TEKTELIC Communications Inc.
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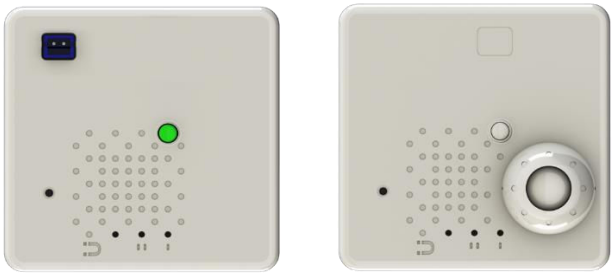
# COMFORT/VIVID
# Smart Room Sensor



## User Guide

| | |
|---|---|
| **DOCUMENT NUMBER:** | T0006338_UG |
| **DOCUMENT VERSION:** | 2.0 |
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| **RELEASE DATE:** | August 6, 2024 |



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# 1 Product Description

## 1.1 Overview

The Comfort/Vivid is a versatile LoRaWAN IoT sensor in a compact form factor, ideal for monitoring and reporting temperature, humidity, light, shock and open/closed doors and windows in an indoor environment. Additional sensing features such as leak and motion detection, as well as counting pulses from an external device, are also supported with the appropriate model. Table 1-1 presents the features available in variants.

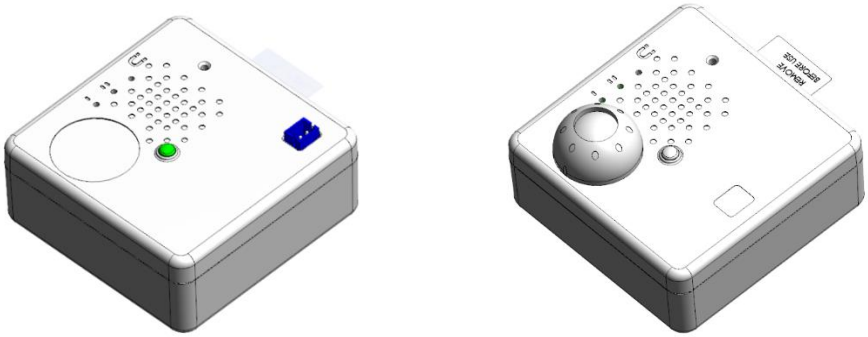
**Table 1-1: Comfort/Vivid Functional Variants**

| Sensor Function | Comfort | Vivid |
|---|---|---|
| Temperature | ✓ | ✓ |
| Relative Humidity | ✓ | ✓ |
| Accelerometer | ✓ | ✓ |
| Light Detection | ✓ | ✓ |
| Human Motion Detection (PIR) | | ✓ |
| Magnetic Switch | ✓ | ✓ |
| External Connection | ✓ | |
| Moisture Detection | ✓ | |

The functions indicated in Table 1-1 are as follows:

- **Temperature & Relative Humidity:** Transducer reports temperature and relative humidity of the local environment.
- **Accelerometer:** Configurable triggers allow the sensor to detect if it has been moved.
- **Light Detection:** Light transducer reports the presence or absence of light using a configurable intensity threshold.
- **Motion Detection (PIR):** A top mounted PIR transducer detects people moving within the sensor's field of view (FoV).
- **Magnetic Switch:** Digital On/Off sensing with an internal magnetic switch.
- **External Connection:** In the digital mode, external contacts connected with a short cable can be monitored for on/off states or used to count events. In the analog mode, a thermistor can be connected for remote temperature sensing.
- **Moisture Detection:** Capacitive transducer mounted in the sensor case detects pooling water under the device for flood or leak detection.

Figure 1-1 illustrates the Comfort/Vivid Sensor functional variants. Both variants share the same external dimensions (42mm x 42mm x 17mm).



**COMFORT** **VIVID**

Figure 1-1: COMFORT/VIVID models.

## 1.2 Physical Interfaces

Figure 1-2 illustrates the customer accessible interfaces for the Comfort/Vivid Sensor. All models share the same layout, though only functional interfaces are exposed in the case of each model. For example, a Base model has been shown in Figure 1-2, which does not have the PIR element (the PIR transducer indicated in the figure is the location for the actual PIR transducer in the PIR variant). Also, the PIR variant does not have the External Connector. Not shown in Figure 1-2, the Base variant has two internal moisture probes for moisture (leak) detection. The PIR variant does not have these probes and does not offer moisture detection.

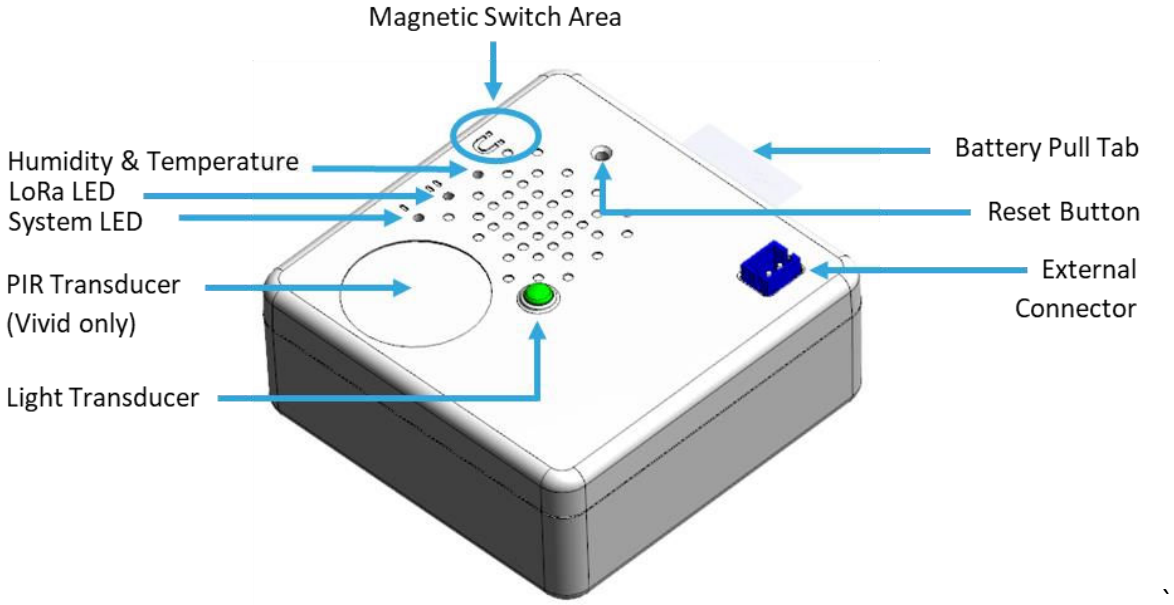



Figure 1-2: The Comfort/Vivid Sensor external interface layout.

## 1.3 Specifications

The Comfort/Vivid Sensor specifications are listed in Table 1-2.

**Table 1-2: Comfort/Vivid Sensor Specifications**

| Parameter | Requirement |
|---|---|
| **Use environment** | IP 3X Indoor commercial/residential only |
| **Operating temperature** | 0°C to 60°C<br>10°C to 40°C for optimal battery life |
| **Storage temperature** | -30°C to 60°C<br>0°C to 30°C for optimal battery life |
| **RH** | 5%–95%, non-condensing |
| **Size** | 42 mm x 42 mm x 17 mm (enclosure)<br>42 mm x 42 mm x 20 mm (with bracket assembly) |
| **Weight** | 25 g |
| **Power source** | CR2477 Battery operated, with FET based reverse polarity protection. |
| **Network technology/Frequency band** | LoRaWAN in the following regions:<br>EU868, US915, AU915, CN470, DN915, AS923, IN865, KR920, DN915, RU864 |
| **Air interface** | LoRa |
| **Lifetime** | > 5 years Base model with the baseline use case[1]<br>> 3.5 years PIR model with the baseline use case |
| **Maximum transmit power** | 14 dBm |
| **Number of indicator LEDs** | 2 (red) |
| **Measurement sensing functions** | Temperature, humidity, light, acceleration, remote temperature sensing |
| **Detection sensing functions** | Moisture, movement, magnetic field, external connector |
| **Temperature measurement accuracy** | < ±0.3°C between 0°C and 5°C<br>±0.2°C between 5°C and 60°C |
| **Humidity measurement accuracy** | < ±4% between 0% and 100%<br>±2% between 20% and 80% |
| **Light sensitivity** | Detection of weak light to typical light conditions (5 lux to 1000 lux)<br>Peak sensitivity at 500 nm |

[1] The baseline use case:
Temperature: 23°C
Tx power: 14 dBm
LoRa SF: 10
Tx periodicity: 4 times/hour for 10 hours and 2 times/hour for 14 hours (= 68 times/day)

| | |
|---|---|
| **Accelerometer sensitivity** | 16 m*g*/LSB, 32 m*g*/LSB, 64 m*g*/LSB, 192 m*g*/LSB corresponding to measurement ranges of $\pm 2$ *g*, $\pm 4$ *g*, $\pm 8$ *g*, $\pm 16$ *g* |
| **Moisture detection** | Capacitive moisture detection<br>Range: ~ 0 mm from bottom surface of sensor case |
| **Motion detection** | Pyroelectric infrared sensor, four-element<br>Two lens type options:<br>○ Ceiling mount<br>• X-angle: 86°<br>• Y-angle: 74°<br>• Height: 2.67 m<br>○ Wall mount<br>• X-angle: 94°<br>• Y-angle: 20°<br>• Z-range: 4 m |
| **Magnetic switch actuation distance** | Operating range: 5-15 AT<br>Requires about 10 gauss at edge of sensor to activate<br>Actuation distance at least 15 mm |
| **External Connection** | Designed to connect to an open-drain output 1.8 V compliant input with pull-up<br>Input pulse frequency <= 20 Hz |
| **Remote Temperature Sense** | A remote temperature probe (thermistor)—recommended 10-kΩ—can be connected to External Connector<br>Measurement range:<br>-55°C–125°C (CWF3AA103G3380)<br>-25°C–105°C (NTCAIMME3) |

# 2 Installation

## 2.1 Included Product and Installation Material

The following items are included with each sensor:

- Comfort/Vivid Sensor
- Mounting Bracket Kit

**NOTE:** to ensure safe installation and maintenance, please read Safety Precautions.

## 2.2 Unpacking and Inspection

The following should be considered during the unpacking of a new Comfort/Vivid Sensor:

1. Inspect the shipping carton and report any significant damage to TEKTELIC.
2. Unpacking should be conducted in a clean and dry location.
3. Do not discard the shipping box or inserts as they will be required if a unit is returned for repair or re-configuration.

## 2.3 Commissioning

Each sensor has a set of commissioning information that must be entered into the network server for the sensor to be able to join the network and begin normal operation once activated. For instructions on how to do this please refer to the Network Server Quick Start Guide you get in the box with the device (also available online in the Knowledge Base).

You can find the commissioning keys inside the box. If you don't have the box, raise a ticket in our support portal and provide the Tcode and serial number on the tag placed on the device.

**Figure 2-1: Comfort/Vivid Commissioning Keys**

## 2.4 Power Up/Down Procedure

Once the sensor information has been added to the Network Server, pull out the battery tab to engage the battery.

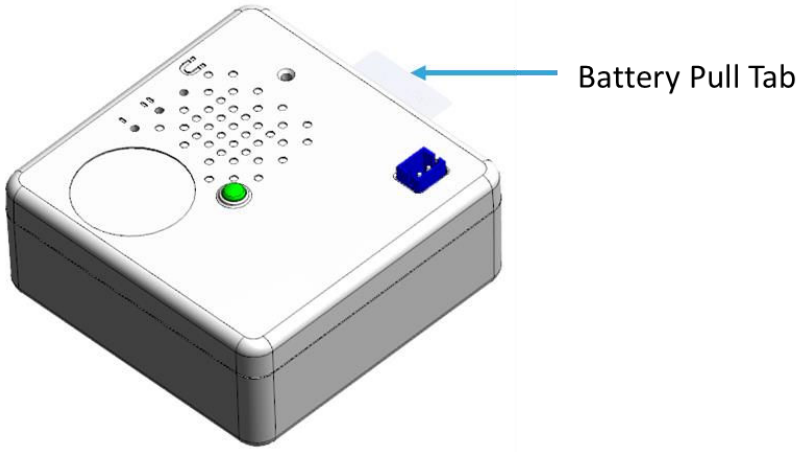



Figure 2-2: Battery Pull-Tabs

To turn off the device remove the battery, but to simply reset the device, the external reset button can be pushed. Refer to Section Battery Replacement for instructions on battery removal.

## 2.5 Default Configuration

The default configurations of Sensors are:

Table 2-1: Default Reporting Periods

| Reported Data | Comfort v2 | Vivid v2 |
|---|---|---|
| Battery Data | 1 hour | 1 hour |
| Ambient Temperature | 1 hour | 1 hour |
| Relative Humidity | 1 hour | 1 hour |
| Magnetic Switch | Every actuation | Every actuation |
| Digital input (i.e. External Connector in the digital mode) | Every actuation | Disabled |
| PIR status | Disabled | When PIR first detects motion<br>When PIR has stopped detecting motion for more than five minutes |

## 2.6 Reconfiguration

The Comfort/Vivid Sensors support a full range of OTA configuration options. Specific technical details are available in the corresponding TRM document. All configuration commands need to be sent OTA during the sensor's DL Rx windows.

## 2.7 Comfort/Vivid Sensor Mounting

Comfort/Vivid Sensor is designed to be mounted using the supplied mounting bracket. The bracket can be attached using screws (not included) or double-sided tape (included).

## 2.8 External Connector Cable Installation

The Comfort/Vivid Sensor with external connection installation requires connection to an external device trough the 2-pin connector on the top of the sensor.

Figure 2-3 shows the external connector pinout. In the digital mode, the connector can be attached to an open-drain output; however, the signal line can also be driven with digital signals at 1.8 V logic levels. In the analog mode, the two pins of the External Connector are polarity agnostic, and are connected to a thermistor.

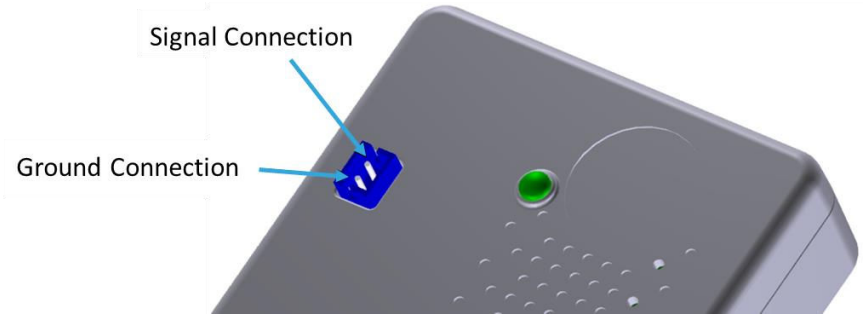



**Figure 2-3: The Comfort/Vivid Sensor external connector signals.**

In the digital or analog mode, the connection cable MUST be routed through a cable clip shown in Figure 2-4. The cable clip is not provided with the module. The clip Essentra MWSB-1-01A-RT is recommended for this usage. Routing the connected external cable through the cable clip leads to the best EMI performance of the Sensor. The cable length in any mode MUST NOT exceed 3 meters. Also ensure that the cable connection is not routed outdoors.

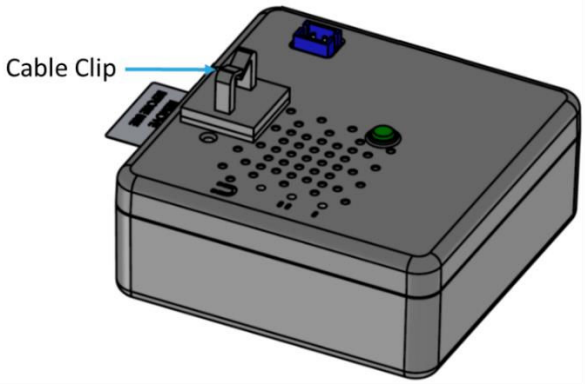



**Figure 2-4: The cable clip to be attached to the Base model as shown**

## 2.9 LED Behaviour

See Figure 2-5 for the location of the sensor LEDs described in Table 2-2.

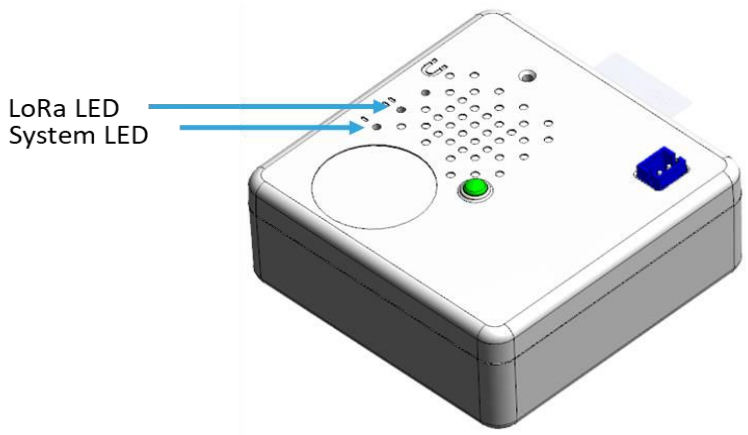



**Figure 2-5: The Comfort/Vivid Sensor external connector signals.**

**Table 2-2: LED Behavior**

| Step | LED Behavior | Meaning |
|---|---|---|
| Power On | Both LEDs briefly on | Power applied |
| | LEDs turn off | |
| | One LED blinks briefly | |
| After Boot Pattern | System LED blinks | All health checks passed |
| | LoRa LED blinks | One health check failed. Consider battery replacement or moving to suitable temperature environment |
| Join Procedure | System LED blinks continuously | Sensor joining network |
| | LoRa LED blinks | LoRa activity on sensor (transmitting or receiving packets, including join request packets) |
| Normal Operation | LoRa LED blinks | LoRa activity on sensor (transmitting or receiving packets) |
| | Any other LED pattern | Low battery |

**NOTE:** If steps 1-2 repeat continuously, the battery no longer has enough charge to power the join procedure.

# 3 Operation, Alarms, and Management

## 3.1 Temperature and Relative Humidity Transducer

The Comfort/Vivid contain a temperature and relative humidity (RH) transducer. Vents on the enclosure allow air to contact the transducer. Response time can be reduced by forcing air to move over the vent as in Figure 3-1.

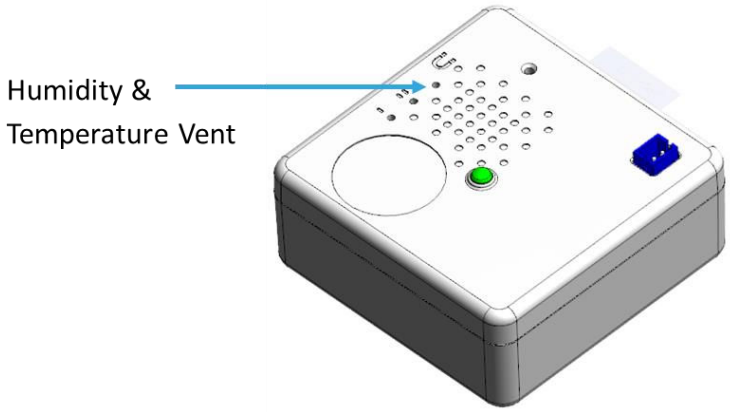



**Figure 3-1: Humidity vents**

The Comfort/Vivid support reporting ambient temperature, MCU temperature and RH values on a user-defined threshold basis. Alarm points can be set individually for ambient temperature, RH, and MCU temperature. The frequency of measurements is user configurable with different sample rates if the measured value is within the normal operating window (see Section 2.5).

## 3.2 Acceleration Transducer

The Comfort/Vivid features a 6-axis accelerometer for acceleration sensing, which can be turned off to save power. It supports two interrupt-based accelerometer events, both with configurable thresholds:

1. **Acceleration Event**: Triggered by exceeding an acceleration threshold. The accelerometer is disabled for a set debounce time to prevent multiple reports for a single event.
2. **Impact Alarm Event**: Activated when an impact alarm threshold is surpassed a configurable number of times within a set period. The alarm clears after a grace period with no impacts.

Both acceleration and impact alarm functions can be toggled independently.

- Accelerometer readings can be in X-Y-Z vector or magnitude form.
- Axes (X, Y, Z) can be enabled or disabled independently; disabled axes output zero.

- Sampling rate is adjustable (possible options: 1 Hz, 10 Hz, 25 Hz, 50 Hz, 100 Hz, 200 Hz, or 400 Hz). Higher rates detect shorter events but drain battery faster. Default is 1 Hz.

**NOTE**: Higher sample rates enable the detection of shorter acceleration events but consume more battery power.

## 3.3 Ambient Light Transducer

The Comfort/Vivid Sensor models feature an ambient light sensor located on the top surface, measuring light intensity through a light pipe.

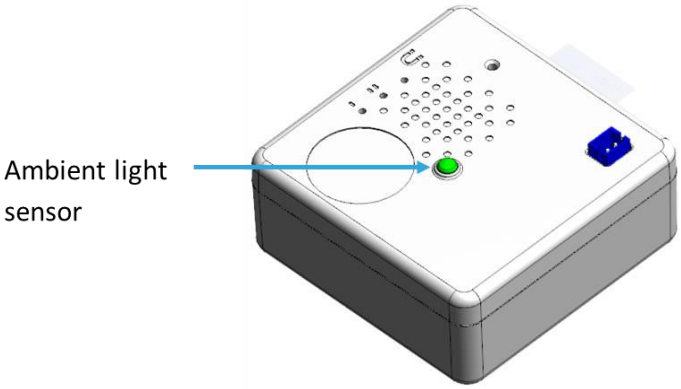



**Figure 3-2: Ambient light sensor**

Ambient light sensor can report both light intensity (periodically) and light status (dark or bright) based on a configurable threshold:

- **Light Measurement**: Sensitive to human visible light, peak sensitivity at 550 nm. Sensing range: 5 lux to 1000 lux.
- **Threshold Adjustment**: Light threshold is adjustable from 1 to 63. If light status (dark/bright) doesn't match detected intensity, an event is reported. This event reporting can be enabled or disabled.

**NOTE**: Higher sample rates increase battery consumption. Testing is required to determine the optimal trigger point for the application.

## 3.4 Motion Detection (PIR) Transducer

The Vivid Sensor PIR model contains a Motion Detector. The Motion Detection Transducer contains PIR elements and is configured to sense human motion within its field of view (FoV).

The transducer has three available options of Fresnel lenses described in Table 3-1.

Table 3-1: Vivid Sensor Lens Options

| Lens View | Description |
|---|---|
|  | **Wide range for ceiling-mount:** designed to cover the whole room (standard) |
|  | **Wide range for wall-mount:** designed to cover smaller room, with no opportunity for ceiling-mount or more localized area monitoring |
|  | **Low range:** designed for more precise area/object monitoring (for example mounting under desk to monitor employee presence on the work place) |

Wide range lens ceiling mount provides the widest sense range for a ceiling height of 2.7 m is a rectangular area of 5 m x 4 m.

**NOTE**: Avoid exposing the PIR lens to strong UV light such as direct sunlight. Do not paint the surface of the lens or attempt to clean it. Any deformation of the lens will distort the sense pattern.

To be most effective at detecting motion, the subject must move across sensor element beams. The Vivid Sensor should be mounted so that the subjects move across its FoV and not towards or away from the Sensor.

## 3.5 Magnetic Switch

The Comfort/Vivid sensors contain a magnetic switch. The location of the switch is shown in Figure 3-3.

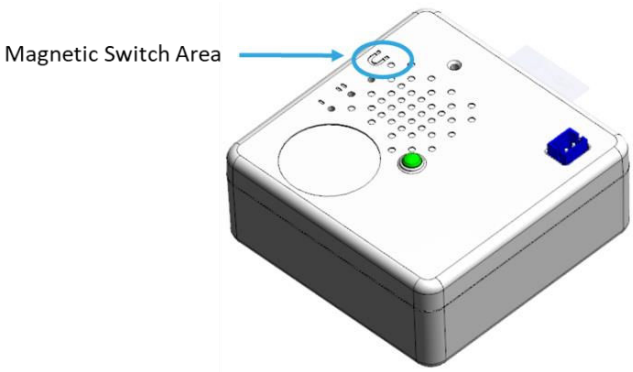



Figure 3-3: Magnetic switch

The Comfort/Vivid Sensor can be configured to activate based on the state of this switch and to report after a user-configurable count of switch events. To activate the switch, a magnetic field of about 10 gauss (1 milli-tesla) must be applied to the edge of Sensor.

**NOTE:** A magnet required to activate the switch is not provided in the box. Standex-Meder M4, M5 or M13 magnets are suggested but any magnet of sufficient strength can be used.

The switch function can be configured to sense open to close events, close to open events or both types of events. For example, if the Sensor is being used for sensing access to a door and is set to read both event types, it will record an event each time the door is opened and each time it is closed. The reporting of these events can be set by the customer to report after a number of events has occurred. If it is set to 0, no events are reported. If it is set to 1, it reports after each event.[2]

## 3.6 External Connection

The Comfort contains an External Connector, which has two modes, digital and analog. In the digital mode, the internal, control, and reporting interfaces of the External Connector are similar to, but independent from, the Magnetic Switch in the Base model. See Section 2.5 for a description of the event function configuration and reporting count feature, which are similar to those of External Connector.

In the digital mode, the External Connector electrical interface is designed to be connected to an open-drain output; however, the signal line can also be driven with digital signals at 1.8 V logic levels.

In the analog mode, the External Connector is connected to a 10-kΩ thermistor (recommended CWF3AA103G3380 or NTCAIMME3) for remote temperature sensing. The Sensor in this mode of the External Connector reports voltages in mV, which can then be converted to temperatures. The conversion formula (voltage to temperature) can be obtained in one of the following ways:

1. Calibrating Thermistor and Performing Curve Fitting:
   A number of voltage-temperature pairs can be obtained for a given thermistor, then the following curve fitting formula can be used:

[2] Input pulse frequency must be less than 20 Hz (for both Reed Switch and External Connector).

$$T = \frac{-B}{\ln\left(\frac{a}{V} - b\right)} - 273.15$$

where *T* is in °C and *V* is in mV, and where *B* is the B-value of the thermistor (e.g. 3380 K for CWF3AA103G3380 or 3984 K for NTCAIMME3), to obtain the best *a* and *b* based on a desired criterion, e.g. MMSE (minimum mean square error) or minmax criterion.
For example, for CWF3AA103G3380 and NTCAIMME3, using the MMSE criterion, the conversion formulas

$$T = \frac{-3380}{\ln\left(\frac{0.00314}{V} - 0.0000018\right)} - 273.15$$

and

$$T = \frac{-3984}{\ln\left(\frac{0.000416}{V} - 0.00000024\right)} - 273.15$$

are obtained, respectively.

2. Quick and Approximate Conversion Formula:
   Another easier, though less accurate, way to quickly characterize any NTC (negative temperature coefficient) thermistor is to use the following conversion formula:

$$T = \frac{-B}{\ln\left(\frac{26.43}{V} - \frac{1}{68.1}\right) + \ln\left(R_0\right) - \frac{B}{T_0}} - 273.15$$

   Where *T* is in °C and *V* is in mV, and where *B* is the B-value of the thermistor, and $R_0$ is the reference resistance, in *k*Ω, of the thermistor at the reference temperature $T_0$, in *K*. For example, for CWF3AA103G3380, $B = 3380$, $R_0 = 10$ and $T_0 = 273.15 + 25 = 298.15$.

3. Steinhart–Hart Equation:
   In this method the temperature of the thermistor, in K, is given as:

$$\frac{1}{T} = A + B\ln\left(\frac{R}{R_0}\right) + C\ln^2\left(\frac{R}{R_0}\right) + D\ln^3\left(\frac{R}{R_0}\right)$$

   where $R_0$ is the reference resistance, in *k*Ω, of the thermistor (e.g. 10 *k*Ω), and where *R* is the thermistor resistance at temperature *T*, which can be obtained as

$$R = \frac{68.1 \times V}{1800 - V}$$

   where *V* is the reported voltage from the sensor in mV.

Coefficients A, B, C, D are usually given by the thermistor manufacturer. If not given, the coefficients can be determined by measuring 4 voltage-temperature pairs from the thermistor, and forming 4 linear equations with 4 unknowns (i.e. A, B, C, D).

The physical connector and its mating connector of the External Connector are listed in Table 3-2. The Comfort/Vivid Sensor is not supplied with an external connection jumper cable. The link in Table 3-2 is a suggested cable. It is the customer's responsibility to modify the cable harness for their application.

Should an external cable be connected to the External Connector, the external cable MUST be routed through a cable clip, characterized in Section 2.8, and the cable length MUST NOT exceed 3 meters. See Section 2.8 for the connector pin assignment and cable installation.

**Table 3-2: Comfort/Vivid Sensor Interface Connector Types**

| Interface | Sensor Connector | Mating Jumper Cable (300mm) |
|---|---|---|
| External Connector | JST B2B-ZR(LF)(SN) | JST A02ZR02ZR28H305B |

## 3.7 Moisture Detection Transducer

The Comfort model contains a Moisture Detector. The Moisture Detection Transducer is built into the bottom surface of device (screw side). The moisture is detected once the bottom surface gets moist. The transducer is sensitive materials in the sensing region so the trigger set point for reporting the presence of water must be calibrated for each application. This transducer can also be used to sense liquids other than water or skin. The customer must evaluate each application and configure the trigger point as required.

A calibration command can be sent to the Sensor to set a "dry" condition. The alarm point can also be set directly as a value. Sample period for moisture detection can be set to one of 4 values: 16, 32, 64, or 128 seconds. Smaller sample periods (faster sampling) use more energy and shortens battery life. The default sample period is 32 seconds.

# 4 Battery Replacement

The Comfort/Vivid Sensor is powered by a standard CR2477 coin cell.

**Warning**

**The Kona Comfort/Vivid Sensor contains a coin cell battery.**

**Do not ingest battery, Chemical Burn Hazard.**

**If a battery is swallowed, it can cause severe internal burns in just 2 hours and can lead to death.**

**Keep new and used batteries away from children.**

**If the battery compartment does not close securely, stop using the product and keep it away from children.**

**If you think batteries might have been swallowed or placed inside any part of the body, seek immediate medical attention.**

Use only approved CR2477 cells when replacing the battery. The following are approved replacement cells:

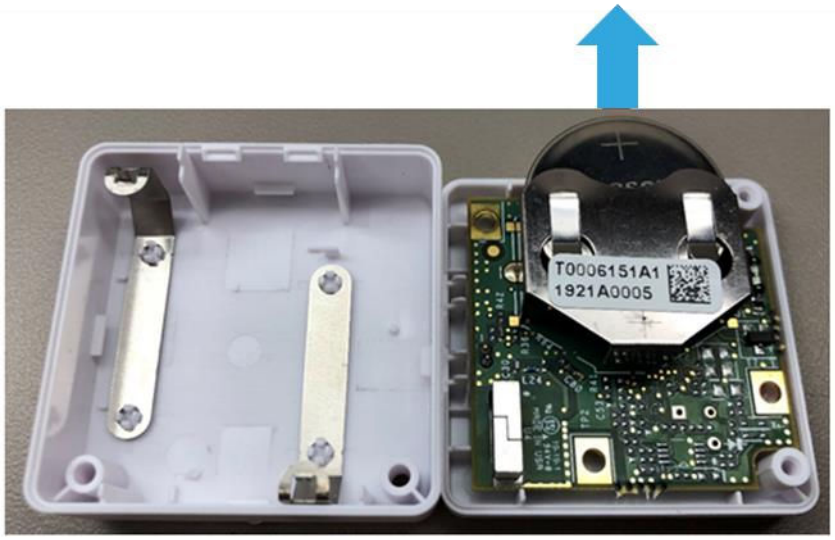
- Panasonic (model CR2477)
- Sony (model CR2477)
- EVE Energy (model CR2477)
- Jauch (model CR2477)

In order to access the battery, remove the two screws securing the case. The screws are accessible on the bottom of the sensor case and require a Phillips screwdriver PH1:

- Remove the two screws on the bottom of the case.
- While holding the sensor with the bottom facing up, remove the bottom of the case by gently prying the case apart.

- With the bottom removed, the coin cell holder is accessible.


- Remove the coin cell from the holder by gently pushing the cell a little outwards (e.g. by a small screwdriver), then taking the cell from the other end and pulling it out as indicated in the image below:




- Place the new cell in the holder. The top of the coin cell is marked with a + symbol indicating the positive terminal. This positive terminal must face up when replacing the cell. Push the cell into the holder until it hits the closed end of the holder.
- Check for LED activity. If the LEDs are lit, the battery replacement was successful.
- Replace the sensor cover and insert the two screws.

# 5 Basic Downlinks

COMFORT/VIVID use a "tick" system for reporting data. Generally, the sensor will report most important data every tick. A tick can be measured in seconds.

There are two sets of settings that must be configured in conjunction - "Core reporting tick in seconds" and "Ticks per [data/report]".

"Core reporting tick in seconds" will determine the interval between ticks. For example, you may set it to 60 seconds or 180 seconds (3 minutes) for each tick.

"Ticks per [data/report]" determines how many ticks it will take before the sensor reports any data. For example, if you set "Ticks per Battery report" to 2, it will take 2 ticks before the sensor reports battery data.

**To Change The Core Report To Every Minute**

With LeapX application (you can get it on Google Play or App Store): write number 1 in the field minutes between reports, then click on save changes.

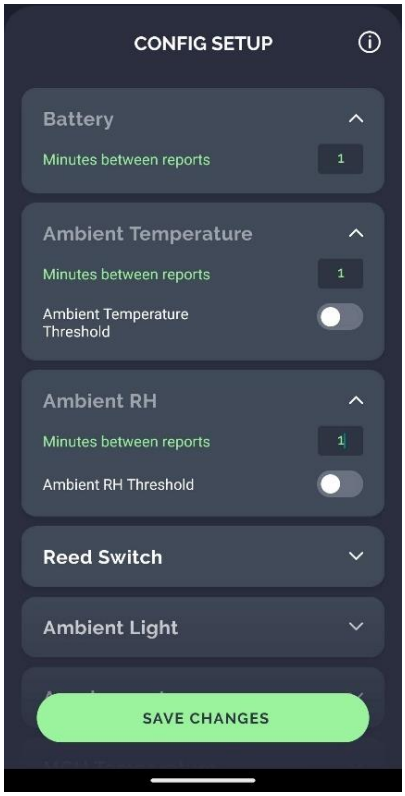



Figure 5-1: LeapX application

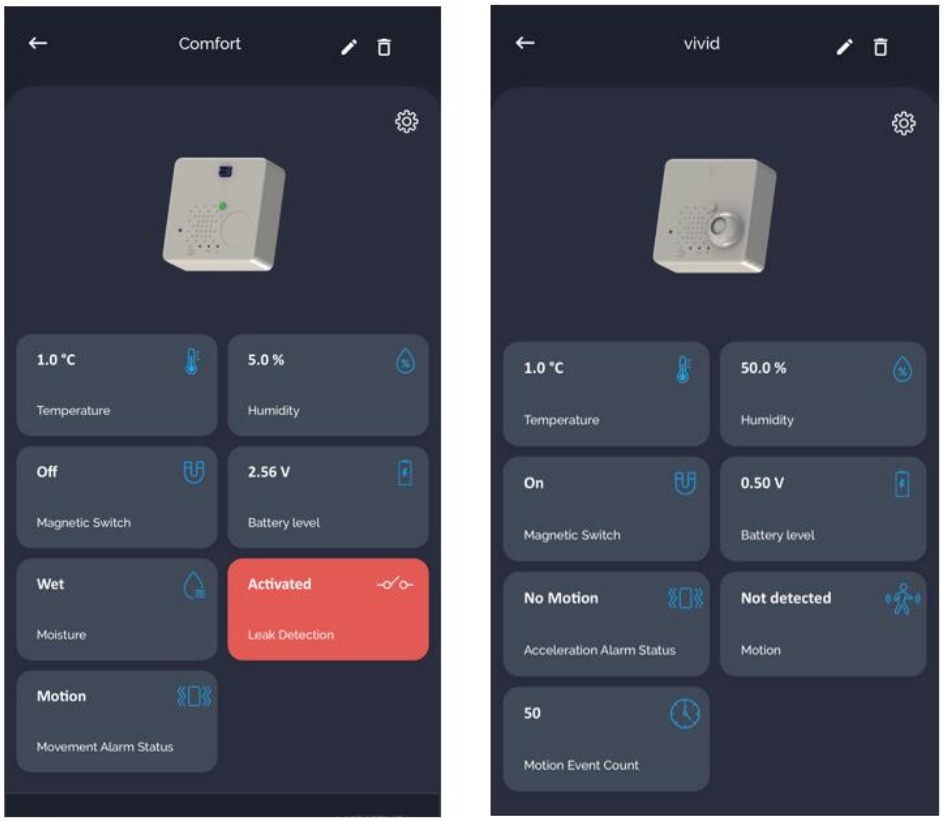



**Figure 5-2: LeapX report**

With ATLAS: check the box for Core report tick in seconds and ticks between ambient temperature reports. Write the values shown in the Figure 5-3 and click send.

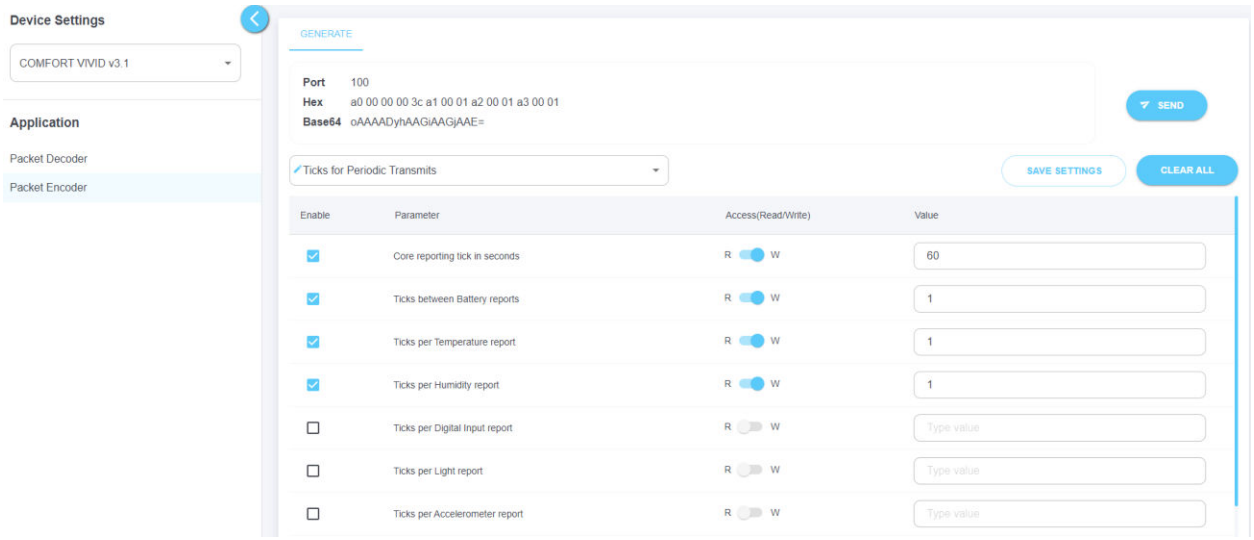



**Figure 5-3: ATLAS**

**Examples Of Uplinks**

Example 1


```
"data": {
"raw": "03 67 00 E1 04 68 4D 00 BA 0B 9E",
"fPort": 10,
"ambient_temperature": "22.5",
"relative_humidity": "38.5",
"battery_voltage": "2.974" },
```

# 6 Device Configuration with ATLAS

To perform more configuration or read the data of TUNDRA device you can use TEKTELIC's complementary service, ATLAS at www.atlas.tektelic.com.

There are two ways to access ATLAS:

1) Using in Offline mode

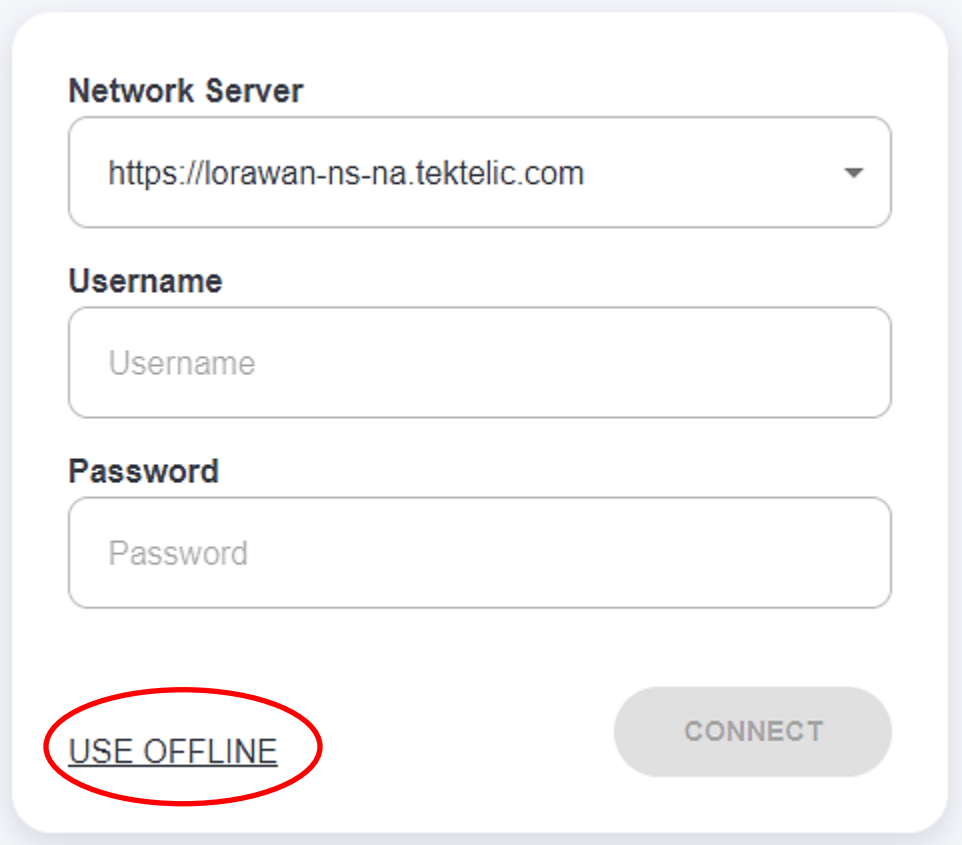



Figure 6-1 : Login as offline mode

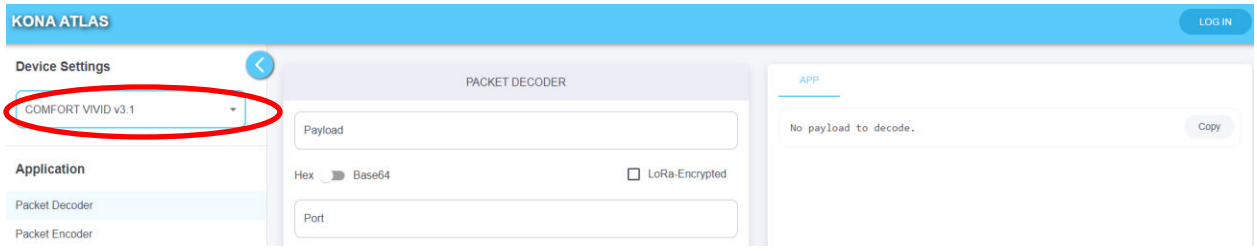



Figure 6-2: Select TUNDRA decoder

2) with your TEKTELIC Network Server Credentials

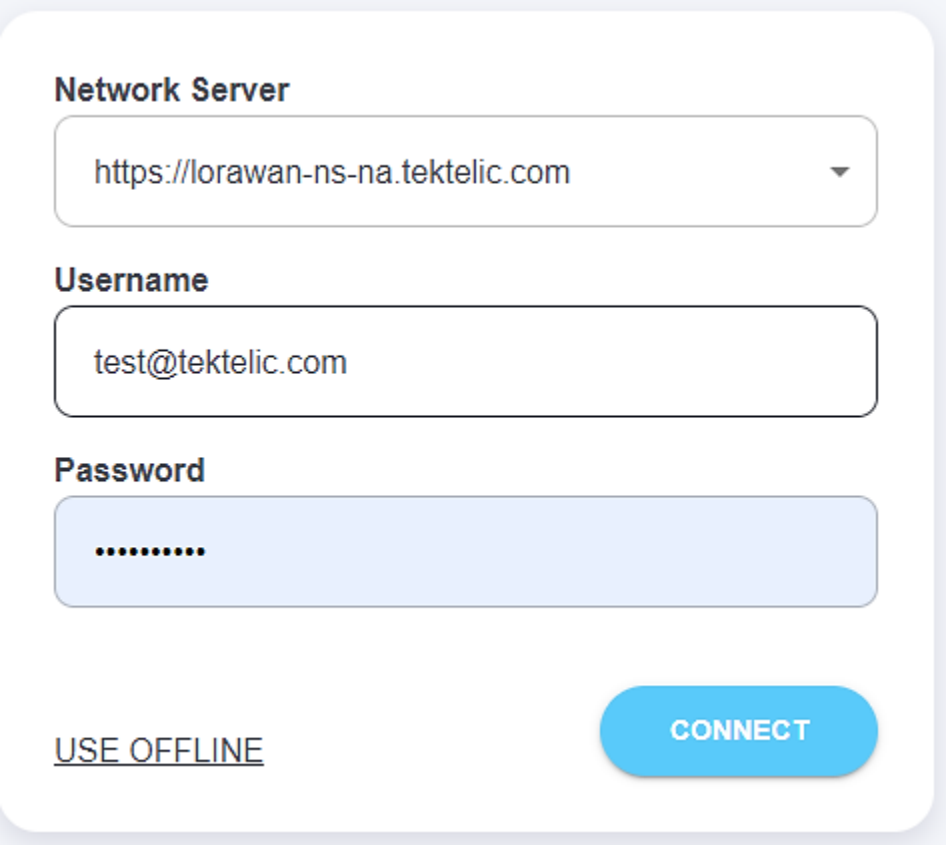



Figure 6-3: Login with Network server credentials

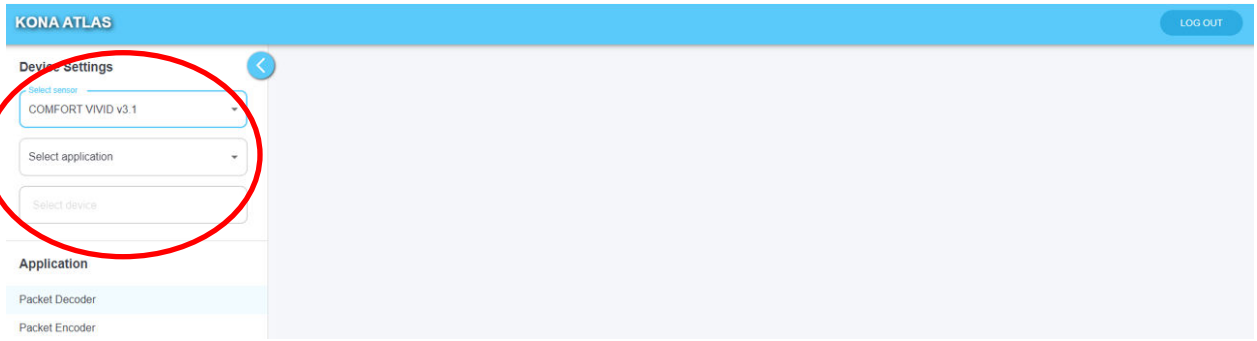



Figure 6-4: Select COMFORT VIVID V3.1 Decoder, application and the device

For more information follow this link https://knowledgehub.tektelic.com/kona-atlas

# 7 Data converters

Please follow this link: https://github.com/TektelicCommunications/data-converters/tree/master for the data converters that are to be used on TEKTELIC & other Network Server for TEKTELIC Sensors. These data converters can be used as a reference for other platforms.

TEKTELIC's data converters conform to the LoRa Alliance Payload Codec Specification and can be used with any 3rd party Network Server / Application Server that supports this specification.

https://resources.lora-alliance.org/technical-specifications/ts013-1-0-0-payload-codec-api

# 8 Compliance Statements & Safety Precautions

## 8.1 Safety Precautions

The following safety precautions should be observed:

- The Comfort/Vivid Sensor is intended for indoor use only.
- The Comfort/Vivid Sensor contains a lithium coin cell battery.
- **Do not ingest battery, Chemical Burn Hazard.**
- **If a battery is swallowed, it can cause severe internal burns in just 2 hours and can lead to death.**
- **Keep new and used batteries away from children.**
- **If the battery compartment does not close securely, stop using the product and keep it away from children.**
- **If you think batteries might have been swallowed or placed inside any part of the body, seek immediate medical attention.**
- To reduce risk of fire, explosion or chemical burns: replace only with approved 3 V CR2477 coin batteries; DO NOT recharge, disassemble, heat above 100°C (212°F) or incinerate battery.
- The Comfort/Vivid Sensor requires an external magnet for use with the internal magnetic switch.
- Keep magnets away from all children. Small magnets can pose a serious choking hazard. If multiple magnets are swallowed, immediately seek medical attention.

## 8.2 Compliance Statements

***Federal Communications Commission:***

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.

To comply with FCC exposure limits for general population / uncontrolled exposure, this device should be installed at a distance of 20 cm from all persons and must not be co-located or operating in conjunction with any other transmitter.

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

***Innovation, Science and Economic Development Canada:***

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference.
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

This device should be installed and operated with minimum distance 0.2 m from human body.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique 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.
(2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Cet appareil doit être installé et utilise à une distance minimale de 0.2 m du corps humain.

***California Proposition 65:***

⚠ **WARNING:** This product can expose you to chemicals including lead, nickel & carbon black, which are known to the State of California to cause cancer, birth defects or other reproductive harm. For more information, go to www.p65warnings.ca.gov.

## Revision History

| Revision | Issue Date | Editor | Comments |
|---|---|---|---|
| 0.1 | Jun 12, 2019 | Emma Tholl | Initial Draft. |
| 0.2 | Jun 17, 2019 | Emma Tholl | Added region info, made corrections. |
| 0.3 | Aug 7, 2019 | Shawn Morrison | Updated battery warning statements. |
| 0.4 | Aug 15, 2019 | Maheeka Wijesinghe | Added P65 warning. |
| 1.0 | Jul 30, 2019 | Reza Nikjah | • Release for NA and DN certification:<br>• Updated for cable clip in Base model.<br>• Updated for digital and analog modes of External Connector.<br>• Updated for battery type.<br>• Updated for maximum output power.<br>• Updated for Light Transducer operation.<br>• Updated for Accelerometer operation.<br>• Updated for PIR sense pattern for ceiling-mount and wall-mount lenses. |
| 1.1 | Aug 13, 2019 | Reza Nikjah | Compliance statements for Industry Canada were updated and also given in French. |
| 1.2 | Aug 14, 2019 | Reza Nikjah | Added to compliance statements. |
| 1.3 | Oct 16, 2019 | Reza Nikjah | • Added EU and CN regional variants<br>• Added more information about the cable clip attached on Base models. |
| 1.4 | Nov 7, 2019 | Reza Nikjah | • Updated based on internal reviews.<br>• Included missing info from versions 0.3 and 0.4.<br>• Updated the document format. |
| 1.5 | February 25, 2020 | Carter Mudryk | Updated LED Behaviour section to include typical dead battery behaviour. |
| 2.0 | August 6, 2024 | Marharyta Yuzefovych | User friendly format |