



# IECEx Temperature Sensor **SAFETY MANUAL**



# MONNIT<sup>®</sup>

Remote Monitoring for Business



# Temperature Sensor Safety Instructions

## General Description

It is of the utmost importance that qualified personnel, as defined below, read the following safety instructions before installing, operating, servicing, maintaining, and decommissioning the IECEx-certified Monnit ALTA<sup>®</sup> Temperature Sensor MNS2-f-W2S-TS-ST-L03, where ‘f’ is a wildcard for: 9 – 900 MHz, 8 – 868 MHz, 4 – 433 MHz, and 94 – 940 MHz (“Temperature Sensor” or “Sensor”).

Failure to do so and meet the requirements set forth herein can result in death and serious injury to one or even many individuals, and can result in significant property damage. These safety instructions must be kept on file and always referred to when engaging in activity related to the Temperature Sensor.

Throughout the body of these safety instructions, the following warning messages may appear to call attention to particular risks, without diminishing the importance, risks, and dangers addressed in other portions of these instructions.

These safety instructions are also available for reference at [www.monnit.com](http://www.monnit.com).

### **WARNING**

There are one or more relevant hazardous situations, which, if not avoided, **could possibly result in death or serious injury.**

### **CAUTION**

There are one or more relevant hazardous situations, which, if not avoided **could result** in minor to moderate injury.

## 1. Product Information

The IECEx-certified ALTA Temperature Sensor has been manufactured in accordance with IEC 60079-0 (2017) and IEC 60079-11 (2011).

The Temperature Sensor has a thermistor disposed within a temperature lead/probe. The housing of the Sensor comprises a base and a lid made of black ABS plastic that are sealed together with four steel screws coated in black phosphate. Additionally, the Sensor is battery-powered and has a single AA-battery coffin for receipt of a single **AA RAMWAY ER14505M lithium / thionyl chloride battery**.

Apart from the battery coffin, the circuitry for the Temperature Sensor resides on the underside of the circuit board and within a protective epoxy encapsulant surrounded by the Sensor's housing. The circuitry includes a radio module within the protective, safety encapsulant with an antenna attached and extending out of the encapsulant and the surrounding housing.

The radio module transmits at the following maximum Equivalent, Isometric Radiated Powers for the corresponding frequencies: 50 mW at 900 MHz and 940 MHz; 25 mW at 868 MHz; and 10 mW at 433 MHz, which are well under the threshold power of 6W for Group IIA gases.

The Sensor is supplied with a single **AA RAMWAY ER14505M battery** with a capacity of approximately 2,200 mAh. The AA RAMWAY ER14505M battery is compliant with: (1) Clause 23.2 of IEC 60079-0: 2011 and EN 60079-0: 2012; (2) Clauses 10.4, 10.5.2, 10.5.a, and 10.5.3b of IEC 60079-11 2011 and EN 60079-11: 2012; and (3) Clauses 5 through 9 of EN-60086-4: 2015. As long as the integrity of the battery is maintained, the battery is self-contained and non-reactive. However, care should be taken to prevent thermal, electrical, or mechanical damage, and battery contacts should be protected to prevent premature discharge.

Even when the cell is discharged, the battery may present a hazard. The battery should be stored in a clean, dry environment not to exceed 303°K (30°C), when not in active use within the Sensor.



TOP VIEW



FRONT VIEW



ISOMETRIC VIEW

## **WARNINGS**

The Temperature Sensor **MUST USE** and **MUST ONLY** use a single **AA RAMWAY ER14505M lithium / thionyl chloride battery**. The Sensor has **ONLY** been certified for use with a single AA RAMWAY ER14505M battery. Use of ANY other battery, or modification of the Sensor to use multiple batteries, and other power source(s) **MAY** result in sparking and thermal events that could lead to ignition and explosion in the environments for which the Temperature Sensor has been otherwise designed to be deployed. Furthermore, use of a single AA RAMWAY ER14505M battery that has been thermally, electrically, or mechanically compromised may also lead to ignition and explosions. As discussed below, the single AA RAMWAY ER14505M lithium/thionyl chloride battery **MUST ONLY be inserted in and removed** from the battery coffin of the Temperature Sensor **outside of any hazardous location** and in an area free of potentially explosive dust or gases.

DO NOT attempt to recharge the RAMWAY ER14505M battery. DO NOT incinerate the battery, place it near heating equipment, expose it to direct sunlight for long periods, or subject the RAMWAY ER14505M battery to temperatures in excess of 343°K (70°C). DO NOT short circuit the RAMWAY ER14505M. DO NOT drop, crush, or puncture the battery. DO NOT immerse the battery in liquids. DO NOT install the RAMWAY ER14505M battery with an incorrect polarity. The battery coffin of the Temperature Sensor has a raised plus sign and a raised negative sign to indicate correct polarity.

The temperature lead/probe and antenna of the Temperature Sensor **MUST NOT** be deployed in any location where voltage and current may be injected on any exposed wires arising from accidental melting of insulation, severing, cutting, or cap removal of the antenna.

While the tip / bullet covering the temperature lead/probe may be exposed to process temperatures ranging from 233°K to 393°K (-40°C to +120°C), in order to measure such temperatures, the housing of the Temperature Sensor must be maintained within an ambient temperature between 253°K to 313°K (-20°C to 40°C).

## 2. Markings

The Temperature Sensor is a product of Monnit® Corporation. All maintenance and repair questions should be addressed to Monnit's customer service department at 1-801-561-5555. If customer service indicates it to be necessary, products can be shipped to Monnit for repair and maintenance at 3400 South West Temple, South Salt Lake, UT 84115, USA.

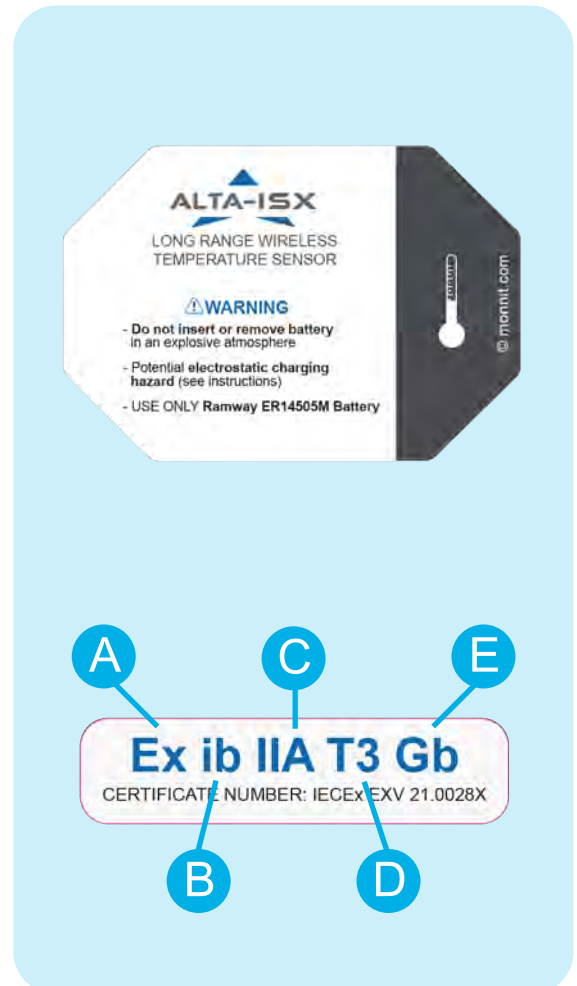
Mockups of the labeling on the Temperature Sensor are shown to the right.

The Temperature Sensor is marked **Ex ib IIA T3 Gb**.

- A) The first marking, '**Ex**,' indicates that the Temperature Sensor is ex-rated equipment.
- B) The next marking, '**ib**,' identifies a protection method of intrinsic safety with a level of protection appropriate for deployment in IECEx Zone 1 areas.
- C) The third marking, '**IIA**,' indicates the group of gases to which the Temperature Sensor may be exposed from time to time, such as propane.
- D) The '**T3**' marking is the temperature class and means that the hottest surface temperature on the Temperature Sensor will be below 473°K (200°C), when the Temperature Sensor is used at an ambient temperature of 313°K (40°C).
- E) The '**Gb**' indicates the Equipment Protection Level of the Temperature Sensor and that it is gas explosion protected for the specific conditions indicated by the other markings.

The 'X' following the Certification number indicates the necessity of following specific conditions of use set forth below in section 4, titled Specific Conditions of Use, and are referred to on the lid label with the three warnings.

- **Do not insert or remove battery** in an explosive atmosphere.
- Potential **electrostatic charging hazard** (see instructions).
- USE ONLY a single **AA RAMWAY ER14505M lithium / thionyl chloride battery**.



### 3. Installation, Operation, Servicing, Maintenance, and Decommissioning

In preparing the Temperature Sensor for installation, mounting, and maintaining, the following instructions and requirements **MUST** be followed.

#### **WARNINGS**

The Temperature Sensor must only be installed, operated, serviced, maintained, and decommissioned by qualified personnel. All qualified personnel involved in the aforementioned activities must meet the following requirements.

- (1) All qualified personnel involved in any of the foregoing activities must also first familiarize themselves with the Temperature Sensor, its functionality, and components before attempting to engage in any such activities.
- (2) All qualified personnel must be trained in hazardous locations and explosion protection generally.
- (3) All qualified personnel must be trained in the meaning of and appropriate safety precautions for: IECEx Zone 1; intrinsic safety and ib level intrinsic safety; group IIA gases; temperature classifications and the T3 temperature classification; and, protection in areas exposed to potentially explosive gases.
- (4) All qualified personnel must be familiar with and observe the conditions of use set forth in the Specific Conditions of Use herein below.
- (5) All qualified personnel must be familiar with and adhere to the requirements in IEC 60079-14 pertaining to installation in hazardous areas and must be familiar with and adhere to the requirements in IEC 60079-17 pertaining to inspection and maintenance in hazardous areas.
- (6) All qualified personnel must be familiar with and adhere to the relevant laws, regulations, and or other rules promulgated by any legal authorities with jurisdiction where the Temperature Sensor is to be installed, operated, serviced, maintained, and decommissioned.

The Temperature Sensor must be installed, operated, serviced, maintained, and decommissioned in accordance with the following standards, instructions, and requirements.

- (1) The Temperature Sensor must be installed, operated, serviced, maintained, and decommissioned in accordance with IEC 60079-14 and IEC 60079-17.
- (2) The Temperature Sensor must be installed, operated, serviced, maintained, and decommissioned in accordance with relevant laws, regulations, and other rules promulgated by any legal authorities with jurisdiction where the Temperature Sensor is to be installed, operated, serviced, maintained, and decommissioned.
- (3) The Temperature Sensor must be installed, operated, serviced, maintained, and decommissioned in accordance with ALL instructions, guidance, conditions, and requirements appearing in these safety instructions herein below.

#### **ONSITE ASSEMBLING**

Whenever the Temperature Sensor is located where an explosive atmosphere of gas or dust is, or may potentially be, present, **DO NOT touch** the surface of the Temperature Sensor **without first wiping it down with a wet rag** to prevent electrostatic discharge. Such electrostatic discharge events result in sparks that can cause ignition of an explosive atmosphere and explosions.

#### **INSTALLATION AND SETUP**

The Temperature Sensor should be deployed so that the temperature lead/probe can be exposed to the temperatures it is to measure and the housing remains affixed where it will be exposed to ambient temperatures between 253°K to 313°K (-20°C to 40°C). Because the Sensor did not go through an impact test, the housing **MUST** be securely affixed to the surface against which it is deployed, to prevent impact from dropping or falling.

When installing the Sensor, qualified personnel **MUST** follow all applicable rules set forth in IEC 60079-14 and in IEC 60079-17. Before affixing the housing to the surface where it will be deployed, the qualified personnel should wipe clean the surface to which the housing is to be affixed with a **wet rag**.

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The qualified personnel should then affix the housing to the surface by sandwiching the exposed adhesive membrane between the housing and the surface, and applying firm pressure. In the alternative, the qualified personnel may affix the housing to the surface by using screw fasteners screwed through the eyelets provided in the two tabs extending from the two shortest sidewalls of the housing. The screw fasteners **MUST** be suitable for installations in explosive atmospheres. Because of the lack of impact testing on the Sensor and the potential to become dislodged and drop to the ground, it is **NOT** recommended to mount the Sensor with a magnet.

In determining a surface to which to affix the Sensor, consider again that the Sensor did not go through an impact test. **DO NOT** affix the Temperature Sensor higher than two meters above a surface it would strike in the event of a fall. **DO NOT** affix the Temperature Sensor where it is likely to be bumped by personnel. **DO NOT** affix the Sensor anywhere where moving parts of machinery may strike it.

The Temperature Sensor **MUST** be installed in a location where it will be protected and sheltered from **ALL** sunlight and other luminaries emitting light at UV wavelengths. Additionally, the housing of the Temperature Sensor is made of ABS plastic with two nylon adhesive labels adhering to it, which may present a potential for electrostatic discharge. **DO NOT** affix the Sensor anywhere where personnel are likely to rub against it. Also, the Temperature Sensor **MUST** be installed 1,000 mm distance from a potential electrostatic source, such as a conveyor belt, moving machinery, pipe, or the like.

## **ADJUSTMENT AND PARAMETER SETTING**

The Temperature Sensor is designed to be adjusted and have its parameters set remotely. All firmware updates are also received remotely. Personnel need **NOT** interact within a hazardous area to perform these functions, with the exception of power cycling the Sensor. To power cycle the Sensor, the instructions in the Repair section below **MUST** be followed. Please refer to the User Guide.

### **USE AND SETUP:**

Again, the Temperature Sensor is designed to be used and set up remotely. Please reference the User Guide. Personnel need **NOT** interact within a hazardous area to perform these functions, with the exception of power cycling the Sensor. To power cycle the Sensor, the instructions in the Repair section below **MUST** be followed.

### **MAINTENANCE:**

Layers of dust should not be allowed to accumulate on the Temperature Sensor. Clean the Sensor regularly. However, **DO NOT** clean the surfaces of the Sensor with a dry rag. Only clean these surfaces with a **wet rag**.

### **REPAIR:**

Many repairs may be undertaken remotely by adjusting and setting parameters and updating firmware over the wireless network in which the Temperature Sensor is embedded. However, if such attempts are unsuccessful, a determination may be made, with or without the assistance of Monnit customer support, that the Sensor needs to be power cycled, have its battery replaced, be shipped back to Monnit, or decommissioned.

To power cycle the Sensor, the battery is removed and reinserted. Before opening the Sensor to power cycle it, qualified personnel **MUST** wipe the Sensor with a **wet rag**, and **remove the Sensor from any hazardous location** where explosive atmospheres of gas or dust are OR may be present. **Alternatively**, qualified personnel **MUST** wipe the Sensor with a **wet rag** and ensure that the area where the Sensor is located **is free of potentially explosive dust or gas. DO NOT remove, reinsert, or replace the single AA RAMWAY ER14505M lithium / thionyl chloride battery where explosive gas or dust is present or potentially present.** Qualified personnel open the Sensor by removing screws in the top lid of the housing. The battery may then be removed from the battery coffin within the housing. To power cycle, qualified personnel then wait at least ten seconds before reinserting the single **AA RAMWAY ER14505M battery**. When replacing the battery, qualified personnel **MUST ONLY** replace the old battery with a new, **single AA RAMWAY ER14505M lithium/ thionyl chloride battery**. A single AA RAMWAY ER14505M lithium / thionyl chloride battery is the **ONLY** battery that can be used with the Temperature Sensor. Any other battery may result in a thermal ignition or a spark ignition event causing an explosion.

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## CAUTION

### TAKING OUT OF SERVICE AND DISMANTLING:

When a determination is made to decommission the Temperature Sensor, qualified personnel **MUST** wipe the Sensor with a **wet rag** and remove the Sensor from the hazardous location where explosive atmospheres of gas or dust are present, or are potentially present.

You should comply with all local laws, regulations, directives, and the like regarding the disposal of electronic equipment and lithium batteries.

## 4. Specific Conditions of Use

The IECEx certificate number for the Temperature Sensor carries an 'X' at the end. The following comprises a list of reasons why the Temperature Sensor is marked with this 'X' behind the certificate number, together with specific precautions that need to be observed as prerequisite conditions of use:

## WARNINGS

### POTENTIAL ELECTROSTATIC CHARGING HAZARD

The Sensor's housing is ABS plastic with two nylon adhesive labels adhered. Electrostatic charging of plastic components can lead to electrostatic discharge events, sparking, and explosions. Whenever the Temperature Sensor is in a hazardous location where an explosive atmosphere of gas or dust is, or may potentially be, present, the surface of the Temperature Sensor must first be wiped with a **wet rag** before touching the Sensor to prevent electrostatic discharge.

Avoid friction on the surfaces of the Sensor. Keep ambient relative humidity above 25%. Only clean these surfaces with a **wet rag**. Do NOT dry clean the surfaces. The Temperature Sensor **MUST NOT** be used in high-charge generating processes, such as in the presence of mechanical friction, in the presence of separation processes, or mounted in a pneumatic conveying flow. If there is a potential electrostatic source with which a potential difference, relative to the Sensor, of around 30 kV or above may be created, an electrostatic expert **MUST** be called to evaluate the electrostatic risk and the distance from the electrostatic source to the Sensor.

### USE ONLY RAMWAY ER14505M BATTERIES

A single **AA RAMWAY ER14505M lithium / thionyl chloride battery** is the **ONLY** battery that can be used with the Temperature Sensor. Any other battery, or combinations of batteries, may result in a thermal ignition or a spark ignition event causing an explosion.

### DO NOT REPLACE THE BATTERY WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT

The Temperature Sensor **MUST NOT be opened** and the single **AA RAMWAY ER14505M lithium / thionyl chloride battery MUST NOT be removed, reinserted, or replaced** when an explosive atmosphere, comprised of either gas or dust, is either present or potentially present. Qualified personnel **MUST EITHER** remove the Sensor from a hazardous location where an explosive atmosphere is either present or potentially present, **OR** the qualified personnel **MUST** clear the area where the Temperature Sensor is located of any explosive atmosphere and ensure its absence.

### THERMISTOR CIRCUIT IS CONNECTED TO THE METAL HOUSING

For the ALTA Wireless Temperature Sensor, Model MNS2-(f)-W2S-TS-ST-L03, the **thermistor circuit is connected to the metal thermistor housing and therefore does not pass the dielectric strength test according to clause 6.3.13 of IEC 60079-11.**



## Change Log

Revision	Author	Date (yyyy/mm/dd)	Change
1		2021/01/04	Original release.
2	R. Simmons	2021/5/11	Extended warning information in warning boxes on pages 3 and 7. Updated all product shots - cover, pages 2 and 4.
3	S. Preston	2021/5/12	Changed process temperature range to 233°K to 393°K (-40°C to +120°C) and changed maximum surface temperature to 473°K (200°C).
4	K. Detro	2022/03/17	Branding and color scheme updates for images. Various grammar and punctuation edits throughout.
5	K. Detro	2022/03/23	Updated images to reflect new label.