

Smart Eco

LORAWAN WIRELESS SENSOR

Smart Eco is a LoRaWAN indoor climate sensor that measures temperature, humidity and light intensity. This sensor is an environmentally friendly option, with an organic solar cell as the only power source and an enclosure made from biodegradable material.

Removing batteries from a wireless IoT device significantly reduces the environmental impact and maintenance costs. Smart Eco has a Scandinavian design, which fits nicely in any application.

The sensor can last up to fifty days in the dark depending on the sample interval, transmit interval, data rate, and environmental factors. It can be used with a self-adapting feature, which results in lower power consumption and reduced network load.

Product Features & Specifications

Product Features

- Temperature, humidity and light sensor
- Powered by organic indoor solar cell
- Made from biodegradable material
- Wireless and battery-free
- Scandinavian design
- Lasts up to fifty days in the dark
- Self-adapting feature
- Easy configuration

Mechanical Specifications

Weight	33 g
Dimensions	66,2 x 66,2 x 17,2 mm
Enclosure	Gaia Biomaterial Biodolomer®
IP Rating	IP20
Mounting	Screw/Adhesive tape

Operating Conditions

Temperature	0 to 50 °C
Humidity	0 to 85 % RH
Illuminance	90 – 5000 lux
Usage Environment	Indoor

Device Specifications

Device Power Supply

Battery Type	Lithium-ion capacitor (LIC)
Expected Battery Life	Up to 50 days in the dark. Depending on the sample interval, transmit interval, data rate, and environmental factors.

Device Logging Function

Sampling Interval	10 min (Default), Configurable via NFC and Downlink
Data Upload Interval	10 min (Default), Configurable via NFC and Downlink

Radio / Wireless

Wireless Technology	LoRaWAN® 1.0.4
Wireless Security	LoRaWAN® End-to-End encryption (AES-CTR), Data Integrity Protection (AES-CMAC)
LoRaWAN device type	Class A (configurable) End-device
Supported LoRaWAN® features	OTAA, ABP, ADR, Adaptive Channel Setup
Supported LoRaWAN® regions	EU868, IN865, US915, AU915, AS923, KR920
Link budget	137 dB (SF7) to 151 dB (SF12)
RF transmit power	Max 14 dBm EIRP

Sensors

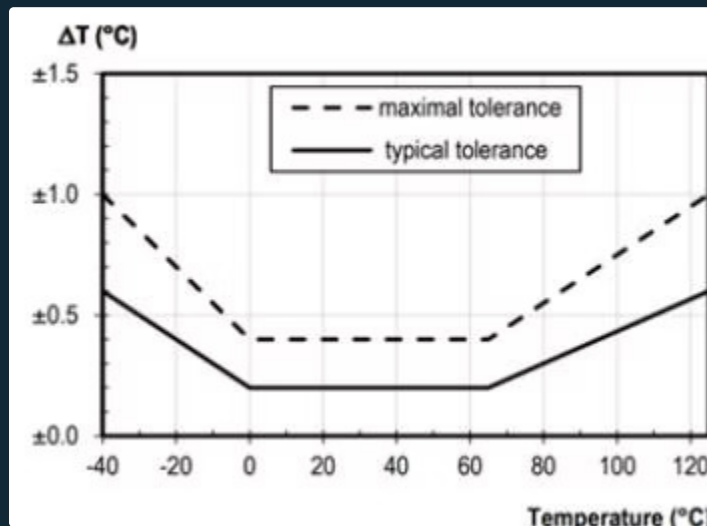
Temperature Resolution	0.1 °C
Temperature Accuracy	± 0.2 °C (see figure 1)
Humidity Resolution	1 % RH
Humidity Accuracy at 25 °C	± 2 % RH (see figure 2)
Humidity Accuracy over Temperature	See figure 3
Light Range	0 – 4000 lux
Light Resolution	1 lux
Light Accuracy	±10 lux ±2% of reading

☐ The sensor uses the solar cell to measure light intensity. For correct reading, make sure it isn't obstructed. The electrical characteristics of the solar cell as a function of light angle of incidence roughly equates to a cosine corrected measurement.

Sensor Accuracy Charts

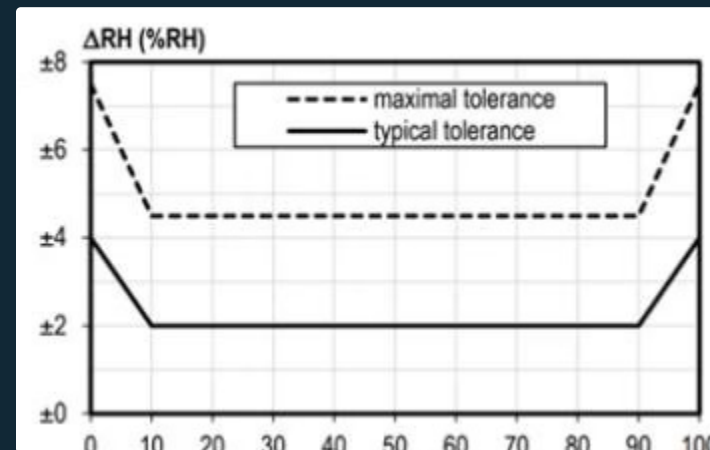
The following figures illustrate the tolerance curves for temperature and humidity measurements across operating ranges.

Figure 1 — Temperature Accuracy



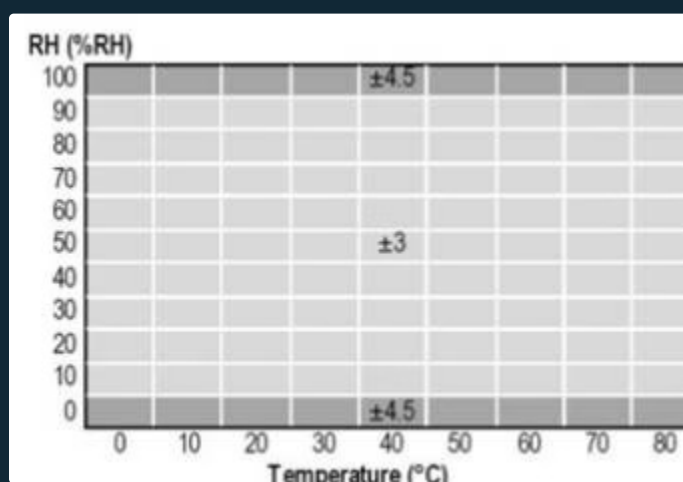
Graph showing Temperature (°C) on the x-axis (from -40 to 120) versus ΔT (°C) on the y-axis (from ± 0.0 to ± 1.5). The graph displays two tolerance curves: *maximal tolerance* (dashed line) and *typical tolerance* (solid line). The maximal tolerance curve starts at ± 1.0 at -40°C , drops to ± 0.4 at 0°C , and rises back to ± 1.0 at 120°C . The typical tolerance curve starts at ± 0.6 at -40°C , drops to ± 0.2 at 0°C , and rises to ± 0.6 at 120°C .

Figure 2 — Humidity Accuracy



Graph showing Temperature (°C) on the x-axis (from 0 to 100) versus ΔRH (%RH) on the y-axis (from ± 0 to ± 8). The graph displays two tolerance curves: *maximal tolerance* (dashed line) and *typical tolerance* (solid line). The maximal tolerance curve starts at ± 8 at 0°C , drops to ± 4.5 at 10°C , and rises back to ± 8 at 100°C . The typical tolerance curve starts at ± 4 at 0°C , drops to ± 2 at 10°C , and rises to ± 4 at 100°C .

Figure 3 — Humidity Accuracy over Temperature



Graph showing Temperature (°C) on the x-axis (from 0 to 80) versus RH (%RH) on the y-axis (from 0 to 100). The graph shows three horizontal tolerance bands: ± 4.5 at the top (90–100% RH), ± 3 in the middle (40–60% RH), and ± 4.5 at the bottom (0–10% RH). The middle band is shaded grey.



Sustainability, Smart Features & Recycling

The Solar Cell

The organic photovoltaic (OPV) cell from Epishine provides best in class, efficient energy harvesting from indoor light sources.

The Biodegradable Material

The biodegradable material, Biodolomer from Gaia Biomaterials, used for the enclosure is made from biobased ester, calcium carbonate and vegetable oils. It does not produce microplastics and is certified for home and industrial composting.

The Self-Adapting Feature

The Smart Eco comes with Adaptive Send Rate enabled by default. With ASR enabled, sensors transmit on their normal schedule, but delay sending when measured values are unchanged. The hold-off time and thresholds are user configurable (default max: 30 minutes). With default ASR settings, transmissions drop by ~30% in typical homes and up to ~50% in typical office environments, reducing power use and network load and helping lower packet loss.

How to Recycle

Remove the back panel and then separate the circuit board from the enclosure. Sort the enclosure into your food waste and the circuit board with the solar cell in electronic waste.

Avoid

- Using the sensor outside.
- Placing the sensor where it constantly is exposed to direct sunlight.
- Removing the back panel.

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