YO Thermostat.

DATASHEET

Telemetry experts

LoRaWAN-based communication

BLE 5.0 support

Efficient device deployment& management

Support for multiple LoRaWAN regions

High-quality products made in EU

YOSENSI.IO

LoRa Alliance Member CE

Release notes

Released	Version	Key changes
14.06.2024	1.0	Initial release.

Content

Application

- YO Thermostat is a compact indoor ambience monitoring device designed to measure temperature, humidity, illuminance, and CO_2 (*optional*) levels.
- It also has an infrared presence sensor, which is equipped with a built-in occupancy counter, enabling it to track the number of people presence in the room in real-time.
- The device measures the room temperature using a built-in sensor and compares it to a desired setpoint. The PID controller continuously fine-tunes the state in response to the ambient temperature, ensuring consistent and precise temperature control. Based on the controller output signal an **on or off state** is passed via LoRaWAN.
- Device states received via the LoRaWAN network should be used to control actuators.
- Intended for use in offices, stores, classrooms, hospitals, and more, the YO Thermostat device provides valuable insights into indoor conditions and occupancy of the room.
- **Important!** YO Thermostat is not an actuator - to control the heater, HVAC, etc. it requires a relay that will open/close the circuit, such as **YO Relay Switch**.
- The YO Thermostat device is ideal for assessing and maintaining optimal indoor environments, enhancing occupant comfort, productivity, and overall well-being. Additionally, it is a wireless battery-operated device.

Components

- The device consists of a **microcontroller** (with Bluetooth Low Energy), communication modules (LoRa), CO2 (optional), illuminance, temperature, humidity and infrared presence sensor.
- The device features a PID controller to ensure the optimum room temperature is maintained.
- YO Thermostat includes an **ABS enclosure**, which is ideal for wall mounts and smart applications.

Operation of the device

- A LoRaWAN network is required for data transmission.
- In order to use the thermostat's functionality, it is recommended to use the **YO Relay Switch** to control the heat source.
- It is possible to configure or reconfigure device parameters, **at any time**, via BLE.
- Yosensi provides access to the **Yosensi Configuration Web Tool** and mobile **Yosensi App** as part of the **Yosensi Management Platform** comprehensive solution, allowing device configuration and firmware updates.
- It is recommended to add the device to the **Yosensi Management Platform**, which allows detailed and easy monitoring of the data transmitted by the devices.

Device configuration

LoRaWAN settings	Network type (private or public) operating mode selection (OTAA or ABP) **OTAA** • Device EUI • Application EUI • Application Key • Number of trails **ABP** • Device address • Network session key • Application key
Bluetooth Low Energy (BLE) settings	Transmission power Advertising frame interval
Device settings	Measuring interval CO2 calibration value Temperature offset Illuminance coefficient
Thermostat settings	Comfort setpoint Standby offset Economy offset Frost protection setpoint Operating mode after reset

	Cycle time
	Computing interval
	Regulator Kp
	Regulator Ki
	Regulator Kd

Advantages

- **Production quality** - made in the **European Union** by **qualified engineers**.
- Possibility of calibration CO_2 sensor and temperature sensor.
- Indoor condition monitoring all in one device.
- The device features an output signal for controlling the heating/cooling source.
- Fine tuning with PID controller.
- Pre-set operating modes for temperature control.
- Depending on the version, the **LoRa radio** can operate in different regions (e.g., EU868, US915, AU915, AS923) adapted to several ISM frequency bands.
- Using **Bluetooth** Low Energy (BLE) provides:
  - *Configuration convenience (in a user-friendly way via a JSON data exchange format)*
  - *Possibility of firmware update via OTAA*
  - *Very low energy consumption*
- **Supported LoRaWAN** network type: private or public and connection over **ABP** or **OTAA**.
- Access to the **Yosensi Management Platform** for device configuration, firmware updates and infrastructure management.

Technical details

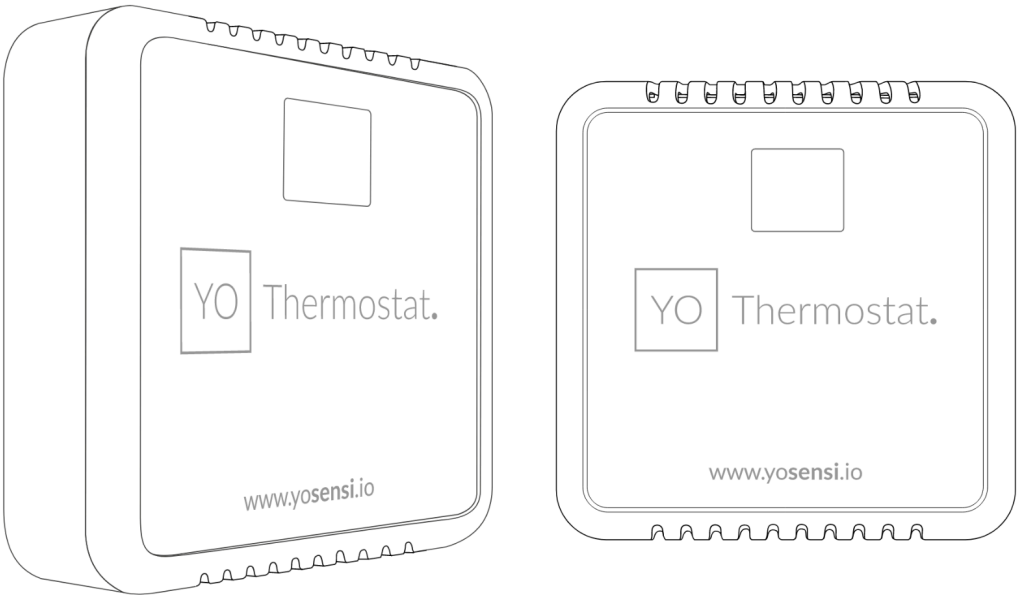

Figure 1 Top view of the device.

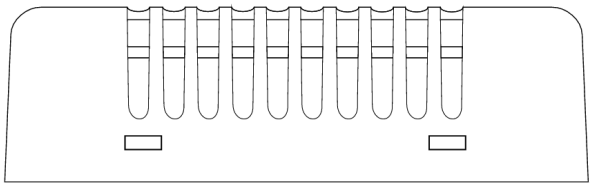

Figure 2 Side view of the device.

Enclosure of the device

Dimensions	Height: 25,5 mm Width: 86 mm Depth: 86 mm
Colour	White
Installation	Horizontal Vertical (can be screwed to the wall)
Enclosure material	ABS (FR)
Level of protection	IP40, UL94-V0

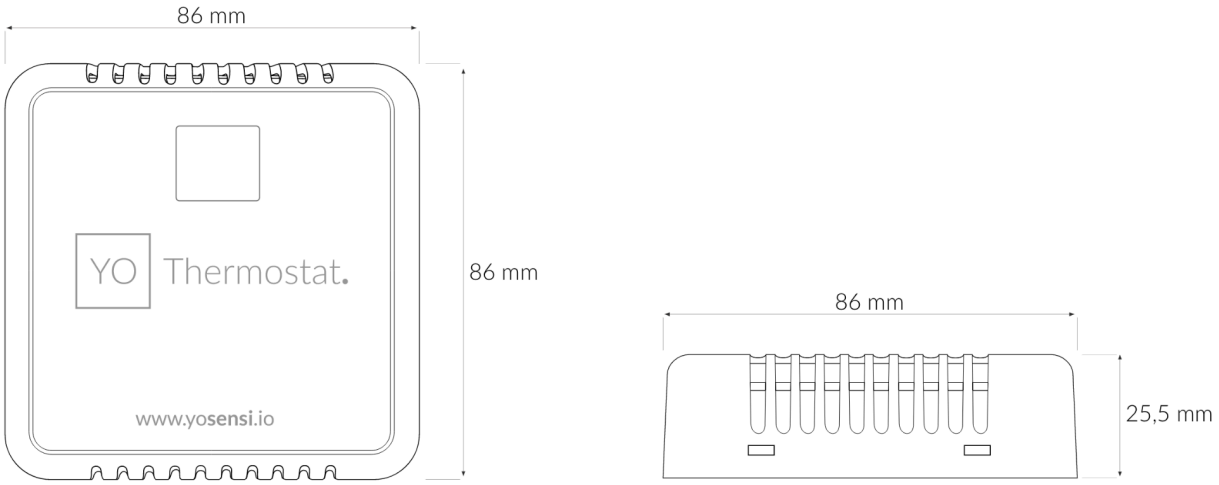

Figure 3 *Dimension of the device.*

Parameters

Tx power	LoRa EU868: to +14 [dBm] LoRa US915, AU915, AS923: to +22 [dBm] Bluetooth Low Energy (BLE): -20 to +6 [dBm]
Power supply	3 x AA battery (3 x 1,5 V)
Power consumption	Maximum: 120mA (4,5 VDC)
Measuring range	**Temperature:** Measuring range: –40°C to 125°C *(-40°F to 257°F)* Accuracy: ±0,2°C *(at temperatures between 5°C and 60°C (41°F to 140°F))* **Humidity:** Measuring range: 0% to 100% Accuracy: ±2% *(relative humidity from 20% to 80%)* **CO2 (optional):** Measuring range: 0 ppm to 40 000 ppm Recommended working conditions: -10 - 60 °C (14°F to 140°F) / from 0% RH to 95% RH Accuracy of measurements: ±(40 ppm+5%) (in the measuring range from 400 ppm to 5000 ppm) **Illuminance:** Measuring range: 0 lx to 120 klx Recommended working conditions: -25°C to 85°C (-13°F to 185°F) Accuracy: 10% (in temperature 25°C (77°F) **Infrared presence sensor:** Measuring range: 0 to 4,5 meters, 80° field of view
Weight	82,5 g
Certificates	CE

Sample charts

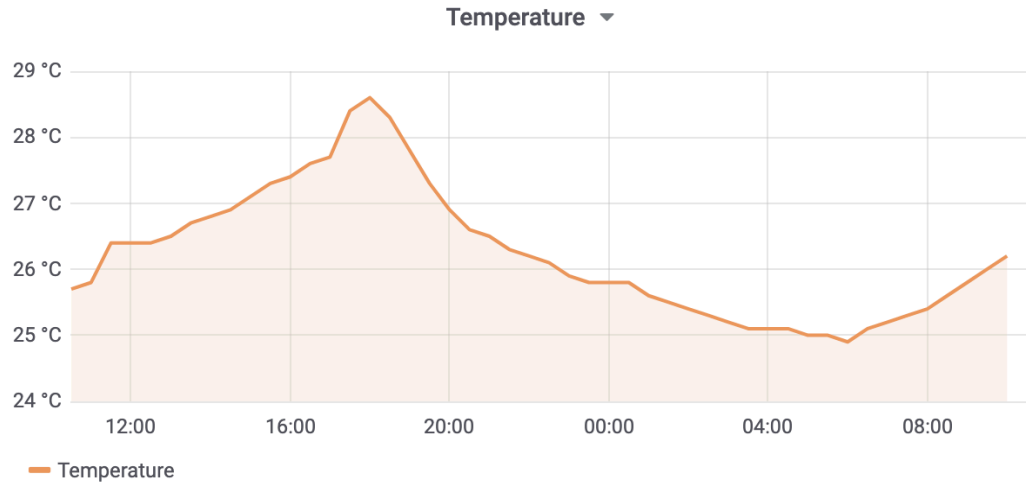

Figure 4 Internal temperature example chart.

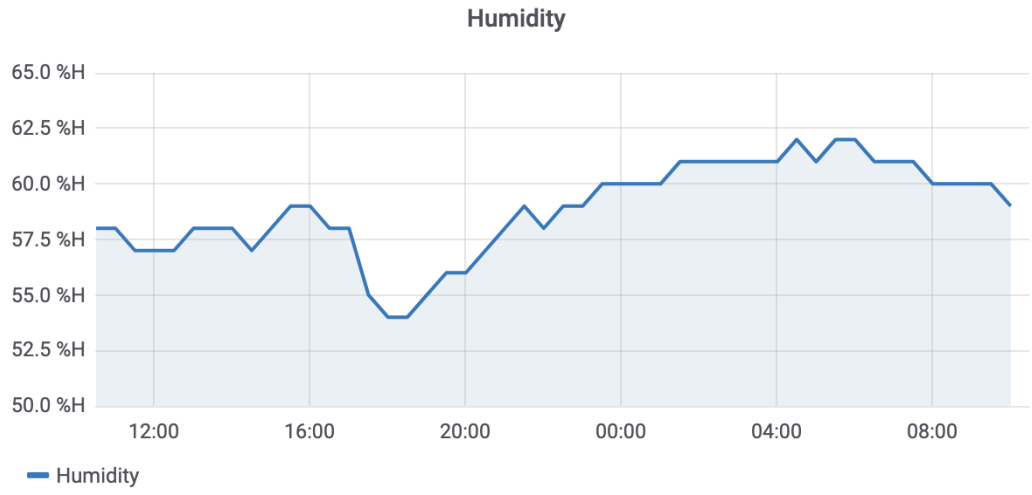

Figure 5 Internal humidity example chart.

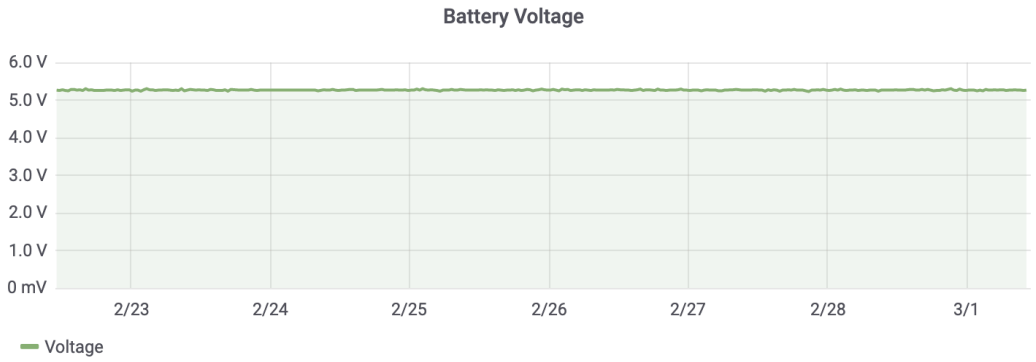

Figure 6 Example of battery voltage monitoring chart.

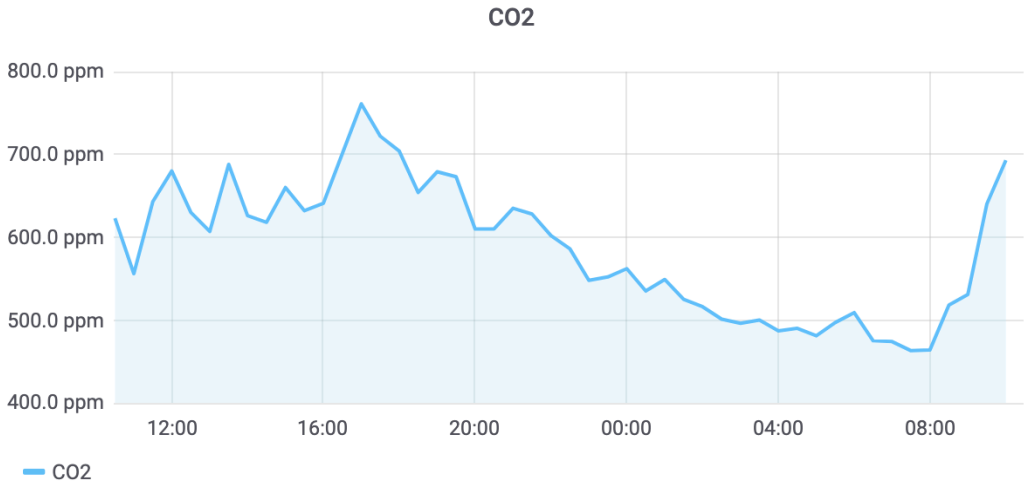

Figure 7 Example of CO_2 monitoring chart.

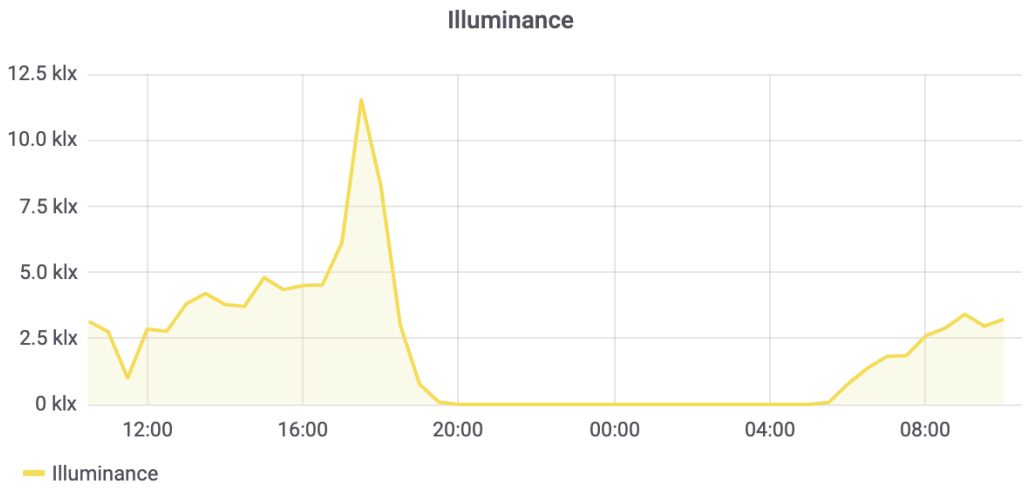

Figure 8 Example of illuminance monitoring chart.

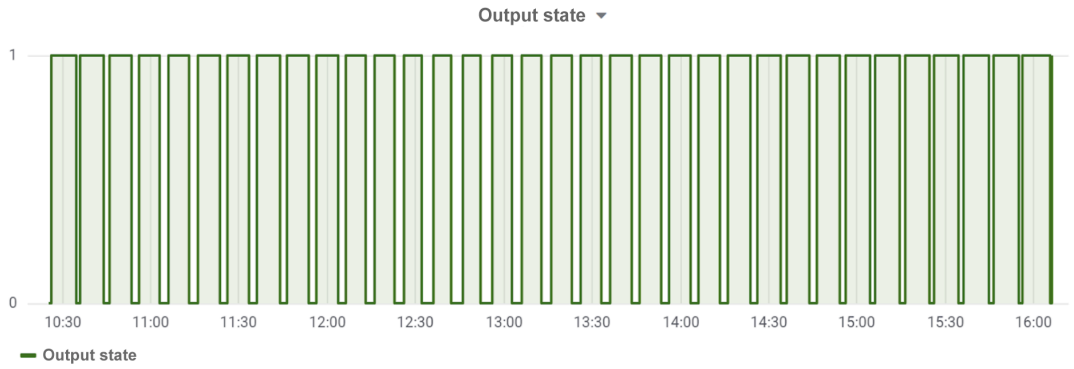

Figure 9 *Example of temperature controller output state monitoring chart.*

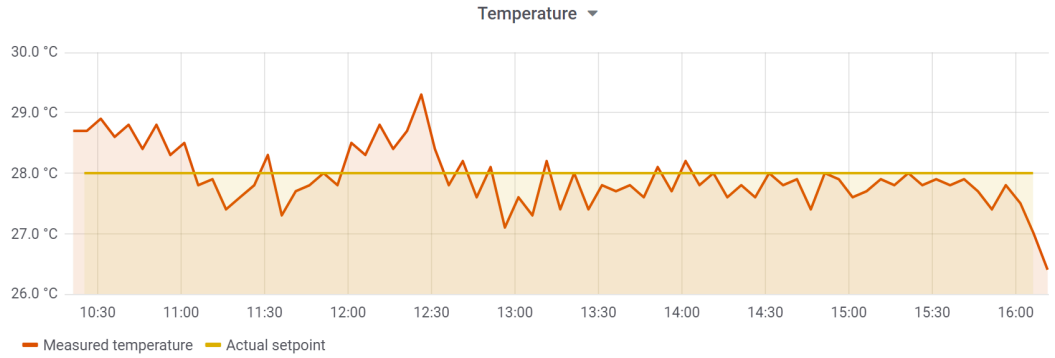

Figure 10 *Example of temperature monitoring chart with temperature setpoint.*

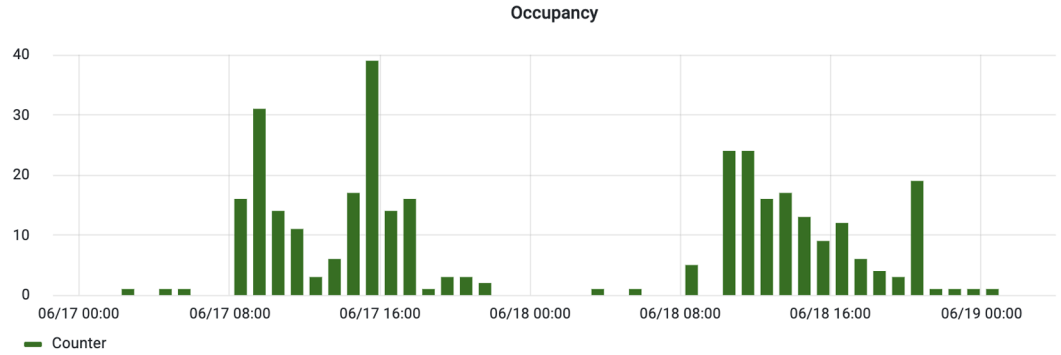

Figure 11 *Example of occupancy monitoring chart.*

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