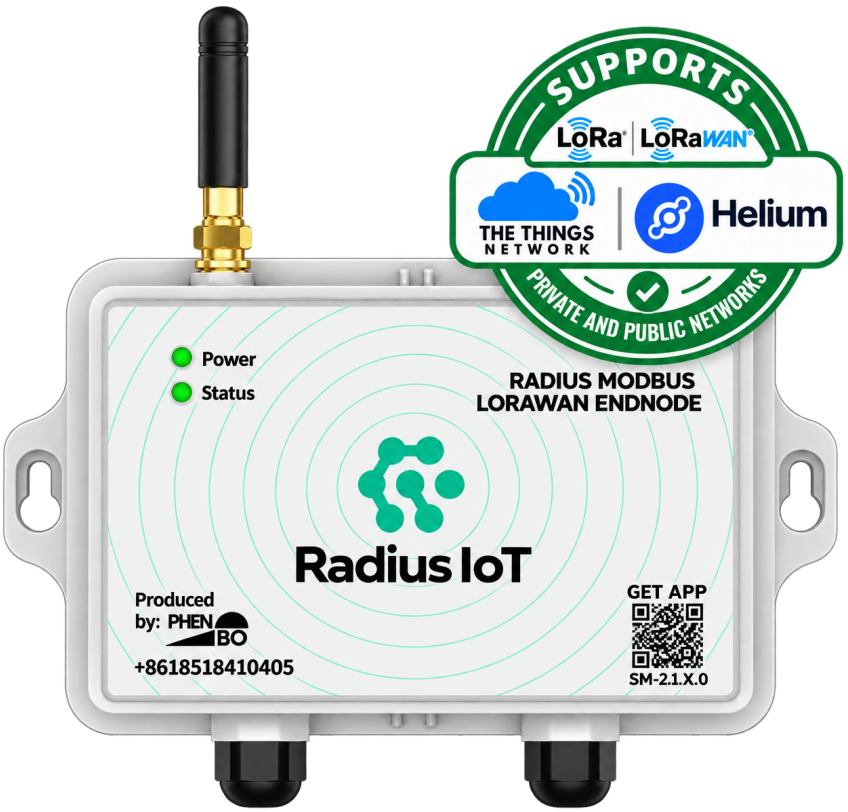
User Manual

SM-2.1.1.x

Radius Modbus LoRaWAN IoT

Multi-channel End-Node for EU868



Items:

- SM-2.1.1.x end-node
- Batteries are not included

Contents

1. Overview 3
2. Features 3
3. Technical Specifications . 4
4. Applications 5
5. Safety instructions 7
6. Installation 8
7. Usage 10
8. Sensor Support 11
9. Contact Information . . . 12

1. Overview:

The SM-2.1.1.x is a LoRaWAN ClassA end-node that works with any Modbus device. The device connects to private LoRaWAN gateways via The Things Network or public networks like The Helium Network. The device is configured through a mobile app where the sensor readings are also displayed. For more information, visit `www.radius-technologies.app`

2. Features:

- **Software support**: Easy to setup with mobile app on IOS and Android.
- **Compatibility**: Works with any Modbus sensor.
- **Power Efficiency**: Battery-powered design with extended battery life.
- **Boost converter**: Onboard 5V, 12V, or 24V power supply.
- **Environmental Resilience**: Waterproof enclosure for reliable performance in outdoor environments.
- **Network Flexibility**: Supports both private and public LoRaWAN networks through Radius IoT (Helium, TTN, Chirpstack).

- **Bidirectional Communication**: Enables command execution and configuration updates from the mobile app.
- **Periodic Monitoring**: Periodic sensor data collection with configurable sampling intervals 30mins - 24H.
- **Application support**: Works with Radius IoT billing services and API integrations (business features).

3. Technical Specifications:

- **LoRaWAN** : Version 1.0.3, Class A, OTAA.
- **Power** : 4×AA alkaline batteries, 6 V nominal.
- **Frequency** : EU868, multi-channel.
- **Antenna gain** : 3 dBi.
- **Modbus baudrate** : 2400, 4800, 9600, 19200, 38400, 57600, 115200.
- **Modbus parity** : Odd, Even, None.
- **Operating temp.** : −20 °C to +60 °C
- **Storage temp.** : −30°C to +70°C.
- **Humidity range** : 0–75% RH.
- **Dimensions** :150×95×45 mm.
- **Enclosure** : ABS.
- **Weight** : 200 g.
- **Certifications** : CE, RoHS.

4. Applications:

The SM-2.1.1.x is a versatile Modbus RTU LoRaWAN end-node suitable for a wide range of monitoring, control, and metering use cases.

Subscription-Based Metering & Billing

Ideal for service providers offering remote metering with automated billing:

- **Electricity monitoring** — track consumption per tenant or unit, generate usage reports, and support automated invoicing.
- **Water metering** — monitor water consumption for residential, commercial, or irrigation applications.
- **Gas metering** — remote gas consumption tracking with alert thresholds for anomaly detection.
- **Fuel monitoring** — track fuel usage in generators, tanks, or industrial equipment to prevent theft and optimize refill scheduling.

Control & Monitoring

Suitable for automation and remote sensing applications:

- **Water level sensors** — monitor tanks, reservoirs, rivers, or drainage systems.
- **Soil moisture sensors** — smart irrigation and agricultural monitoring.

- **Temperature & humidity sensors** — greenhouse control, cold chain monitoring, HVAC systems, and server rooms.
- **Pressure sensors** — pipeline and hydraulic system monitoring.
- **CO_2 / air quality sensors** — indoor air quality monitoring for offices and public spaces.

To add support for a specific Modbus sensor, see **Section 6**.
For APIs and development please visit our website.

5. Safety instructions:

Information for your own safety

Qualified personnel

Commissioning and operation must be performed only by qualified personnel — those authorized to install and wire electrical devices in accordance with local safety standards.

Proper handling

Correct transport, storage, installation, and operation are essential for safe functioning. Electrical equipment may carry dangerous voltages. Improper handling may cause injury or property damage.

- Do not connect or touch terminals while live.
- Do not mount in explosive or dusty areas.
- Verify the connections before powering on.
- Avoid contact with bare hands or metal tools on terminals.
- Do not break seals or open the front cover.
- Avoid drops or physical shocks.

6. Installation:

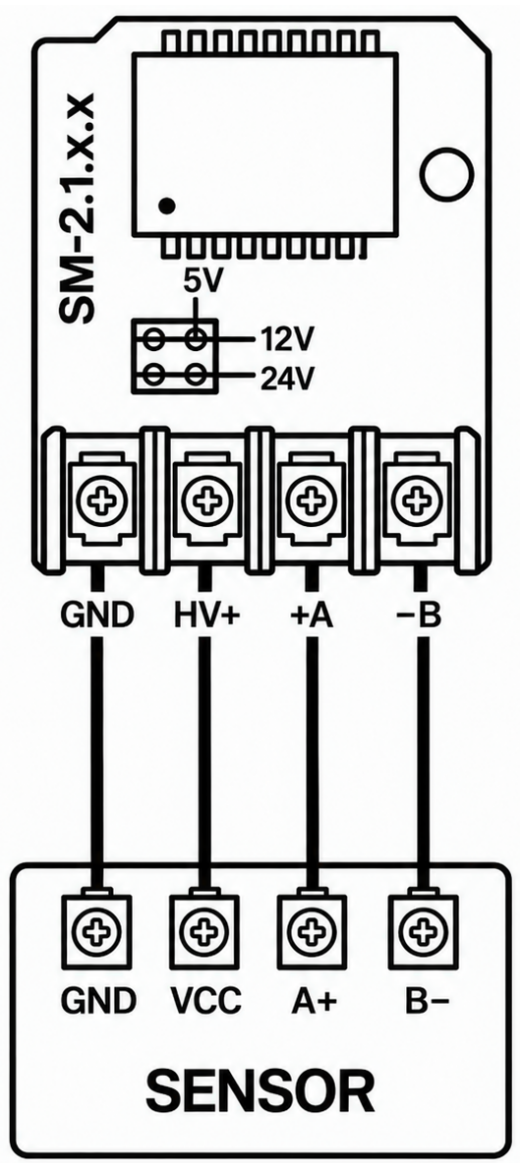
This end-node can be configured to support different applications that use Modbus sensors and actuators. Modbus devices are usually connected with 2 data wires usually named A+ and B-. The data wires should form a twisted pair especially in noisy environments or if the data cable is longer than a few centimeters.
It is possible to power external sensors and actuators from the end-node itself. To support different voltage requirements, the device is equipped with a boost converter that can supply **5V, 12V, or 24V** check below table. Place the provided jumper in the appropriate position to select the voltages as shown on the next page.

Voltage	**Current**
5 V	500 mA
12 V	200 mA
24 V	100 mA

Note: The number and power draw of the connected sensors contribute to battery drain.

Note: The HV+ pin is only turned on for a few seconds when the end-node communicates with the connected devices. Sensors that require more than 2 seconds startup time are not supported

due to battery constraints. To connect devices, select a voltage output or change the batteries, the device should be disassembled by removing 4 screws from the back side. Use the waterproof wire sleeves to preserve the waterproof capabilities of the enclosure.



7. Usage:

1. Scan the QR code to download the app:



2. Follow the in-app instructions to complete setup.
3. Scan the QR code on the back of the device to onboard.
4. Turn on the device by pressing the button on the bottom.
5. The power led should turn on for a few seconds then off indicating that the device has booted successfully.
6. The status led should blink to indicate that a message has been sent by the device.
7. The device auto-reads at a configurable interval between **30 minutes and 24 hours**. The interval can be adjusted in the app.
8. The device supports **bidirectional communication** — configuration changes and commands sent from the app are delivered to the device over the LoRaWAN network.

Note: The leds are in off state most of the time to preserve battery.

8. Sensor Support:

The SM-2.1.1.x can be configured to work with any Modbus RTU sensor. To request a custom configuration profile for your sensor, contact our support team:

Support: `Support@radius-technologies.app`

When contacting support, please include the following in your email:

- The full name and model number of your Modbus sensor.
- The sensor datasheet as an attachment (PDF preferred).
- A description of the register addresses or data points you need to read.

Our team will review the datasheet and provide a custom configuration profile for your device.
Do not dispose of this product with household waste. Recycle at a designated collection point in accordance with local regulations.

9. Contact Information:

Sales: Sales@radius-technologies.app
Support: Support@radius-technologies.app

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