



Autonomous Tracking Device for containers, attachments, and other assets without own power source

Wi-Fi / BLE / LoRa, LoRaWAN / GPRS / Mobile / GPS

M1-L1 Overview

The ENAIKOON IIoT M1-L1 **tracking device** is a powerful, multi-purpose waterproof tracking device "Made in Germany".

It has mainly been designed for tracking containers, attachments, trailers, agricultural machines and other assets without own power source.

The device comes with 5 different **radio technologies**:

- Cellular (GSM / GPRS / 4G)
- GPS
- Bluetooth Low Energy (BLE)
- Wi-Fi
- LoRa / LoRaWAN (optional)

This allows setting up all required wireless connections:

- from tracking device to the ginstr cloud
- from tracking device to the ENAIKOON cloud
- from tracking device to a Smartphone app
- from trailer to engine
- from attachment to construction machine
- from tracking device to a Gateway

The device comes with one or two powerful Mono-D batteries.

Because of the sophisticated power saving technologies, the batteries allow operating the device depending on the device configuration for more than 8 years without replacing the batteries.

The optional **LoRa / LoRaWAN communication** provides spread spectrum data transmission on a distance of several hundred meters with exceptional high protection against radio interferences and with very low power consumption at the same time.

This is especially interesting if data must be transmitted on longer distance without SIM card or in case of data transmission in demanding environment.

The LoRa modem supports LoRaWAN v1.0.2 and LoRaWAN v1.0.3. This allows transmitting data thru any public LoRaWAN network.

In **deep-sleep mode**, the device needs less than 30 μ A @ 3.6 V. Therefore, the device is very suitable for autonomous applications without external power supply.

The **3D G-sensor** allows waking up M1-L1 after detecting motion, even from deep sleep, as well as a timer-based wake-up.

The dedicated LM75B **temperature sensor** allows measuring the ambient temperature. Since the sensor is not part of the GSM modem, it measures the real ambient temperature and not the temperature of the GSM modem which would be typically higher.

The big **non-volatile memory** with a total size of 16 MB does not only provide space for the firmware and a 2nd copy of the firmware during an over-the-air firmware update but also for thousands of data records in case there is no connection to the ginstr platform or ENAIKOON platform.

On top, this memory holds the **device configuration** which can be updated at any time thru the ginstr cloud.

The **GNSS receiver** (GPS, GLONASS, Beidou) allows tracking the device with a precision of a few meters. The GNSS signal can also be used for adjusting the real-time clock.

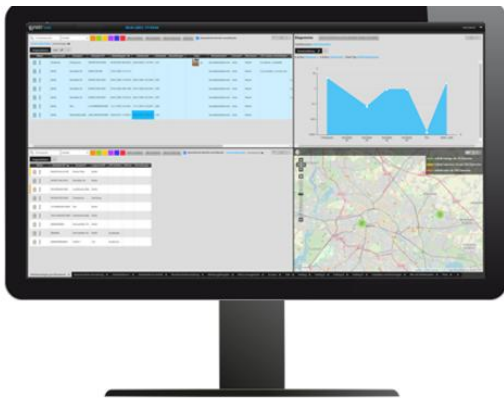
The device is waterproof. The housing is robust and can be mounted either with M5 screws or with magnets (optional).

For usage in extremely harsh environments the device can be potted.

Data transmission is encrypted with high security standards including SSL / HTTPS protocol and complies with European data protection regulations.

The device can be individually programmed with any **Arduino IDE** like PlatformIO or Sloeber.

The M1-L1 device is "**Made in Germany**".



M1-L1 Device specification

Processor: ESP32S-WROOM (Arduino compatible)

Memory:

- RAM 512 KB
- Flash 16 MB
 - 6 MB for the firmware
 - 10 MB for data (approx. 10.000 sensor readings)

Radio modules:

- Wi-Fi 2.4 GHz: built into the ESP processor
- BLE: built into the ESP processor
- GPRS, NB-IoT, LTE Cat-M: SIMCOM SIM7070G, Nano-SIM
- LoRa / LoRaWAN: SX1276 Ra-01h with 868/915 MHz (optional)

GNSS (location): GPS, GLONASS, BeiDou

Antennas: integrated into the housing

Connectors for external antennas:

- Mobile
- Active GNSS

Real-time clock:

- PCF8563
- Long term stable
- Separate coin cell backup battery

Temperature sensor:

- LM75B
- Temperature range: -40 °C ~ +85 °C

3-axis motion sensor: KXTJ3-1057

1 LED (inside the housing):

- Programmable
- LEDs can be activated/deactivated

Ultra-low power mode:

- Max. 30 µA @ 3.6V
- All relevant components can be switched on/off thru software individually

Battery:

- Primary battery
 - 19 Ah
 - Size: Mono-D
- One or two batteries can be connected
- Optional usage of rechargeable batteries

SHUNT resistor:

- for calculating the remaining lifetime of the battery

Operating temperature: -40 °C ~ +85 °C

Housing:

- waterproof, semi-transparent
- 155 x 88 x 41 mm
- Mounting with four M5 screws or magnets (optional)

Weight including 2 batteries: 750 g

Watchdog:

- automatic device restart in case of software problems or connection problems

Firmware update:

- over the air (Wi-Fi, Mobile)
- thru programming cable

Programmable with any Arduino IDE

- For ex. PlatformIO

Platform integration

- ginstr web
- ENAIKOON inViu pro

Made in Germany