

Manual

**LoRaWAN**

**People Counter**

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IMBuildings B.V.

2020

v1.1 (latest)

## Preface

**Note:** This document is shared by IMBUILDINGS B.V. for the purpose of transferring knowledge only to our customers and/or partners.

This documented is not to be distributed by any other than IMBUILDINGS B.V.

## Revision history

Version, Date, Author(s)	Changes
v0.1 10-09-2019 R. Conen	Preliminary release
v0.2 11-11-2019 R.Conen	Preliminary release - Added robust housing picture. More detailed information about working states
v1.0 15-01-2020 R.Conen	Images added, ordering information added.
v1.1 (latest) 20-03-2020 R.Conen	More accessories added. Fixed v1.0 date in revision history

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## About IMBUILDINGS™

The focus for IMBUILDINGS is the Smart Building market. Within this market there is a growing need for sensor products.

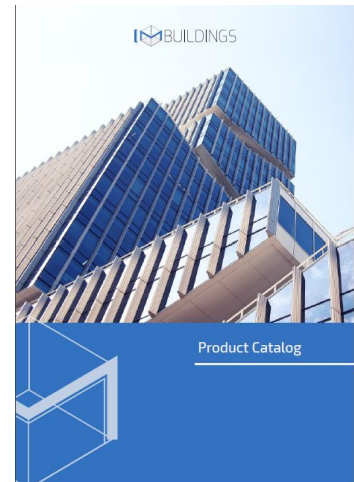
Customers of IMBUILDINGS are mainly System Integrators who integrate the hardware products within their total solution. These solutions are for example IoT platforms for Facility Management, Building Monitoring, Healthy Schools and so on.

A complete range of sensing products using a variety of connectivity technologies are offered.

We see our customers as partners. Together with our partners a complete range of solutions can be offered with the needs within the market.

**Sensor Development International:** Research and Development company which is focusing on the development of sensor based products. Developed products are also placed into the market by Sensor Development International for the brand IMMOTION®

For IMBUILDINGS a more open product range is required. The development for these demands are executed by Sensor Development International. For example, implementing standardized communication protocols and implementing open data formats.



# 1. Product introduction

The LoRaWAN People Counter is a battery powered sensor for counting people crossing a horizontal line. The counter consists of two parts, an infrared (IR) transmitter part and an infrared receiver part, which always work together.



The IR transmitter transmits the infrared signal.

The IR receiver is the main part and holds the intelligence and communication with the outside world.

## 1.2 Principle of work

The IR transmitter device points the IR beam horizontal towards the IR receiver part at a recommended height. When this beam is interrupted, the algorithm in the IR receiver part determines if this was a person and determines the direction A or B.

## 1.3 Communication

The created data is communicated from the internal algorithm microprocessor to the internal gateway microprocessor. The internal gateway processor communicates this information to the internal LoRaWAN (Certified) module which takes care of the communication with the LoRaWAN network.

Settings for the LoRaWAN interface are done via NFC memory.

## 1.4 Specifications

For main technical specification please refer the [product sheet](#).

Technical specifications	
Single operation voltage	Nominal 3.0V
Power supply	2x AA Batteries
Protection degree	IP20



Image: IR Receiver part

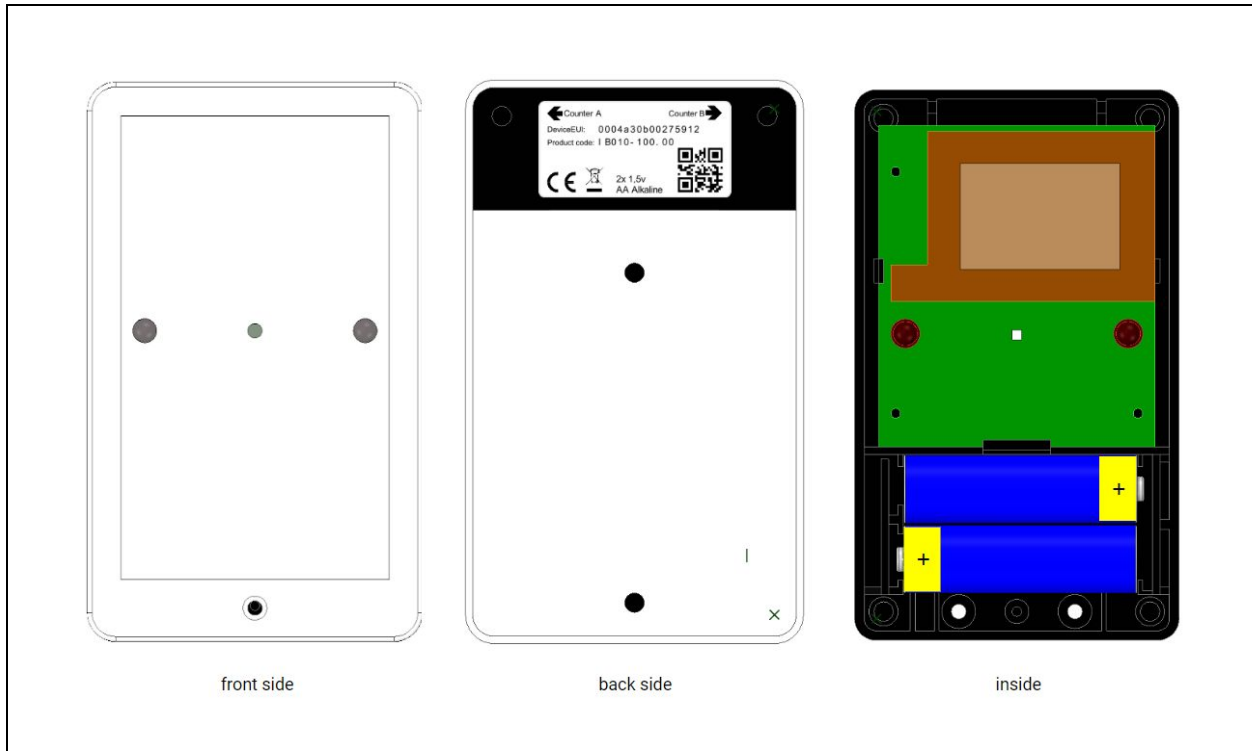
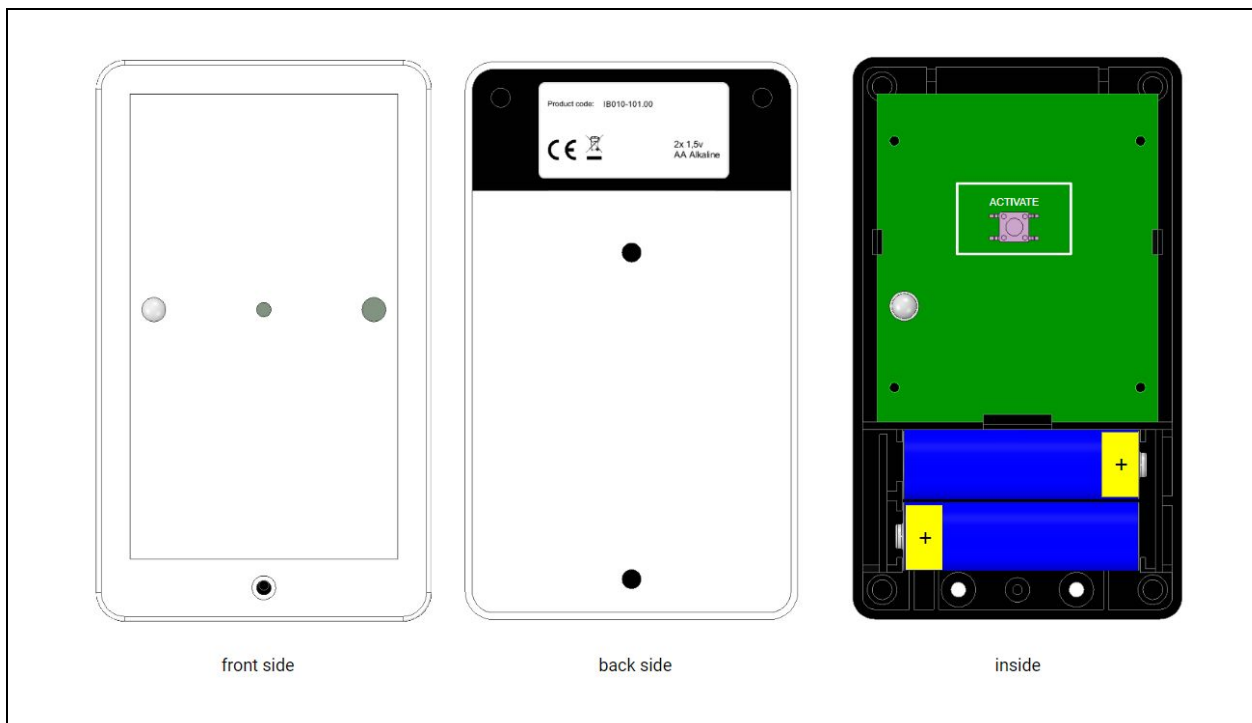


Image: IR Transmitter part



\*batteries shown in the picture are not included. a black sliding bracket on the back side may also be used

## 2. Configurable settings

The table below shows the settings which can be configured using the NFC Memory.

**Table 1:**

Setting	Info
Send interval	1 to 240 minutes
Device registration	ABP or OTAA
ABP App Session Key	128 bits key
ABP Network Session Key	128 bits key
ABP Device Address	4 bytes address
OTAA App Key	16 bytes key
OTAA App EUI	8 bytes EUI
ADR	On or Off
Confirmed message	On or Off
Data rate Min and Max	For both 0 to 5
Default data rate	Value between Min and Max data rate
LoRaWAN Port	Default 1 (1 to 223)
LoRaWAN Region	Default EU868
Factory Reset	

These setting may have influence on the working of the device.

To setup the device an Android device/phone with NFC is required. For our partners we have an App available.



### 3. Contents of delivery

When the product is ordered it will be shipped in a bulk package.

Contents of a single LoRaWAN People Counter set

- LoRaWAN People Counter Rx (IR receiver part)
- People Counter Tx (IR transmitter Part)

Both, IR receiver and IR transmitter, includes a white front cover and a sliding bracket and 2x a screw to close the front cover.

Note: Alkaline batteries are not included.

A LoRaWAN People Counter set needs 4x AA 1.5V Batteries. Both, IR receiver and IR transmitter, need 2x AA 1.5V Alkaline batteries.

### 4. Installation Tools

For installing this product only a few simple tools are required.

Task	Tool
Determine installation height	Measurement tape
Mount the People Counter	Scissors and double sided tape or screws and a drill / screwdriver
Enable validation mode	Magnet*
Close the front cover	Screwdriver*
Device configuration	Android device with NFC

\* available as accessory

## 5. Accessories

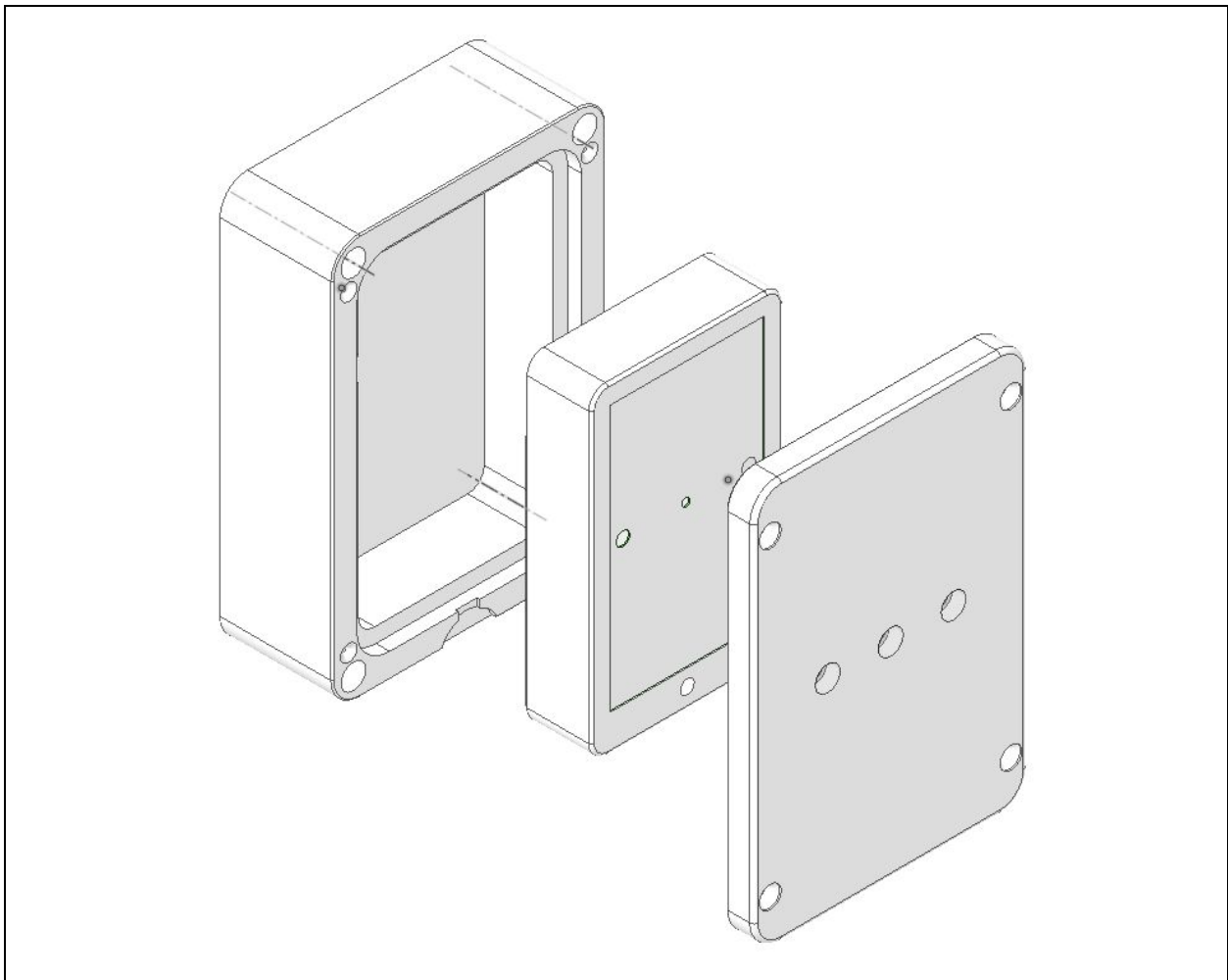
The product comes in bulk packaging without accessories.

There are several accessories available.

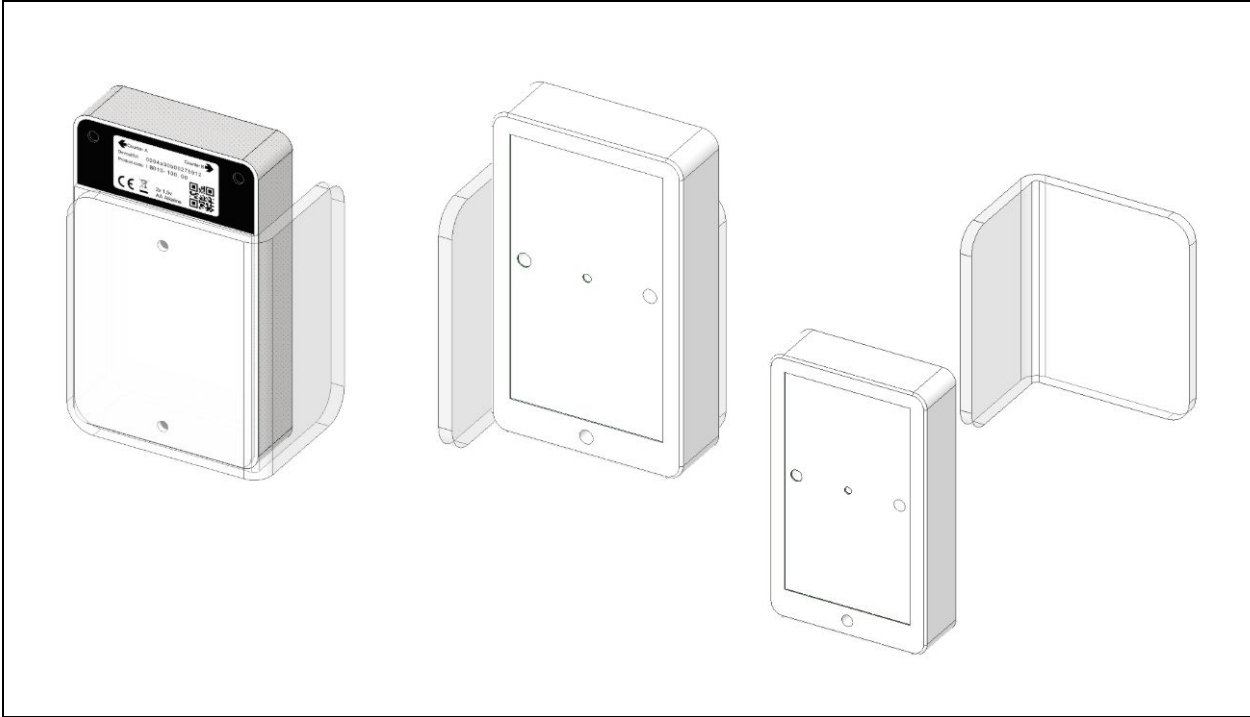
Brackets, screwdriver (for closing front cover), magnet (for enabling validation mode)

It is allowed to use and make your own accessories. In case there is a request for a special accessory like a specific bracket we will look into the possibilities to manufacture this and add it to our portfolio.

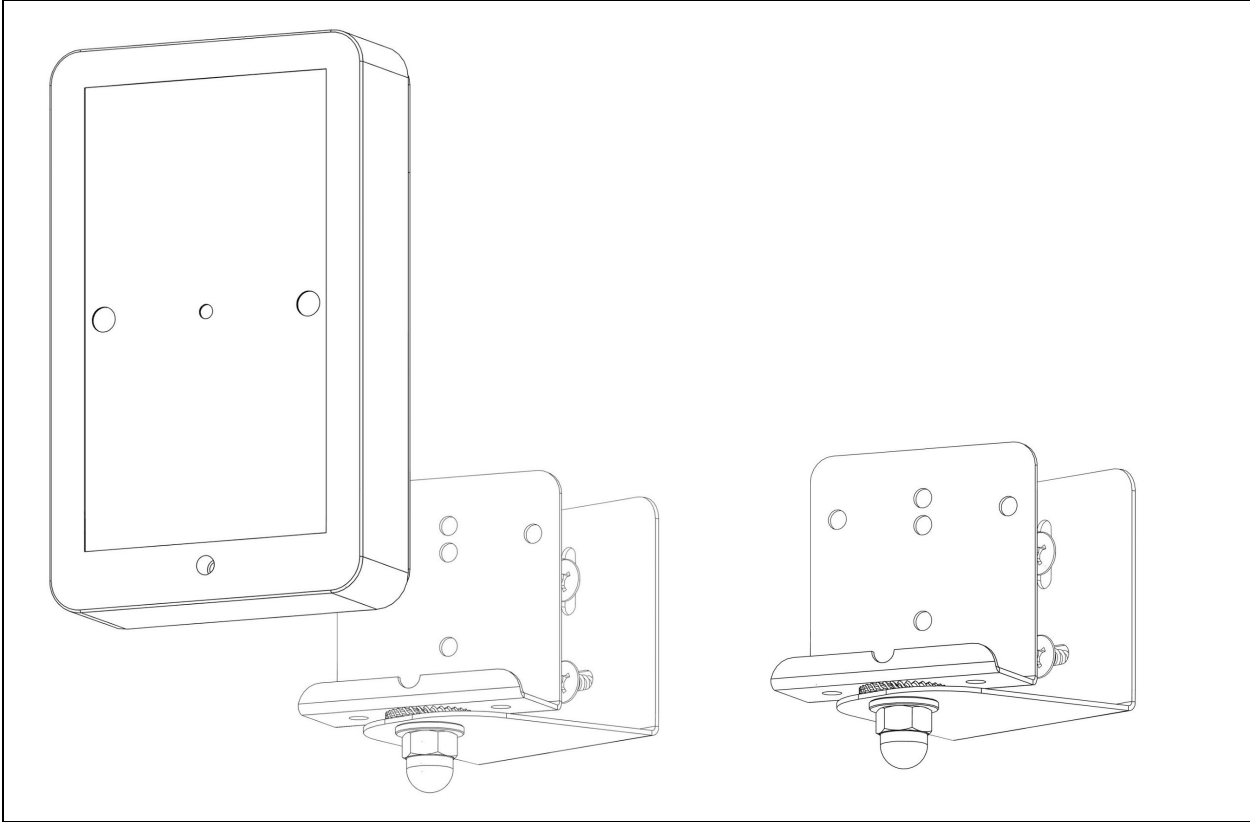
For outdoor/public use we have a robust housing available. As shown in the picture below the People Counter will fit in this robust housing.



**Plexiglass corner bracket**



**Rotation bracket**



## 6. Installation

Before installing the device physically on the desired location we recommend to setup the LoRaWAN settings in advance. This includes the setup needed within your LoRaWAN network and software platform.

Always be aware where which device is placed. Each device has a unique Device EUI which can be used as a reference.

### 6.1 Handling the housing

**Image: Removing the front cover**

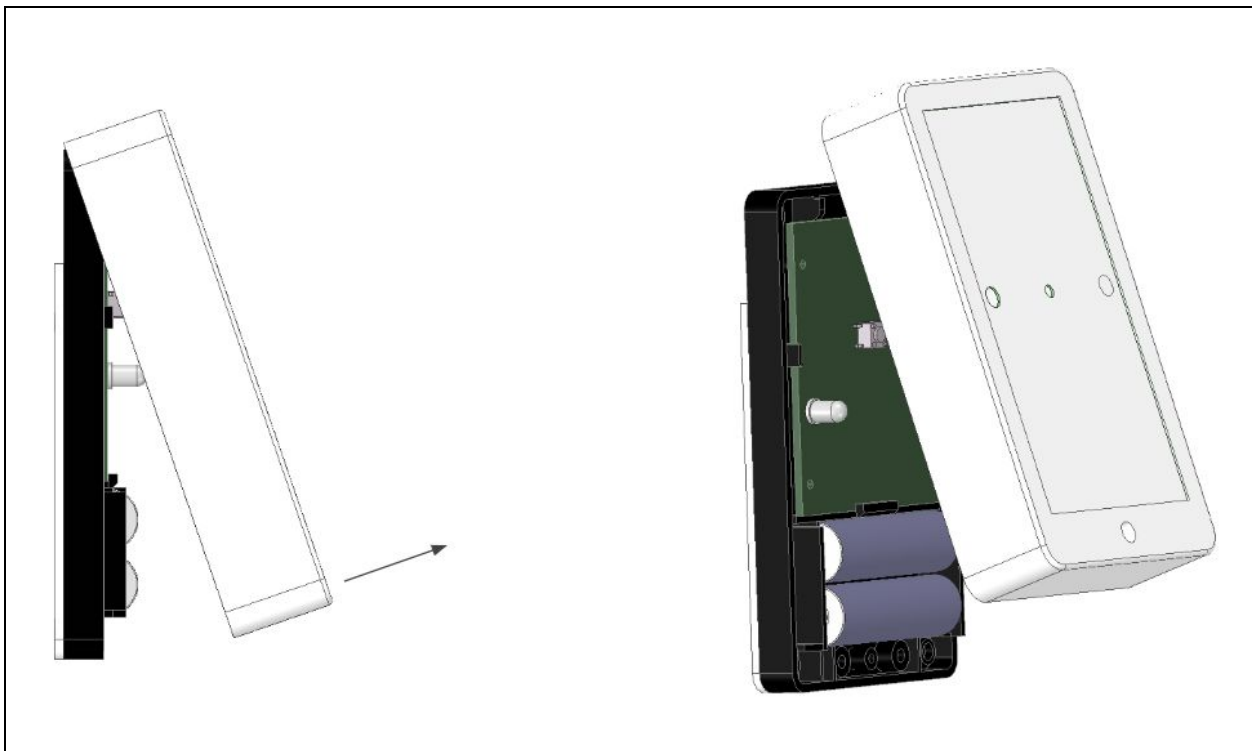
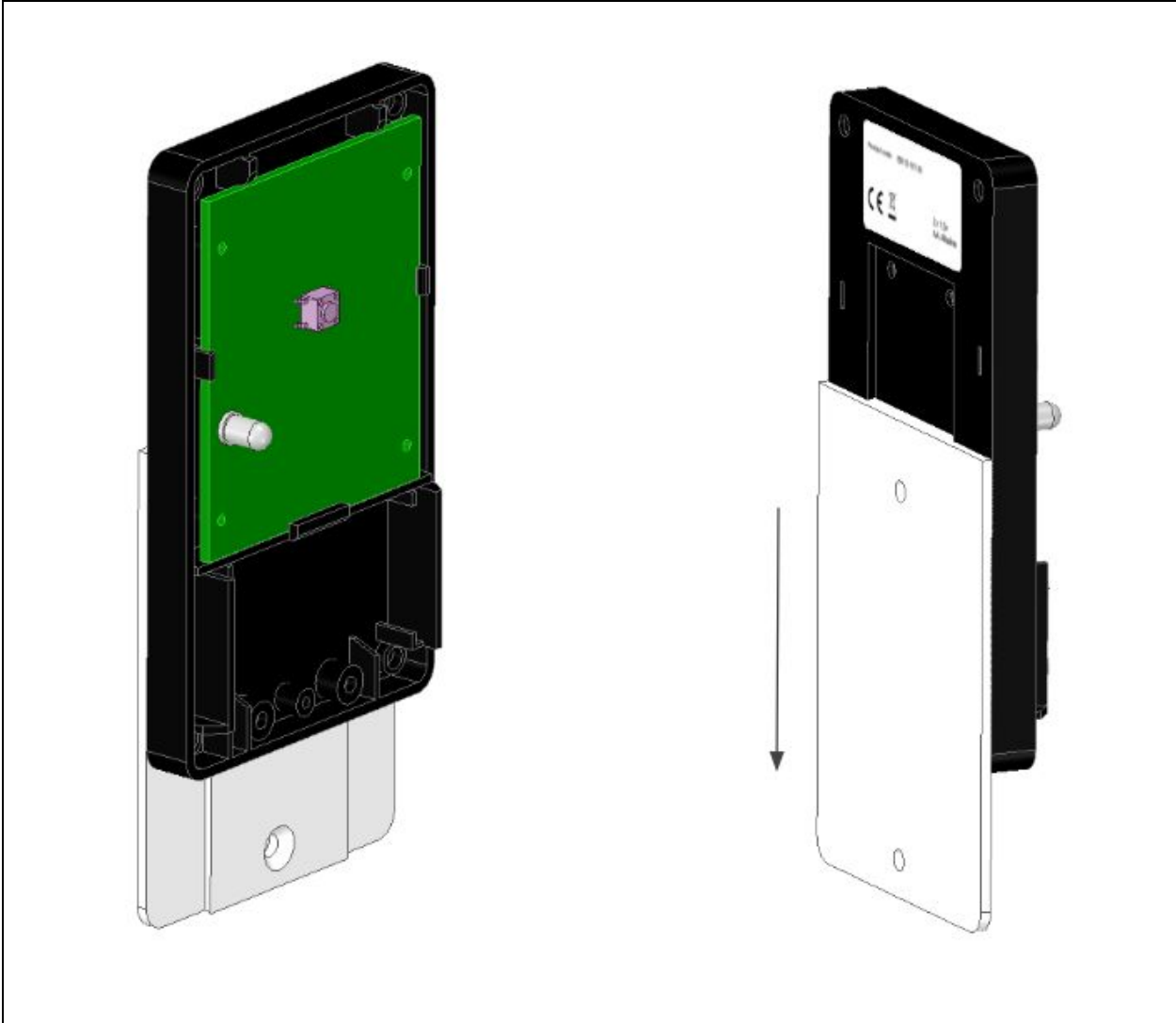


Image: Using the included bracket



## 6.2 Count directions

The LoRaWAN People Counter counts bi-directional, described as Counter A (In) and Counter B (Out). Please check the sticker on the backside to view these count directions.



## 6.3 Mount the People Counter

When mounting the People Counter take care of the following:

- The maximum distance between the transmitter (Tx) and receiver (Rx) is 8 meter.
- To count adults we recommend to use a mounting height between 125cm and 140cm.
- Use a wall or another steady object to mount the People Counter on.

## 6.4 Additional information

The maximum measurement width of 8 meter will decrease when the infrared signal goes through glass or when full sunlight is shining directly into the receiver at a low angle.

## 6.5 ENI (Enhanced Noise Immunity)

The LoRaWAN People Counter is featured with ENI. The ENI uses DSP technology to filter out disturbances received from the environment like AM anti-shoplifting systems and pulsating infrared sources.

In case there is too much noise received, the red led will light up. In this case find the cause of the disturbance and try to take it away.

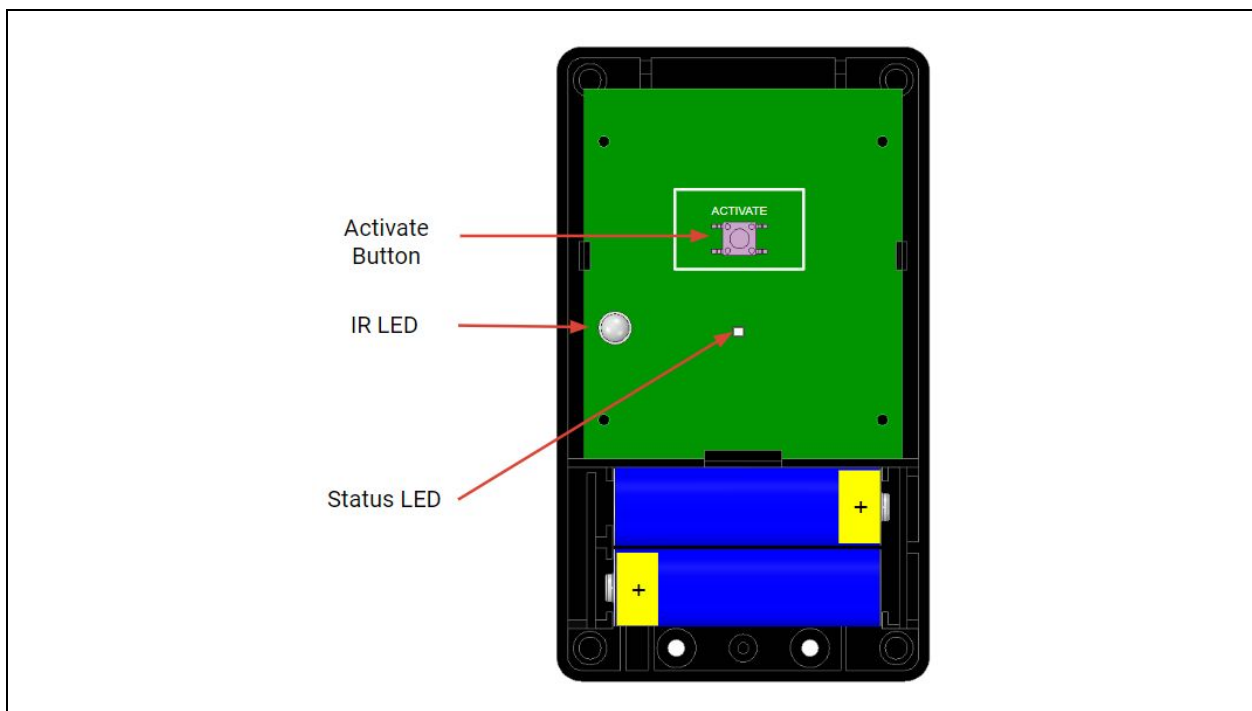
## 7. Power on

### 7.1 IR Transmitter

Place the batteries into the IR transmitter to power on the device.

To activate the IR Transmitter press and release the small Activation Button. The status LED will blink **RED** twice during activation.

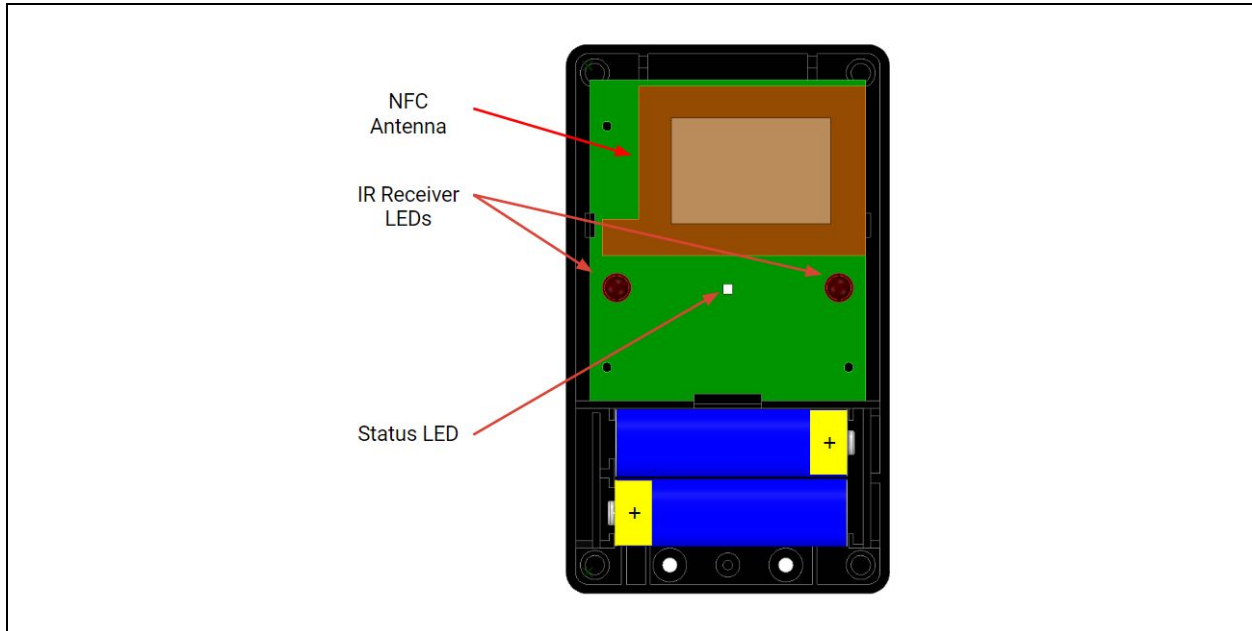
**Image: IR Transmitter inside**





## 7.2 IR Receiver

When placing the batteries in the IR receiver the device will guide through the installation procedure.



Please read the following about this procedure

### 7.2.1 Power On:

LED blinks orange	Battery voltage too low. Cause: empty batteries or rechargeable batteries placed. <b>The device halts here</b>
LED is orange for 2 seconds	used batteries are detected at power up
LED is blue	No or incomplete settings. <b>The device halts here</b>
LED is blinking blue	Building connection with the LoRaWAN network
LED is green for 2 seconds	Connected. Device is now in validation mode

## 7.2.2 Validation mode

This mode is active for 2 minutes.

*You can enter this mode anytime by sliding a magnet over the magnet area. When using the magnet the device will first into alignment mode for 1 minute before entering the validation mode.*

Within the validation mode the led will **blink green** when an count is registered. Please make some counts.

**Note:** In case you don't see a green blink please check the alignment of the People Counter first. This is described in the next chapter 'Alignment mode'

When the validation mode is ending the **blue led will blink** indicating the first validation counts are send away over the LoRaWAN connection.

At this moment we recommend to check if the data was received by the LoRaWAN network/platform or software platform.

## 7.2.3 Counting mode

Within this mode the device will not show any LED information.

Once every n minutes the data is send using the LoRaWAN connection. This interval was set during the configuration of the device using NFC.

## 7.3 Alignment mode

To have accurate counting the receiver needs to 'see' (be in alignment with)the IR transmitter.

The IR receiver contains an alignment mode which helps to point the IR transmitter to the IR receiver. To enable the alignment mode slide the magnet on the top of the IR receiver [magnet area]. When the led is blinking **RED** you need to point the IR transmitter to the IR receiver until the led lights up **GREEN** continuously.

Please try to find the middle of the infrared light beam during the alignment.

## 7.4 Accuracy of the People Counter

The accuracy of the People Counter will be higher when the distance between the IR transmitter and IR receiver gets smaller. When multiple people interrupt the infrared beam at once the People Counter will increase the count value by one.

## 8. Ordering information

All items do have a product code. These codes are on the back side of the product.

Below a list of related products and their product codes:

### 8.1 People Counter sets

Product code	Product name
IB010-001.00	LoRaWAN People Counter set EU868 <b>Contains: IB010-100.00, IB010-101.00</b>
IB010-002.00	LoRaWAN People Counter set US915 <b>Contains: IB010-102.00, IB010-101.00</b>

### 8.2 People Counter parts

Product code	Product name
IB010-100.00	LoRaWAN People Counter Rx EU868 <b>IR Receiver part</b>
IB010-102.00	LoRaWAN People Counter Rx US915 <b>IR Receiver part</b>
IB010-101.00	People Counter Tx <b>IR Transmitter part</b>

### 8.3 Accessories

Product code	Product name
IB001-003.00	Alkaline battery 1.5V (4pcs)
IB001-002.00	Lithium battery 1.5V (4pcs)
IB001-004.00	Magnet key hanger
IB001-005.00	Screw driver (small)
IB002-001.00	People Counter black covers (2pcs)
IB002-002.00	People Counter robust housing (2pcs)

## 9. Related information

Below a list links to related information.

Every link except for the IMBUILDINGS section are externally. In case links are broken please contact us.

### IMBUILDINGS

[Product Catalog](#)

[LoRaWAN People Counter Productsheet](#)

[Reference guide for System Integrators](#)

## Notes

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