YOSENSI.IO

YO People Counter

User guide v1.2

Release notes

Released	Version	Key changes
10.02.2023	1.0	Initial release.
31.07.2023	1.1	Changed payload description. Since firmware 3.5.0 YO People counter sends two LoRa frames. First with measurement of battery, humidity and temperature. Second with motion detection. Changed description of connecting nodes with Yosensi Management Platform
26.10.2023	1.2	Added configuration with Yosensi Mobile App.

Content

Product description

Overview

YO People Counter is a bi-directional device that uses a novel 24 GHz radar transceiver to detect motion from both directions simultaneously. This device detects a person moving independently when a certain distance exists between people. This device counts people flow in buildings, exhibitions, and airports. Users should install the device near the entrance of the building. A narrow corridor is recommended to allow the device to work properly. Also, it should not be mounted where its field of view is close to the moving objects, such as sliding doors.

Figure 1 **Device top view.**

Device sticker placed on the right side of the device enclosure contains information about model, version, LoRaWAN region and 3 parameters important in case of device identification and configuration:

- **DEV EUI:** 64-bit unique device identifier in a LoRaWAN network,
- **DEV ADDR:** address required to connect via ABP activation type to LoRaWAN,
- **BLE MAC:** bluetooth physical address.

Figure 2 **Device sticker.**

Physical interfaces

LEDs

YO People Counter communicates its current behaviour to the user by RGBW LED placed next to the reset button. Figure 3 indicates its location.

DIODE STATUES INTERPRETATION

BEHAVIOUR	COLOUR	DEVICE STATUS
Single flash	Green	**General:** device is working correctly (power and memory). The device detected and counted a person nearby
Single flash	Red	**General:** device is working incorrectly (power and memory). **LoRaWAN communication:** failed to receive an acknowledgement from LoRaWAN Server within specified timeout.
Single flash	White	**LoRaWAN communication:** LoRaWAN frame sent \ confirmation from LoRaWAN Server after receiving the frame.
Slow flashing	Blue	**BLE communication:** connection to the device via BLE (configuration).
Rapid flashing	Blue	**LoRaWAN communication:** connecting to LoRaWAN network.

Buttons

YO People Counter is equipped with a reset button inside the device. Figure 3 indicates its location. To reset the device you need a thin stick to push the button.
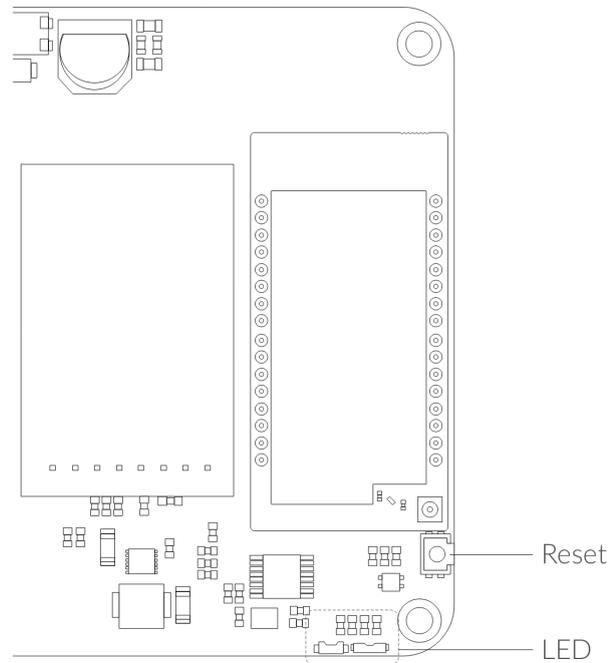

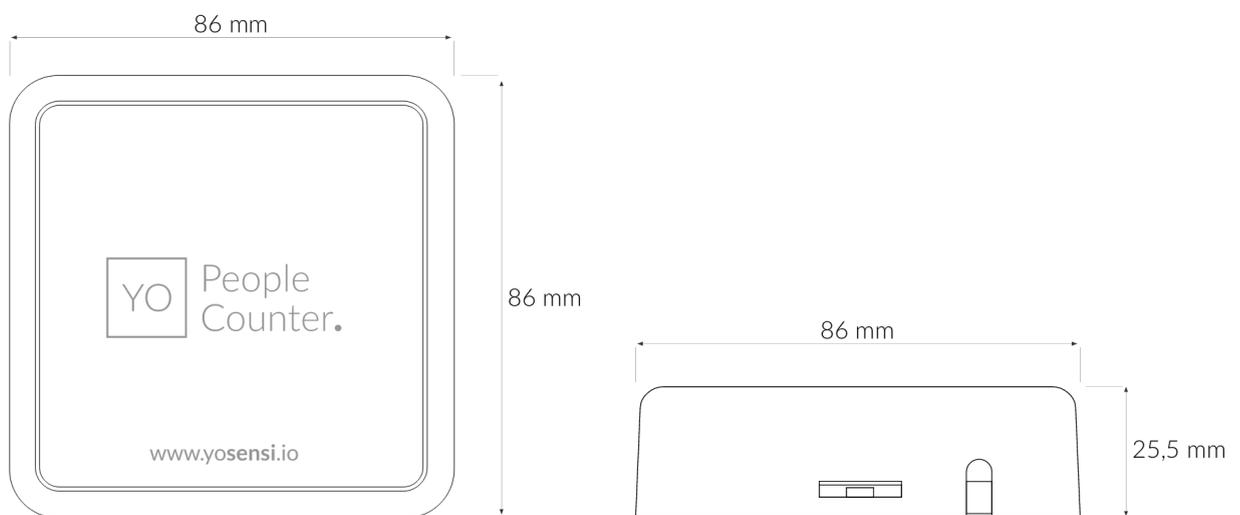*Figure 3 Device reset button location.*

Specifications

Physical

Figure 4 Dimensions of the device.

PHYSICAL SPECIFICATION

Dimensions	Height: 25.5 mm Width: 86 mm Depth: 86 mm
Colour	White
Mounting method	Horizontal Vertical (can be screwed to the wall)
Enclosure material	ABS
Level of protection	IP40, UL94-V0
Weight	91 g

Operating conditions

OPERATING CONDITIONS

Temperature	0° to 70°C
Humidity	0 to 90%
Placement	Indoor use
Power supply	USB-C 5 V DC 6 - 30 V DC 5 - 21 V AC
Power consumption	44 mA (normal work), 100 mA (max peak) - at 5V supply voltage
Technology	Radar Frequency: 24 GHz Beam Aperture: 80° / 34° Range: 10-500cm

Measured values

MEASUREMENT RANGES

Parameter	Measuring range	Accuracy
Temperature (internal)	-40°C to 125°C	±0,2°C (from 5°C to 60°C)
Relative humidity	0% to 100%	±2% (at 20% to 80%)
Left-to-right counter	0-2147483647 (int32)	-

Right-to-left counter	0-2147483647 (int32)	-
Sum-of-left to right counts	0-2147483647 (int32)	-
Sum-of-right to left counts	0-2147483647 (int32)	-
Difference between sum counts	0-2147483647 (int32)	-

Internal Temperature and relative internal humidity

Sensors placed inside the device enclosure measure temperature and relative humidity. These measurements monitor if the device is working in recommended conditions.
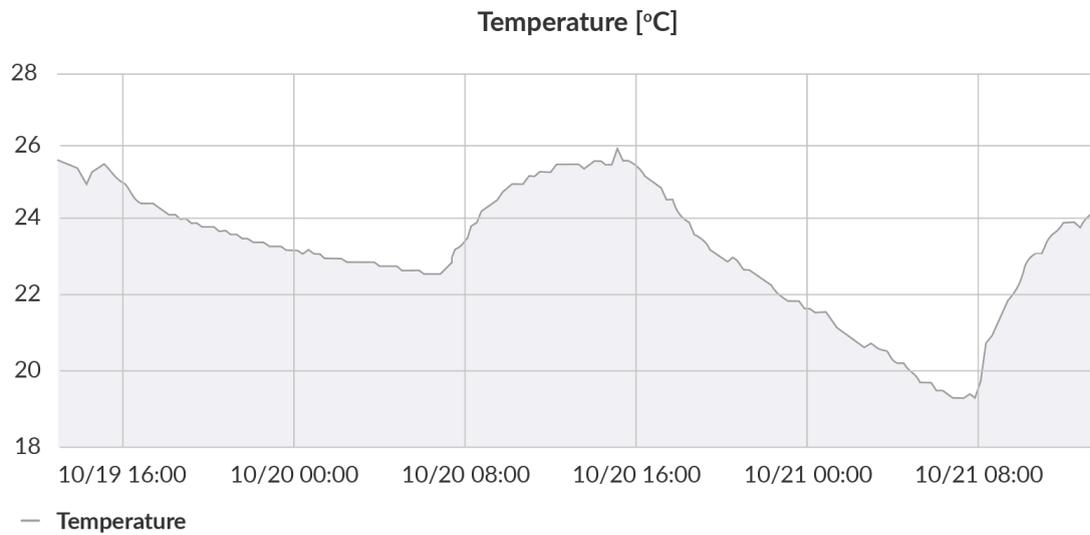
Temperature [°C]

Figure 5 Internal temperature example chart.
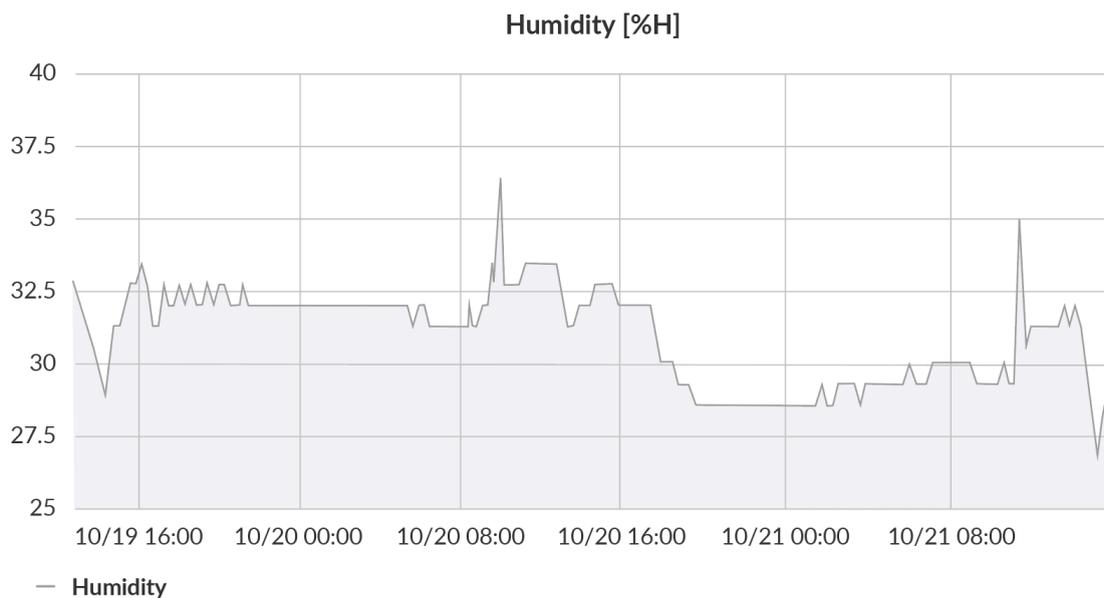
Humidity [%H]

Figure 6 Internal humidity example chart.

People counts from left to right and right to left

Counts are the result of capturing people movement within the field of the radar located inside the device's enclosure. The measurements monitor the flow of people or objects from left to right side and right to left.
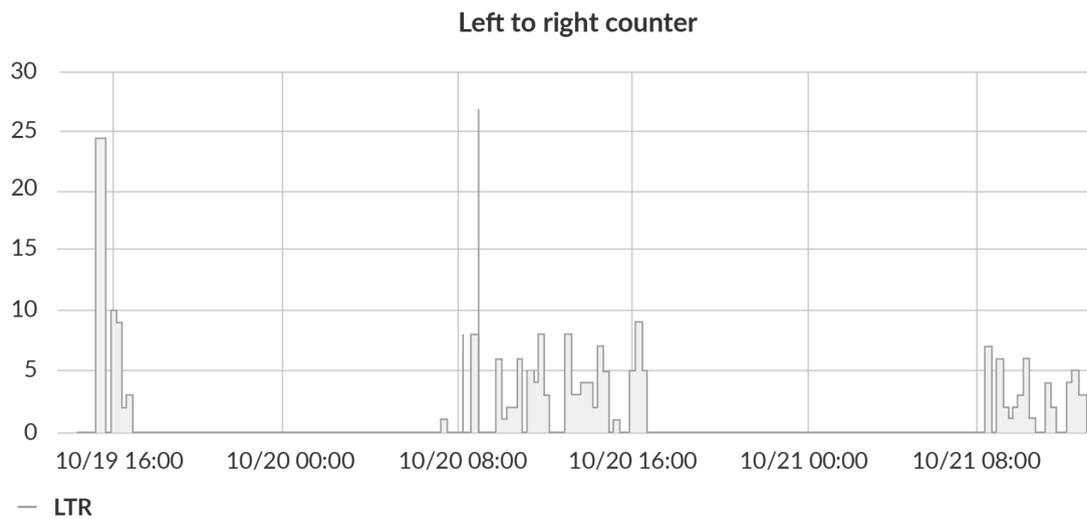
Left to right counter

Figure 7 Left-to-right counts example chart.

Right to left counter
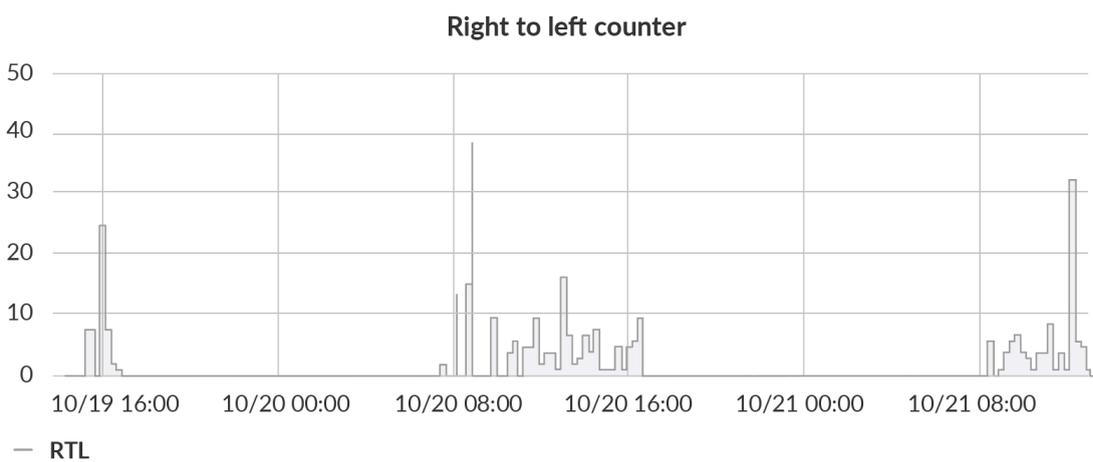
Figure 8 Right-to-left counts example chart.

People counts sum from left to right and right to left & the difference between both sums

The device sums the counts to check how many people passed by a sensor in both directions. It compares those counts, and the difference of amount measurements gives the total people flow in the building. The result shows the difference between the sum of people that entered and people that left the room where the sensor is mounted.

Sum of right-to-left counts
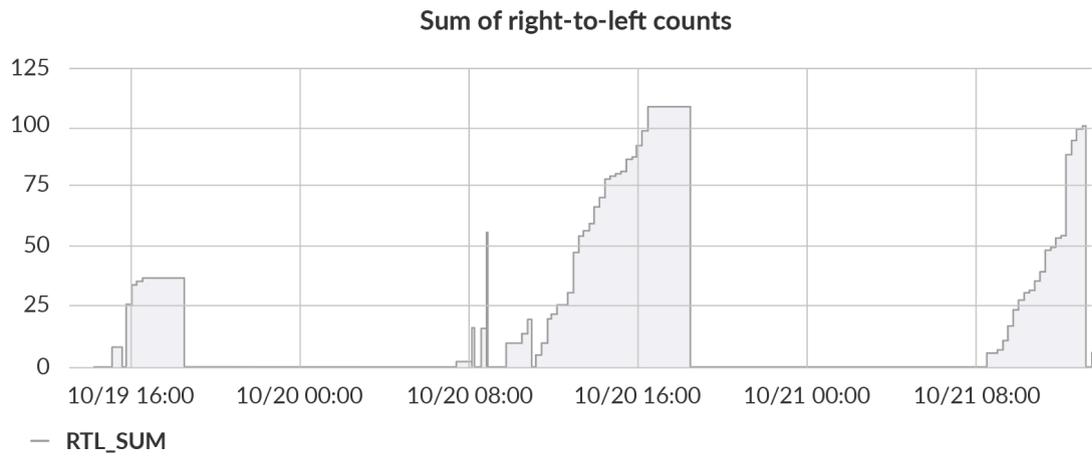

Figure 9 Sum of right–to-left counts in the example chart.

Sum of left-to-right counts
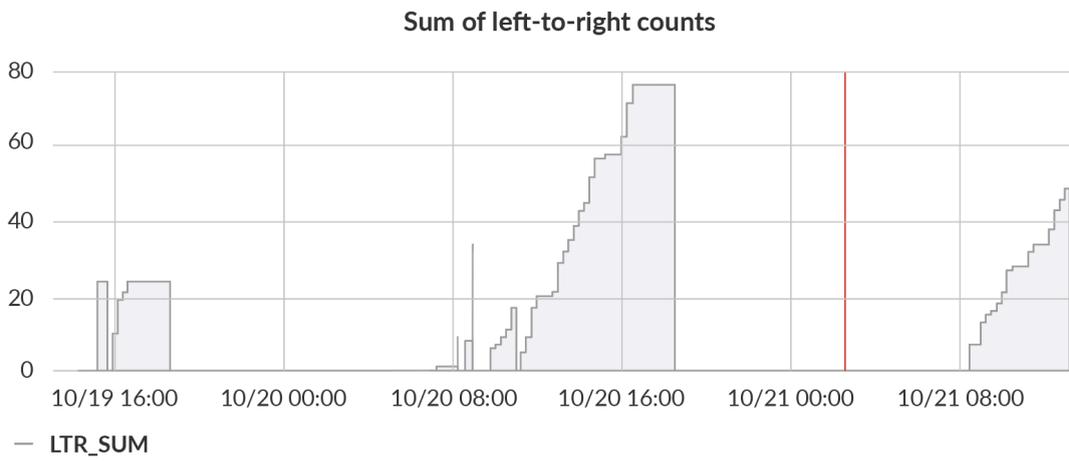
Figure 10 Sum of left-to-right counts in the example chart.

Difference between LTR_SUM and RTL_SUM
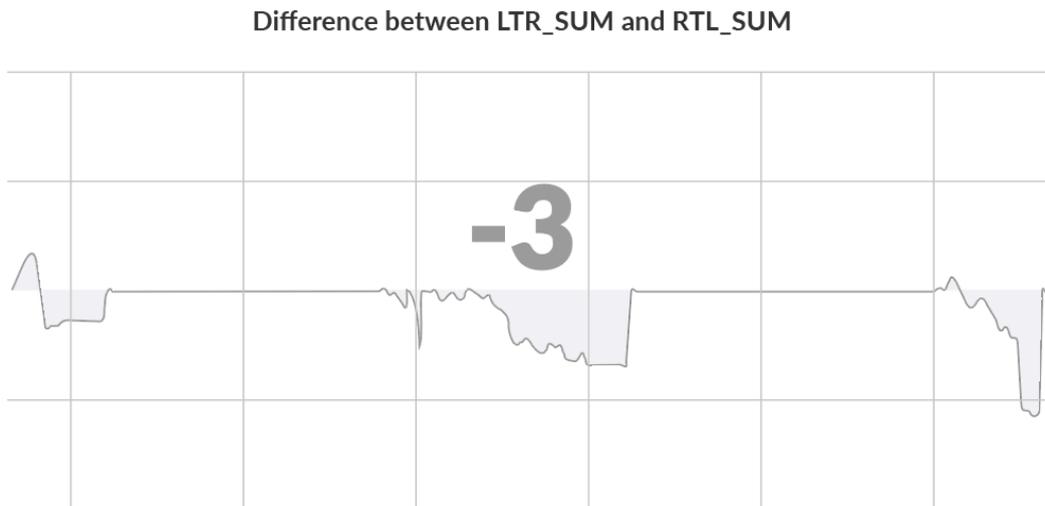

Figure 11 Difference between both count sums in people flow, the example chart.

Power supply voltage

The supply voltage monitors the operating conditions of the device. With this data, it is possible to detect anomalies and voltage fluctuations that may affect its correct operation.
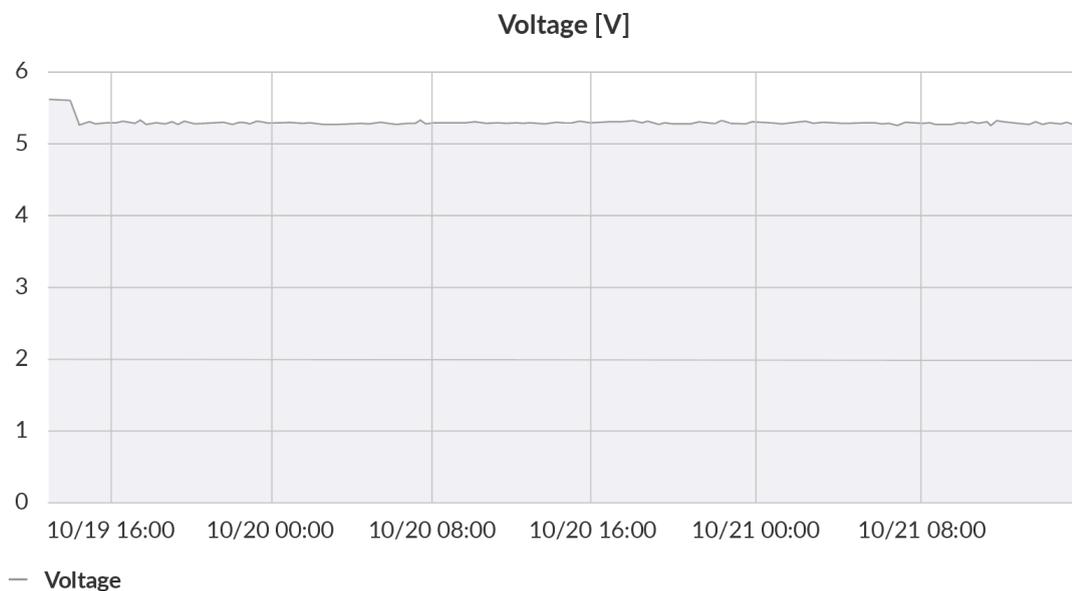
Voltage [V]

— **Voltage**

Figure 12 Power supply voltage example chart.

Installation

Package contents

1. Device.
2. Warranty card.

Safety precautions

SAFETY PRECAUTIONS

SYMBOL	DESCRIPTION
	Device is marked with a symbol saying that electrical and electronic products may not be mixed with unsorted household waste. Remember that batteries used to power the device must be treated at a specialised treatment facility.
	Remember about possible electrostatic discharge when replacing battery, connecting input or doing some other operations near inside electronics.
	Be careful while handling the device – dropping it may cause damage that will affect the sensors and other electronics inside.
	When installing the device on the wall remember to wear adequate protective equipment.
	To maintain the level of protection device cover screws must be properly tightened. Device shouldn't be used without cover.
	Any actions inside the device's enclosure (excluding replacing batteries) must be performed by trained personnel only.
	Clean the device only with damp cloth.
	Device is intended for indoor use. Make sure that device is not exposed for long term UV rays and in an environment in the immediate vicinity of water which may flood the device

Installation guide

1. Important! Figure 12 shows the direction of detection, this must be taken into account when mounting the device.

Figure 13 Showing the direction of detection.

2. To open the enclosure, peel off the lower part, as shown in Figure 13.
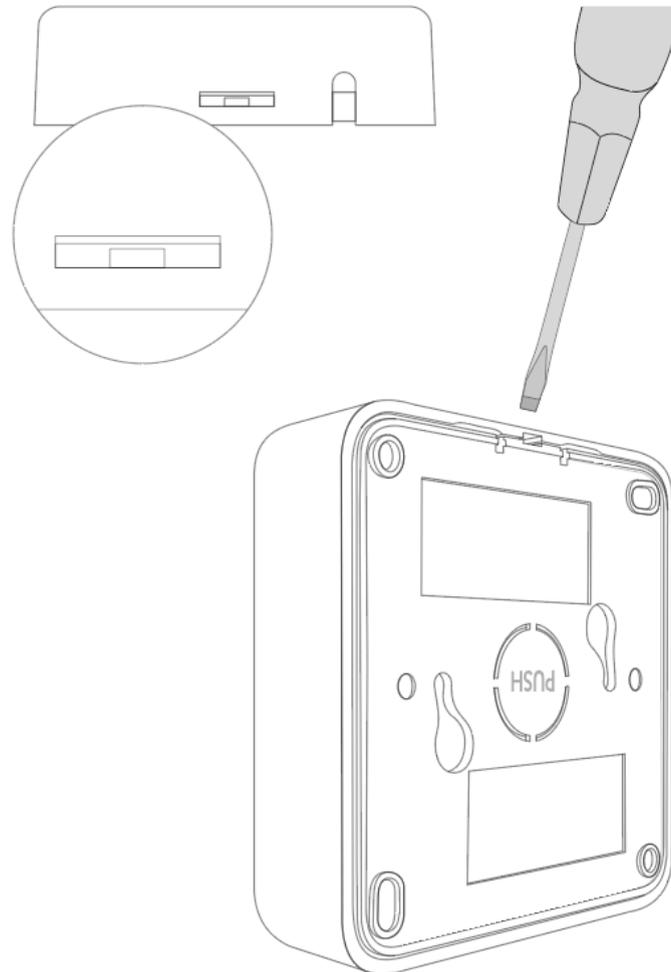
Figure 14 Opening the enclosure of the device.

3. YO People Counter can be powered in via USB-C connector, via power supply 6-30 DC or 5-21 AC. There are two ways to connect the device to the power supply.
   A. The user must break the centre plastic circle labelled PUSH out of the mounting bracket before installation. After that, route the cable through the centre hole of the bracket.
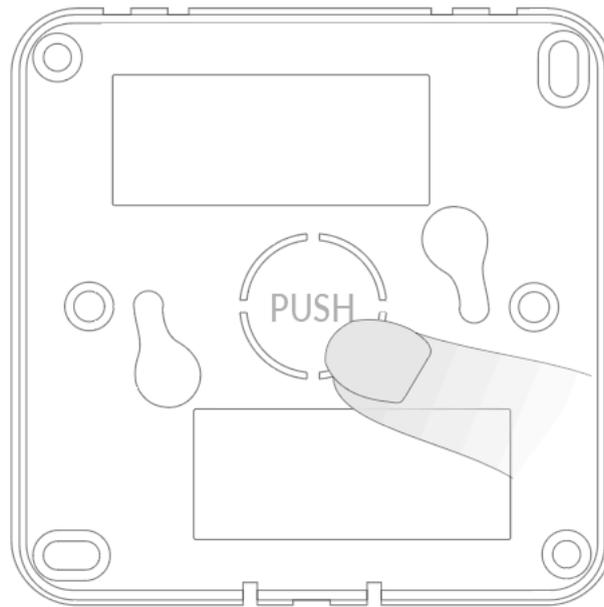
Figure 15 Breaking out the plastic circle labelled PUSH.
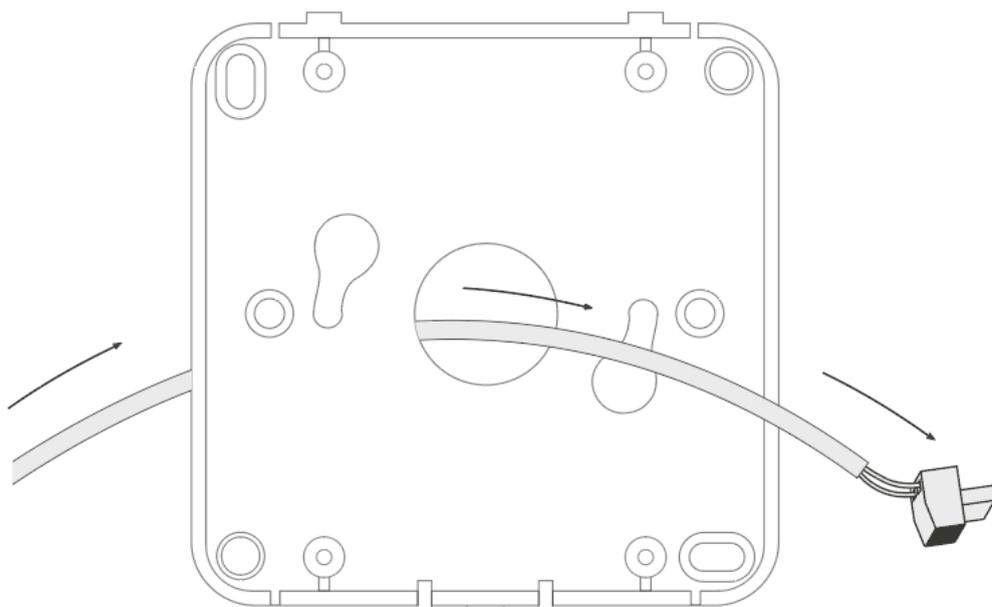
Figure 16 Routing the power supply connector through the centre hole.
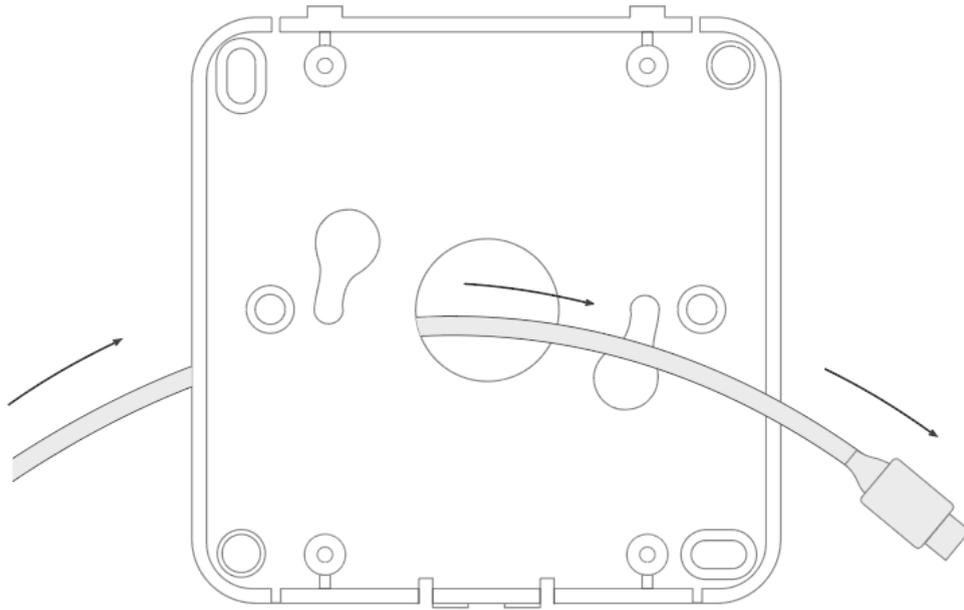
Figure 17 Routing the USB-C cable through the centre hole.

A. The second option is routing the wire through the hole in the mounting bracket. You can route the USB-C cable, 6-30 DC or 5-21 AC power supply cable depending on the supply you need.
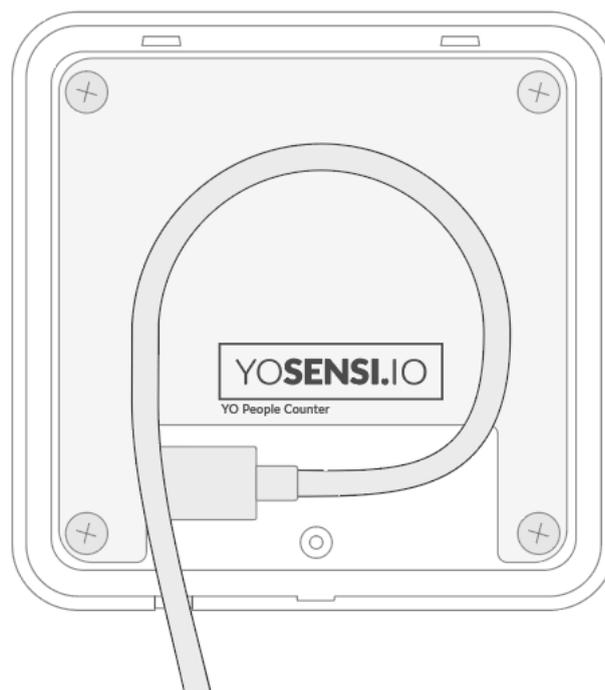
Figure 18 Routing the USB-C cable through the hole in the bottom of the device.
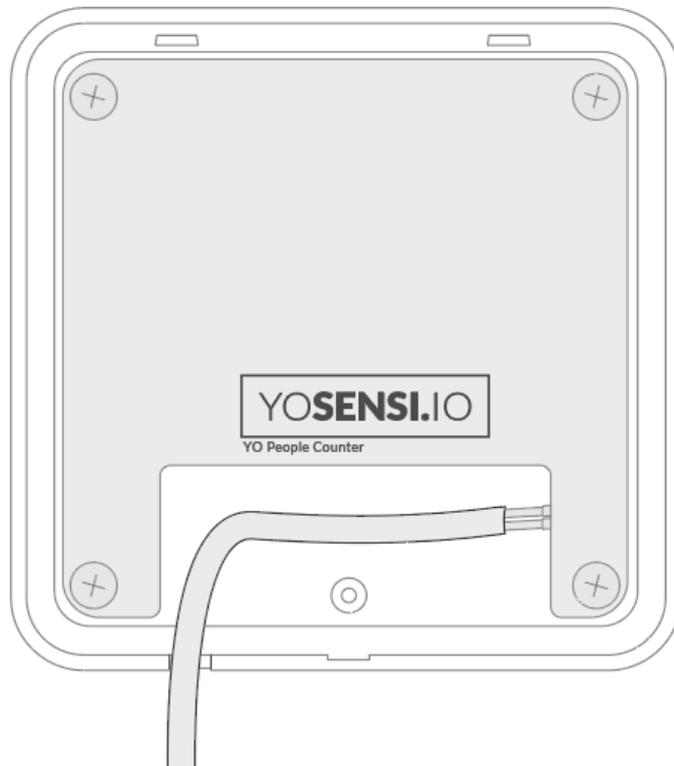
Figure 19 *Routing the power supply cable through the hole in the bottom of the device.*
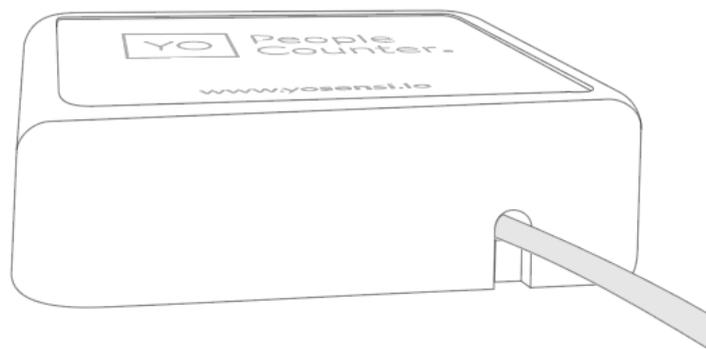
Figure 20 *Bottom view of the device after connecting the supply via the bottom hole.*

4. There are two ways to mount the device into a wall.
   A. Install the bottom part of the enclosure and mount four screws in each corner to the wall.
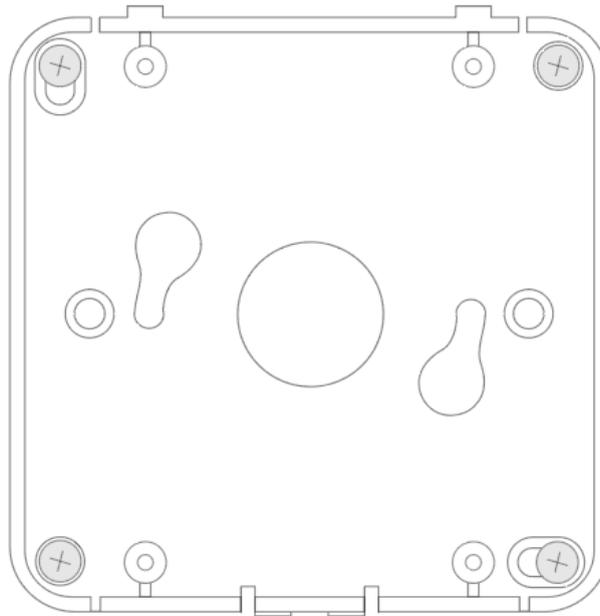
Figure 21 Mounting the device using four screws.

   B. Fit two mounting screws into the centre of the bottom case. Then, angle the bottom of the enclosure and turn it clockwise.
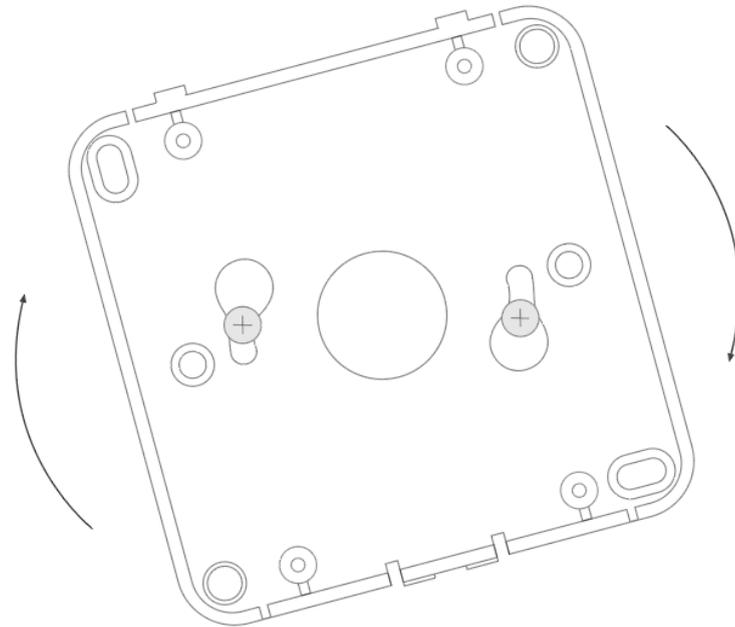
Figure 22 Mounting the device using two screws at an angle.
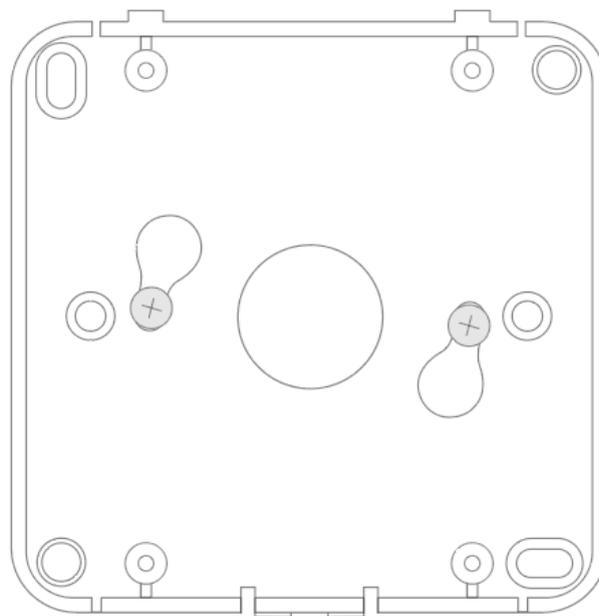
Figure 23 Mounting the device using two screws after a clockwise turn.

Remember to route the supply cable through the centre of the bottom enclosure before mounting it to the ceiling or a wall.

5. Place the upper part of the device enclosure on the bottom part mounted on a wall.
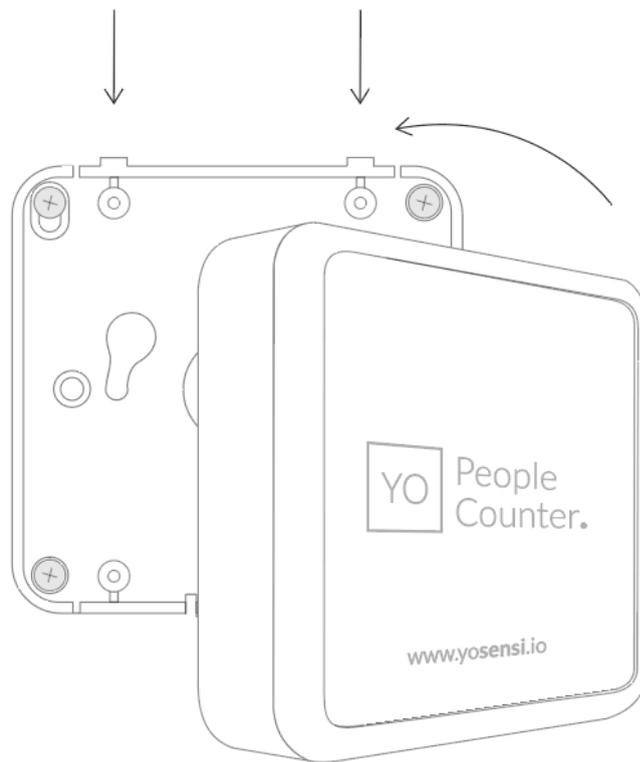
Figure 24 Placing the top of the enclosure on the mounting bracket.

Operation

IoT system components

Typical IoT systems consist of 3 main elements *(Figure 24)*, brief described below. In order to set communication, each element must be properly configured.

1. **Node** – device with sensors and a wireless communication module that gathers data, forms the payload and sends it to the gateway.
2. **Gateway** – device similar to routers, equipped with a LoRa concentrator, that receives LoRa packets and sends them to the Internet-connected server.
3. **Server** – in most cases, a cloud-based service where data is processed, stored, analysed, and presented in user-friendly ways (via a user interface); Yosensi default and recommended tools are Yosensi Management Platform (for IoT structure management) and Grafana (for data presentation).
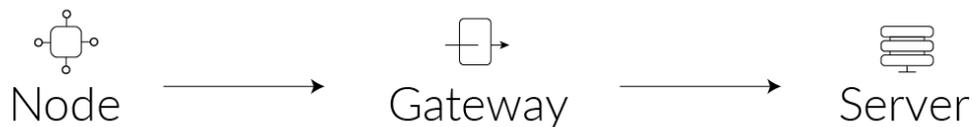
Figure 25 IoT system components.
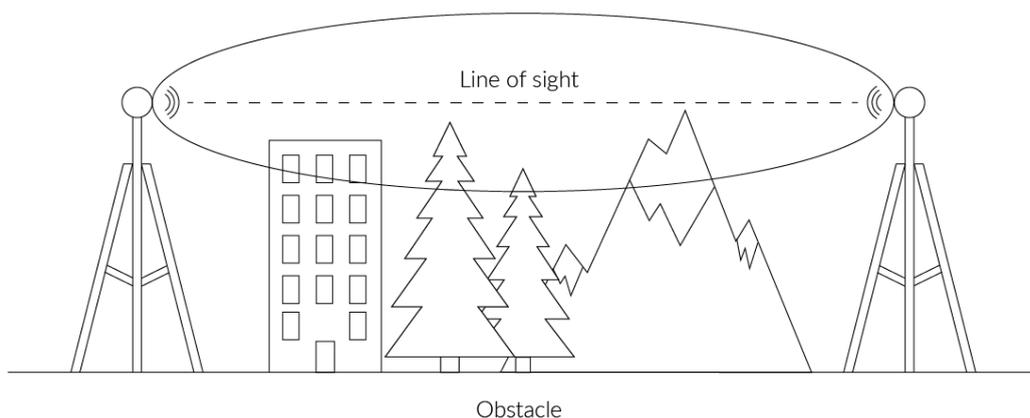
Figure 26 Fresnel zone where communication between two antennas can occur.

Device configuration

A few parameters must be set before sending data to the gateway. The default firmware is configured in OTAA mode with predefined *deveui*, *appkey (OTAA)* and *appskey, nwkskey (*ABP*)*.

Configuration of the device is stored in a JSON file divided into the following sections:
- **info** (generic, read only): information about the device,
- **lorawan** (generic): configuration data for LoRaWAN connection,
- **ble** (generic): bluetooth settings,
- **device** (dynamic): individual configuration for a specific device (this section's structure differs for each device),
- **detection area** (dynamic): individual configuration for the YO People Counter that detects counts by various parameters. Depending on the application of the sensor in this section, you can configure its features.
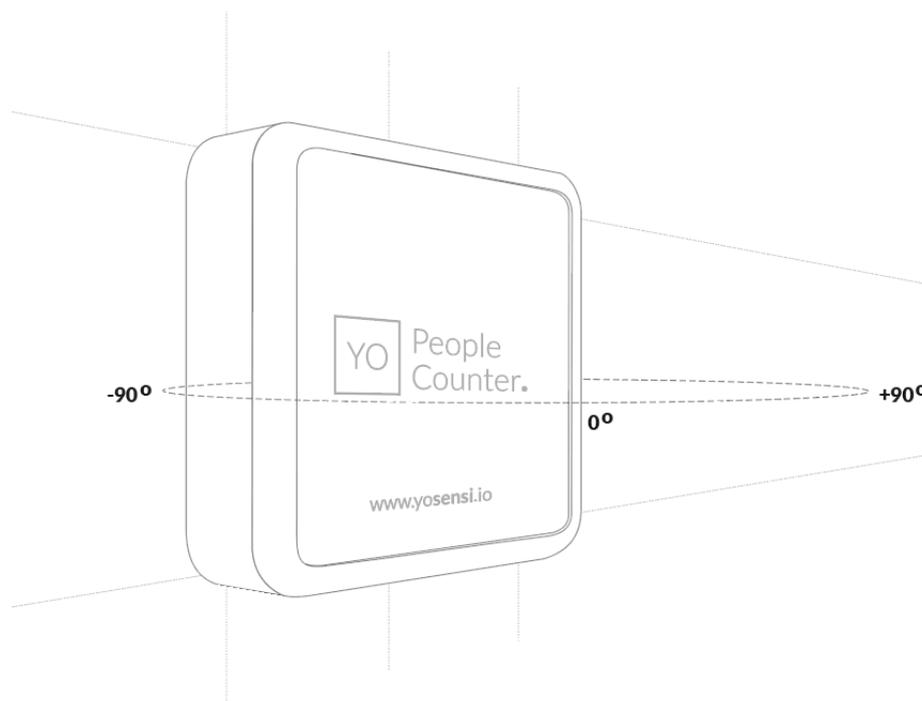
Figure 27 Definition of positive and negative angles in the detection area. Positive values of the beam angle are more to the left side from the centre of the device, and negative values are more to the right side of the threshold. A beam angle equal to zero means the object is in front of the device.

Sample configuration file for the YO People Counter device.

```json
{
        "info": {
                "devmodel": "LNRP",
                "fwver": "3.6.1",
                "loraradio": "SX1261",
                "lorawanver": "1.0.2",
                "loraregion": "EU868",
                "blemacaddr": "0123456789ab"
        },
        "lorawan": {
                "subband": 1,
                "nwktype": "public",
                "acttype": "otaa",
                "otaa": {
                        "deveui": "0123456789abcdef",
                        "appeui": "fedcba9876543210",
                        "appkey": "000102030405060708090a0b0c0d0e0f",
                        "trials": 3
                },
                "abp": {
                        "devaddr": "01234567",
                        "nwkskey": "0123456789abcdef0123456789abcdef",
                        "appskey": "000102030405060708090a0b0c0d0e0f"
                }
        },
        "ble": {
                "power": 0,
                "interval": 1600
        },
        "device": {
                "measinterval": 900,
                "clearsumtime": 120
        },
        "detectionarea": {
                "radarfreq": "low",
                "holdtime": 1,
                "sensitivity": 30,
                "beamanglemin": -30,
                "beamanglemax": 30,
                "beamanglethreshold": 0,
                "distancerange": 10,
                "distancemin": 0,
                "distancemax": 50,
                "distancethreshold": 10,
                "speedrange": 25,
                "speedmin": 0,
                "speedmax": 100,
                "speedthreshold": 50,
                "direction": "approach",
                "trackfilter": "standard",
                "defaultsettings": "no"
        }
}
```

GENERICS PARAMETERS

SECTION	NAME	DESCRIPTION	POSSIBLE VALUES	DEFAULT VALUE	READ/WRITE
info	devmodel	Device name	-	LNRP	R
	fwver	Firmware version	-	3.6.1	R
	loraradio	Radio chipset model	-	SX1261[1]	R
	lorawanver	LoRaWAN stack version	-	1.0.2	R
	loraregion	LoRaWAN region	-	EU868[1]	R
	blemacaddr	Bluetooth LE address	-	predefined	R
lorawan	subband	Uplink subband number	Table[2]	predefined	R/W
	nwktype	Network type	public, private	public	R/W
	acttype	Activation type	otaa, abp	otaa	R/W
lorawan-otaa	deveui	Device EUI (Extended Unique Identifier)	8 B (HEX)	predefined	R/W
	appeui	Application EUI	8 B (HEX)	predefined	R/W
	appkey	Application Key	16 B (HEX)	predefined	R/W
	trials	Join request trials	1-9	3	R/W
lorawan-abp	devaddr	Device Address	4 B (HEX)	predefined	R/W
	nwkskey	Network Session Key	16 B (HEX)	predefined	R/W
	appskey	Application Session Key	16 B (HEX)	predefined	R/W
ble	power	Bluetooth LE transmit power [dBm]	0[4]	0	R/W
	interval	Bluetooth LE advertising interval [ms]	MS_INPUT[3]	1600	R/W

[1] LoRa radio chipset used defines the LoRaWAN region: SX1261 - EU868; SX1262 - AU915, US915, AS923

[2] Uplink subband list for specific LoRaWAN regions - UPLINK SUBBAND Table.

[3] Calculation formula: $MS\_INPUT = INTERVAL\_MS \times 1.6$.

[4] Change currently not supported.

DEVICE PARAMETERS

NAME	DESCRIPTION	POSSIBLE VALUES	DEFAULT VALUE	READ/ WRITE
measinterval	Measuring and sending interval LoRa [s]	120–999999 [s]	900 [s]	R/W
clearsumtime	Clearing the sum of people counters detection. Setting value to 0 equals to disable refreshing counters.	0-1440 [min]	120 [min]	R/W

DETECTION AREA PARAMETERS

NAME	DESCRIPTION	POSSIBLE VALUES	DEFAULT VALUE	READ/ WRITE
radarfreq	Frequency channel of the radar sensor	Low, middle, high	low	R/W
holdtime	Time between measurements. It is counted after the radar loses the object from its field of view	1-7200 [s]	1	R/W
sensitivity	The sensitivity of the device sensor in [dB]. The highest is 10; 60 is the lowest	10-60 [dB]	30	R/W
beamanglemin	The minimum beam angle of the sensor. The parameter describes the field of view of the device	$-90° \div 90°$	-30	R/W
beamanglemax	The maximum beam angle of the sensor. The parameter describes the field of view of the device	$-90° \div 90°$	30	R/W
beamanglethreshold	The beam angle threshold for the object approaching or moving away from the sensor	$-90° \div 90°$	0	R/W
distancerange	Setting maximum distance range of sensor	5m, 10 m, 30m, 100m	10	R/W

distancemin	Minimum distance detection field based on the percentage value of distancerange parameter	0-100[%]	0	R/W
distancemax	Maximum distance detection field based on the percentage value of distancerange parameter	0-100[%]	50	R/W
distancethreshold	Distance in percentage value of the distancragne parameter that determines the detection of an object below or above the given distance value	0-100[%]	10	R/W
speedrange	The parameter that sets the speed range of measurement	12.5 km/h, 25km/h, 50km/h, 100km/h	25	R/W
speedmin	The minimum speed in percentage value of speedrange	0-100[%]	0	R/W
speedmax	The maximum speed in percentage value of speedrange	0-100[%]	100	R/W
speedthreshold	The speed in a percentage value of the speedrange parameter that determines the detection of an object going below or above a given value	0-100[%]	50	R/W
direction	About the direction of objects approaching the sensor or moving away	Receding, approaching, both	approach	R/W
trackfilter	Parameters that determine and filter the target type(standard). Parameter for fast detection of a target (fast). Parameter with high immunity to interference and prediction to lost target (long)	Standard, fast, long	standard	R/W
defaultsettings	Setting default values of all detection area parameters	no, yes	no	R/W

Parameter description

- **nwktype:** used for setting the device in public or private network type.

- **acttype:** used for setting the device in ABP or OTAA mode.

- **deveui, ..., appskey:** predefined addresses and keys. These parameters are generated using multiple IDs specific to the particular MCU and are unique for each device. They can be changed if needed.

- **interval:** determines the interval of sending broadcast packets, used to connect to every BLE receiver around the device.

- **subband:** sets the communication frequency sub-band in LoRaWAN.

- **measinterval:** measurement interval [s] between sending LoRa packets

- **clearsumtime:** if, after a given time, there is no movement detected, the device clears its counters.

- **radarfreq:** frequency channel of the radar sensor mounted on the device.

- **holdtime:** parameter that keeps the information about tracking an object or person passing by from one side to another. It counts the time between additional measurements after the object leaves the radar field of the view.

- **sensitivity:** sensitivity of radar to detect people passing by near device value in dB, 10 is the highest, and 60 is the lowest.

- **beamanglemin:** It describes the field view of the sensor. The minimum beam angle of the sensor detects a person passing a field view of the device. The angles locate on which side the target is. Negative or positive defines a wider or shorter target detection field.

- **beamanglemax:** It describes the field view of the sensor. The maximum beam angle of the sensor detects a person passing a field view of the device. The angles locate on which side the target is. Negative or positive defines a wider or shorter target detection field.

- **beamanglethreshold:** It describes the field view of the sensor. A parameter in an angle checks when the person or object moves a nearby sensor from one side to another. The default value of zero means the person who went from the left or right side informs the sensor about approaching or moving away.

- **trackfilter:** there are three types of track filters. First, the 'standard' filter tracks various targets, such as cars or persons. Second, the 'fast' filter enables faster detection of targets with the disadvantage of reducing immunity against reflections and other interferences. Third, the 'long' filter has high immunity against interference and a high prediction of temporarily lost targets.

- ***defaultsettings:*** parameter that helps the user return to default settings in case of a mistake during device configuration. To set the default setting, type 'true' and upload it to the device.

Parameter description for additional future usage

- ***distancerange:*** maximum distance range for measurements.

- ***distancemin:*** minimum distance given in percentage value of **distancerange** parameter between device and person.

- ***distancemax:*** maximum distance given in percentage value of **distancerange** parameter between device and person.

- ***distancethreshold:***. The parameter detects the object after entering the field view sensor. After sensing a target above the threshold given in a percentage of the maximum distance, it provides information about the target approaching the sensor or moving away from it.

- ***speedrange:*** speed range detection of a walking person or object that approaches the sensor field view.

- ***speedmin:*** minimum speed given in a percentage of the speed range parameter.

- ***speedmax:*** maximum speed given in a percentage of the speed range parameter.

- ***speedthreshold:*** parameter that is a percentage of the speedmax parameter. After detecting a moving object in the field view of the sensor, it calculates how fast the target is moving. When the movement of an object is tangential, the speed needs to be adjusted by the angle of the movement compared to the sensor.

- **direction**: parameter describes if an object or person is approaching the sensor or receding from it. Also it can work in both configurations, to detect target approaching and receding from the sensor.
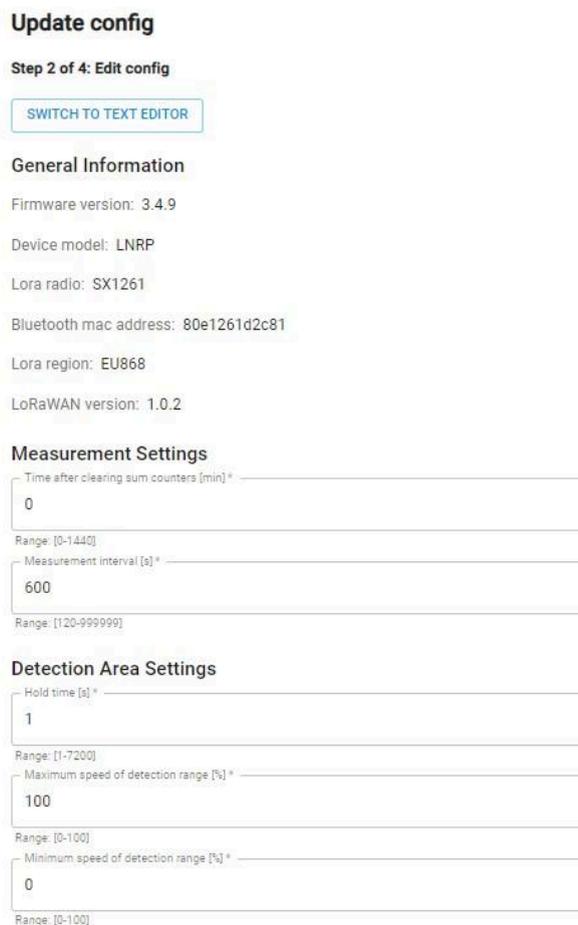
UPLINK SUBBAND

REGION	DESCRIPTION	POSSIBLE VALUES	DEFAULT VALUE	READ/ WRITE
EU868	Sub-band 1; 867.1 - 868.5 MHz; channels 0-7	1	1	R
US915	Sub-band 1; 902.3 - 903.7 MHz; channels 0-7	1	2	R/W
	Sub-band 2; 903.9 - 905.3 MHz; channels 8-15	2		
	Sub-band 3; 905.5 - 906.9 MHz; channels 16-23	3		
	Sub-band 4; 907.1 - 908.5 MHz; channels 24-31	4		
	Sub-band 5; 908.7 - 910.1 MHz; channels 32-39	5		
	Sub-band 6; 910.3 - 911.7 MHz; channels 40-47	6		
	Sub-band 7; 911.9 - 913.3 MHz; channels 48-55	7		
	Sub-band 8; 915.5 - 914.9 MHz; channels 56-63	8		
AU915	Sub-band 1; 915.2 -916.6 MHz; channels 0-7	1	2	R/W
	Sub-band 2; 916.8 - 918.2 MHz; channels 8-15	2		
	Sub-band 3; 918.4 - 919.8 MHz; channels 16-23	3		
	Sub-band 4; 920.0 - 921.4 MHz; channels 24-31	4		
	Sub-band 5; 921.6 - 923.0 MHz; channels 32-39	5		
	Sub-band 6; 923.2 - 924.6MHz; channels 40-47	6		
	Sub-band 7; 924.8 - 926.2 MHz; channels 48-55	7		
	Sub-band 8; 926.4 - 927.8 MHz; channels 56-63	8		
AS923	Sub-band 1; 922.0 -923.2 MHz; channels 0-8	1	1	R/W
	Sub-band 2; 923.2 - 924.5 MHz; channels 9-17	2*		

2* change is not supported

Configuration node with Yosensi Management Platform

Connect to the device as follows:

1. Log in at app.yosensi.io.
2. You'll see the dashboard organization view. Go to the Application section in the sidebar.
3. Select application, locate and select the device by looking for the DEV EUI on the device label.
4. Select the Firmware section. For the configuration of the device you can see three different buttons:
   - Configure – here, you can change and upload the device parameters.
   - Update firmware – here, you can update the firmware to version 3.4.0 and newer.
   - Recover device – this section restores the firmware of the device. This button helps if you lose the connection while uploading firmware.
5. Once the configure button has been selected and the node has been paired with the computer, the next step is to configure parameters. You will see 2 different display options of the configuration, first recommended is "Form-based-editor" second "Text editor". Possible values with description of each parameter can be found in the device configuration.

Figure 28 Update configuration section view.

6. Press the upload button and wait.

> NOTE   Additional information including device configuration can be found in <u>Yosensi</u> <u>configuration web tool</u>.

Configuration node with Yosensi mobile app

Connect to the device using Yosensi app as follows:

1. Login to Yosensi App using your credentials.
2. Go to the Devices section and choose the device you want to configure. If you can not see the device ensure that you are in the correct organization. Alternatively you can also scan the QR code placed on the node. It will redirect you right to the device details.
3. After selecting the device go to the "configuration" option in device details. Now wait, your mobile will pair with the node.
4. You will see 2 different display options of the configuration, first recommended is "Form-based-editor" second "Text editor". Possible values with description of each parameter can be found in the device configuration.
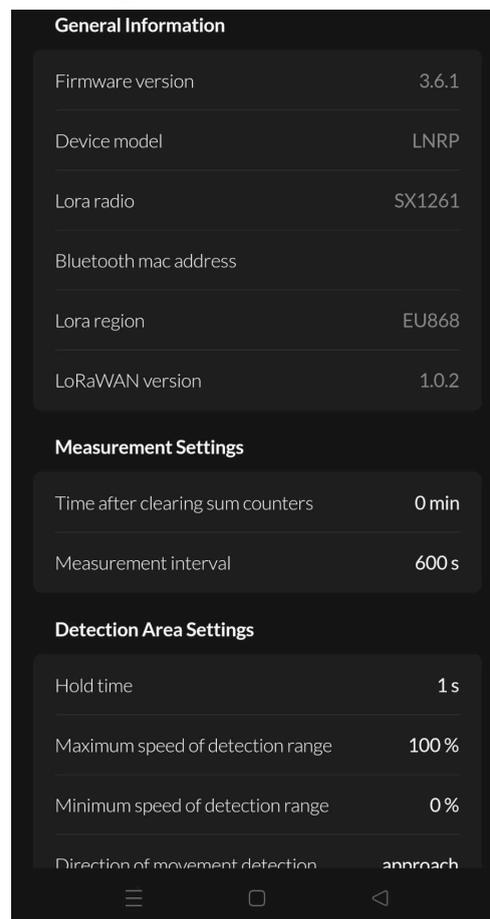

Figure 29 Configuration view in mobile app.

5. After changing parameters press the 'save' button.

Connecting node with network

The LoRaWAN architecture requires a configured Gateway and Network Server. We'll go through an example in our recommended Yosensi Management Platform software.

### Yosensi Management Platform configuration

Before you can make the node visible, you'll need an **organization** and an **application**. The organization is your own space, at the highest level of IoT systems management (like the root directory in operating systems). It can be created only by Yosensi staff, and all clients using Yosensi Management Platform have one created for them by default. In case of any questions, you can find us at support@yosensi.io. The application is a representation of each system and, together with the node definitions, is created by customers. The basic integration of a node into the Yosensi Management Platform is described below. Nodes can be added manually or via Bluetooth.

> **NOTE**   A subscription is needed to use Yosensi Management Platform. Contact us on contact@yosensi.io for more information and pricing.

Adding a node manually

Yosensi Management Platform integration instructions:

1. Log in to app.yosensi.io.
2. You'll see the default organization view. To switch to another organization, click on the user avatar in the right top corner and select 'Switch Organization'.
3. To create a new application, press the bottom right '+' button. Fill in the 'Name' and 'Description' fields and select an 'Application Profile', which is the region definition
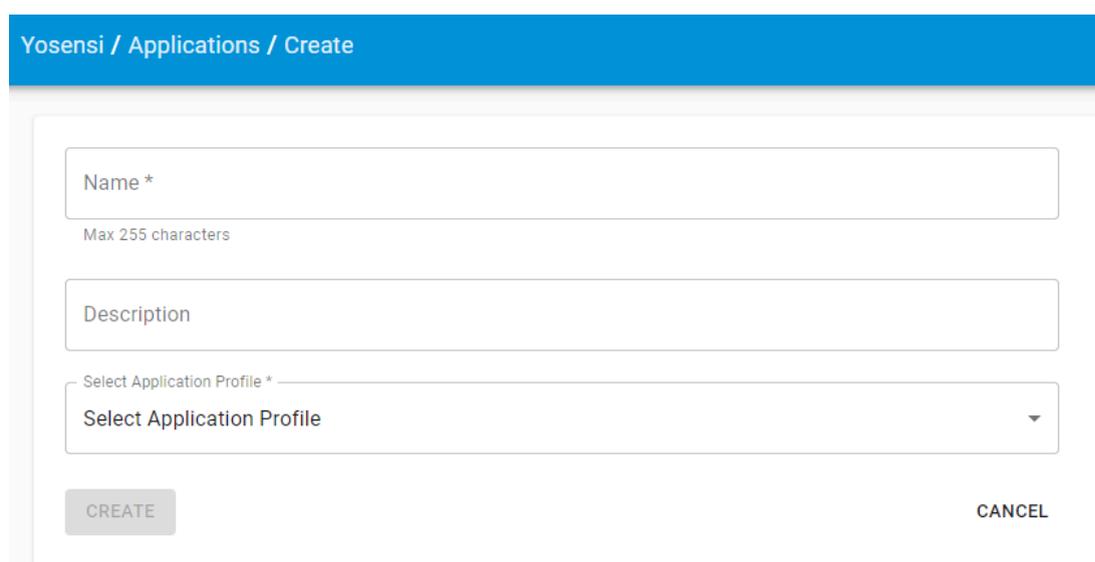
Figure 30 Application creation form.

4. Proceed to the application by clicking its name on the list, then press the '☰' button to add a node. Click '**Add manually**'. Set the node's 'Name' and 'Description' fields, and fill in 'DEV EUI' and 'OTAA Key' (otaa section – *appkey*). **All device identifiers are provided by Yosensi Support when you order the nodes.**

Select a model that is compatible with your device — this choice affects the number of charts and data source (YO People Counter). You can also set the node's 'Location', if locations have been pre-defined. If you haven't defined a suitable location, leave this field set at <None>.
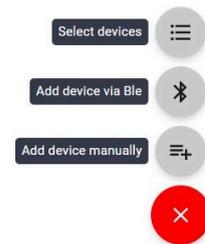
Figure 31 Adding node to the Yosensi Management Platform section view.

Figure 32 Node creation form.

5. **New nodes must be added in OTAA mode**. Nodes can be switched to ABP mode after activation in the Yosensi Management Platform by changing the Node configuration.

Click on the link in the 'Node Name' column. Go to the 'KEYS' tab and switch 'LoRa Type' from OTAA to ABP and fill in the blank spaces, then press update. The identifiers 'Device Address' (*devaddr*), 'Application Session Key' (*appskey*) and 'Network Session Key' (*nwkskey*) are provided by Support, or can be found in the device's configuration pane while connected to the node in the firmware section.

Figure 33 Node LoRa type configuration form.

6. When the server receives data from the device, you'll notice that the 'Last Seen' column ('NODES LIST' tab) status changes from 'never' to a few 'seconds ago'.
7. Open charts by clicking on the 'OPEN' button in Dashboard columns or by entering the node's 'DETAILS' tab ('Node Name' column link) and clicking 'CHARTS'.

Adding node via bluetooth

1. Log in at app.yosensi.io.
2. You'll see the default organization view. To switch to another organization, click on the user avatar in the right top corner and select 'Switch Organization'.
3. To create an application, click the bottom right '+' button. Fill in the 'Name' and 'Description' fields and select the 'Application Profile', which is the region definition.
4. Proceed to the application by clicking its name on the list, and press the '☰'' button to add a node. Click '**Add via Ble**'. Select the device to add. Then, the list with devices available to connect to the application will appear. The name of the node will be generated automatically from the device model and DEV EUI, with OTAA key and DEV EUI filled in, press create.
5. When the server receives data, you'll notice that the 'Last Seen' column (NODES LIST' tab) status changes from 'never' to a few 'seconds ago'.
6. Open charts by clicking on the 'OPEN' button in Dashboard columns or by entering the node's 'DETAILS' tab ('Node Name' column link) and clicking 'CHARTS'.

Payload description

If you want to connect to your own server, it is necessary to decode the specific payload for each device. To accomplish this, a payload decoder is required, which can be downloaded using the following link: Payload decoder. Extended documentation of the protocol can be found in the Payload description on our website. An example payload produced by YO People Counter is presented below with divisions for each measurement and marked with decoded values, whose interpretation is described in the Payload description.

Example of YO People Counter payload with description:

First frame:

02:0e:00:00:08:00:01:14 :a0:0d:00:01:01:22:10:00:00:20

Payload header				First measurement (battery voltage)				
0x02	0x0E	0x00	0x00	0x08	0x00	0x01	0x14	0xA0
ver = 2	cnt = 14	pct [s] = 0		type = 2 prec = 0	md [s] = 0	addr_len = 0 meas_len = 2	val=5280 (5280[mV])	

Second measurement (temperature)				
0x0D	0x00	0x01	0x01	0x22
type = 3 prec = 1	md [s] = 0	addr_len = 0 meas_len = 2	val = 290 (29 [°C])	

Third measurement (relative humidity)			
0x10	0x00	0x00	0x20
type = 4 prec = 0	md [s] = 0	addr_len = 0 meas_len = 1	val =32 (32[%])

Second frame:

02:0f:00:3c:60:00:11:00:00:04:60:00:11:01:00:1a:60:00:13:02:00:00:00:0d:60:00:13:03:00:00:00:5a :60:00:13:04:ff :ff:ff:b3

Payload header				First measurement (Left to right counter)					
0x02	0x0F	0x00	0x3C	0x60	0x00	0x11	0x00	0x00	0x04
ver = 2	cnt = 15	pct [s] = 60		type = 24 prec = 0	md [s] = 0	addr_len = 1 meas_len = 2	addr=0	val=4	

Second measurement (Right to left counter)

0x60	0x00	0x11	0x01	0x00	0x1A
type = 24 prec = 0	md [s] = 0	addr_len = 1 meas_len = 2	addr=1	val = 26	

Third measurement (Sum of left to right counts)

0x60	0x00	0x13	0x02	0x00	0x00	0x00	0x0D
type = 24 prec = 0	md [s] = 0	addr_len = 1 meas_len = 4	addr=2	val = 13			

Fourth measurement (Sum of right to left counts)

0x60	0x00	0x13	0x03	0x00	0x00	0x00	0x5A
type = 24 prec = 0	md [s] = 0	addr_len = 1 meas_len = 2	addr=3	val = 90			

Fifth measurement (Difference between left to right counts and right to left counts)

0x60	0x00	0x13	0x04	0xFF	0xFF	0xFF	0xB3
type = 24 prec = 0	md [s] = 0	addr_len = 1 meas_len = 4	addr=4	val=-77			

Compliance statements

CE

EC DECLARATION OF CONFORMITY
No. 02/2022/EN

with the European Directives: EMC 2014/30/UE; RED 2014/53/UE; RoHS 2015/863/UE

Yosensi Sp. z o.o., ul. Żurawia 71A, lok.1.50, 15-540 Białystok

On our sole responsibility, we hereby declare that the product:

Name	**YO People Counter**
Technical data	**Voltage 6÷30 V DC/5÷21V AC; current max 100 mA; 50/60Hz(for AC); IP40**

to which this declaration of conformity applies is consistent with legal acts:

The Directive EMC 2014/30/UE	Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (Official Journal of the European Union L 96/79 of 29.3.2014)
The Directive RED 2014/53/UE	Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC(Official Journal of the European Union L 153/62of 22.5.2014)
The Directive RoHS 2015/863/EU and 2015/863/EU	Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (Official Journal of the European Union L 174/88 of 1.7.2011) and Commission Delegated Directive (EU) 2015/863 of 31 March 2015 amending Annex II to Directive 2011/65/EU

Harmonized standards applied to the product to which this Declaration of Conformity relates:

EN 62311:2008	Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz)
EN IEC 61326-1:2021	Electrical equipment for measurement, control and laboratory use -- EMC requirements -- Part 1: General requirements (IEC 61326-1:2020)
EN IEC 61000-6-1: 2019	Electromagnetic compatibility (EMC) -- Part 6-1: Generic standards -- Immunity standard for residential, commercial and light-industrial environments (IEC 61000-6-1:2016)
EN IEC 61000-6-3: 2021	Electromagnetic compatibility (EMC) -- Part 6-3: Generic standards -- Emission standard for equipment in residential environments (IEC 61000-6-3:2020)
EN IEC 61000-6-2: 2019	Electromagnetic compatibility (EMC) -- Part 6-2: Generic standards -- Immunity standard for industrial environments (IEC 61000-6-2:2016)
EN IEC 61000-6-4: 2019	Electromagnetic compatibility (EMC) -- Part 6-4: Generic standards -- Emission standard for industrial environments (IEC 61000-6-4:2018)
ETSI EN 301 489-3 V2.1.1:2019	ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU
ETSI EN 300 220-2 V3.2.1:2018	Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz; Part 2: Harmonised Standard for access to radio spectrum for non specific radio equipment
ETSI EN 300 328 V2.2.2:2019	Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz band; Harmonised Standard for access to radio spectrum
ETSI EN 300 440 V2.2.1:2018-07	Short Range Devices (SRD);Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Harmonised Standard for access to radio spectrum
EN IEC 63000:2018	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

The last two digits of the year in which the CE marking was affixed to the product: 22

Founder/R&D Director
Paweł Popławski

Białystok, 2022-11-18

Place and date of issue

Name, surname and signature of the authorized person

YOSENSI.IO