Ceiling-Mounted Recessed People Counting Sensor

Quick Start Guide

Content

1. Overview 1

2. Network Configuration 1

2.1 Network Configuration Guide 1

2.1.1 Server Configuration and Network Configuration LED Status 1

2.1.2 Wifi Network Configuration 3

2.1.3 Connect to the Default Server and Subscribe to Device Topics Using a Third-Party MQTT Client 4

2.2 Manual Configuration of Detection Range Parameters and Installation Requirements 5

2.2.1 For recessed / top-mounted installation, the coordinate axes of the device are defined as follows: 5

2.2.2 Installation Notes 5

2.2.3 Detection Range Configuration in the Configuration File 6

2.3 Test Procedure 8

1. Overview

The People Counting Sensor is designed to monitor changes in human occupancy and movement within a monitored area. Based on mmWave radar technology, it supports human presence detection, people counting, and target position output. The sensor transmits data to the cloud via the MQTT protocol, enabling scenario-based automation and real-time status reporting.

2. Network Configuration

Before connecting the device to the network, complete the following setup procedure:

1) Configure the server.
2) Connect the Wi-Fi module to the network.
3) Use a third-party MQTT client (e.g., MQTT.fx or MQTTX) to subscribe to the device topics. The default MQTT broker settings are:
   Broker: tcp://broker.emqx.io
   Port: 1883
4) Manually configure the detection range parameters.

2.1 Network Configuration Guide

2.1.1 Server Configuration and Network Configuration LED Status

Before integrating the radar device with the customer's platform, two setup procedures are required:

1) Configure the customer's MQTT server information.
2) Connect the device to the network and establish communication with the server.

Factory pre-configuration of the server address is supported. During mass production, the customer server information can be configured at the factory in advance. During on-site deployment, only network connection is required before use.

Sample devices do **not** include customer server settings by default. Before testing, please manually configure the server address and related MQTT parameters provided by the customer.

The MQTT connection information must be configured first, including the server address, Client ID, username, and password. This only needs to be configured once. The configuration information will be stored in the module.

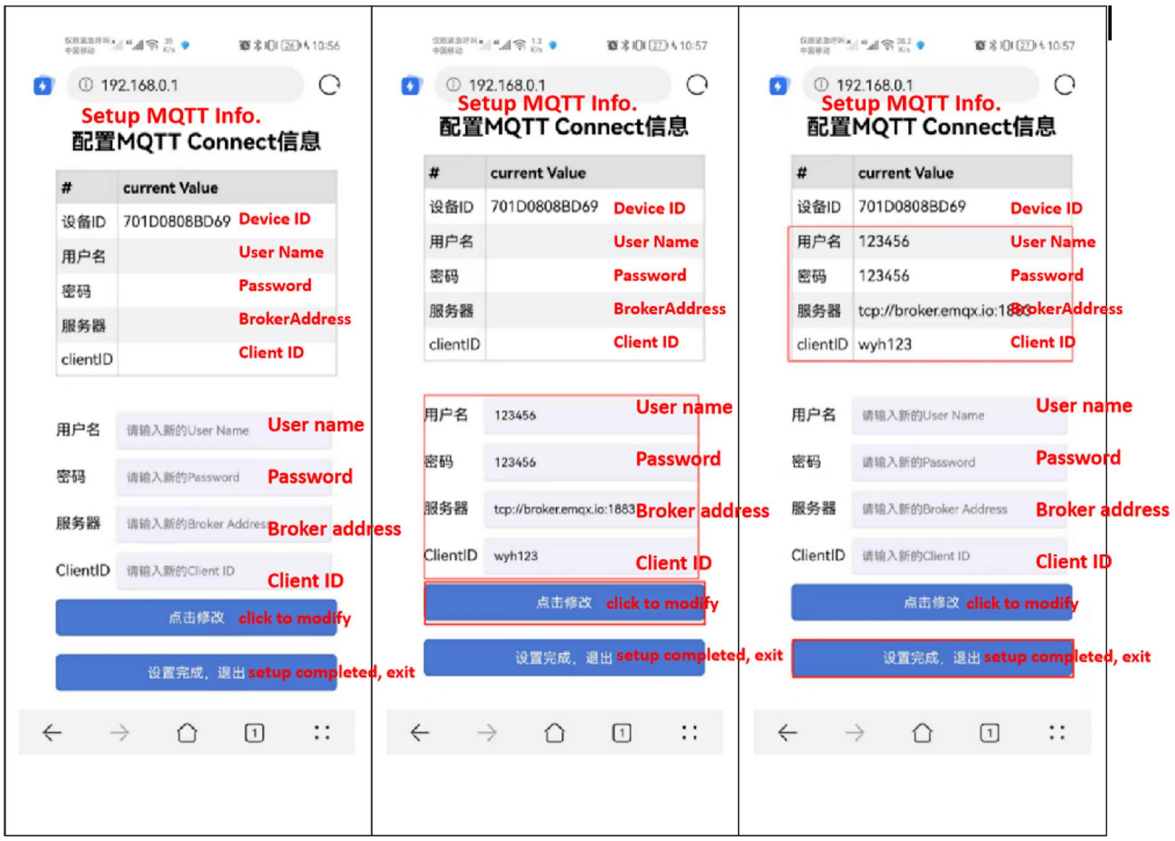
The configuration procedure is as follows:

1) Press and hold the button for more than **10 seconds**. The module will create a hotspot named **RadarConfig-xxxxxxxxxxxx**. Connect to the hotspot. The browser will automatically open **192.168.0.1**. After the mobile phone is connected to the

hotspot, the configuration page shown below will be displayed. Only the **Device ID** is displayed by default. All other information should be configured according to the MQTT server settings.

2) Configure the corresponding parameters according to the MQTT server. After all information has been entered, click **Modify (First blue button)** to submit the configuration. The server address format is as follows: **tcp://broker.emqx.io:1883**.

3) After the configuration is submitted, the page will refresh automatically. The updated information will be displayed in the table. Click **Finish and Exit(Second blue button)** to exit the configuration. The module will then restart.



After the device is powered on, it will connects to the default server and goes online. During the startup process, the red network configuration LED flashes to indicate the network configuration progress. The LED turns off after the device successfully connects to the server.

Network Configuration LED Status:

Start network configuration	Red LED flashes every 500 ms
Searching for a network and registering	Red LED flashes every 500 ms
Connecting to the server	Red LED flashes every 2 s

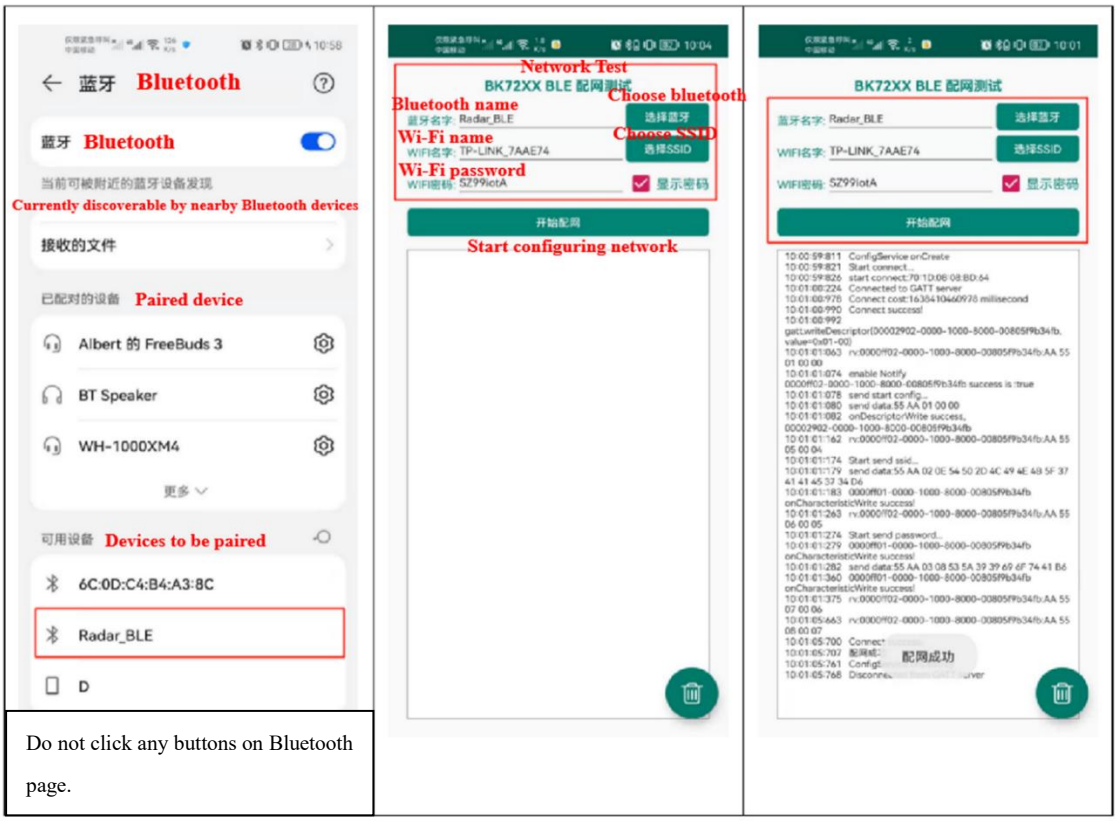
Device online after network configuration is complete	Red LED off

2.1.2 Wifi Network Configuration

Note: All the following network configuration operations must be performed while the device indicator LED is flashing. If the LED is not flashing, the configuration process has failed, and the network configuration procedure must be restarted. The following figure shows the LED flashing status during the network configuration process:

The device network configuration must be performed using the Android APP provided by the manufacturer.

1) Press and hold the Reset button for 5 seconds until the LED indicator turns off, then release the button. The LED will start flashing, indicating that the radar sensor has entered Wi-Fi provisioning mode. At this time, the radar sensor will broadcast a Bluetooth device named "Radar_BLE". Open the App “BK_BLE” and start the network configuration process.
2) Note: The maximum provisioning time is 90 seconds. If the radar sensor is not successfully configured within 90 seconds after entering provisioning mode, a provisioning timeout command will be sent to the App.
3) Open the network provisioning App“BK_BLE”, select the Bluetooth device and Wi-Fi network (SSID), then enter the Wi-Fi password. Please use a 2.4 GHz Wi-Fi network, as 5 GHz Wi-Fi is not supported.
4) Click "Start Configuring network"
   For detailed operating steps, please refer to the figure below.



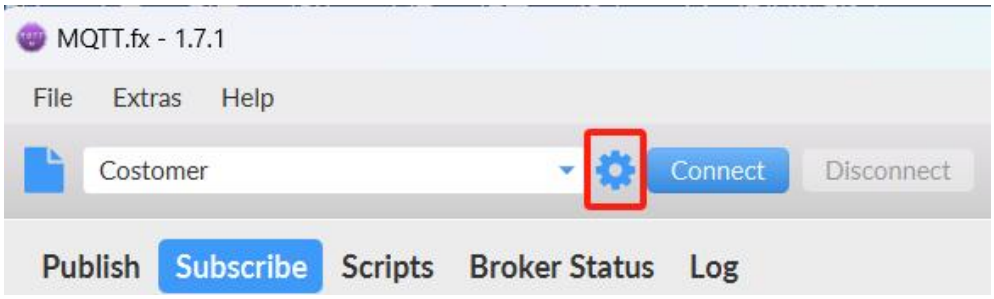
Do not click any buttons on Bluetooth page.

2.1.3 Connect to the Default Server and Subscribe to Device Topics Using a Third-Party MQTT Client

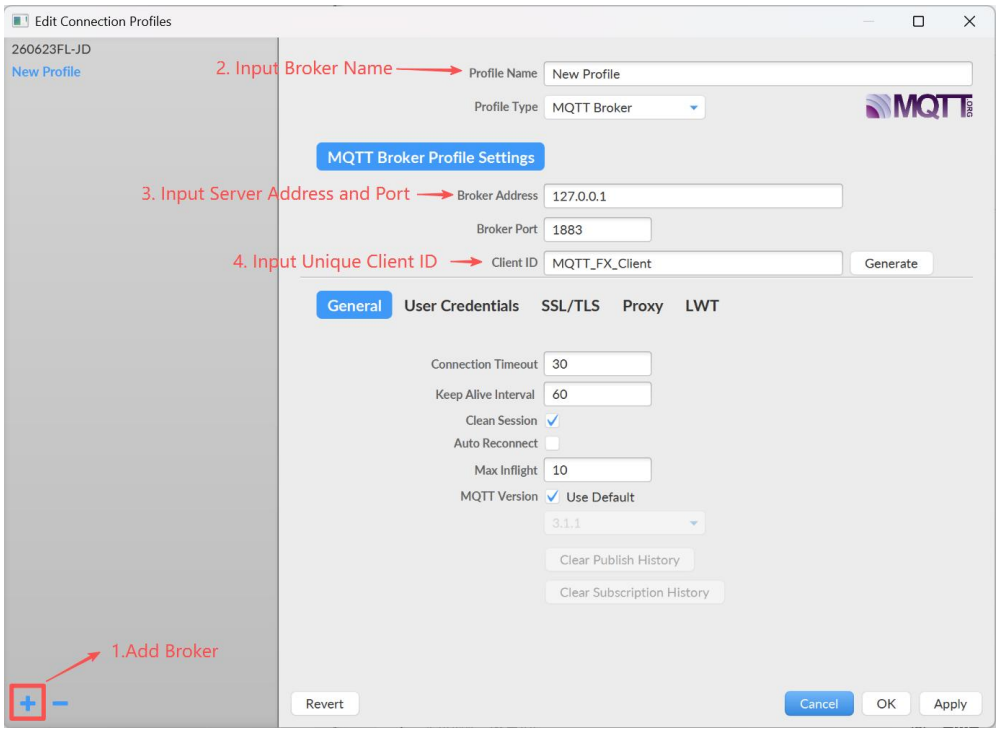
Note: The following operations assume that the device has successfully connected to the public server. After the connection is established, the **Network Configuration LED** should be **off**. If the Network Configuration LED still indicates any network configuration status, troubleshoot the issue according to the network configuration procedure and LED indications, then perform the network configuration again until the device successfully connects to the public server.

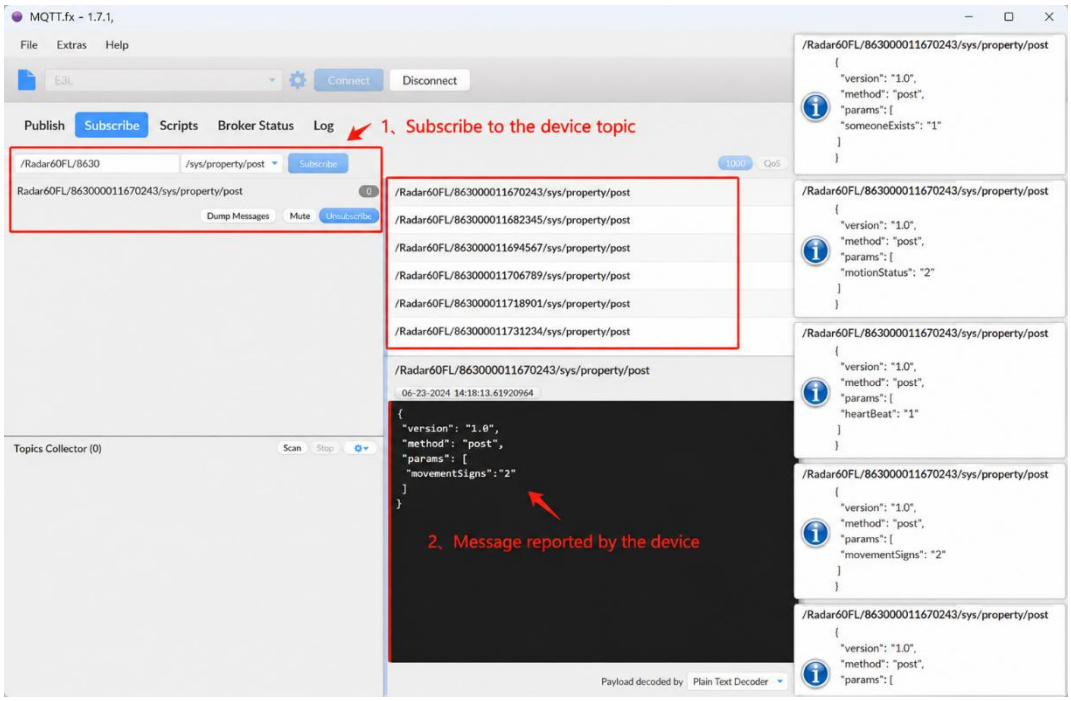
Open MQTT.fx, add the default server information, and subscribe to the device topics by following the steps shown below.

1)



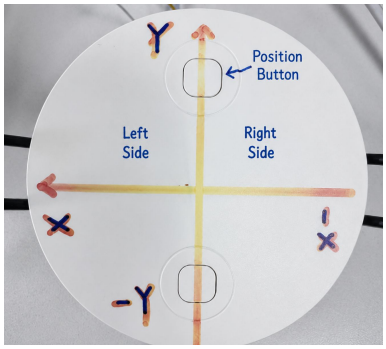
2)

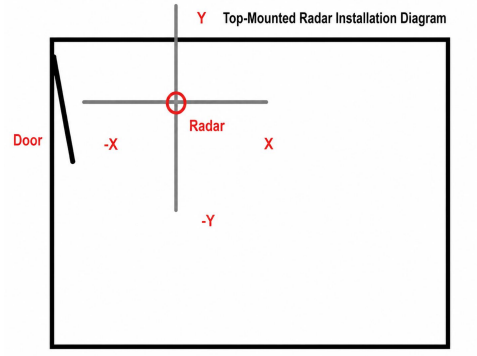


3) 

2.2 Manual Configuration of Detection Range Parameters and Installation Requirements

2.2.1 For recessed / top-mounted installation, the coordinate axes of the device are defined as follows:





- The direction of the device reset button is the +Y axis.
- The opposite direction of the reset button is the −Y axis.
- The left side of the reset button corresponds to the +X axis, and the right side corresponds to the −X axis.

2.2.2 Installation Notes

When installing the device, ensure that the coordinate axis orientation matches the top-view installation diagram.

The device's **−X axis** (the right side of the reset button) must be perpendicular to the direction of the door.

Install the device 1 – 2.5 m away from the door, centered with respect to the doorway.

The recommended installation height is 2.2 – 3.0 m.

Ensure that the actual installation height matches the height configured in the device settings.

2.2.3 Detection Range Configuration in the Configuration File

Coordinate Value Encoding

1) For data on the negative half-axis, the most significant bit of the first Byte must be 1 in binary (Hexadecimal: 80; Decimal: 128). The detection range parameters should be filled in using decimal values.

Example:

"2B (Negative X-axis)" = 128 100

Here, 128 indicates that the most significant bit is 1 in binary, representing a negative value. Therefore:

128 100 = -100 cm

2) If the data size exceeds one Byte, the corresponding value of each byte should be parsed and filled in.

Example:

To set the Negative X-axis distance to -400 cm, the corresponding hexadecimal value is 81 90.

"2B (Negative X-axis)" = 129 144

To set the Positive X-axis distance to 400 cm, the corresponding hexadecimal value is 01 90.

"2B (Positive X-axis)" = 1 144

3) If the data size does not exceed one Byte, fill it in directly.

Example:

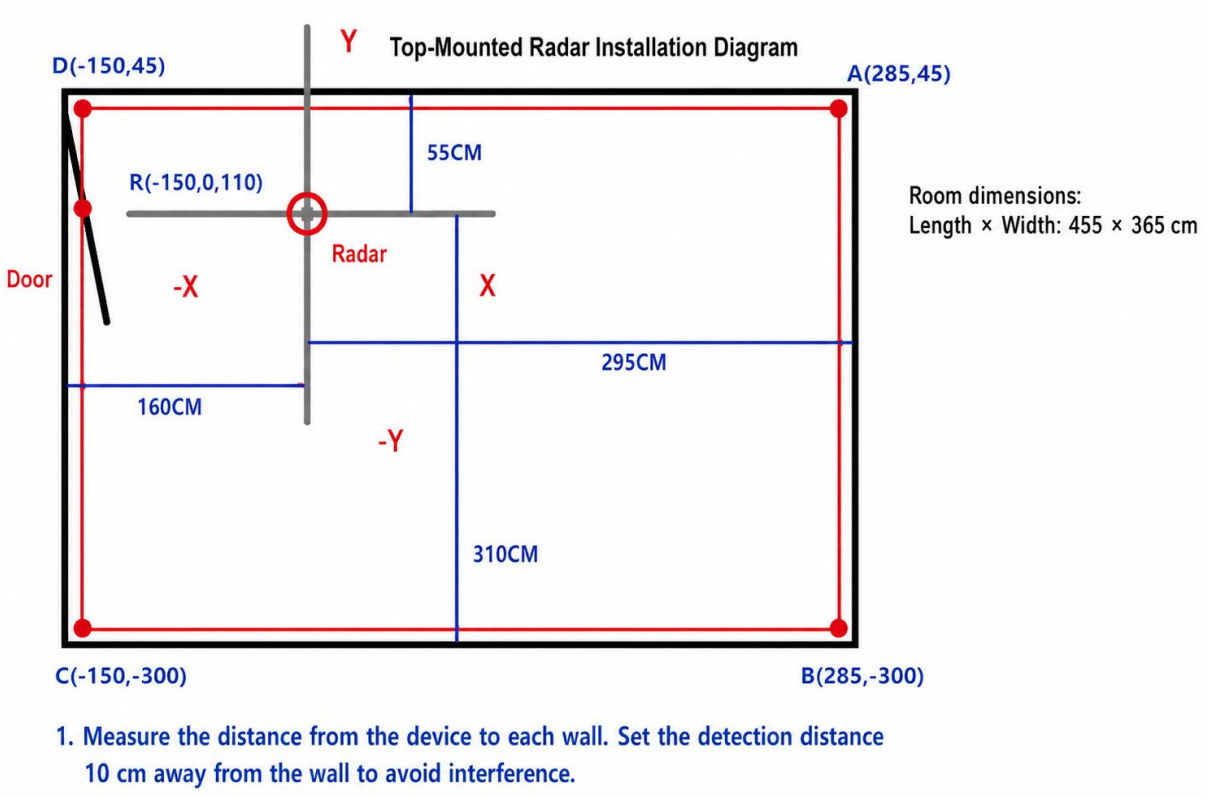
To set the Negative X-axis distance to -100 cm:

"2B (Negative X-axis)" = 128 100

To set the Positive X-axis distance to 100 cm:

"2B (Positive X-axis)" = 0 100

Example Photo in next page:



1. Measure the distance from the device to each wall. Set the detection distance 10 cm away from the wall to avoid interference.

To configure the detection range parameters using the configuration file, the coordinate point and radius of the door, as well as the coordinate points of the rectangle, must be obtained. When entering the rectangle coordinate points, they must be entered sequentially in either clockwise or counterclockwise order.

Based on the installation shown in the figure above (the device is installed 160 cm away from the door), the door coordinate point and radius are R (-150, 0, 110), where -X = -150, Y = 0, and the radius is 110. (The width of a standard door is generally 80 cm. Setting the radius to 110 cm ensures that a person passing through the door can be completely detected.)

The four coordinate points of the rectangle, A, B, C, and D, can then be obtained. After converting them to decimal values, configure the parameters as shown in the figure below.

This attribute supports configuration. The data range is: Door (2B X-axis + 2B Y-axis + 2B **Radius**) + n × (2B X-axis + 2B Y-axis), formatted as follows:

```
{
    "version":      "1.0",
    "method":       "set",
    "params":       {
            "configFileDetectionRange":
[128,150,0,0,0,110,01,29,0,45,01,29,129,44,128,150,129,44,128,150,0,
45]
    }
}
```

2B X-axis | 2B Y-axis | 2B Radius | A coordinates | B coordinates | C coordinates | D coordinates

2.3 Test Procedure

After the installation is completed, ensure that all people have left the room, then send the "Clear Number of People Information" (clearNumberOfPeopleInfor) command to calibrate the people count before performing the test.