TECHNICAL GUIDE

LIGHT UP ACTIVITY MULTISENSOR DETECTOR

PROCEDURES MANUAL

FEBRUARY
2024

GLOBAL SPECIALIST IN ELECTRICAL AND
AND DIGITAL BUILDING INFRASTRUCTURES

legrand®

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PRODUCT PRESENTATION

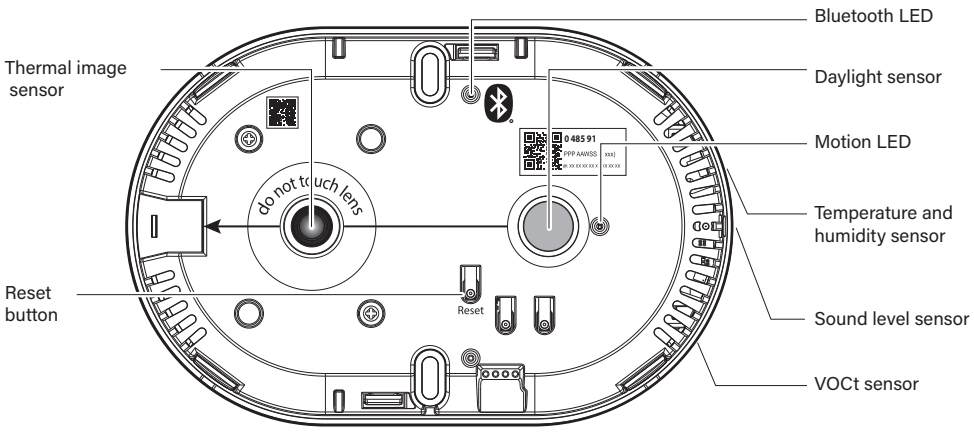
The Light Up Activity Multisensor detector is intended for tertiary buildings (small or large) such as offices, co-working spaces, meeting rooms, shared spaces, etc., to relay information enabling third parties to provide services such as :

- Managing space occupancy
- Managing cleanliness on the premises
- Improving air quality and the comfort of living spaces

With regard to these objectives, the Light Up Activity Multisensor includes sensors able to detect the number/location/activity of people and perform readings on physical factors : temperature, humidity, VOCt, eCO2, IAQ, noise level, brightness, etc.

The counting module can count the number of people present as well as their position.

The Light Up Activity Multisensor is a connected object whose function is to broadcast information from its various sensors onto the network via the MQTTs protocol.



Reset button :
Restores factory settings with this key.
Bluetooth light (blue) :
Indicates that a device is paired with the Close Up application.
Motion light (green) :
Green light for start-up and movement.

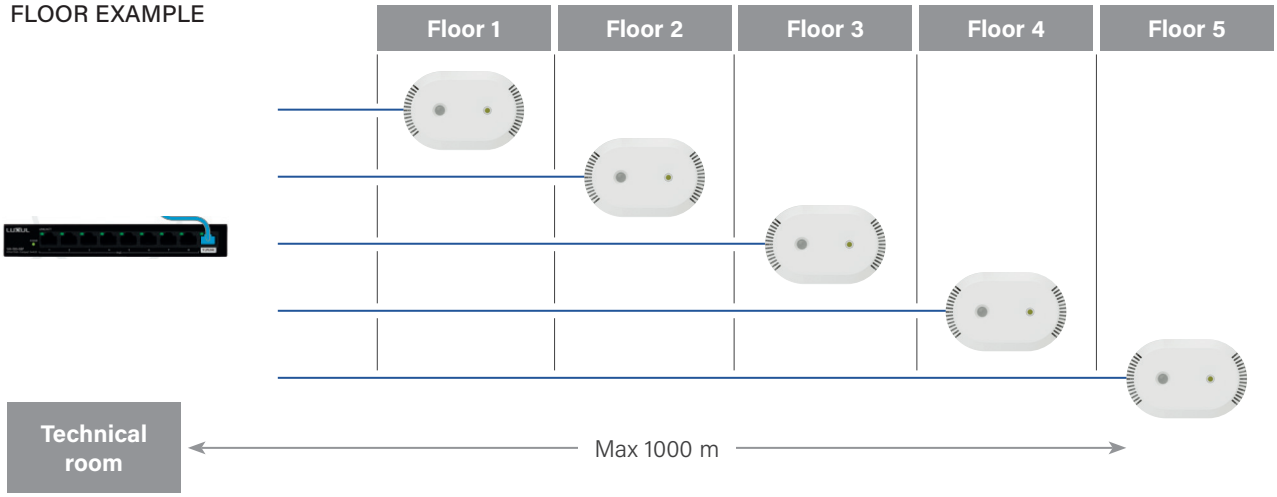
ARCHITECTURAL DESCRIPTION

Installation principle

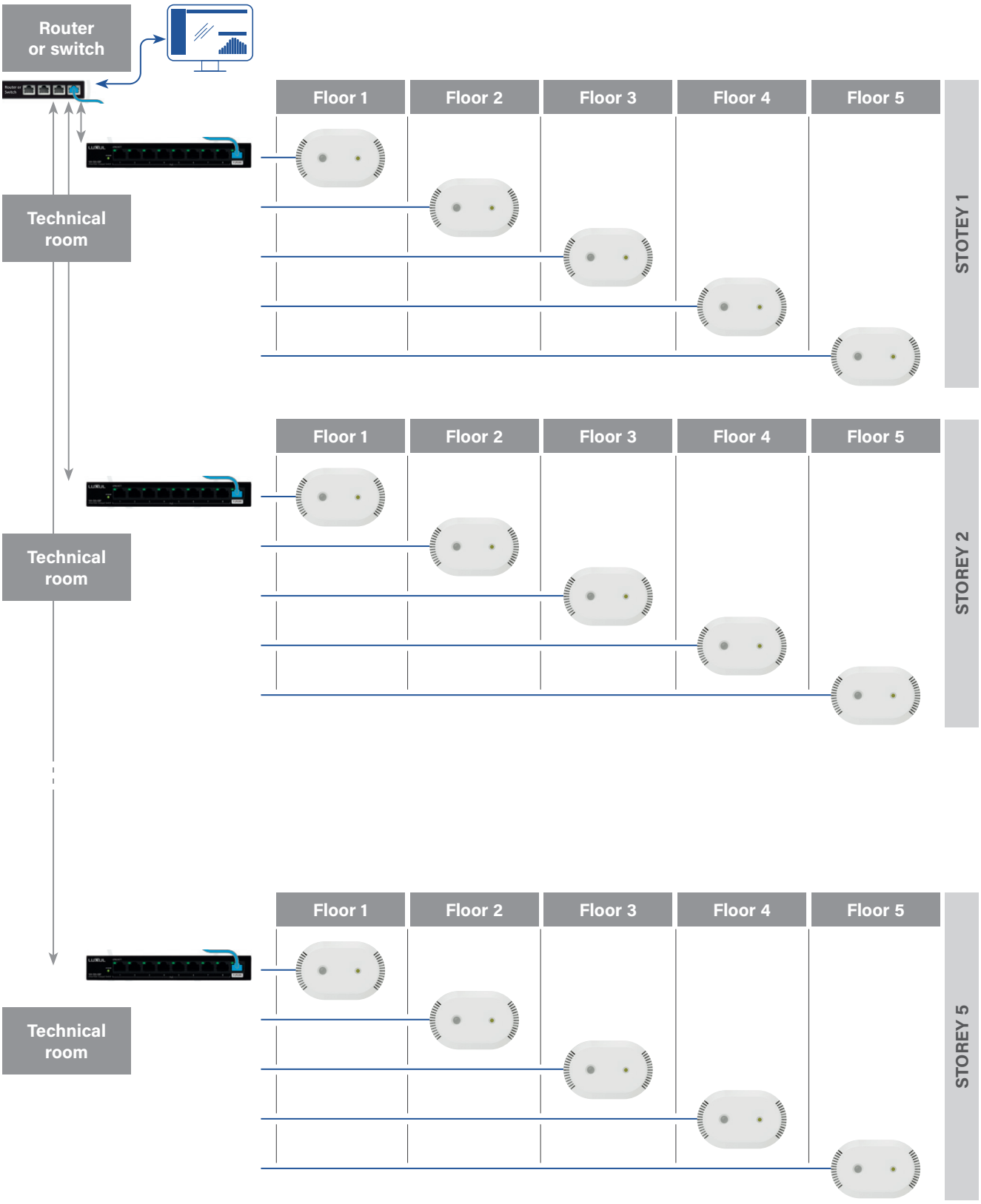
The product must be installed by a qualified technician who complies strictly with installation conditions, taking into account operating modes.

Office building
A 5-storey building with 5 office floors.
One Activity Sensor per office floor (64 m2).

FLOOR EXAMPLE



ARCHITECTURAL DESCRIPTION (CONTINUED)

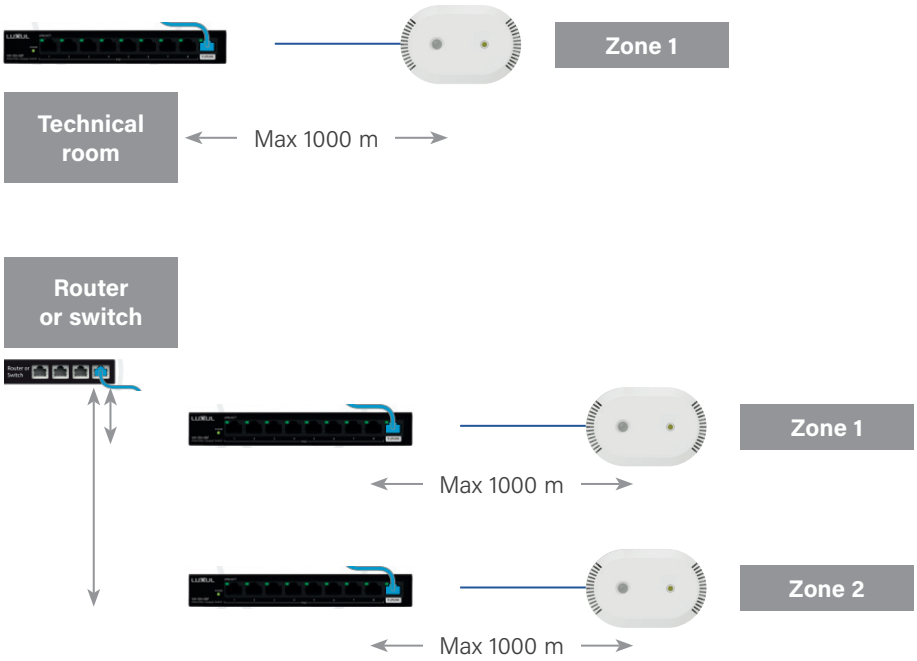


ARCHITECTURAL DESCRIPTION

Commerce

A commercial site consisting of 2 functional areas.
One Activity Sensor per functional area (max 64 m2).

EXAMPLE OF A FUNCTIONAL ZONE



POE

POE power supply

Power supply via Power over Ethernet (PoE) Class 1 (0.44 W to 3.94 W).

The installation examples in this guide are sample configurations. For each installation, it is essential to calculate the power capacity to determine the PoE power supplies. The number of devices that can be connected to the PoE switch depends on the total power they absorb. Once the installation has been completed, it is also necessary to check that the installation is working properly and that the power supplies are suitable for the limiting scenario considered during the study.

PRESENTATION AND PRODUCT INSTALLATION

Characteristics

IPv4 & IPv6.

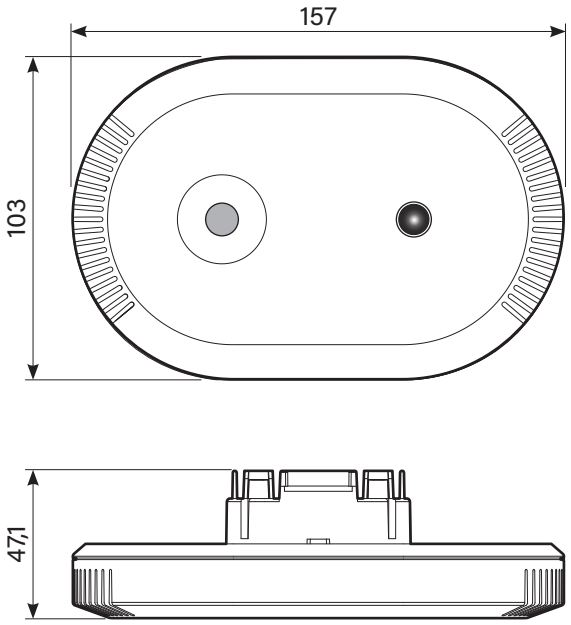
Metrics published via MQTTs protocol.

Configuration via API REST HTTPs or COAPs.

API documentation in Swagger/OpenAPI format (Version 3).

Protocol security provided by TLS/DTLS 1.2.

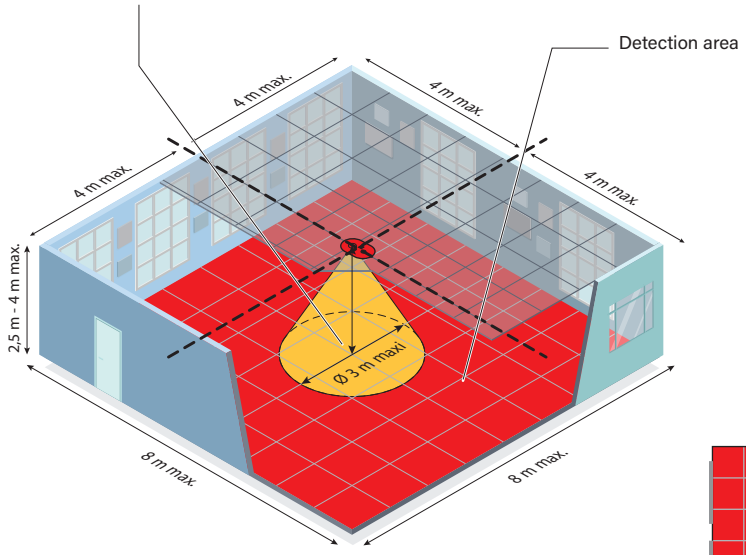
Dimensions

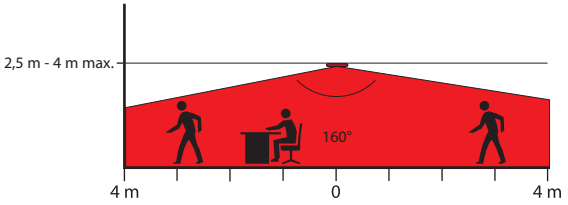


Monitored area and installation height

Maximum detection area : 64 m² ⟶ 8 m x 8 m square, independently of product installation height (between 2,5 m and 4 m)

The measurement of the light level is carried out vertically to the detector on a diameter of 3 m.

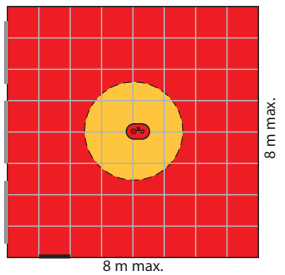




Detects the position of people in three dimensions: X, Y, Z.

Accuracy of people's coordinates in X, Y: 50 cm from any direction, regardless of posture.

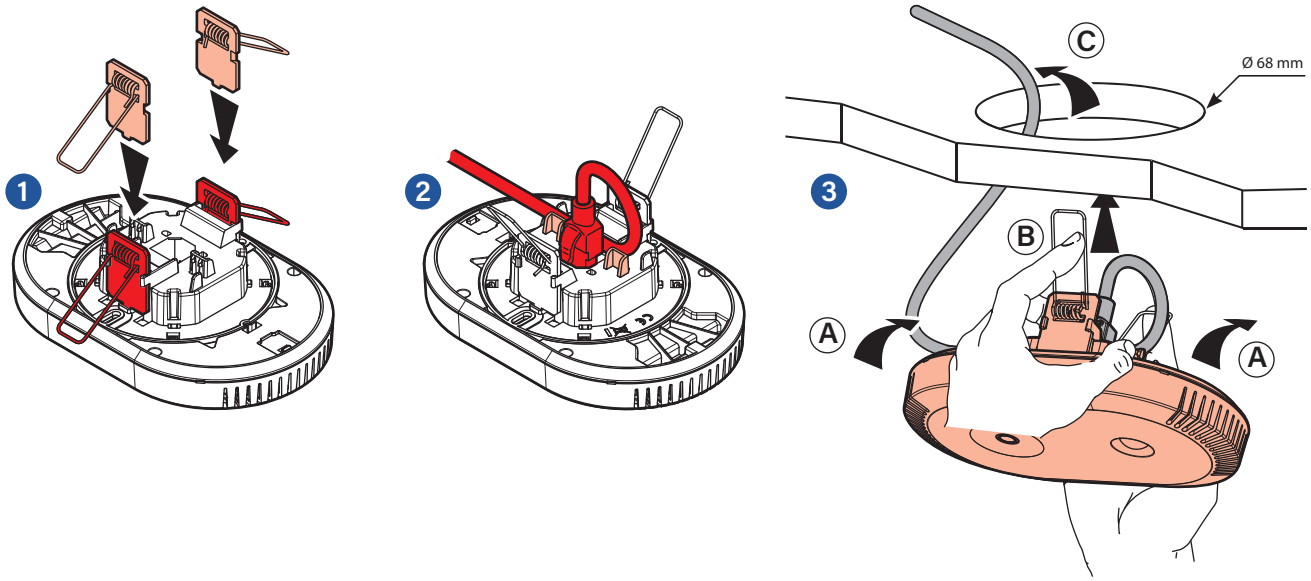
In height (Z) only differentiation between sitting/standing position.



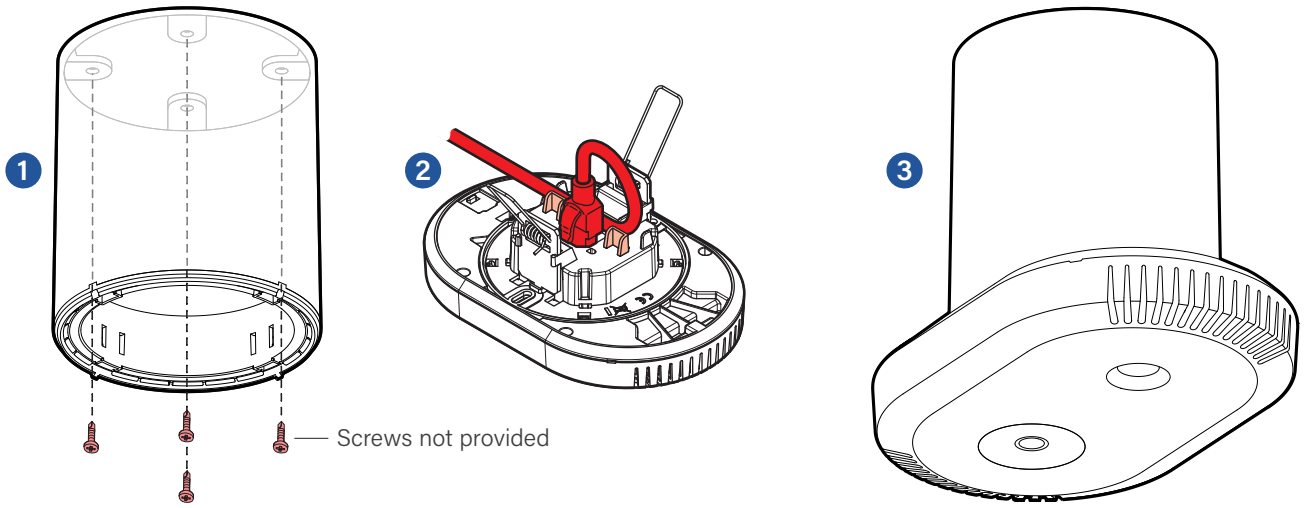
Up to 6 configurable **Zones of Interest** and/or **Exclusion** can be monitored.

PRESENTATION AND PRODUCT INSTALLATION (CONTINUED)

Ceiling installation (2.5 m to 4 m high) flush-mounted

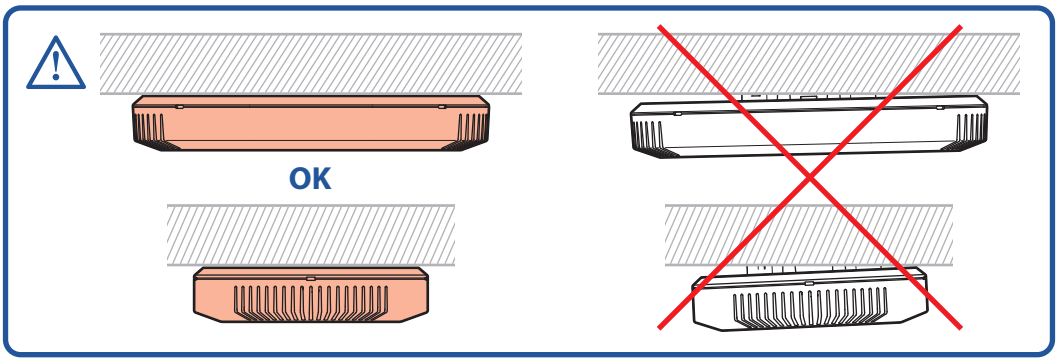


Accessory ref. 0 485 80 for surface mounting



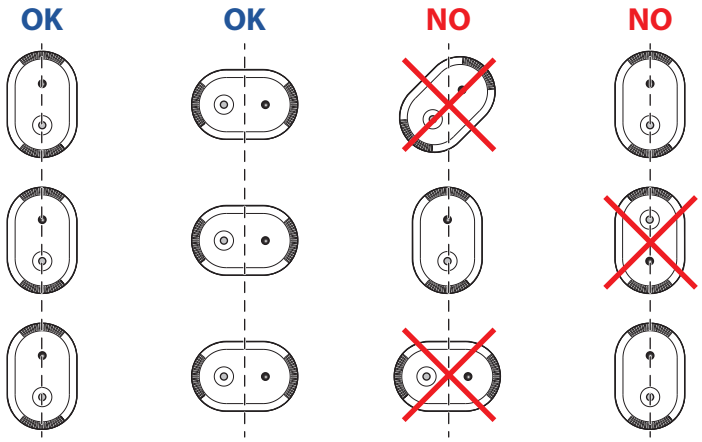
PRESENTATION AND PRODUCT INSTALLATION (CONTINUED)

The detector must be mounted perfectly horizontal.



Sensor orientation parallel to wall : it is recommended to orient the detector towards the back of the room following the door's movement.

In large areas that require the installation of several devices, it is recommended to install them in a row and facing in the same direction.

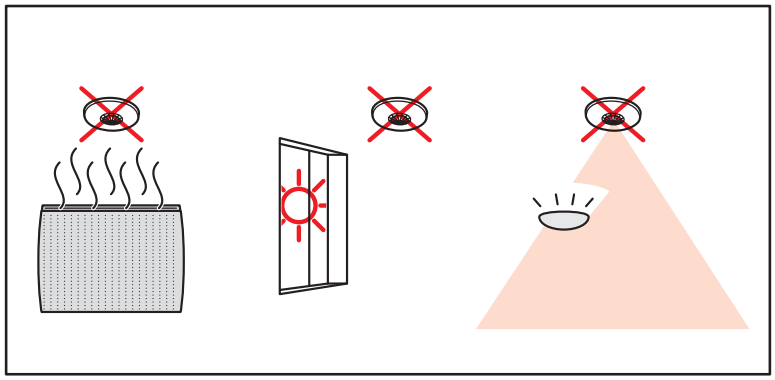


To avoid double counting, position the detectors far enough apart (8 m).
If this isn't possible ⟶ create an exclusion zone on the 2 sensors to exclude the overlapping zone.

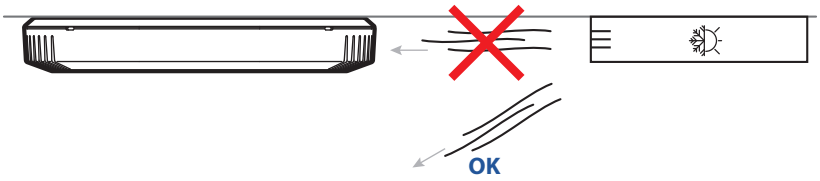
PRESENTATION AND PRODUCT INSTALLATION (CONTINUED)

It is advisable to install the product :

- in the center of the room
- avoid direct airflow over product vents. Place the detector at a distance of over 1.5m from a glass surface to avoid infra-red reflection.
- away from an electrical supply column or suspended luminaire to maintain maximum field of vision.



No direct airflow over the product.



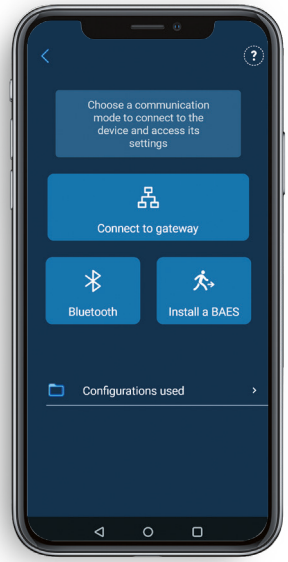
Do not move the detector after calibration.

Should it be necessary to relocate the detector : mandatory re-calibration procedure and redefinition of existing counting zones, if any.

CLOSE UP APPLICATION

Product configuration via Close Up enables :

- Securing the detector.
- Access to Activity multisensor settings.
- Configuration of the people counting module: calibration, operating modes, creation of zones.



Legrand Close Up

TÉLÉCHARGEMENT GRATUIT SUR

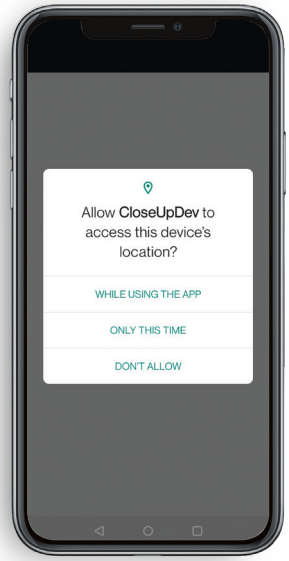
DISPONIBLE SUR Google Play

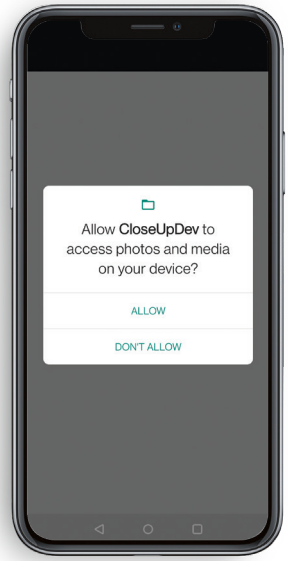
Télécharger dans l'App Store

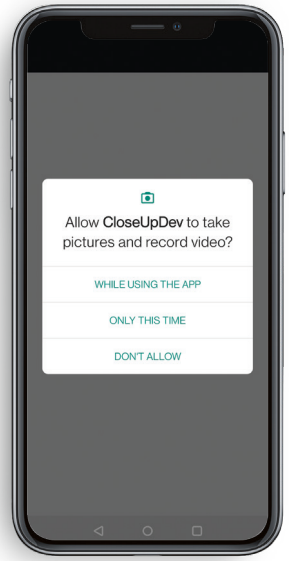
App Store is a service mark of Apple Inc. registered in the United States and other countries. Google, Google Play, Android, are registered trademarks of Google LLC.

On opening the Legrand Close Up application for the first time, you must accept the following terms and conditions to ensure optimal use :

- geolocation : necessary for Bluetooth use
- access to photos, videos, music/audio files : to save settings within a file
- take photos and record videos: for scanning QR codes







PREREQUISITES FOR USING THE CLOSE UP APPLICATION

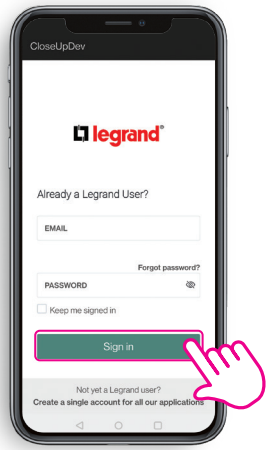
1. SIGN IN TO THE LEGRAND CLOSE UP APPLICATION VIA YOUR LEGRAND ACCOUNT

Wi-Fi

Internet connection is required as all your sites will be linked to your Legrand account.

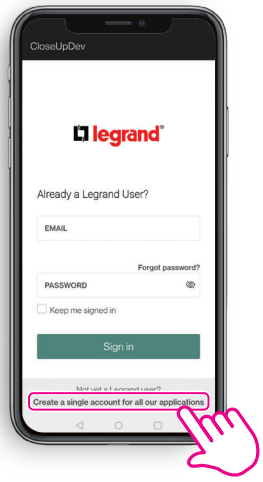
- **Open the Legrand Close Up application :**

- If you already have a **Legrand account**, log in and go directly to the following page.

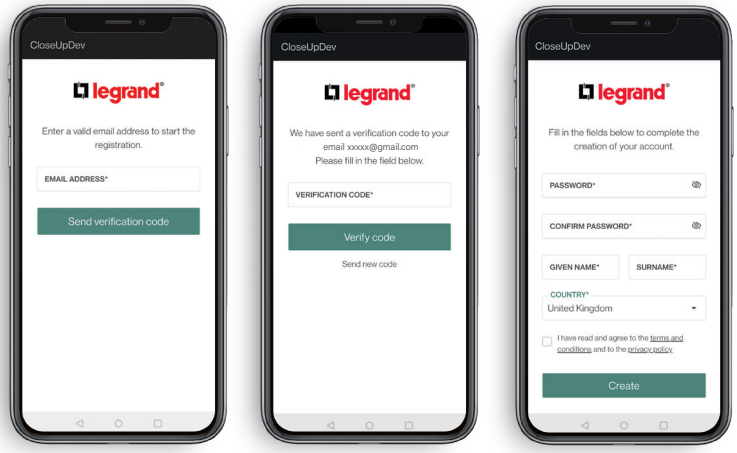


Or

- Otherwise, click on **Create a single account for all our applications.**



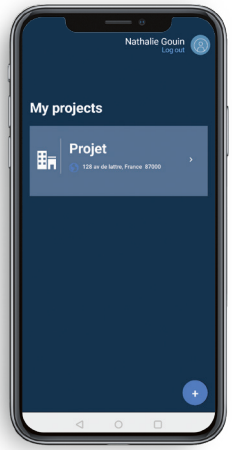
- To create your Legrand account, enter your **e-mail address** and the **verification code** you received before entering the required information.



PREREQUISITES FOR USING THE CLOSE UP APPLICATION (CONTINUED)

2. LEGRAND CLOSE UP APPLICATION: OPENING THE PROJECTS SCREEN

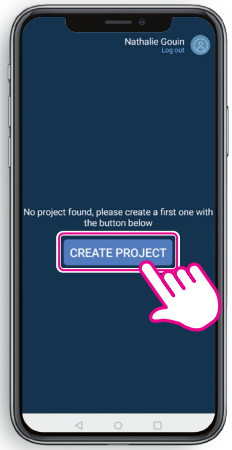
The project exists :
Click on it to select it.



NOTE

A project corresponds to a site (with one or more buildings, floors and zones)

The project does not exist :
Click on **Create project** and fill in the requested details.



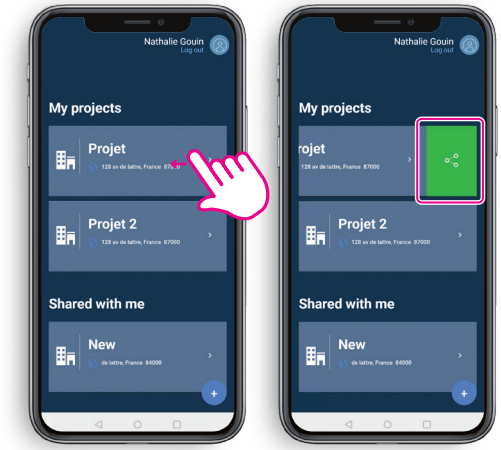
Internet access is required to create a project.

Projects can only be accessed without an internet connection if you have accessed them (with internet) in the previous 24 hours.

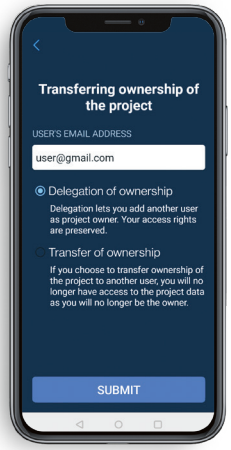
SHARING OR TRANSFERRING PROJECT MANAGEMENT

1. SHARE PROJECT MANAGEMENT

- Open the projects list.
- Swipe from **right to left**.
- Click the **share button.**



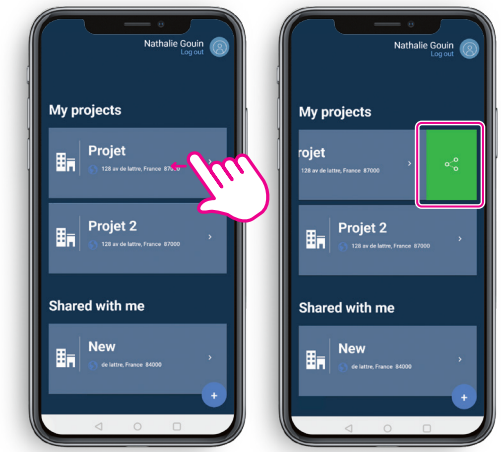
- Select **Delegation of ownership.**
- Enter the **e-mail** address of the person you want to share ownership of the project with.
- Click on **Validate.**



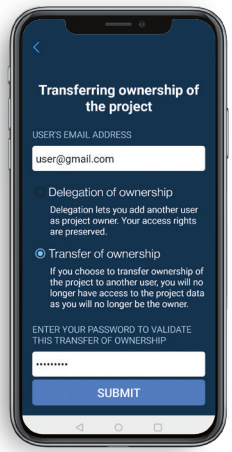
Ownership of the project is shared, preserving all your access settings.

2. TRANSFER PROJECT MANAGEMENT

- Open the projects list.
- Swipe from **right to left**.
- Click the **share button.**



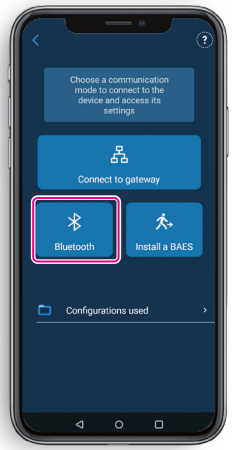
- Select **Transferring ownership of the project.**
- Enter the **e-mail** address of the person you want to transfer ownership of the project to.
- Enter your **Legrand account password**.

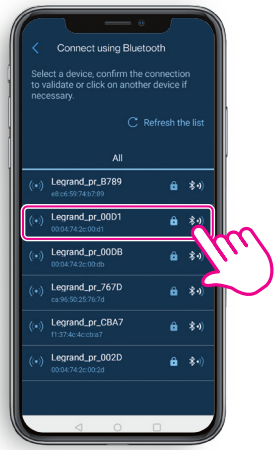


Ownership of the project is transferred completely. You will no longer have access to it.

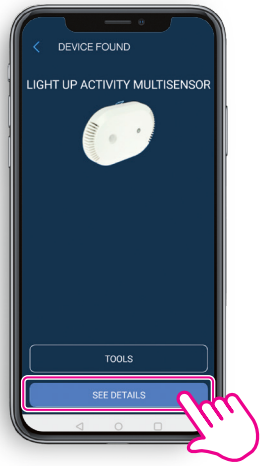
USING THE CLOSE UP APPLICATION

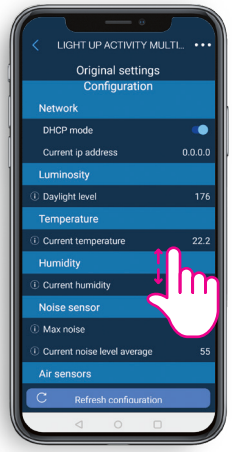
1. PRODUCT SELECTION





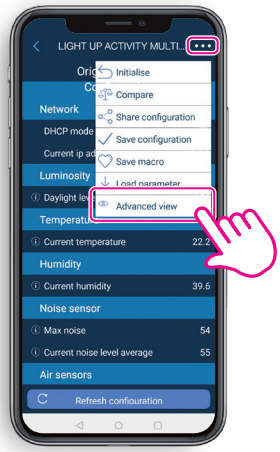
2. PRODUCT SETTINGS READING

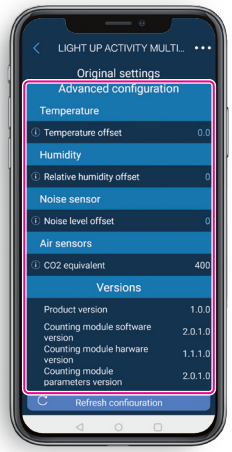




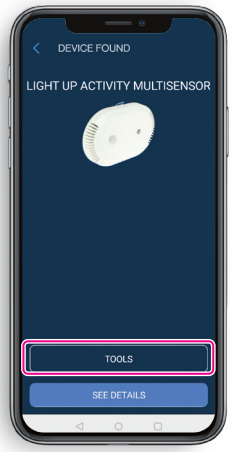
USING THE CLOSE UP APPLICATION (CONTINUED)

3. ACCESS TO ADVANCED SETTINGS



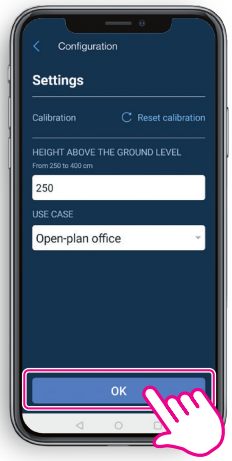


4. TOOLS ACCESS



USING THE CLOSE UP APPLICATION (CONTINUED)

5. COUNTING MODULE CONFIGURATION

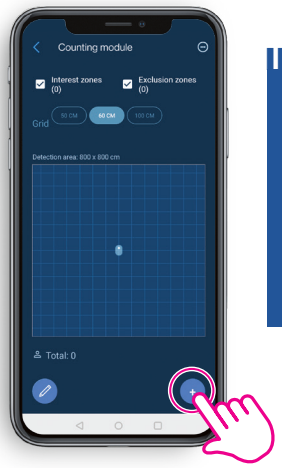


List of selectable **USE CASES** :

- **DemoMode** : demonstration mode, reaction times are very fast.
- **Open-plan office** : open area where people are positioned at work stations. Default value.
- **Meeting room** : situation where people are within close proximity of each other and hardly move.
- **Circulation area** : hall, a place where people are very mobile (or don't stop at all).
- **Medium office** : Office less than 40 m^2 , very few people and very little mobility.

6. COUNTING MODULE - CREATION OF ZONES PER MOVE

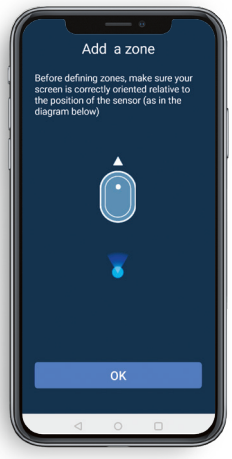
- Click on **+** to add a zone.



IMPORTANT

Before creating a counting zone (exclusion or interest), make sure that no one is present in the zone monitored by the product.

- Once you are well positioned, click **OK.**



IMPORTANT

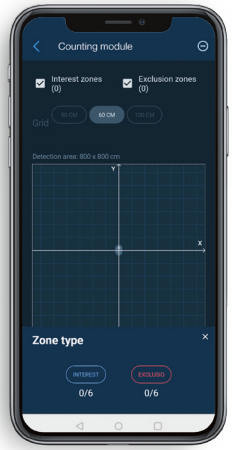
Ensure that the screen is oriented towards the product installation.

USING THE CLOSE UP APPLICATION (CONTINUED)

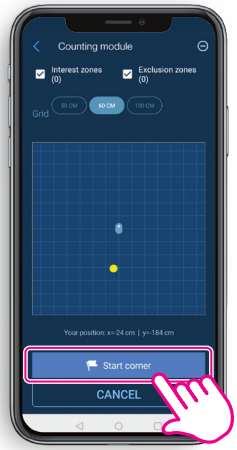
6. COUNTING MODULE - CREATION OF ZONES PER MOVE (CONTINUED)

- Click on **Zone per move**.

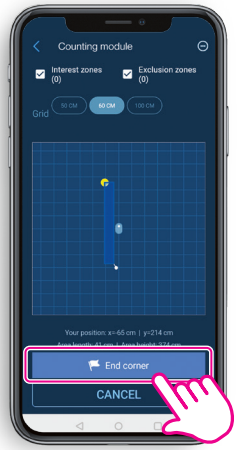
- Choose between an **Interest zone** or an **Exclusion zone.**



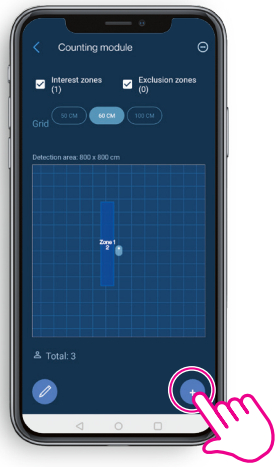
- Move around the room and confirm the starting angle of the zone being created by clicking on **Start corner.**



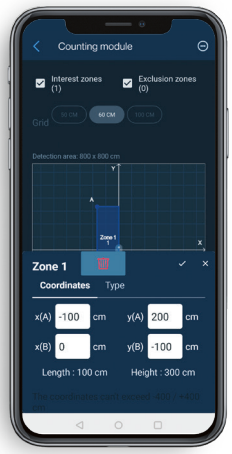
- Then, move to the end point of the zone being created and confirm it by clicking on **End corner.**



- The zone is created
- Repeat the operation for each area of interest as well as exclusion by clicking on **+**



- Coordinates and surface area can be modified.



NOTE

Zone creation: max. 6 interest zones / max. 6 exclusion zones.
Counting only on interest zones.
To create the zones, it is necessary to stand 80 cm away from obstacles (tables, desks, etc.) to set the coordinates of the start and end angles.

Use of exclusion zones :
Designed to filter passage areas.
Avoid overlapping zones between 2 sensors.
Exclude devices with rapid temperature variations.

IMPORTANT

Zones must not overlap.

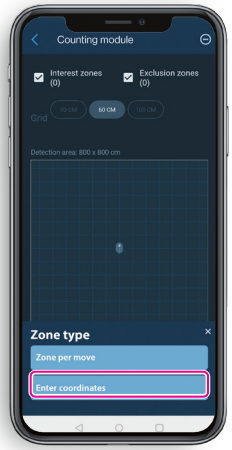
TIP

You'll have :
6 zones of interest maximum
and
6 exclusion zones maximum

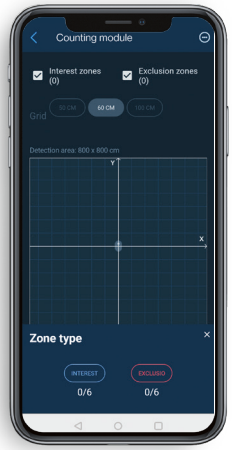
USING THE CLOSE UP APPLICATION (CONTINUED)

7. COUNTING MODULE - MANUAL ZONE CREATION THROUGH COORDINATE INPUT

- Select **Enter coordinates.**



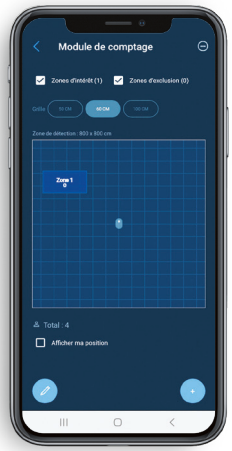
- Choose between an **Interest zone** or an **Exclusion zone.**



- The zone is displayed in the center of the screen.

- Next, enter the desired coordinates for points A and B.
- Click on the ✓ icon to validate.

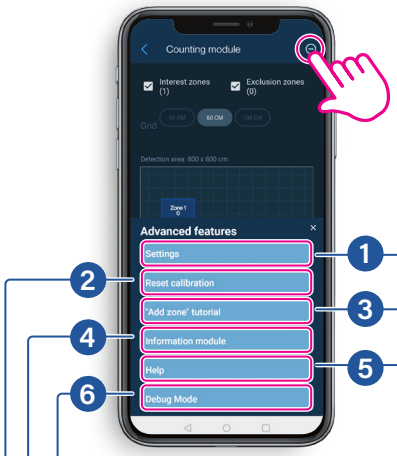
- The zone has now been created.



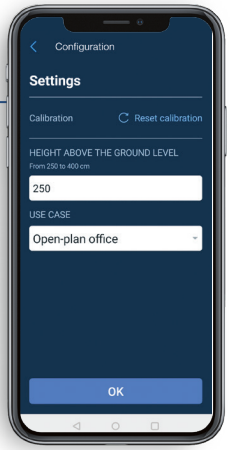
USING THE CLOSE UP APPLICATION (CONTINUED)

8. ADVANCED FEATURES

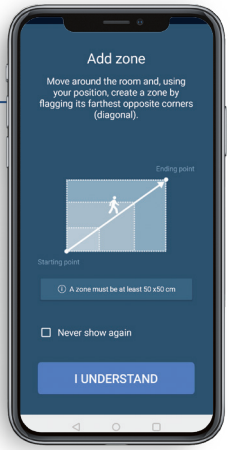
- Click on the 3 small dots to display the **advanced features**.



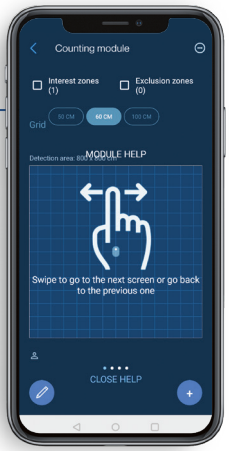
- **1** **Set up** room configuration.



- **3** **Add zone** tutorial

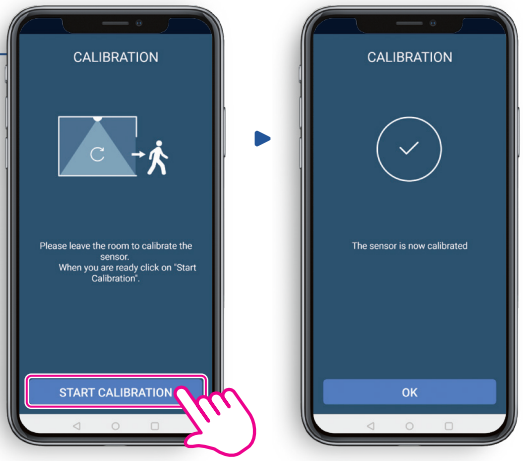


- **5** Module Help



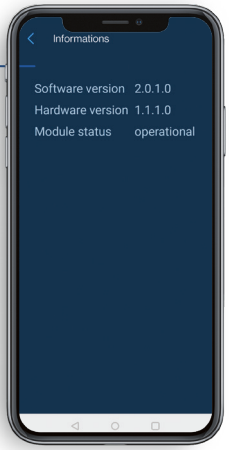
- **2** To **calibrate** the detector, **leave the room** and click on **Start calibration**.

- Calibration is complete.
- You may return inside the detection zone.

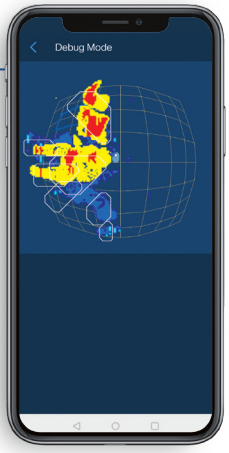


IMPORTANT
Exit the room.

- **4** Module information



- **6** Debug Mode

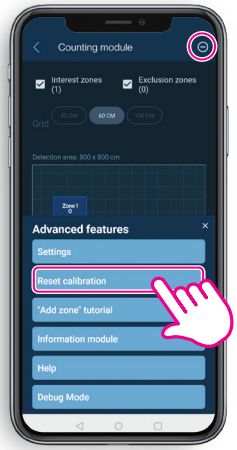


USING THE CLOSE UP APPLICATION (CONTINUED)

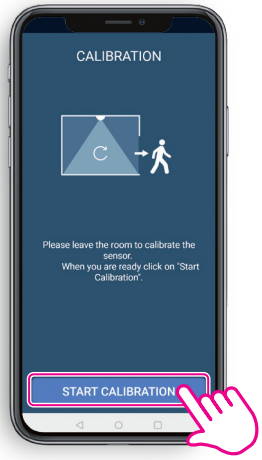
9. CALIBRATION

The product is operational after 5 minutes.
The product will self-calibrate in 20 minutes (adapting to its environment).
To calibrate immediately, start calibration from Close Up.

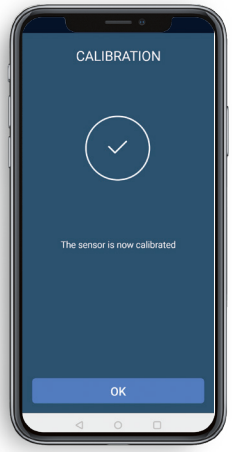
- Press on the 3 small dots to display the **advanced features.**
- Click on **Reset calibration**.



- To **calibrate** the detector, **leave the room** and click on **Start calibration**.



- Calibration is complete.
- You may return inside the detection zone.



IMPORTANT

Exit the room.

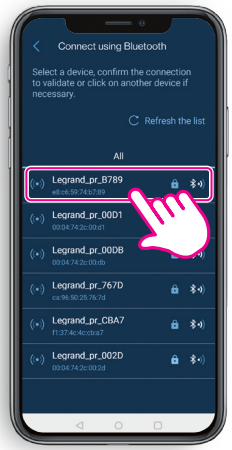
NOTE

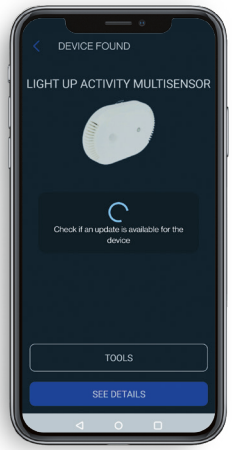
During calibration, hot spots corresponding to electrical equipment (screens, lighting, convectors, etc.) are automatically treated as image backgrounds and are not counted as people.

USING THE CLOSE UP APPLICATION (CONTINUED)

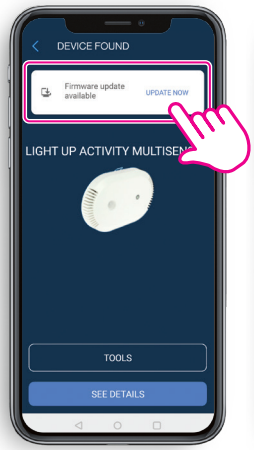
10. PRODUCT UPDATE

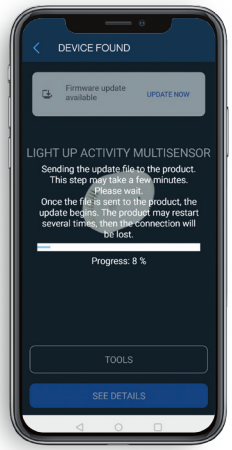
- Connect to the detector using Bluetooth.





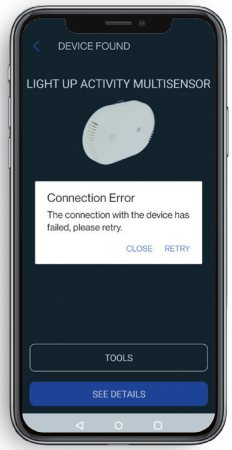
- Click **Update Now** to launch the update.

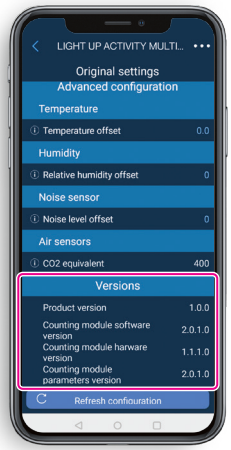




- The update file has been sent to the detector.

- The detector will blink cyan during the update. This step requires the detector to be restarted.





TIP

To check the version of the product in the settings list, activate the "Advanced view".

USE CASES

The operating modes described in this guide are sample configurations corresponding to specific uses.
For each operating mode, it is essential to verify the correct positioning and configuration of the products.

MEETING ROOM

- **Definition :**
  Space where people (around 10 on average) are close to each other (approximately 80 cm).
  Individuals are likely to move in and out of the room in groups. They move sparingly (non-displacement) but may spread out : deploy a computer, lean towards another person.
  A single entrance allows access to the space.

- **Expectations :**
  95% reliability on people counting within one minute of installation. Space clearance (presence and counting reset to zero) within three minutes (maximum) of participants' departure.

- **Zone management :**
  Interest zone : Little or no need to create this type of zone in a meeting room.
  Exclusion zone : Filtering of passage areas (room entrance).

OPEN-PLAN OFFICE

- **Definition :**
  Collective workspace (less than 20 people) where workstations are not separated by any dividers (open space). Individuals are separated (approx. 1.2 m) from one another. There is a high probability that people will come and go individually or in small groups. They are likely to move around and interact with each other.
  Access to the area is possible from all directions.

- **Expectations :**
  90% reliability when counting people within one minute of one or more people accessing the area.
  The space is cleared within 12 minutes of the last person leaving (on average less than 3 minutes).

- **Zone management :**
  Interest zone : Up to 6 zones can be created, depending on space organization.
  Exclusion zone : Filtering of passage areas. Avoid overlapping zones between 2 sensors.

USE CASES (CONTINUED)

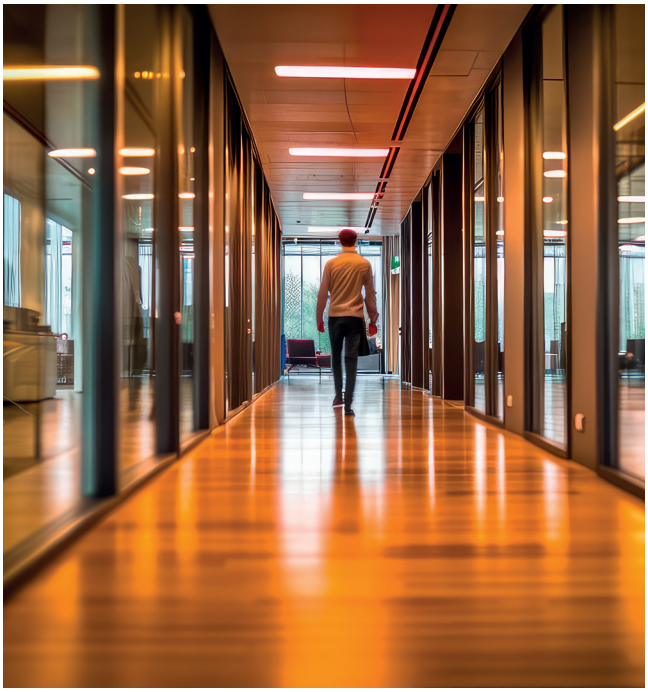
MEDIUM OFFICE

- Definition :
  Work space, less than 40 m², with a small number of people (less than 6). Individuals are separated (approx. 1.2 m) from one another. There is a high probability that people will come and go individually or in small groups. They are likely to move around and interact with each other.
  Access to the area is generally through a single entrance.

- Expectations :
  90% reliability when counting people within one minute of one or more people accessing the area.
  The space is cleared within 12 minutes of the last person leaving (on average less than 3 minutes).

- Zone management :
  Interest zone : Up to 6 zones can be created, depending on space organization.
  Exclusion zone : Filtering of passage areas.

CIRCULATION AREA



- Definition :
  The circulation zone is a space intended to facilitate the passage of individuals between different areas of a building, such as corridors, main entrances, lobbies... This zone is characterized by a high flow of people moving in various directions, often rapidly and transiently. Unlike static environments such as meeting rooms or offices, transition zones are not intended to accommodate occupants for extended periods. This case is particularly suitable for tracking people's whereabouts.

- Expectations :
  80% reliability on counting people within 10s of one or more people entering the space. The space is cleared within 30s of the last person leaving.

- Zone management :
  The use of interest zones is not recommended.
  Exclusion zone : exclude zones where detection (and therefore lighting) is not desired, and avoid overlapping zones between 2 sensors.

FLOW MATRIX

The network flow matrix specifies the network flows used by the product for configuration and operation.

FLUX TYPE	PROTOCOL	DESTINATION PORT	SOURCE	DESTINATION
Configuration	TCP	443	HTTP Client	Activity Multisensor
Operation	TCP	8883	Activity Multisensor	MQTT Broker
Operation	UDP	53	Activity Multisensor	DNS Server
Operation	UDP	68	Activity Multisensor	DHCP Server
Operation	UDP	123	Activity Multisensor	NTP Server
Operation	UDP	5353	Activity Multisensor	MDNS

MQTT CLIENT CONFIGURATION USING THE ACTIVITY'S API HTTP - REST

1. PREREQUISITES

- To find out the product's IP address, it is possible to obtain it in several ways :
- By logging on to the product using the Close Up application and reading through all the product settings.
- By requesting mDNS if our pc is connected on the same subnet as the product, for example with dns-sd :

```
dns-sd -B _legrand._tcp
```

Then ping the name instance, adding the suffix .local

```
ping LGR-ACTIVITY-0004742C0012.local
```

In the following examples, curl is installed to send HTTP requests.
The examples also use jq, this command simply formats the json and is optional.

MQTT CLIENT CONFIGURATION USING THE ACTIVITY'S API HTTP - REST (CONTINUED)

2. FIRST TIME USE

The API HTTP - REST uses basic authentication to manage access rights to the product.

User is always admin.

Factory password is Password_XXXXXX with XXXXXX being the last 6 characters of the MAC address.

In the following example, the product MAC address is 00:04:74:2C:00:12, the default password is Password_2C0012.

NOTE

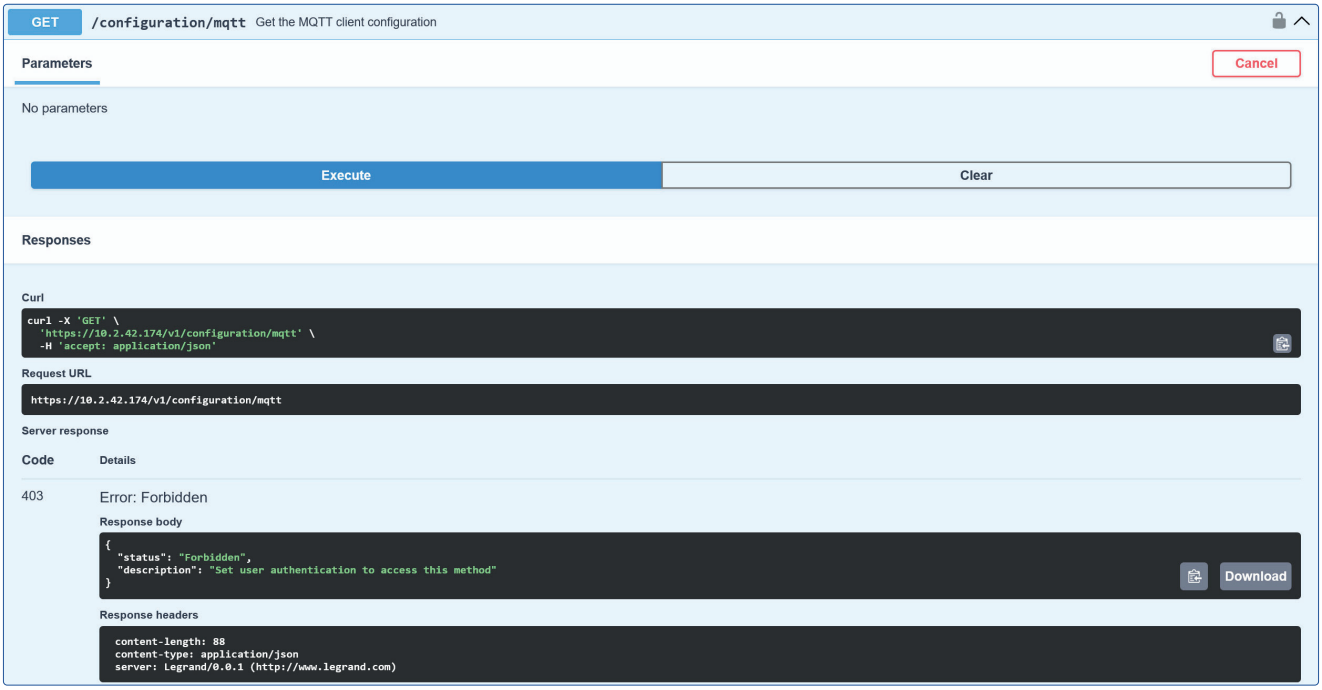
The product includes documentation of the REST API, which can also be used to test the various endpoints.

To access it, use the following URL https://[ip du produit]/v1/swagger.

In order to use all API routes, the password must be changed, otherwise the product will respond with a 403 error code.

```
> curl -X GET -u "admin:Password_2C0012" --insecure
https://10.2.42.174/v1/configuration/mqtt | jq .
```

```
{
"status": "Forbidden",
"description": "Set user authentication to access this method"
}
```



MQTT CLIENT CONFIGURATION USING THE ACTIVITY'S API HTTP - REST (CONTINUED)

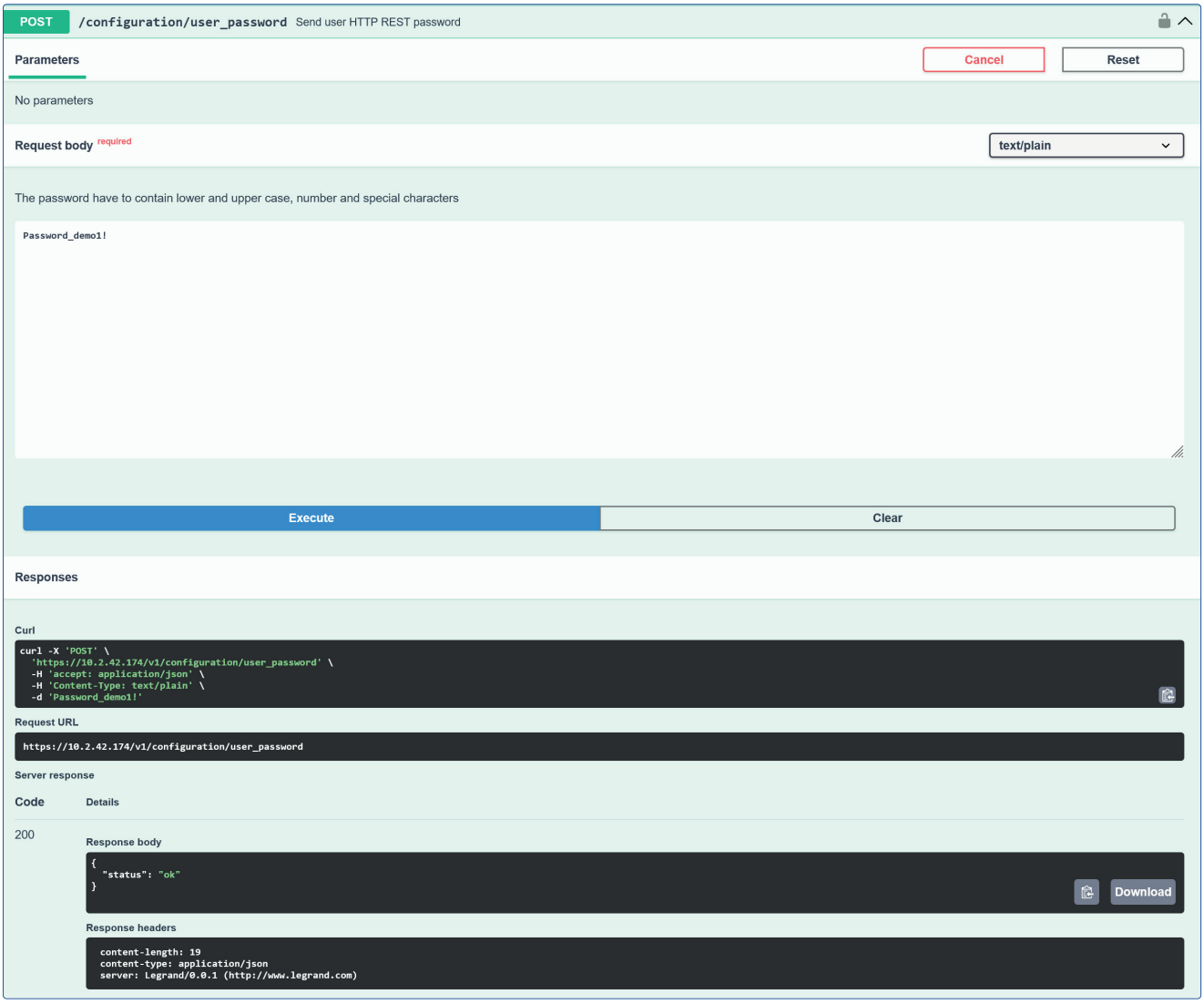
2. FIRST TIME USE (CONTINUED)

Curl password modification.

```
> curl -X POST -u "admin:Password_2C0012" -H "Content-Type: text/plain"
-d "Password_demo1" --insecure https://10.2.42.174/v1/configuration/user_password | jq .
```

```
{
"status":"ok"
}
```

Password modification through OpenAPI documentation.



MQTT CLIENT CONFIGURATION USING THE ACTIVITY'S API HTTP - REST (CONTINUED)

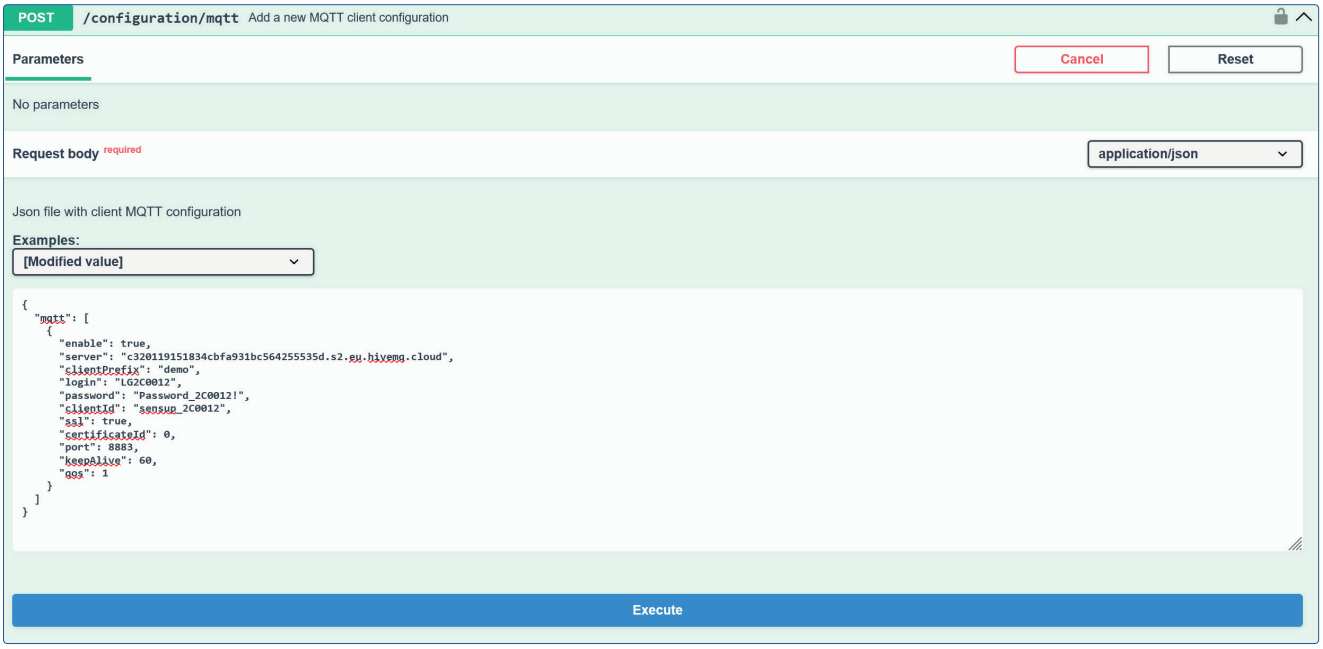
3. MQTT CLIENT CONFIGURATION

Example of curl client configuration.

```
> curl -X POST -u "admin:Password_demo1" -H "Content-Type: application/json"
-d "{\"mqtt\":[{\"enable\":true,
\"server\":\"c320119151834cbfa931bc564255535d.s2.eu.hivemq.cloud\",
\"clientPrefix\":\"demo\",\"login\":\"LG2C0012\",\"password\":\"Password_2C0012!\",
\"clientId\":\"sensup_2C0012\",\"ssl\":true,\"certificateId\":0,\"port\":8883,
\"keepAlive\":60,\"qos\":1}]}"
--insecure https://10.2.42.174/v1/configuration/mqtt | jq .
```

```
{
"status": "ok",
"macAddress": "00:04:74:2C:00:12"
}
```

Example of MQTT client configuration using the OpenAPI page.



MQTT CLIENT CONFIGURATION USING THE ACTIVITY'S API HTTP - REST (CONTINUED)

3. MQTT CLIENT CONFIGURATION (CONTINUED)

It is possible to retrieve the current configuration (excluding the password).

```
curl -X GET -u "admin:Password_demo1" --insecure
https://10.2.42.174/v1/configuration/mqtt | jq .
```


```
{
"mqtt": [
{
"enable": true,
"server": "c320119151834cbfa931bc564255535d.s2.eu.hivemq.cloud",
"clientPrefix": "demo",
"login": "LG2C0012",
"password": "**************",
"clientId": "sensup_2C0012",
"ssl": true,
"certificateId": 0,
"port": 8883,
"keepAlive": 60,
"qos": 1
}
]
}
```


In this example, the server uses a TLS connection with server authentication.
It is therefore necessary to send the server's CA certificate so that the product an verify the certificate provided by the server.

Example of CA server certificate configuration using curl.

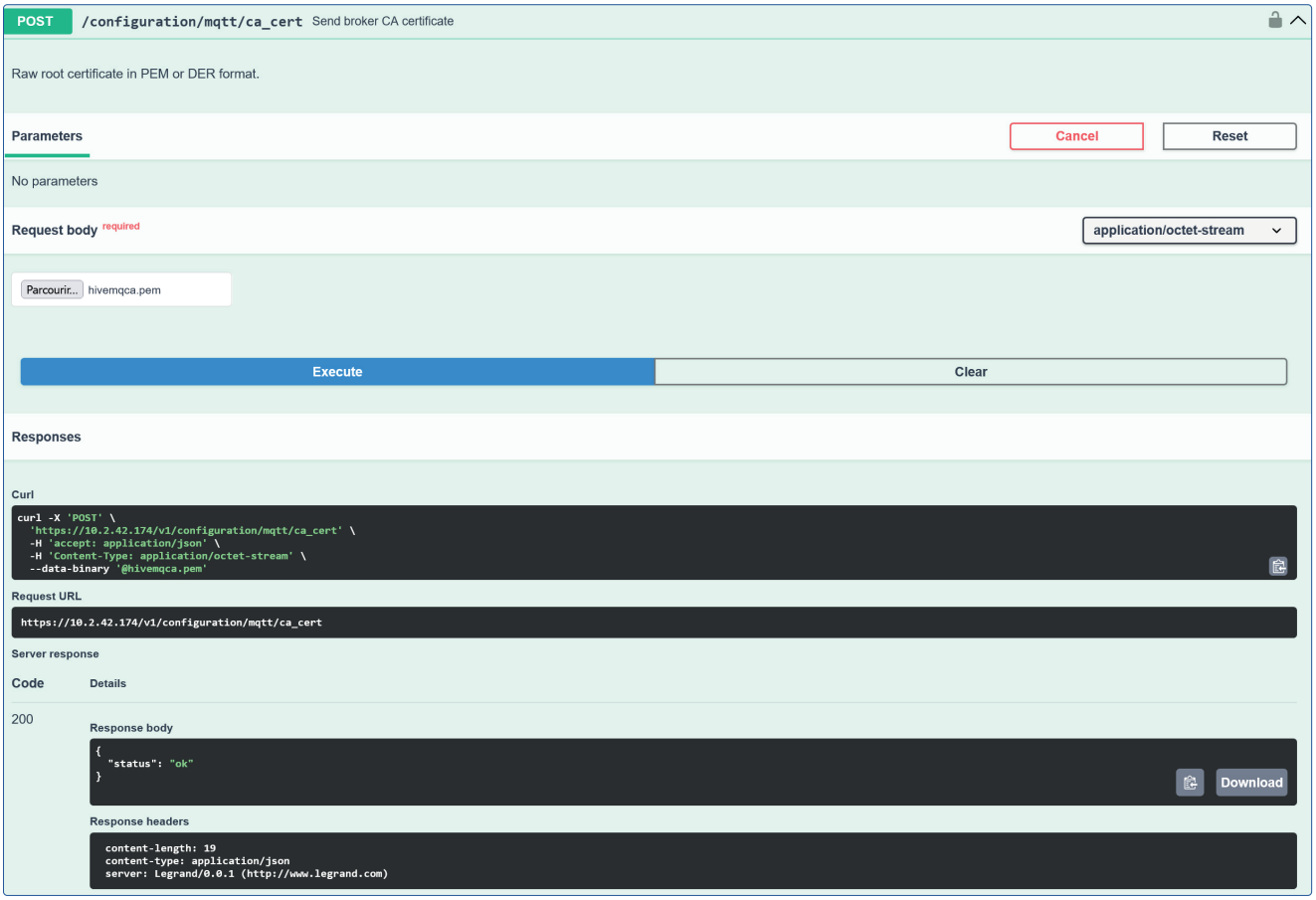
```
curl -X POST -u "admin:Password_demo1" --data-binary @hivemqca.pem
--insecure https://10.2.42.174/v1/configuration/mqtt/ca_cert | jq .
```


```
{
"status": "ok"
}
```

MQTT CLIENT CONFIGURATION USING THE ACTIVITY'S API HTTP - REST (CONTINUED)

3. MQTT CLIENT CONFIGURATION (CONTINUED)

Example of CA server certificate configuration via the OpenAPI page.



Double TLS authentication can be configured, but is not documented in this document.
It is possible to get an indication of the MQTT client status by inquiring the product status.

MQTT CLIENT CONFIGURATION USING THE ACTIVITY'S API HTTP - REST (CONTINUED)

3. MQTT CLIENT CONFIGURATION (CONTINUED)

Example of curl error status.

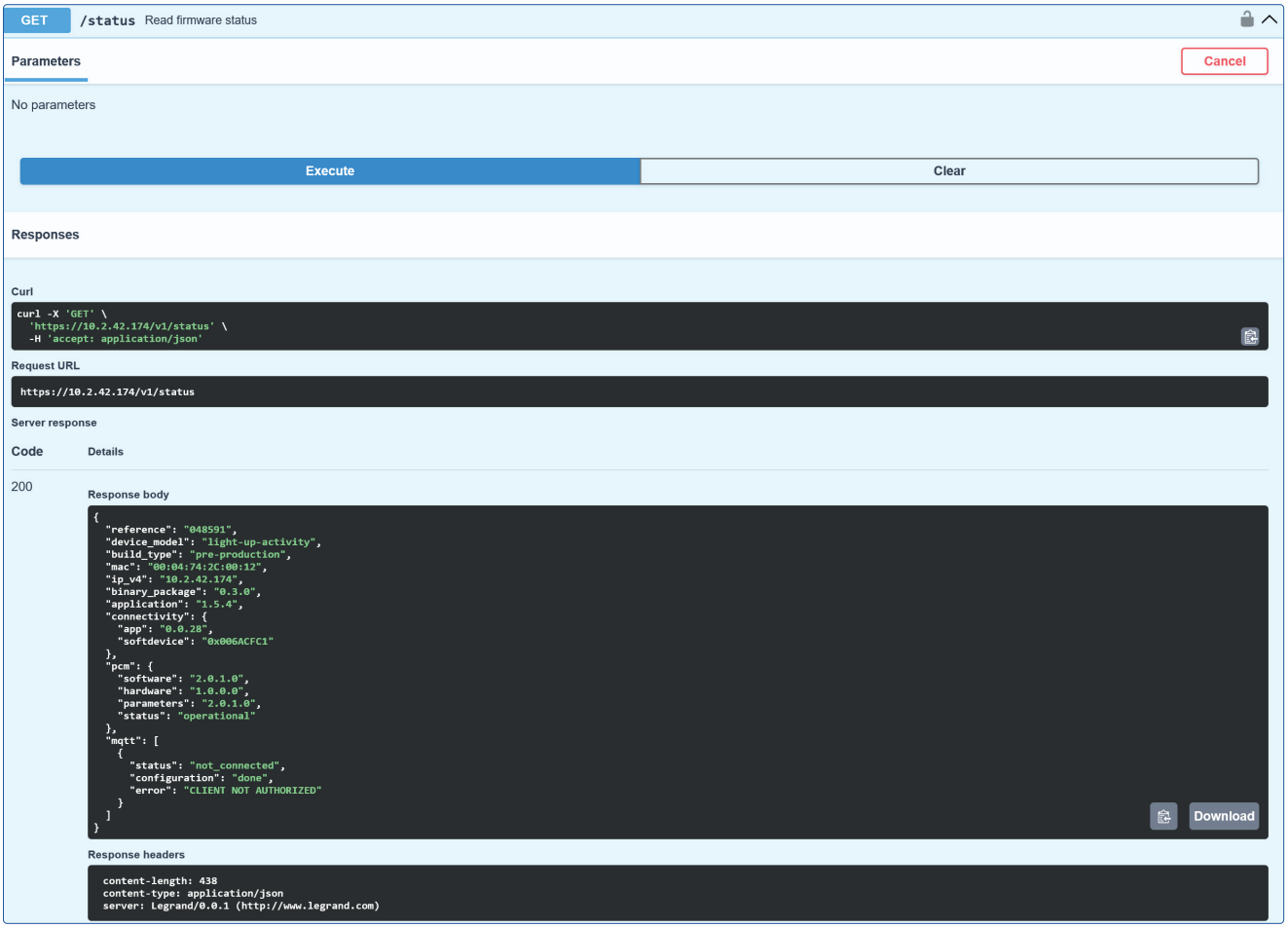
```
> curl -X GET -u "admin:Password_demo1" --insecure https://10.2.42.174/v1/status | jq .
```


```
{
"reference": "048591",
"device_model": "light-up-activity",
"build_type": "pre-production",
"mac": "00:04:74:2C:00:12",
"ip_v4": "10.2.42.174",
"binary_package": "0.3.0",
"application": "1.5.4",
"connectivity": {
"app": "0.0.28",
"softdevice": "0x006ACFC1"
},
"pcm": {
"software": "2.0.1.0",
"hardware": "1.0.0.0",
"parameters": "2.0.1.0",
"status": "operational"
},
"mqtt": [
{
"status": "not_connected",
"configuration": "done",
"error": "CLIENT NOT AUTHORIZED"
}
]
}
```

MQTT CLIENT CONFIGURATION USING THE ACTIVITY'S API HTTP - REST (CONTINUED)

3. MQTT CLIENT CONFIGURATION (CONTINUED)

Example of error status on the OpenAPI page.



MQTT CLIENT CONFIGURATION USING THE ACTIVITY'S API HTTP - REST (CONTINUED)

3. MQTT CLIENT CONFIGURATION (CONTINUED)

Example of an ok status on curl.

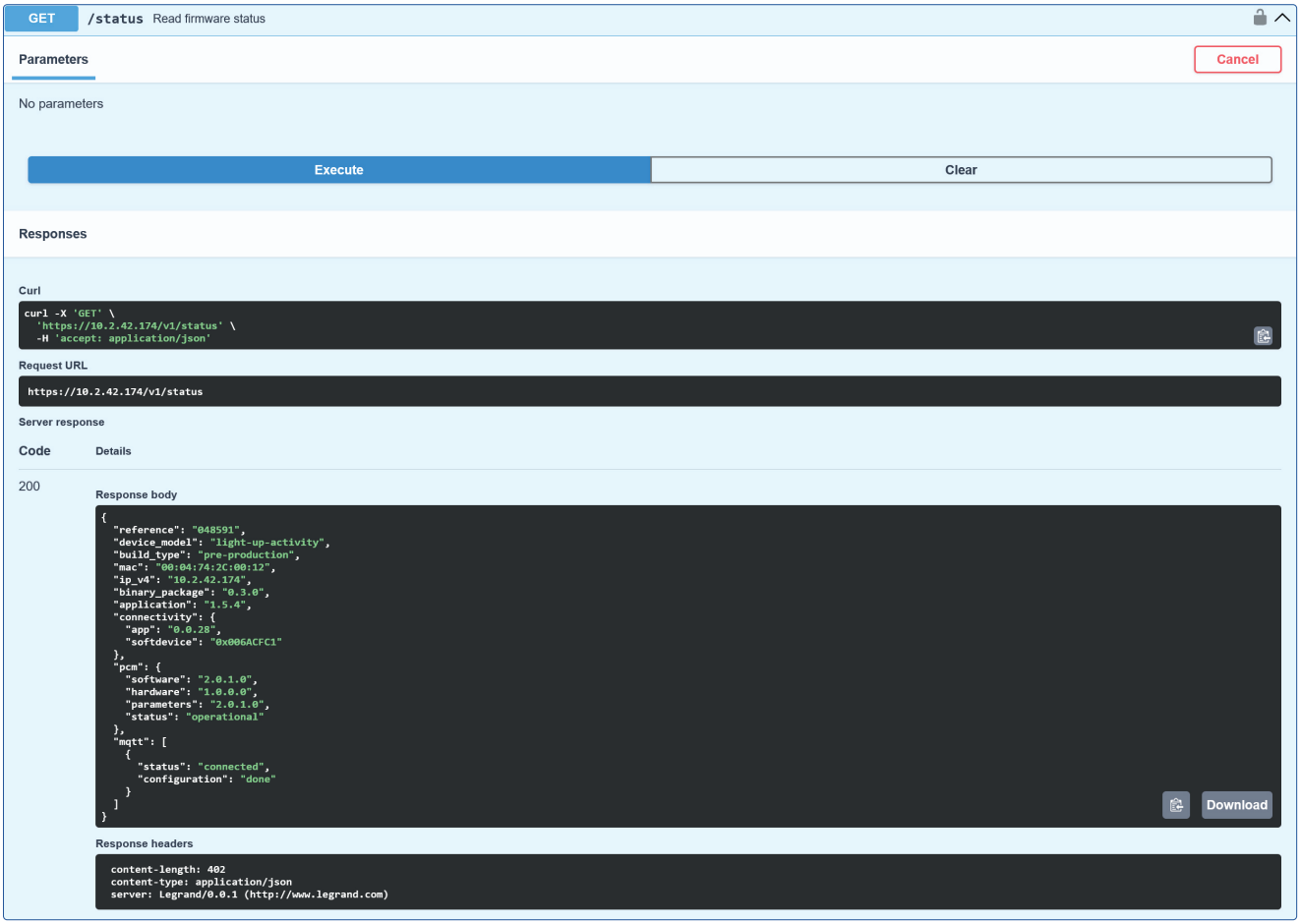
```
curl -X GET -u "admin:Password_demo1" --insecure https://10.2.42.174/v1/status | jq .
```


```
{
"reference": "048591",
"device_model": "light-up-activity",
"build_type": "pre-production",
"mac": "00:04:74:2C:00:12",
"ip_v4": "10.2.42.174",
"binary_package": "0.3.0",
"application": "1.5.4",
"connectivity": {
"app": "0.0.28",
"softdevice": "0x006ACFC1"
},
"pcm": {
"software": "loading",
"hardware": "loading",
"parameters": "loading",
"status": "start-up"
},
"mqtt": [
{
"status": "connected",
"configuration": "done"
}
]
}
```

MQTT CLIENT CONFIGURATION USING THE ACTIVITY'S API HTTP - REST (CONTINUED)

3. MQTT CLIENT CONFIGURATION (CONTINUED)

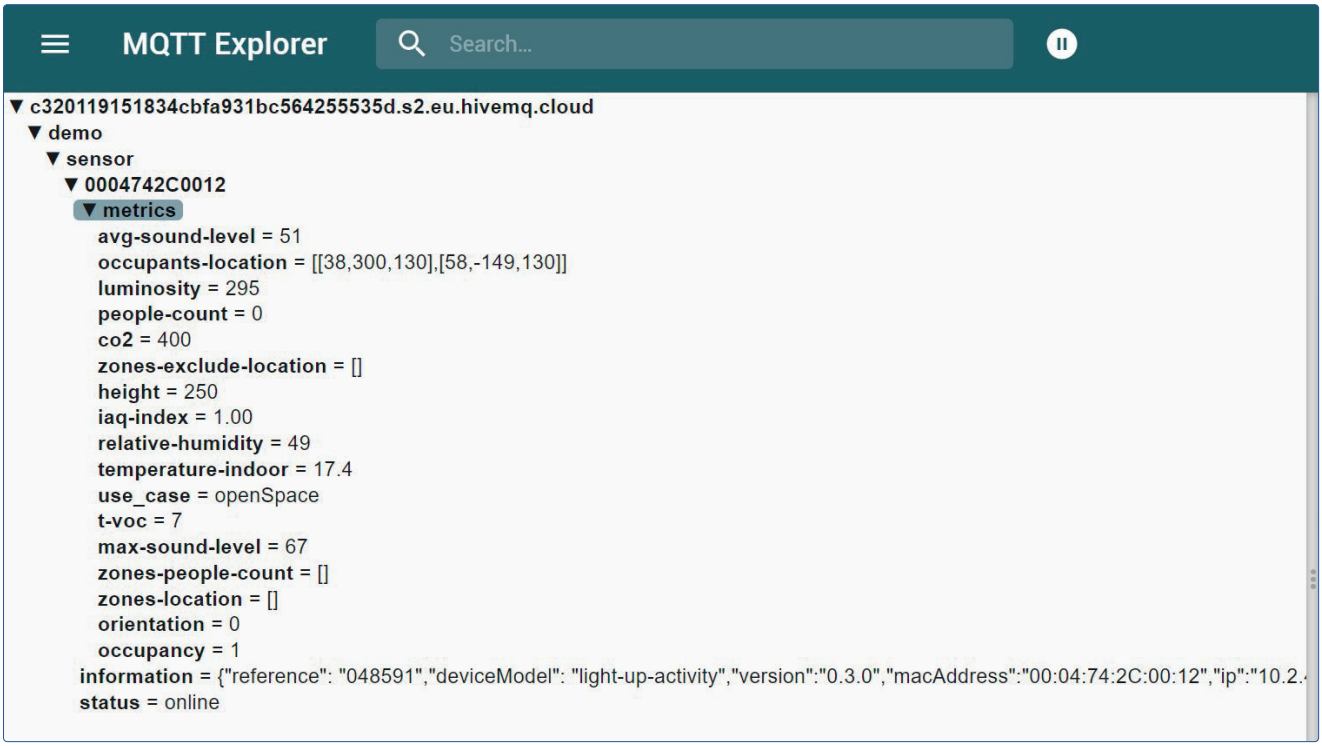
Example of an ok status on the OpenAPI page.



MQTT CLIENT CONFIGURATION USING THE ACTIVITY'S API HTTP - REST (CONTINUED)

3. MQTT CLIENT CONFIGURATION (CONTINUED)

By connecting an MQTT client to this same broker, it is possible to verify if metrics are being correctly sent.



MQTT CLIENT CONFIGURATION USING THE ACTIVITY'S API HTTP - REST (CONTINUED)

4. METRICS TRANSMISSION FREQUENCY CONFIGURATION

The MQTT client has a default configuration (out of factory or after factory reset procedure).
Configuration query for sending metrics on curl.

```
curl -X GET -u "admin:Password_demo1" --insecure
https://10.2.42.174/v1/configuration/metrics_broker | jq .
```


```
[
{
"id": 0,
"period": 60,
"on_change": 0.25
},
{
"id": 1,
"period": 60,
"on_change": 1
},
{
"id": 2,
"period": 60
},
{
"id": 4,
"period": 60
},
{
"id": 5,
"period": 60
},
{
"id": 6,
"period": 60,
"on_change": 1
},
{
"id": 7,
"period": 60
},
{
"id": 8,
"period": 60
},
{
"id": 9,
"period": 60
},
{
"id": 10,
"period": 60
},
{
"id": 11,
"period": 60,
"on_change": true
},
```

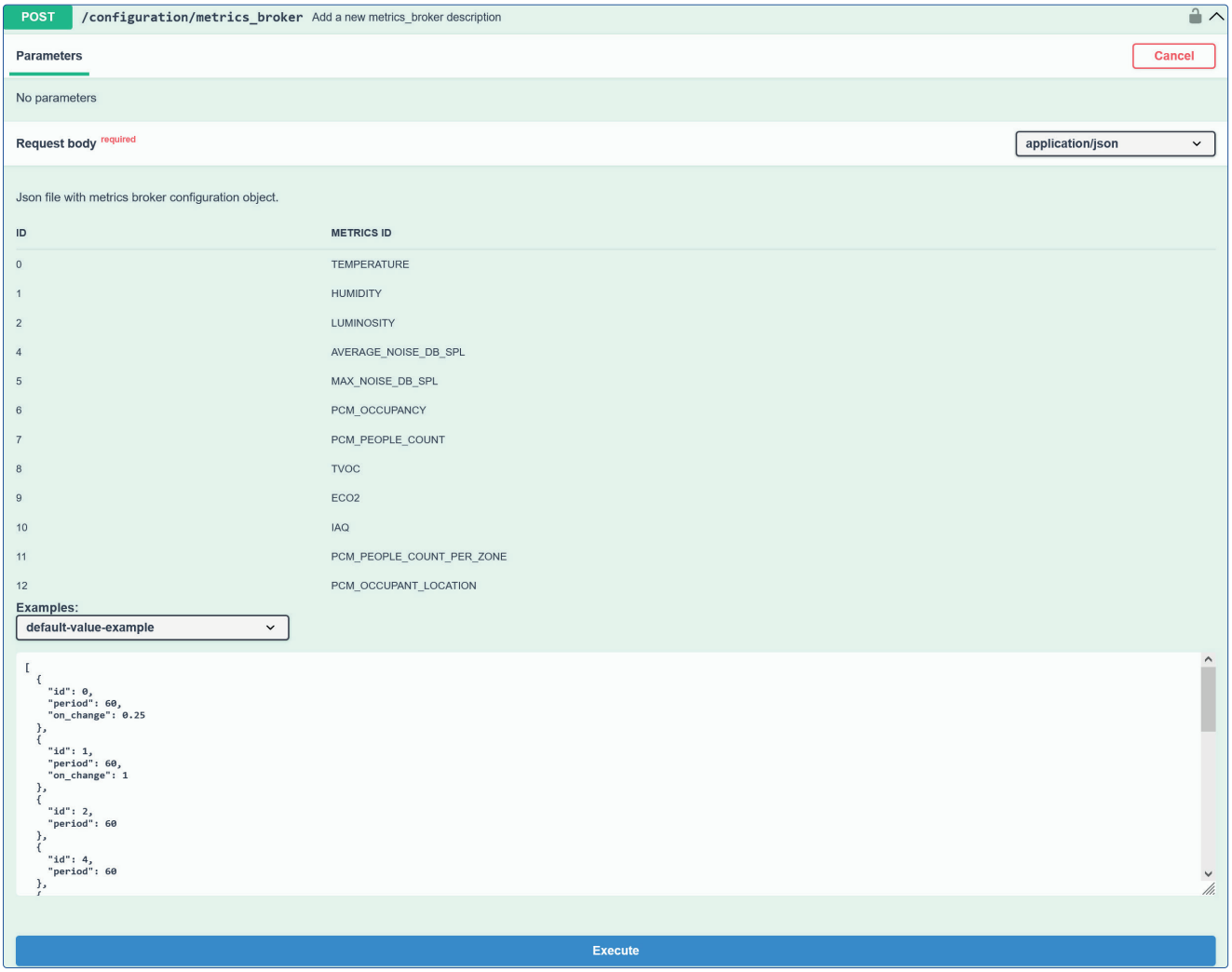
MQTT CLIENT CONFIGURATION USING THE ACTIVITY'S API HTTP - REST (CONTINUED)

4. METRICS TRANSMISSION FREQUENCY CONFIGURATION (CONTINUED)


```
{
"id": 12,
"period": 60,
"on_change": true
}
]
```


This configuration can be modified.

Example of metrics transmission frequency modification by openAPI.





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