



Hub/Dot

Installation Manual

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Objective

The Technical documentation is describing and defining the usage of specified items for technical experts. It shall describe features of the defined topic, expected performance and examples. Target audience is professional trained experts only.

Definitions and Abbreviations

| | |
|-------------|--|
| Diagram | All diagrams shall be provided in a way that they can be directly transferred into any relevant Marketing material such as Technical Specifications or User Manual. |
| Instruction | All instructions shall be formulated or presented in a way that they can be understood by a third-party layman and used as basis for descriptions in the User Manual |

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General

Introduction

The Hub is a central IoT gateway with integrated wireless transmitters to uplink sensor data to the cloud backend. The Hub can connect to Energybox sensors (Dot) wirelessly and receive sensor data. The information will be time synchronized and aggregated. Connected to internet via LAN interface or the internal cellular modem the data can be uplinked to the cloud database.

This document describes how to install a unit and ensure proper operation. Besides general information you will be guided through the physical installment process and the operation of device and data uplink connectivity.

Safety Instructions

Please always disconnect power before installing the unit ! Any installation should be done by certified personnel. Please make sure the unit is not connected to any voltage level outside specification.

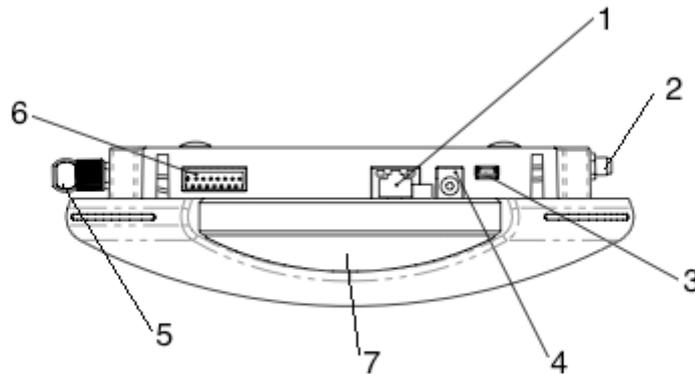
Package content

The package contains the following items:

- Hub
- Mounting Plate
- Mounting-Screws
- Sim card (optional)
- CAT5 cable (LAN)
- Antenna for RF connection
- Antenna for cellular connection
- AC/DC Power adaptor
- DC Jack Adaptor for fixed wire mounting on DC cord

Specification Hub

Interfaces



| PORT | DESCRIPTION | PORT SPECIFICATION | CABLE REQUIREMENTS |
|------|-----------------------------|--------------------|----------------------------|
| 1 | LAN port | RJ 45 TCP/IP | CAT5 or higher |
| 2 | Antenna 4G (green code) | SMA Jack | - |
| 3 | USB Port for backup battery | Micro USB | Micro USB cable |
| 4 | DC Power port | DC Jack 2.5mm | Adaptor or DC In hole Jack |
| 5 | Antenna RF (grey code) | SMA Jack | - |
| | | | |
| | | | |

Power Compatibility

The Hub provides various options to power the unit. All of them can be operated simultaneously and provide fallback feature between each other.

| POWER INPUT | DESCRIPTION | PORT SPECIFICATION |
|-------------|--|-------------------------------------|
| PoE | Power over Ethernet | LAN RJ45 |
| DC JACK | 5V / 2A DC input | AC/DC adaptor required |
| USB POWER | 5V / 2A USB power from battery power pack for backup of unit | Micro USB; not charging is provided |

Technical Data
Build In Powersupply

| | |
|-------------|---|
| Power Input | DC Power input 5V / 2A, AC-DC Power Adaptor 90-240VAC, 50/60 Hz PoE via LAN port USB 5V / 2A battery power pack support (backup function) |
|-------------|---|

Sensor Communication

| | |
|-------------------|---|
| RF Frequency | 902-928 MHz (US version) |
| Antenna | SMA, 3dBi gain |
| Wireless range | 1000 ft / 300m (in line of sight), 150 ft / 45m (indoor) Range may vary according to environmental variables |
| Max no of Sensors | 50 |
| Security | AES-128 Encryption |

Network Communication

| | |
|-----------|-------------------------------------|
| LAN | RJ45 10/100 Mbps |
| Security | TLS1.2, AES-128 Encryption |
| IP | DHCP or static IPv4 |
| Bandwidth | min. 128kBps upload speed |
| 4G | LTE/4G Modem with dedicated Simcard |
| Antenna | SMA, 3dBi gain |

Data Logger

| | |
|-------------|--------------|
| Memory Size | 120MB |
| Capacity | Max. 4 weeks |

Enclosure

| | |
|------------------|--|
| Mounting/Housing | Wall or Ceiling mount |
| Size | DIA 7.88" x H 2.21" DIA 200mm x H56mm |
| Weight | 0.98lbs / 445g |

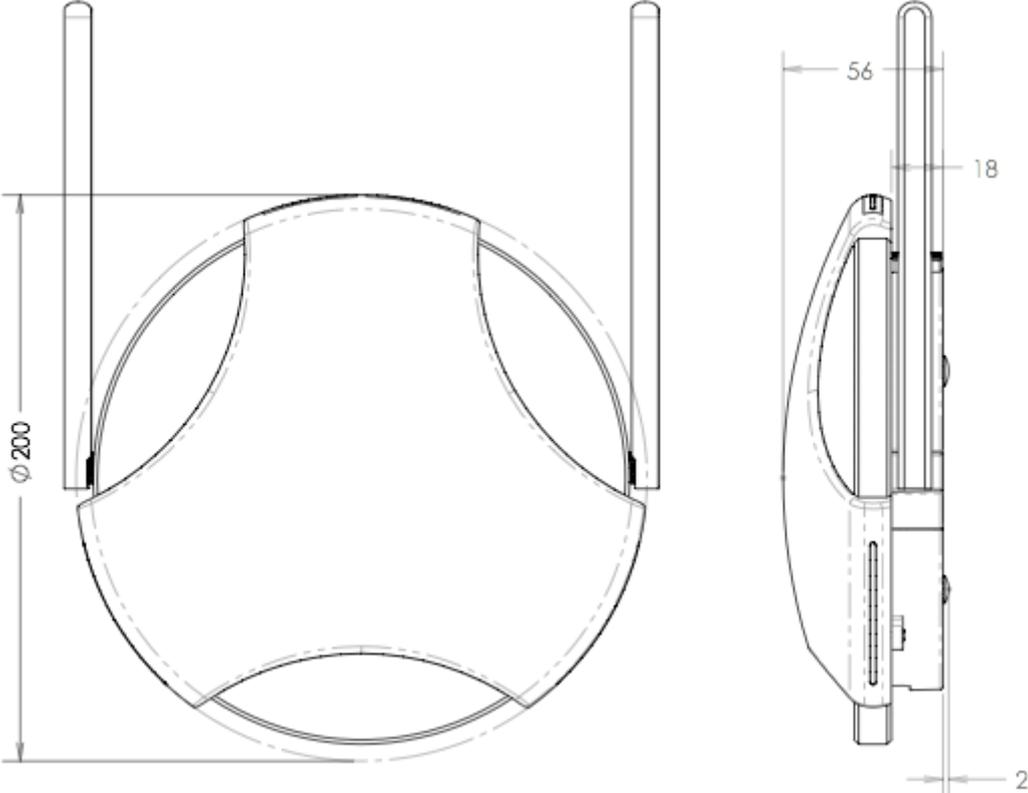
Environmental conditions

| | |
|-----------------|----------------------------------|
| Location | Indoor Unit |
| Operating Temp. | 32°F to 113°F (0°C to +45°C) |
| Storage Temp. | -22°F to 140°F (-30°C to +60°C) |
| Humidity | max. 90% non-condensing |

Regulatory

FCC

Dimensions

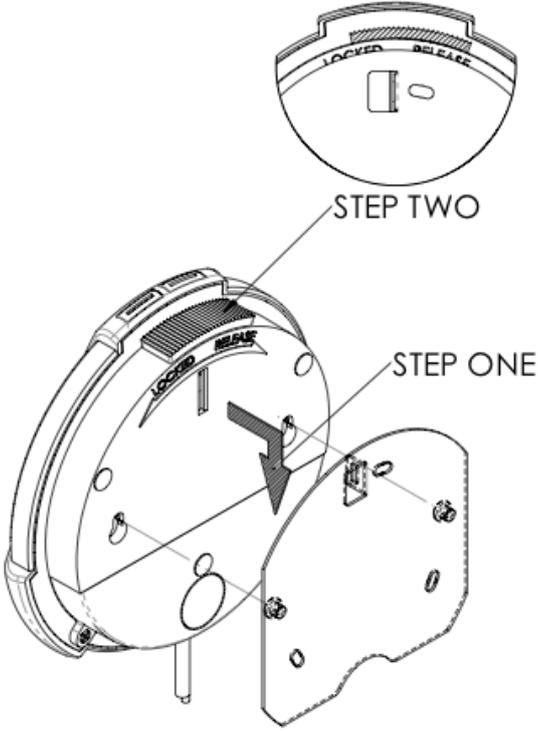
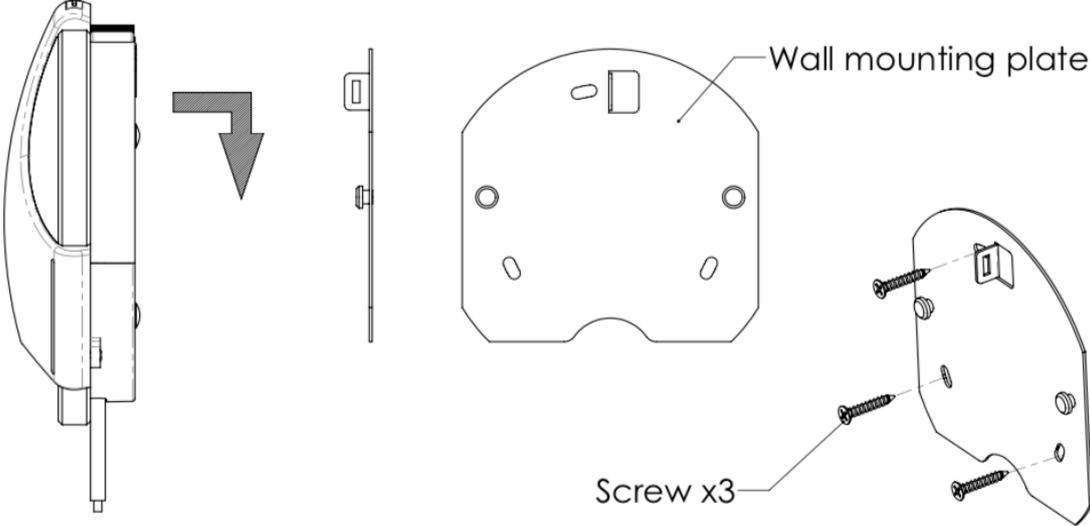


Technical Documentation
Installation Hub

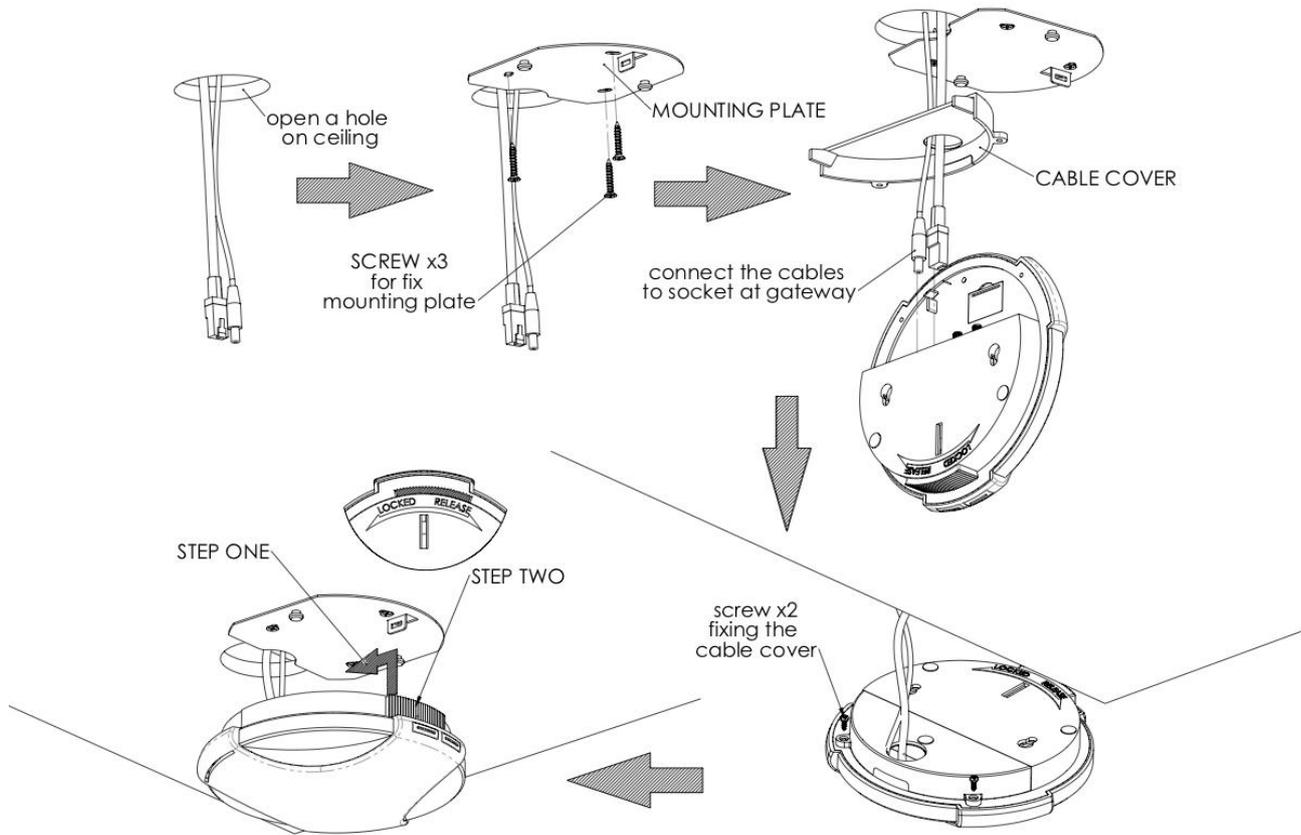
Mounting Options

The Hub can be mounted in different options on Wall, Ceiling or Desk. Necessary mounting equipment is provided as accessory.

Mounting on Wall



Technical Documentation
Mounting on Ceiling



Setup Hub

User Interface (Buttons & LEDs)



| No | | DESCRIPTION | LED COLOR | SIGNAL STATUS |
|---|---|----------------|-----------------|--|
|  | 1 | RF Status | Red | No Sensor connected |
| | | | Amber | At least one sensor of whitelist connected, but some missing |
| | | | Green | All Sensors from whitelist connected |
|  | 2 | Pairing Mode | Off | Pairing Mode disabled |
| | | | Green flash | Pairing Mode enabled |
|  | 3 | Cloud Status | Red | Disconnected |
| | | | Amber | Connected to Cloud, Buffer mode operation |
| | | | Green | Connected to Cloud |
|  | 4 | 4G/LTE Status | Off | Disabled or no Simcard inserted |
| | | | Red | No signal detected |
| | | | Amber | Signal detected, but no Host-Server connection |
| | | | Green | Connected to Host-Server |
| | 5 | Central Status | Green | Normal operation |
| | | | Green flash | Firmware updating |
| | | | Amber | Buffer erase in progress |
| | | | Red flash (1x) | Door opened |
| | | | Cyan flash (1x) | Door closed |
| | | | Blue flash (1x) | Button double click on dot |

Network connect

The Hub requires an Internet connection and offers connectivity via the internal LAN network connection port or built-in 4G Modem. Default setting is to 4G modem as primary link to Internet. The LAN port supports standard Ethernet communication at 10/100Mbps and TCP/IP protocol.

Standard unit is equipped with international simcard for mobile network access and does not require user interaction for linking the unit to internet. After unit is powered will automatically link to cellular network and connect to cloud. The LEDs on unit indicate current state.

For wired connectivity the Hub supports a local LAN interface, standard set to DHCP IP setting and with ability link to cloud through any standard broadband router. IP settings can be modified in admin portal of Hub towards static IPv4 setting.

IP settings (wired LAN connection)

Default setting for IP connection of Hub is set to DHCP. There is a 4G over LAN fallback enabled.

In case of usage inside a local network with firewall the following ports are required to be open to access the energybox cloud system:

Pairing of wireless Sensors (Dots)

The Hub supports whitelist method of pairing of sensors to the Hub. Each wireless sensor is equipped with a global unique ID (UID) and once powered the sensor will seek for a Energybox Hub to transmit data to. The whitelist is a list of UID inside Hub which is the 'allowance list'. Hub will only accept sensors transmitting data to Hub that are listed in whitelist. Once a sensor is transmitting data to Hub it is in paired mode causing the sensor to no longer seek for a Hub rather than transmitting data in regular configured interval.

On admin portal of Hub is an overview of listed sensors in whitelist and status (paired / non-paired).

To add a device to whitelist and pair with Hub activate the pairing mode on Hub.



The green LED of pairing mode starts flashing and Dots that are not yet paired and seeking for Hub will pair to Hub accordingly. The flashing LED on dot indicates pairing seek and will be in off state once paired.

ATTENTION: Do not start pairing mode on multiple Hubs simultaneously in same communication area next to each other as the pairing will be random by then.

Clear Buffer Data

The Hub provides Memory for storing measurement data up to 4 weeks in case of disconnect to host server. This data can be manually erased following the procedure:

Step 1: power off Hub

Step 2: Hold RF link button 

Step 3: Power on Hub

Step 4: RF link and cloud LED turn red, Status LED turn green

Step 5: Keep pressing RF link button for 15s

Step 6: Pairing and RF link LED turn green

Step 7: Release button

Reset RF setting

During normal operation of Hub press and hold RF link button and pairing button for 5s. This will reset the RF settings.

Technical Documentation
Admin Portal

The Hub is providing an internal webserver allowing access to devices admin portal for manual configuration settings. To enter the admin portal attach the Hub to your network or computer with a wired LAN connection.

Start an internet browser (preferred Chrome) and enter the Hubs IP address. You will be linked to the device admin portal.

Credentials for login:
 User : hubadmin
 Password : hubadmin

Status page

Landing page is the status of unit:

Status

UUID: 70:B3:D5:FA:4B:27
 Server: mqtt-bridge.energybox.com
 Status: Online
 Network: Mobile - Vodafone.de
 LTE RSSI: -93dBm
 LTE Signal Quality: -14dB
 SIM card detected: Yes
 Paired Sensors: 1

19/10/2018 8:23am UTC

| | |
|----------------|---|
| UUID | Unique ID of Hub (same as MAC adress of LAN port) |
| Server | Host Server setting the Hub is connecting to |
| Status | Cloud link status (connected to Host server) |
| Network | Network type and carrier |
| LTE RSSI | Signal strength of RSSI on 4G/LTE |
| LTE | Signal quality of 4G/LTE connection |
| Sim card | Status of simcard |
| Paired Sensors | Number of paired Sensors to Hub |

Network page

Ethernet Setting Edit

DHCP
Enable

IP
192.168.178.35

Subnet Mask
255.255.255.0

Default Gateway
192.168.178.1

Preferred DNS
174.47.40.106

Alternate DNS
174.47.20.106

Mobile Setting Edit

Mobile Module:HL7692 - EMEA

Connection Options
Mobile Over LAN

Mobile APN
vfd1.korem2m.com

APN Username

APN Password

SIM PIN

NTP Servers Edit

0.pool.ntp.org

1.pool.ntp.org

2.pool.ntp.org

3.pool.ntp.org

Cloud Setting

Edit Cloud

Ethernet setting applies between DHCP mode of operation or fixed IPv4 setting. Ports in use please see referring chapter in manual.

Mobile setting applies the 4G/LTE setting. For Energybox simcard set to default. In case of instable 4G network a preference handling Mobile/LAN can be set.

NTP servers are set to default NTP pool operation. In case of operating of unit inside intranetwork the settings can be modified.

Cloud setting defaults to standard Energybox Host Server and can be modified for intranetwork operation.

Sensors

Whitelist Edit

| Type | ID | Ver | Location | Time | Signal | Battery | Pair |
|---|--------------|---------|----------|-------------------------------|---------------------------------|---------------------------------|------|
|  | 010000000041 | 1.0.226 | | Fri, 19 Oct 2018 08:32:58 GMT | <div style="width: 50%;"></div> | <div style="width: 50%;"></div> | ∞ |
| 0 | 0000000001FB | 0.0.0 | | Thu, 01 Jan 1970 00:00:00 GMT | <div style="width: 50%;"></div> | <div style="width: 50%;"></div> | o |

Current whitelist of sensors shows which UID of sensors will be accepted by Hub and their actual pair status.

Unpaired sensors shows only sensors that are seeking for Hub to pair to. On admin portal can manually add those to whitelist.

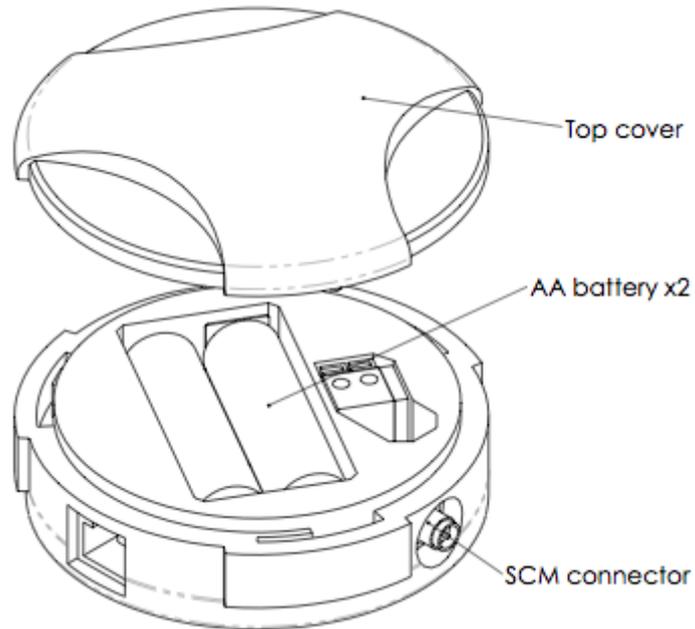
Setup Dot

General



The Energybox Dot Sensor lines supports two models:
Ambient Dot with internal temperature and humidity sensor
Sensor Dot with external probe connector.

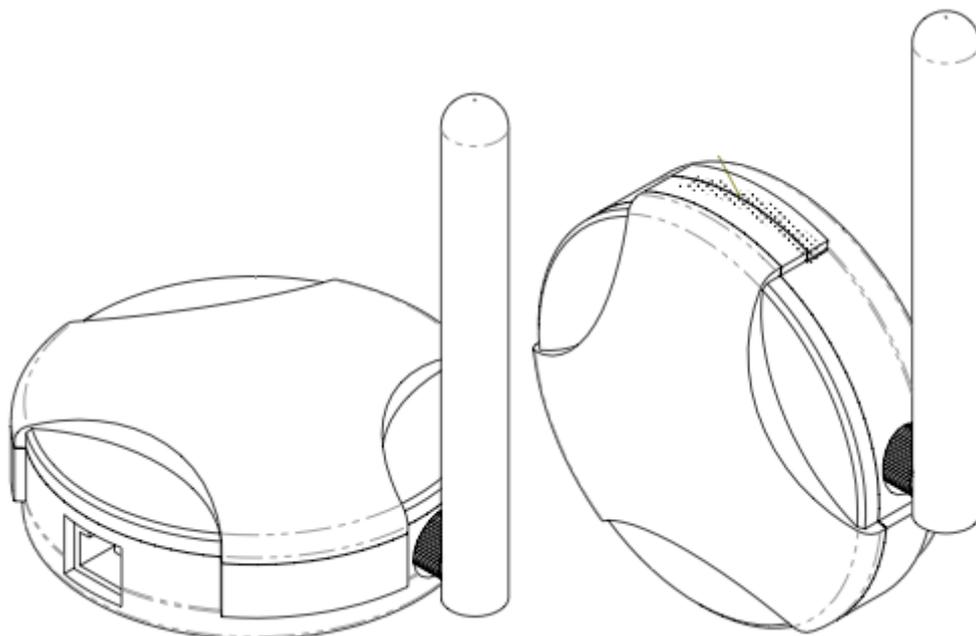
Powering Dot



The Dot can be battery powered or DC hard wired powered.

Open top cover by turn counterclockwise and insert 2x AA batteries (non-rechargeable). For DC wiring connect a 5V / 200mA DC source to the terminal for powering and follow polarity mark. The wiring can be support from backside of dot through hole.

Mounting Dot

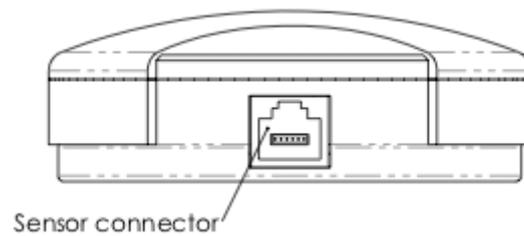


Technical Documentation

The dot comes with Velcro-tape for easy mounting on surface. Screw mounting is also provided and suitable screws are in accessory of Dot package.

Connect the antenna to SMA jack of Dot. The Dot cannot operate properly without antenna connected.

Connecting Sensor Probe



The sensor connector supports probes from Energybox portfolio. The probe can be connected to Dot via sensor connector and will be recognized automatically. In case of probe requires powering the sensor port will provide this and no additional equipment is needed to operate the probe.

Pairing Dot

After first power up the Dot sensor will seek for Hub to pair with. The LED will be on green flashing (slow) and it needs to be made sure Hub in pairing mode is at near. A Hub with UID of Dot listed in whitelist will pair the Dot automatically.

After pairing done the LED of Dot will be off state.

Button / LED

The Dot comes with one button and built in LED.

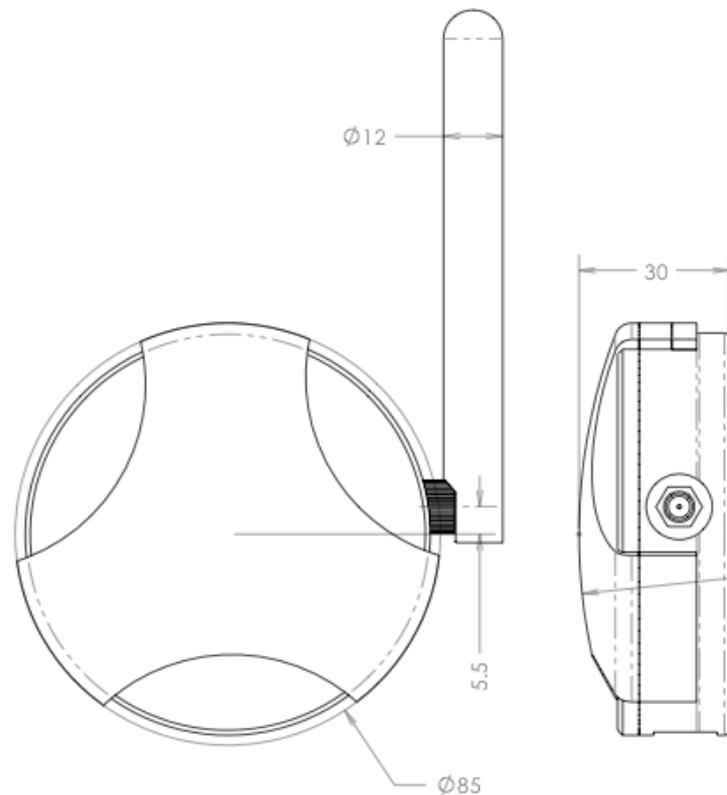
| LED COLOR | SIGNAL STATUS |
|--------------------|-------------------------------|
| Off | Paired mode, normal operation |
| Green flash (5s) | Seeking pairing to Hub |
| Green flash (0.2s) | Pairing in process |

| BUTTON PRESS | SIGNAL STATUS |
|--------------|---|
| Double click | manual transmit of value, LED will flash up (6x) for proper transmission (can be used for checking connection to Hub) |

Factory reset Dot

To factory reset Dot and activate pairing mode again follow the procedure:

- Step 1: Press and hold button of Dot
- Step 2: Power on Dot
- Step 3: Keep holding button for >15s
- Step 4: Ensure LED flash quick for 3s
- Step 5: Click button once within 3s

Dimensions Dot

Firmware update

Hub provides functionality for firmware update on both internal operating system and wireless connected devices. To ensure synchronized proper operation the Hub will update wireless connected devices automatically to same firmware being installed on Hub. Whilst the firmware update process on Hub is being performed in less than 1 Minute the update via RF to wireless connected devices might take time depending on bandwidth available in air traffic and number of devices connected to Hub.

During Hub firmware update the Center LED is green flashing.

During Dot or any wireless connected device firmware update the RF LED is flashing green/red. On Dot device the LED is flashing green quickly.

Firmware update from cloud

For Firmware update on cloud follow online instruction.

Firmware update manually

For manual firmware update in admin portal:

1. Connect the Hub to the LAN.
2. Enter Hub's Admin portal
3. Goto Maintenance page
4. Enter Firmware update page and choose firmware-file from your computer
5. Wait until reboot of system

Please note that the filename is case-sensitive.

FCC Regulatory Information

These devices comply with Part 15 of the FCC Rules. Operation is subject to the following two conditions :

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Caution :

The user is cautioned that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note :

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

RF Exposure Statement :

This equipment complies with FCC's RF radiation exposure limits set forth for an uncontrolled environment. The antenna(s) used for this transmitter must be installed and operated to provide a separation distance of at least 20 cm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter. Installers must ensure that 20cm separation distance will be maintained between the device (excluding its handset) and users.