USER MANUAL

Longo Bluetooth Products
LBT-1.B02
Bluetooth Mesh Multisensor

Version 1

Written by SMARTEH d.o.o.
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User Manual

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STANDARDS AND PROVISIONS: Standards, recommendations, regulations and provisions of the country in which the devices will operate, must be considered while planning and setting up electrical devices. Work on 100 .. 240 V AC network is allowed for authorized personnel only.

DANGER WARNINGS: Devices or modules must be protected from moisture, dirt and damage during transport, storing and operation.

WARRANTY CONDITIONS: For all modules LBT-1 – if no modifications are performed upon and are correctly connected by authorized personnel – in consideration of maximum allowed connecting power, warranty of 24 months is valid from the date of sale to the end buyer, but not more than 36 months after delivery from Smarteh. In case of claims within warranty time, which are based on material malfunctions the producer offers free replacement. The method of return of malfunctioned module, together with description, can be arranged with our authorized representative. Warranty does not include damage due to transport or because of unconsidered corresponding regulations of the country, where the module is installed.

This device must be connected properly by the provided connection scheme in this manual. Misconnections may result in device damage, fire or personal injury.

Hazardous voltage in the device can cause electric shock and may result in personal injury or death.

NEVER SERVICE THIS PRODUCT YOURSELF!

This device must not be installed in the systems critical for life (e.g. medical devices, aircrafts, etc.).

If the device is used in a manner not specified by the manufacturer, the degree of protection provided by the equipment may be impaired.

Waste electrical and electronic equipment (WEEE) must be collected separately!

LBT-1 devices are developed considering the following standards:
- EMC: EN 303 446-1
- LVD: EN 60669-2-1

Smarteh d.o.o. operates a policy of continuous development. Therefore we reserve the right to make changes and improvements to any of the products described in this manual without any prior notice.

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Longo Bluetooth Products LBT-1.B02

1. ABBREVIATIONS

LED   Light Emitted Diode

PLC   Programmable Logic Controller

PC   Personal Computer

OpCode   Message Option Code

lx   Lux, the unit of illuminance

PB   Push button

2. DESCRIPTION

LBT-1.B02 Bluetooth Mesh multisensor is designed to measure room temperature, humidity and ambient light intensity. It can detect presence of people with PIR sensor. It is also equipped with 4 push buttons, that can be used for the desired functionality in Bluetooth Mesh network.

Multisensor can primarily be mounted with double sided glue tape or in addition with screws provided.

LBT-1.B02 Bluetooth Mesh multisensor transmits information regarding its sensors and battery voltage level. The multisensor can only operate with Smarteh LBT-1.GWx Modbus RTU Bluetooth Mesh gateway connected to the same Bluetooth Mesh network. LBT-1.GWx Modbus RTU gateway is connected to the main control device as Smarteh LPC-3.GOT.012 7" PLC based Touch panel, any other PLC or any PC with Modbus RTU communication. Besides Smarteh Bluetooth Mesh devices, other standard Bluetooth Mesh devices can be integrated into above mentioned Bluetooth Mesh network. More than a hundred Bluetooth Mesh devices can be provisioned and can operate in a single Bluetooth Mesh network.

NOTE: Alkaline AA type batteries (LR6) are not supplied together with the product.

WARNINGS:

Explosion due to fire or short circuit, even with discharged batteries:

* Risk of injury due to flying parts.

* Prevent the batteries to be in contact with water.

* Do not damage the batteries.

* Do not heat batteries over 85°C.

Leakage of electrolyte:

* Handle damaged batteries only by wearing suitable protective gloves.
  Otherwise severe burns are possible.

* In case of contact with an electrolyte, rinse your eyes immediately with a lot of water. Visit the doctor.

Falling objects:

* Overhead installation may result in injury from falling objects.

Observe also the following:

* Pay attention to battery polarity (+/-).

* The batteries must be new and undamaged.

* Do not mix new and used batteries.

* Store, transport and dispose of the batteries in compliance with local requirements, regulations and laws. Also, observe the instructions of the battery manufacturer.

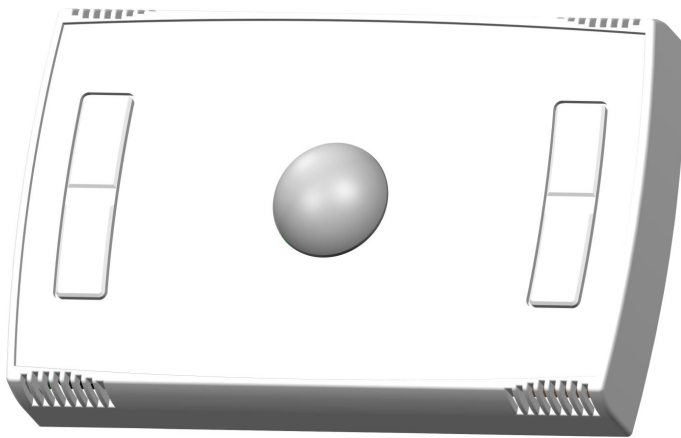* Dispose of empty batteries in designated collection points.

3. FEATURES

Figure 1: LBT-1.B02

Table 1: Features

Communication standard: Bluetooth Mesh is a low power wireless mesh protocol and allows device to device communication and device to main control device communication.
Radio frequency: 2.4GHz
Radio range for direct connection: < 30m, depending on application and building. By using Bluetooth Mesh topology, much bigger distances can be achieved.
Power supply: 2 batteries 1.5V AA type commercially available, use alkaline batteries only (LR6). Do not use any type of rechargeable battery. Constructed for full year operation.
Protection degree: IP30
Working temperature: 0 .. 50 ˚C
Storage temperature: -20 .. 60 ˚C
Type of casing: ABS
Status indicator: red and green LED
4 push buttons
Temperature and humidity measurement
Ambient light measurement
Moving detection with PIR sensor
Vandal proof switch

4. OPERATION

LBT-1.B02 Bluetooth Mesh multisensor can only operate with Smarteh LBT-1.GWx Modbus RTU Bluetooth Mesh gateway while provisioned to the same Bluetooth Mesh network.
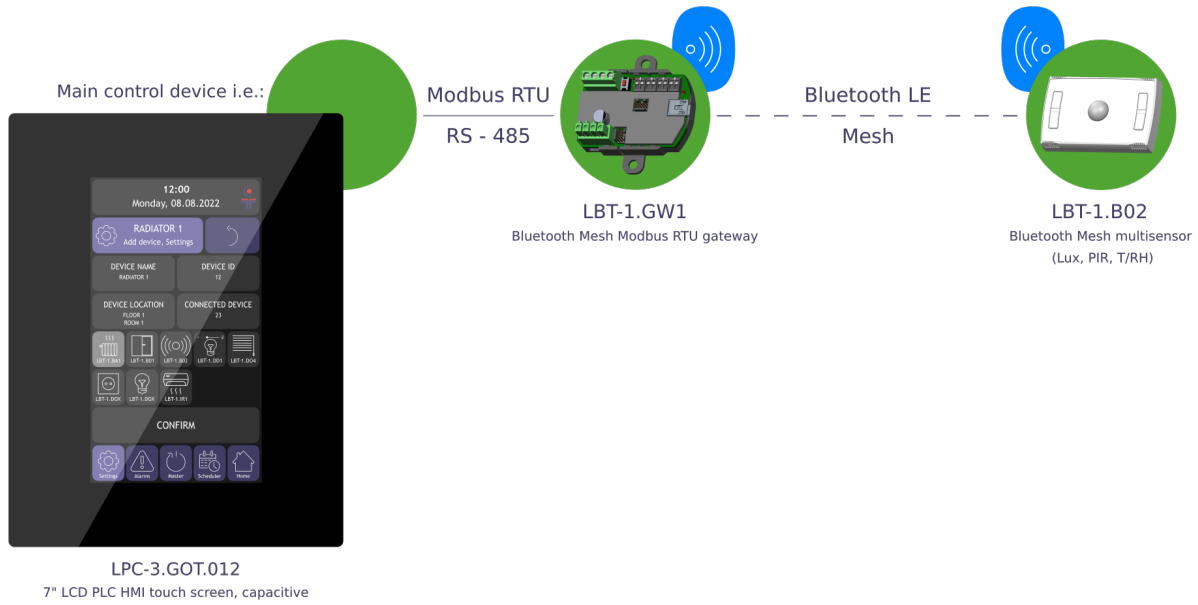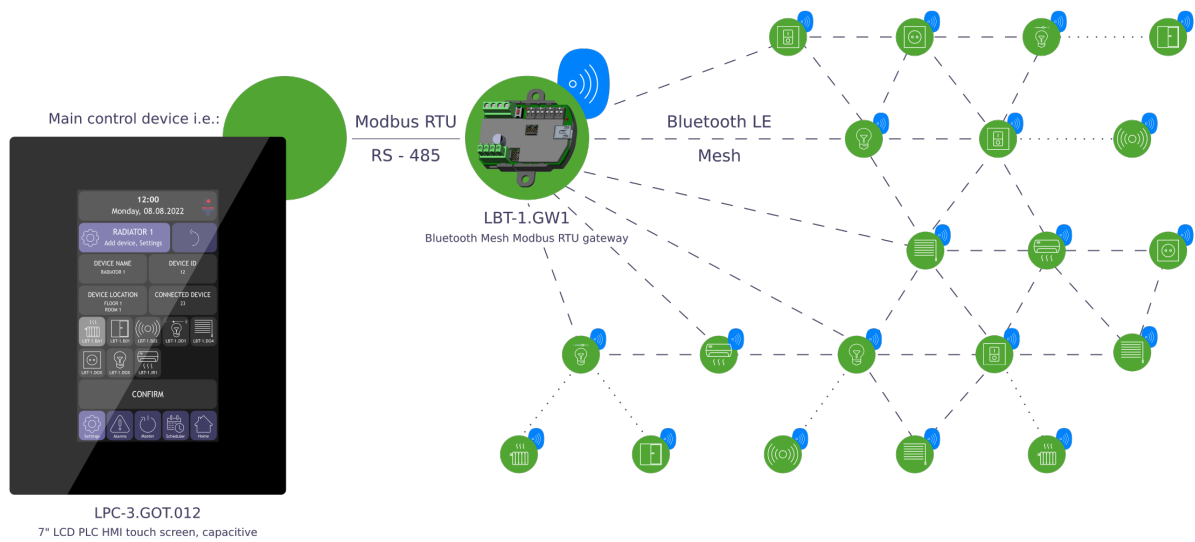

Figure 2: LBT-1.B02 device connection

Figure 3: Bluetooth Mesh system topology

4.1. Multisensor functions

• **Room temperature and humidity:** Measurement of room temperature and relative humidity.

• **Ambient light intensity:** Measurement of ambient light intensity in lux.

• **People presence:** The multisensor detects the presence of people. The PIR sensor status remains active for 10 seconds after the last movement is detected.

• **Vandal proof alarm:** The device is equipped with a vandal proof switch, which will detect if the front part of the multisensor is removed.

• **Factory reset:** This function will delete all Bluetooth Mesh network parameters stored on LBT-1.B02 multisensor and will restore to the conditions of the initial programming, ready for provisioning. See Table 5 for more information.

• **Mode setting:** Inside a 5-second time window, perform a corresponding number of simultaneous pressing of the two left push buttons in duration of not less than 200 ms.

Following multisensor action or mode will be set:

Number of simultaneous push buttons press	Action
4	Reset
5	Factory reset

Hardware reset is triggered if two left push buttons are continuously simultaneous pressed for more than 5 seconds.

NOTE: When the voltage of two installed AA batteries in series is lower than 2.2 V, LBT-1.B02 multisensor detects low battery condition. If the batteries are not replaced soon, the multisensor will switch off. Voltage level of the batteries can be monitored regularly i.e. on the Smarteh LPC-3.GOT.012 PLC based Touch panel or similar.

4.2. Operation parameters

LBT-1.B02 Bluetooth Mesh multisensor accepts a set of operation codes as specified in below tables 2 to 4.

LBT-1.B02 Bluetooth Mesh multisensor is communicating with the main control device as Smarteh LPC-3.GOT.012 via Smarteh LBT-1.GWx Modbus RTU Bluetooth Mesh gateway.

All communication between the main control device, as LPC-3.GOT.012 or similar, is performed by using Modbus RTU communication. Individual Bluetooth Mesh node configuration data should be observed by using a network provisioning tool.

Table 2: 4xxxx, Holding registers, Modbus RTU to Bluetooth Mesh gateway			
Reg.	Name	Description	Raw → Engineering data
10	Execute command	Execute command for Read and/or Write by toggling bit	Bit 0 toggle → Write Bit 1 toggle → Read
11	Destination address*	Destination node address. Can be a unicast, group or virtual address	0 .. 65535 → 0 .. 65535
12	Element index*	Sending node model element index	0 .. 65535 → 0 .. 65535
13	Vendor ID*	Vendor ID of the sending node model	0 .. 65535 → 0 .. 65535
14	Model ID*	Model ID of the sending node model	0 .. 65535 → 0 .. 65535
16	Virtual address index*	Index of the destination Label UUID	0 .. 65535 → 0 .. 65535
17	Application key index*	The application key index used	0 .. 65535 → 0 .. 65535
18	Option code**	Refer to the option code table	0 .. 63 → 0 .. 63
19	Payload byte length**	Refer to the option code table	1 .. 10 → 1 .. 10 bytes
20	Payload word[0]**	Refer to the option code table	0 .. 65535 → 0 .. 65535
21	Payload word[1]**	Refer to the option code table	0 .. 65535 → 0 .. 65535
22	Payload word[2]**	Refer to the option code table	0 .. 65535 → 0 .. 65535
23	Payload word[3]**	Refer to the option code table	0 .. 65535 → 0 .. 65535
24	Payload word[4]**	Refer to the option code table	0 .. 65535 → 0 .. 65535

* Observed from network provisioning tool

** User defined parameters, refer to the option code table

Table 3: 3xxxx, Input registers, Modbus RTU to Bluetooth Mesh gateway			
Reg.	Name	Description	Raw → Engineering data
10	Messages pending	Number of messages pending in receiving buffer	1 .. 10 → 1 .. 10
11	Destination address	Destination node address. Can be a unicast, group or virtual address	0 .. 65535 → 0 .. 65535
12	Element index	Sending node model element index	0 .. 65535 → 0 .. 65535
13	Vendor ID	Vendor ID of the sending node model	0 .. 65535 → 0 .. 65535
14	Model ID	Model ID of the sending node model	0 .. 65535 → 0 .. 65535
15	Source address	Unicast address of the node model which sent the message	0 .. 65535 → 0 .. 65535
16	Virtual address index	Index of the destination Label UUID	0 .. 65535 → 0 .. 65535
17	Application key index	The application key index used	0 .. 65535 → 0 .. 65535
18	Option code	Refer to the option code table	0 .. 63 → 0 .. 63
19	Payload length	Refer to the option code table	1 .. 10 → 1 .. 10 bytes
20	Payload word[0]	Refer to the option code table	0 .. 65535 → 0 .. 65535
21	Payload word[1]	Refer to the option code table	0 .. 65535 → 0 .. 65535
22	Payload word[2]	Refer to the option code table	0 .. 65535 → 0 .. 65535
23	Payload word[3]	Refer to the option code table	0 .. 65535 → 0 .. 65535
24	Payload word[4]	Refer to the option code table	0 .. 65535 → 0 .. 65535

Table 4: Multisensor LBT-1.B02 option codes

Option code	Name	Description	Raw → Engineering data
1	FW version status	Firmware version status	0 .. 65535 → 0 .. 65535
2	Operation mode set	Node operation mode selection	0 → Not used 1 → Not used 2 → Not used 3 → Not used 4 → Reset 5 → Factory reset
6	Vandal switch alarm status	Node vandal switch status	0 → Not active 1 → Active
8	Battery voltage status	Battery voltage level	0 .. 330 → 0.00 .. 3.30 V
9	Wake up interval set	Node wake up from sleep mode interval	0 → Always on 1 .. 65535 → 1 .. 65535 sec
10	Wake up interval status	Node wake up from sleep mode interval status	0 → Always on 1 .. 65535 → 1 .. 65535 sec
11	Error codes status	Error codes status	0 .. 7 → Bit 0: Not used Bit 1: Not used Bit 2: Battery low
12	Push buttons status	Status of push buttons	0 .. 15 → Bit 0: PB1 pressed Bit 1: PB2 pressed Bit 2: PB3 pressed Bit 3: PB4 pressed
20	Temperature status	Node temperature sensor status	0 .. 5000 → 0 .. 50.00 °C
21	Humidity status	Node humidity sensor status	0 .. 10000 → 0 .. 100.00 %
22	Light status	Node light sensor status	1 .. 65535 → 0 .. 65535 lx
23	PIR sensor status	Node PIR sensor status	0 → Presence not detected 1 → Presence detected

5. INSTALLATION

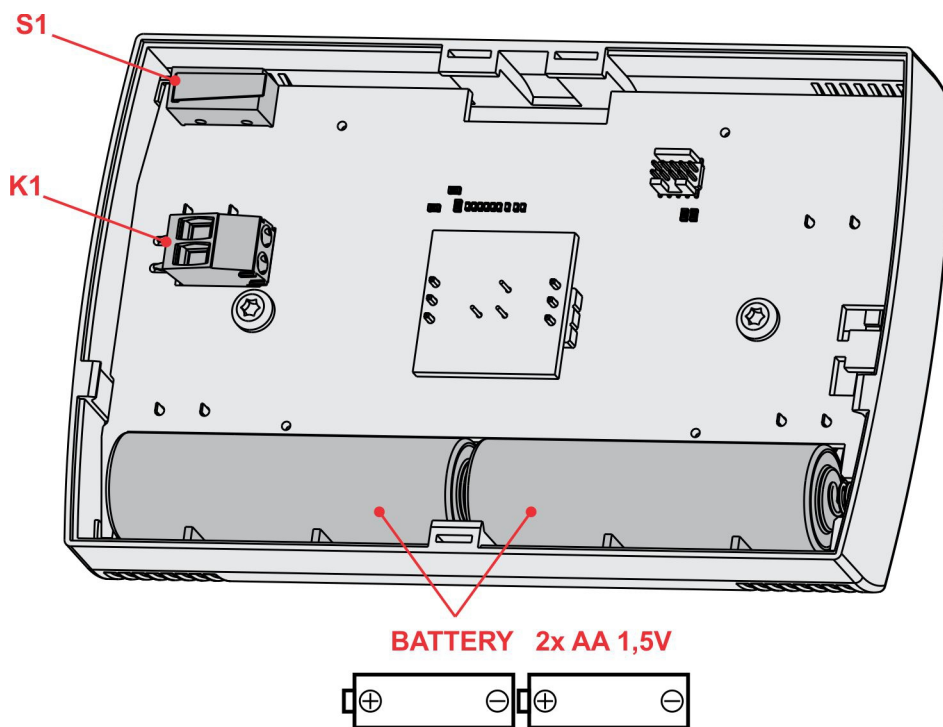| Table 5: Connectors and switches		
S1	Switch	Vandal switch: close = not active, open = active
K1.1	+U	Power supply, 7..30 V DC
K1.2	GND	Power supply, GND
Bat.1	Battery	Alkaline AA/LR6 1.5 V high capacity battery, non rechargeable
Bat.2	Battery	Alkaline AA/LR6 1.5 V high capacity battery, non rechargeable

Figure 4: LBT-1.B02 connectors and switches positions

WARNING: When batteries are used, external power supply 7 .. 30 V DC must be removed. Only one source of power supply at a time is allowed.

Table 6: Push buttons and LEDs

| PB1	Bottom-right push button	Button press notification
PB2	Upper-right push button	Button press notification
PB3	Upper-left push button	Button press notification or Mode setting: Inside 5-second time window, perform a corresponding number of simultaneous pressing of PB3 and PB4 in duration of not less than 200 ms. Following multisensor action or mode will be set:
PB4	Bottom-left push button	Number of simultaneous keystrokes — Action 4 — Reset 5 — Factory reset Hardware reset is triggered if PB3 and PB4 are continuously simultaneous pressed for more than 5 seconds.
LED1: red	Error	1x blink inside 5sec time period = empty battery 2x blink inside 5sec time period = network/friend lost 3x blink inside 5sec time period = unprovisioned node
LED2: green	Status	1x blink = normal operation. It is also feedback for mode setting by simultaneous pressing of the two left push buttons.
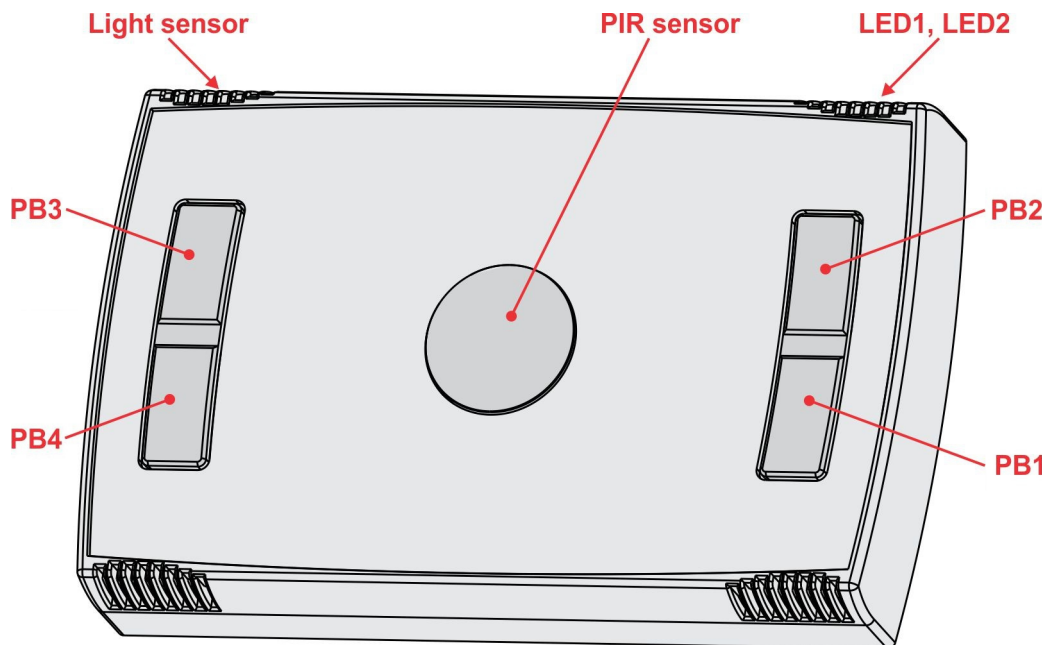
Figure 5: LBT-1.B02 push buttons, LEDs and sensors positions

5.1. Mounting instructions
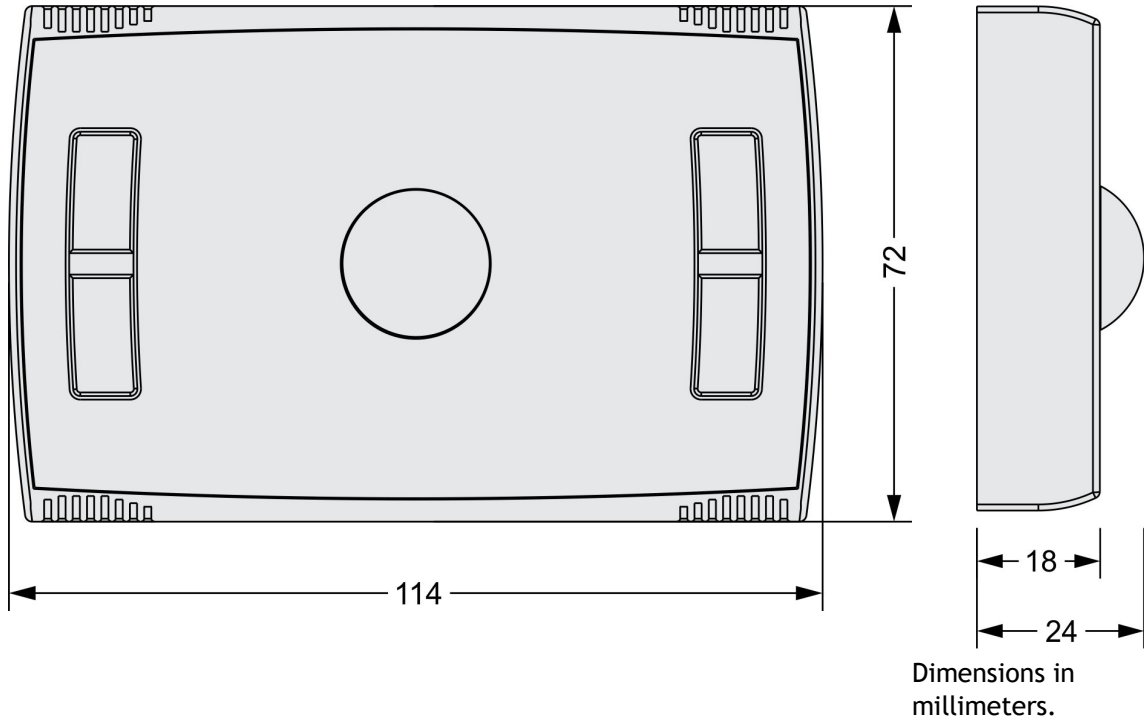
Figure 6: Housing dimensions

Dimensions in millimeters.

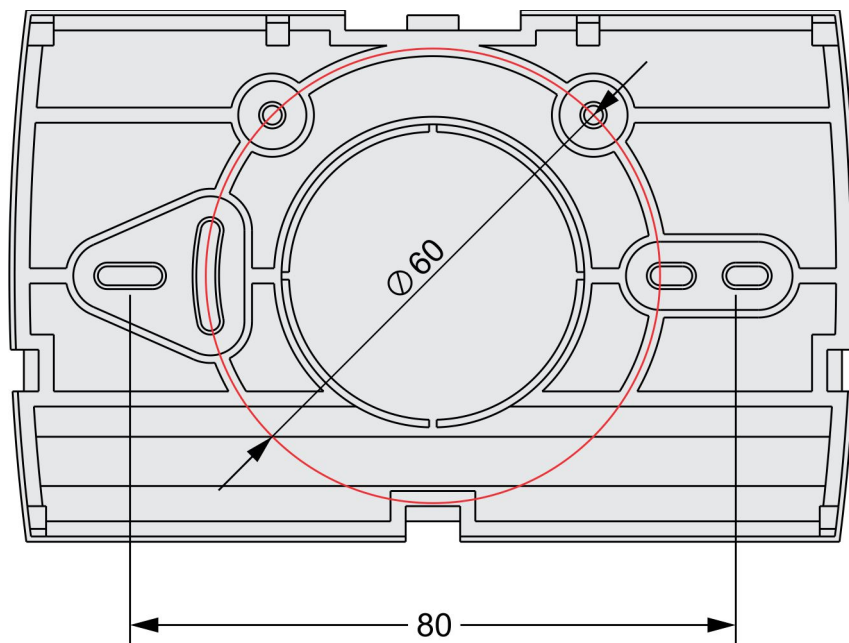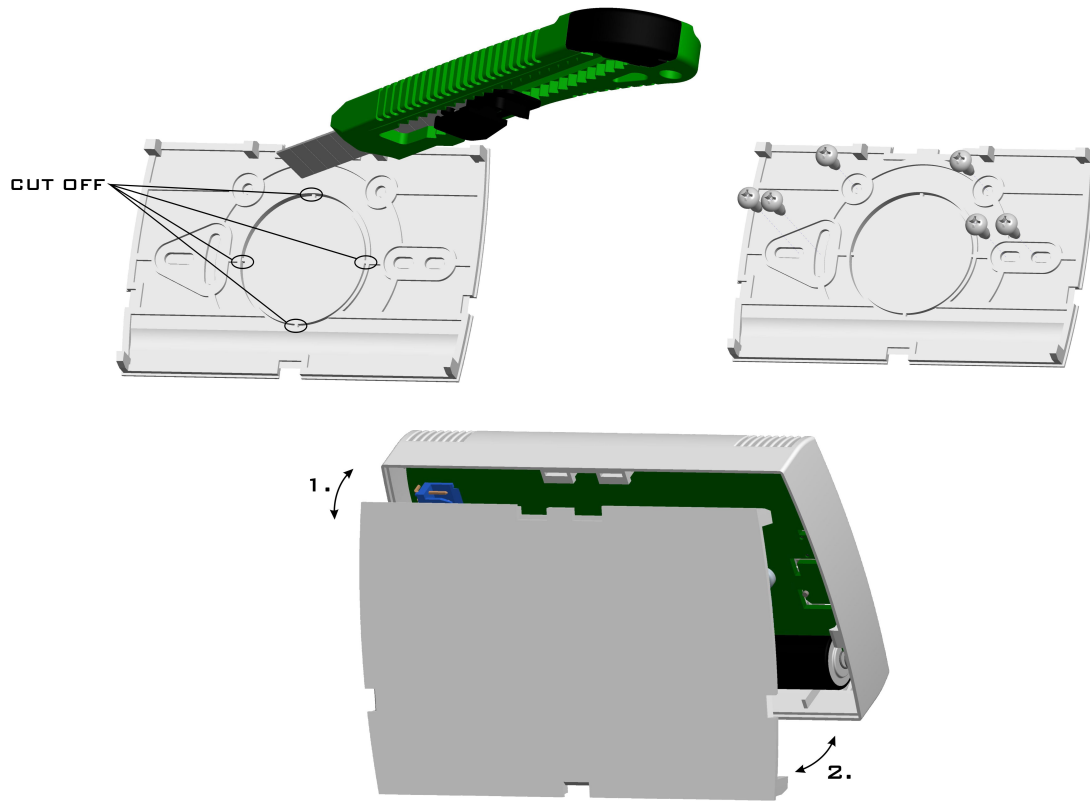**Figure 7: Screw holes positions**

Figure 8: Mounting instructions
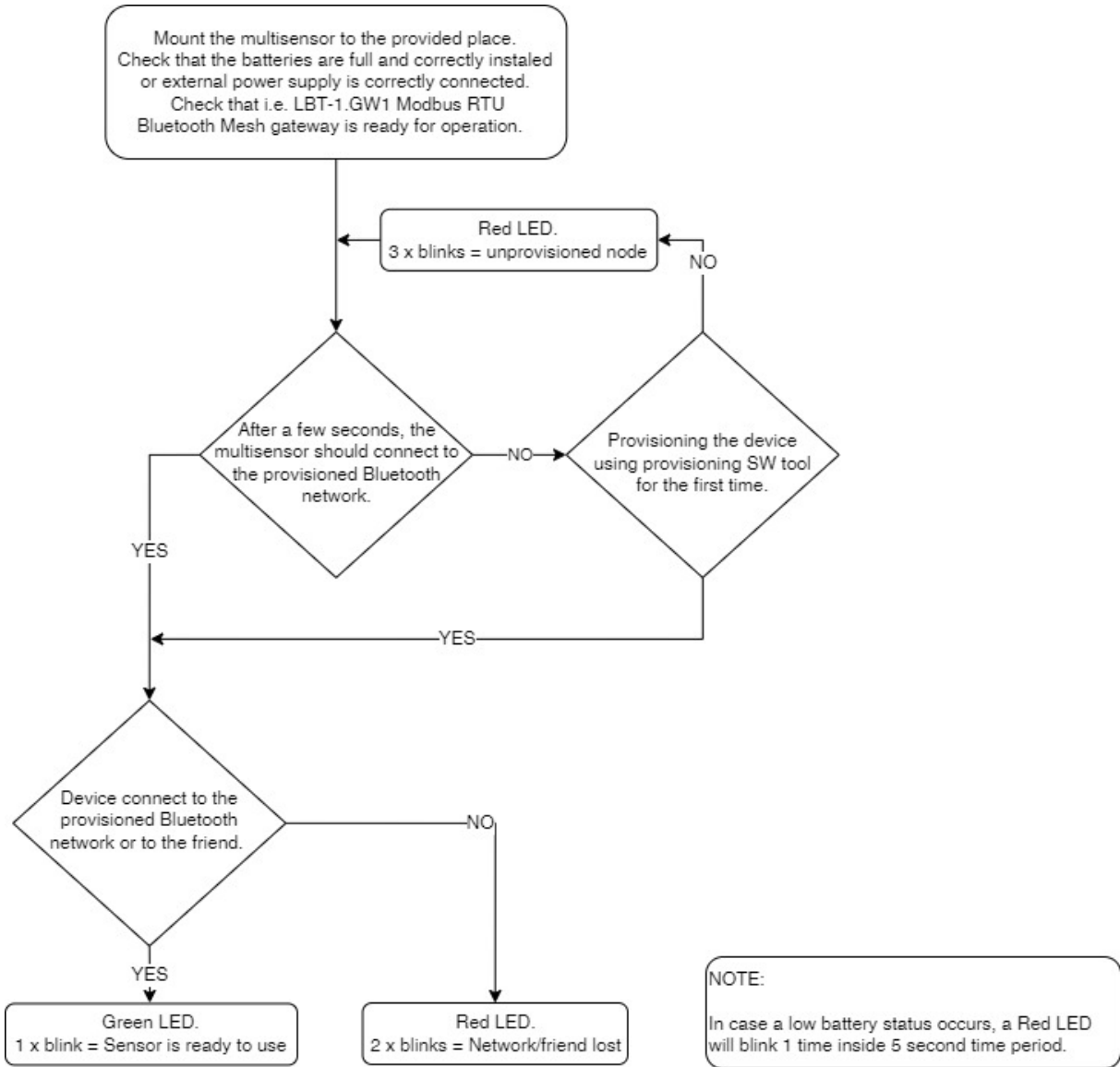

CUT OFF

1.

2.

Figure 9: Installation flowchart

1. Check if the multisensor will be fixed with double sided glue tape or with screws. It can also be fixed both ways.

2. Once the back plate is mounted to provided place, insert two AA batteries or connect external power supply wires and firmly attach front part to the mounted back plate.

3. After few seconds Green or Red LED starts to blink, please see flowchart above for details.

4. If multisensor is not provisioned Red LED will blink 3x, the provisioning procedure has to be started. Contact the producer for more details*.

5. Once provisioning is finished, multisensor will continue with normal mode of operation and this will be indicated as a green LED blinking once per 10 sec.

*NOTE: Smarteh Bluetooth Mesh products are added and connected to a Bluetooth Mesh network by using standard provisioning and configuration mobile apps tool such as nRF Mesh or similar.

For further information, please contact producer for more details.

5.2. Maintenance

The LBT-1.B02 multisensor is maintenance free. Only two AA batteries require replacement with the new one when empty. On the main control device i.e. LPC-3.GOT.012, the indication for replacing the batteries will become active. If batteries will not be replaced approximately in one month after the battery warning appear for the first time, multisensor will switch off.

For optimal performance, the usage of alkaline AA batteries (LR6) with high capacity is recommended.

Batteries replacement procedure

1. Remove a the front part of multisensor.

2. Take both batteries out of the battery holder.

3. Insert two new high capacity batteries alkaline AA/LR6. PAY ATTENTION ON POLARITY!

4. Attach front part of multisensor to the mounted back plate.

5. The multisensor will automatically start to re-establish the connection if Bluetooth Mesh network is available.

Unsuccessful connecting to the Bluetooth Mesh network will be shown on the device itself and also on main control device i.e. LPC-3.GOT.012 or similar. Please refer to *the* Mounting instructions chapter for more information.

6. SYSTEM OPERATION

6.1. Interference warning

Common sources of unwanted interference are devices that generate high frequency signals. These are typically computers, audio and video systems, electronics transformers, power supplies and various ballasts. The distance of the LBT-1.B02 multisensor to the above mentioned devices should be at least 0.5m or greater.

WARNING:

- In order to protect plants, systems, machines and network against cyber threats, necessary to implement and continuously maintain up to date security concepts.

- You are responsible for preventing unauthorized access to your plants, systems, machines and networks and they are allowed to be connected to Internet only, when security measures like firewalls, network segmentation, … are in place.

- We strongly recommend the updates and usage of latest version. Usage of version that are not longer supported may increase the possibility of cyber threats.

7. TECHNICAL SPECIFICATIONS

Table 7: Technical specifications	
Power supply	2 high capacity batteries alkaline AA type (LR6) or external power supply 7 .. 30 V DC. Can not be connected in parallel, only a separate connection is allowed.
Battery life	> 1 year
RF communication interval	When the motion by PIR sensor is detected or typically every 10min
Life cycle status and monitor capabilities	Yes
Max. power consumption	0.1 W
Mounting fixation	double sided glue tape and/or with a screw
Connection type PS	screw type connector for stranded wire 0.75 to 2.5 mm^2
Dimensions (L x W x H)	114 x 72 x 24 mm
Weight (with two AA batteries)	120 g
Ambient temperature	0 to 50 ˚C
Ambient humidity	max. 95 %, no condensation
Maximum altitude	2000 m
Mounting position	Vertical
Transport and storage temperature	-20 to 60 ˚C
Pollution degree	2
Over voltage category	II
Electrical equipment	Class II (double insulation)
Protection class	IP 30

8. MODULE LABELING

Figure 10: Label

Label (sample):

```
XXX-N.ZZZ.UUU
P/N: AAABBBCCDDDEEE
S/N: SSS-RR-YYXXXXXXXXX
D/C: WW/YY
```

Label description:

1. **XXX-N.ZZZ** - full product name,
   - **XXX-N** - product family,
   - **ZZZ.UUU** – product,
2. **P/N: AAABBBCCDDDEEE -** part number,
   - **AAA** - general code for a product family,
   - **BBB** - short product name,
   - **CCDDD** - sequence code,
      - **CC** – the year of code opening,
      - **DDD** - derivation code,
   - **EEE** – version code (reserved for future HW and/or SW firmware upgrades),
3. **S/N: SSS-RR-YYXXXXXXXXX -** serial number,
   - **SSS** – short product name,
   - **RR** – user code (test procedure, e.g. Smarteh person xxx),
   - **YY** – year,
   - **XXXXXXXX** – current stack number,
4. **D/C: WW/YY -** date code,
5. **WW** – week and,
6. **YY** – the year of production.

   Optional:
   - *MAC,*
   - *Symbols,*
   - *WAMP,*
   - *Other.*

9. CHANGES

The following table describes all the changes to the document.

Date	V.	Description
12.10.23	1	The initial version, issued as *LBT-1.B02 multisensor UserManual*.

10. NOTES