



SMARTEH[®]
LIVING SYSTEMS

USER MANUAL

— Longo Bluetooth Products
LBT-1.GW1
Modbus RTU Bluetooth Gateway

Version 3

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.GW1

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1.ABBREVIATIONS

LED	Light Emitted Diode
PLC	Programmable Logic Controller
PC	Personal Computer
OpCode	Message Option Code
LBT-1.GWx	x means a different number of gateway type i.e. LBT-1.GW1 Modbus RTU Bluetooth Mesh gateway



2. DESCRIPTION

LBT-1.GW1 Modbus RTU Bluetooth gateway is designed to operate with any PC or any PLC controller if they support Modbus RTU RS485 communication. Beside default 115.2kbps/8N1, also other communication settings are supported. If the PC cannot directly support RS485 communication, it's possible to use an appropriate USB → RS485 adapter, for example: Smarteh LSA-2 adapter.

For each Smarteh LBT-1 product such as LBT-1.BA1 BLT Mesh thermostatic valve actuator, LBT-1.B01 BLT Mesh window/door sensor, etc., there is a description of Modbus RTU commands in the corresponding user manual. Using these commands, communication with the nodes can be established after LBT-1 nodes are successfully provisioned/added to the Bluetooth Mesh network.

Example of Modbus RTU commands:

Table 1: 4xxxx, Holding registers

Reg.	Name	Description	Raw → Engineering data
10	Execute command	Execute command for Read and/or Write by toggling bit	Bit0 toggle → Write Bit1 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

* Observed from network provisioning tool

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

In addition to Smarteh Bluetooth Mesh devices, other standard Bluetooth Mesh devices can also be integrated in the above mentioned Bluetooth Mesh network. More than a hundred Bluetooth Mesh devices can be provisioned and can operate in a single Bluetooth Mesh network.



3.FEATURES

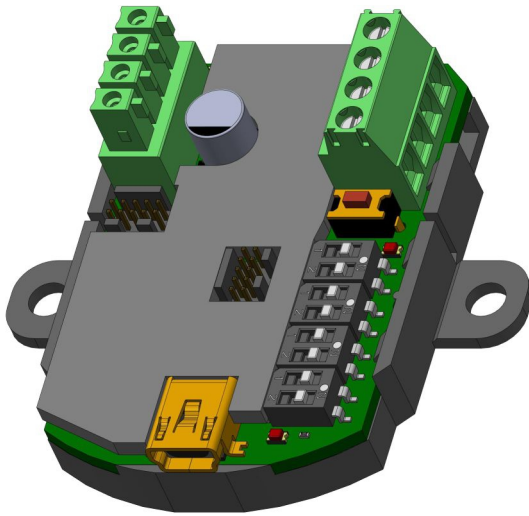


Figure 1: LBT-1.GW1

Table 2: Technical data

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: 2.4 GHz

Radio range for direct connection: < 30 m, depending on application and building.
By using Bluetooth Mesh topology, much bigger distances can be achieved.

USB for power supply and Modbus RTU Slave for communication with the main device

RS485 Modbus RTU Slave for communication with main device

DIP switches for gateway and communication settings

Power supply: 5..30 V DC

Protection degree: IP20

Working temperature: 0 .. 50 °C

Storage temperature: -20 .. 60 °C

Type of casing: PA6

Status indicators: red and green LEDs



4. OPERATION

LBT-1.GW1 Modbus RTU Bluetooth gateway can operate with Smarteh LBT-1 products and with other vendors Bluetooth Mesh products while provisioned to the same Bluetooth Mesh network. Bluetooth Mesh vendor model of the individual product must be obtained from the vendor. At the same time, it must also be connected to the PLC controller or PC, supporting Modbus RTU RS485 communication.

For each Smarteh LBT-1 product e.g. radiator valve actuator, window/door sensor,..., there is a description of Modbus RTU commands in the corresponding Smarteh LBT-1 product user manual. Using these commands, communication with nodes can be established, after LBT-1 products are successfully provisioned to the same Bluetooth Mesh network.

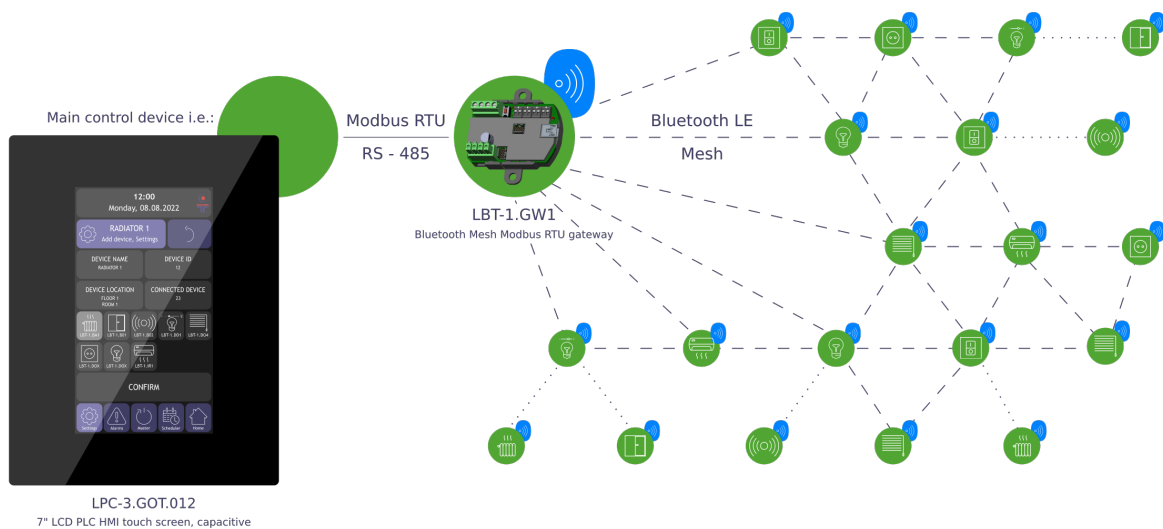


Figure 2: Bluetooth Mesh system topology

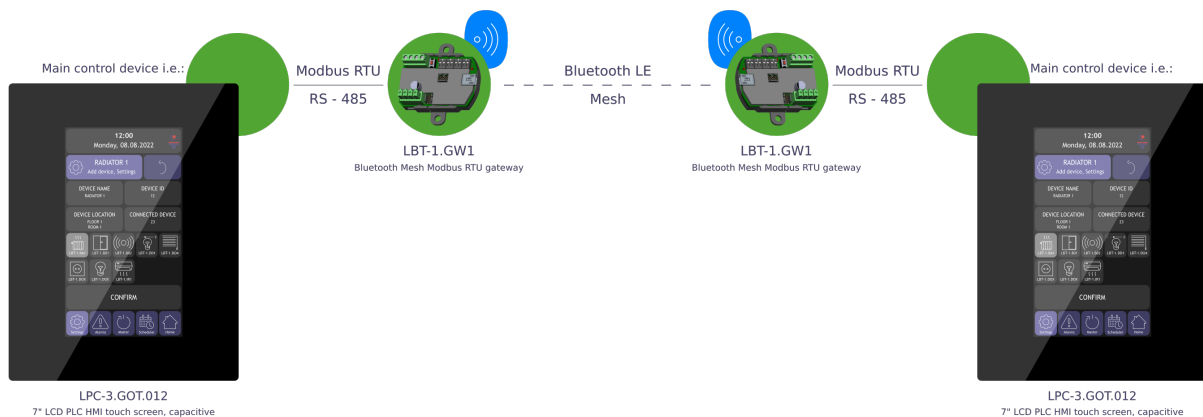


Figure 3: Bluetooth Mesh connection between two LBT-1.GW1



4.1. Other Modbus RTU Bluetooth gateway functions:

- **Factory reset:** This function will delete all Bluetooth Mesh network parameters stored on the LBT-1.GW1 gateway and will restore to the factory default condition. LBT-1.GW1 gateway will be ready for provisioning. See Table 7 for more information.

4.2. Operation parameters

LBT-1.GW1 Modbus RTU Bluetooth gateway connected to the main control device like Smarteh LPC-3.GOT.012 or similar, transmits and receives the following general operation codes listed in the table below. For operation codes related to the individual Smarteh LBT-1 Bluetooth product, please see the corresponding LBT-1 user manual. All communication between PLC based 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 the Bluetooth network provisioning tool.

4.3. Modbus RTU settings:

Default Modbus RTU settings: Slave ID 234, Baudrate: 115200 bps, Parity: None, Stop bit: 1.

Slave ID is set by DIP switches S3 and S4.

Default Modbus settings are applied when DIP switches S3 and S4 are set to “0” position. When the DIP switches are set to another position, user defined Modbus RTU settings are applied.

Do not use smaller Modbus RTU poll times than 100 ms.

Table 3: 4xxxx, Holding registers, Modbus RTU settings

Reg. Name	Description	Raw → Engineering data
801 SlaveID	Modbus RTU save address, read only	0 → 234 (default) 1 .. 15 → 1 .. 15
802 Baudrate	Baudrate for Modbus RTU communication	0 → 115200 bps (default) 1 → 4800 bps 2 → 9600 bps 3 → 14400 bps 4 → 19200 bps 5 → 38400 bps 6 → 56000 bps 7 → 57600 bps 8 → 115200 bps
803 Parity	Parity for Modbus RTU communication	0 → None (default) 1 → Even 2 → Odd
804 StopBit	Stop bits for Modbus RTU	1 → 1 (default) 2 → 2



Table 4: 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	Bit0 toggle → Write Bit1 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 5: 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 status	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



5.INSTALLATION

5.1.Connection scheme

Figure 4: Connection scheme

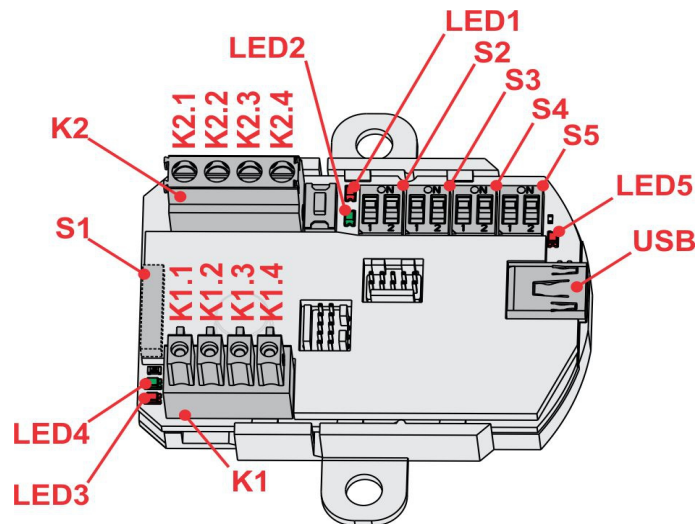


Table 6: K1, K2

K1.1	+	Power supply input 5 .. 30 V DC
K1.2	-	Ground
K1.3	A	RS485 A
K1.4	B	RS485 B
K2.1	+	Power supply input 5 .. 30 V DC
K2.2	-	Ground
K2.3	A	RS485 A
K2.4	B	RS485 B



Table 7: LEDs

LED1: red	Error	3x blinks inside 5 sec time period = unprovisioned node
LED2: green	Status	1x blink inside 10 sec time period = normal operation. It's also feedback for S1 reed contact when activated with magnet.
LED3: red	RS-485 Rx status	Blink: OK Off: no communication from Master On: A and/or B line in the shortcut
LED4: green	RS-485 Tx status	Blink: OK Off: no answer On: A and/or B line in the shortcut
LED5: red	Status	Generic status

Table 8: USB

USB	USB	Power supply and Modbus RTU communication
-----	-----	---

Table 9: Inputs

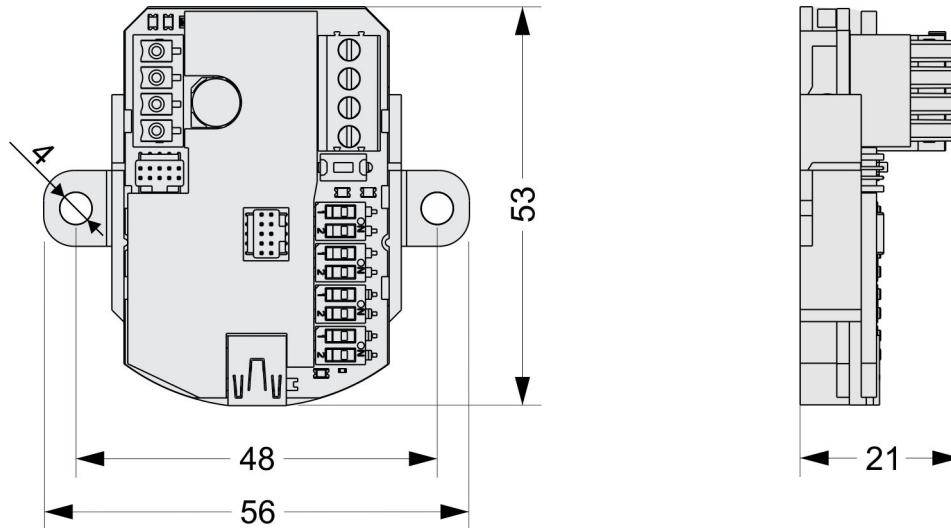
S1	Reed contact	<p>Inside the 5sec time window, perform number of swipes in a duration of not less than 200ms with a permanent magnet close to the gateway reed contact position. The following gateway action or mode will be set:</p> <table border="1"> <thead> <tr> <th>number of swipes</th> <th>Action</th> </tr> </thead> <tbody> <tr> <td>4</td> <td>Reset</td> </tr> <tr> <td>5</td> <td>Factory reset</td> </tr> </tbody> </table> <p>A hardware reset is triggered if reed contact is continuously closed with a permanent magnet for more than 5 seconds.</p>	number of swipes	Action	4	Reset	5	Factory reset
number of swipes	Action							
4	Reset							
5	Factory reset							
S2.1	DIP Switch	Modbus RTU 0 → USB 1 → RS485, K1 and K2						
S2.2	DIP Switch	Spare						
S3.1	DIP Switch	Modbus RTU Slave ID						
S3.2	DIP Switch	0000 → default Modbus RTU settings, Slave ID: 234 0001 .. 1111 → 1 .. 15 Slave ID						
S4.1	DIP Switch	S3.1: MSB						
S4.2	DIP Switch	S4.2: LSB						
S5.1	DIP Switch	Spare						
S5.2	DIP Switch	Spare						

NOTE: If LBT-1.GW1 Modbus RTU Bluetooth Mesh gateway is not connected directly to the Smarteh LPC-3.GOT.012 main control or similar device using male-female connectors, twisted pair extension cable should be used. The LBT-1.GW1 gateway must be placed separately from other electrical appliances and cable must be installed separately from high power and high voltage wires in accordance with general industry electrical installation standards.



5.2.Mounting instructions

Figure 5: Housing dimensions



Dimensions in millimeters.



Gateway attachment to the LPC-3.GOT.012, other PLC controller or PC must be performed while main control device is not powered.



Figure 6: LBT-1.GW1 gateway directly connected to the main control device LPC-3.GOT.012 or similar

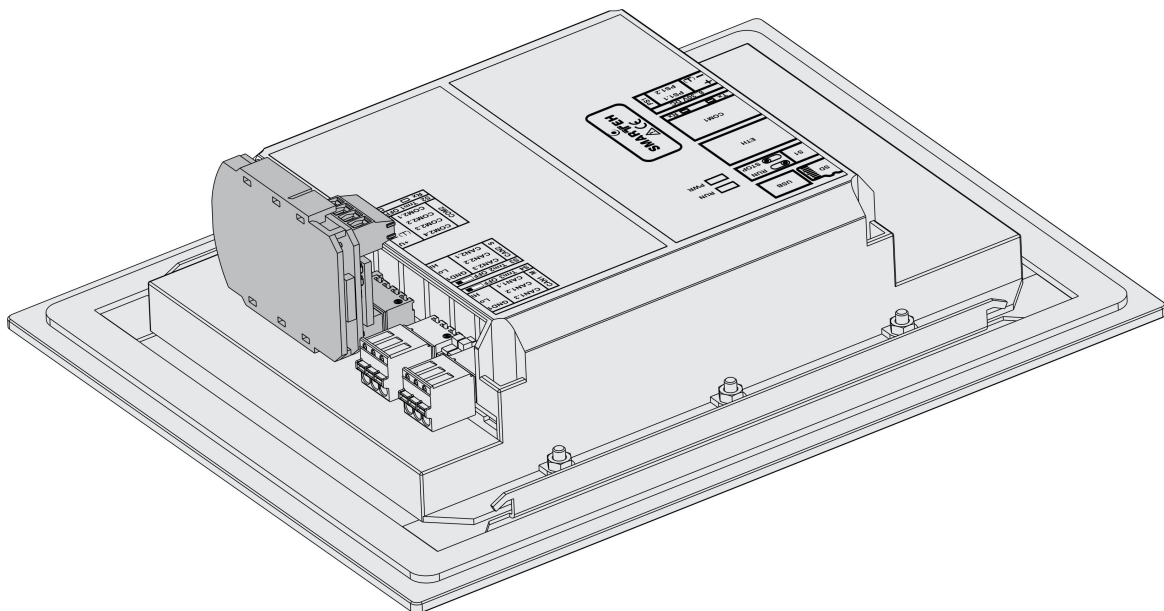
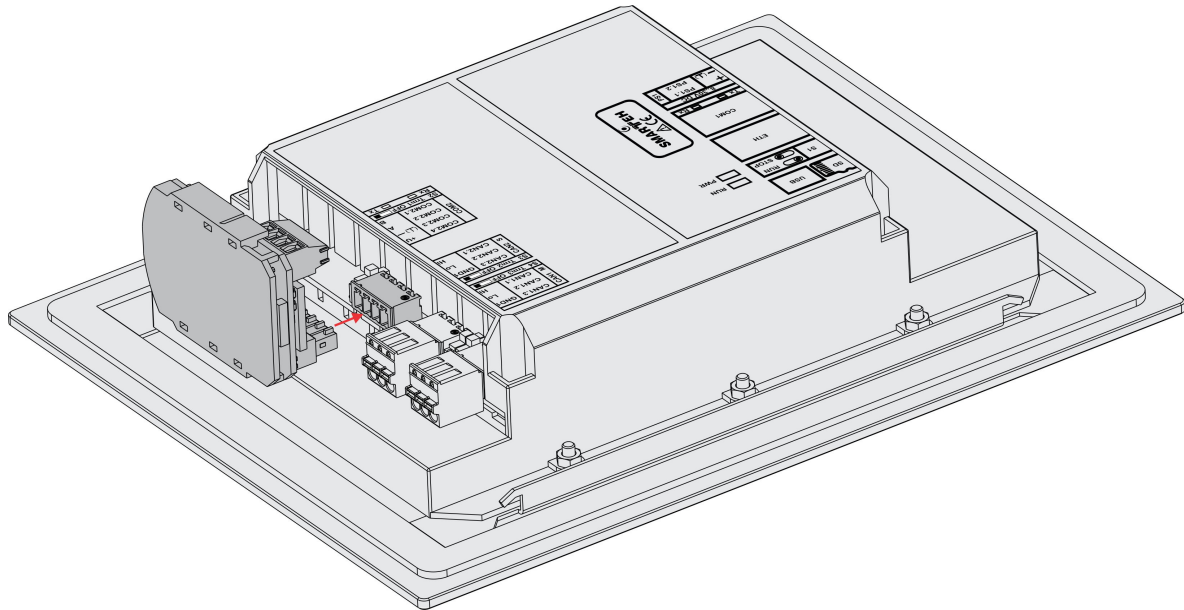
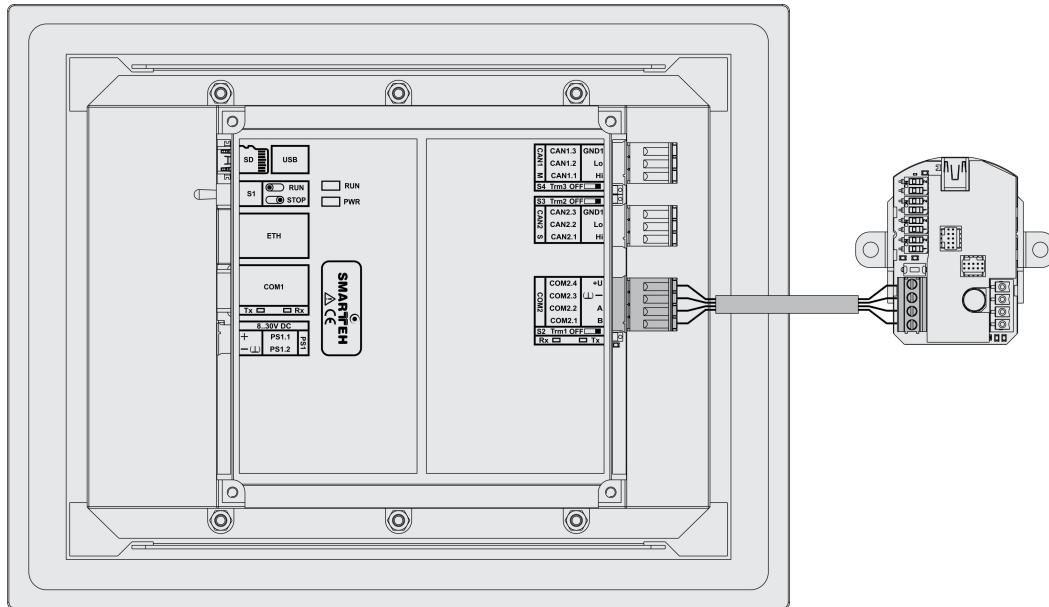
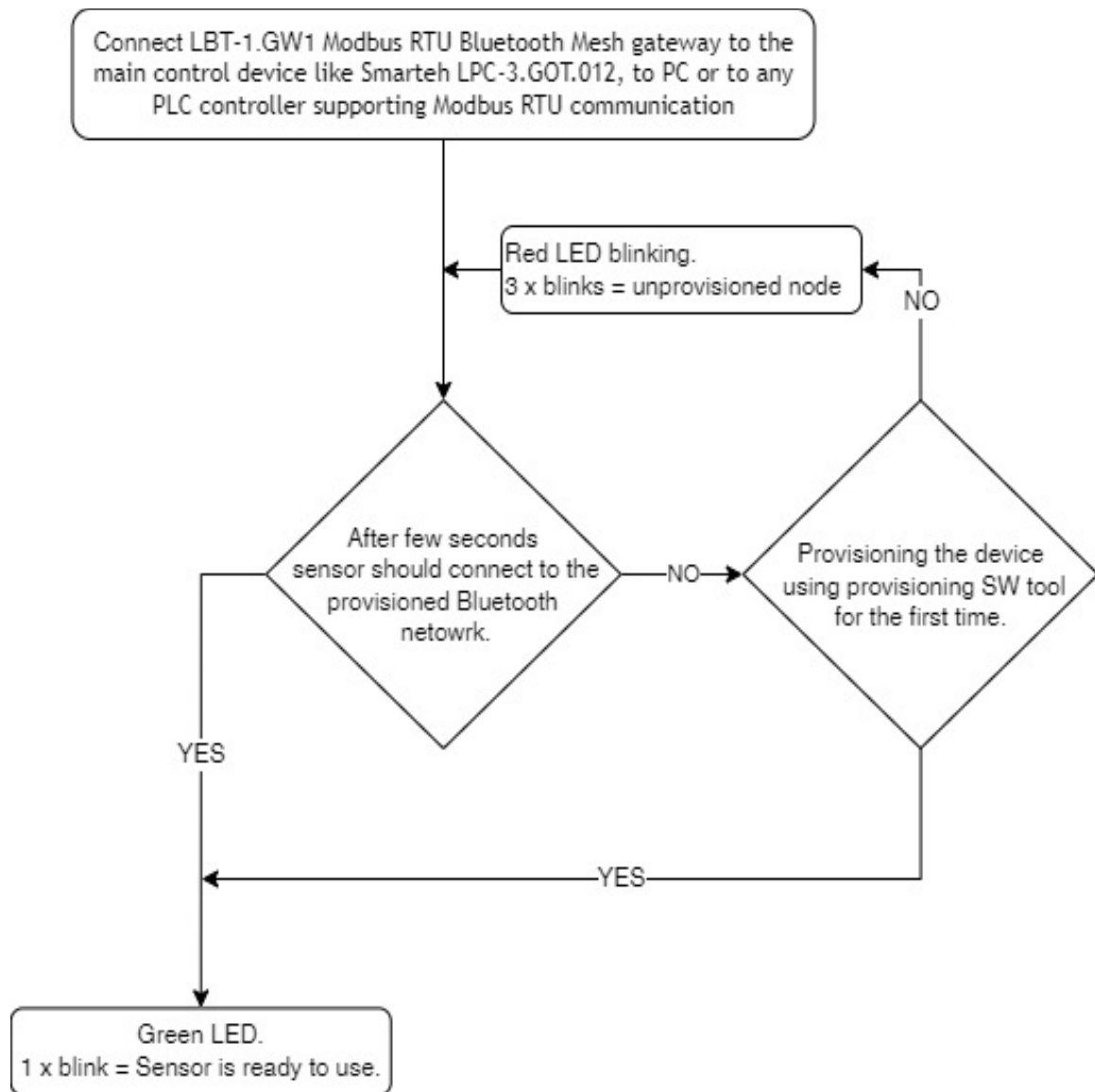


Figure 7: LBT-1.GW1 gateway connected to the main control device LPC-3.GOT.012 or similar using an extension cable





1. Check that main control device like Smarteh LPC-3.GOT.012 or similar is not powered.
2. Attach LBT-1.GW1 Modbus RTU Bluetooth gateway to the LPC-3.GOT.012 using integrated male-female connector or use extension cable for connection to other PC or PLC device.
3. Power up the main control device.
4. Once provisioning of LBT-1.GW1 Modbus RTU Bluetooth gateway is finished, gateway will continue with normal mode of operation and this will be indicated as Green LED blinking.

Dismount in reverse order.



5.3.Maintenance

The LBT-1.GW1 Modbus RTU Bluetooth gateway is a maintenance free.



6.SYSTEM OPERATION

6.1.Interference warnings

Common sources of unwanted interference are devices that generate high frequency signals. Those are typically computers, audio and video systems, electronic transformers, power supplies, various ballasts, frequency converters and similar. The clearance distance from the LBT-1.GW1 gateway to any of above mentioned devices should be at least 0.5 m or greater.

WARNING:

- To protect plants, systems, machines and network against cyber threats, it's necessary to implement and continuously implemented state of the art security concept.
- You are responsible for preventing unauthorized access to your plants, systems, machines and networks and they are allowed to be connected to the internet only, when security measures like firewalls, network segmentation, ... are in place.
- We strongly recommend the updates and usage of the latest version. Usage of the version that is no longer supported may increase the possibility of cyber threats.



6.2. Application examples based on Smarteh Bluetooth products

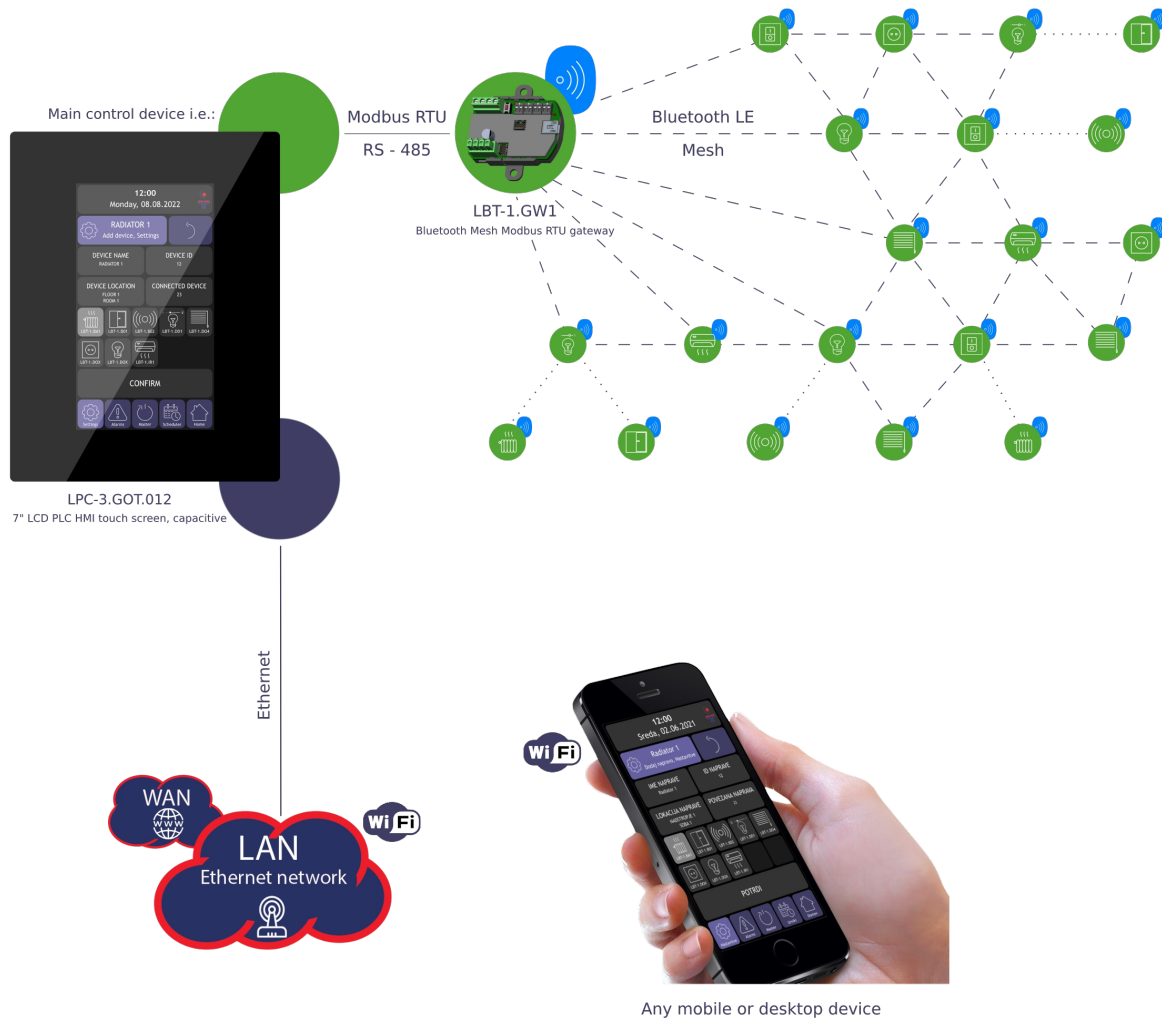


Figure 8: Smarteh Bluetooth Mesh application example



7. TECHNICAL SPECIFICATIONS

Table 10: Technical specifications

Power supply	5 .. 30 V DC
RF communication interval	The parameter inside SW application
Max. power consumption	1 W
Connection type	screw type connector for stranded wire 0.75 to 2.5 mm ²
Dimensions (L x W x H)	53 x 38 x 21 mm
Weight	25 g
Ambient temperature	0 to 50 °C
Ambient humidity	max. 95 %, no condensation
Maximum altitude	2000 m
Mounting position	Any. Please read the chapter Interference warnings
Transport and storage temperature	-20 to 60 °C
Pollution degree	2
Over voltage category	II
Electrical equipment	Class II (double insulation)
Protection class	IP 20



8. MODULE LABELING

Figure 9: Label

Label (sample):

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

Label description:

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

Optional

1. **MAC**
2. **Symbols**
3. **WAMP**
4. **Other**





9.CHANGES

The following table describes all the changes to the document.

Date	V.	Description
27.03.23	3	Table 5 update.
07.03.23	2	Table 9 update.
10.02.23	1	The initial version, issued as <i>LBT-1.GW1 Modbus RTU Bluetooth gateway User Manual</i> .





10.NOTES

