

# Logic IO Remote Control

*Advanced Industrial M2M/IoT Accessory*



**Technical Manual**

**Version 1.00**

## Introduction

This technical manual provides comprehensive documentation for installing, configuring, and properly using the Logic IO Remote Control device.

### Product Overview

The Logic IO Remote Control is an ergonomic key fob accessory featuring the following core physical components:

- **Four Control Buttons:** Multi-use tactile switches that drive device signaling and configuration changes.
- **Bi-color Status LED:** An integrated indicator that communicates transmission tracking, pairing feedback, and system configuration updates.
- **Key Ring Slot:** A molded-in base opening enabling easy attachment to key chains or lanyards.
- **Internal Power Source:** The unit is powered by a standard, pre-installed CR2032 coin-cell battery.

### Dual Operational Mode

Depending on the application, the remote control can toggle dynamically between two primary operational modes:

- **BidCos Mode (Default):** Operating on the **868 MHz** radio frequency band, this mode broadcasts button event triggers. When successfully paired with an external BidCos device, it supports verified, acknowledged packet transfers to safeguard connection reliability.
- **BLE Mode:** Operating on the **2.4 GHz** Bluetooth frequency band, this setting broadcasts battery status and button-state data. Packet payloads are explicitly formatted to comply with the open, low-energy BTHome v2 protocol framework.

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## Important Information



Thank you very much for using a product from Logic IO Aps. Our products are designed for professional use; therefore, this manual assumes technical knowledge and practice working with such products.

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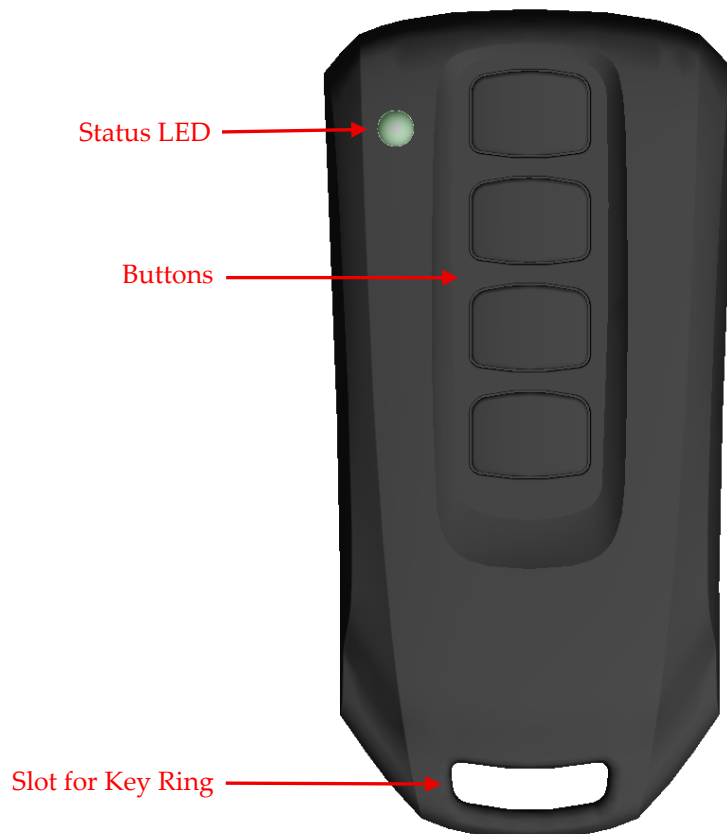
For safety and licensing reasons (CE), unauthorized change and/or modification of the product is not permitted.

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## Graphical Overview

The BLE/BidCos Remote Control includes an LED for status and four control buttons:



A CR2032 type coin-cell battery is included inside the device.

## Functions

BLE/BidCos Remote Control is delivered in a standby state, and ready for activation. When one of the buttons is pressed, the device becomes operational.

The BLE/BidCos Remote Control is in BidCos mode by default. This means that button events and routine battery status information are sent as BidCos packets.

The BLE/BidCos Remote Control is configured to send the battery level information every hour. Even if no buttons are pressed, the battery status is periodically sent to ensure that a possible low-battery situation can be discovered.

Depending on the configuration, the BLE/BidCos Remote Control can operate in one of the following modes:

- BLE mode: The status of the battery level and the button state information is sent on BLE
- BidCos mode: The status of the battery level and the button state information is sent on 868Mhz frequency band.

The device configuration can be changed by the following button combinations:

### Device Configuration

Button Combination	Description
Button 1 + 2	Switch to BLE mode
Button 1 + 3	Switch to BidCos mode
Button 1 + 4	Power down the device
Button 2 + 3	Reset BidCos pairing information
Button 2 + 4	Initiate BidCos pairing
Button 3 + 4	<i>Not Assigned</i>

*Note that the above button numbering is according to the BLE mode, as described in the next section.*

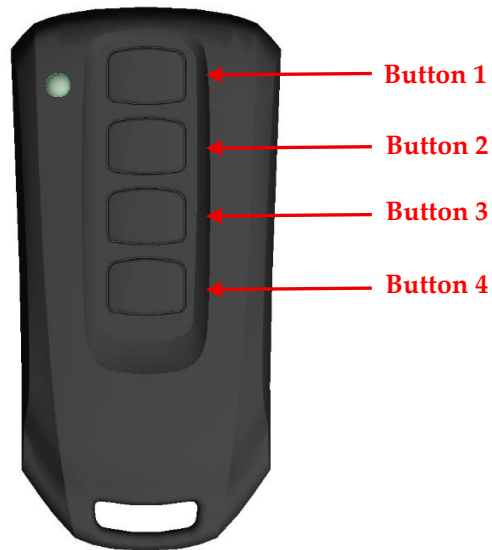
The configuration button combination is detected when two buttons are held down simultaneously for more than 10 seconds.

A long-press is registered and sent when a button is held down for more than 0.5 seconds. When the button is held down for more than 1 second, the packet is sent continuously at 0.1-second intervals until the button is released.

When the device is powered down using the button combination 1+4 (power-down), or when the battery is reinserted or replaced, the device starts up in a standby state. In this state, it does not send any packets. The device switches to normal operational mode only after a button is pressed.

## **BLE mode**

In BLE mode the BLE/BidCos Remote Control button assignment is as following:



In this mode, the data packets are formatted according to the BTHome<sup>1</sup> protocol, and every packet is being sent 10 times in 100ms intervals.

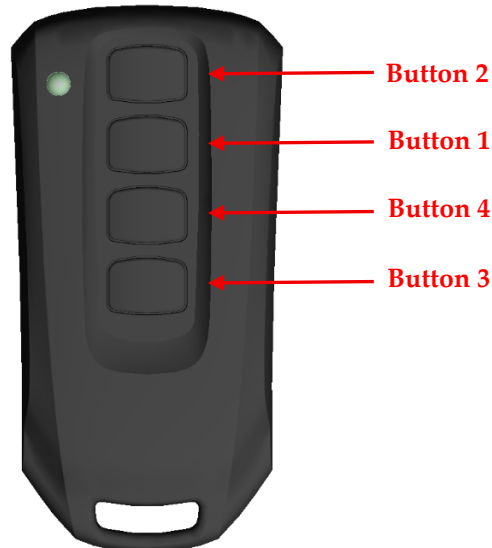
The description of the used format can be found in “Appendix A – The BLE data packet format”.

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<sup>1</sup> BTHome is an open, low-energy Bluetooth standard for broadcasting sensor data in a standardized format. The description can be found at <https://bthome.io/format/>

## BidCos mode

In BidCos mode, the BLE/BidCos Remote Control button assignment is as following:



The button order differs from that in BLE mode to ensure compatibility with the RT-O-HM-RC42.

In this mode, the packets are being sent once, or up to three times if not acknowledged by the paired recipient.

## Pairing with another BidCos device

When the device is not paired with an external BidCos device, the button and battery status information will be broadcast to all available devices without needing any acknowledgment. When paired with a device, the status information will only be addressed to the paired device, and the status information will be resent up to three times if an acknowledgment is not received.

For the pairing process, proceed as follows:

- Press and hold the following buttons simultaneously for 10 seconds until the green LED lights up,



- When the pairing process is finished, the green LED will blink 5 times. A failed pairing is indicated by a solid red LED for 2 seconds.

The paired device ID is stored in the non-volatile memory and will be remembered upon a restart. In order to reset the paired device ID, press and hold the following button for at least 10 seconds:



## Status LED

The bi-color LED indicates various states as listed below:

### Normal operation

Pattern	Description
5 blinks, red	The device restarts and immediately enters power-down mode
Single blink, green	Button status is transmitted in BidCos mode (not paired)
2 blinks, green	Button status is transmitted in BLE mode
Single blink, yellow	A packet is transmitted to the paired device in BidCos mode
Single blink, red <sup>1</sup>	An acknowledgment was not received from the paired BidCos device after three attempts

### Device configuration

Pattern	Description
Single blink, green	BLE mode activated
Single blink, long red	BidCos pairing process failed
2 blinks, green	BidCos mode activated
3 blinks, green	The paired BidCos device address is cleared
5 blinks, green	The device is successfully paired with a BidCos device in pairing mode
5 blinks, red	The device restarts and immediately enters power-down mode

#### Notes:

1: In BidCos paired mode, a successful data packet transmission is indicated by a single yellow blink of the LED. If no acknowledgment is received from the paired device, the packet is retransmitted up to three times. A red blink indicates that all three attempts have failed.

## Replacing battery

### WARNING:

Use only an **Energizer Ultimate Lithium 2032** coin-cell. Other battery types are not compatible with this product.

The battery holder is located on the underside of the PCB, inside the encapsulation. The top and bottom parts of the encapsulation are secured using a snap-fit mechanism. In order to disassemble the encapsulation, the top part needs to be lifted carefully in order to free the cantilever snap-fit latches using a soft material, e.g. a plastic spudger tool. Follow the steps below in order to dismount the device:

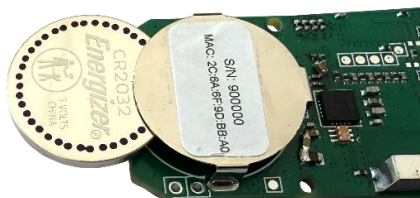
- Use the spudger tool to separate the top and the bottom part of the encapsulation by placing it at the junction near the key ring slot end.



- When the top part is removed, use the spudger tool to lift the PCBA in order to gain access to the battery at the bottom side.



- The battery is an **Energizer CR2032 Ultimate Lithium**. Please make sure not to short-circuit anything when removing/inserting the battery. The positive and negative pole orientation of the battery is as follows:



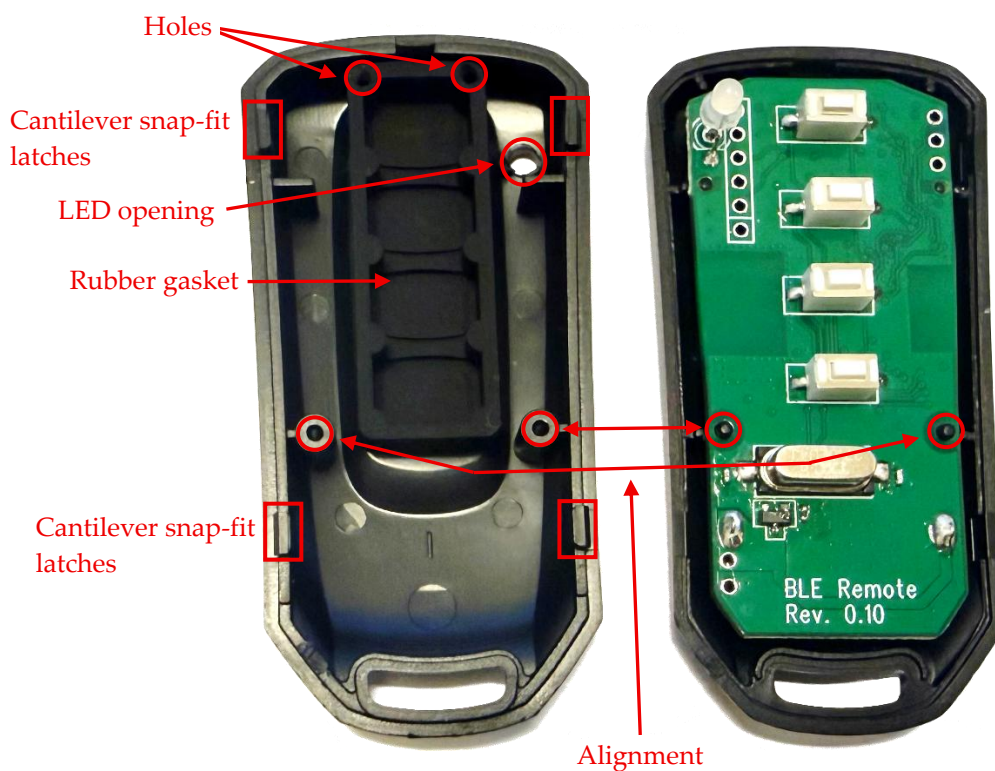
When the battery is inserted correctly, the red LED will blink 5 times to indicate the device is powered on and then enters standby state.

When reassembling the device, please make sure the rubber gasket for the buttons is placed on the top of the encapsulation.

There are two holes on the rubber gasket that need to be aligned with the encapsulation top.

After inserting the rubber gasket, insert the device PCB with the buttons aligned with the gasket, then place the bottom part of the encapsulation.

Attach the bottom part of the encapsulation carefully until a click is heard on all the corners. Verify that the encapsulation is assembled properly by checking the alignment of the rubber gasket, the LED, and the gap between the top and bottom parts of the encapsulation at all corners.



## Product Identification Label with Barcode

The BLE/BidCos Remote Control product identification on the battery holder contains a unique serial number in readable form and a barcode.

**Barcode format used:** 2/5 Interleaved with check-digit.

## Maintenance and cleaning

The product is designed for long-term, maintenance-free use, requiring only a battery change after an extended period. Maintenance or repairs are to be performed only by trained professionals.

Clean the product with a soft, lint-free, dry cloth. To remove heavier contamination, make the cloth damp with lukewarm water. Cleaning agents containing solvents should not be used because they can harm the plastic housing.

## Technical data

Radio Frequency	868.3 MHz	In BidCos mode
	2.400 – 2483.5 MHz	In BLE mode
RF Range	50 m	Line of sight in BLE mode
	50 m	Line of sight in BidCos mode
Supply Voltage	1 x 3V CR2032	
Current Consumption	100mA max.	The device is in BidCos pairing mode
Battery Life	~3 years	Based on a usage rate of 10 times per day in BLE or BidCos mode (unpaired)
	~2 years	Based on usage rate of 10 times per day when the device is in BidCos paired mode
Degree of protection	IP20	
Dimensions	70 x 35 x 18 mm	
Weight	TBD	
Ambient temperature	-10 to +55 °C	

## Appendix A – The BLE data packet format

The data packet in BLE mode is formatted to comply with the BTHome v2 protocol<sup>1</sup>.

The payload of the BLE data packet contains the following data fields:

### Flags (0x01)

The flag value has several bits that indicate the device's capabilities. The format that is being used in the BLE/BidCos Remote Control is **02 01 06**:

- 0x02: Length (2 bytes)
- 0x01: Flags (Advertising Data element type)
- 0x06: Binary representation 0000110, bit mask of boolean flags:  
bit 1: "LE General Discoverable Mode"  
bit 2: "BR/EDR Not Supported"

### Local Name (0x09)

This **Advertising Data** type is the complete local name (0x09).

The format that is being used in the BLE/BidCos Remote Control is **05 09 4C 49 4F 31**:

- 0x05: Length (5 bytes)
- 0x09: **Complete local name**
- 4C 49 4F 31: The complete local name. After converting to text, it is "LIO1"

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<sup>1</sup> The BTHome v2 protocol is described at <https://bthome.io/format/>

**Service Data (16-bit UUID, 0x16)**

The **Service Data** contain the actual BTHome formatted data. As an example, the data from the BLE key fob can be:

15 16 D2 FC 44 00 47 3A 00 3A 00 3A 01 3A 00 01 4B 0C E4 0B 57 19:

- 0x15: Length (21 bytes)
- 0x16: **Service Data** type
- D2 FC 44 3A 00 3A 00 3A 01 3A 00 01 4B 0C E4 0B 57 19: BTHome data

The BTHome data contains the 16-bit UUID, the BTHome device information and the various status/measurement data. The data format that is being used in the BLE/BidCos Remote Control is:

**UUID (D2FC)**: The UUID is little-endian, so the UUID is 0xFCD2. This UUID is mandatory in order for the packet to be recognized as BTHome data.

**BTHome device information (0x44)**: This data field consist of bitwise data:

- Bit 0: Encryption flag. This flag is telling the receiver whether the data is encrypted (1) or non-encrypted (0)
- Bit 1: Reserved
- Bit 2: Trigger based device flag. This flag tells if it should be expected that the device is sending BLE advertisements at a regular interval (0) or at an irregular interval (1), e.g. only when a button is pushed.
- Bit 3: Reserved
- Bit 4: Reserved
- Bit 5-7: BTHome version, which is version 2 (010) in this case

So, the information indicates BTHome version 2, device is sending irregular data, and no encryption.

**Packet ID (0x00 0x47)**: The first byte 0x00 defines that the data is a 1-byte packet ID. The second byte is the packet ID, in this case 71. This information can be used to filter duplicate data. This allows also to send multiple advertisement packets that are exactly the same. The packet ID number is reset when it is reached to 256.

**Button state (0x3A 0x00)**: The first byte 0x3A defines that the data is the button event. When the second byte is 0x00 the button is not pressed, when it is 0x01 the button is pressed, and when it is 0x04 the button held down for more than 0.5 seconds (long press).

When a button is pressed and held down, the device keeps sending the button event as “long-press”, and increments the packet ID after 10 advertisement packets.

There are button states for 4 buttons, thus “0x3A 0x00” appears twice followed by “0x3A 0x01” for button 3 which is pressed, followed by “0x3A 0x00” again for button 4 in the example data packet above.

**Battery Level (0x01 0x4B)**: The first byte defines that the data is the battery level. The second byte indicates the battery level in percent (%), which is 0x4B (75%) in this case.

**Battery Voltage (0x0C 0xE4 0x0B)**: The first byte defines that the data is the battery voltage in mV. The next two bytes are in little-endian, so the battery voltage is 0x0BE4 (3044mV)

**Temperature (0x57 0x19)**: The first byte defines that the data is the temperature in degrees-Celsius (°C). The second byte is the temperature value in 8-bit signed int. In this case it is 0x19 (25 °C).

The following table summarizes the BTHome data fields that are used on the BLE/BidCos Remote Control:

Object ID	Property	Data Type	Factor	Example	Result	Unit
0x00	Packet ID	uint8 (1 bytes)	-	00 47	71	-
0x01	Battery Level	uint8 (1 byte)	1	01 4B	75	%
0x0C	Voltage	uint16 (2 bytes)	0.001	0C E40B	3.044	V
0x3A	Button	uint8 (1 byte)	-	3A 01	Pressed	-
0x57	Temperature	sint8 (1 byte)	1	57 19	25	°C

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