



MerryIoT Leak Detection

Reference Manual

WL10-915

WL10-868

Model Name: WL10

BQW_02_0035.003

Table of Content

1. Description	1
2.1 Mechanical.....	2
2.1.1 Sensor	2
2.2 Environmental.....	2
2.3 Power.....	2
2.4 Radio	2
2.5 User Interface	2
2.6 Certifications and Conformity.....	2
2.7 Additional Features.....	2
2. Specifications	2
3. Operation	3
3.1 Transport Mode	3
3.2 Installation Mode.....	3
3.3 Default Operation	3
4. Messages.....	4
4.1 Status	4
4.1.1 Triggers	4
4.1.2 Payload.....	4
5. Battery.....	6
5.1 Replacement	6
5.2 Cautions	6
6. Label format information	7
6.1 Device back label	7
6.1.1 All QR code.....	7
6.1.2 Serial Number	8
6.1.3 Model Name	8
6.1.4 FCC ID	8
6.1.5 IC ID	8
6.1.6 Caution!.....	8
6.2 Packaging label.....	8
7. Important Product & Safety Instructions.....	9
8. Warnings	10
9. Notices	10
10. Cautions	11
11. Regulatory	12
11.1 Federal Communication Commission Interference Statement	12
11.2 Industry Canada statement:	12
12. Configuration Downlink Command.....	13
12.1 Configuration Command.....	13
12.2 Payload.....	14
12.3 Response Content.....	15
12.4 Frame Count 1 Content.....	15
13. BLE FOTA Downlink Command.....	16
13. 1 Payload.....	16

1. Description

The Water Leakage Sensor utilizes LoRaWAN connectivity to send uplink notifications and buzzer alarms when a water leak is detected.

There are also vibration and tilt detection in case of tampering.

2. Specifications

2.1 Mechanical



2.1.1 Sensor

Length x Width x Height	26.5mm x 70mm x 70 mm
Weight	54g without battery 89g with battery
Sensor	<ul style="list-style-type: none"> Combined with temperature, humidity, and water leak detection functions Buzzer for notifying the user Tamper detection

2.2 Environmental

Temperature	0°C to +50°C	Source	1.5V AA Alkaline 2700 mAH battery x 2pcs
IP Rating	IP 67 equivalent	System Maximum Voltage	3.0V

2.4 Radio

Frequency	Either 863–870MHz for EU models and 902–928MHz for North America	Current	135mA maximum
Rx Sensitivity (Conducted)	-140dBm	LEDs	One blue LED
Antenna Gain(Lora)	0.27dBi Peak, -5dBi Avg	Button	Test Button
Antenna Gain(BLE)	1.84dBi Peak	Buzzer	Alarm 0cm 75dB

2.6 Certifications and Conformity

FCC	On-going	2.7 Additional Features
CE	On-going	Battery Monitoring
IC	On-going	

3. Operation

3.1 Transport Mode

They are shipped with batteries inside the sensor. Default the sensor is in transport mode which means not to activate operation.

3.2 Installation Mode

- Users need to press the button over 5 seconds to activate operation into installation mode. When the Sensor tries to join the network, it will keep blinking for 3 seconds.
- Once the sensor joins the network, the LED will keep on for 3 seconds and send an uplink.
- Users can press the button for over 5 seconds to try to join the network again.
- The device will send uplink three times with FW version when the device joined successfully.

3.3 Default Operation

- During default operation the device will send a message to the network anytime there is a sufficient delta in the environmental conditions
 - Water leakage status change dry/wet (dry to wet Buzzer alarm)
 - Tamper detected (Buzzer alarm)
 - Button pressed (No buzzer alarm)
 - Keepalive message (No buzzer alarm).
- Users can press the button to send a test message to the network.
- The device will send a message saying it has been inactive for 60 minutes.
- While in default mode the device will flash the LED 3 times within 100ms only when the user presses the test button.

4. Messages

LoRaWAN Packets for this device uses port 126.

4.1 Status

4.1.1 Triggers

Water Leakage Sensor Packet Triggers

- The device will send a message when it has been inactive for 60 minutes.
- Water leakage detected (when the status changes from dry to wet), will send 3 uplinks with an interval of 5 seconds.
- Water leakage detection per 5 minutes.

Tamper Trigger:

Immediately send a message

Button Pressed Trigger:

Immediately send a message

4.1.2 Payload

Port	126
Payload Length	4 bytes

Bytes	0	1	2	3
Field	Status	Battery	Temp.	RH

Status	Sensor status			
	Bit [0]	1 – Water leakage detected, 0 – Dry		
	Bit [1]	1 – Button pressed, 0 - Button released		
	Bit [2]	1 – Tamper detected, 0 - No tamper detected		
Battery	Bits [7:3]	RFU		
	Battery level			
	Bits [3:0]	unsigned value v , range 0 – 15; battery voltage in V = $(21 + v) \div 10$.		
	Bits [7:4]	RFU		

	Environment Temperature
Temperature	Bits [7:0] sign integer temperature in °C -20~50 °C
	Relative humidity as measured by a digital sensor
RH	Bits [6:0] unsigned value in %, range 0-100. The value 127 indicates measurement error.
	Bit [7] RFU

5. Battery

5.1 Replacement

Use Alkaline battery (AA) only.

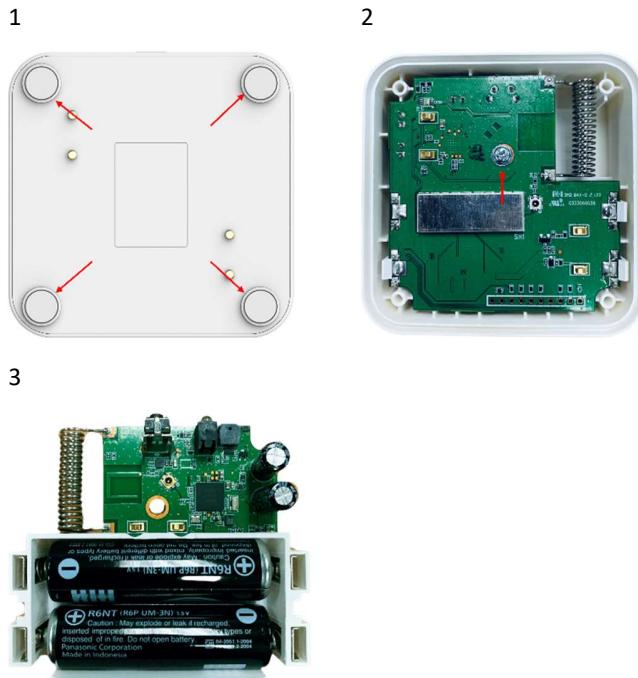
Remove the bottom cover, remove the screw which fixes the circuit board, then turn the device upside-down, the board will fall out easily. Replace the batteries. (cross-slot screwdriver required)

Cautions:

Operate with antistatic gloves is preferred.

Avoid touching the circuit board other than the battery holder.

Do not remove the battery holder from the circuit board.



5.2 Cautions

CAUTION: Disposal of a battery (or battery pack) into a fire or a hot oven, or mechanically crushing or cutting of a battery (or battery pack) can result in an EXPLOSION!

Leaving a battery (or battery pack) in an extremely high temperature surrounding environment can result in an EXPLOSION or leakage of flammable liquid or gas.

A battery (or battery pack) subjected to extremely low air pressure may also result in an EXPLOSION or leakage of flammable liquid or gas.

Discard used batteries according to the manufacturer's instructions.

CAUTION: The unit is provided with a battery-powered circuit.

There is a danger of explosion if the battery is incorrectly replaced.

Replace only with the same or equivalent type recommended by the manufacturer.

Discard used batteries according to the manufacturer's instructions.

Risk of Explosion if Battery is replaced by an Incorrect Type. Dispose of Used Batteries according to the Instructions.

6. Label format information

6.1 Device back label



6.1.1 All QR code

URN:LW:DO: 0016160000000007:0016160000XXXXXX:01632004

The total maximum resulting character sentence is 48 alphanumeric characters long.

6.1.1.1 JoinEUI

900MHz: 0016160000000007. (US)

800MHz: 0016160000000008. (EU)

Uses a hexadecimal representation resulting in 16 characters.

6.1.1.2 DevEUI

0016160000XXXXXX.

Uses a hexadecimal representation resulting in 16 characters

6.1.1.3 ProfileID

The profile identifier encodes a Vendor Identifier and a Vendor Profile Identifier as a hexadecimal representation resulting in 8 characters.

6.1.1.3.1 VendorID

0163

VendorID is assigned by the LoRa Alliance.

6.1.1.3.2 VendorProfileID

900MHz: 2004 (US)

800MHz: 3004 (EU)

6.1.2 Serial Number

SN: WL10915XXXXXX

Not including in QR code.

6.1.3 Model Name

MODEL: WL10.

Fixed code, not including in QR code.

6.1.4 FCC ID

2AAS9WL10

6.1.5 IC ID

26296-WL10

6.1.6 Caution!



For more information, please refer to chapter 5.2. and 10.

6.2 Packaging label



GS1 DataMatrix

- The GS1 Application Identifier (21) indicates that the GS1 Application Identifier data field contains a serial number.
- The GS1 Application Identifier (92) assigned to the company's internal information is DevEUI.

7. Important Product & Safety Instructions

For the most current and more detailed information about Brownan features and settings as well as safety instructions, please download the user manual for the products online at www.brownan.com before the use of any Brownan products or services.

Certain sensors contain magnets. **Keep away from ALL Children!** Do not put it in your nose or mouth.

Swallowed magnets can stick to intestines causing serious injury or death. Seek immediate medical attention if magnets are swallowed.

These products are not toys and contain small parts that can be dangerous to children under 3 years old. Do not allow children or pets to play with products.

Observe proper precautions when handling batteries. Batteries may leak or explode if improperly handled.

Observe the following precautions to avoid a sensor explosion or fire:

- Do not drop, disassemble, open, crush, bend, deform, puncture, shred, microwave, incinerate, or paint the sensors, Hub, or other hardware.
- Do not insert foreign objects into any opening on the sensors or Hub, such as the USB port.
- Do not use the hardware if it has been damaged—for example, if cracked, punctured, or harmed by water.
- Disassembling or puncturing the battery (whether integrated or removable) can cause an explosion or fire.
- Do not dry the sensors or battery with an external heat source such as a microwave oven or hairdryer.

8. Warnings

- Do not place naked flame sources, such as lighted candles, on or near the equipment.
- The battery shall not be exposed to excessive heat such as sunshine, fire, or the like.
- Do not dismantle, open or shred battery packs or cells.
- Do not expose batteries to heat or fire. Avoid storage in direct sunlight.
- Do not short-circuit the battery. Do not store batteries in a box or drawer where they may short-circuit each other or be short-circuited by other metal objects.
- Do not remove a battery from its original packaging until required for use.
- Do not subject batteries to mechanical shock.
- In the event of a battery leaking, do not allow the liquid to come in contact with the skin or eyes. If a contact has been made, wash the affected area with copious amounts of water, and seek medical advice.
- Do not use any charger other than that specifically provided for use with the equipment.
- Observe the plus (+) and minus (-) marks on the battery and equipment and ensure correct use.
- Do not use any which is not designed for use with the product.
- Do not mix cells of different manufacture, capacity, size, or type within a device.
- Keep batteries out of the reach of children.
- Seek medical advice immediately if a battery has been swallowed.
- Always purchase the correct battery for the equipment.
- Keep batteries clean and dry.
- Wipe the battery terminals with a clean dry cloth if they become dirty.

9. Notices

- Avoid exposing your sensors or batteries to very cold or very hot temperatures. Low or high-temperature conditions may temporarily shorten the battery life or cause the sensors to temporarily stop working.
- Take care in setting up the Hub Gateway and other hardware. Follow all installation instructions in the User Guide. Failure to do so may result in injury.
- Do not install hardware equipment while standing in water or with wet hands. Failure to do so can result in electric shock or death. Use caution when setting up all electronic equipment.
- When charging the sensors, do not handle the sensors with wet hands. Failure to observe this precaution could result in electric shock.
- PROP 65 WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm
- Cleaning Brownan Products: Use a clean dry cloth or wipe to clean Brownan products. Do not use detergent or abrasive materials to clean the Brownan products, as this may damage the sensors.

10. Cautions

CAUTION: Disposal of a battery (or battery pack) into a fire or a hot oven, or mechanically crushing or cutting of a battery (or battery pack) can result in an **EXPLOSION!**

Leaving a battery (or battery pack) in an extremely high temperature surrounding environment can result in an **EXPLOSION** or leakage of flammable liquid or gas.

A battery (or battery pack) subjected to extremely low air pressure may also result in an **EXPLOSION** or leakage of flammable liquid or gas.

Discard used batteries according to the manufacturer's instructions.

CAUTION: The unit is provided with a battery-powered circuit.

There is a danger of **EXPLOSION** if the battery is incorrectly replaced.

Replace only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

Risk of **EXPLOSION** if Battery is replaced by an Incorrect Type. Dispose of Used Batteries According to the Instructions.

11. Regulatory



Hereby, Brownan Communications Inc. declares that the radio equipment for Brownan products complies with Directive 2014/53/EU.

This device complies with Part 15 of the FCC Rules and RSS Standards of Industry Canada.



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.



This symbol means that according to local laws and regulations your product should be disposed of separately from household waste. When this product reaches its end of life, take it to a collection point designated by local authorities. Some collection points accept products for free. The separate collection and recycling of your product at the time of disposal will help conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment.

11.1 Federal Communication Commission Interference Statement

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 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.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies 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.

IMPORTANT NOTE:

Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

11.2 Industry Canada statement:

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science, and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference
- (2) This device must accept any interference, including interference that may cause undesired operation of the device

Cet appareil contient des émetteurs / récepteurs exempts de licence qui sont conformes au (x) RSS (s) exemptés de licence d'Innovation, Sciences et Développement économique Canada. L'opération est soumise aux deux conditions suivantes :

- (1) Cet appareil ne doit pas causer d'interférences
- (2) Cet appareil doit accepter toute interférence, y compris les interférences pouvant provoquer un fonctionnement indésirable de l'appareil

Radiation Exposure Statement:

This equipment complies with Canada radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Déclaration d'exposition aux radiations:

Cet équipement est conforme Canada limites d'exposition aux radiations dans un environnement non contrôlé. Cet équipement doit être installé et utilisé à distance minimum de 20cm entre le radiateur et votre corps.

12. Configuration Downlink Command

12.1 Configuration Command

Port	204
------	-----

12.2 Payload

Bytes	0	1	2
Field	Cmd	Config	

Cmd	Command	1 byte															
	Bit [7:0]	0x00 – Set keepalive interval. default: 3600 sec. (Min: 15 sec.) *Note: If keep alive interval value < detection interval value, "detection interval" will be used as the uplink time.)															
		0x03 – Set sensor detection interval default value: 300 sec value range: 15~65535															
		0x04 – Set tamper detection on/off default: enable															
		0x05 – Set buzzer alarm period(seconds) default: 3															
Config	Configuration (1 or 2 bytes) See the table as follows:																
	<table border="1"> <thead> <tr> <th>Command</th> <th>Command Description</th> <th>Data Length</th> </tr> </thead> <tbody> <tr> <td>0x00</td> <td>Get Sensor Configuration (Only for unconfirmed downlink) *Note: little-endian format.</td> <td>0 byte</td> </tr> <tr> <td>0x00</td> <td>Set keepalive interval. *Note: little-endian format.</td> <td>2 bytes</td> </tr> <tr> <td>0x03</td> <td>Set detection interval *Note: little-endian format.</td> <td>2 bytes</td> </tr> <tr> <td>0x04</td> <td>Bit[0] = 1: Enable tamper detection, 0: Disable tamper detection Bit[7:1] = RFU</td> <td>1 byte</td> </tr> </tbody> </table>		Command	Command Description	Data Length	0x00	Get Sensor Configuration (Only for unconfirmed downlink) *Note: little-endian format.	0 byte	0x00	Set keepalive interval. *Note: little-endian format.	2 bytes	0x03	Set detection interval *Note: little-endian format.	2 bytes	0x04	Bit[0] = 1: Enable tamper detection, 0: Disable tamper detection Bit[7:1] = RFU	1 byte
Command	Command Description	Data Length															
0x00	Get Sensor Configuration (Only for unconfirmed downlink) *Note: little-endian format.	0 byte															
0x00	Set keepalive interval. *Note: little-endian format.	2 bytes															
0x03	Set detection interval *Note: little-endian format.	2 bytes															
0x04	Bit[0] = 1: Enable tamper detection, 0: Disable tamper detection Bit[7:1] = RFU	1 byte															

	0x05	Buzzer alarm period in seconds	1 byte
Payload Content	<p>Command content</p> <p>Ex:</p> <p>00100E 032C01 0401 0503</p> <p>00 100E => Set keepalive interval: 0xE10 -> 3600 (sec) 03 2C01 => Set detection interval: 0x012C -> 300(seconds) 04 01 => Enable tamper detection: 0x01 05 03 => Buzzer alarm period in 3 seconds: 0x03</p>		

12.3 Response Content

(Only for unconfirmed downlink)

Port	204
Payload Length	10 bytes
Payload Content	<p>Response content</p> <p>Example:</p> <p>00100E 032C01 0401 0503</p> <p>00 100E => Set keepalive interval: 0xE10 -> 3600 (sec) 03 2C01 => Set detection interval: 0x012C -> 300(seconds) 04 01 => Enable tamper detection: 0x01 05 03 => Buzzer alarm period in 3 seconds: 0x03</p>

12.4 Frame Count 1 Content

Payload Length	9 bytes
Payload Content	Frame count 1 content

Ex:

01 04200000 7ff1f102

01 => command ID

04200000 => HW ID: 0x00002004 (little-endian format)

7ff1f102 => FW version: 0x02f1f17f (little-endian format)

13. BLE FOTA Downlink Command

Port	206
Payload Length	3 bytes

13. 1 Payload

Bytes	0~2
Payload	0x444655