MERRYIOT MS10 Motion Detection User Manual

MS10 Motion Detection
User Manual

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Description

The Motion Sensor utilizes LoRaWAN connectivity to communicate the presence or not of a person. The intended use is to place the sensor with a good view of a room to determine if there is motion in the room or not.
The sensor is composed of a Passive Infrared Detector and Fresnel Lens. The main body contains active electronics to measure movement and transmit any changes to a LoRaWAN network.
There are also vibration and tilt detectors in case of tampering. Once the event is detected, the sensor will send an uplink.

Specifications

2.1 Mechanical

2.1.1 Sensor

Length x Width x Height	25mm x 70mm x 70mm
Weight	62g without battery 96g with battery
Sensor	• Dual Passive Infrared detectors • Fresnel Lens with 123° horizontal & 93° vertical view • Tamper detection • Temperature/Humidity • Maximum detect range 7M

2.2 Environmental

Temperature	0°C to +50°C
IP Rating	IP 40 equivalent

2.3 Power

Source	1.5 V AA Alkaline x 2 pcs, 2700 mAh
System Maximum Voltage	3.0 V
System Minimum Voltage	2.4 V
Operation Current	135mA maximum

2.4 Radio

Frequency	Either 863-870 MHz for the EU model and 902-928 MHz for North America
Rx Sensitivity (Conducted)	-140dBm
Antenna Gain	-2dBi Peak, -5dBi Avg

2.5 User Interface

LEDs	One blue LED
Motion	One Motion Sensor
Button	Test Button

2.6 Certifications and Conformity

FCC On-going
CE On-going
IC TBD

2.7 Additional Features

Battery Monitoring
Tamper detection
Environment temperature

Operation

Installation Mode

- Users need to press the button for over 5 seconds to activate the 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 the FW version when the device joined successfully.

Default Operation

- While in default operation the device will immediately send a message any time a control signal is transmitted.
  - Free to Occupied
  - Tamper detected
  - Button pressed
  - Keepalive message
- Users can press the button to send a test message to the network.
- The device will send a status message every 10 minutes while in the occupied state and every 1 hour while in the vacant state.

- While in default mode the device will flash the LED 3 times within 100ms only when the user presses the test button.

Messages

LoRaWAN Packets for this device use port 122.
Status
Triggers
Motion Sensor Triggers:

1. While in free mode, send a message every 60 minutes;
2. When the status changes from the free mode to occupied mode, send a message immediately;
3. While the occupied state continues, send a message every 10 minutes;
4. When the device isn't triggered by the occupied state again within 5 minutes from the last message, the status changes from occupied to free mode and sends a message.

Tamper Trigger:
Immediately send a message Button Pressed Trigger: Immediately send a message

Payload

Port			122		
Payload Length			9 bytes		
Bytes	0	1	2	34	5617
Field	Status	I Battery	Temp	RH Time Count	

Status	Sensors status	
	Bit [0]	1— occupied, 0 — free
	Bit [1]	1— Button pressed, 0 – Button released
	Bit [2] Bits (7:3)	1 —Tamper detected, 0 – No tamper detected RFU
Battery	Battery level	
	Bits [3:0]	unsigned value v, range 0 — 15;
		battery voltage in V = (21 + v) + 10.
	Bits (7:4)	RFU
Temp	Environment Temperature	
	Bits (7:0) sign integer temperature in °C	
RH	Relative humidity as measured by a digital sensor	
	Bits (6:0) Bit [7]	unsigned value in %, range 0-100. RFU
Time	Time elapsed since the last event-triggered	
	Bits [15:01	unsigned value in minutes, range 0— 65,535.
		`Note little-endian format.
Count	Total count of event-triggered	
	Bits (23:0]	unsigned value, range 0— 16,777,215.
		*Note little-endian format.
	Note: This value is not stored persistently on the device, and may reset whenever the device i s power-cycled or rebooted.	

Battery

Replacement
Use Alkaline battery (AA) only.
Remove the battery cover and replace the batteries. (cross-slot screwdriver required)

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.

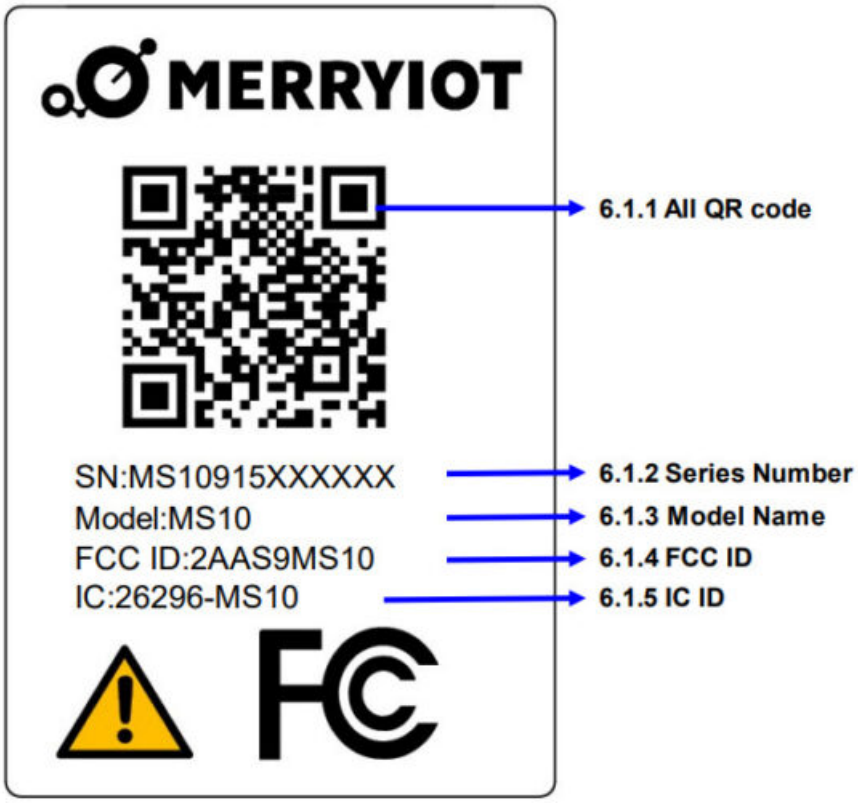
Replace only with the same or equivalent type recommended by the manufacturer.

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.

Label format information

Device back label

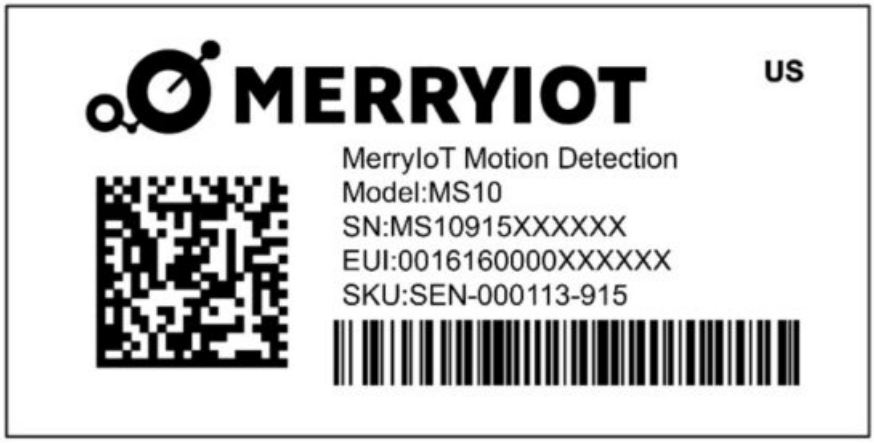


URN:LW:D0:E8E1E10001013647:E8E1E1000XXXXXX:01632001

All QR code
URN:LW:D0: 0016160000000001:0016160000XXXXXX:01632002
The total maximum resulting character sentence is 48 alphanumeric characters long.
JoinEUI
900MHz: 0016160000000001. (US)
800MHz: 0016160000000002. (EU)
Uses a hexadecimal representation resulting in 16 characters.
DevEUI
0016160000XXXXXX.
Uses a hexadecimal representation resulting in 16 characters
profile ID
The profile identifier encodes a Vendor Identifier and a Vendor Profile Identifier as a hexadecimal representation resulting in 8 characters.
VendorID
0163
VendorID is assigned by the LoRa Alliance.
VendorProfileID
900MHz: 2002 (US)
800MHz: 3002 (EU)
Serial Number
SN: MS10915XXXXXX
Not including in QR code.
Model Name
MODEL: MS10.
Fixed code, not including in QR code.
FCC ID
2AAS9MS10
IC ID
26296-MS10
Caution!

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

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.

Important Product & Safety Instructions

For the most current and more detailed information about Brown features and settings as well as safety instructions, please download the user manual for the products online at **www.browan.com** before the use of any Browan 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.

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 manufacturers, capacities, sizes, or types 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.

Notices

- Avoid exposing your sensors or batteries to very cold or very hot temperatures. Low or hightemperature 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 Browan Products: Use a clean dry cloth or wipe to clean Browan products. Do not use detergent or abrasive materials to clean the Browan products, as this may damage the sensors.

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.

Regulatory

Hereby, Browan Communications Inc. declares that the radio equipment for Browan 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.

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:
The product complies with the US portable RF exposure limit set forth for an uncontrolled environment and is safe for intended operation as described in this manual. Further RF exposure reduction can be achieved if the product can be kept as far as possible from the user body or set the device to lower output power if such a function is available. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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

The product complies with the Canada portable RF exposure limit set forth for an uncontrolled environment and is safe for intended operation as described in this manual. Further RF exposure reduction can be achieved if the product can be kept as far as possible from the user body or set the device to lower output power if such a function is available.
This equipment should be installed and operated with a minimum distance of 0cm between the radiator & your body.

Configuration Downlink Command

Note: Only For PIR Parameters Settings

Port	102
Payload Length	5 bytes

*Note: Configuration Down-link Command should consider the duty cycle.

Payload

Bytes	0	1	2	3	4
Field	Cmd	Config			

Cmd	**Command**	
	Bit [7:0]	0x01 – Set configuration, other values – RFU
Config	**PIR Sensor Configuration**	
	Bits [4:0] Bit [5] Bits [8:6] Bits [10:9] Bits [12:11] Bits [16:13] Bits [24:17] Bits [31:25]	RFU 0 – use band-pass filter, 1 – use low-pass filter. Default: 0 (use BPF) RFU unsigned value ω, range 0-3; window time in sec = (ω + 1) × 4. Default: 0 (4 sec) unsigned value ρ, range 0-3; pulse counter threshold = ρ + 1. Default: 0 (1 pulse) unsigned value β, range 0 – 15; blind time in sec = (β + 1) × 0.5. Default: 15 (8 sec) detection threshold, range 0 – 255. Default: 16 RFU

Payload Content	Command content
	Ex: 01000e02100 **01 00e02100 => PIR parameter : 0x0021e000** Example: =>Room Occupied: 0100e02100 => Desk Occupied:(<=60cm) 0100148101

For Sensor Settings
Payload

Port	204

Bytes	0	1~4
Field	Cmd	Config

Cmd	Command	1 byte
		0x00 – Set keepalive interval in sec. default value : 3600 sec value range: 15~65535 0x02 – Set occupied interval in sec. default value : 600 sec value range: 0~65535 0x03 – Set free detection time in min. default value: 5 min value range: 0~255 0x04 – Set trigger count in the occupied status. default value : 0 value range: 0~65535 0x05 – Set PIR parameters. default value: please see 12.1 0x06 – Set tamper detection on/off default: enable

Config
Configuration (0~4 bytes)
See the table as follows:

Cmd	Command Description	Config Length
Ox00	Get Sensor Configuration (Only for unconfirmed downlink) *Note: little-endian for mat.	0 bytes
Ox00	Set keepalive interval in sec *Note: little-endian format.	2 bytes
0x02	Occupied interval in sec *Note: little-endian format.	2 bytes
0x03	Free detection time in min	1 byte
0x04	Trigger Count in the occupied status *Note: little-endian format.	2 bytes
Ox05	PIR Parameters (see 5.1) *Note: little-endian format.	4 bytes
Ox06	Bit[0] = 1: Enable tamper detection, 0: Disable tamper d etection Bit[7:1] = RFU	1 byte

Command Description

Payload Content	Command content
	Ex: 00100e || 025802 || 0305 || 040000 || 0500e02100 || 0600 00 100e => Reporting interval : 0x0e10 -> 3600 sec 02 5802 => Occupied override : 0x0258 -> 600 sec 03 05 => Free detection time : 0x05 -> 5 min 04 0000 => Trigger Count in the occupied status 05 00e02100 => PIR parameter : 0x0021e000 06 00 => Disable tamper detection Example: =>Room Occupied: 0500e02100 => Desk Occupied: 0500148101

Response Content

Port	204
Payload Length	18 bytes

	Response content
Payload Conte nt	**Ex:** 00100e 025802 0305 040000 0500e02100 0600 00 100e => Reporting interval : 0x0e10 -> 3600 sec 02 5802 => Occupied override : 0x0258 -> 600 sec 03 05 => Free detection time : 0x05 -> 5 min 04 0000 => Trigger Count in the occupied status 05 00e02100 => PIR parameter : 0x0021e000 06 00 => Disable tamper detection

Frame Count 1 Content

Payload Length	9 bytes
Payload Content	Frame count 1 content Ex: 01 02200000 7ff1f102 01 => Command ID 02200000 => HW ID : 0x00002002 (little-endian format) 7ff1f102 => FW Version : 0x02f1f17f (little-endian format)

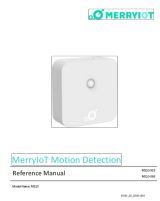
BLE FOTA Downlink Command

Port	206
Payload Length	3 bytes

Payload

Bytes	0~2
Payload	0x444655

Documents / Resources

	MERRYIOT MS10 Motion Detection [pdf] User Manual MS10, Motion Detection, MS10 Motion Detection
	MERRYIOT MS10 Motion Detection [pdf] User Manual MS10 Motion Detection, MS10, Motion Detection, Detection

References

- BROWAN COMMUNICATIONS INC.