BE NEXT

Quick Start: **Door Sensor EU**

Technical specifications

Normal operating voltage	2x AAA 1,5V batteries
Normal battery lifetime	5 years
Frequency range	868.42 MHz
Wireless range	30~100 meters in line of sight
Temperature sensor accuracy	+/- 2,5° C from -15° C to +85° C

Indicator light

Screw **connector**

Magnet
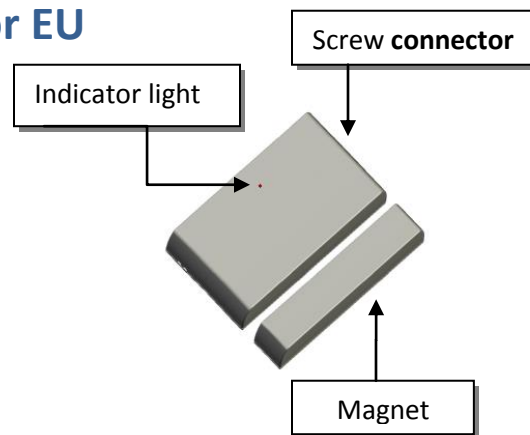
Basic operations

- The *Door Sensor* can be placed on any door or window.
- The *Door Sensor* can report the status of the door (OPEN/CLOSED).
- The *Door Sensor* can measure the temperature.
- The *Door Sensor* also has a screw connector for an external (dry) contact.
- Indoor use only.

How it operates

After a successful inclusion the *Door Sensor* can be mounted on the wall or door/window.
When opening the door the indicator light will blink shortly, this indicates that a z-wave message has been send successfully.
With a controller you can request the temperature and battery level.

Mounting

1. Before mount, the *Door Sensor* should be included into a Z-Wave network and associated.
2. Use a flat screwdriver at the inlets on the sides to gently unlock the back cover.
3. Do the same for the m*agnet* cover.
4. Use the supplied screws to mount the covers with the designated holes.
5. Preferred to mount the magnet on the door/window and the *Door Sensor* on the wall.
6. Make sure the m*agnet* is not more than 1cm mounted away from the *Door Sensor*.
7. Place two AAA 1,5V batteries into the device.
8. Place the *Door Sensor* and magnet onto the back covers.
9. Make sure to close it nicely on all sides.
10. Mounting is completed when the led blinks for a full second.
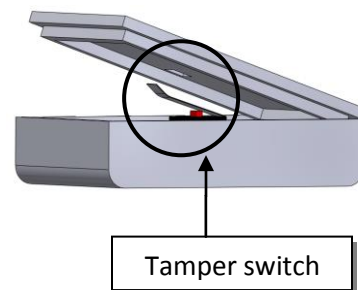
Tamper switch

Include or exclude in Z-Wave network [1]

1. When the *Door Sensor* is mounted, remove it from the back cover.
2. Press and hold the *tamper switch* for two seconds and release to start the inclusion or exclude process.
3. When classic inclusion failed, the product will start Network Wide Inclusion automatically.

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[1] Make sure your Z-Wave controller is in the correct operation mode (include or exclude).

Caution:

- **This device is using a radio signal that passes through walls, windows and doors. The range is strongly influenced by local conditions such as large metal objects, house wiring, concrete, furniture, refrigerators, microwaves and similar items. On average, the indoor range is approximately 30 meters.**
- **Do not expose this product to excessive heat or moisture. Dry location use only.**
- **Prevent long term exposure to direct sunlight.**
- **Do not attempt to repair this product. If the product is damaged or if you are in doubt about the proper operation, take the product back to the place of purchase.**
- **Do not clean the product with any liquid.**
- **Indoor use only.**

Technical details

Normal operating voltage	2x AAA 1,5V batteries From 2,3 to 4,0Vdc Do not use rechargeable batteries
Battery lifetime	Approximately 5 years (normal usage) Approximately 3~4 years (long networks and heavily usage)
Frequency range	868.42 MHz (EU) others on request
Wireless range	Approximately 100 meters in line of sight Min. 150 meters with good mesh network (max. 4 hops)
Absolute max. temperature	-15°C to +85°C **
Storage temperature	-5°C to +65°C
Storage humidity	10% to 70%
Normal operating temperature	0°C to 50°C
Operating humidity	10% to 80%

**Offset of the temperature ADC measurement must be calibrated with the z-wave configuration command class.

Product dimensions (length x width x height)

Door Sensor = 58 x 33 x 17 mm

Magnet = 58 x 11 x 17 mm

Indication mode

The indicator light gives various statuses of the device as follows:

1. Ready for learn mode: indicator light blinks every second
2. Learn in progress (add):   indicator light 2 times every second
3. Learn in progress (remove):   indicator light 3 times every 1.5 second
4. Learn mode success: indicator light is on for one second
5. Tamper released   indicator light blinks 6 times rapidly
6. Mounting successful   indicator light is on for 1 second
7. RF message send failed   indicator light blinks 6 times rapidly

Supporting Command Classes:

Basic type: BASIC_TYPE_ROUTING_SLAVE
Generic type: GENERIC_TYPE_SENSOR_BINARY
Specific type: SPECIFIC_TYPE_NOT_USED
Listening: False, Z-Wave Lib: 4.54

class: 0x30 COMMAND_CLASS_SENSOR_BINARY
class: 0x70 COMMAND_CLASS_CONFIGURATION
class: 0x71 COMMAND_CLASS_ALARM
class: 0x72 COMMAND_CLASS_MANUFACTURER_SPECIFIC
class: 0x80 COMMAND_CLASS_BATTERY
class: 0x84 COMMAND_CLASS_WAKE_UP
class: 0x85 COMMAND_CLASS_ASSOCIATION
class: 0x86 COMMAND_CLASS_VERSION
class: 0x31 COMMAND_CLASS_SENSOR_MULTILEVEL
class: 0xEF COMMAND_CLASS_MARK
class: 0x20 COMMAND_CLASS_BASIC

Not listening routing slave

This Z-Wave product will be used as routing slave. Slave nodes are nodes in a Z-Wave network that receive commands and perform actions based on the command. This device will always be in sleep mode because it works on batteries. In sleep mode the device is not active listening, the device will wake up according to the wakeup command class.

Include initiator

The include initiator is used when Primary and Inclusion Controllers include nodes into the network. When both the include initiator have been activated simultaneously the new node will be included to the network (if the node was not included previously).

Exclude initiator

The exclude initiator is used by Primary Controllers to exclude nodes from the network. When the exclude initiator and a slave initiator are activated simultaneously, it will result in the slave being excluded from the network (and reset to Node ID zero). Even if the slave was not part of the network it will still be reset by this action.

Z-Wave compatibility

Because this is a Z-Wave device, it means it can co-operate with other Z-Wave devices of other manufacturers. It can co-exist in a Z-Wave network existing with product from other manufacturers.

Hops & retries

The Z-Wave range has a range of up to 30 meters in line of sight. This signal is not limited to the 30 meter range due to routing the Z-Wave message to other nodes in the network. This way the range of the Z-Wave network can be expanded to 150 meters indoors (limit of 4 hops).

Door Sensor external contact

Next to the magnetic read contact the Door Sensor also has an external contact which can be used to connect for example a door bell.
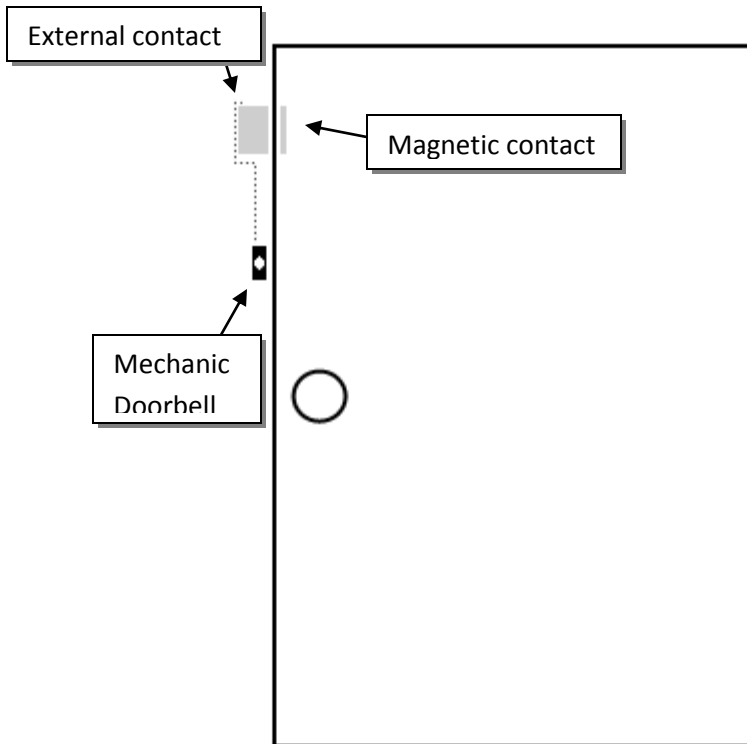
Also with this external contact it is possible to add a debounce time and to possibly connect a bed sensor. With configuration parameters 7,8 and 9 this can be set up. Below you find a flow diagram. (Please see also § command class configuration for more information).

```
External
door opened

Wake up

Configuration parameters:
External-ON-debounce = Parameter 7
External-OFF-debounce = Parameter 8
Total-awake-time = Parameter 9

External-
ON-debounce
finished          True → Is External
                        door still open?

False                                    True

Total-awake-                            Z-Wave send
time finished                           External door is
                                        opened

False    True          False

Go to sleepmode
```
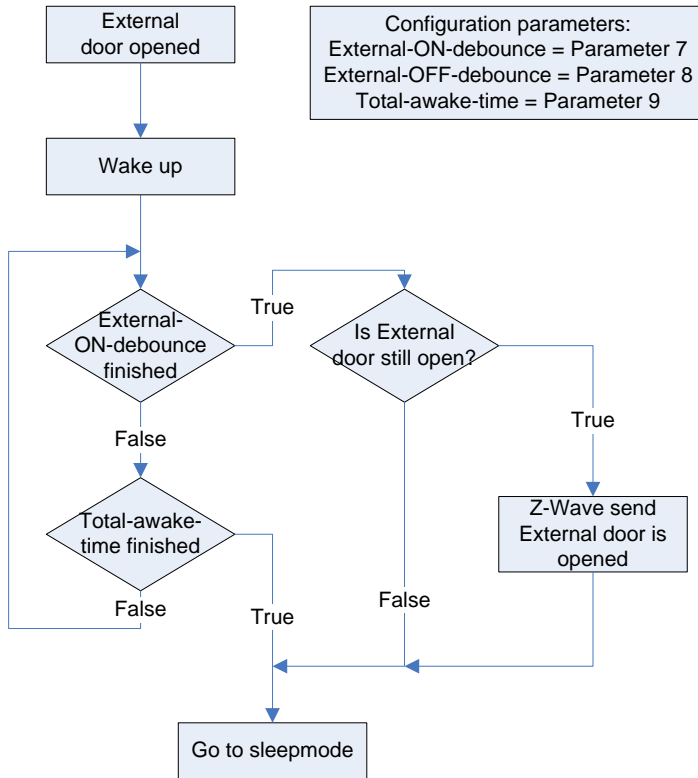
class: 0x20 COMMAND_CLASS_BASIC

When a door is opened a basic set frame with the value 255 is sent to the associated nodes.

When a door is closed a basic set frame with the value 0 is sent to the associated nodes. This is the controlling role of the Basic command class.

The supporting role of the Basic command class is mapped to the Sensor Binary command class.

class: 0x25 COMMAND_CLASS_SENSOR_BINARY

The Sensor Binary command class can be used to check the status of the *Door Sensor* (open or closed).

Where '255' is open and '0' is closed.

class: 0x86 COMMAND_CLASS_VERSION

This command class is used to obtain information about the *Door Sensor*. The Z-Wave library type, the Z-Wave protocol version and the application version will be reported.

class: 0x72 COMMAND_CLASS_MANUFACTURER_SPECIFIC

This will report information about the manufacturer. This product will contain the manufacturer ID of *BeNext*.

Manufacturer ID of *BeNext* is 138, the ID of this product is 4.

class: 0x70 COMMAND_CLASS_CONFIGURATION

Configure parameters:

   0. not used
   1. Set to default
      Description: Set all configuration values to default values (factory settings).
                                 Read more in chapter Configuration Reset.

Size: 1 byte*
Param1:   If 0xFF then set to default
Param2,3,4:   Not used

2. External contact
Description: Configure what the external contact sends when trigger
Default: 0x00 (send alarm report)

Size: 1 byte*
Param1:   If 0x00: Send an alarm report with type 2
                                If 0x01-0xFF: Send a basic set frame to all nodes in association group 2.

3. Not used
Description: Is not used but still can be set and requested.
Size: 1 byte*

4. Not used
Description: Is not used but still can be set and requested.
Size: 1 byte*

5. The mode
Description: The operating mode.
Default: 0x01

Size: 1 byte*
Param1:   Mode 1: normal operating mode
                                Mode 3: Z-Wave chip is always on to request e.g. version or
                                manufacturer ID
                                Any mode other then 3. That value will be reported after a get but will
                                be handled in SW as mode 1.
Param2,3:   Not used

6. The temperature offset
Description: An offset for the temperature.
Default: 0x00

Size: 2 bytes*
Param1,2:   A signed integer to determine the offset off the temperature.
Param3,4:   Not used

7. Extern contact debounce ON
Description: Debounce time when the external contact is opened.
                                (see also § Door Sensor external contact)

Default: 0x00

Size: 1 byte*
Param 1:   value 0 – 255 seconds
Param 2,3,4:   Not used

8. Extern contact debounce OFF
Description: Debounce time when the external contact is opened.
                                (see also § Door Sensor external contact)

Default: 0x00

Size: 1 byte*
Param 1:   value 0 – 255 seconds
Param 2,3,4:   Not used

9. **Wake up delay**
    Description: A delay from the wake up time to give the external contact a chance to change his status.
    (see also § Door Sensor external contact)

    Default: 0x00

    Size: 1 byte*
    Param 1:   value * 100 ms, 0 – 25,5 seconds
    Param 2,3,4:   Not used

* If a size is other then given size the frame is ignored totally so configuration values are **not** changed.

class: 0x85 COMMAND_CLASS_ASSOCIATION
The Association command class is used to associate other devices with the *Door Sensor*. The devices that are associated can be controlled on application level.

The *Door Sensor* can be associated into a grouping. If so, the *Door Sensor* can control other Z-Wave device (does not have to be a controller).

Number of groupings: 2
Maximum supported nodes per group: 5

Group 1: if the internal door contact (magnet) is triggered it sends a Z-Wave frame to every node in this group

Group 2: if the external door contact is triggered it sends a Z-Wave frame to every node in this group if it is configured (see configuration documentation parameter 2: external contact).

Class: 0x80 COMMAND_CLASS_BATTERY
This class is used to request and report battery levels for a given device.
When battery level is lower then 20% the Door Sensor will send a battery warning (value 255) after every wake up notification. A battery get will report the actual value even if below 20 %.

An unsolicited (without receiving a BATTERY_GET) BATTERY_REPORT is sent when the Door Sensor has measured that the battery level has dropped.

Note that the following points apply for the unsolicited BATTERY_REPORT:
- When new batteries applied a report is sent with the current value
- The report will always be lower then the previous sent value
- The battery level in the report is maximum 2% lower then the previous sent value

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class: 0x84 COMMAND_CLASS_WAKE_UP

The Wake Up command class is used at battery-operated devices. This class allows the *Door Sensor* to wake up occasionally to notify others devices, that the *Door Sensor* is ready to receive commands. After receiving the commands the *Door Sensor* will go into sleep mode again. The wake up interval can be set using the WAKE_UP_INTERVAL_SET command.

The default value is 0x1C20 = 7200 sec = 2 hour
The default node is 0xFF = 255 (broadcast)

It is possible to send a **wake up notification** on user interaction. To do this press and hold the tamper switch for 4 seconds.

When the wake up time is set to 0, a **wake up notification** is never send periodically, only on user interaction.

class: 0x31 COMMAND_CLASS_SENSOR_MULTILEVEL

Sensor_multilevel_get
The Sensor Multilevel command class is used to get a report from the Door Sensor. The returned value is the measured temperature inside the housing with one decimal.

class: 0x71 COMMAND_CLASS_ALARM

This command class is used to identify the state of the tamper alarm. The device will send an unsolicited report to the controller if the status is changed, the value 0x00 will indicate that the tamper is placed correctly on the wall. The value 0xFF will indicate a tamper alarm.

There are two different alarm types:
2: External door contact
3: Tamper switch

Every other alarm type that is requested will be ignored by application.

Configuration reset

The Door Sensor supports a configuration resets function. Configuration reset means:
- All configuration values are defaulted
- Wake up interval is defaulted
- All association are cleared

This function can be activated by sending a configuration set frame:

CONFIGURATION_SET
Parameter: 0x01
Size: 0x01 (can't be different from 1)
Value: 0xFF (can be any value except for 0x55 or 0xAA)

When the value of configuration value is requested 2 possible values can be returned.

CONFIGURATION_REPORT
Parameter: 0x01
Value 0x55:   Device doesn't have all his configuration settings anymore.
                Even when a configuration parameter is changed back to the default value
Value 0xAA: Devices still has all his factory settings.
                This are only configuration parameters, wake up interval can be changed.

Always awake mode

The always awake mode is used to request different values from the device e.g. version and manufacturer specific.

The always awake mode can be activated by:

CONFIGURATION_SET
Parameter: 0x05
Size: 0x01 (can't be different from 1)
Value: 0x03 (mode 3)

The always awake mode can be deactivated by:

CONFIGURATION_SET
Parameter: 0x05
Size: 0x01 (can't be different from 1)
Value: Any value except 3

A second option to deactivate mode 3 is
1. Remove batteries
2. Wait ca 10 seconds
3. Replace batteries

Note: in always awake mode the batteries will be drain very fast, we do not recommend to use this mode.

Frequently Asked Questions

Q: I can't have my *Door Sensor* included into my Z-Wave network, what am I doing wrong?
A: **1**. Is the controller ready to include any device into the Z-Wave network? If the controller is not in
Include or exclude mode, the *Door Sensor* will not be included or excluded.
2. The *Door Sensor* is already included in a Z-Wave network. Exclude the *Door Sensor* and
Try to include it again.

Q: Why doesn't the *Door Sensor* detect if the door is open or closed?
A: **1**. The *Door Sensor* isn't included in a Z-Wave network. Include it and try it again.
2. Make sure the tamper switch is mounted correctly.
3. The magnet contact is not mounted close enough or on the wrong side of the device.

Q: I have configured a value but when I request it, it is not changed?
A: It is mandatory that the correct size is used while configure a parameter; go to the documentation about
the configuration command class to check if the right size is used during configuration. If the wrong size is used
the frame is ignored totally.

Q: I have configured a new value and when I request it the correct value is returned but the behavior is still the
same?
A: Some configuration parameters have limits of what they can do, go to the documentation about
configuration to check if the value of the configured parameter is out off limit.

Q: When I mount the Door Sensor it performs its standard mounting routine but after 8 seconds the indicator
light doesn't go on for 1 second but blinks 6 times.
A: blinking 6 times can mean:
1.   Door Sensor is not included
2.   Door Sensor is not associated
3.   Door Sensor can't reached his destination
The Door Sensor will operate correctly and can be mounted again if all three options are corrected.

Q: How to connect an external sensor/contact?
A: Make sure you have a dry/no voltage sensor like a pushbutton or a switch or any kind of opencollector
circuitry is good. Connect the GND to pin1 and connect the signal to PIN2, see below the internal circuitry of
the doorsensor.