

This sensor has motion detector, ambient temperature and ambient humidity sensor in one which based on Z-Wave™ Plus technology.

This product can be included and operated in any Z-Wave™ network with other Z-Wave™ certified devices from other manufacturers and/or other applications. All non-battery operated nodes within the network will act as repeaters regardless of vendor to increase reliability of the network.

Z-Wave™ Network Inclusion/Exclusion/Reset

Remove out the front cover, there is one button on the PCB board, it can be executed inclusion, exclusion and reset from Z-Wave™ network.

Add ¹	1、 Power up the device. 2、 Set Z-Wave™ Controller into inclusion mode 3、 Press the button 3 times within 1.5s to enter inclusion mode. 4、 The device will be recognized and automatically included into Z-Wave™ Network.	Led lights will be blinked with 1s interval until inclusion successful.
Remove	1、 Power up the device. 2、 Set Z-Wave™ Controller into exclusion mode 3、 Press the button 3 times within 1.5s to enter exclusion mode	Led lights will be blinked 3 times with 0.5s interval.
Factory Reset ²	1、 Power up the device. 2、 Press and hold the button for 10s until led lights is on, then release the button.	Reset successfully, led light will be Blinked 5 times.
Wakeup up Notify	1、 Press the button briefly.	Led will blink once.
Product Test Mode	1、 Press and hold the button. 2、 Power on the device, device will enter factory product test mode	Led will blink with 100ms interval.

Notice 1: When device enters into inclusion mode, the device all functionality will be useless. The inclusion mode will be timeout after 30s, user can press the button 3 times within 1.5s to terminate inclusion mode.

Notice 2: Factory Reset will clear the device all Z-Wave™ Network data (include home id, node id, etc...) saved in memory, and restore all configuration parameters to factory default. Please use this procedure only when the network primary controller is missing or otherwise inoperable.

Association

The device supports 4 association groups, and each group supports max 5 associated nodes.

Group 1 is lifeline group; all nodes which associated in this group will receive the messages sent by device through lifeline.

Group 2 is controlling group, all nodes associated in this group will be controlled through BASIC_SET command by the device when device detects a movement event or a tampering event.

Group 3 is controlling group, all nodes associated in this group will be controlled through BASIC_SET command by the device when device detects an ambient temperature alarm (Decided by configuration parameter 16, 17).

Group 4 is controlling group, all nodes associated in this group will be controlled through BASIC_SET command by the device when device detects an ambient humidity alarm (Decided by configuration parameter 14, 15).

The Command Class supported by each association group is shown in the table below:

Group	Command Class	Command
1 (Lifeline)	COMMAND_CLASS_NOTIFICATION	NOTIFICATION_REPORT
	COMMAND_CLASS_SENSOR_BINARY	SENSOR_BINARY_REPORT
	COMMAND_CLASS_SENSOR_MULTILEVEL	SENSOR_MULTILEVEL_REPORT
	COMMAND_CLASS_BATTERY	BATTERY_REPORT
	COMMAND_CLASS_DEVICE_RESET_LOCALLY	DEVICE_RESET_LOCALLY_NOTIFICATION
2 (Control) ¹	COMMAND_CLASS_BASIC (Home Security)	BASIC_SET
3 (Control)	COMMAND_CLASS_BASIC (Temperature)	BASIC_SET
4 (Control)	COMMAND_CLASS_BASIC (Humidity)	BASIC_SET

Note 1 It is valid that the motion event controls the associated device only after tampering event cleared.

Z-Wave™ Message Report

Once the device detects a movement, it will report the event to the controller and current ambient humidity value or Temperature value will be followed if current measurement value is satisfy to configuration No.12 or 13.

In default, device will use COMMAND_CLASS_NOTIFICATION to represent the motion event. User can also enable COMMAND_CLASS_SENSOR_BINARY report by setting the "Configuration No. 9" to '1'.

Motion Report

When device detects a motion event, it will automatically send the notification report to nodes associated in lifeline. The messages are listed in table below:

Command Class	COMMAND_CLASS_NOTIFICATION
Command	NOTIFICATION_REPORT
Type	HOME_SECURITY (0x07)
Event	HOME_SECURITY_MOTION_DETECTION_UNKNOWN_LOCATION (0x08) / HOME_SECURITY_NO_EVENT (0x00)
Command Class	COMMAND_CLASS_SENSOR_BINARY
Command	SENSOR_BINARY_REPORT
Type	MOTION (0x0C)
Event	Detected (0xFF) / No-detected (0x00)

Tampering Report

When device detects a tampering event, it will automatically send the notification report to nodes associated in lifeline. The messages are listed in table below:

Command Class	COMMAND_CLASS_NOTIFICATION
Command	NOTIFICATION_REPORT
Type	HOME_SECURITY (0x07)
Event	NOTIFICATION_EVENT_HOME_SECURITY_TAMPERING_COVERING_REMOVED (0x03) / HOME_SECURITY_NO_EVENT (0x00)
Command Class	COMMAND_CLASS_SENSOR_BINARY
Command	SENSOR_BINARY_REPORT
Type	TAMPER (0x08)
Event	Detected (0xFF) / No-detected (0x00)

Multilevel Sensor Report

This device embeds in a digital temperature sensor and a digital humidity sensor. The device measures the ambient temperature and humidity with a certain time interval that decides by configuration No. 11.

Temperature Sensor

When the ambient Temperature differential over 0.5°C (in default, and decides by configuration No. 12), the device will unsolicited to send a "SENSOR_MULTILEVEL_REPORT" to nodes which associated in lifeline.

Command Class	COMMAND_CLASS_SENSOR_MULTILEVEL
Command	SENSOR_MULTILEVEL_REPORT
Type	Air Temperature
Scale	Celsius

Humidity Sensor

When the relative humidity differential over 5%RH (in default, and decides by configuration No. 13), the device will unsolicited to send a "SENSOR_MULTILEVEL_REPORT" to nodes which associated in lifeline.

Command Class	COMMAND_CLASS_SENSOR_MULTILEVEL
Command	SENSOR_MULTILEVEL_REPORT
Type	Humidity
Scale	RH(%)

Command Class Configuration

The device supports the controller to configure parameters of the device through Configuration Command Class, and the device has 17 parameters available for users to set according to their different needs:

1) Motion Sensitivity

This parameter is configured the sensitivity that motion detect. This value is larger, the sensitivity is lower, and the distance for motion detecting is closer.

Parameter Number	Size (Byte)	Available Settings	Default value
1	1	1 ~ 100	1

2) Motion Window Time

This parameter is configured the specified time window (4s..16s) in which the amount of pulses will trigger a motion event.

Window Time = [Value] * 4s + 4s.

Parameter Number	Size (Byte)	Available Settings	Default value
2	1	0 ~ 3	2

3) Pulse Count

This parameter is configured amount of pulses during the specified time window which trigger a motion event.

Amount of pluses = [Value] + 1.

Parameter Number	Size (Byte)	Available Settings	Default value
3	1	0 ~ 3	1

4) Motion Blind Time

This parameter is configured the no motion detected time after a motion event detects. The device will wait for setting times to ready to next detect.

Blink Time = ([Value] + 1) * 0.5s.

Parameter Number	Size (Byte)	Available Settings	Default value
4	1	0 ~ 15	15

5) Motion Enable

This parameter is configured the motion detected if enable or not. If '1', Motion detected function is enable. Otherwise is disabled.

Parameter Number	Size (Byte)	Available Settings	Default value
5	1	0 , 1	1

6) Motion Clear Time

This parameter is configured the time to clear motion event after a motion event detected. Time to motion clear, the device will send a clear event report to controller. Unit: Second.

Parameter Number	Size (Byte)	Available Settings	Default value
6	2	10 ~ 3600	30

7) Motion Event Re-trigger Enable

'1' – Enabled. The time interval for motion event detecting is defined by configuration No. 4.

'0' – Disabled. The motion event will be sent to controller only when the last motion event is cleared.

Parameter Number	Size (Byte)	Available Settings	Default value
7	1	0, 1	0

8) Led Indicate Enable

This parameter is configured the Led light on disable or enable.

'1' – Enable Led blink when device detects a motion event.

'0' – Disable led blink. This configuration is not affecting inclusion, exclusion and reset.

Parameter Number	Size (Byte)	Available Settings	Default value
8	1	0, 1	1

9) Binary Sensor Report Enable

'1' – Enable sensor binary report when device detects a motion event.

'0' – Disable sensor binary report when device detects a motion event.

Parameter Number	Size (Byte)	Available Settings	Default value
9	1	0, 1	0

10) Basic Set Level

This parameter is configured the value that BASIC_SET for nodes that associated in Group 2, 3, 4.

'100' – BASIC_SET = 0xFF (ON).

'0' – BASIC_SET = 0x00 (OFF).

Parameter Number	Size (Byte)	Available Settings	Default value
10	1	0 - 100	100

11) Sensor Measuring Interval

This parameter is configured the time interval for temperature and humidity sensor measure the ambient temperature and humidity value. This value is larger, the battery life is longer. And the value changed is not obvious.

Parameter Number	Size (Byte)	Available Settings	Default value
11	2	30 - 3600	180

12) Temperature Differential Report

This parameter is configured the value that differential between current measured and previous report value. If the differential value larger than the settings, device will report this measured temperature value to nodes associated in lifeline.

$$\text{Differential Value} = [\text{Value}] \times 0.1^{\circ}\text{C}$$

Parameter Number	Size (Byte)	Available Settings	Default value
12	1	1~127	10

13) Humidity Differential Report

This parameter is configured the value that differential between current measured and previous report value. If the differential value larger than the settings, device will report this measured relative humidity value to nodes associated in lifeline.

$$\text{Differential Value} = [\text{Value}] \times 0.1\% \text{ RH}$$

Parameter Number	Size (Byte)	Available Settings	Default value
13	1	1~127	50

14) Low Level Humidity Threshold

This parameter is configured the threshold value that low level for humidity.

When the current ambient humidity value is lower than this configuration value, this will trigger a BASIC_SET = [Value] (The value is decided by **Configuration Parameter 10**) to control the devices in group 4. Otherwise, The BASIC_SET = 0x00 will be sent to devices in group 4 if these devices have been set to 'ON'.

$$\text{Low Level Value} = [\text{Value}] \times 0.1\% \text{ RH}$$

Parameter Number	Size (Byte)	Available Settings	Default value
14	2	100~999	300

15) High Level Humidity Threshold

This parameter is configured the threshold value that high level for humidity.

When the current ambient humidity value is larger than this configuration value, this will trigger a BASIC_SET = [Value] (The value is decided by **Configuration Parameter 10**) to control the devices in group 4. Otherwise, The BASIC_SET = 0x00 will be sent to devices in group 4 if these devices have been set to 'ON'.

$$\text{High Level Value} = [\text{Value}] \times 0.1\% \text{ RH}$$

Parameter Number	Size (Byte)	Available Settings	Default value
15	2	100~999	900

16) Low Level Temperature Threshold

This parameter is configured the threshold value that low level for temperature.

When the current ambient temperature value is lower than this configuration value, this will trigger a BASIC_SET = [Value] (The value is decided by **Configuration Parameter 10**) to control the devices in group 3. Otherwise, The BASIC_SET = 0x00 will be sent to devices in group 3 if these devices have been set to 'ON'.

$$\text{Low Level Value} = [\text{Value}] \times 0.1^{\circ}\text{C}$$

Parameter Number	Size (Byte)	Available Settings	Default value
16	2	0~500	150

17) High Level Temperature Threshold

This parameter is configured the threshold value that high level for temperature.

When the current ambient temperature value is larger than this configuration value, this will trigger a BASIC_SET = [Value] (The value is decided by **Configuration Parameter 10**) to control the devices in group 3. Otherwise, The BASIC_SET = 0x00 will be sent to devices in group 3 if these devices have been set to 'ON'.

High Level Value = [Value] $\times$ 0.1°C

Parameter Number	Size (Byte)	Available Settings	Default value
17	2	0~500	300

Wakeup Command Class

The device stays in sleep status for the majority of time in order to conserve battery life.

The minimum wakeup interval is 1800s (30 minutes)

The maximum wakeup interval is 86400s (24 Hours)

Allowable min step among each wakeup interval is 60 seconds, such as 1860s, 1920s, 1980s...

Note: The default value is 8 hours with factory default. This value is greater, the battery life is longer.

Basic Command Class

This device support COMMAND_CLASS_BASIC to control other devices associated in group 2, 3 and 4. The devices associated in group 2, 3 and 4 must be the AOS device or FLiRS Device. The value for BASIC_SET is also can be configured by configuration No. 10.

Battery Command Class

The users can also enquire the battery status of the device by sending BATTERY_GET command. Once the device receivers the command, it will return BATTERY_REPORT command. The device will send BATTERY_LEVEL = 0xFF command to the Z-Wave™ Controller to inform that the device is in dead battery status, otherwise BATTERY_LEVEL value range is 0% to 100%.

Led Action Indicator

LED Color	Led Display Status	Description
Red	Blink 5 Times(1s Interval)	Power on and Not Add in Z-Wave Network
	Blink 5 Times(300ms Interval)	Power on and Already Add in a Z-Wave Network
	Blink 3 Times(500ms Interval)	1, Press button tripled, device sends Node Info. 2, Press button tripled, device enters into exclusion mode.
	1, Blink with 1s interval and then 2, blink 15 times with 2s interval	Press button tripled, device enters into inclusion mode. Device assigned a node id and wait for configuration completed.
	Light On 150ms	Press the button briefly, device send a wakeup information to controller
		Detect a movement.
	Light On 500ms	Hold pressed the button and factory reset.

Security Network

The device supports the security function with S0 and S2 encrypted communication. The device will auto switch to the security mode when the device included with a security controller. In the security mode, the follow commands must use security and security_2 command class wrapped to communicate, otherwise the device will not response any commands.

Security Keys

This device supports security levels are listed in below table:

Security Levels	Support (Yes/No)
SECURITY_KEY_S0	Yes
SECURITY_KEY_S2_UNAUTHENTICATED	Yes
SECURITY_KEY_S2_AUTHENTICATED	No
SECURITY_KEY_S2_ACCESS	No

All Security Command Class in Security Network

The Z-Wave Command Classes are secured in security network as follows:

- * COMMAND_CLASS_VERSION (V2)
- * COMMAND_CLASS_POWERLEVEL (V1)
- * COMMAND_CLASS_ASSOCIATION (V2)
- * COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION (V3)
- * COMMAND_CLASS_ASSOCIATION_GRP_INFO (V1)
- * COMMAND_CLASS_MANUFACTURER_SPECIFIC (V2)
- * COMMAND_CLASS_DEVICE_RESET_LOCALLY (V1)
- * COMMAND_CLASS_BATTERY (V1)
- * COMMAND_CLASS_WAKEUP (V2)
- * COMMAND_CLASS_NOTIFICATION (V8)
- * COMMAND_CLASS_SENSOR_BINARY (V2)
- * COMMAND_CLASS_SENSOR_MULTILEVEL (V7)
- * COMMAND_CLASS_CONFIGURATION (V1)

All Supports Command Class

This device supports Z-Wave Command Class as follows:

- * COMMAND_CLASS_ZWAVEPLUS_INFO (V2)
- * COMMAND_CLASS_SECURITY (V1)
- * COMMAND_CLASS_SECURITY_2 (V1)
- * COMMAND_CLASS_TRANSPORT_SERVICE (V2)
- * COMMAND_CLASS_VERSION (V2)
- * COMMAND_CLASS_POWERLEVEL (V1)
- * COMMAND_CLASS_ASSOCIATION (V2)
- * COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION (V3)
- * COMMAND_CLASS_ASSOCIATION_GRP_INFO (V1)
- * COMMAND_CLASS_MANUFACTURER_SPECIFIC (V2)
- * COMMAND_CLASS_DEVICE_RESET_LOCALLY (V1)
- * COMMAND_CLASS_BATTERY (V1)
- * COMMAND_CLASS_WAKEUP (V2)
- * COMMAND_CLASS_NOTIFICATION (V8)
- * COMMAND_CLASS_SENSOR_BINARY (V2)
- * COMMAND_CLASS_SENSOR_MULTILEVEL (V7)
- * COMMAND_CLASS_CONFIGURATION (V1)
- * COMMAND_CLASS_SUPERVISION (V1)

Non-Secure Command Class in Secure Network

Unsecure Command Class which included in a secure Z-Wave Network is listed in unsecure node information.

- * COMMAND_CLASS_ZWAVEPLUS_INFO (V2)
- * COMMAND_CLASS_SECURITY (V1)
- * COMMAND_CLASS_SECURITY_2 (V1)

- * COMMAND_CLASS_TRANSPORT_SERVICE (V2)
- * COMMAND_CLASS_SUPERVISION (V1)

Specifications

Power Supply	CR123A × 1
Standby Current	25uA
Work Current(RF Tx)	Up to 36mA
Operational Temperature	0 - 70℃
Communication frequency	868.40MHz, 869.85MHz (EU) 908.40MHz, 916.00MHz(US)
Range	Up to 45m indoors (depending on the building structure), and 80m for outdoor open fields. Up to 60m outdoors.