Motion 4In1 User Manual

(Motion, Light, Temperature and Humidity)

(Z-Wave 700s)

Version	Written By	Date	Change List
1.0	Yongqi	20210509	Initial

NOTE: 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 or more 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

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the 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.

This sensor has motion detector, light intensity sensor and ambient temperature/humidity sensors 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

There is one button in the back side of the sensor, 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 and hold the button for 5s until white led lights is on, then release the button before led turn off.	Blue led will blink with 1s interval until inclusion successful.
Remove	1、 Power up the device. 2、 Set Z-Wave™ Controller into exclusion mode 3、 Press and hold the button for 5s until white led lights is on, then release the button before led turn off.	Blue led will blink with 0.5s interval until exclusion successful.
Factory Reset[2]	1、 Power up the device. 2、 Press and hold the button for 10s until pink led lights is on, then release the button before led turn off.	
Product Test Mode	1、 Press and hold the button. 2、 Power on the device, device will enter into factory product test mode with white light blink one time.	
Send NIF[3]	Press and hold the button for 5s until white led lights is on, then release the button before led turn off.	

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 implement step 3 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 2 association groups(Only 1 association group in long range device), 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.
The Command Class supported by each association group is shown in the table below:

Group	Command Class	Event
1 (Lifeline)	COMMAND_CLASS_NOTIFICATION COMMAND_CLASS_SENSOR_BINARY COMMAND_CLASS_SENSOR_MULTILEVEL COMMAND_CLASS_BATTERY[1] COMMAND_CLASS_DEVICE_RESET_LOCALLY	NOTIFICATION_REPORT SENSOR_BINARY_REPORT SENSOR_MULTILEVEL_REPORT BATTERY_REPORT[1] DEVICE_RESET_LOCALLY_NOTIFICATION
2 (Control)	COMMAND_CLASS_BASIC	BASIC_SET

Notice 1: Group 2 does not exist for long range device.

Z-Wave™ Message Report

Once the device detects a movement, it will report the event to the controller and current light intensity value will be followed.
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. 5**" to '1'.

Notification Report

Motion Detector

When device detects a motion event, it will automatically send the notification report to nodes associated in lifeline.

Command Class		COMMAND_CLASS_NOTIFICATION
Command		NOTIFICATION_REPORT
Type		HOME_SECURITY (0x07)
Event	**Motion Detected**	HOME_SECURITY_MOTION_DETECTION_UNKNOWN_LOCATION (0x08)
	Motion Cleared	HOME_SECURITY_NO_EVENT (0x00)

Multilevel Sensor Report

This device embeds in a digital light sensor and a digital temperature sensor. The device measures the ambient light intensity and temperature with a certain time interval that decides by **Configuration No. 15.**

Light Sensor

When the ambient light intensity differential over 50lux (in default, and decides by **Configuration No. 14**), 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	Luminance
Scale	Lux

Temperature Sensor

When the ambient temperature differential over 1℃ (in default, and decides by **Configuration No. 8**), 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	Fahrenheit(US) / Celsius(Other Region)

Humidity Sensor

When the ambient humidity differential over 2RH% (in default, and decides by **Configuration No. 9**, 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 16 parameters available for users to set according to their different needs:

1) **Led Indicator 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 affect inclusion, exclusion and reset.

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

2) Motion Enable

This parameter is configured the motion detected if enable or not.
'0' – Motion detected disable.
'1' – Motion detected enable.

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

3) Motion Alarm Once Enable

This Parameter is configured the motion detected event report one time before motion event cleared.
'0' – Motion event alarm will be reported when motion event is detected every time.
'1' – Motion event alarm report only once before motion event cleared.

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

4) Luminance Associated Enable

'1' – Enable current light intensity to associate the motion event, if there has a motion event detected and the current light intensity is less than the settings in **Configuration No.14**, the device will send a BASIC_SET to nodes associated in **Group 2**. And if the current light intensity is larger than the settings in **Configuration No. 14**, the device will not send BASIC_SET to nodes associated in **Group 2**.
'0' – Light intensity is not associated with motion event.
This configuration is invalid for long range device.

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

5) 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
5	1	0, 1	0

6) Temperature Offset Value

The current measuring temperature value can be add and minus a value by this setting.
Temperature Offset Value = [Value] × 0.1 Degree Celsius / Fahrenheit (US).

Parameter Number	Size (Byte)	Available Settings	Default value
6	1	-120 ~ 120	0

7) Humidity Offset Value

The current measuring humidity value can be add and minus a value by this setting.
Humidity Offset Value = [Value] × 0.1 RH%.

Parameter Number	Size (Byte)	Available Settings	Default value
7	1	-120 ~ 120	0

8) Temperature D-Value Setting

This configuration sets the changed value of the temperature. When the difference from the last report exceeds this setting value, the device will report current temperature value to Z-Wave Hubs.
The D-Value = [Value] × 0.1 Degree Celsius / Fahrenheit (US).

Parameter Number	Size (Byte)	Available Settings	Default value
8	1	0 ~ 100	10

9) Humidity D-Value Setting

This configuration sets the changed value of the humidity. When the difference from the last report exceeds this setting value, the device will report current humidity value to Z-Wave Hubs.
The D-Value = [Value] × 0.1 RH%.

Parameter Number	Size (Byte)	Available Settings	Default value
9	1	0 ~ 100	20

10) Luminance D-Value Setting

This configuration sets the changed value of the humidity. When the difference from the last report exceeds this setting value, the device will report current humidity value to Z-Wave Hubs. Unit: Lux.

Parameter Number	Size (Byte)	Available Settings	Default value
10	1	0 ~ 120	50

11) Basic Set Level

This parameter is configured the value that BASIC_SET for nodes that associated in Group 2.
'100' – BASIC_SET = 0xFF (ON).
'0' – BASIC_SET = 0x00 (OFF).
This configuration is invalid for long range device.

Parameter Number	Size (Byte)	Available Settings	Default value
11	1	0 - 100	100

12) Basic Set Off Delay Time

This Parameter is configured the time delay for device sending BASIC_SET = 0x00 to nodes that associated in **Group 2** when device detects a motion event.
[0] – Not Send BASIC_SET = 0x00 Command.
[1 … 30000] – Time delay count. Unit: Second.
This configuration is invalid for long range device.

Parameter Number	Size (Byte)	Available Settings	Default value
12	2	0 ~ 30000	30

13) 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
13	2	1 ~ 30000	30

14) Luminance Threshold for Associated

This parameter is configured the light intensity threshold. When Ambient light intensity is less than this setting, device will consider the current environment is insufficient light. If "**Configuration No. 4**" is set '1' and a motion event is detected, the device will send a BASIC_SET to the nodes which associated in **Group 2**. Unit: 1Lux.

This configuration is invalid for long range device.

Parameter Number	Size (Byte)	Available Settings	Default value
14	2	0~ 1000	50

15) Sensor Measuring Interval

This parameter is configured the time interval for light sensor, temperature and humidity sensor measuring. This value is larger, the battery life is longer. And the sensors values changed are not obvious. 0 – All sensors are disabled. Unit: Second

Parameter Number	Size (Byte)	Available Settings	Default value
15	2	0 - 30000	180 (Included with LPM Mode)

16) Light Intensity Offset Calibration

This parameter defines the calibrated scale for ambient light intensity. Because the method and position that the sensor mounted and the cover of sensor will bring measurement error, user can get more real light intensity by this parameter setting. User should run the steps as blows for calibrating

1) Set this parameter value to default (Assumes the sensor has been added in a Z-Wave Network).
2) Place a digital luxmeter close to sensor and keep the same direction, monitor the light intensity value (Vm) which report to controller and record it. The same time user should record the value (Vs) of luxmeter.
3) The scale calibration formula: k = Vm / Vs.
4) The value of k is then multiplied by 1000 and rounded to the nearest whole number.
5) Set the value getting in 5) to this parameter, calibrate finished.

   For example, Vm = 300, Vs = 2000, then

   k = 300 / 2600 = 0.11538

   k = 0.11538 * 1000 = 115.38 ≈ 115

The parameter should be set to 115.

Parameter Number	Size (Byte)	Available Settings	Default value
99	2	1 - 32767	5320

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 20s
The maximum wakeup interval is 86400s (24 Hours)
Allowable min step among each wakeup interval is 10 seconds, such as 1860s, 1870s,1880s…
Note: The default value is 8 hours with factory default. This value is greater, the battery life is longer.

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%.

Command Class Basic

The COMMAND_CLASS_BASIC is realized to control the devices associated in **Group 2** in this motion detector.
When device detects a motion event occurred, it will send a "BASIC_SET = [Value]" command to control the devices in **Group 2**.
And it will send a "BASIC_SET = 0x00" command to control the devices in **Group 2** after the motion event is cleared.
The [Value] is set by **configuration No.11**.

SmartStart

SmartStart enabled products can be added into a Z-Wave network by scanning the Z-Wave QR Code present on the product with a controller providing SmartStart inclusion. No further action is required and the SmartStart product will be added automatically within 10 minutes of being switched on in the network vicinity.

This device supports SmartStart function. QR code printed by laser can be found on surface of product and the outside of packing box. And the full DSK code is printed can be found on the packing box.

The device will enter SmartStart if the device is not included in network after power up. And if device is not included successfully during 10 second, it will enter sleep mode. And then
2nd SmartStart time delay approximately 16s
3rd SmartStart time delay approximately 32s
4th SmartStart time delay approximately 64s
5th SmartStart time delay approximately 128s

6th SmartStart time delay approximately 256s
7th SmartStart time delay approximately 512s
Afterwards, the Smartstart mode will be auto running with 512 second interval until device is included successfully or battery run down.

Led Action Indicator

Led Color	Action	Description
Red	Light On 1s When Power On	Not Add in Z-Wave Network
Pink	Light On 2s	Press And Hold Button 10s, Off at 12th Second
	Blink One Time	Motion is Detected
Green	Light On 1s When Power On	Add in Z-Wave in Network Already
White	Light On 2s	Press And Hold Button 5s, Off at 7th Second
Blue	Blink with 1s Interval	Add to Z-Wave Network
	Blink with 500ms Interval	Remove from Z-Wave Network
Yellow	Blink with 500ms Interval	OTA is Running
	Light On Always	Button Pressed and Held Time Large Than 12s.

Security Network

The device supports the security function with 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 (No for Long Range Device)
SECURITY_KEY_S2_UNAUTHENTICATED	Yes (No for Long Range Device)
SECURITY_KEY_S2_AUTHENTICATED	Yes
SECURITY_KEY_S2_ACCESS	No

All Supports Command Class

Command Class	Version	Not Included	Non-secure Included	S0 Included		S2 Included	
				Non-Secure	Secure	Non-Secure	Secure
COMMAND_CLASS_ZWAVEPLUS_INFO	2	●	●	●		●	
COMMAND_CLASS_SECURITY	1	●	●	●		●	
COMMAND_CLASS_SECURITY_2	1	●	●	●		●	
COMMAND_CLASS_TRANSPORT_SERVICE	2	●	●	●		●	
COMMAND_CLASS_VERSION	3	●	●		●		●
COMMAND_CLASS_POWERLEVEL	1	●	●		●		●
COMMAND_CLASS_ASSOCIATION	2	●	●		●		●
COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION	3	●	●		●		●
COMMAND_CLASS_ASSOCIATION_GRP_INFO	1	●	●		●		●
COMMAND_CLASS_MANUFACTURER_SPECIFIC	2	●	●	●			●
COMMAND_CLASS_DEVICE_RESET_LOCALLY	1	●	●		●		●
COMMAND_CLASS_BATTERY	1	●	●		●		●
COMMAND_CLASS_WAKEUP	2	●	●		●		●
COMMAND_CLASS_NOTIFICATION	8	●	●		●		●
COMMAND_CLASS_SENSOR_MULTILEVEL	11	●	●		●		●
COMMAND_CLASS_SENSOR_BINARY	2	●	●		●		●
COMMAND_CLASS_INDICATOR	3	●	●		●		●
COMMAND_CLASS_CONFIGURATION	4	●	●		●		●
COMMAND_CLASS_SUPERVISION	1	●	●	●		●	
COMMAND_CLASS_FIRMWARE_UPDATE_MD	5	●	●		●		●

Notice 1: When device is included with S0 level, COMMAND_CLASS_MANUFACTURER_SPECIFIC is supported non-securely. And when device is included with S2 level, COMMAND_CLASS_MANUFACTURER_SPECIFIC is supported securely only.

Notice 2: "●" – Indicates the corresponding command class is supported in NIF, Blank means the command class is not supported

Specifications

Power Supply	CR123A × 1
Standby Current	28uA
Work Current(RF Tx)	Up to 15mA
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.