

Multi Sensor Engineering Specifications



V1.4

The Multi Sensor 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.

The Multi Sensor is a security Z-Wave device (S2), so a security enabled controller is needed for take full advantage of all functionality for the Multi Sensor.

Features:

- The Multi Sensor is powered by two CR123A batteries with 2 year’s battery life.
- The Multi Sensor Support low battery alarm function.
- The Multi Sensor Support Smart Start.
- New 800 chip for batter performance than ever.
- Support new features for Z-Wave Long Range, including 4x wireless range, 10x node scalability for larger network.
- Supporting firmware OTA.

1 Technical Specifications

Communication Protocol	Z-Wave
Z-Wave Radio Frequency	908.42MHz(US) 868.42MHz(EU) 912.42MHz(AU)
Z-Wave LR Radio Frequency	912.00 MHz(default channel) 920.00 MHz(back up channel)
Wireless Range	More than 100m outdoors About 40m indoors (depending on building materials)
Power Source	3V, CR123*2 or 5VDC
Working current	~10mA
Standby current	~30μA
Temperature Sensor	-10°C to 50°C / 14°F to 122°F with accuracy of ±2°C
Humidity Sensor	20%RH—80%RH,accuracy:±8% RH (at 25°C)
Light Sensor	0 LUX to 30000 LUX with ±20% accuracy
Battery Life	2 years
Operating Temperature	-10°C - 40°C / 32 - 104°F
Operating Humidity	8%- 80% non-condensing

2 Security and non-Security features of Multi Sensor

This device is a security enabled Z-Wave Plus™ product that is able to use encrypted Z-Wave Plus messages to communicate to other security enabled Z-Wave Plus products.

When a node includes into a S2 Z-Wave network, the node supports S2 unauthenticated class, S2 authenticated and so do the supported CCs.

This product can be operated in any Z-Wave network with other Z-Wave certified devices from other manufacturers. All mains operated nodes within the network will act as repeaters regardless of vendor to increase reliability of the network.

2.1 Supported Security Levels

- SECURITY_KEY_S2_AUTHENTICATED_BIT
- SECURITY_KEY_S2_UNAUTHENTICATED_BIT
- SECURITY_KEY_S0_BIT

2.2 Library

- Basic Device Class: BASIC_TYPE_ROUTING_SLAVE
- Generic Device Class: GENERIC_TYPE_SENSOR_NOTIFICATION
- Specific Device Class: SPECIFIC_TYPE_NOTIFICATION_SENSOR

2.3 Commands List

Command Classes	Version	Required Security Class
COMMAND_CLASS_ZWAVEPLUS_INFO_V2	2	None
COMMAND_CLASS_TRANSPORT_SERVICE_V2	2	None
COMMAND_CLASS_SECURITY_0_V1	1	None
COMMAND_CLASS_SECURITY_2_V1	1	None
COMMAND_CLASS_SUPERVISION_V1	1	None
COMMAND_CLASS_APPLICATION_STATUS_V1	1	None
COMMAND_CLASS_BASIC	3	S2 Authenticated/Unauthenticated
COMMAND_CLASS_NOTIFICATION_V8	8	S2 Authenticated/Unauthenticated
COMMAND_CLASS_BATTERY_V1	1	S2 Authenticated/Unauthenticated
COMMAND_CLASS_WAKE_UP_V2	2	S2 Authenticated/Unauthenticated
COMMAND_CLASS_CONFIGURATION_V4	4	S2 Authenticated/Unauthenticated
COMMAND_CLASS_ASSOCIATION_V2	2	S2 Authenticated/Unauthenticated
COMMAND_CLASS_ASSOCIATION_GRP_INFO_V3	3	S2 Authenticated/Unauthenticated
COMMAND_CLASS_VERSION_V3	3	S2 Authenticated/Unauthenticated

COMMAND_CLASS_MANUFACTURER_SPECIFIC_V2	2	S2 Authenticated/Unauthenticated
COMMAND_CLASS_DEVICE_RESET_LOCALLY_V1	1	S2 Authenticated/Unauthenticated
COMMAND_CLASS_POWERLEVEL_V1	1	S2 Authenticated/Unauthenticated
COMMAND_CLASS_FIRMWARE_UPDATE_MD_V5	5	S2 Authenticated/Unauthenticated
COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION_V3	3	S2 Authenticated/Unauthenticated
COMMAND_CLASS_INDICATOR_V3	3	S2 Authenticated/Unauthenticated
COMMAND_CLASS_MULTILEVEL_SENSOR_V11	11	S2 Authenticated/Unauthenticated

3 All functions of each trigger

3.1 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.

Add the Multi Sensor into the Z-Wave network via Smart Start (SmartStart Inclusion):

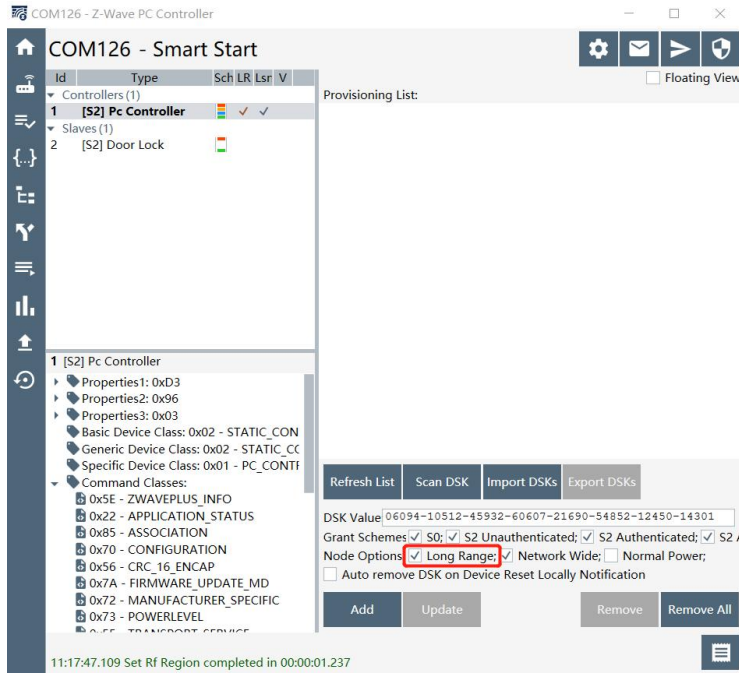
- a. Add Multi Sensor DSK into the primary controller Smart Start Provisioning List (If you don't know how to do this, refer to its manual, DSK usually print on the main body).
- b. Remove the battery from the Multi Sensor. A few seconds later, reinsert battery in the DUT.
- c. The Multi Sensor will send "Z-Wave protocol Command Class" frame to start Smart Start Inclusion.

LED will blink blue during the inclusion, and then solid blue for 3 seconds to indicate that the inclusion is successful, otherwise the LED will slow blink blue for 2 seconds in which you need to repeat the process from step b

Note:

Z-Wave Long Range device can only support be included via SmartStart.

Extract the DSK from end device and paste it into the DSK Value in PC Controller, make sure the 'Long Range' option is ticked.



In the scanning process when using US_LR frequency, the end device will switch between 2 PHY setups, the classic US PHY and the LR PHY with both LR channels active. When the inclusion of end device starts, it will settle on using the PHY that was used by the controller for inclusion. In other words, during learn mode, an end node that supports LR will send SmartStart Prime on both classic Z-Wave and Z-Wave LR PHY, both requests are sent up to the host on the controller and it is the host's responsibility to determine which PHY is used for inclusion.

The controller doesn't do channel scanning the same way as in end device. The controller will scan 4 channels, including 3 classic Z-Wave channels 9.6/40/100 kbps and 1 LR channel, using US_LR frequency will scan at 912 MHz while using US_LR_BACKUP will scan at 920 MHz during startup. The active LR channel can be switched at runtime.

3.2 Power on

In the network:

Send Battery report and Wake up notification, LED keeps Blue on 3 seconds.

Not in the network:

LED will slow blink Blue for 2 seconds and start Smart Start.

3.3 Short press Config Button one time

In the network:

Send Wake up notification, and LED will fast blink blue during sending data.

3.4 Short press Config Button three times

Add the Multi Sensor into the Z-Wave network (Manual Inclusion):

- a. Power on your Multi Sensor, set your Z-Wave controller into add/inclusion mode.
- b. Short press Config Button three times.
- c. LED will fast blink during the inclusion, and then solid for 3 seconds to indicate the inclusion is successful, otherwise the LED will slow blink for 2 seconds. If the device is not connected to the network after more than 60 seconds, it will exit the inclusion mode, the LED indicator light will go out, and the device will enter sleep. And you need to repeat the process from step a.

Remove Multi Sensor from a Z-Wave network (Manual Exclusion):

- a. Power on your Multi Sensor, and let the Z-Wave primary controller into remove/exclusion mode.
- b. Short press Config Button three times.
- c. LED will fast blink during the exclusion, and then solid for 3 seconds to indicate that the exclusion is successful, otherwise the LED slow blink for 2 seconds. If the device does not go out of the network after more than 60 seconds, it will exit the exclusion mode, the LED indicator light will go out, and the device will enter sleep. And you need to repeat the process from step a.

3.5 Press and hold Config Button 20 seconds

Reset Multi Sensor to factory default:

Press and hold for at least 20 seconds > LED start led blinking quickly, then after 20s confirmed reset. The Multi Sensor will reset itself to factory default by sending a “Device Reset Locally Notification” to gateway when the button is released.

Note: Please use this procedure only when the network primary controller is missing or otherwise inoperable.

Long press	In the network	1~3S, solid on 3~10S, flashing quickly	long press the button till the LED flashing quickly , it will send “wake up notification” And then LED indicator will be off after receive” wake up no more information”
	In the network / Outside the network	>=20s,solid on	Restore to factory Settings, sending “Device Reset locally” to notify the controller.

Receive command	In the network	Flash 1 time	--
sleep	In the network	Be off	--

3.6 Battery

When the battery state changed, a battery report command will be sent to the controller.

3.7 Definition of button and indicator light

Definition of actions	Action time interval (seconds)
Short press	< 1s
Long press	>=1s

Flashing way	definition
Slow flash	Blink every 2S.
Quick flash	Blink every 0.5 seconds.

4 Special Rule of Each Command

4.1 Basic Command Class

Basic CC is not maps to any CC

4.2 Z-Wave Plus Info Report Command Class

Z-Wave Plus Version: 0x02

Role Type: 0x06 (ZWAVEPLUS_INFO_REPORT_ROLE_TYPE_SLAVE_SLEEPING_REPORTING)

Node Type: 0x00 (ZWAVEPLUS_INFO_REPORT_NODE_TYPE_ZWAVEPLUS_NODE)

Installer Icon Type: 0x0C07
(ICON_TYPE_SPECIFIC_SENSOR_NOTIFICATION_HOME_SECURITY)

User Icon Type: 0x0C07
(ICON_TYPE_SPECIFIC_SENSOR_NOTIFICATION_HOME_SECURITY)

4.3 Association Command Class

The Multi Sensor supports 2 association groups and max 5 nodes for each group.

Grouping Identifier	Max Nodes	Send Commands
Group 1(Lifeline)	0x05	<p>1. Notification Report. Sensor will send Notification Report when the supported event is triggered.</p> <p>2. Sensor Multilevel Report. See param 183, 184, 185, param 21, 22, 23 and param 173, 174, 175</p> <p>3. Battery Report. Power on or the battery level is low, see param 32, 172, 182</p>

		<p>4. Device Reset Locally Notification. Config Button is press and hold for 20 seconds</p> <p>5.Indicator Report. Receiving Indicator Set will trigger this CC.</p>
Group 2(Motion)	0x05	<p>1. Basic Set Basic Set Command will be sent to the associated device when motion trigger or untrigger.</p>

4.4 Notification Command Class

Notification Type	Notification Event/State	Description
Home Security (0x07)	(0x00) State idle	Notification value for the state variable going to idle.
	(0x08) Motion detection	When motion triggered.
	(0x09) Tampering, product moved	When vibrating.
Power Management (0x08)	(0x02) AC mains disconnected	When USB disconnected and insert battery again.
	(0x03) AC mains re-connected	When insert the USB cable. Note: When powered by USB, the device will work as a repeater.
	(0x0A) Replace battery soon	When battery level below the param ³² value
	(0x0B) Replace battery now	When battery level below 1%.

Par	Value (HEX)
Manufacturer ID 1	0x02
Manufacturer ID 2	0x7A
Product Type ID 1	0x02
Product Type ID 2	EU=0x00,US=0x01,AU=0x02
Product ID 1	0x00
Product ID 2	0x06

4.5 Wake Up Command Class

The device stays in sleep status for the majority of time in order to conserve battery life. The minimum wakeup interval is 3600 seconds(60 minutes) The maximum wakeup interval is 86400 seconds(24 hours) The default wakeup interval is 14400 seconds(4 hours) The value is greater, the battery life is longer. Allowable min step among each wakeup interval is 3600 seconds. The device will can't wakeup when wakeup interval less than 3600 seconds.

WAKEUP_PAR_DEFAULT_SLEEP_TIME	14400(4 hours)
WAKEUP_PAR_MAX_SLEEP_TIME	86400(24 hours)
WAKEUP_PAR_MIN_SLEEP_TIME	3600(1 hours)
WAKEUP_PAR_SLEEP_STEP	3600(1 hours)

4.6 Multilevel Sensor Command Class

The device has a temperature/humidity sensor and a ambient light sensor. The ambient temperature/humidity and light will be checked period.

Sensor Type	Scale
Air Temperature (0x01)	Celsius(EU) / Fahrenheit (US)
Humidity (0x05)	Percentage value
Illuminance (0x03)	Lux

4.7 Indicator Command Class

The Receptacle support the Indicator Command Class, version 3 and support the Indicator ID 0x50 (Identify) and Properties ID 0x03, 0x04 and 0x05

4.8 Configuration Set Command

#	Name	Size	Range	Description	Default
12	Motion sensitivity	1	0/1/2/3/4/5/6/7/8	Set the sensitivity of motion sensor. 0 - disable 1 - minimum sensitivity 8 - maximum sensitivity	6
13	Motion untrigger time	2	10~3600	Timeout configuration set in second for motion sensor to send no trigger status. 10 ~3600 - timeout set in seconds	30
14	Motion group control	1	0/1	Set control of other devices on group2 based on motion trigger 0 - disable 1 - enable	1

15	Motion group value setting	1	0~1	Set Basic Set value for Group2. 0 - then BASIC_SET(0xFF) will be sent when motion trigger, BASIC_SET(0x00) will be sent when motion untrigger. 1 - then BASIC_SET(0x00) will be sent when motion trigger, BASIC_SET(0xFF) will be sent when motion untrigger.	0
16	Motion-Report-control	1	0/1	When motion is triggered, send "Binary Sensor Report" or not (Sensor Type: Motion). 0 - don't send 1 - send Note: Z-wave 800 does not support 'Binary Sensor CC', so remove this parameter.	1
18	Temperature report scale	1	1/2	Set the scale for temperature when reports. 1 - Celsius 2 - Fahrenheit	1(EU/AU) 2(US)
19	LED activity	1	0/1	Allow user to enable/disable LED activity of specific reports sent by sensor. Button press indicator is not affected by this. 0 - disable 1 - enable	1
32	Low battery threshold	1	10~50	Configure low battery report threshold, sends low battery report via notification and battery report when battery level drops under setting. Unit % (Up to 1 report per day)	10
172	Battery power checking interval	2	0-744	Checking battery power time interval , value 0-744 hours. While set to 0 DISABLE battery power check. Send report ONLY if changed by threshold set in par 182 - comparing to recent report.	4

182	Battery threshold	1	0~50	Threshold value to enable battery power report when the battery's changed value exceeds the threshold set. 0 - disable. (reports send ONLY on time basis set in par 172) effective Battery range = 1% to 50%.	2
183	Temperature threshold	2	0~144	Temperature Threshold unit 0.1, Scale is determined by Param18. 0 – disable . (no send reports based on threshold, only on time set with par 173) Effective value:1~144	10
184	Humidity threshold	1	0~80	0 – disable . (no send reports) . (no send reports based on threshold, only on time set with par 174) effective Humidity range = 1% to 80%.	5
185	Lux threshold	2	0~30000	0 – disable . . (no send reports based on threshold, only on time set with par 175) effective Lux range = 0 to 30000lux.	10

The following parameters are new to the 800 series

#	Name	Size	Range	Description	Default
20	Vibration sensor enable/disable	1	0~1	Used to enable/disable vibration sensor. 0 - disable vibration 1- enable vibration When the vibration is untriggered, after 5 seconds, a cleaning event report will be sent.	1

30	Threshold check- enable/disable	1	0/1	Enable/disable all threshold reports, including Temperature, Humidity, Lux, check time can be adjusted by Param- 31 0 – disable all threshold reports – 1 – enable all threshold reports no need this par while par 182-185 has 0 value.	0
21	LUX sensor checking interval	2	0-43200	Checking light sensor time interval , value 0-43200 seconds. While set to 0 sensor DISABLE (also not visible in hub then after reconfiguring) Send report ONLY if changed by threshold set in par 185 – comparing to recent report	10
22	TEMP sensor checking interval	2	0-43200	Checking TEMP sensor time interval , value 0-43200 seconds. While set to 0 sensor DISABLE (also not visible in hub then after reconfiguring) Send report ONLY if changed by threshold set in par 183 – comparing to recent report	60
23	HUMIDITY sensor checking interval	2	0-43200	Checking HUMIDITY sensor time interval , value 0-43200 seconds. While set to 0 sensor DISABLE (also not visible in hub then after reconfiguring) Send report ONLY if changed by threshold set in par 184 – comparing to recent report	60
173	Automatic report interval time for TEMP sensor	2	0-43200	0 –NO reporting, all reports based on threshold 1-43200 time in seconds to send report to the hub regardless of threshold	0

174	Automatic report interval time for HUMIDITY sensor	2	0-43200	0 –NO reporting, all reports based on threshold 1-43200 time in seconds to send report to the hub regardless of threshold	0
175	Automatic report interval time for light sensor	2	0-43200	0 –NO reporting, all reports based on threshold 1-43200 time in seconds to send report to the hub regardless of threshold	0
201	Temperature offset parameter	1	0~200	Default value: 100, range : 0-200 0~99: decimal deprecation of reporting, 100: disable 101~200 : increasing. ex. 56 means Deduct 4.4 degree from measured value,121 means add 2.1 degree This parameter is automatically restored to the default value only in the Restore factory setting.	100
202	Humidity Offset parameter value	1	0~200	Default value: 100, range : 0-200 0~99: decimal deprecation of report. 100: disable 101~200 :increasing ex. 95 means Deduct 5% from measured value,112 means add 12% This parameter is automatically restored to the default value only in the Restore factory setting.	100
203	LUX Offset parameter value	1	0~200	Default value: 100, range : 0-200 0~99: decreasing by 1 LUX 100: disable 101~200 :increasing by 1 LUX ex. 75 means Deduct 25Lux from measured value,147 means add 47Lux This parameter is automatically restored to the default value only in the Restore factory setting.	100

Warning: Changes or modifications to this unit not expressly approved by the party responsible for

compliance could void the user's authority to operate the equipment.

NOTE: 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.

FCC 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 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.

The equipment complies with FCC Radiation exposure limit set forth for uncontrolled environment.

This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.