Water Leak Sensor

Advanced Information Product Manual

Engineering Specification

Water Leak Sensor Advanced Information Product Manual

Document No.	Engineering Specification – Z-Wave® Product Line (ZW864)
Version	1.1
Description	This document mainly introduces the new generation **Water Leak Sensor**. The content mainly includes its interfaces, accessories, features, specifications, quick start, and software function definition. Water Leak Sensor is a Z-Wave Plus v2 device with many advantages. ● Used to send out notification via Group 1 (Lifeline) when detects water leakage or no leakage. ● Used to control other Z-Wave device directly via Group 2. ● Support SmartStart, which makes inclusion more convenient. ● Support S2, which makes it more secure and reliable. ● Support Long Range, extended communication range is more than 500 meters. ● Used 800 chip, it has lower power consumption and longer life.
Written By	
Date	
Reviewed By	
Date	
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Date	

Version	Date	Brief description of changes
1.0	2024.10.05	First revision.
1.1	2024.11.25	Update the factory reset Settings.

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1 OVERVIEW

Please read this Engineering Specification carefully for correct and effective use.

Failure to follow the recommendations set forth by **ZVIDAR** Limited may be dangerous or cause a violation of the law. The manufacturer, importer, distributor, and/or reseller will not be held responsible for any loss or damage resulting from not following any instruction in this guide or in other materials.

The product is intended for indoor use in dry locations only. Do not use in damp, moist, and /or wet locations.

Contains small parts, keep away from children.

Z-Wave® is the international wireless protocol for communication in the Smart Home.

This device is a security enabled Z-Wave Plus® v2 product that is able to use encrypted Z-Wave Plus v2 messages to communicate to other security S2 enabled Z-Wave Plus v2 products. This device must be used in conjunction with a S2 security enabled Z-Wave controller in order to fully utilize all implemented functions. Otherwise it will automatically turn into a lower level of security to maintain backward compatibility. 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.

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.

2 INTERFACES & INSTALLATION

2.1 Interfaces

Terminology	Description
LED	Used for indicating the current state of the product.
Config Button	Inside the Config Button Hole. Used for networking and resetting.
Probe	Change the sensor state via making the Probe Put or Out in water.
QR Code	2D barcode format that can contain large amounts of information in a small square of encoded blocks resembling a random checkerboard pattern. In Z-Wave, it is used to represent the S2 public part of the DSK on a device, as well as additional information needed for the inclusion process

3 FEATURES & SPECIFICATIONS

3.1 Structural Characteristics

Parameter	Value
Product Identifier	ZW864
Dimensions	70*24.5*20mm
Weight	
Color	White
Shell Material	ABS
Shell Fire-proof Level	UL94 V-0
Waterproof and Dustproof	Rated IP20 under IEC 60529
Usage	For indoor use.
Operating Temperature	14-122° F (-10 ~ 50° C)
Relative Humidity	Up to 90% non-condensing

3.2 Hardware Characteristics

Parameter	Value
Z-Wave Module	EFR32ZG23A010F512GM40
Z-Wave TX Power	Max: 14dBm
Z-Wave Antenna Distance	100m(Indoor) /200m(Outdoor) />400m (US-LR)
Indicator Light Color	red and green
Buttons and Connectors	Config Button(x1), Probe(x1)
Power	3V, AAA*2
Wakeup current	~5mA
Standby current	~2uA
Battery Life	~5 years

3.3 Software Characteristics

Parameter	Value
Wireless Technology	Z-Wave
Certification Type	Z-Wave Plus v2
Z-Wave SDK Version	7.18.06
Z-Wave Library Type	Enhanced 232 Slave
Z-Wave Role Type	ZWAVEPLUS_INFO_REPORT_ROLE_TYPE_SLAVE_SLEEPING_REPORTING (0x06)
Generic Device Type	GENERIC_TYPE_SENSOR_NOTIFICATION (0x07)
Specific Device Type	SPECIFIC_TYPE_NOTIFICATION_SENSOR (0x01)
Security Class	Non-Security, S2-UNAUTHENTICATED, S2-AUTHENTICATED
SmartStart	Support. After powering on, SmartStart is auto active if it' s out of the Z-Wave network.
Over The Air （OTA）	Support. Firmware can be updated via RF.

Multichannel Device	No.
Association	Support. Refer to Section 5.7 Association Group Info.
Factory Reset	Support. Refer to Section 4.5 How to factory reset.
Power-down Memory	Support. All command settings will stay unchanged even power down.
Water Leakage Status Report	Support. When Probe detected is water leakage or no leakage, send out notification via Group 1.
Control Other Device	Support. When Probe detected is water leakage or no leakage, control orther Z-Wave device directly via Group 2.
Low Battery Alarm	Support. Refer to Configuration Parameter 4
Signal Repeater	No.
Z-Wave Long Range	Support.

4 PRODUCT QUICK START

4.1 Z-Wave DSK Location

You can find the QR CODE on the side of this **Water Leak Sensor** sensor body.

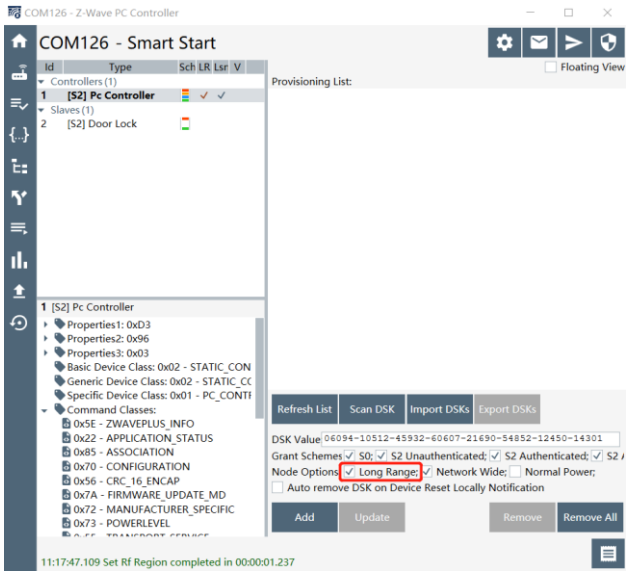
You may also find the QR Code and DSK card in the individual package of each product.

Please do not remove or damage them.

4.2 How to add the product into Z-Wave Long Range network

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, a end node that support LR will send SmartStart Prime on both classic Z-Wave and Z-Wave LR PHY, both request are send 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 switch at runtime.

4.3 How to add the product into Z-Wave network

1. Follow the user guide of hub to enter inclusion mode.

2. Click the Config button 3 times quickly, enter "Include mode"

3. The LED will fast blink green during the inclusion, and then solidly green for 2 seconds to indicate the inclusion is successful, otherwise the LED will solidly red for 2 seconds in which you need to repeat the process form step 1

4.4 How to remove the product from Z-Wave network

1. Follow the user guide of hub to enter exclusion mode.

2. Click the Config Button 3 times quickly, enter "Exclusion mode"

3. LED will fast blink green during the exclusion, and then solidly green for 2 seconds to indicate that the exclusion is successful, otherwise the LED will solidly red for 2 seconds in which you need to repeat the process form step 1

4.5 How to factory reset

If the primary controller is missing or inoperable, you may need to reset the device to factory settings.

Press the Config Button quickly twice and followed hold more than 10s. The LED indicator will change from flashing red to solid red during the process, the **Water Leak Sensor** will reset itself to factory default by sending a "Device Reset Locally Notification" to gateway when the Config Button is released

Note:

1. This procedure should only be used when the primary controller is missing or otherwise inoperable.
2. Factory Reset will:
   - Remove the product from Z-Wave network;
   - Delete the Association setting;
   - Restore the configuration settings to the default.

5 SOFTWARE FUNCTION DEFINITION

5.1 User Behavior Interaction

User behavior	Out of the Z-Wave network	In the Z-Wave network
Power on	LED will solidly red for 1 second. Send Inclusion Requests for SmartStart Learn Mode.	LED will solidly green for 1 second. 1. Send Inclusion Requests for SmartStart Learn Mode. 2. 2.Send Battery Report. If re-power on, it will issue Battery Report with current battery level via Lifeline. 3.Send Wake Up Notification.
Detected water leakage or no leakage	**Water Leakage:** LED will flash red once. **No Leakage:** LED will flash orange once.	**Water Leakage**: LED will flash red once. Refer to section 5.7 for details about Association function. **No Leakage**: LED will flash orange once. Refer to section 5.7 for details about Association function.
Click Config Button once	LED will flash red once	Issue Wake Up Notification and stay awake for 10 seconds, or goes into sleep immediately if receiving the Wake Up No More Information frame from the gateway. LED will flash green 10 seconds and then off, or goes into sleep immediately if receiving the Wake Up No More Information frame from the gateway
Click Config Button 3 times quickly	**Click the Z-Wave button 3 times quickly, enter "Include mode"** LED become flash green for 30s until it is added into the network. If adding successful, LED will solidly green for 2 seconds and then off. If adding fail, LED will solidly red for 2 seconds and then off.	**Click the Z-Wave button 3 times quickly, enter "Exclusion mode"** LED become flash green for 30s until it is removed from the network. If adding successful, LED will solidly green for 2 seconds and then off. If adding fail, LED will solidly red for 2 seconds and then off.
Press the Config Button quickly twice and followed hold more than 10s and released.	Reserved.	**Factory Reset.** LED indicator will change from flashing red to solid red during the process. The device will issue a Device Reset Locally Command via its Lifeline to notify the Lifeline destination that the device has been reset to its factory default state. And it will perform the reset operation regardless of whether or not the delivery of the Device Reset Locally Notification is successful.

5.2 Supported Command Classes

Command	Version	Required Security Class
COMMAND_CLASS_ZWAVEPLUS_INFO_V2	2	None
COMMAND_CLASS_TRANSPORT_SERVICE_V2	2	None
COMMAND_CLASS_SECURITY_2_V1	1	None
COMMAND_CLASS_SUPERVISION_V1	1	None
COMMAND_CLASS_APPLICATION_STATUS_V1	1	None
COMMAND_CLASS_NOTIFICATION_V8	8	Highest granted Security Class
COMMAND_CLASS_BATTERY_V1	1	Highest granted Security Class
COMMAND_CLASS_WAKE_UP_V2	2	Highest granted Security Class
COMMAND_CLASS_CONFIGURATION_V4	4	Highest granted Security Class
COMMAND_CLASS_ASSOCIATION_V2	2	Highest granted Security Class
COMMAND_CLASS_ASSOCIATION_GRP_INFO_V3	3	Highest granted Security Class
COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION_V3	3	Highest granted Security Class
COMMAND_CLASS_VERSION_V3	3	Highest granted Security Class
COMMAND_CLASS_MANUFACTURER_SPECIFIC_V2	2	Highest granted Security Class
COMMAND_CLASS_DEVICE_RESET_LOCALLY_V1	1	Highest granted Security Class
COMMAND_CLASS_POWERLEVEL_V1	1	Highest granted Security Class
COMMAND_CLASS_FIRMWARE_UPDATE_MD_V5	5	Highest granted Security Class
COMMAND_CLASS_INDICATOR_V3	3	Highest granted Security Class

5.3 Basic Command Class mapping

Basic CC does not map to any Command Class.

5.4 ZWAVEPLUS_INFO

The Command is used to differentiate between Z-Wave Plus v2, Z-Wave for IP and Z-Wave devices. This command provides additional information about the Z-Wave Plus v2 device in question.

Parameter	Value
Z-Wave Plus Version	0x02
Role Type	0x06 (ZWAVEPLUS_INFO_REPORT_ROLE_TYPE_SLAVE_SLEEPING_REPOR TING)
Node Type	0x00 (ZWAVEPLUS_INFO_REPORT_NODE_TYPE_ZWAVEPLUS_NODE)
Installer Icon Type	0x0C06 (ICON_TYPE_SPECIFIC_SENSOR_NOTIFICATION_ACCESS_CONTROL)
User Icon Type	0x0C06 (ICON_TYPE_SPECIFIC_SENSOR_NOTIFICATION_ACCESS_CONTROL)

5.5 Manufacturer Specific

The Command is used to advertise manufacturer specific information.

Parameter	Value
Manufacturer ID 1	**0x04**
Manufacturer ID 2	**0x5A**
Product Type ID 1	0x00

Product Type ID 2	0x04
Product ID 1	0x01
Product ID 2	0x15

5.6 Version

The Command may be used to obtain the Z-Wave library type, the Z-Wave protocol version used by the application, the individual command class versions used by the application.

Parameter	Value
Z-Wave Protocol Library Type	0x03
Z-Wave Protocol Version	0x07
Z-Wave Protocol Sub Version	0x12
Firmware 0 Version	Z-Wave Chip Firmware Version Major
Firmware 0 Sub Version	Z-Wave Chip Firmware Version Minor
Hardware Version	0x01
Number of firmware targets	0x00

5.7 Association Group Info

The Command is used to manage associations to Node ID destinations.

ID	Name	Count	Profile	Function
1	Lifeline	5	General: Lifeline (0x0001)	**Device Reset Locally Notification (0x5A01):** Issued when Factory Reset is performed. **Battery Report(0x8003):** Issued when re-power or battery voltage becomes low. **Notification Report(0x7105):** Issued When Probe detected is water leakage or no leakage. Issued when battery voltage becomes low. **Indicator Report(0x8703):** Issued when indicator set received
2	On/Off Control	5	General: Control (0x2001)	**Basic Set (0x2001) :** Issued when Probe detected is water leakage or no leakage. (The Basic Set value is determined by Configuration Parameter 2)

5.8 Notification

The Command is used to advertise events or states, such.

Notification Type = Water Alarm (0x05), according to Table 5-8-1

Notification Type = Power Management (0x08), according to Table 5-8-2

Table 5-8-1:

Description	Event	Alarm type	Alarm Level	Parameters
Water no leak detected	0x00	0x00	0x00	0x02
Water leak detected, Unknown Location	0x02	0x00	0x00	

Table 5-8-2:

Description	Event	Alarm type	Alarm Level	Parameters
Replace battery soon	0x0A	0x00	0x00	
Replace battery now	0x0B	0x00	0x00	

How to trigger these different notifications;

Access Control:

Water no leak detected (0x00): The Probe detected Water leak.

Water leak detected, Unknown Location (0x02): The Probe detected Water not leak.

Power Management:

REPLACE_BATTERY_SOON (0x0A): When the battery level is less than/equal the value set by configuration parameter 0x0A.

REPLACE_BATTERY_NOW (0x0B): When the battery level is less than/equal 1%.

5.9 Wake Up

The Wake Up used to configure the Wake Up interval and destination.

1. When the product has been online, short press the Config Button to report the product has been awakened.
2. Wake up interval set command can be used to configure the product to automatically wakeup time.
3. Wake up Interval Capabilities

   Minimum Wake up Interval Seconds = 60 seconds

   Maximum Wake up Interval Seconds = 2678400 seconds, that is 31 days

   Default Wake up Interval Seconds = 3600 seconds

   Wake up Interval Step Seconds = 60 seconds

5.10 Battery

The Command is used to advertise battery level.

1. When sending Battery get command to the product, the product will report the current battery level when it wakes up.

2. The battery report value 0xff will be reported to the associated node of group 1 when the product is at a low voltage (the threshold value can be configured in Configuration, the default value is less than 10% of the battery level).

5.11 Indicator

The Command is used to help end users to monitor the operation or condition of the application provided by a supporting node.

Indicator ID		Property ID	
Node Identify	0x50	On Off Period	0x03
		On Off Cycles	0x04
		On time within an On/Off period	0x05

5.12 Configuration

The Command allows product specific configuration parameters to be changed.

Note: No Bulk Support equals to True. ***It will return an Application Rejected Request Command when receiving Configuration Bulk Set or Get (if received without Supervision encapsulation).*** It will reset all its configuration parameters if either manually reset to factory default or receives a Configuration Default Reset Command. It will NOT modify or reset any configuration parameter when being included or excluded of a Z-Wave network.

Parameter 1:

Parameter	**0x01 (1)**			
Name	Enable/Disable send Basic Set to group 2			
Info	Enable/Disable send Basic Set to group 2			
Properties	Size	1	Min Value	0
	Format	Enumerated	Max Value	1
	Read-only	False	Default Value	0
	Altering capabilities	False	Advanced	False
Description	The sensor can send BASIC SET command to nodes associated with group 2.			
	Value	Function		
	0	Disable.		
	1	Enable.		

Parameter 2:

Parameter	**0x02 (2)**			
Name	Set Basic Set value for group 2			
Info	Set Basic Set value for group 2			
Properties	Size	2	Min Value	0
	Format	Enumerated	Max Value	1
	Read-only	False	Default Value	0
	Altering capabilities	False	Advanced	False
Description	The sensor can reverse its value of BASIC SET when flooding is triggered.			
	Value	Function		
	0	Send BASIC SET VALUE = 255 to nodes associated with group 2 when flooding alarm is triggered. Send BASIC SET VALUE = 0 to nodes associated with group 2 when flooding alarm is canceled.		
	1	Send BASIC SET VALUE = 0 to nodes associated with group 2 when flooding alarm is triggered. Send BASIC SET VALUE = 255 to nodes associated with group 2 when flooding alarm is canceled.		

Parameter 3:

Parameter	**0x03 (3)**

Name	Enable led indication for alarm			
Info	Enable led indication for alarm			
Properties	Size	1	Min Value	1
	Format	Enumerated	Max Value	1
	Read-only	False	Default Value	1
	Altering capabilities	False	Advanced	False
Description	Enable/Disable blinking LED when alarm being triggered.			
	Value	Function		
	0	Disable.		
	1	Enable.		

Parameter 4:

Parameter	**0x04 (4)**			
Name	Low battery alarm threshold			
Info	Low battery alarm threshold			
Properties	Size	1	Min Value	10
	Format	Unsigned Integer	Max Value	50
	Read-only	False	Default Value	20
	Altering capabilities	False	Advanced	False
Description	This parameter defines a battery level as the low battery.			
	Value	Function		
	0	Disable.		
	10-50	10%-50%.		