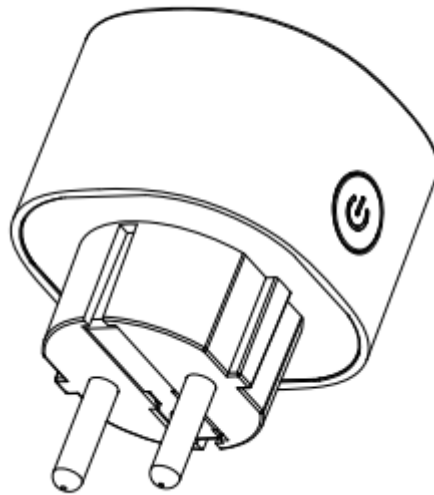


Smart Plug Engineering Specification

HKZW-SO13



Smart Plug is a Z-Wave Switch plugin module specifically used to enable Z-Wave command and control (on/off) of any plug-in tool. It can report wattage consumption or kWh energy usage.

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.

Smart Plug is also a security Z-Wave device and supports the Over The Air (OTA) feature for the product's firmware upgrade.

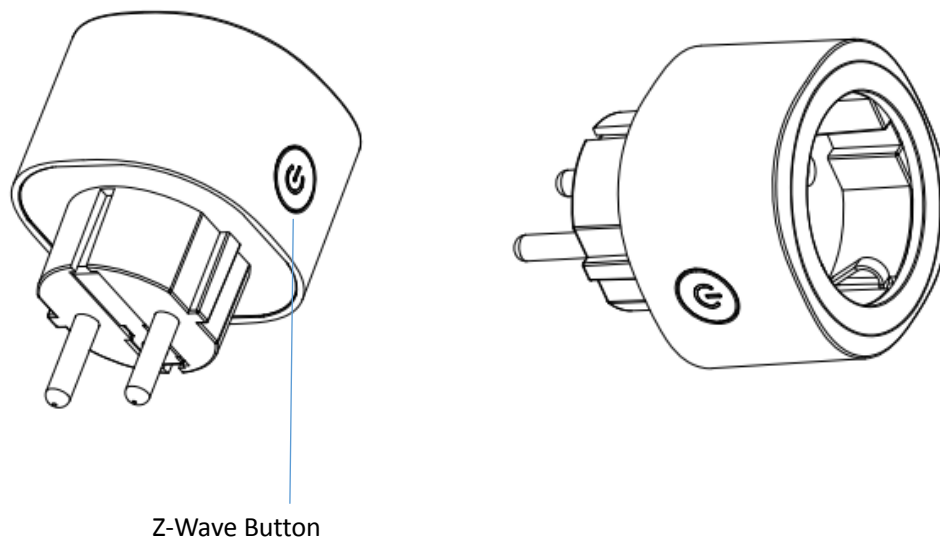
This device must be used in conjunction with a Security Enabled Z-Wave Controller in order to fully utilize all implemented functions.

Features:

- 1) AC output switch on/off by manual or Z-Wave command;
- 2) LED indicates the Z-WAVE network range and load power;
- 3) Support S0 and S2 security network;
- 4) Supporting power meter;
- 5) Supporting repeater role;
- 6) Supporting firmware OTA;
- 7) Supporting Smart Start;
- 8) Supports over-current protection

1. Familiarize yourself with your Smart Plug

1.1 Smart Plug Layout



2. Technical specifications

Power supply:	AC 230V \pm 10%,50Hz
Power loss:	\leq 1W
Nominal input voltage:	230V
Rated current:	16A
Storage temperature:	-20-60 $^{\circ}$ C
Operational temperature:	-10-40 $^{\circ}$ C
Radio protocol:	Z-Wave
Radio frequency:	868.42MHz
Range:	More than 100m outdoors, About 30m Indoors(depending on building materials)
Dimensions:	55mm(L)*55mm(W)*72mm(H)

3. Functions of each trigger

Function of Action Button:

Smart Plug is not in the Z-Wave network:

Trigger	Description
Power on	<ol style="list-style-type: none">1. LED will blink in blue for 3 times, and enter Smart Start mode. Add for inclusion(SmartStart) <ol style="list-style-type: none">1. Scan the QR code on your device, and add the device DSK to the main controller.2. Power on Smart Plug.3. LED will blink in blue for 3 times, and enter Smart Start. If add Smart

	Plug for inclusion is successful, the LED will be off.
Short press once	<ol style="list-style-type: none"> 1. Change the state of Smart Plug's load. 2. LED indicates network status, blue light has been flashing slowly.
Short press thrice (within 1.5 second)	<ol style="list-style-type: none"> 1. LED will blink in blue for 3 times, Smart Plug sends node info frame. <p>Add for inclusion:</p> <ol style="list-style-type: none"> 1. Set the Z-Wave network main controller into learning mode. 2. Short press the Z-button thrice. 3. LED will blink in blue for 3 times, and then turn off to indicate that the add for inclusion is successful. LED will indicate load status after it is included into Z-Wave network.

Smart Plug is in the Z-Wave network:

Trigger	Description
Power on	<ol style="list-style-type: none"> 1. LED will indicate load status.
Short press once	Changing the status of Smart Plug's load.
Short press thrice (within 1.5 seconds)	<ol style="list-style-type: none"> 1. LED will blink in blue for 3 times, Smart Plug sends node info frame. <p>2. Remove for exclusion:</p> <ol style="list-style-type: none"> 1. Set the Z-Wave network main controller into removing mode. 2. Short press Z-button thrice (within 1.5 seconds). 3. LED will blink in blue for 3 times, and then start slow flashing to indicate that the remove for exclusion is successful. LED will indicate network status after it is removed from Z-Wave network.
Long press more than 20 seconds	<p>Reset Smart Plug to factory Default:</p> <p>Long press the button for 20 seconds and the blue LED will speed up the flash and then LED will keep on for 3 seconds in blue and Smart Plug will send "Device Reset Locally Notification" to the main controller and exclude from the Z-Wave network, this procedure will reset Smart Plug to factory default.</p>

4. Security and non-security features of Smart Plug in Z-Wave network

Smart Plug 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 way to add for inclusion and node info frame of Smart Plug as a security and non-security device is different.

4.1 The way to add for inclusion is different.

4.1.1 Add for inclusion (non-security and security):

- 1) Connect the power supply.
- 2) Set the Z-Wave network main controller into learning mode.
- 3) Triple click the Z-button, the LED indicator will be flashing 3 times in Blue.
- 4) Smart Plug should be recognized and included into the Z-Wave network.

4.1.2 Add for inclusion (SmartStart):

- 1) Scan the QR code on your device, and add the device DSK to the main controller.
- 2) Power on Smart Plug.
- 3) LED will blink in blue for 3 times, and enter Smart Start. If add Smart Plug for inclusion is successful, the LED will be off. Then Z-Wave PC Controller interface will display the corresponding device information.

4.2 Node info frame is different.

4.2.1 Non-security device

The node info frame supports:

COMMAND_CLASS_ZWAVEPLUS_INFO V2
COMMAND_CLASS_SWITCH_BINARY V1
COMMAND_CLASS_METER V3
COMMAND_CLASS_TRANSPORT_SERVICE V2
COMMAND_CLASS_SUPERVISION V1
COMMAND_CLASS_SCENE_ACTUATOR_CONF V1
COMMAND_CLASS_SCENE_ACTIVATION V1
COMMAND_CLASS_CONFIGURATION V1
COMMAND_CLASS_ASSOCIATION_GRP_INFO V1
COMMAND_CLASS_ASSOCIATION V2
COMMAND_CLASS_MANUFACTURER_SPECIFIC V2
COMMAND_CLASS_VERSION V2
COMMAND_CLASS_FIRMWARE_UPDATE_MD V3
COMMAND_CLASS_POWERLEVEL V1
COMMAND_CLASS_SECURITY V1
COMMAND_CLASS_SECURITY_2 V1
COMMAND_CLASS_DEVICE_RESET_LOCALLY V1

4.2.2 Security device

The node info frame supports (S0):

COMMAND_CLASS_ZWAVEPLUS_INFO V2
COMMAND_CLASS_TRANSPORT_SERVICE V2
COMMAND_CLASS_SUPERVISION V1
COMMAND_CLASS_SECURITY V1
COMMAND_CLASS_SECURITY_2 V1
COMMAND_CLASS_MANUFACTURER_SPECIFIC V2

Security S0 Command Supported Report Frame:

COMMAND_CLASS_VERSION	V2
COMMAND_CLASS_SWITCH_BINARY	V1
COMMAND_CLASS_METER	V3
COMMAND_CLASS_SCENE_ACTUATOR_CONF	V1
COMMAND_CLASS_SCENE_ACTIVATION	V1
COMMAND_CLASS_CONFIGURATION	V1
COMMAND_CLASS_ASSOCIATION	V2
COMMAND_CLASS_ASSOCIATION_GRP_INFO	V1
COMMAND_CLASS_DEVICE_RESET_LOCALLY	V1
COMMAND_CLASS_POWERLEVEL	V1
COMMAND_CLASS_FIRMWARE_UPDATE_MD	V3

The node info frame supports (S2):

COMMAND_CLASS_ZWAVEPLUS_INFO	V2
COMMAND_CLASS_TRANSPORT_SERVICE	V2
COMMAND_CLASS_SUPERVISION	V1
COMMAND_CLASS_SECURITY	V1
COMMAND_CLASS_SECURITY_2	V1

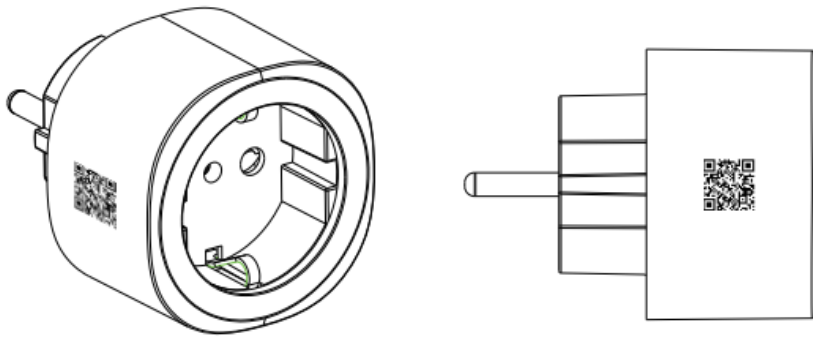
Security S2 Command Supported Report Frame:

COMMAND_CLASS_VERSION	V2
COMMAND_CLASS_SWITCH_BINARY	V1
COMMAND_CLASS_METER	V3
COMMAND_CLASS_SCENE_ACTUATOR_CONF	V1
COMMAND_CLASS_SCENE_ACTIVATION	V1
COMMAND_CLASS_CONFIGURATION	V1
COMMAND_CLASS_ASSOCIATION	V2
COMMAND_CLASS_ASSOCIATION_GRP_INFO	V1
COMMAND_CLASS_DEVICE_RESET_LOCALLY	V1
COMMAND_CLASS_POWERLEVEL	V1
COMMAND_CLASS_FIRMWARE_UPDATE_MD	V3
COMMAND_CLASS_MANUFACTURER_SPECIFIC	V2

4.3 SmartStart function description

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.

The position of the QR code is on the side of the product, using 29*29 pixels, which will be attached to the product in the form of a label. As shown below:



4.4 Z-WAVE NETWORK EXCLUSION

- 1) Insert the Plug into a socket.
- 2) Set the Z-Wave network controller into the exclusion mode.
- 3) Triple click the Z button.
- 4) LED will blink in blue for 3 times, and then start slow flashing to indicate that the remove for exclusion is successful. LED will indicate network status after it is removed from Z-Wave network.

4.5 Reset Smart Plug to factory Default

Long press the button for 20 seconds and the blue LED will speed up the flash and then LED will keep on for 3 seconds in blue and Smart Plug will send "Device Reset Locally Notification" to the main controller and exclude from the Z-Wave network, this procedure will reset Smart Plug to factory default.

NOTE:

If you want your Smart Plug to be a security device that use secure/encrypted message to communicate in a Z-Wave network, then a security enabled Z-Wave controller is needed.

5. Note for special command

5.1 Association Command

The Smart Plug supports only one association group.

Grouping Identifier	Max Nodes	Send Commands
Group 1	0x05	1. Basic Report 2. Meter Report 3. Device Reset Locally Notification

5.2 Basic Command

Smart Plug can send basic report to association device (Group Lifeline) when state of Smart

Plug's load change.

5.3 Configuration Command

Smart Plug offers a wide variety of advanced configuration settings. Below parameters can be accessed from main controllers configuration interface.

Parameter No. 20 Overload protection

Smart Plug keep detecting the load power, once the AC current exceeds 17.5A for more than 5s, smart plug's relay will turn off.

0 - The function is disabled

1 - The function is enabled.

Default setting: **1**

Parameter size: **1 [byte]**

Parameter No. 21 Setting device status after power failure

Define how the Plug reacts after the power supply is back on.

0 - Smart Plug memorizes its state after a power failure.

1 - Smart Plug does not memorize its state after a power failure.

Connected device will be on after the power supply is reconnected.

2 - Smart Plug does not memorize its state after a power failure.

Connected device will be off after the power supply is reconnected.

Default setting: **0**

Parameter size: **1 [byte]**

Parameter No. 24 Notification when Load status change

Smart Plug can send notifications to association device (Group Lifeline) when state of smart plug's load change.

0 - The function is disabled.

1 - Send Basic report.

2 - Send Basic report only when Load condition is not changed by Z-WAVE Command.

Default setting: **1**

Parameter size: **1 [byte]**

Parameter No. 27 Indicator modes

After smart plug being included into a Z-Wave network, the RGB LED indicator will indicator the situation of load.

0 - The indicator light remains the same as the load on/off status. When the load is on, the

light is on, and the off is off.

1 - Within 5 seconds after the operation load, the indicator light is consistent with the load on/off status, and then the indicator is off.

Default setting: **0**

Parameter size: **1 [byte]**

POWER AND ENERGY REPORTS SETTINGS:

Parameter No. 151 Threshold of power report

Power threshold to be interpreted, when the change value of load power exceeds the setting threshold, the smart plug will send meter report to association device (Group Lifeline).

Available settings: **0 - 200** (0 - 200W)

0 - The function is disabled.

Default setting: **50** (50W)

Parameter size: **2 [byte]**

Parameter No. 152 Percentage threshold of power report

Power percentage threshold to be interpreted, when change value of the load power exceeds the setting threshold, the smart plug will send meter report to association device (Group Lifeline).

Available settings: **0 - 100** (0 - 100%)

0 - The function is disabled.

Default setting: **10** (10%)

Parameter size: **1 [byte]**

Parameter No. 171 Power report frequency

The interval of sending power report to association device (Group Lifeline).

Available settings: **3600- 2678400** (3600 - 2678400s)

0 - The function is disabled.

Default setting: **3600** (3600s).

Parameter size: **4 [byte]**

Parameter No. 172 Energy report frequency

The interval of sending energy report to association device (Group Lifeline).

Available settings: **3600- 2678400** (3600 - 2678400s)

0 - The function is disabled.

Default setting: **7200** (7200s).

Parameter size: **4 [byte]**

Parameter No. 173 Voltage report frequency

The interval of sending voltage report to association device (Group Lifeline).

Available settings: **3600- 2678400** (3600 - 2678400s)

0 - The function is disabled.

Default setting: **0** (disabled).

Parameter size: **4 [byte]**

Parameter No. 174 Electricity report frequency

The interval of sending electricity report to association device (Group Lifeline).

Available settings: **3600- 2678400** (3600 - 2678400s)

0 - The function is disabled.

Default setting: **0** (disabled).

Parameter size: **4 [byte]**

Parameter No.254 Enable/disable the configuration command

Lock/unlock all configuration parameters.

0 – Unlock.

1 – Lock.

Default setting: **0**

Parameter size: **1[byte]**