

PAN03-1/-2/-3 Smart Energy In wall Switch Module

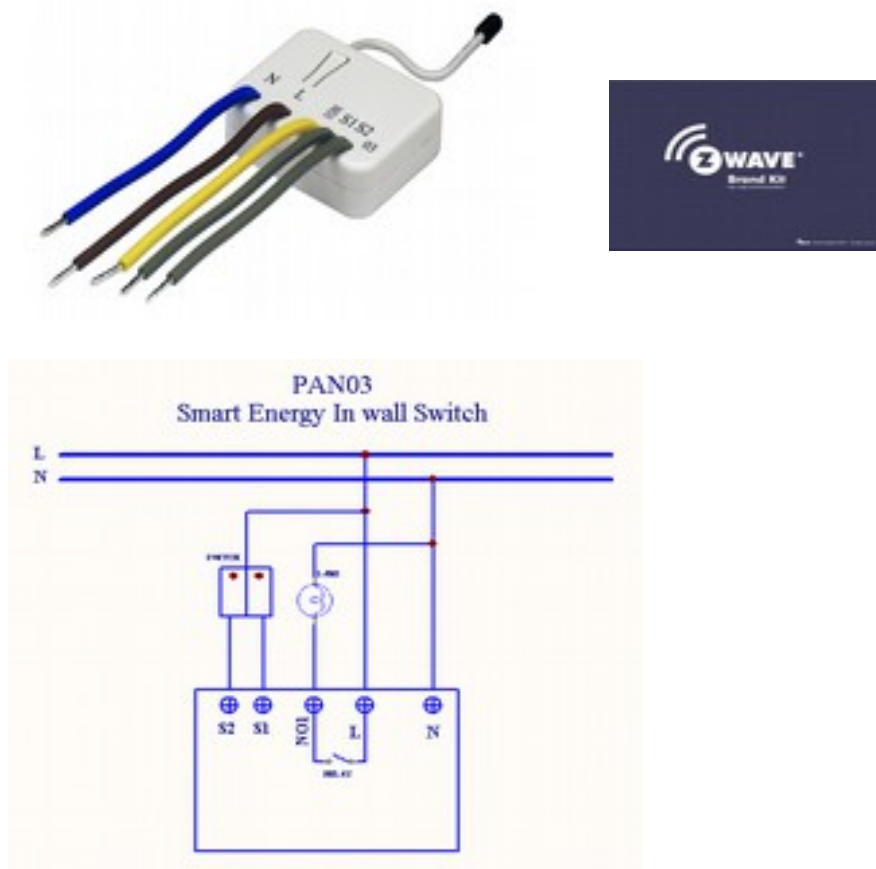


Fig 1. Assembling

This in-wall dual relay switch module is a transceiver which is a Z-Wave™ enabled device and is fully compatible with any Z-Wave™ enabled network. Mini size design let the module can easily hide itself into the wall box and that will be good for the

house decoration.

There are many kind of application by using the module to switch AC power On and Off , one main application is the light control. The new smart relay calibration technology can reduce the inrush current caused by the load and let the module work perfectly with many kind of light like incandescent, fluorescent and LED light.

This in-wall switch module is able to detect Instant power c (5~2500W)(11Ampere) and overload wattage (2700~2800W)(12 Ampere) of connected light or appliances. When detecting overload state, the Module will be disabled and its On/Off button will be lockout of which LED will flash quickly. However, disconnect and re-connect the Module will reset its overload condition to normal status.

Adding to Z-Wave™ Network

In the front casing, there is an on/off button with LED indicator below which is used to toggle switch on and off or carry out inclusion, exclusion, reset or association. When first power is applied, its LED flashes on and off alternately and repeatedly at 2-second intervals. It implies that it has not been assigned a node ID and cannot work with Z-Wave enabled devices.

Auto Inclusion

The function of auto inclusion will be executed as long as the in wall switch does not have Node ID and just connect the switch to main power.

Note: Auto inclusion timeout is 4 minute during which the node information of explorer frame will be emitted once every 5 seconds. Unlike “inclusion” function as shown in the table below, the execution of auto inclusion is free from pressing the On/Off button on the Switch.

The table below lists an operation summary of basic Z-Wave functions. Please refer to the instructions for your Z-Wave™ Certificated Primary Controller to access the Setup function, and to include/exclude/associate devices

Function	Description	LED Indication
No node ID	The Z-Wave Controller does not allocate a node ID to the Switch.	2-second on, 2-second off
Inclusion	1. Have Z-Wave Controller entered inclusion mode.	One press one flash
	2. Pressing INCLUDE_BUTTON three times within 1.5 seconds will enter inclusion mode.	
Exclusion	1. Have Z-Wave Controller entered exclusion mode.	One press one flash
	2. Pressing INCLUDE_BUTTON three times within 1.5 seconds will enter exclusion mode.	
	Node ID has been excluded.	2-second on, 2-second off

Reset	1. Pressing INCLUDE_BUTTON three times within 1.5 seconds will enter inclusion mode.	One press one flash
	2. Within 1 second, press On/Off button again for 5 seconds until LED is off.	
	3. IDs are excluded.	2-second on, 2-second off
Association	1. Have Z-Wave Controller entered association mode. Or Pressing INCLUDE_BUTTON three times within 1.5 seconds will enter association mode	One press one flash
	2. There are 3 groups for the switch	
⌘ Including a node ID allocated by Z-Wave Controller means inclusion. Excluding a node ID allocated by Z-Wave Controller means exclusion. ⌘ Failed or success in including/excluding the node ID can be viewed from the Z-Wave Controller.		

LED Indication

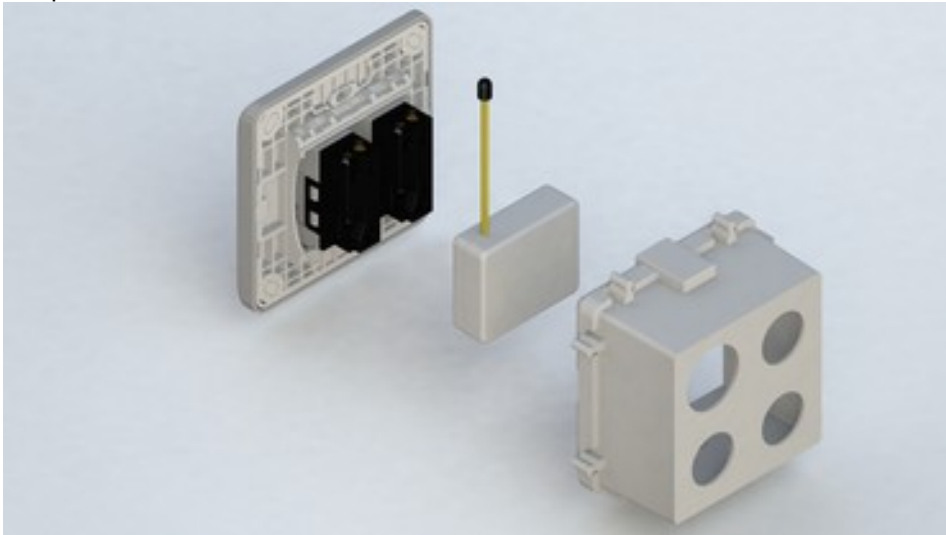
To distinguish what mode the switch is in, view from the LED for identification.

State Type	LED Indication
Normal	Whatever we switch On and off of the PAN03 by S1 S2 or On/Off

	button or RF command , the LED will lights up 1 second and then off.
No node ID	Under normal operation, when the Switch has not been allocated a node ID, the LED flashes on and off alternately at 2-second intervals. By pressing S1 S2 or On/Off button, it will stop flashing temporarily. However, after disconnect and reconnect the Switch, the LED will flash on and off alternately at 2-second intervals.
Overload	When overload state occurs, the Switch is disabled of which LED flashes on and off alternately at 0.5 second intervals. Overload state can be cleared by disconnect and reconnect the Switch to the main power

Choosing a Suitable Location

1. Do not locate the Switch facing direct sunlight, humid or dusty place.
2. The suitable ambient temperature for the Switch is 0°C~40°C.
3. Do not locate the Switch where exists combustible substances or any source of heat, e.g. fires, radiators, boiler etc.
4. After putting it into use, the body of Switch will become a little bit hot of which phenomenon is normal.



1. put the in wall switch into a wall box and connect the AC power wire L,N to PAN03 connector L, N.
2. Connect the wall switch to the PAN03 as Fig1 .
3. To manually turn ON the Switch, press and release the On/Off button. The LED will light ON for 1 second, and the load plugged into the Switch will also turn ON.

4. To manually turn OFF the Switch, simply press and release the On/Off button. The LED will light ON for 1 second and the load plugged into the Switch will turn OFF.

Programming

1. Basic Command Class / Binary Switch Command Class

The Switch will respond to BASIC and BINARY commands that are part of the Z-Wave system.

1-1 BASIC_GET / BINARY_SWITCH_GET

Since the switch have two relay, the Switch will report its On/Off state to the Controller by setting Configuration parameter 3.

Configuration parameter 3=1(default) Report ON either relay 1 ON or relay 2 ON

Report OFF when both relay 1 and relay 2 OFF

Configuration parameter 3=2 Report ON when relay 1 ON

Report OFF when relay 1 OFF

Configuration parameter 3=3 Report ON when relay 2 ON

Report OFF when relay 2 OFF

Basic Get Command: [Command Class Basic, Basic Get]
Basic Report Command: Report OFF: [Command Class Basic, Basic Report, Value = 0(0x00)] Report ON: [Command Class Basic, Basic Report, Value = (255)0xFF]

Binary Switch Get Command: [Command Class Switch Binary, Switch Binary Get]
Binary Switch Report Command: Report OFF: [Command Class Switch Binary, Switch Binary Report, Value = 0(0x00)] Report ON: [Command Class Switch Binary, Switch Binary Report, Value = (255)0xFF]

1-2 BASIC_SET / SWITCH_BINARY_SET

Upon receipt of the following commands from a Z-Wave Controller, the load attached to the Switch will turn on or off.

[Command Class Basic, Basic Set, Value = (255)0xFF] : the load attached to the Switch turns on.
[Command Class Basic, Basic Set, Value = 0(0x00)] : the load attached to the Switch turns off.
[Command Class Switch Binary, Switch Binary Set, Value = (255)0xFF] : the load attached to the Switch turns on.
[Command Class Switch Binary, Switch Binary Set, Value = 0(0x00)] : the load attached to the Switch turns off.

2. Z-Wave's Groups (Association Command Class Version 1)

The Switch can be set to send reports to control associated Z-Wave devices. It supports one association group with one node support for Grouping 1. For grouping 1, the Switch will report its latest status to Z-Wave Controller.

Grouping 1 includes, SWITCH_BINARY_REPORT, METER_REPORT_COMMAND

2-1 Auto report to Grouping 1 (Maximum Node 1)

2-1-1 On/Off Event Report

When “on” or “off ” state has been changed, it will send Binary Switch Report to the nodes of Grouping 1.

Binary Switch Report

ON:[Command Class Switch Binary, Switch Binary Report, Value
=(255)0xFF]
OFF:[Command Class Switch Binary, Switch Binary Report, Value
=0(0x00)]

2-1-2 Instant Power Consumption vary over 5% report

When the power consumption of load vary over 5%, it will send Meter report to the nodes of Grouping 1.

Meter Report Command: [Command Class Meter , Meter
Report , scale(bit 2) +Rate Type +Meter Type , Precision + Scale(bit
1,0)+ Size , Meter Value 1 , Meter Value 2 , Meter Value 3 , Meter Value
4]

2-2 Response to Meter Get Command

The Switch will report its (1) instant Power Consumption (Watt) or (2) accumulated power consumption(KWH) or (3) AC load Voltage (V) or (4) AC load current (I) (5) load power factor (PF) to Z-Wave Controller after receive the Meter Get Command from Z-Wave Controller.

2-2-1 Instant Power Consumption (Watt) of Switch

When receiving Meter Get Command, it will report Meter Report Command to the node asked.

Meter Get Command: [Command Class Meter, Meter Get, Scale =0x02(W)]

Meter Report Command: [Command Class Meter , Meter Report , scale(bit
2) +Rate Type +Meter Type , Precision + Scale(bit 1,0)+ Size , Meter
Value 1 , Meter Value 2 , Meter Value 3 , Meter Value 4]

Rate Type = 0x01

Meter Type = 0x01

Precision = 1

Scale = 0x02(W)

Size = 4 Bytes (Meter Value)

Meter Value 1 = (W) MSB

Meter Value 2 = (W)

Meter Value 3 = (W)

Meter Value 4 = (W)LSB

Example:

Meter Value 1 = 0x00 (W)

Meter Value 2 = 0x00 (W)

Meter Value 3 = 0x03 (W)

Meter Value 4 = 0xEA (W)

Meter(W) = Meter Value 3 *256 + Meter Value 4 = 100.2W

2-2-2 Accumulated Power Consumption (KW/h)

When receiving Meter Get Command, it will report Meter Report Command to the node asked.

Meter Get Command: **[Command Class Meter, Meter Get, Scale = 0x00 KW/h]**

Meter Report Command: **[Command Class Meter , Meter Report , scale(bit 2) +Rate Type +Meter Type , Precision + Scale(bit 1,0)+ Size , Meter Value 1 , Meter Value 2 , Meter Value 3 , Meter Value 4]**

Rate Type = 0x01

Meter Type = 0x01

Precision = 2

Scale = 0x00 (KWh)

Size = 4 bytes (Meter Value)

Meter Value 1 = (W) MSB

Meter Value 2 = (W)

Meter Value 3 = (W)

Meter Value 4 = (W) LSB

Example:

Scale = 0x00 (KWh)

Precision = 2

Size = 4 Bytes (KW/h)

Meter Value 1 = 0x00(W)

Meter Value 2 = 0x01(W)

Meter Value 3 = 0x38(W)

Meter Value 4 = 0xA3(W)

Accumulated power consumption (KW/h) = (Meter Value 2*65536) + (Meter Value 3*256) + (Meter Value 4) = 800.35 (KW/h)

2-2-3 Clearing accumulated power consumption

Meter Reset Command: **[Command Class Meter, Meter Reset]**

2-2-4 AC load Voltage (V)

When receiving Meter Get Command, it will report Meter Report Command to the node asked.

Meter Get Command: **[Command Class Meter, Meter Get, Scale =0x04(V)]**

Meter Report Command:
[Command Class Meter , Meter Report , scale(bit 2) +Rate Type +Meter Type , Precision + Scale(bit 1,0)+ Size , Meter Value 1 , Meter Value 2]

Rate Type = 0x01

Meter Type = 0x01

Precision = 1

Scale = 0x04(V)

Size = 2 Bytes (Meter Value)

Meter Value 1 = High Byte (V)

Meter Value 2 = Low Byte (V)

Example:

Scale = 0x04 (V)

Precision = 1

Size = 2 (2 Bytes of V)

Meter Value 1 = 0x09(V)

Meter Value 2 = 0x01(V)

AC load Voltage = (Meter Value 1*256) +(Meter Value 2)= 230.5 (V)

2-2-5 AC load current (I)

When receiving Meter Get Command, it will report Meter Report Command to the node asked.

Meter Get Command: **[Command Class Meter, Meter Get, Scale =0x05(I)]**

Meter Report Command:
[Command Class Meter , Meter Report , scale(bit 2) +Rate Type +Meter Type , Precision + Scale(bit 1,0)+ Size , Meter Value 1 , Meter Value 2]

Rate Type = 0x01

Meter Type = 0x01

Precision = 2

Scale = 0x05(I)

Size = 2 Bytes (Meter Value)

Meter Value 1 = High Byte (I)

Meter Value 2 = Low Byte (I)

Example:

Scale = 0x05 (I)

Precision = 2

Size = 2 (2 Bytes of I)

Meter Value 1 = 0x01(I)

Meter Value 2 = 0x21(I)

AC load current = (Meter Value 1*256) +(Meter Value 2)= 2.89 (A)

2-2-6 load power factor (PF)

When receiving Meter Get Command, it will report Meter Report Command to the node asked.

Meter Get Command: **[Command Class Meter, Meter Get, Scale =0x06(PF)]**

Meter Report Command:

[Command Class Meter , Meter Report , scale(bit 2) +Rate Type +Meter Type , Precision + Scale(bit 1,0)+ Size , Meter Value 1]

Rate Type = 0x01

Meter Type = 0x01

Precision = 2

Scale = 0x06(PF)

Size = 1 Bytes

Meter Value 1

Example:

Scale = 0x06 (PF)

Precision = 2

Size = 1 (1 Byte of PF)

Meter Value 1 = 0x63(PF)

Load power factor (PF) = Meter Value 1 =0.99

3-1 Watt Meter Report Period:

If the setting is configured for 1hour (set value =720), the PAN03 will report its instant power consumption every 1 hour to the node of correspond Group. The maximum interval to report its instant power consumption is 45 hours (5s*32767/3600=45hr).

3-2 KWH Meter Report Period:

If the setting is configured for 1hour (set value =6), the PAN03 will report its Accumulated Power Consumption (KW/h) every 1 hour to the node of correspond Group. The maximum interval to report its Accumulated Power Consumption (KW/h) is 227.55 days (10min*32767/1440=227.55 days).

4. Command Classes

The Switch supports Command Classes including...

- * COMMAND_CLASS_SWITCH_BINARY
- * COMMAND_CLASS_BASIC
- * COMMAND_CLASS_MANUFACTURER_SPECIFIC_V2
- * COMMAND_CLASS_VERSION
- * COMMAND_CLASS_SWITCH_ALL
- * COMMAND_CLASS_ASSOCIATION_V1
- * COMMAND_CLASS_METER_V3
- * **COMMAND_CLASS_CONFIGURATION**

Troubleshooting

Symptom	Cause of Failure	Recommendation
The Switch not working and LED off	1. The Switch is not connect to the Main power 2. The Switch break down	1. Check power connections 2. Don't open up the Switch and send it for repair.
The Switch LED illuminating, but cannot control the ON/OFF Switch of the load attached	Check if the load connect into the Switch has its own ON/OFF switch	Set the ON/OFF switch of the load attached to ON

The Switch LED illuminating, but the Detector cannot control the Switch	1. Not carry out association 2. Same frequency interference	1. Carry out association 2. Wait for a while to re-try
LED keep flashing 30 seconds, but cannot control	Overload occurs	Remove the load attached or check max. load cannot exceed 2500W~2700W

Specification

Operating Voltage	100 ~240VAC
Maximum Load	11A (Ampere)
Range	Minimum 30 m in door 100m outdoor line of sight
Operating Temperature	0°C ~ 40°C
Frequency Range	PAN03-1: 868.40MHz; 869.85MHz(EU) / PAN03-2 908.40MHz; 916.00MHz(USA/Canada) / PAN03-3 922.5MHz/ 923.9MHz/ 926.3MHz (Taiwan/JP)

** Specifications are subject to change and improvement without notice.



FCC ID : RHHPAN03

Warning:

- 1.Plug out to disconnect from power supply; Do not plug in line.
- 2. Do not exceed the max rating

Disposal

	This marking indicates that this product should not be disposed with other household wastes throughout the EU. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle it responsibly to promote the sustainable reuse of material resources. To return your used device, please use the return and collection systems or contact the retailer where the product was purchased. They can take this product for environmental safe recycling.
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Company of License Holder : Philio Technology Corporation
Address of License Holder : 8F.,No.653-2,Zhongzheng Rd., Xinzhuang Dist., New Taipei City 24257,Taiwan(R.O.C)

FCC Interference 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 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.

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 Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.