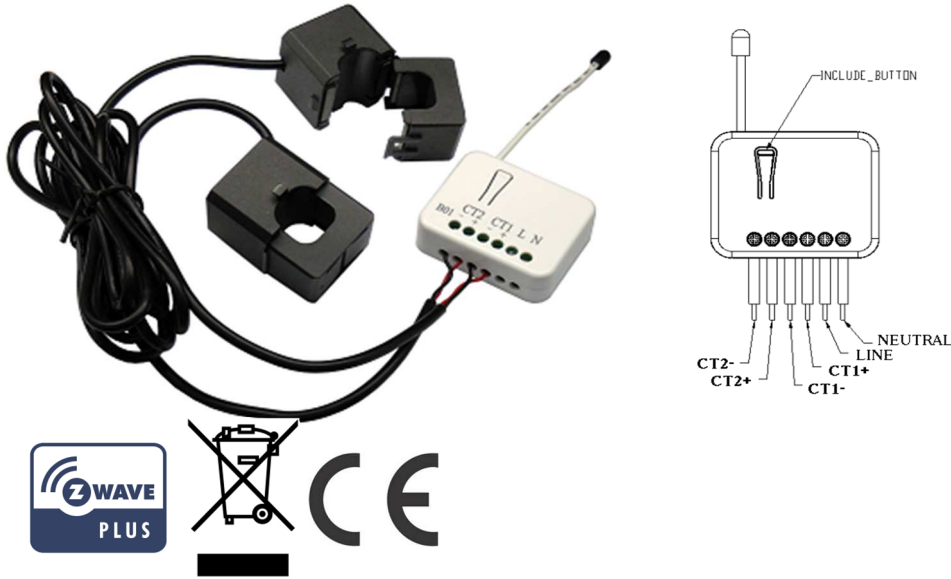


# PAB05 In Wall Smart Energy Meter



## Introduction

This dual meter module is a transceiver which is a Z-Wave™ enabled device and is fully compatible with any Z-Wave™ enabled network. 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. And it can act as repeaters within the network regardless of vendor to increase reliability of the network.

Mini size design let the module can easily hide itself into the electricity distribution box and that will be good for the house decoration.

This dual meter module is able to detect Instant power wattage (13800W/230Vac)(60 Amperes) of connected light or appliances. It can accumulate 0 to 1000000 KWH and auto recover last report energy value after power loss.

**Note :** This meter is directional. If the value of CT1 or CT2 is always 0, please reverse the direction of the clamp sensor or check config 10 and 11 are set properly.

## Safety Precautions and Installation

- Avoid installing the unit in storming or raining weather.
- Be sure to isolate or switch off power source before installing or maintenance.

- Do ensure that the power supply circuit protected by a 16A circuit breaker or suitable equivalent fuse.

## IMPORTANT

- Installation must be performed by skilled technicians who are informed about the standards and technical requirements of the appliance and its proper installation.
- Check your local codes as they apply to your situation. If the house wiring is of aluminum, consult with an electrician about proper wiring methods.

Before proceeding with the installation, TURN OFF THE POWER TO THE LIGHTING CIRCUIT AT THE CIRCUIT BREAKER OR FUSE BOX TO AVOID ELECTRICAL SHOCK.

## Specification

Operating Voltage	100-240VAC, 50-60Hz
Rated Primary Current	0.05A~60A x 2 Channel ; Split Core Transformer
Range	Minimum 40m indoor, 100m outdoor line of sight
Operating Temperature	0°C to 40°C
Humidity	Up to 85% max.
Storage Temperature	-20°C to 60°C
Location	Indoor use only
Frequency Range	868.40MHz; 869.85MHz (EU) 908.40MHz; 916.00MHz (USA/Canada) 920.90 MHz, 921.70 MHz, 923.10 MHz (Taiwan)
RF Maximum Power	+10dBm (Peak), -10dBm (Average)
Communication Protocol	Z-wave™
OTA	Support
FCC ID	RHHPAB05
Dimensions	47.5 x 39 x16 mm

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

# Installation

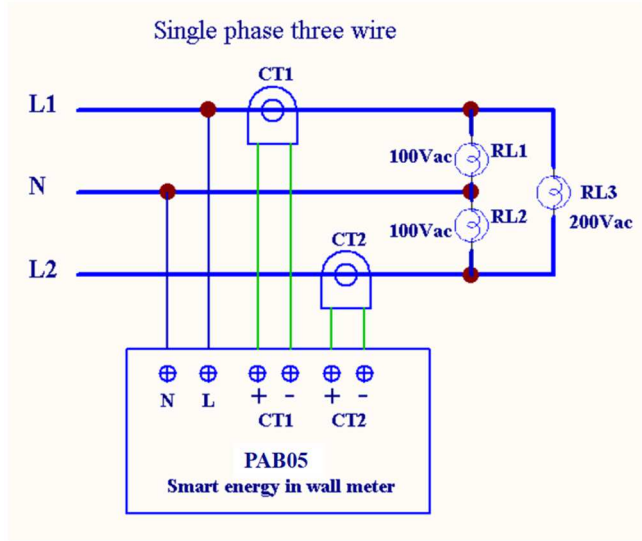


Fig 1. Assembling and wiring

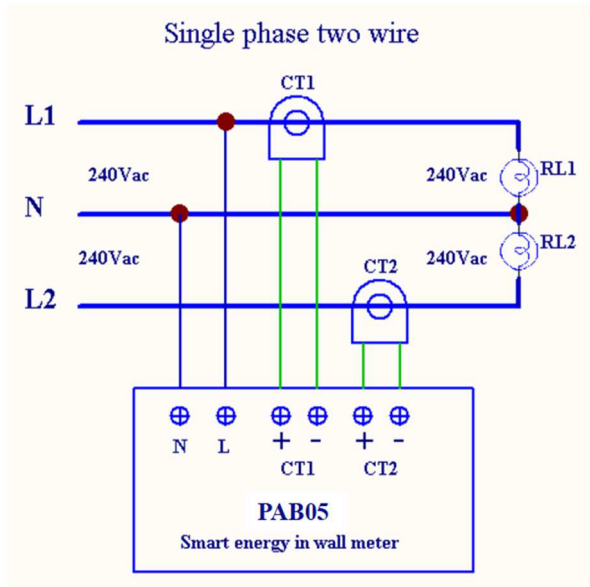


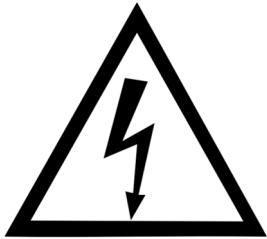
Fig 2. Assembling and wiring

# Troubleshooting

Symptom	Cause of Failure	Recommendation
The meter is not working and LED off	<ol style="list-style-type: none"> <li>The meter is not connect to the Main power</li> <li>The meter break down</li> </ol>	<ol style="list-style-type: none"> <li>Check power connections</li> <li>Don't open up the meter and send it for repair.</li> </ol>
The meter cannot report to the group	<ol style="list-style-type: none"> <li>Not carry out association</li> <li>Same frequency interference</li> </ol>	<ol style="list-style-type: none"> <li>Carry out association</li> <li>Wait for a while to re-try</li> </ol>

For Instruction to [http:// www.philio-tech.com](http://www.philio-tech.com)





**DANGER**

**Danger of electrocution!**

All works on the device may be performed only by a qualified and licensed electrician. Observe national regulations.

Any works introducing changes into the configuration must be always performed with disconnected voltage.

#### Choosing a Suitable Location

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

### Adding to Z-Wave™ Network

In the front casing, there is an on/off button with LED indicator below which is used to carry out inclusion, exclusion, reset or association. After being excluded, 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.

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 Add/Remove/Reset/Associate devices

Function	Description	LED Indication
No node ID	The Z-Wave Controller does not allocate a node ID to the meter.	LED 2-second on, 2-second off
Add (Inclusion)	1. Put your Z-Wave controller into inclusion mode by following the instructions provided by the controller manufacturer.	One press one flash LED
	2. Pressing Include button three times within 2 seconds will enter inclusion mode.	
SmartStart	1.To initiate the SmartStart process, please type in the first five digits of DSK string or scan the QR code. The QR Code can be found on PAB05 or in the box. Ex: DSK: 18112-24021-58001-62259-57092- 27453-08187-47408	
	2. PAB05 is supported with SmartStart, it can be added to Z-Wave™ network by scanning the Z-Wave™ QR code on the product.	
	3.Without further actions, PAB05 will be automatically included in a certified Z-Wave™ Controller with SmartStart inclusion ability in 10 minutes after it turned on.	

Remove (Exclusion)	1. Put your Z-Wave controller into exclusion mode by following the instructions provided by the controller manufacturer.	One press one flash LED
	2. Pressing Include button three times within 2 seconds will enter exclusion mode.	
	3. Node ID has been excluded.	LED 0.5s On, 0.5s Off (Enter auto inclusion)
Reset	1.Pressing INCLUDE_BUTTON three times within 2 seconds will enter inclusion mode.	Use this procedure only in the event that the primary controller is lost or otherwise inoperable.
	2.Within 1 second, press Include button again for 5 seconds.	
	3.IDs are excluded.	LED 0.5s On, 0.5s Off (Enter auto inclusion)
Association	1.The PAB05 is an always listening Z-Wave device, so associations be added or removed by a controller at any time.Or If your controller requires to have the PAB05 send a 'node information frame' or NIF for associations, pressing the On/Off button three times within 2 seconds will cause the PAB05 to send its NIF.	LED One press one flash
	2. There are 3 groups for the meter	
<p>★ Adding a node ID allocated by Z-Wave Controller means inclusion. Removing a node ID allocated by Z-Wave Controller means exclusion.</p> <p>★ Failed or success in including/excluding the node ID can be viewed from the Z-Wave Controller.</p>		

### LED Indication

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

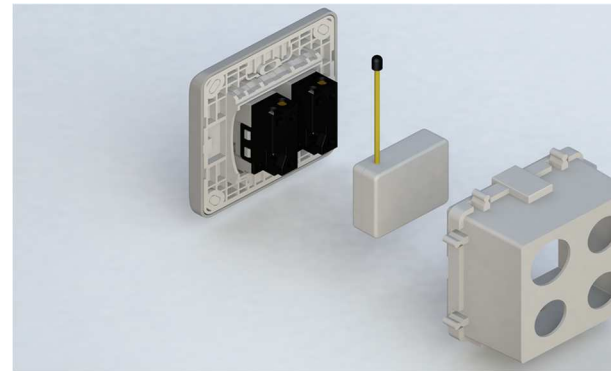
State Type	LED Indication
No node ID	Under normal operation, when the meter has not been allocated a node ID, the LED flashes on and off alternately at 2 seconds

	intervals.
Learning	When PAB05 is in learning mode, LED flashes on and off alternately and repeatedly at 0.5 second intervals.

### Choosing a Suitable Location

1. Do not locate the meter 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 meter where exists combustible substances or any source of heat, e.g. fires, radiators, boiler etc.
4. After putting it into use, the body of meter will become a little bit hot of which phenomenon is normal.

### Installation



1. Put the meter into a wall box and connect the AC power wire L,N to PAB05 connector L, N.
2. The black wire of current sensor, CT1 or CT2, should connected to the negative terminal of PAB05,CT1- or CT2-. Another wire should connected to the plus terminal of PAB05,CT1+ or CT2+.
3. There is a clasp on the side of the current sensor, it can lock or unlock the clamp. It is convenient to circle the already connected cable.

### Programming

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

The meter can be set to send reports to associated Z-Wave devices. It supports 2 association groups which every group has one node support. Group1~Group2 support METER\_REPORT\_COMMAND\_V3

For group 1, the Switch will report : (1) Instant Power Consumption (Watt) read from CT1 · (2) Accumulated Power Consumption (KWh) read from CT1.

For group 2, the Switch will report : (1) Instant Power Consumption (Watt) read

from CT2 , (2) Accumulated Power Consumption (KWh) read from CT2.

## 2. Auto report to Grouping 1 ~2 (Maximum 1 node per Group)

### 2-1 Instant Power Consumption vary over 10% report

When the instant power consumption read from CT1 or CT2 vary over 10%, it will send Meter report to the node of Group

Meter Report Command: [**Command Class Meter , Meter Report , Rate Type = 0x01 , Meter Type = 0x01 , Precision = 1 , Scale = 0x02 , Size = 4 , Meter Value (W)**]

### 2-2 Response to Meter Get Command

The Switch will report : (1) instant Power Consumption (Watt), (2) accumulated power consumption(KWH), (3) AC input Voltage (V), (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)

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 , Rate Type = 0x01 , Meter Type = 0x01 , Precision = 2 , Scale = 0x02 , Size = 4 , Meter Value (W) ]**

Example:

Meter Value 1 = 0x00 (W)

Meter Value 2 = 0x00 (W)

Meter Value 3 = 0x27 (W)

Meter Value 4 = 0x25 (W)

Meter(W) = Meter Value 3 \*256 + Meter Value 4 = 100.21W

#### 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 , Rate Type = 0x01 , Meter Type =0x01 , Precision = 2 , Scale = 0x00 , Size = 4 , Meter Value (KWh) ]**

Example:

Scale = 0x00 (KWh)

Precision = 2

Size = 4 Bytes (KWh)

Meter Value 1 = 0x00(KWh)

Meter Value 2 = 0x01(KWh)

Meter Value 3 = 0x38(KWh)

Meter Value 4 = 0xA3(KWh)

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

Whenever re-start counting the accumulated power consumption is needed, you can use Meter Reset Command to clear it.

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

### 2-2-4 AC input 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)**]

[**Command Class Meter , Meter Report , Rate Type = 0x01 , Meter Type = 0x01 , Precision = 1 , Scale = 0x04 , Size = 2 , Meter Value(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 , Rate Type = 0x01 , Meter Type = 0x01 , Precision = 2 , Scale = 0x05 , Size = 2 , Meter Value(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.  
 If the value of configuration parameter 3 is 1, it will report the power factor of CT1, but not the sum of PF of CT1 and CT2.

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

**Meter Report Command:**  
**[Command Class Meter , Meter Report , Rate Type = 0x01 , Meter Type = 0x01 , Precision = 2 , Scale = 0x06 , Size = 1 Bytes , Meter Value(PF)]**

Example:  
 Scale = 0x06 (PF)  
 Precision = 2  
 Size = 1 (1 Byte of PF)  
 Meter Value 1 = 0x63(PF) (It means that the load power factor is 0.99)

**2-3 Multi Channel Command Class Version 4**  
 PAB05 also support multi channel command class(version 4), which include METER\_SUPPORTED\_GET, METER\_RESET, METER\_GET.  
 You may get report from 3 endpoint of PAB05

**2-3-1 METER\_SUPPORTED\_GET :**

This command is to ask the endpoint of PAB05 what kind of meter data can be reported.

The example show how to get the meter report type

COMMAND_CLASS_MULTI_CHANNEL	
MULTI_CHANNEL_CMD_ENCAP	
Source End Point = 0x01	(this is the endpoint of command inquirer here we assume endpoint is 1 , if the inquirer doesn't support multi Channel this value will be 0)
(Bit Address+Destination End Point = 0x03)	(Bit Address =0 ; Destination End Point range1~3)
Command Class = 0x32	( Command_Class_Meter_V3 = 0x32)
Command =0x03	(Meter_Supported_Get = 0x03)

Below is the example show PAB05 report to last command

COMMAND_CLASS_MULTI_CHANNEL	
MULTI_CHANNEL_CMD_ENCAP	
Source End Point = 0x03	
(Bit Address+Destination End Point = 0x01)	
Command Class = 0x32	(Command_Class_Meter_V3 = 0x32)

Command =0x04	(Meter_Supported_Report = 0x04)
Parameter 1 = 0x81	(Meter Reset =1 , Meter Type=0x01)
Parameter 2 = 0x75	(Scale Supported = KWh+W+V+I+Power Factor = 0x75)

### 2-3-4 METER\_RESET

This command is to reset the Accumulated Power Consumption (KWh) to 0

The example show how to reset the KWh

COMMAND_CLASS_MULTI_CHANNEL	
MULTI_CHANNEL_CMD_ENCAP	
Source End Point = 0x03	(this is the endpoint of command inquirer, here we assume endpoint is 1 , if the inquirer doesn't support multi Channel this value will be 0)
(Bit Address+Destination End Point = 0x01)	(Bit Address =0 ; Destination End Point range1~2)
Command Class = 0x32	( Command_Class_Meter_V3 = 0x32)
Command =0x05	( Meter_Reset = 0x05)

### 2-3-5 METER\_GET :

Using meter get command to get the KWH, W, V, I, PF from endpoint of PAB05

2-3-5-1 Get KWH from endpoint

Meter\_GET example:

COMMAND_CLASS_MULTI_CHANNEL	
MULTI_CHANNEL_CMD_ENCAP	
Source End Point = 0x05	(this is the endpoint of command inquirer, here we assume endpoint is 5 , if the inquirer doesn't support multi Channel this value will be 0)
(Bit Address+Destination End Point = 0x01)	(Bit Address =0 ; Destination End Point range1~2)
Command Class = 0x32	( Command_Class_Meter_V3 = 0x32)
Command =0x01	(Meter_Get = 0x01)
Parameter 1 = 0x00	(Scale = KWH = 0x00)

Accumulated power consumption (KWH) Report example :

COMMAND_CLASS_MULTI_CHANNEL	
MULTI_CHANNEL_CMD_ENCAP	
Source End Point = 0x01	(Meter report = Endpoint3)
(Bit Address+Destination End Point = 0x05)	(Bit Address =0 ; Destination End Point = command inquirer's Endpoint value)
Command Class = 0x32	(Command_Class_Meter_V3 = 0x32)
Command =0x02	(Meter_Report = 0x02)
Parameter 1 = 0x21	(Scale Bit2 = 0 , Rate Type = 0x01 ,

	Meter Type=0x01)
Parameter 2 = 0x44	(Precision = 2 , Scale Bit1Bit0 = 0 , Size = 4)
Parameter 3 = 0x00	Accumulated Power Consumption =
Parameter 4 = 0x00	0x000005FD = 15.33 KWh
Parameter 5 = 0x05	
Parameter 6 = 0xFD	

### 2-3-5-2 Get Instant Power Consumption (Watt) from endpoint

METER\_GET example :

COMMAND_CLASS_MULTI_CHANNEL	
MULTI_CHANNEL_CMD_ENCAP	
Source End Point = 0x05	(this is the endpoint of command inquirer, here we assume endpoint is 5 , if the inquirer doesn't support multi Channel this value will be 0)
(Bit Address+Destination End Point = 0x03)	(Bit Address =0 ; Destination End Point range 1~3)
Command Class = 0x32	( Command_Class_Meter_V3 = 0x32)
Command =0x01	(Meter_Get = 0x01)
Parameter 1 = 0x10	(Scale = W = 0x02)

PAB05 Instant Power Consumption (W) Report example :

COMMAND_CLASS_MULTI_CHANNEL	
MULTI_CHANNEL_CMD_ENCAP	
Source End Point = 0x03	(Meter report = Endpoint3)
(Bit Address+Destination End Point = 0x05)	(Bit Address =0 ; Destination End Point = command inquirer's Endpoint value)
Command Class = 0x32	(Command_Class_Meter_V3 = 0x32)
Command =0x02	(Meter_Report = 0x02)
Parameter 1 = 0x21	(Scale Bit2 = 0 , Rate Type = 0x01 , Meter Type=0x01)
Parameter 2 = 0x34	(Precision = 2 , Scale Bit1Bit0 = 0x02 , Size = 4)
Parameter 3 = 0x00	Instant Power Consumption =
Parameter 4 = 0x00	0x00002725
Parameter 5 = 0x27	= 100.21W
Parameter 6 = 0x25	

### 2-3-5-3 Get load voltage V from endpoint

Meter\_GET example:

COMMAND_CLASS_MULTI_CHANNEL	
-----------------------------	--



MULTI_CHANNEL_CMD_ENCAP	
Source End Point = 0x05	(this is the endpoint of command inquirer, here we assume endpoint is 5 · if the inquirer doesn't support multi Channel this value will be 0)
(Bit Address+Destination End Point = 0x03)	(Bit Address =0 ; Destination End Point range1~3)
Command Class = 0x32	( Command_Class_Meter_V3 = 0x32)
Command =0x01	(Meter_Get = 0x01)
Parameter 1 = 0x20	(Scale = V = 0x04)

PAB05 AC input Voltage report example :

COMMAND_CLASS_MULTI_CHANNEL	
MULTI_CHANNEL_CMD_ENCAP	
Source End Point = 0x03	(Meter report = Endpoint3)
(Bit Address+Destination End Point = 0x05)	(Bit Address =0 ; Destination End Point = command inquirer's Endpoint value)
Command Class = 0x32	(Command_Class_Meter_V3 = 0x32)
Command =0x02	(Meter_Report = 0x02)
Parameter 1 = 0xA1	(Scale Bit2 = 1 · Rate Type = 0x01 ·

	Meter Type=0x01)
Parameter 2 = 0x22	(Precision = 1 · Scale Bit1Bit0 = 0x00 · Size = 2)
Parameter 3 = 0x09	Voltage = 0x0910 = 232.0V
Parameter 4 = 0x10	

### 2-3-5-4 Get load current I from endpoint

Meter\_GET example:

COMMAND_CLASS_MULTI_CHANNEL	
MULTI_CHANNEL_CMD_ENCAP	
Source End Point = 0x05	(this is the endpoint of command inquirer, here we assume endpoint is 5 · if the inquirer doesn't support multi Channel this value will be 0)
(Bit Address+Destination End Point = 0x03)	(Bit Address =0 ; Destination End Point range1~3)
Command Class = 0x32	( Command_Class_Meter_V3 = 0x32)
Command =0x01	(Meter_Get = 0x01)
Parameter 1 = 0x28	(Scale = A = 0x05)

PAB05 AC input current (I) example :

COMMAND_CLASS_MULTI_CHANNEL	
MULTI_CHANNEL_CMD_ENCAP	
Source End Point = 0x03	(Meter report = Endpoint3)
(Bit Address+Destination End Point = 0x05)	(Bit Address =0 ; Destination End Point = command inquirer's Endpoint value)
Command Class = 0x32	(Command_Class_Meter_V3 = 0x32)
Command =0x02	(Meter_Report = 0x02)
Parameter 1 = 0xA1	(Scale Bit2 = 1 , Rate Type = 0x01 , Meter Type=0x01)
Parameter 2 = 0x4A	(Precision = 2 , Scale Bit1Bit0 = 0x01 , Size = 2)
Parameter 3 = 0x00	Current = 0x002B = 0.43A
Parameter 4 = 0x2B	

### 2-3-5-5 Get power factor PF from endpoint

Meter\_GET example:

COMMAND_CLASS_MULTI_CHANNEL	
MULTI_CHANNEL_CMD_ENCAP	
Source End Point = 0x05	(this is the endpoint of command inquirer, here we assume endpoint is 5 , if the inquirer doesn't support multi Channel this value will be 0)

(Bit Address+Destination End Point = 0x03)	(Bit Address =0 ; Destination End Point range1~3)
Command Class = 0x32	( Command_Class_Meter_V3 = 0x32)
Command =0x01	(Meter_Get = 0x01)
Parameter 1 = 0x30	(Scale = PF = 0x06)

PAB05 power factor report example :

COMMAND_CLASS_MULTI_CHANNEL	
MULTI_CHANNEL_CMD_ENCAP	
Source End Point = 0x03	(Meter report = Endpoint3)
(Bit Address+Destination End Point = 0x05)	(Bit Address =0 ; Destination End Point = command inquirer's Endpoint value)
Command Class = 0x32	(Command_Class_Meter_V3 = 0x32)
Command =0x02	(Meter_Report = 0x02)
Parameter 1 = 0xA1	(Scale Bit2 = 1 , Rate Type = 0x01 , Meter Type=0x01)
Parameter 2 = 0x51	(Precision = 2 , Scale Bit1Bit0 = 0x10 , Size = 1)
Parameter 3 = 0x63	Power Factor = 0x63 = 0.99

Note : If the Destination End Point is 1, it will report the power factor of CT1, but not

the sum of PF of CT1 and CT2.

### 3. Multi Channel Association (2 groups and maximum 1 node per group)

The Multi Channel Association Command Class is used to create application bindings to Multi Channel End Point resources as well as to Root Devices. The command class can handle nodes with and without end points.

### 4. Z-Wave's Configuration

Configuration Parameter	Function	Size (Byte)	Value	Unit	Default	Description
1	Watt Meter Report Period	2	1-32767	5s	720	$5*720s=3600s=1 \text{ hour}$
2	KWH Meter Report Period	2	1-32767	10mins	6	$10m*6=60mins=1 \text{ hour}$
3	Threshold of Current for Load Caution	2	10-6000	0.01A	6000	$6000*0.01A=60A$
4	Threshold of KWH for Load Caution	2	1-10000	1KWh	10000	
5	Watt differential report	1	0-4	10%	1	0:Disable $10\%*1=10\%$
6	Voltage Value Report Enable	1	0-1		1	0:Disable 1:Enable
7	Current Value	1	0-1		1	0:Disable 1:Enable

	Report Enable					
8	PF Value Report Enable	1	0-1		1	0:Disable 1:Enable
9	KWH Value Report Enable	1	0-1		1	0:Disable 1:Enable
10	Channel 1 Meter Rate Type	1	1-3		1	1:Import only 2:Export only 3:Both
11	Channel 2 Meter Rate Type	1	1-3		1	1:Import only 2:Export only 3:Both
12	Channel 1 Import KWH Value	4	0-10000000	0.01K WH	0	$10000000*0.01=1000000 \text{ (max)}$
13	Channel 1 Export KWH Value	4	0-10000000	0.01K WH	0	$10000000*0.01=1000000 \text{ (max)}$
14	Channel 2 Import KWH Value	4	0-10000000	0.01K WH	0	$10000000*0.01=1000000 \text{ (max)}$
15	Channel 2 Export KWH Value	4	0-10000000	0.01K WH	0	$10000000*0.01=1000000 \text{ (max)}$

#### 4-1 Watt Meter Report Period:

If the setting is configured for 1hour (set value =720), the PAB05 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 ( $5s*32767/3600=45hr$ ).

#### 4-2 KWH Meter Report Period:

If the setting is configured for 1hour (set value =720), the PAB05 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 45 hours ( $5s*32767/3600=45hr$ ).

#### 4-3 Threshold of Current for Load Caution

This is a warning when the current of load over the preset threshold value, If the setting value is 6000, when the load wattage of CT1 or CT2 over 60A, PAB05 will send current Meter Report command to the node of correspond Group.

#### 4-4 Threshold of KWh for Load Caution

This is a warning when the KWh of load over the preset threshold value, If the setting value is 10000, when the Accumulated Power Consumption of CT1 or CT2 over this value, PAB05 will send KWh Meter Report command to the node of correspond Group, minim value is 1KWh and default value is 10000 kWh

#### 4-5 Watt differential report mode :

1. Disable : The function of Watt differential report will be disabled.
2. 10% : When the differential value of Watt is over 10%, PAB05 will send a meter report to the associated group.
3. 20% : When the differential value of Watt is over 20%, PAB05 will send a meter report to the associated group.
4. 30% : When the differential value of Watt is over 30%, PAB05 will send a meter report to the associated group.
5. 40% : When the differential value of Watt is over 40%, PAB05 will send a meter report to the associated group

#### 4-6 Voltage Value Report Enable, Current Value Report Enable, PF Value Report Enable and KWH Value Report Enable

If these configurations are set to 1, when watt differential report is triggered, PAB05 will report voltage, current, watt, KWH and PF value.

If these configurations are set to 0, when watt differential report is triggered, PAB05

only reports watt value.

#### 4-7 Channel 1 Meter Rate Type, Channel 2 Meter Rate Type

1. import only mode: In this mode, PAB05 only accumulate import energy and report import energy value.
2. Export only mode: In this mode, PAB05 only accumulate export energy and report export energy value.
3. Both mode: In this mode, PAB05 will identify energy type is import or export and will reports import energy value and export energy value at the same time.

#### 4-8 Channel 1 Import KWH Value, Channel 1 Export KWH Value, Channel 2 Import KWH Value and Channel 2 Export KWH Value

PAB05 will start accumulating from user setting value. The default value is 0 and value can be set 0 to 100000000.

### 5.Firmware update over the air (OTA)

PAB05 is based on 800 series SoC and supports Firmware Update Command Class, it can receives the updated firmware image sent by controller via the Z-wave RF media. It is a helpful and convenient way to improve some function if needed.

### 6.Command Classes

The Switch supports Command Classes including...

Command Class	Version	Required Security Class
Z-Wave Plus Info	2	None
Security 0	1	None
Security 2	1	None
Supervision	1	None
Transport Service	2	None
Association	2	Highest granted Security Class
Association Group Information	3	Highest granted Security Class

Configuration	4	Highest granted Security Class
Device Reset Locally	1	Highest granted Security Class
Firmware Update Meta Data	5	Highest granted Security Class
Indicator	3	Highest granted Security Class
Manufacturer Specific	2	Highest granted Security Class
Meter	6	Highest granted Security Class
Multi Channel Association	3	Highest granted Security Class
Multi Channel Command	4	Highest granted Security Class
Notification	8	Highest granted Security Class
Powerlevel	1	Highest granted Security Class
Version	3	Highest granted Security Class

**Warning:**

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

**Disposal**

	<p>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.</p>
--	---

Philio Technology Corporation

8F., No. 653-2, Zhongzheng Rd., Xinzhuang Dist., New Taipei City

24257,Taiwan(R.O.C)

**www.philio-tech.com**

**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.

**警語:**

「取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

低功率射頻器材之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。

前述合法通信，指依電信管理法規定作業之無線電通信。低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。」