

Valves Controller with Water Meter PAB04

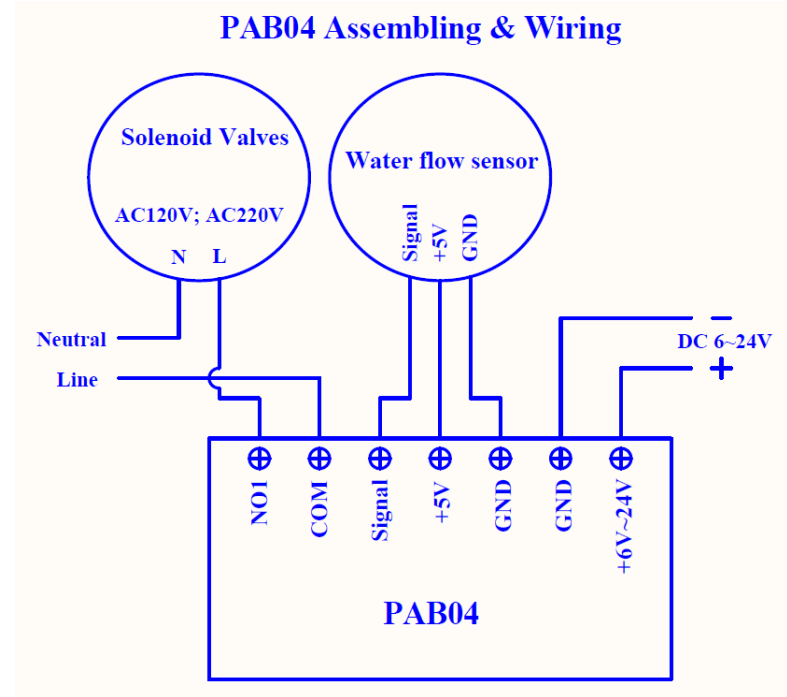
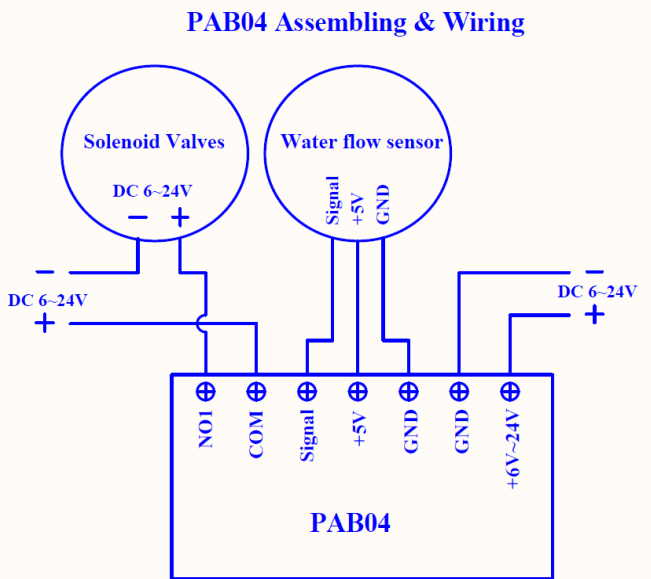


Fig 1. PAB04 Assembling & Wiring
Fig 2. PAB04 Assembling & Wiring



This valves controller PAB04 is a security enabled wireless switch, based on Z-Wave Plus technology. Z-Wave Plus™ enabled devices displaying the Z-Wave Plus™ logo can also be used with it regardless of the manufacturer, and can also be used in other manufacturer's Z-Wave™ enabled networks. Remote On/Off control of the connected valve is possible with other manufacturer's wireless Controller. The switch is designed to act as a repeater. Repeaters will re-transmit the RF signal to ensure that the signal is received by its intended destination by routing the signal around obstacles and radio dead spots. Because PAB04 supports Security Command Class, it can learn with Secured controller. Its functionality and supported command classes is identical when included as a secure and non-secure device.

This valves controller is able to detect instance water flow and the accumulated water

Specification

Input Operating Maximum (PAB04)	DC 6V-24V, 0.7A
Input Maximum load (Relay COM- NO1)	5A (Resistive load) (Dry contact relay)
Output Maximum load (Relay COM- NO1)	5A (Resistive load) (Dry contact relay)
Output Maximum (Water flow sensor)	DC 5V, 0.3A
Operating Temperature	-10°C ~ 40° C
Storage Temperature	-20°C ~ 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)
Range	Minimum 40 m in door 100m outdoor line of sight
RF Maximum Power	+5dBm (peak), -10dBm (Average)
FCC ID	RHHPAB04

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

Troubleshooting

Symptom	Cause of Failure	Recommendation
The Switch not working and LED off	1. The Switch is not plugged into the electrical outlet properly 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 plugged 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
Meter Report value is a lot different to the actual value.	The configuration parameter of pulse count per litter is a wrong value.	Check the specification of meter and set an appropriated value.

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.

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



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. Do not locate the Module where exists combustible substances or any source of heat, e.g. fires, radiators, boiler etc.
3. 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 a leaning button with LED indicator which is used to carry out inclusion, exclusion, reset or association. You can easily on/off the internal relay to switch the on/off state of the external valve by shortly pressing the button once.

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/associate devices

Function	Description	Annotation
No node ID	The Z-Wave Controller does not allocate a node ID to the Switch.	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.	2. LED is on when key pressed and LED is off when key released.
	2. Pressing On/Off button three times within 2 seconds will enter inclusion mode.	
Remove (Exclusion)	1. Put your Z-Wave controller into exclusion mode by following the instructions provided by the controller manufacturer.	2. LED is on when key pressed and LED is off when key released.
	2. Pressing On/Off button three times within 2 seconds will enter exclusion mode.	
	Node ID has been excluded.	
Reset	1. Pressing On/Off 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 On/Off button again for 5 seconds.	

	3. IDs are excluded.	
Association	1. The PAB04 is an always listening Z-Wave device, so associations may be added or removed by a controller at any time. Or If your controller requires to have the PAB04 send a 'node information frame' or NIF for associations, then pressing the On/Off button three times within 2 seconds will cause the PAB04 to send its NIF.	
	2. There are only one group for the switch	
Adding a node ID allocated by Z-Wave Controller means inclusion. Removing 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	When the connected valve is switch on by short pressing button once or RF command, the LED will lights up. When the connected valve is switch off by short pressing key once or RF command, the LED will lights off.
No node ID	Under normal operation, when the dimmer has not been allocated a node ID, the LED flashes on and off alternately at 2-second intervals.
Learning	When we press learn button to enter learn mode, the LED will on. When the learn button is released, the LED will off.

Installation

1. If the connected valve is used the same power, DC 6V~24V, with PAB04. Please refer to Fig1.
2. Or if the connected valve is used the AC power 120V or 220V. Please refer to Fig2.

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

Upon receipt of the following commands from a Z-Wave Controller, the Switch will report the On/Off state of the connected valve.

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 connected valve will be turned on or off.

[Command Class Basic, Basic Set, Value = 255(0xFF)] : the connected valve turns on.
[Command Class Basic, Basic Set, Value = 0] : the connected valve turns off.
[Command Class Switch Binary, Switch Binary Set, Value = (255)0xFF] : the

connected valve turns on.
[Command Class Switch Binary, Switch Binary Set, Value = 0] : the connected valve turns off.

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

The Switch can be set to send reports to associated Z-Wave devices. It supports one association group with 5 nodes support for Grouping 1. For group 1, Lifeline, the Switch will report its latest status to Z-Wave Controller.

Grouping 1 Lifeline supports SWITCH_BINARY_REPORT · METER_REPORT · SENSOR_MULTILEVEL_REPORT and RESET_LOCALLY_NOTIFICATION.

2-1 Auto report to Grouping 1 (Maximum 5 Nodes)

2-1-1 On/Off Event Report

When "on" or "off" state of the connected valve has been changed, it will send Binary Switch Report to the node 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 water flow vary over 10% report

In default, when the instant water flow vary over 10%, it will send SENSOR_MULTILEVEL_REPORT to the nodes of Grouping 1. In order to avoid too frequent report, it will not report when the instant water flow vary lower than the configured percentage of a liter.

Multilevel Sensor Report Command: [Command Class Multilevel Sensor · Multilevel Sensor Report · Sensor Type = 0x38 · Precision = 1 · Scale = 0x00 · Size = 4 · Water Flow Value (Liter/hour)]

2-2 Response to Meter Get Command

The Switch will report its accumulated water of Cubic meters (KL) (0x00) or US gallons (0x02) to Z-Wave Controller after receive the Meter Get Command from Z-Wave Controller.

2-2-1 Accumulated Water (KL)

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

Meter Get Command: [Command Class Meter, Meter Get, Scale =0x00(KL)]
Meter Report Command: [Command Class Meter , Meter Report , Rate Type = 0x01 , Meter Type = 0x03 , Precision = 1 , Scale = 0x00 , Size = 4 , Meter Value(KL)]

Example:

Meter Value 1 = 0x00

Meter Value 2 = 0x00

Meter Value 3 = 0x03

Meter Value 4 = 0xEA

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

2-2-2 Accumulated Water (US gallons)

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

Meter Get Command: [Command Class Meter, Meter Get, Scale = 0x02 (US Gallon)]
Meter Report Command: [Command Class Meter , Meter Report , Rate Type = 0x01 , Meter Type = 0x03 , Precision = 1 , Scale = 0x02 , Size = 4 , Meter Value (US Gallon)]

Example:

Scale = 0x02 (US Gallon)

Precision = 1

Size = 4 Bytes

Meter Value 1 = 0x00

Meter Value 2 = 0x01

Meter Value 3 = 0x38

Meter Value 4 = 0xA3

Accumulated water (US Gallon) = (Meter Value 2*65536) + (Meter Value 3*256) + (Meter Value 4) = 8003.5 (US Gallon)

2-2-3 Clearing accumulated water flow

Whenever re-start counting the accumulated water flow is needed, you

can use Meter Reset Command to clear it.

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

3. Z-Wave's Configuration

No.	Function	Size (Byte)	Value	Unit	Default	Description
1	Unit of Accumulated Water Flow	1	1~2		2	1 : US Gallon 2. KL
2	Threshold of Accumulated Water Flow	2	0~255		1	0 : Disable accumulated meter report 1~255 : 1~255 US Gallon or KL
3	Differential of Instant Water Flow	1	0~100		10	0 : Disable instant water flow Report 1~100 : 1% ~ 100%
4	Pulse count per liter	2	1-0x7FFF	Pulse/L	450	450 Pulse/L
5	Electric Solenoid Valve Control mode	1	0-1		0	0 : NC 1 : NO
6	Periodic Auto Report Timer	2	0-1440	min	60	0 : Disable Periodic Auto Report 1~1440 : 1min ~ 1440 min
7	Remember Last Switch State mode	1	0-1		0	0 : Disable 1 : Enable

3-1 Unit of Accumulated Water Flow

If the setting is configured for accumulated cubic meters (set value =2), PAB04 will report its accumulated water flow every 1 hour to Group1 nodes. The default

setting value is KL.

3-2 Threshold of Accumulated Water Flow

When the accumulated water is over the threshold of accumulated water flow, PAB04 will send meter report of its Accumulated water flow (KL or US gallon) to Group1 nodes. For example : If the threshold of accumulated water flow is set as 1KL. PAB04 will send meter report whenever it detects the accumulated water flow crossing over 1KL 、 2KL 、 3KL 、 ...etc.

3-3 Differential of Instant Water Flow

When the variation of instant water flow is over the differential, PAB04 will send Multilevel Sensor report (Liter/h) to group1 nodes. In order to avoid too frequent report, it will not report when the instant water flow vary lower than the configured percentage of one liter.

3-4 Pulse count per liter

The calculation of accumulated water flow and instant water flow is based on this value of the attached meter. Check the specification of the water meter, you can find Pulse Frequency. For example : 7.5Q, Q is flow rate in L/min. Then the pulse count per liter will be 450, this value is count from 7.5 (L/min) multiply 60 seconds.

3-5 Electric Solenoid Valve Control mode

If the Electric Solenoid Valve control mode is set as 0 (NC), it will turn on the valve by closing the relay contact. If the Electric Solenoid Valve control mode is set as 1 (NO), it will turn on the valve by opening the relay contact.

3-6 Periodic Auto Report Timer

The auto report timer define how long will PAB04 report the meter report of accumulated water flow. At the same time it also sand the Multilevel Sensor report of instant water flow and Switch Binary Report of the state of the connected valve.

3-7 Remember Last Switch State mode

When this mode is enable, PAB04 will remember the last switch state. After the power reconnect, it will restore the switch state before power lost. The default setting is 0 (disable).

4. Firmware update over the air (OTA)

PAB04 is based on 500 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.

5. Command Classes

The PAB04 supports Command Classes including...

Command Class	Version	Required Security Class
Association	2	Highest granted Security Class
Association Group Information	1	Highest granted Security Class
Basic	1	Highest granted Security Class
Configuration	1	Highest granted Security Class
Device Reset Locally	1	Highest granted Security Class
Firmware Update Meta Data	4	Highest granted Security Class
Manufacturer Specific	2	Highest granted Security Class
Multilevel Sensor	9	Highest granted Security Class
Powerlevel	1	Highest granted Security Class
Security 0	1	None
Security 2	1	None
Switch Binary	1	Highest granted Security Class
Meter	2	Highest granted Security Class
Supervision	1	None
Transport Service	2	None
Version	3	Highest granted Security Class
Z-Wave Plus Info	2	None

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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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。」