

## INSTALLATION MANUAL

# Variable Water Flow Control Kit

- Please read this installation manual completely before installing the product.
- Installation work must be performed in accordance with the national wiring standards by authorized personnel only.
- Please retain this installation manual for future reference after reading it thoroughly.

MODEL : PWFCKN000



P/NO : MFL42540232

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# Safety Precautions



To prevent injury to the user or other people and property damage, the following instructions must be followed.

- Incorrect operation due to ignoring instruction will cause harm or damage. The seriousness is classified by the following indications.

**⚠ WARNING** This symbol indicates the possibility of death or serious injury.

**⚠ CAUTION** This symbol indicates the possibility of injury or damage.

- Meanings of symbols used in this manual are as shown below.

	<b>Be sure not to do.</b>
	<b>Be sure to follow the instruction.</b>

## ⚠ WARNING

### ■ During installation

**Be sure to turn off  
Outside unit power  
Before installation.**

**Please install the  
designated location in the  
Control box.**

**Do not touch the board  
when the power is  
connected .**

- It can cause the breakdown or accident.

- It can cause a fire, electric shock, explosion, injury and problem to the product.

**Always request for installation of the  
product to the service center or the  
installation service provider.**

- It can cause a fire, electric shock, explosion and injury.

**When reinstalling the previously  
installed product, request for service to  
the service center or the installation  
service provider.**

- It can cause a fire, electric shock, explosion and injury.

■ **During use**

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**Do not modify or extend the Provided wires.**

- It can cause a fire and electric shock.

**Do not pour water inside the product.**

- It can cause an electric shock and problem to the product.

**When the product is submersed in water, always request for service to the service center or the installation service provider.**

- It can cause a fire and electric shock.

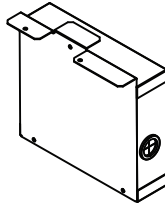
**Make the children and the elderly use the product with the help of a guardian.**

- It can cause a safety accident and problems to the product.

**Do not give impact to the product.**

- It can cause problem to the product.

# Accessory Parts



Controller Assy  
(Variable Water Flow Control Board,  
Transformer, Terminal Block, Harness Single)



Screw(2EA)

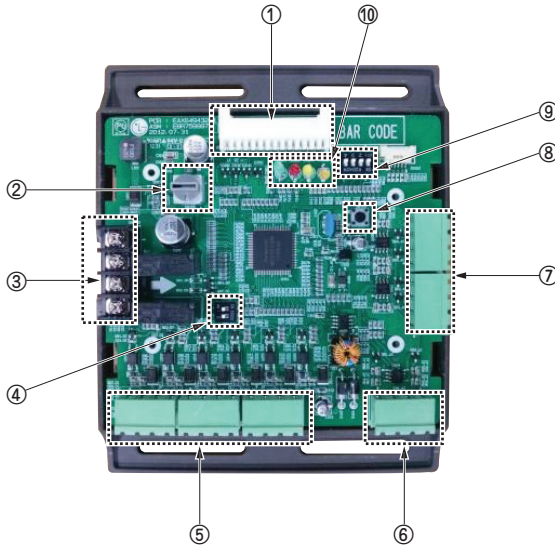


Manual



Tie (1EA)

# Name of each Part



- ① **Main connector** : Power input and communication connector with Outside Unit
- ② **SW104** : Rotary Switch for setting capacity control step
- ③ **Digital Output** : Operating & Error status Relay output (DDC output AC 1A at 250V source)
- ④ **SW102** : Switch for setting internal function
- ⑤ **Digital Input** : Dry contact input
- ⑥ **Analog Input** : DC 0~10V Analog signal input
- ⑦ **Analog Output** : DC 0~10V Analog signal output
- ⑧ **SW103** : Reset Switch
- ⑨ **SW101** : DIP Switch for setting operating function
- ⑩ **LED** : Indicate VWFC\*(board) status
  - LED1C(Green) : communication status (receive)
  - LED2C(Red) : communication status (transfer)
  - LED3C(Yellow) : Communication error status
  - LED4C(Orange) : Power status

\* Variable Water Flow Control Kit

# Variable Water Flow Control kit – Functions summary

## Variable Water Flow Control

This function can be applied to save pump operation power by optimizing water flow rate by interlocking between electric valve and MULTI V WATER IV operation. Depends on MULTI V WATER IV operation cycle, Variable Water Flow Control Kit(Board) outputs analog signal (0~10V) to electric valve.

## CAUTION

**Please keep water flow rate more than 40% of rated water flow indicated MULTI V WATER IV PDB**

### Demand control

- This function is to reduce Outside Unit power consumption by using input signal. This manual provides variable setting to control outside unit capacity according to input method. This function supports 2 types of input signal : AI(0~10V) and contact signal(3 Step).

### Output Outside or Indoor Unit Operation status

- This function displays outside or indoor unit's operation status. Depends on DIP switch setting, either outside or indoor unit operation status is reflected through output signal.

### Output Outside or Indoor Unit Error Status Signal

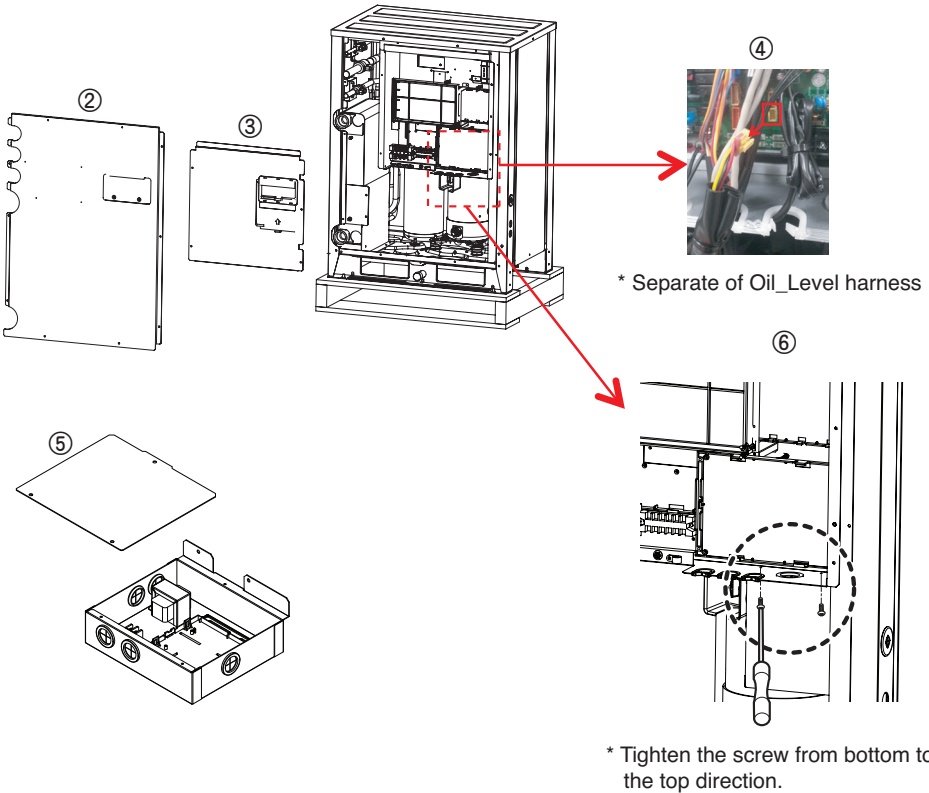
- This function displays error signal by digital output when either outside or indoor unit has an error

# Installation Method

## Variable Water Flow Control kit Installation Method

- ① Be sure to turn off outside unit power before installaion.
- ② Separate front panel from outside unit
- ③ Separate front cover of control box.
- ④ Separate Oil\_Level Harness(3Pin Yellow) in External PCB(CN28).
- ⑤ Sepatate VWFC\* Cover in VWFC Assy.
- ⑥ Install the VWFC Assy to the C/Box by using screws.

\* VWFC : Variable Water Flow Control kit

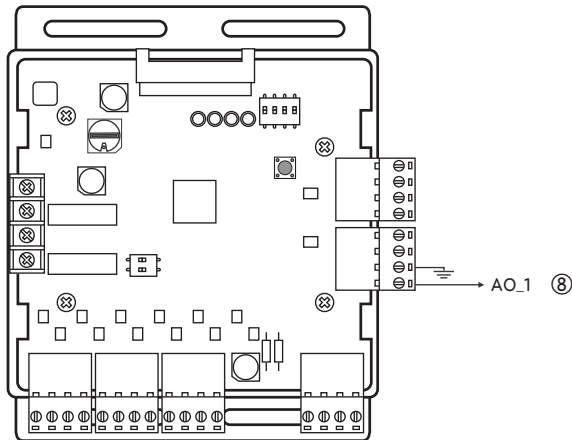
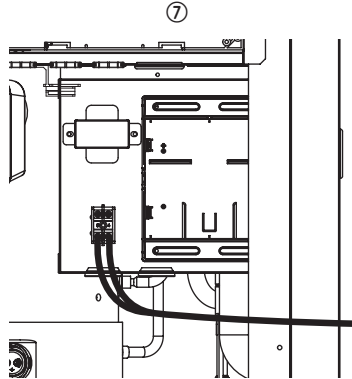


### **⚠ CAUTION**

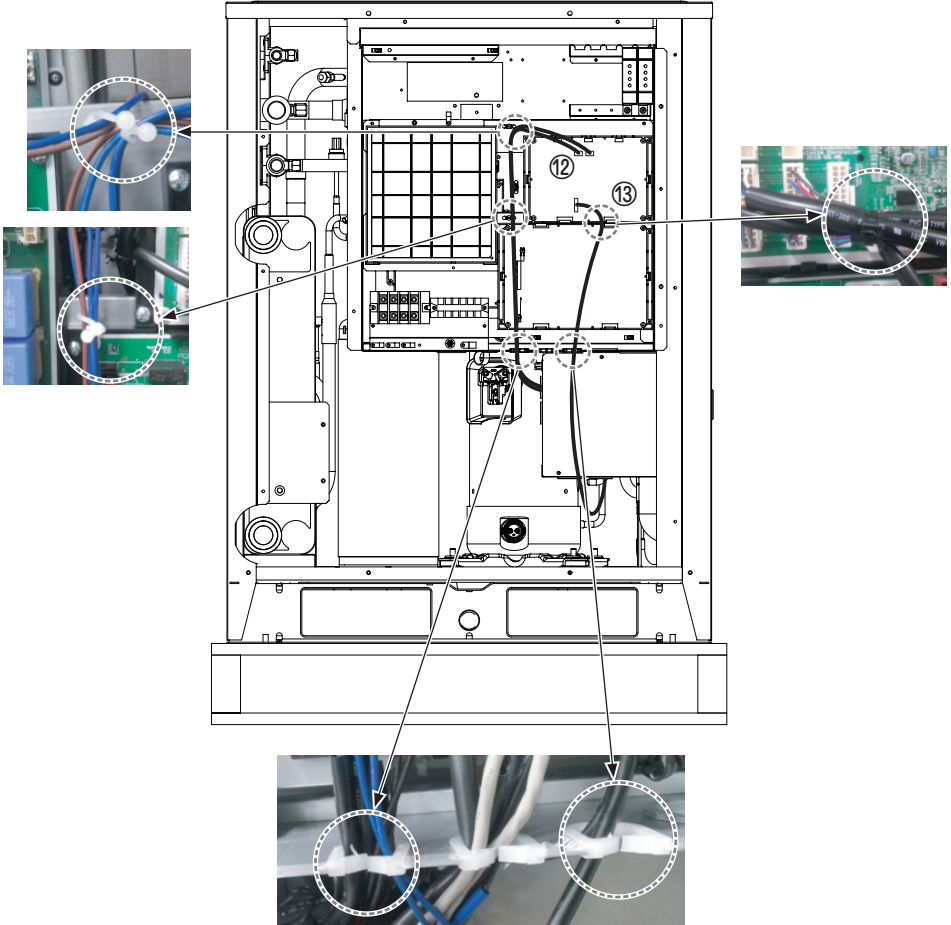
Be sure to turn off outside unit power before installation.



- ⑦ Connect a power cable (AC 24V) of water flow control valve to the terminal block (2Pin Terminal block, Max current 0.42A).
- ⑧ Connect a signal cable (DC 0~10V) of water flow control valve to CN1\_A0(A0\_1(A+), GND(A-)) of VWFC.
- ⑨ Set up the main function DIP Switch of VWFC PCB. (Refer to 16page)
- ⑩ Pull out put through the cover hole.
- ⑪ Install the VWFC Cover by using screws.



- ⑫ Connect the blue cable of transformer to the Main PCB(CN\_JIG\_N,CN\_JIG\_L).
- ⑬ Connect the black cable of VWFC PCB to the Main PCB(CN10).
- ⑭ Connect the Oil\_Level harness(3Pin Yellow) to the External PCB(CN28).
- ⑮ Fix and fasten components and cables.
- ⑯ Turn on the main power line of outside unit.

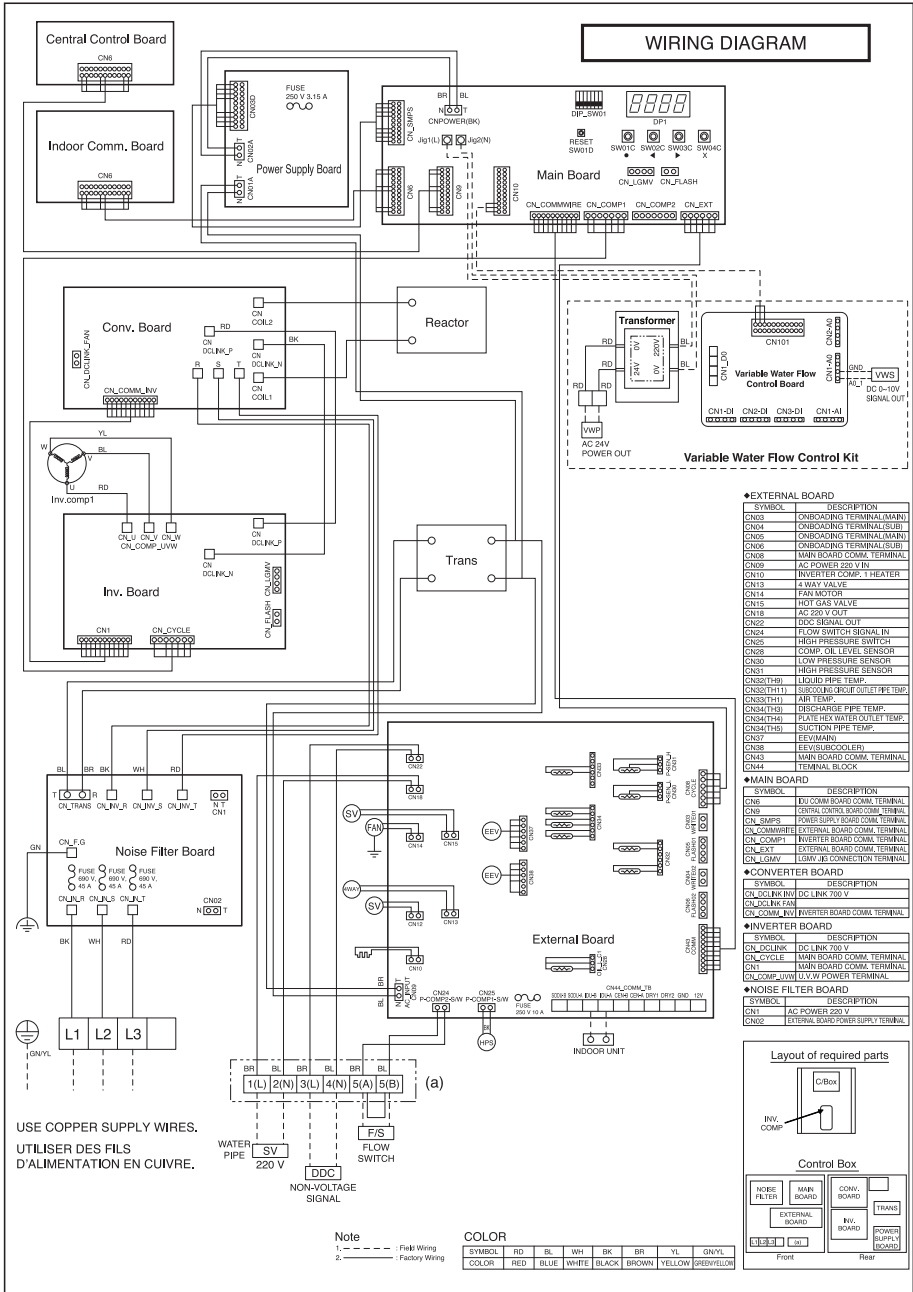


**▲ CAUTION**

- 1. Install the product on flat surface and screw at least 2 places. Otherwise the VWFC PCB may not be anchored properly.
- 2. Do not deform the case at random. It may cause malfunction of the Variable Water Flow Control PCB
- 3. This is a class A product. In a non-industrial environment, this product may cause radio interference, in which case the user may be required to take adequate measures.
- 4. It must be installed variable flow valve on water circulation system in advance.
- 5. The internal resistance of variable water flow control valve must be above 100kΩ. The resistance of signal cable(CN1\_A0) must be below 10Ω.

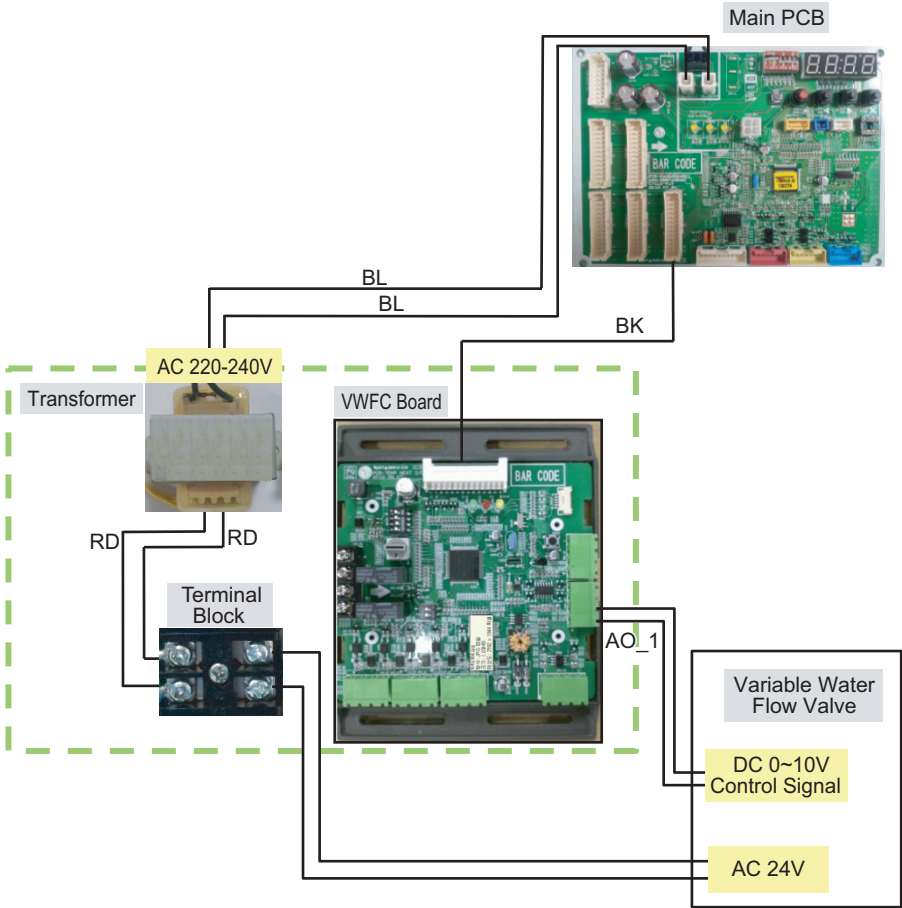
# Setting and Using Method

## 1. Wiring Diagram



## 2. Wiring for Variable Water Flow Control kit

### 1 Unit



\* BL : Blue, RD : Red, BK : Black

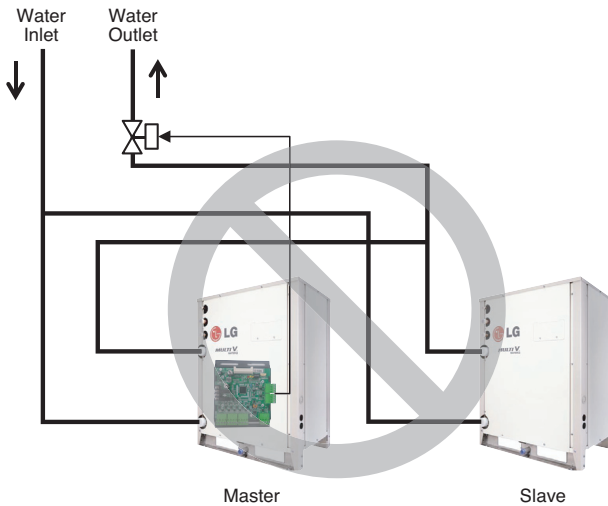
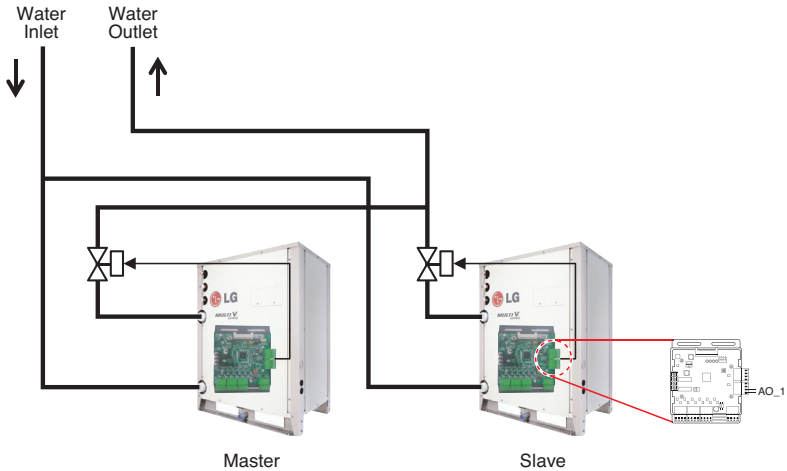
#### Notes

- Transformer can supply only AC 24V to the terminal block
- Do not input external power into Main PCB. Otherwise it will cause a serious damage.
- The Variable Water Flow Control Kit controls only 1 valve actuator.
- The power (AC 24V) and signal(DC 0~10V) line is recommended by AWG22(1/32 in, (0.644 mm), 0.016  $\Omega$ /ft (0.053  $\Omega$ /m)).
- Please refer to the variable water flow control valve installation manual for wiring.

### 3. Series Installation(more than 2 unit)

#### For Variable Water Flow Control

Please apply an individual PWFKN000 model for each MULTI V WATER IV unit



## ⚠ CAUTION

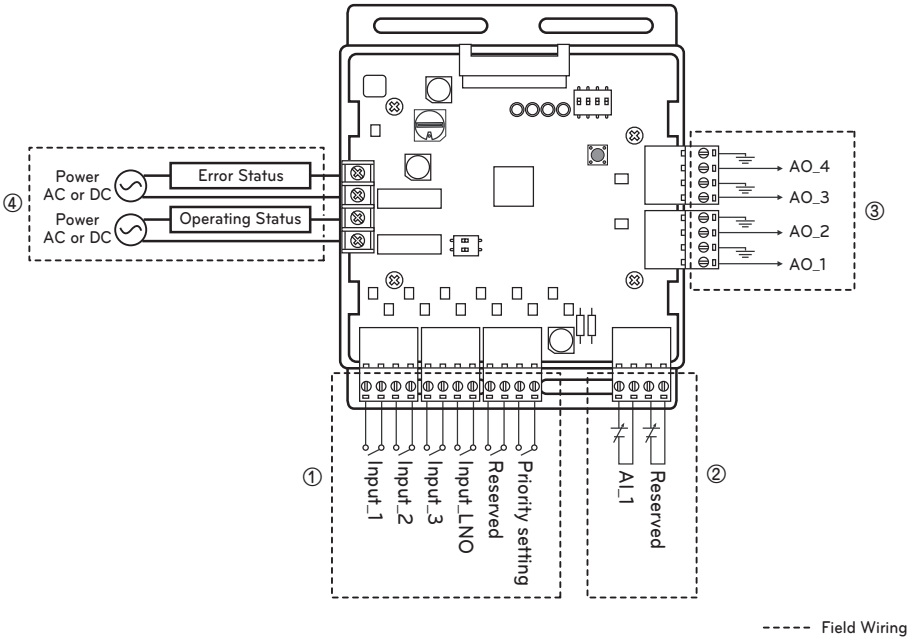
Variable Water Flow Control Kit only can control 1 unit of MULTI V WATER IV and electric valve.

#### Notes

Communication line from controller such as DDC must be installed only with VWFC of master outside unit.

- Demand control
- Output outside or indoor unit operation status
- Output outside or indoor unit error status signal

## 4. Power source input



### ① Dry contact input part

- Input\_1,2,3 : Demand control by contact input(3 Step)
- Input\_LNO : Low Noise Operation
- Priority setting

Using 'Priority setting' contact signal the priority of command.

(Demand control for external command from DDC vs peak control by LG Control controller.)

- Close : Central controller has priority to external signal
- Open : External signal has priority to central controller(default setting)

### ② Analog input part (AI : DC 0 ~ 10V)

- AI\_1 : Demand control by analog input (10 Step)

### ③ Analog output part(AO : DC 0 – 10V, Max 20 mA)

- AO\_1 : Connect analog output signal for variable water flow valve.

### ④ Digital Output (DDC output AC 1A at 250V source)

- Output error status
- Output operation status

## ⚠ CAUTION

Power must be turned on after the product is wired completely.

## ■ Communication and Power Line

- If communication and power lines are run alongside each other then there is a strong likelihood of operational faults developing due to interference in the signal wiring caused by electrostatic and electromagnetic coupling. The tables below indicates our recommendation as to appropriate spacing of communication and power lines where these are to be run side by side.

Current capacity of power line		Spacing
100V or more	10A	11-13/16 in (300 mm)
	50A	19-11/16 in (500 mm)
	100A	39-3/8 in (1,000 mm)
	Exceed 100A	59-3/64 in (1,500 mm)

### Notes

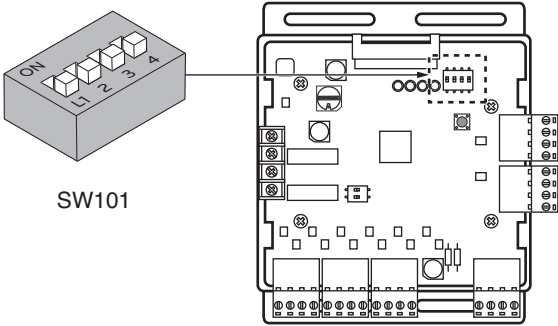
If the power supply waveform continues to exhibit some distortion the recommended spacing in the table should be increased.

- If the lines are laid inside conduits then the following point must also be taken into account when grouping various lines together for introduction into the conduits.
- Power lines (including power supply to air conditioner) and signal lines must not be laid inside the same.
- In the same way, when grouping the lines power and signal lines should not be bunched together.

## 5. Variable Water Flow Control Kit Functions

### Setting of DIP Switch

Using 'SW101', select the minimum analog output value as described below to meet the requirement of applied valve or to keep minimum flow rate.



**Notes**  
Default status is all off.

• Output signal setting : SW101 L1, L2

Position	Function
	Control signal : DC 0V(OFF), DC 8~10V(ON)
	Control signal : DC 0V(OFF), DC 6~10V(ON)
	Control signal : DC 0V(OFF), DC 4~10V(ON) Default status
	Control signal : DC 0V(OFF), DC 2~10V(ON)

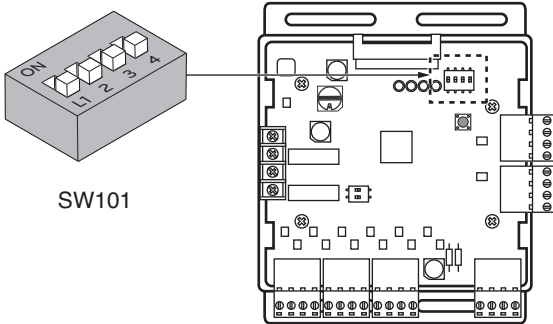
### ⚠ CAUTION

After change 'DIP Switch' setting, then you must press reset switch to reflect the setting. Before operating the outside unit, check the flow rate of water and voltage signal of PCB. Minimum flow rate of water is recommended 40% of rated flow rate. Otherwise, the outside unit get damage.



Using 'SW101', Select the option of control function as described below.

- Operation Status output



**Notes**

Default status is all off.

• Operation status output : SW101 L4

Position	Function	Wiring
	ON : Activate Digital Output according to Indoor Unit status OFF : Activate Digital Output according to Outside Unit status	Operation status

Depends on SW101 L4 position(ON/OFF), VWCK(Board) is operated as below

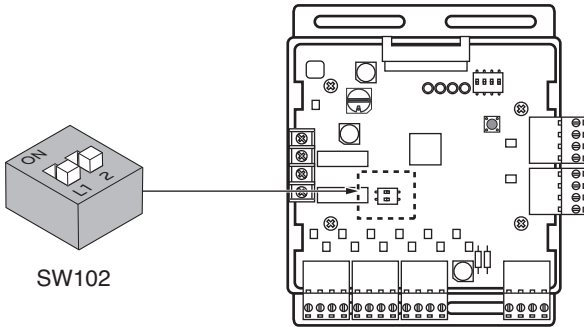
Dip Switch	VWCK(Board) operation
SW101 L4 ON	When even one of indoor unit (Remote controller) is turned on → Relay on All Indoor are turned off → Relay off
SW101 L4 OFF	When even one of compressor is turned on → Relay on All compressor are turned off → Relay off

**CAUTION**

After change DIP SW setting, press reset switch to reflect the setting.

Using 'SW102', Select the option of control function as described below.

- Set analog output optional function



**Notes**

Default status is all off.

The setting method makes to open the valve using output signal when occur communication error.

- Set analog output default value in case that communication error between VWFC and outside unit PCB is occurred : SW102 L1

Position	Function	Wiring
	ON : Analog output 0V OFF : Analog output 10V	AO_1 ~ 4

When communication error happened, LED3C(yellow) will turned ON

- Set Analog output Range : SW102 L2

Basically this module keeps a minimum Analog output voltage refer to L1,L2 setting of SW101 to prevent unexpected accident. When you need to use 0~10V full range, L2 should be set as ON.

Position	Function
	ON : Ignore minimum Analog output value setting (L1,L2 setting value of 4pin DIP SW) OFF : Follow minimum Analog output value setting (L1,L2 setting value of 4pin DIP SW)

**⚠ CAUTION**

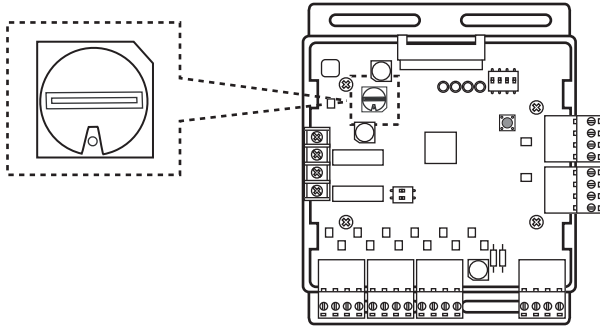
Do not operate the DIP SW except authorized person.  
 After change DIP SW setting, press reset switch to reflect the setting.

## Setting For Demand control

Use the Rotary Switch to set a control step for contact signal input : The type of input signal and control step can be set using 'SW104'

This function is for Demand control to reduce power consumption.

Set the control mode what you want according to the table as below.



- Setting of Demand control by type of input signal

Input signal	SW_STEP	Wiring
Demand control by contact input	0, 1, 2, 3, 4, 5, 6, 7	Input 1,2,3
Demand control by analog input(0~10V)	C, D, E	AI_1

## ⚠ CAUTION

Do not change a command too quickly.

Keep the command 30 seconds at least, otherwise it will cause a damage to outside unit.

• Operation rate condition :

- Cooling : Outside 35 °C, Indoor 27 °C

- Heating : Outside 7 °C, Indoor 20 °C

• The tolerance of the operation rate can be cause by combination of outside unit, operating condition, installation circumstance.

• When operation rate is 100%, Target Evaporating Temp. and Target Condensing Temp. can be changed by installation option.

• Input\_1 : 0 ← OFF, Input\_1 : 1 ← ON

## Setting and Using Method

### • Demand control by contact input control (3 Step)

SW_STEP	Input_1	Input_2	Input_3	Cooling		Heating		Type of input
				Evaporating Temp. [°C]	Operation rate	Condensing Temp. [°C]	Operation rate	
0	0	0	0	No control	-	No control	-	Contact signal
	1	0	0	5.9	70%	40.4	70%	
	0	1	0	11.0	40%	31.3	40%	
	0	0	1	Comp off	0%	Comp off	0%	
1	0	0	0	No control	-	No control	-	
	1	0	0	5.9	70%	40.4	70%	
	0	1	0	9.0	50%	34.5	50%	
	0	0	1	Comp off	0%	Comp off	0%	
2	0	0	0	No control	-	No control	-	
	1	0	0	5.0	80%	43.1	80%	
	0	1	0	9.0	50%	34.5	50%	
	0	0	1	Comp off	0%	Comp off	0%	
3	0	0	0	No control	-	No control	-	
	1	0	0	5.9	70%	40.4	70%	
	0	1	0	11.0	40%	31.3	40%	
	0	0	1	All off	0%	All off	0%	
4	0	0	0	No control	-	No control	-	
	1	0	0	5.9	70%	40.4	70%	
	0	1	0	9.0	50%	34.5	50%	
	0	0	1	All off	0%	All off	0%	
5	0	0	0	No control	-	No control	-	
	1	0	0	5.0	80%	43.1	80%	
	0	1	0	9.0	50%	34.5	50%	
	0	0	1	All off	0%	All off	0%	
6	0	0	0	No control	-	No control	-	
	1	0	0	9.0	50%	34.5	50%	
	0	1	0	Comp off	0%	Comp off	0%	
	0	0	1	All off	0%	All off	0%	
7	0	0	0	No control	-	No control	-	
	1	0	0	5.5	75%	41.8	75%	
	0	1	0	9.0	50%	34.5	50%	
	0	0	1	All off	0%	All off	0%	

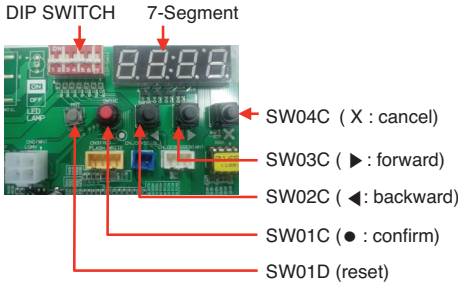
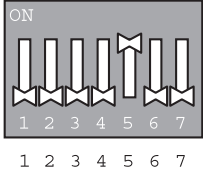
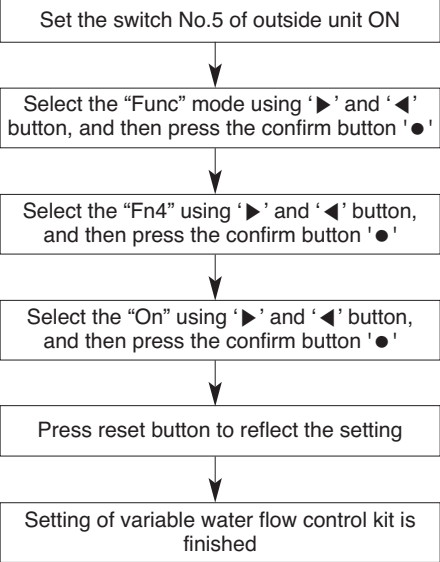
## • Demand control by analog input control (10 Step)

SW_STEP	Normal (V)	Input voltage range(V)		Cooling		Heating		Type of input
		Min	Max	Evaporating Temp. [°C]	Operation rate	Condensing Temp. [°C]	Operation rate	
C	0	0	0.4	Comp off	0%	31.3	40%	Analog input
	1	0.6	1.4	Comp off		Comp off		
	2	1.6	2.4	Comp off		Comp off		
	3	2.6	3.4	11.0	40%	31.3	40%	
	4	3.6	4.4	9.8	45%	33.3	45%	
	5	4.6	5.4	9.0	50%	34.5	50%	
	6	5.6	6.4	7.2	60%	37.5	60%	
	7	6.6	7.4	5.9	70%	40.4	70%	
	8	7.6	8.4	5.0	80%	43.1	80%	
	9	8.6	9.4	4.1	90%	45.6	90%	
10	9.6	10	3.1	100%	48.1	100%		
D	0	0	0.4	No control	-	No control	-	Analog input
	1	0.6	1.4	3.1	100%	48.1	100%	
	2	1.6	2.4	4.1	90%	45.6	90%	
	3	2.6	3.4	5.0	80%	43.1	80%	
	4	3.6	4.4	5.9	70%	40.4	70%	
	5	4.6	5.4	7.2	60%	37.5	60%	
	6	5.6	6.4	9.0	50%	34.5	50%	
	7	6.6	7.4	9.8	45%	33.3	45%	
	8	7.6	8.4	11.0	40%	31.3	40%	
	9	8.6	9.4	Comp off	0%	Comp off	0%	
10	9.6	10	All off	0%	All off	0%		
E	0	0	0.4	Comp off	0%	Comp off	0%	Analog input
	1	0.6	1.4	11.0	40%	31.3	40%	
	2	1.6	2.4	9.8	45%	33.3	45%	
	3	2.6	3.4	9.0	50%	34.5	50%	
	4	3.6	4.4	7.2	60%	37.5	60%	
	5	4.6	5.4	5.9	70%	40.4	70%	
	6	5.6	6.4	5.0	80%	43.1	80%	
	7	6.6	7.4	4.1	90%	45.6	90%	
	8	7.6	8.4	3.1	100%	48.1	100%	
	9	8.6	9.4	3.1		48.1		
10	9.6	10	3.1	48.1				

## 6. Setting of Outside Unit DIP Switch

### Variable Water flow Control Kit Mode

• Steps for setting of Variable water flow control mode



※ If you want to stop the variable water flow control mode, follow the same step and make “Fn4” “Off”

### ⚠ CAUTION

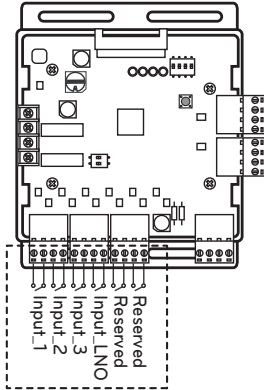
After change ‘DIP Switch’ setting, then you must press reset switch to reflect the setting. Before operating the outside unit, check the flow rate of water and voltage signal of PCB. Minimum flow rate of water is recommended 40% of rated flow rate. Otherwise, the outside unit get damage.

## 7. Setting Example

### Using

#### Demand control

Using Demand control function with 3-Non Voltage contact.



LG does not supply this section  
(Field supply)

With this function comp capacity of outside unit can be controlled.

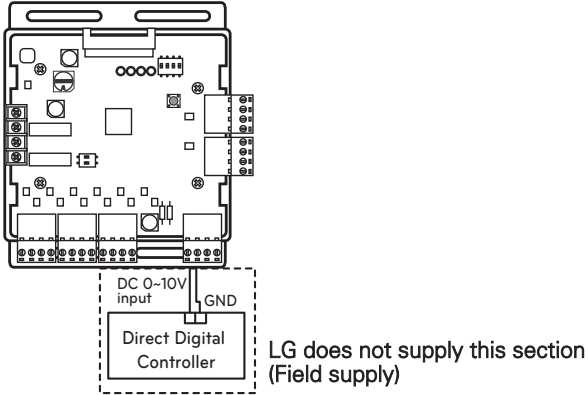
Ex) Demand control by 3-contact signal

SW_STEP	Input_1	Input_2	Input_3	Comp capacity Of outside unit(%)	Type of input
0	0	0	0	No control	Contact signal
	1	0	0	70	
	0	1	0	40	
	0	0	1	Comp off	

### **!** CAUTION

- This input can accept only non voltage contact.  
Do not input external power source. Otherwise it will cause a serious damage.

Using Demand control function with 0~10V DC voltage signal



With this function compressor capacity of outside unit can be controlled by Building Management System.

Ex) Demand control by Analog input signal Refer to Detail of the control step for analog input signal.

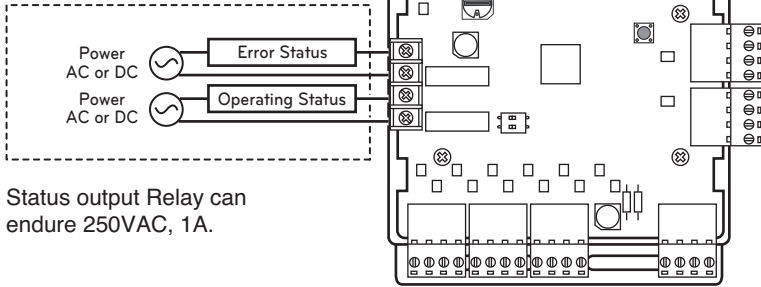
**⚠ CAUTION**

- This function is sensitive to voltage level.  
So when using analog input, make a signal cable as short as possible.
- Do not change a command too quickly.  
Keep the command 30 seconds at least, otherwise it will cause a damage to outside unit.



## Operation Status

LG does not supply this section (Field supply)



## ⚠ CAUTION

When using high voltage over than AC24V, make sure to use H07RNF wire.

### ① Error Display

: This function displays error signal by digital output when either outside or indoor unit has an error

### ② Operating Display

: This function is depend on 4th DIP SW setting of 'SW101'.

- L4 is ON : Display indoor unit operating status (Include FAN mode only)
- L4 is OFF : Display outside unit operating status (Compressor operating on/off status)

- L4 : Set Operating status output

Position	Function
	ON : Activate Digital Output according to indoor unit status OFF : Activate Digital Output according to outside unit status



