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INSTALLATION MANUAL

AIR CONDITIONER

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.

WATER COMMUNICATION MODULE

Original instruction

LG Electronics Inc. Single Point of Contact (EU/UK):
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SAFETY INSTRUCTIONS

The following safety guidelines are intended to prevent unforeseen risks or damage from unsafe or incorrect operation of the appliance.

The guidelines are separated into 'WARNING' and 'CAUTION' as described below.

This symbol is displayed to indicate matters and operations that can cause risk. Read the part with this symbol carefully and follow the instructions in order to avoid risk.

⚠ WARNING

This indicates that the failure to follow the instructions can cause serious injury or death.

⚠ CAUTION

This indicates that the failure to follow the instructions can cause the minor injury or damage to the product.

⚠ WARNING

- Installation or repairs made by unqualified persons can result in hazards to you and others.
- Installation must conform with local building codes or, in the absence of local codes.
- The information contained in the manual is intended for use by a qualified service technician familiar with safety procedures and equipped with the proper tools and test instruments.
- Failure to carefully read and follow all instructions in this manual can result in equipment malfunction, property damage, personal injury and/or death.

Installation

- Be sure to request to the service center or installation specialty store when installing products.
  - It will cause fire or electric shock or explosion or injury.
- Always perform grounding.
  - Otherwise, it may cause electrical shock.
- Don't use a power cord, a plug or a loose socket that is damaged.
  - Otherwise, it may cause fire or electrical shock.
- You need to use a safely insulated power supply which follows IEC61558-2-6 and NEC Class2.
  - If you do not follow, It may cause fire, electric shock, explosion or injury.
- For installation of the product, always contact the service center or a professional installation agency.
  - Otherwise, it may cause fire, electrical shock, explosion or injury.
- Securely attach the electrical part cover to Comm. Module.
  - If the electric part cover of Comm. Module is not attached securely, it could result in a fire or electric shock due to dust, water, etc.
- Always install an air leakage breaker and a dedicated switching board.
  - No installation may cause a fire and electrical shock.
- Do not keep or use flammable gases or combustibles near the equipment.
  - Otherwise, it may cause a fire or the failure of product.
- Do not install, remove or reinstall the unit by yourself.
  - Otherwise, it may cause a fire, electrical shock, explosion or injury.

- Do not disassemble or repair the product randomly.
  - It will cause a fire or electrical shock.
- Do not install the product in a place where there is the concern of falling down.
  - Otherwise, it may result in personal injury.
- Use caution when unpacking and installing.
  - Sharp edges may cause injury.

Operation

- Do not share the outlet with other appliances.
  - It will cause an electric shock or a fire due to heat generation.
- Do not use the damaged power cord.
  - Otherwise, it may cause a fire or electrical shock.
- Do not modify or extend the power cord randomly.
  - Otherwise, it may cause a fire or electrical shock.
- Take care so that the power cord may not be pulled during operation.
  - Otherwise, it may cause a fire or electrical shock.
- Unplug the unit if strange sounds, smell, or smoke comes from it.
  - Otherwise, it may cause electrical shock or a fire.
- Keep flames away.
  - Otherwise, may occur a fire.
- Take the power plug out if necessary, holding the head of the plug and do not touch it with wet hands.
  - Otherwise, it may cause a fire or electrical shock.
- Do not use the power cord near the heating tools.
  Otherwise, it may cause a fire and electrical shock.
- Do not allow water to run into electrical parts.
  - Otherwise, it may cause the failure of machine or electrical shock.
- Hold the plug by the head when taking it out.
  - It may cause electric shock and damage.
- Be cautious that water could not enter the product.
  - Otherwise, it may cause a fire electrical shock or product damage.
- Do not step on the indoor/outdoor unit and do not put anything on it.
  - It may cause an injury through dropping of the unit or falling down.
- Do not place a heavy object on the power cord.
  - Otherwise, it may cause a fire or electrical shock.
- When the product is submerged into water, always contact the service center.
  - Otherwise, it may cause a fire or electrical shock.

BEFORE INSTALLATION

⚠ CAUTION

• Don't install or operate the unit in rooms mentioned below.

① Where mineral oil, like cutting oil is present.

② Where the air contains high levels of salt such as air near the ocean.

③ Where Sulphur gas is present such as that in areas of hot spring.

④ In vehicles or vessels.

⑤ Where voltage fluctuates a lot such as that in factories.

⑥ Where high concentration of vapor spray are present.

⑦ Where machines generating electromagnetic waves are present.

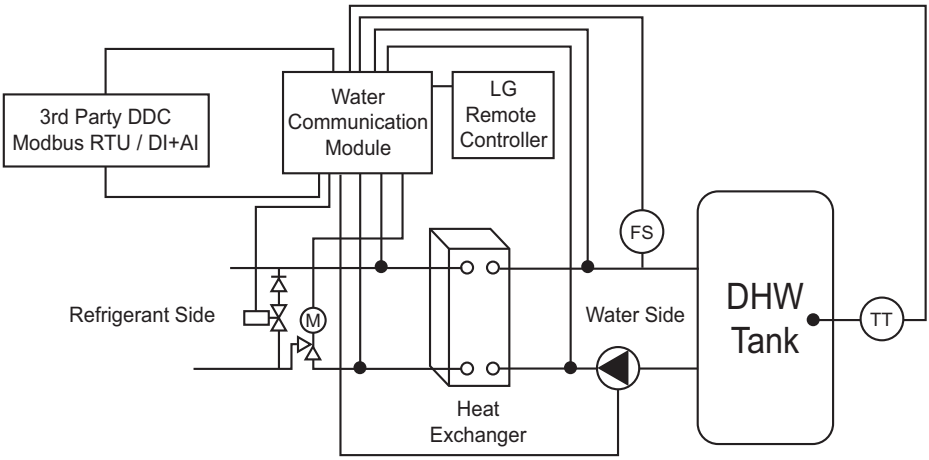
⑧ Where acidic or alkaline vapor is present.

⑨ The option boxes must be installed with entrances downward.

INSTALLATION SCENE

Schematic Diagram

This module is intended to connect 3rd party plate heat exchanger to LG outdoor unit with the ability to control water temperature from 3rd party DDC or LG remote controller.



❊ FS : Flow Switch

❊ TT : DHW Temperature Transmitter

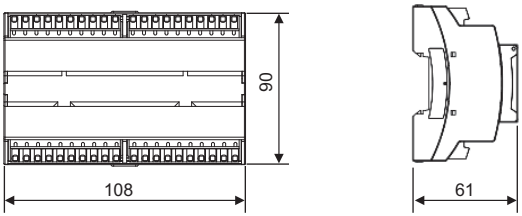
NOTE

- Installation scene shows a general installation.
- Some items are field supply.
- Installation scene may vary on application.
- Heating wired remote controller is sold separately.

SPECIFICATION

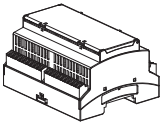
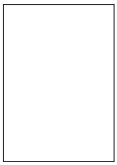
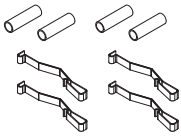
Dimension

[Unit: mm]



<Water Communication Module>

SUPPLIES

PAHCMW000				
Components	Water Communication Module	Thermistor (Water In / Water Out / Pipe In / Pipe Out)	OWNER'S & INSTALLATION MANUAL	Sensor Holder & Clip
Shape				
Quantity	1	4 (each 5m)	1	4

⚠ CAUTION

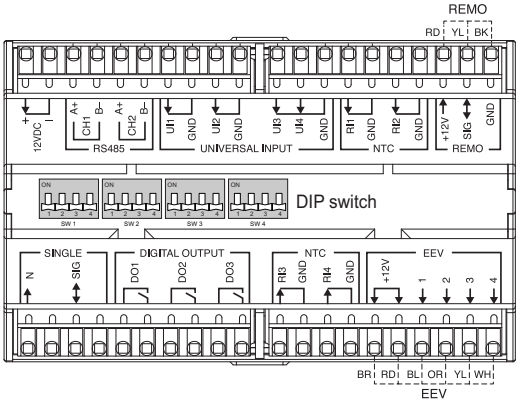
- This model requires DC12 V external power supply. (Select an insulating transformer that complies with IEC61558-2-6 and NEC Class 2.)
- Please check the Product operation range below.
- The Ingress Protection marking for this product restricts installation location. LG Electronics is not responsible for installation at locations non-compliant to the IP rating.

Power Supply		12 V DC
Product Operation Range	Ambient Temperature	-20 ~ 65 °C DB
	Humidity	0~98 % (Non Condensing)
Product Protection Class	IP Rating	IP20

INSTALLATION

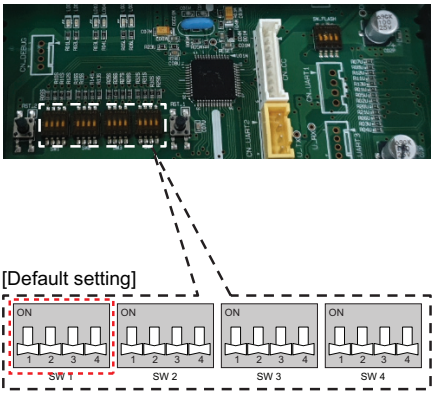
Electrical Wiring Work PAHCMW000

Circuit diagram

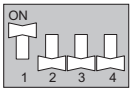
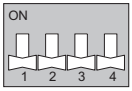
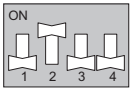
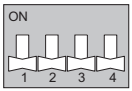


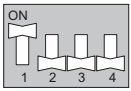
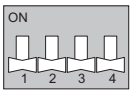
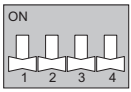
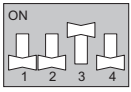
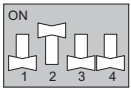
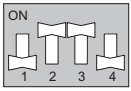
Contents	Connection Port		Function
RS485	CH1 (A+ / B-)	Module Comm. Port	Communication Port Modbus
	CH2 (A+ / B-)	IDU Comm. Port	Communication with Multi V Outdoor
UNIVERSAL INPUT (Cooling/Heating Setting)	UI1	Flow Switch	Flow Switch Input by 3rd party
	UI2	0-10V Set Temp	Target Temp. Setting
	UI3	Cooling Thermostat Signal	Thermostat Cooling Signal
	UI4	Heating Thermostat Signal	Thermostat Heating Signal
UNIVERSAL INPUT (DHW Only)	UI1	Flow Switch	Flow Switch Input by 3rd party
	UI2	0-10V Set Temp	Target Temp. Setting
	UI3	DHW Temperature Transmitter 0-10V	Measured Water Temp Input by 3rd party 0 ~10 V sensor
	UI4	DHW Thermostat Signal	DHW Heating Signal
NTC	RI1	Water Inlet Sensor	PHEX Water Inlet Sensor
	RI2	Water Outlet Sensor	PHEX Water Outlet Sensor
REMO	+12V / SIG / GND	LG Remote Controller	-
SINGLE	Reserved	-	-
DIGITAL OUTPUT	DO1	Defrost/Mode	Output for defrost signal and/or cool mode
	DO2	Pump	Output signal for pump on/off
	DO3	Bypass	Output signal for PHEX Bypass Valve
NTC	RI3	Thermistor Pipe In	PHEX Ref. Inlet Pipe Sensor
	RI4	Thermistor Pipe Out	PHEX Ref. Outlet Pipe Sensor
EEV	+12V / 1 / 2 / 3 / 4	Expansion Valve	EEV Control

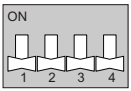
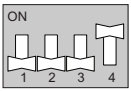
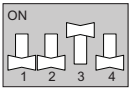
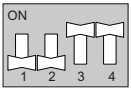
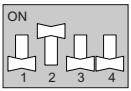
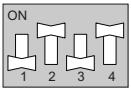
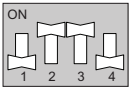
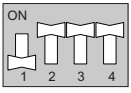
DIP switch setting for Function

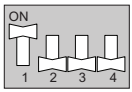
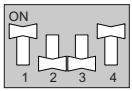
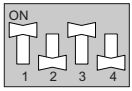
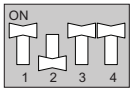
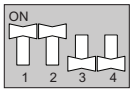
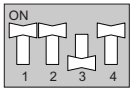
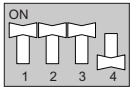
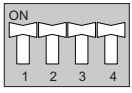


• Detailed actions for the DIP switch value are shown below.

S/W name	No	Item	Setting		Note
SW 1	1	ODU		On	Reserved
				Off	Using Multi V outdoor unit
	2	Control type		On	LG Wired remote controller / Modbus RTU (by 3rd party DDC)
				Off	Digital / Analogue Inputs
	3/4	Reserved			
SW 2	Reserved				

S/W name	No	Item	Setting		Note
SW 3	1	Master/Slave		On	Reserved
				Off	Master
	2/3	Operation Mode Setup		Off/Off	Heat Pump
				Off/On	Reserved
				On/Off	Reserved
				On/On	DHW Only
	4	Reserved			

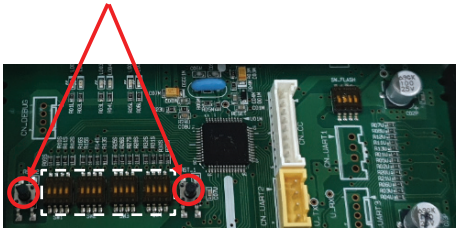
SW 4	Capacity [kBtu/h]	Capacity [kW]
	12	3.5
	15	4.5
	18	5.6
	24	7.1
	28	8.2
	36	10.6
	42	12.3
	48	14.1

SW 4	Capacity [kBtu/h]	Capacity [kW]
	54	15.8
	76	22.4
	96	28.0
	115	33.6
	134	39.2
	153	44.8
	172	50.4
	192	56.0

❊ It's needed to match indoor unit's capacity with outdoor unit by DIP switch setting.

❊ Select the biggest available capacity(192 kBtu/h) index when EEV(DX Coil) capacity is bigger than 192 kBtu/h or 56 kW.

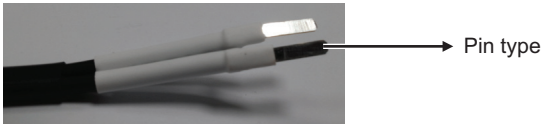
❊ After setting DIP switch, power reset is needed.
(or push the reset button)



Electrical Work

Connection of the wires

For the wired remote controller wire and outdoor unit communication wire, remove the coating at the end of the wire to connect and use the Pin type to connect to the terminal block.



⚠ CAUTION

- All field supplied parts and materials and electric works must be conform to local codes.
- Use copper wire only.
- All wiring must be performed by an authorized electrician.
- A main switch or other means for disconnection, having a contact separation in all poles must be incorporated in the fixed wiring in accordance to relevant local and national regulations.
- Refer to the installation manual attached to the outdoor unit for the size of power supply electric wire connected to the outdoor unit, the capacity of the circuit breaker and switch, wiring and wiring instructions.

THERMISTORS INSTALLATION

Pipe thermistors Installation

Location of the pipe thermistors

A correct installation of the thermistors is required to ensure a good operation:

1 Pipe In
: Install the thermistor at the refrigerant inlet of the heat exchanger as close as possible to the heat exchanger.

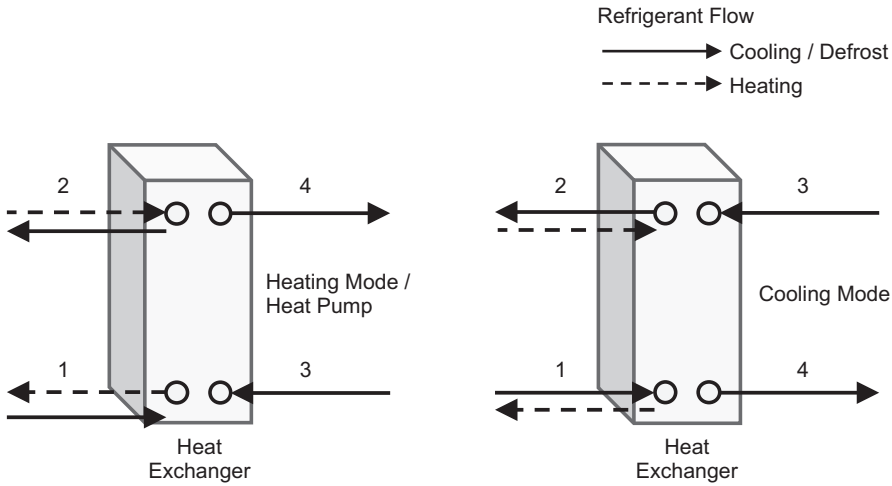
2 Pipe Out
: Install the thermistor at the refrigerant outlet of the heat exchanger as close as possible to the heat exchanger.

3 Water In
: Install the thermistor at the water inlet of the heat exchanger as close as possible to the heat exchanger.

4 Water Out
: Install the thermistor at the water outlet of the heat exchanger as close as possible to the heat exchanger.

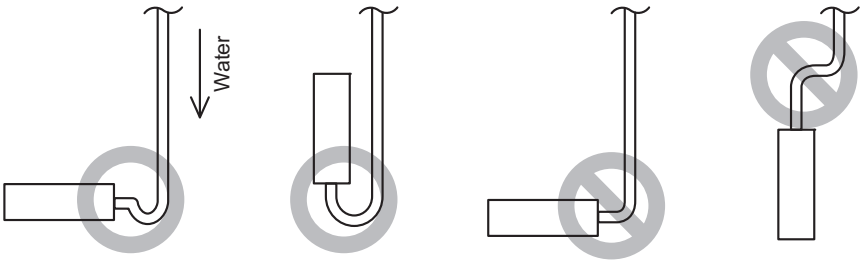
Evaluation must be done to check if the evaporator is protected against freeze-up. Execute test operation and check for freeze-up.

1 Pipe In (Suction Pipe)
2 Pipe Out (Discharge Pipe)
3 Water In (Water Inlet Pipe)
4 Water Out (Water Outlet Pipe)

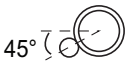


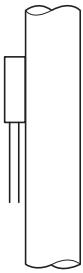
INSTRUCTION

- Put the thermistor wire slightly above to avoid water accumulation on down of the thermistor.



- For sensing the evaporator's temp. in thermistor, Put the upper port of the thermistors on the evaporator, this is the most sensitive point of the thermistor.





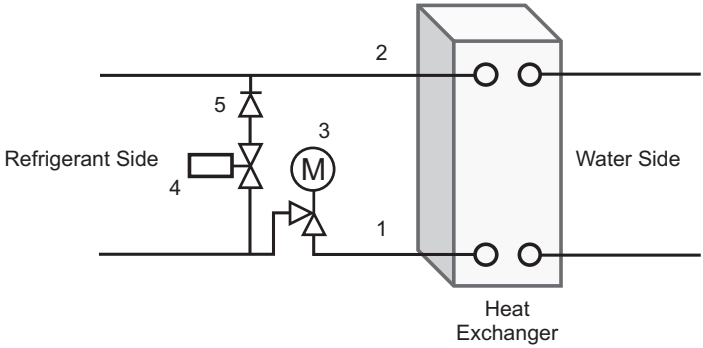
- Fasten the sensor using the supplied sensor holder and clip
- Insulate ther thermistor with insulation material (Over 5mm thick, field supply)

PIPING INSTALLATION

Installation of bypass, non-return and EEV Valve

When used with Multi V Outdoor unit a bypass valve and non-return valve must be installed in the refrigerant cycle following the diagram and table below. The solenoid valve must be connected to the bypass valve output on the communication module.

1 Refrigerant Inlet
2 Refrigerant Outlet
3 EEV
4 Solenoid Valve (NC) - Field supplement
5 Non-Return Valve - Field Supplement



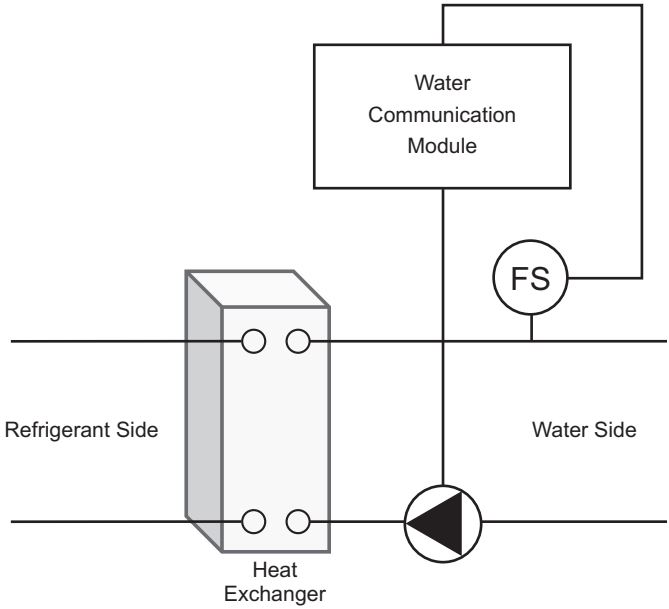
Capacity (kW)		EEV Type	System Compatibility	Kv Value of Solenoid and Non-Return Valve	Pipe size for bypass
Min	Max				
3.6	28	PAEEVC000	HP/HR	0.95	3/8" / 9.52mm
		PRLK048A0			
> 28	56	PRLK096A0	HP	1.90	1/2" / 12.7mm

NOTE

- The solenoid valve must be a normally closed type (NC)
- The non-return valve must be a type without preloaded spring
- The valves must be selected as close as possible and preferably not smaller than the Kv value from the table above.
- Connection of PRLK594A0 is not possible

Flow Switch and Pump

The unit must control the main pump and must get the flow input from field supply flow switch
Nominal flow should be available when pump output but is closed.



The nominal flow and cut of flow can be calculated using the values below.

	Nominal Flow	Flow switch Cut Off
L/min*kW	3.29	1.23

Example: ODU Nominal Cooling Capacity 28 kW
28 * 3.29 = 92.12 L/min nominal flow
28 * 1.23 = 34.44 L/min flow switch cut off

CONTROL

AI/DI Control

When SW 1-2 is turned off it is possible to control the unit by AI and DI input.
The range and temperature of the input can be found below.

UNIVERSAL INPUT (Cooling/ Heating Setting)	UI1	Flow Switch	Open - Not enough flow Closed - Enough flow
	UI2	0-10 V Set Temp	2 V = 5 °C 10 V = 65 °C
	UI3	Cooling Thermostat Signal	UI3 Closed + UI4 Open = Cool Mode ON UI3 Open + UI4 Closed = Heat Mode ON UI3 + UI4 Closed = Auto Mode ON
	UI4	Heating Thermostat Signal	

UNIVERSAL INPUT (DHW Only)	UI1	Flow Switch	Open - Not enough flow Closed - Enough flow
	UI2	0-10 V Set Temp	2 V = 5 °C 10 V = 65 °C
	UI3	DHW Temperature Transmitter	0 V = 0 °C 10 V = 100 °C
	UI4	DHW Thermostat Signal	UI4 Open = DHW Heating OFF UI4 Closed = DHW Heating ON

DIGITAL OUTPUT	DO1	Defrost/Mode	DO1 OFF = Heating Mode DHW only mode DO1 ON = Defrost Active Cooling/Heating Mode DO1 ON = Defrost Active or Cool Mode Active
	DO2	Pump	DO2 OFF = Pump OFF DO2 ON = Pump ON
	DO3	Bypass	DO3 OFF = Bypass valve OFF DO3 ON = Bypass valve ON

Set Temperature Analogue Input

UI2 Input	AI Input	
	Input	Temperature
Set point	0-2 V	No response
	2 V	5 °C
	10 V	65 °C
Resolution	0.13333 V / °C	

NOTE

- Depending on application and product control range of the product can be different. Input range is equal.
  Example : If the products set temp is set to max 50°C. The AI will not respond above this set point.
- The input range has a linear output between min and max value.

DHW Temperature Analogue Input

When used for DHW you must connect a 0-10V temperature transmitter to send the water temperature from the DHW tank to the LG communication module. The set point can be given by remote controller. AI or Modbus, The range and temperature of the input can be found below.

UI3 Input	AI Input	
	Input	Temperature
DHW	0 V	0 °C
	10 V	100 °C
Resolution	0.1 V/ °C	

NOTE

• The input range has a linear output between min and max value.

Modbus Control

When SW1-2 is turned to ON it is possible to control the unit by Modbus RTU using the Modbus registers below.

❊ ODU must be set up for 9600Bps transmission speed to be able to get all data by Modbus.

- Physical Layer: RS-485 Serial Line
- Mode: Modbus RTU Mode
- Baud Rate: 9600Bps
- Parity: None Parity
- 1 Stop Bit
- Frame Length 8 Bit

The Modbus RTU slave address can be set up with wired remote controller

- Setting 3 seconds push > Input passcode (sw version). Installer Menu > Central Controller Address (HEX)
- Applied Function Code

Function Code	Sub Function	Function Name	Start Address form Master Device
0x01	None	Read Coil	Register Address -00001
0x02	None	Read Discrete Input	Register Address -10001
0x03	None	Read Holding	Register Address -40001
0x04	None	Read Input	Register Address -30001
0x05	None	Write Single Coil	Register Address -00001
0x06	None	Write Single Holding	Register Address -40001
0xF1~FF	Reserved for Exception Code		

Coil Register

No	Address		Register	Description	Range		Value explanation
	HEX	DEC			High	Low	
1	0x0000	0	00001	Enable/Disable (Heating/Cooling)	1	0	0 : Operation OFF / 1 : Operation ON
2	0x0001	1	00002	Enable/Disable (DHW)	1	0	0 : Operation OFF / 1 : Operation ON
5	0x0004	4	00005	Emergency stop	1	0	0 : Normal operation / 1 : Emergency stop

Discrete Register

No	Address		Register	Description	Range		Value explanation
	HEX	DEC			High	Low	
1	0x0000	0	10001	Water flow status	1	0	0 : Flow rate ok / 1 : Flow rate too low
2	0x0001	1	10002	Water pump status	1	0	0 : Water pump OFF / 1 : Water pump ON
4	0x0003	3	10004	Compressor status	1	0	0 : Compressor OFF / 1 : Compressor ON
5	0x0004	4	10005	Defrosting status	1	0	0 : Defrost OFF / 1 : Defrost ON
6	0x0005	5	10006	DHW heating status (DHW Thermal On/Off)	1	0	0: DHW inactive / 1: DHW active
9	0x0008	8	10009	Cooling status	1	0	0 : No cooling / 1 : Cooling operation
14	0x000D	13	10014	Error status	1	0	0 : No error / 1 : Error state

Input Register

No	Address		Register	Description	Range		Value explanation
	HEX	DEC			High	Low	
1	0x0000	0	30001	Error code	0xFFFF	0x0000	Error code
2	0x0001	1	30002	ODU operation cycle	0xFFFF	0x0000	0 : Standby(OFF) / 1 : Cooling / 2 : Heating
3	0x0002	2	30003	Water inlet temp.	0xFFFF	0x0000	[0.1 °C ×10]
4	0x0003	3	30004	Water outlet temp.	0xFFFF	0x0000	[0.1 °C ×10]
6	0x0005	5	30006	DHW tank water temp.	0xFFFF	0x0000	[0.1 °C ×10]
13	0x000C	12	30013	Outdoor air temp.	0xFFFF	0x0000	[0.1 °C ×10]

Holding Register

No	Address		Register	Description	Range		Value explanation
	HEX	DEC			High	Low	
1	0x0000	0	40001	Operation mode	4	0	0 : Cooling / 4 : Heating / 3 : Auto
2	0x0001	1	40002	Control method	1	0	0 : Water outlet temp. control 1 : Water inlet temp. control
3	0x0002	2	40003	Target temp (Heating/Cooling)	65	5	°C
5	0x0004	4	40005	Shift value(Target) in auto mode	5	-5	1K
9	0x0008	8	40009	DHW target temp.	65	30	°C


LG
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