INSTALLATION MANUAL
FOR LG AIR HANDLER UNIT (AHU) COMMUNICATIONS KIT

AHU Model Number: PAHCMS000

PROPRIETARY DATA NOTICE

Do not throw away, destroy, or lose this manual.
Please read carefully and store in a safe place for future reference.
Content familiarity required for proper installation.

The instructions included in this manual must be followed to prevent product malfunction, property damage, injury, or death to the user or other people. Incorrect operation due to ignoring any instructions will cause harm or damage. The level of seriousness is classified by the symbols described by the summary list of safety precautions on page 3.

For more materials such as submittals, catalogs, engineering, installation, owner's, and service manuals, visit www.lghvac.com.

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SAFETY PRECAUTIONS

The instructions below must be followed to prevent product malfunction, property damage, injury or death to the user or other people. Incorrect operation due to ignoring any instructions will cause harm or damage. The level of seriousness is classified by the symbols described below.

TABLE OF SYMBOLS

⚠ DANGER	*This symbol indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.*
⚠ WARNING	*This symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.*
⚠ CAUTION	*This symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.*
Note	*This symbol indicates situations that may result in equipment or property damage accidents only.*
⃠	*This symbol indicates an action should not be completed.*

Installation

⚠ WARNING

All electrical work must be performed by a licensed electrician and conform to local building codes or, in the absence of local codes, with the National Electrical Code, and the instructions given in this manual.
If the power source capacity is inadequate or the electric work is not performed properly, it may result in fire, electric shock, physical injury or death.

⃠ **Do not touch the communications and EEV kits' wiring, terminals, or other electrical components with tools or exposed skin when the power is connected. Only qualified technicians should install, remove, or re-install the kits.**
Improper installation or use may result in fire, electric shock, physical injury or death.

⃠ **Do not install, remove, or re-install the communications and EEV kits by yourself (end user). Ask the dealer or a qualified technician familiar with safety procedures and equipped with the proper tools and test instruments to install the kits.**
Improper installation by the user may result in fire, electric shock, physical injury or death.

For replacement of an installed communications and EEV kits, always contact a qualified LG service provider familiar with safety procedures and equipped with the proper tools and test instruments.
There is risk of fire, electric shock, and physical injury or death.

⃠ **Do not install the communications and EEV kits in a location where the kits can be exposed to rain, snow, etc.**
There is risk of physical injury or death due to electric shock.

Safely dispose of the packing materials.
Tear apart and throw away plastic packaging bags so that children may not play with them and risk suffocation and death.

Wear protective gloves when unpacking, installing, and handling the kits. Sharp edges may cause personal injury.

⃠ **Do not install the communications and EEV kits in locations where either kit could fall down.**
There is risk of physical injury.

Use the appropriate parts and connectors.
There is risk of physical injury or death due to fire and / or electric shock.

Replace all control box and panel covers on the communications and EEV kits.
If cover panels are not installed securely, dust, water, and animals may enter the kits, causing fire, electric shock, and physical injury or death.

Failure to carefully read and follow all instructions in this manual can result in physical injury or death.

Note

Only qualified technicians familiar with safety procedures and equipped with the proper tools and test instruments should install, remove, or re-install the communications and EEV kits.
Improper installation or use may result in product malfunction.

⃠ **Do not install the communications and EEV kits in a location where the kits can be exposed to rain, snow, etc.**
There is risk of product malfunction.

⃠ **Do not drop the communications and EEV kits.**
It may damage the products.

Failure to carefully read and follow all instructions in this manual can result in property damage and equipment malfunction.

WIRING

⚠DANGER

High voltage electricity is required to operate the communications and EEV kits. Adhere to the NEC code and these instructions when wiring.
Improper connections and inadequate grounding can cause accidental injury or death.

Always ground the communications and EEV kits following local, state, and NEC codes.
There is risk of fire, electric shock, and physical injury or death.

Turn the power off at the nearest disconnect before servicing the equipment.
Electrical shock can cause physical injury or death.

Properly size all circuit breakers or fuses.
There is risk of fire, electric shock, explosion, physical injury or death.

Communication kit requires its own power source (EEV kit is powered off of Communication kit). ⃠ Do not share the power source with other equipment.
There is risk of heat generation which may cause fire, electric shock, explosion, physical injury or death.

⚠WARNING

The information contained in this manual is intended for use by an industry-qualified, experienced, certified electrician familiar with the U.S. National Electric Code (NEC) who is equipped with the proper tools and test instruments.
Failure to carefully read and follow all instructions in this manual can result in personal injury or death.

All electric work must be performed by a licensed electrician and conform to local building codes or, in the absence of local codes, with the National Electrical Code, and the instructions given in this manual.
If the power source capacity is inadequate or the electric work is not performed properly, it may result in fire, electric shock, physical injury or death.

Refer to local, state, and federal codes, and use power wires of sufficient current capacity and rating.
Wires that are too small may generate heat and cause a fire and physical injury or death.

Secure all field wiring connections with appropriate wire strain relief.
Improperly securing wires will create undue stress on equipment power lugs. Inadequate connections may generate heat, cause a fire and physical injury or death.

Verify that all power wiring, plugs, and sockets are not loose or damaged.
Loose wiring may overheat at connection points, causing a fire, electrical shock, physical injury or death.

Note

⃠ Do not supply power to the communication and EEV kits until all electrical wiring, controls wiring, piping, installation, and refrigerant evacuation are completed for the whole air conditioning system.

The information contained in this manual is intended for use by an industry-qualified, experienced, certified electrician familiar with the U.S. National Electric Code (NEC) who is equipped with the proper tools and test instruments.
Failure to carefully read and follow all instructions in this manual can result in equipment malfunction or property damage.

SAFETY PRECAUTIONS

OPERATION

⚠DANGER

⃠ **Do not provide power to or operate communication and EEV kits if the kits are flooded or submerged. Always have the dealer or an authorized technician to service the kits.**
There is risk of fire, electric shock, physical injury or death.

⃠ **Do not store or use flammable gas or combustibles near the communications and EEV kits.**
There is risk of fire, explosion, and physical injury or death.

Unplug the communication and EEV kits if either kit emits strange sounds, smells, or smoke.
There is risk of fire, electric shock, physical injury or death.

⚠WARNING

⃠ **Do not install the communications and EEV kits in locations exposed to open flame or extreme heat. Do not touch the kits with wet hands.**
There is risk of fire, electric shock, physical injury or death.

⃠ **Do not modify or extend the power supply cords.**
There is risk of fire, electric shock, physical injury or death.

⃠ **Do not step or place anything on the communications and EEV kits.**
If the product falls, there is risk of physical injury.

⃠ **Do not place heavy objects on the communications and EEV kits' power cables.**
There is risk of fire, electric shock, physical injury or death.

⚠CAUTION

Only authorized persons should operate the communications and EEV kits.
If the kits are not operated properly, there is a risk of physical injury.

Note

⃠ **Do not let the communication and EEV kits get wet.**
There is risk of product failure or malfunction.

Only authorized persons should operate the communication and EEV kits.
There is risk of product failure or malfunction.

⃠ **Do not drop the communications and EEV kits.**
There is risk of product failure or malfunction.

⃠ **Do not step or place anything on the communications and EEV kits.**
If the product falls, there is risk of product damage.

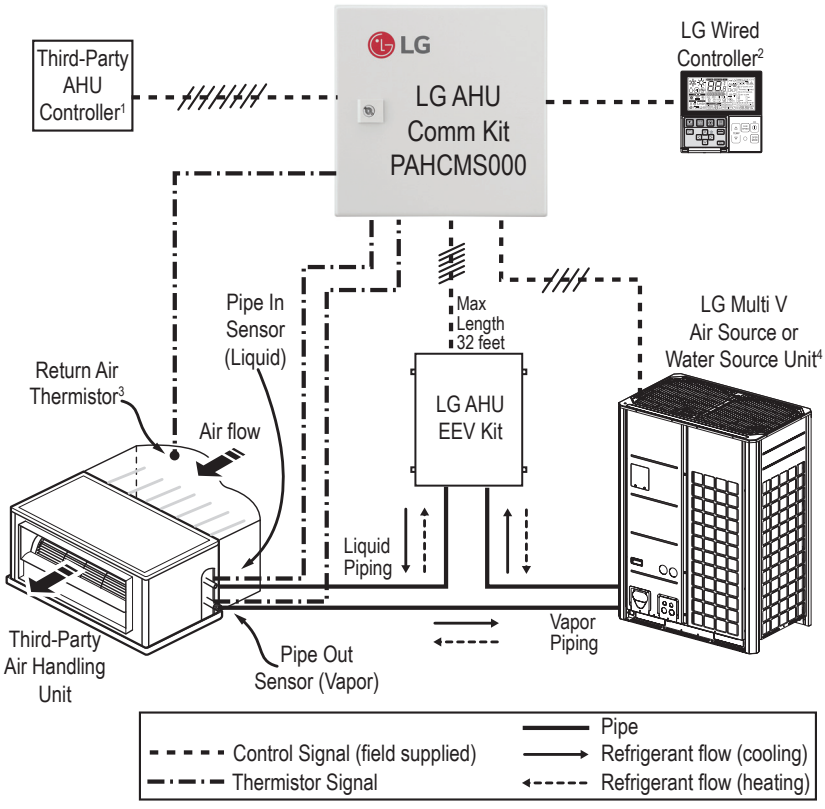
Introduction

The PAHCMS000 AHU Communications Kit bridges LG's air conditioning outdoor unit to a third party Air Handling Unit (AHU). Its function is based on discharge or supply air temperature control. In installations where the AHU is designed with Direct Expansion (DX) Coil, the PAHCMS000 will control the supply air temperature by measuring the inlet and outlet temperatures of the DX coil and changd the operation of the outdoor unit and the expansion unit. PAHCMS000 AHU Communications Kit features are:

- It can be used with LG Multi V air or water source outdoor units and LG Single Zone outdoor units.
- It supports AHU coil capacities from 12 - 594 kBtu/h.
- It controls the Electronic Expansion Valve (EEV, required, sold separately)
- It measures the supply air temperature through the enclosed temperature sensor and controls the outdoor unit to secure the demanded supply air temperature.
- It can be directly connected to direct digital control (DDC) without a separate control module, so DDC can receive product control and status information through Modbus communication.
- The PAHCMS000 AHU Communications Kit consists of a chassis, communication module, pipe-in thermistor, pipe-out thermistor, and return air thermistor.
- Supply air temperature control is possible without DDC.
- It increases heating comfort by applying sequential defrost logic and simultaneous defrosting prevention logic of the outdoor unit.

Figure 1: PAHCMS000 AHU Communications Kit.

Figure 2: AHU Communications Kit System Schematic.



[1]Third-party AHU controller is recommended.

[2]LG wired controller (required accessory) functions as error code display only. No system control available.

[3]Return air temperature thermistor can be replaced with fixed resistor when AHU controller is using third-party temperature sensors.

[4]Compatible units are Multi V and Single Zone.

AHU COMMUNICATIONS KIT SPECIFICATIONS, COMPONENTS LIST

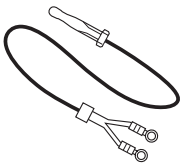
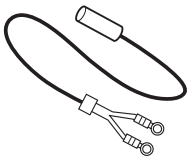
Specifications

Table 1: PAHCMS000 AHU Communications Kit Specifications Table.

Kit Model Number	PAHCMS000
For Use With	Multi V and Single Zone
Power Supply Requirements	208-230VAC, 60Hz, 1Ph
Rated Current	0.1A
Ambient Operating Temperature Range	-4 to +149°F
Ambient Operating Humidity Range	0 to 98% (Non-condensing)
Dimensions (in., W x H x D)	14-31/32" W x 6-3/32" H x 11-13/16" D
Net Weight (lbs.)	16.5
Shipping Weight (lbs.)	19.4
Communications	RS-485 (4 wires required: 2 connect to IDU A/B terminals and 2 connect to UI4/G terminals on ODU)
Communications Cable	AWG 18 x 4 Stranded, Shielded Copper Cable

AHU Communications Kit Components

Table 2: PAHCMS000 AHU Communications Kit Components Table (factory supplied).

Part	Quantity	Image
AHU Communications Kit	One (1)	
Return Air (Room) Thermistor	One (1)	
Pipe Thermistor	Two (2) (One [1] Pipe In, One [1] Pipe Out)	

AHU COMMUNICATIONS KIT INSTALLATION

Selecting the Best Location

AHU Communications Kit Design Parameters

- Minimum coil entering air temperature is 41°F when system is operating in heating mode.
- AHU coil sizing parameters:
  - Suction (evaporating) temperature for coil sizing is 41°F, Condensing (liquid) temperature for coil sizing is 110°F.
  - Recommended coil tube sizes: 3/8 or 1/2 inches.
  - Coil volume is needed to calculate additional refrigerant charge amount.
  - Coils larger than 16 tons should be divided into multiple circuits to allow EEV Kit connection kit (EEV Kit sold separately).
- Pipe sizing rules are same rules as the connected air-source or water-source heat pump (see respective Engineering and Installation Manuals for more information).
- Maximum recommended combination ratio is 100%.
- AHU Communications Kits and EEV Kits (sold separately) are not weatherproof and must be protected from rain, snow, etc.

Selecting the Best Location

Do

- Install the AHU Communications and EEV Kits with the access panels facing outward.
- Install in a location that can support the weight of the kits.
- Install the EEV kit on the AHU as close as possible to the heat exchanger.

Don't

- Don't install or operate the unit in an area where mineral oils, sulphuric gases, acidic or alkaline vapors or spray are present.
- Don't install in an area where the air contains high levels of salt (oceanside locations).
- Don't install in vehicles or vessels.
- Don't install in an area where voltage fluctuates significantly (factories), or near machines that generate electromagnetic waves.

AHU Operation Range

Range of the heat exchanger inlet air temperature is 64.4 to 104°F for cooling, and 41 to 86°F for heating. If the temperature is <64.4°F for cooling and >86°F for heating, the system might cycle on and off because of the system's protection logic.

Note

To measure room temperature accurately, install the room thermistor in the heat exchanger inlet. If the room thermistor is not installed properly, the AHU may not operate properly. Room thermistor can be replaced with fixed resistor when using a third-party AHU controller.

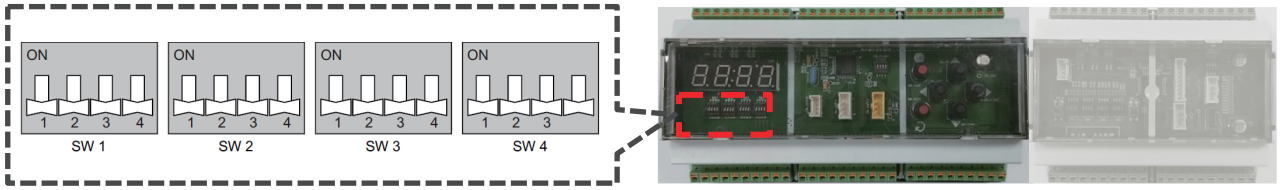
Table 3: AHU Application and Condition.

Application	Condition
100% outside air intake: The AHU(s) is (are) the only indoor unit(s) connected to the air-source / water-source heat pump unit(s).	The total capacity of 100% outside air intake AHU(s) should be 50~100% of the air-source / water-source heat pump.

AHU COMMUNICATIONS KIT INSTALLATION

DIP Switch Settings

Figure 3: Main Module DIP Switches.



The default setting of all DIP switches is “off”

Table 4: Main Module DIP Switch Settings

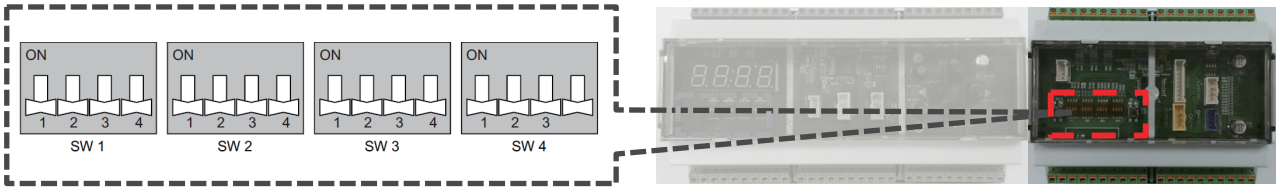
S/W name	No	Item	Setting		Note
SW1	1	Control Type	On	Communication	Controlled by DDC through Modbus or LG centralized controller
			Off	Contact signal	Controlled by DDC through Contact signal AI and DI LG Centralized controller can only monitor status
	2	Discharge Temp. Control Type	On	Stand alone	Discharge temp. control by LG controller using own discharge temp. sensor
			Off	Manual by DDC	Discharge temp. control by DDC using filed supplied discharge temp. sensor
	3	Defrost Operation Type[1]	On	Normal	In case of multiple outdoor units, Defrost operation can be operated simultaneously
			Off	Sequential Start up	In case of multiple outdoor units, the outdoor unit is sequentially started at intervals of 10 minutes
	4	Central Communication Type	On	LG Central Comm	Modbus Communication
			Off	-	Not Used
SW2	1	ODU Capacity Control	On	ODU Capacity Setting #2	ODU capacity control #2
			Off	ODU Capacity Setting #1	ODU capacity control #1
	2	Reserved	-	-	-
	3	Reserved	-	-	-
	4	Reserved	-	-	-
SW3	1	Reserved	-	-	-
	2	Reserved	-	-	-
	3	Reserved	-	-	-
	4	Reserved	-	-	-
SW4	1	Reserved	-	-	-
	2	Reserved	-	-	-
	3	Reserved	-	-	-
	4	Reserved	-	-	-

Note:
1. Function of defrost operation type can be applied only to Multi V outdoor units (after MULTI V 5 model).

AHU COMMUNICATIONS KIT INSTALLATION

DIP Switch Settings

Figure 4: Communications Module DIP Switches.



The default setting of all dip switch is set “off”

Table 5: Communications Module DIP Switch Settings

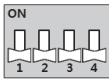
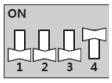
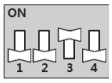
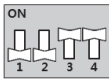
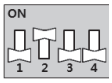
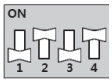
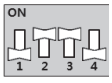
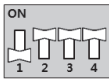
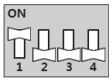
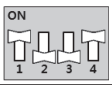
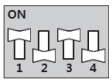
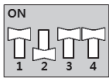
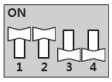
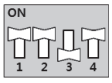
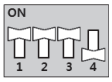
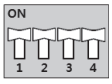
S/W name	No	Item	Setting		Note
SW1	1	ODU Type	On	Single Comm	Using Single Split outdoor unit
			Off	MULTI V Comm	Using MULTI V outdoor unit
	2	Control Type	On	Communication	Controlled by Modbus between modules
			Off	Contact signal	Not used
	3	DO Type	On	Fan Speed	Not used
			Off	Status	Not used
	4	Fan Speed (TH. On/Off)	On	Fixed	Not used
			Off	Change	Not used
SW2	1	Reserved	-	-	-
	2	Reserved	-	-	-
	3/4	UI Setting	Off/Off	UI Setting #1	Not used
			Off/On	UI Setting #2	Not used
			On/Off	-	-
			On/On	-	-
SW3	1	Master/Slave	On	Slave mode	Not used
			Off	Master mode	Master is default
	2/3	Operation mode setting	Off/Off	Heat Pump	Cooling or Heating operation mode is available
			Off/On	Heating Only	Operation mode is Heating only (Heating / Ventilation)
			On/Off	Cooling Only	Operation mode is Cooling only (Cooling / Ventilation)
			On/On	Reserved	-
	4	Reserved	-	-	-
SW4	1~4	Capacity Index Setting	-	-	According to ODU Type, you can setup the capacity index of MULTI V or Single Split

Note :
1. Do not change the settings of reserved switches. Changing these settings can result in equipment malfunction.

AHU COMMUNICATIONS KIT INSTALLATION

DIP Switch Settings

Table 6: SW4 DIP Switch Settings for AHU Capacity

Switch Number	SW4 DIP switches	Capacity (kBTU/h)	
		MULTI V	Single Zone
1		12	5
2		15	7
3		18	9
4		24	12
5		28	15
6		36	18
7		42	24
8		48	30
9		54	36
10		76	42
11		96	48
12		115	60
13		134	70
14		153	85
15		172	Reserved
16		192	Reserved

Notes:

1. PAHCMS000 AHU can be connected to the PRLK048A0, PRLK096A0, or PRLK396A0 EEV kits only.
2. If connecting the PRLK396A0 EEV kit to a Multi V outdoor unit, set DIP switches 1, 2, 3, and 4 to ON to set capacity to 192 kBtu/h.

AHU COMMUNICATIONS KIT INSTALLATION

AHU Communications Kit Parts

Figure 5: AHU Communications Kit Parts Diagram.

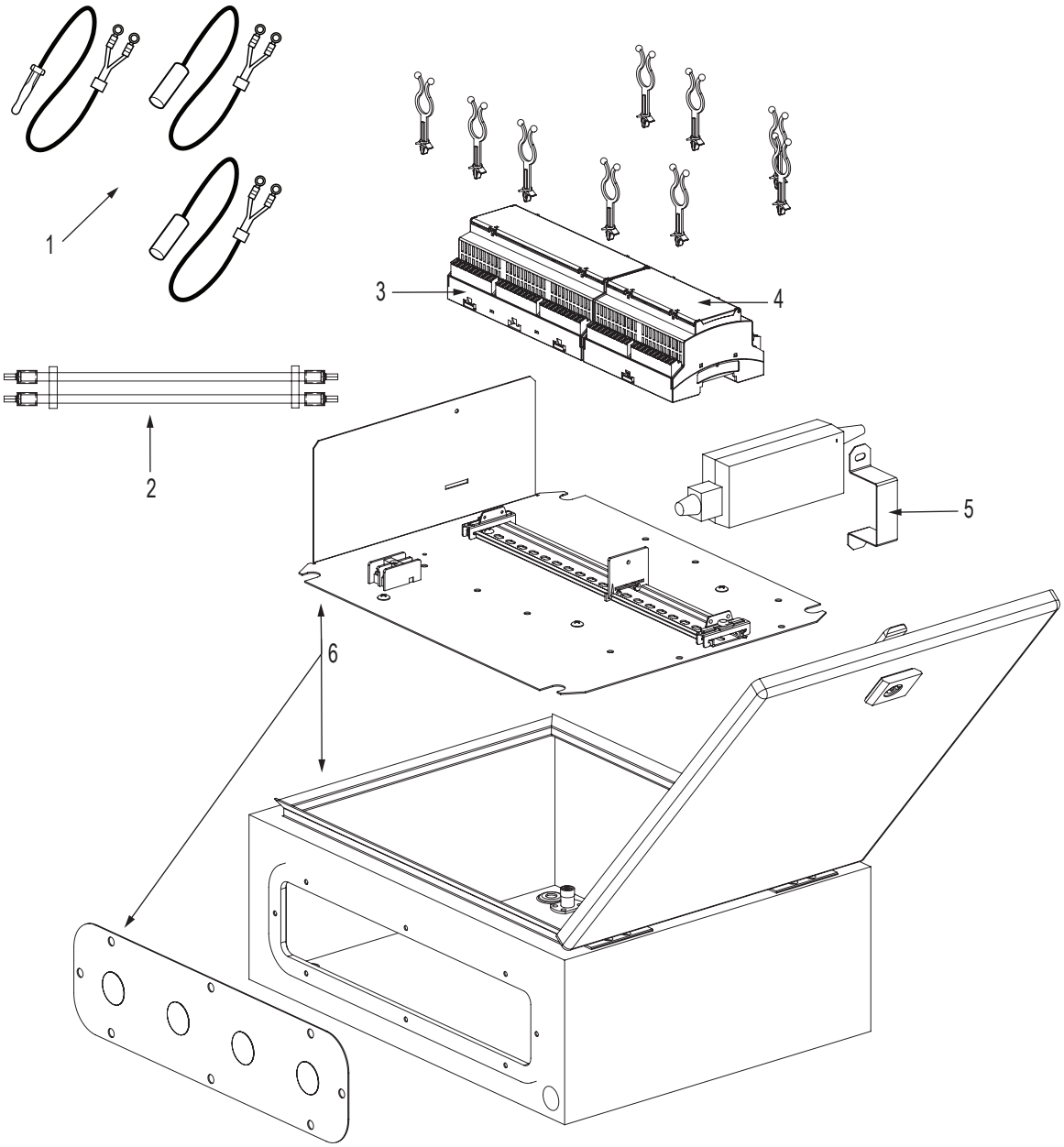


Table 7: AHU Communications Kit Parts Table.

Diagram Label	Part Name	Quantity
1	Thermistor Assembly, NTC	Three (3)
2	Harness, Multi	One (1)
3	Main Module	One (1)
4	Communications Module	One (1)
5	Bracket	One (1)
6	Panel Assembly, Control	Three (3)

AHU COMMUNICATIONS KIT INSTALLATION

AHU Communications Kit Mounting

1. Use the key to open the AHU Communication Kit door.

2. Remove the four nuts from the four captive bolts at the corners of the control panel assembly.

3. Carefully remove the control panel assembly from the AHU Communication Kit.

4. Use the AHU Communication Kit as a template and mark the locations of the screw holes on the mounting surface.

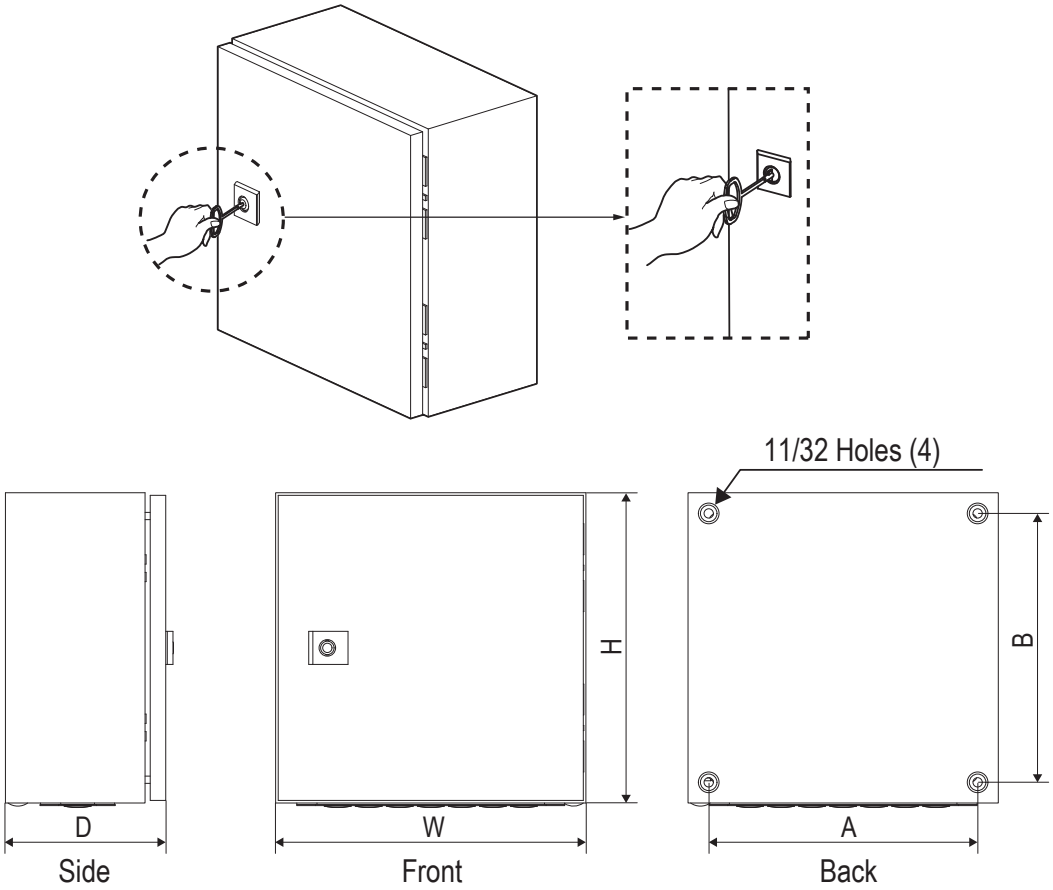
NOTE: Do not drill holes without removing the control panel assembly.
Metal shavings can collect on the control panel assembly and damage the equipment when power is applied.

5. Drill the four holes for the field-supplied screws. Ensure the drill bit does not damage any equipment or components.

6. Carefully replace the control panel assembly and secure with the four nuts on the four captive bolts.

7. Position the AHU Communications Kit at the mounting location and secure with four field-supplied screws. Ensure the screws do not damage any equipment or components.

Figure 6: AHU Communications Kit Installation

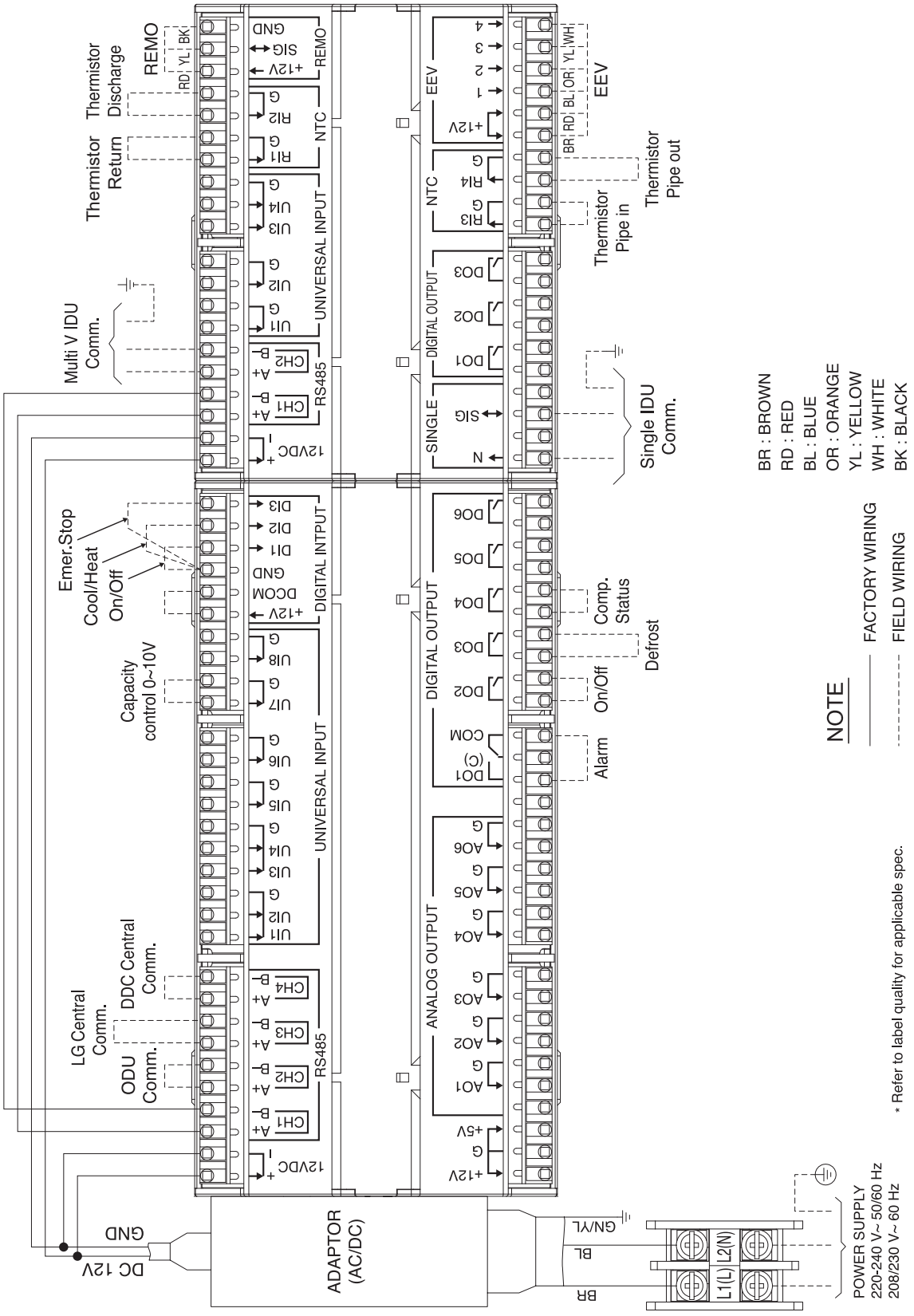


Model	Size (inch)				
	W	D	H	A	B
PAHCMS000	14 31/32	6-3/32	11-13/16	13-2/5	10-1/4

AHU COMMUNICATIONS KIT INSTALLATION

Wiring Diagram

Figure 7: AHU Communications Kit Wiring Diagram



AHU COMMUNICATIONS KIT INSTALLATION

Wiring Diagram

Table 8: RS485 Communication Port

Name	Port	Item	Electrical Spec.	Function
ODU Comm.	RS485 CH2	ODU Comm. (CEN A/B or INT A/B)	Max 3280 ft, 2C x 18~16 AWG (shield wire)	Communication with MULTI V/Single split ODU for ODU Capacity control
LG Central Comm.	RS485 CH3	LG Central Comm.	Max 1640 ft, 2C x 18~16 AWG (shield wire)	Communication with LG centralized controller through LGAP Protocol
DDC Central Comm.	RS485 CH4	DDC(Modbus) Central Comm.	Max 1640 ft, 2C x 18~16 AWG (shield wire)	Communication with DDC centralized controller through Modbus protocol

Table 9: Digital Input

Name	Port	Value		Electrical Spec	Function
		Short	Open		
On/Off	DI1	On	Off	Non voltage	Operation On/Off
Cool/Heat	DI2	Heating	Cooling	Non voltage	Operation Mode
Emer. Stop	DI3	Emergency Stop	Normal	Non voltage	Emergency Stop Input (Priority operation)

*DI is available when Dip SW1-1 is Off

Table 10: Digital Output – Relay C Contact

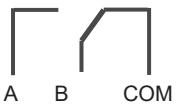
Name	Port	Value	Electrical Spec.	Function
Alarm	DO1	-Normal Status  -Error Status  	30 VDC / 5 A 250 VAC / 5 A	Output normal or error status (Relay C Contact) - A Contact Normal status : open Error status : short - B Contact Normal status : short Error status : open

Table 11: Digital Output

Name	Port	Value		Electrical Spec.	Function
		Short	Open		
On/Off	DO2	On	Off	12 VDC / 1 A, 250 VAC / 3 A	Operation On/Off status
Defrost	DO3	Defrost	Normal		ODU Defrost status
Comp. Status	DO4	On	Off		Compressor operation On/Off status
Reserved	DO5	-	-		-
Reserved	DO6	-	-		-

Table 12: Universal Input

Name	Port	Value	Electrical Spec.	Function
Reserved	UI1	-	-	-
Reserved	UI2	-	-	-
Reserved	UI3	-	-	-
Reserved	UI4	-	-	-
Reserved	UI5	-	-	-
Reserved	UI6	-	-	-
Capacity Control[1] 0~10V	UI7 (AI)	0~10 V Input	DC 0~10 V, 20 mA	ODU Capacity control input(0~10 V) *When Temp. Control Type is 'Manual by DDC'(SW 1-2 : Off), refer to UI7 Analog Input
Reserved	UI8	-	-	-

1. Refer to the Capacity Control (UI7) combination ratio table.
2. UI is available when Dip SW1-1 is Off

AHU COMMUNICATIONS KIT INSTALLATION

Power Wiring

General Power Wiring Guidelines

⚠ WARNING

All electrical work must be performed by a licensed electrician and conform to local building codes or, in the absence of local codes, with the National Electrical Code, and the instructions in this manual.
Inadequate power source capacity or improper electric work may result in fire, electric shock, physical injury or death.

All field-supplied parts, materials, and electric work must be conform to local codes.
Improper components and installation may result in fire, electric shock, physical injury or death.

A main switch or disconnect, in accordance with relevant local and national codes, and having a contact separation in all poles, must be incorporated in the wiring.
Improper installation by the user may result in fire, electric shock, physical injury or death.

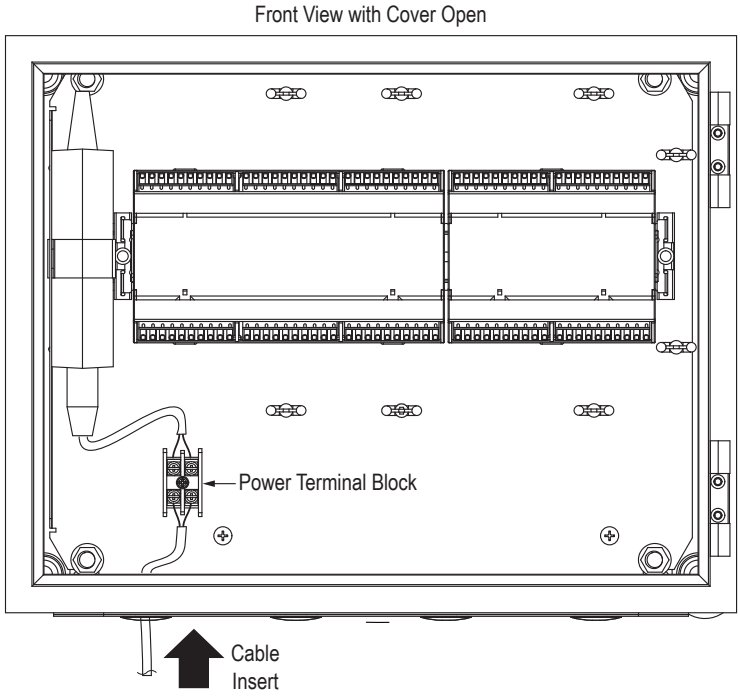
Refer to the air-source / water-source heat pump unit installation manual for power wiring sizes, circuit breaker and switch capacities, and wiring instructions.
If the power source capacity for the air-source unit / water-source unit is inadequate or the electric work is not performed properly, it may result in fire, electric shock, physical injury or death.

Use copper wire only and connect wires tightly to the terminals. Install wiring so that other equipment is not obstructed.
Improper or incomplete connections could result in overheating, fire, electric shock, physical injury or death.

Ensure the power source is disconnected before performing this procedure.
If the power source is connected during this procedure, it could result in electric shock, physical injury, or death.

1. Carefully pull the power cable through the cable nut and grommet.
2. Connect the power cable to the power terminal block.
3. Pull enough cable through the nut and grommet to allow enough slack for strain relief.
4. Tighten the cable nut.

Figure 8: Power Wiring Connection.



⚠ WARNING

All electrical work must be performed by a licensed electrician and conform to local building codes or, in the absence of local codes, with the National Electrical Code, and the instructions in this manual.
If the electrical work is not performed properly, it may result in fire, electric shock, physical injury or death.

All field-supplied parts, materials, and electric work must be conform to local codes.
Improper components and installation may result in fire, electric shock, physical injury or death.

Ensure the power source is disconnected before performing this procedure.
If the power source is connected during this procedure, it could result in electric shock, physical injury, or death.

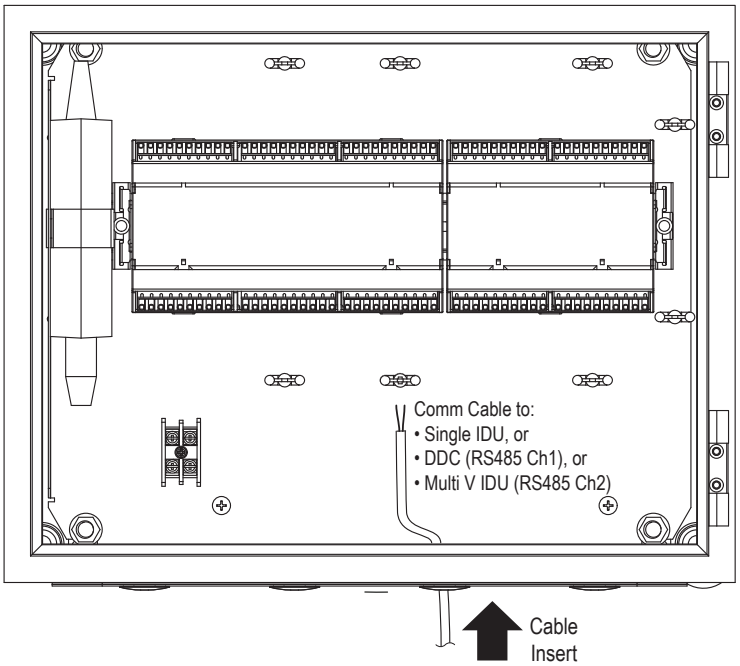
Note

- *Communications wiring must be 18 gauge, shielded, and stranded.*
- *The thermistor cable, remote controller wires, and communications wires should be positioned at least two (2) inches away from power supply wires. If these wires are installed too closed together, it may result in product malfunction due to electrical interference.*

1. Carefully pull the communications cable through the cable nut and grommet.
2. Refer to the wiring diagram in Figure 6 and connect the communications cable to the power terminal block.
3. Pull enough cable through the nut and grommet to allow enough slack for strain relief.
4. Tighten the cable nut.

Figure 9: Communications Wiring Connection

Front View with Cover Open

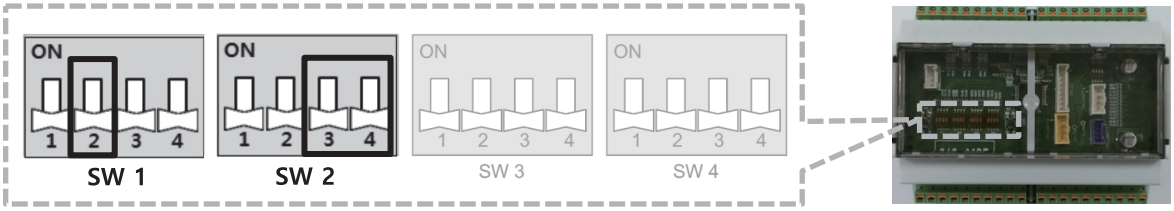


AHU COMMUNICATIONS KIT INSTALLATION

Controller Settings

Universal Input – UI Setting #1

UI setting #1 is available when DIP switches SW1-2, SW2-3, and SW2-4 are Off.



Note : Dip SW 1-2 is for contact signal control

Name	Port	Value		Electrical Spec.	Function
		Short	Open		
On / Off	UI1 (DI)	On	Off	Non voltage	Operation On/Off Control
Cool / Heat	UI2 (DI)	Heating	Cooling	Non voltage	Heating/Cooling Operation Control if operation mode (DIP SW 3-2, 3-3) is set to cooling only mode, UI2 “Short” status will work as fan mode. if operation mode (DIP SW 3-2, 3-3) is set to heating only mode, UI2 “Open” status will work as fan mode.
Forced Thermo On / Off	UI3 (DI)	Thermal On	Thermal Off	Non voltage	When UI4(Target temp.) is less than 1.5 V, Target temp. and Room temp. is fixed like below table

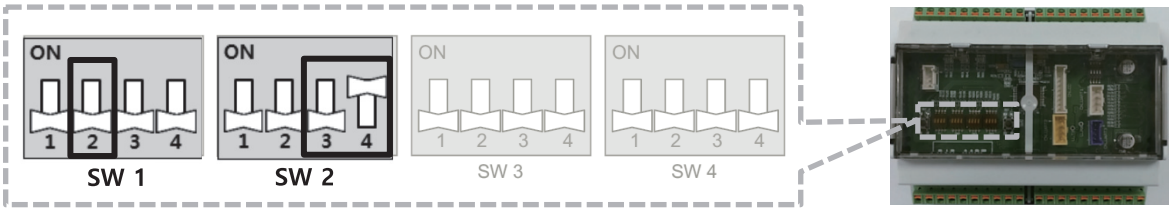
Mode / UI3 status	Cooling Mode (°F)	Heating Mode (°F)
Thermal On	Target temp. = 60 Room temp. = 80	Target temp. = 80 Room temp. = 60
Thermal Off	Target temp. = 80 Room temp. = 60	Target temp. = 60 Room temp. = 80

Target Temp.	UI4 (AI)	Voltage			Electrical Spec.	Cooling Mode (°F)	Heating Mode (°F)
		V	Min.	Max			
		< 1.5	0	1.6	DC 0~10 V, 20 mA	UI3 short : 60 UI3 open : 80	UI3 short : 80 UI3 open : 60
		2.0	1.9	2.1		60	60
		2.5	2.4	2.6		62	62
		3.0	2.9	3.1		64	64
		3.5	3.4	3.6		66	66
		4.0	3.9	4.1		68	68
		4.5	4.4	4.6		69	69
		5.0	4.9	5.1		71	71
		5.5	5.4	5.6		73	73
		6.0	5.9	6.1		75	75
		6.5	6.4	6.6		77	77
		7.0	6.9	7.1		78	78
		7.5	7.4	7.6		80	80
		8.0	7.9	8.1		82	82
		8.5	8.4	8.6		84	84
		9.0 ≤	8.7	10.0		86	86

Note : Maintain previous value when getting intermediate value to UI4

Universal Input – UI Setting #2

UI setting #1 is available when DIP switches SW1-2 and SW2-3 are Off and SW2-4 is On.



Note : Dip SW 1-2 is for contact signal control

Name	Port	Value		Electrical Spec.	Function
		Short	Open		
On / Off	UI1 (DI)	On	Off	Non voltage	On/Off operation control
Forced Th. On / Off	UI4 (DI)	Thermal On	Thermal Off	Non voltage	

Mode	Cooling Mode (°F)	Heating Mode (°F)
Thermal On	Target temp. = 60 Room temp. = 80	Target temp. = 80 Room temp. = 60
Thermal Off	Target temp. = 80 Room temp. = 60	Target temp. = 60 Room temp. = 80

Operation Mode Setting

Mode	Status		Electrical Spec.	Function
	UI2	UI3		
Cooling	Short	Open	Non voltage	Cooling mode operation control
Heating	Open	Short	Non voltage	Heating mode operation control
Fan	Open	Open	Non voltage	Fan mode operation control
	Short	Short	Non voltage	

AHU COMMUNICATIONS KIT INSTALLATION

Controller Settings

Digital Output – Status

Status Output is available when DIP switch SW1-3 is Off.

Name	Port	Value		Electrical Spec.	Function
		Short	Open		
On / Off	DO1	On	Off	12 VDC / 1A, 250VAC / 3A	Operation On/Off Status
Defrost	DO2	Defrost	Normal		ODU Defrost Status(Only total defrost mode)
Alarm	DO3	Error	Normal		Error output status

Digital Output – Fan Speed

Fan Speed Output is available when DIP switch SW1-3 is On.

Name	Port	Value		Electrical Spec.	Function
		Short	Open		
Fan_High	DO1	High	-	12 VDC / 1A, 250VAC / 3A	Fan High
Fan_Mid	DO2	Mid	-		Fan_Mid
Fan_Low	DO3	Low	-		Fan_Low
Fan_Stop	DO1 DO2 DO3	-	Stop		Fan_Stop (When all DO are 'Open' Status)

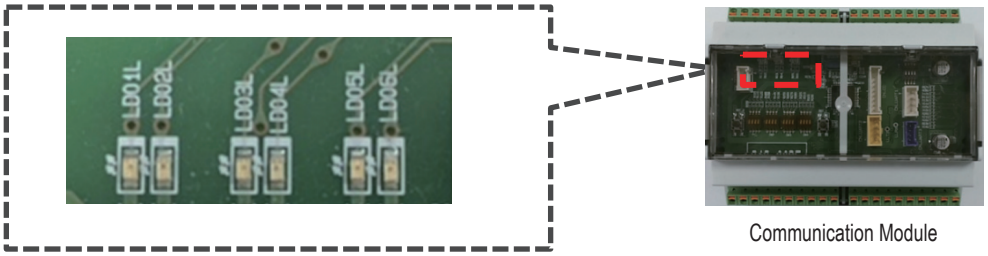
Remote Controller

Name	Port	Item	Electrical Spec.	Function
REMO	+12V/SIG/GND	Wire Remote Controller	Max 164 ft	Communication with Wired Remote Controller

Electronic Expansion Valve

Name	Port	Item	Electrical Spec.	Function
EEV	12 VDC/1/2/3/4	EEV Control	Max 32.8 ft	EEV Control

LED Display



Communication Module

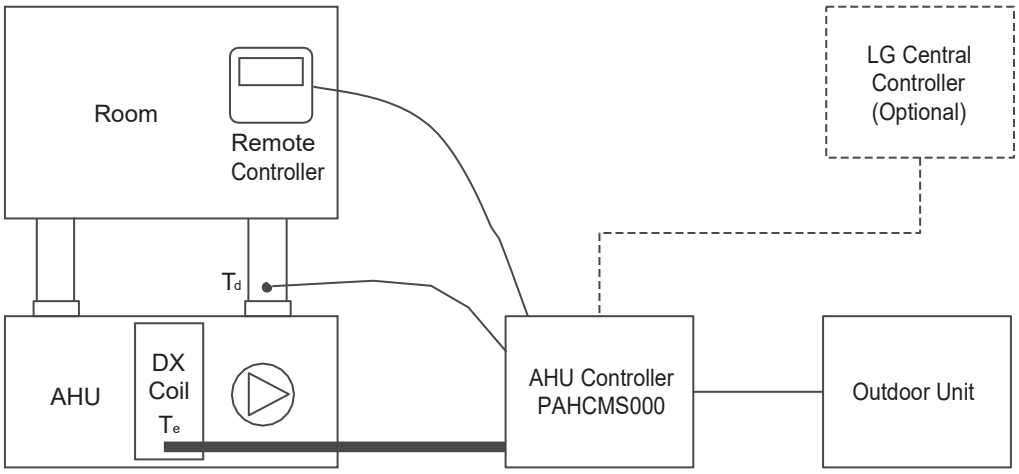
Name	Port	Function
LD01L	LED1	Modbus Comm. Tx
LD02L	LED2	Modbus Comm. Rx
LD03L	LED3	Inner Comm. Tx
LD04L	LED4	Inner Comm. Rx
LD05L	LED5	ODU Comm. (Repeat On/Off when communicating with ODU)
LD06L	LED6	Error Status (Repeat On/Off when error occurs)

AHU COMMUNICATIONS KIT INSTALLATION

Solutions Overview

Discharge Air Temperature Control

LG Control: Variable T_e + T_d



The Communication Kit for Discharge Air Temperature Control is single-handed able to cover this function. The Communication Kit adjusts the evaporating or condensing temperature (T_e) by monitoring the supplied air temperature (T_d) to meet the required set target (T_d).

Required item

	Expansion Valve	Wired Remote Controller	Central Controller
MULTI V	EEV	O	Optional
Single Split	Not Required	O	Optional

Function List

	Function List	LG Remote Controller	LG Central Controller [1]
Control	Operating On/Off	O	O
	Operation Mode	O	O
	Return Air Temperature	X	X
	Discharge Air Temperature	O	O
	Forced Thermal On/Off	X	X
	Capacity Control	X	X
	Emergency Stop	X	O
Monitor	Operating On/Off	O	O
	Operation Mode	O	O
	Return Air Temperature	X	X
	Discharge Air Temperature	X	O
	Defrost status	O	X
	Error Alarm	O	O
	Compressor On/Off	O	X

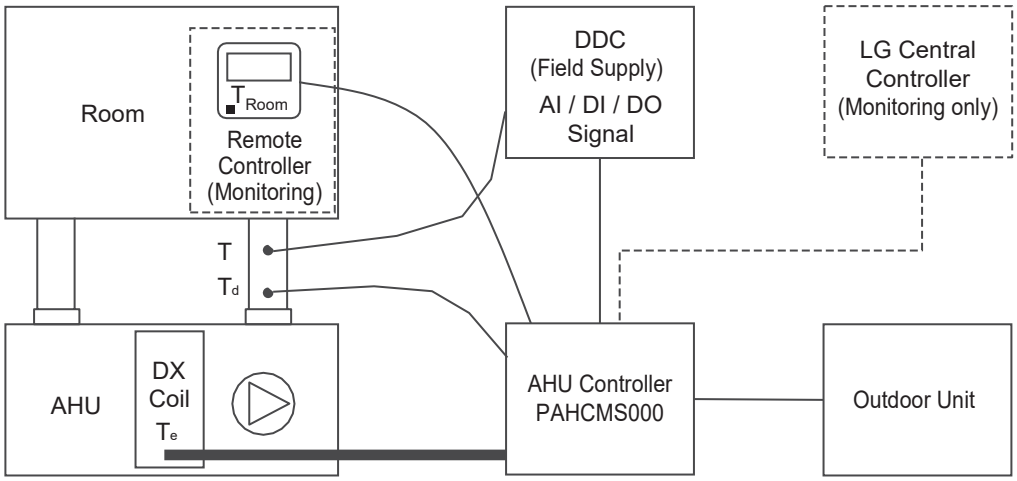
Note :

O : Applied, X : Not applied

1. LG Central controller is based on AC Smart IV and ACP IV

Discharge Air Temperature Control

DDC Control by Contact Signal: Variable T_e + T_d (0 - 10V)



The DDC controls discharge air temperature by sending an analog input (0 to 10V) to the AHU Communications Kit. The AHU Communications Kit adjusts the outdoor unit target temperatures (T_e), increasing or decreasing the discharge air temperatures.

Required Items

	Expansion Valve	Wired Remote Controller	Central Controller
MULTI V	EEV	Optional (Monitoring only)	Optional (Monitoring only)
Single Split	Not Required	Optional (Monitoring only)	Optional (Monitoring only)

Function List

	Function List	Contact Signal type (DDC)	LG Remote Controller	LG Central Controller[1]
Control	Operating On/Off	O	X	X
	Operation Mode	O	X	X
	Return Air Temperature	X	X	X
	Discharge Air Temperature	X	X	X
	Forced Thermal On/Off	X	X	X
	Capacity Control	O	X	X
	Emergency Stop	O	X	X
Monitor	Operating On/Off	O	O	O
	Operation Mode	X	O	O
	Return Air Temperature	X	X	O
	Discharge Air Temperature	X	X	O
	Defrost status	O	O	X
	Error Alarm	O	O	O
	Compressor On/Off	O	O	X

Note :

O : Applied, X : Not applied

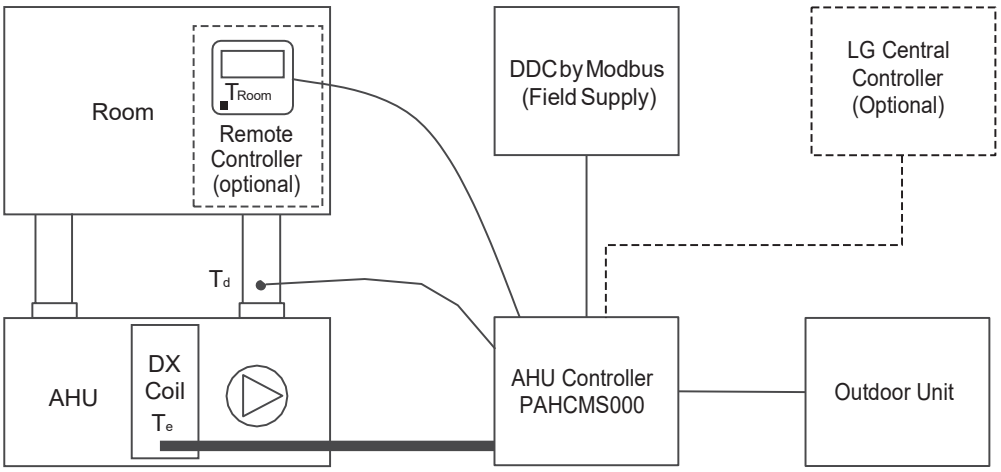
1. LG central controller is based on AC Smart IV and ACP IV

AHU COMMUNICATIONS KIT INSTALLATION

Solutions Overview

Discharge Air Temperature Control

DDC Control by Modbus: Variable T_e + T_d



The DDC controls discharge air temperature (T_d) by sending modbus signals to the AHU Communications Kit. The AHU Communications Kit adjusts the outdoor unit target temperatures (T_e), increasing or decreasing the discharge air temperatures.

Required Items

	Expansion Valve	Wired Remote Controller	Central Controller
MULTI V	EEV	Optional	Optional
Single Split	Not Required	Optional	Optional

Function List

	Function List	Modbus Comm. type (DDC)	LG Remote Controller	LG Central Controller[1]
Control	Operating On/Off	O	O	O
	Operation Mode	O	O	O
	Return Air Temperature	X	X	X
	Discharge Air Temperature	O	O	O
	Forced Thermal On/Off	X	X	X
	Capacity Control	O	X	X
	Emergency Stop	X	X	O
Monitor	Operating On/Off	O	O	O
	Operation Mode	O	O	O
	Return Air Temperature	O	X	O
	Discharge Air Temperature	O	X	O
	Defrost status	O	O	X
	Error Alarm	O	O	O
	Compressor On/Off	O	O	X

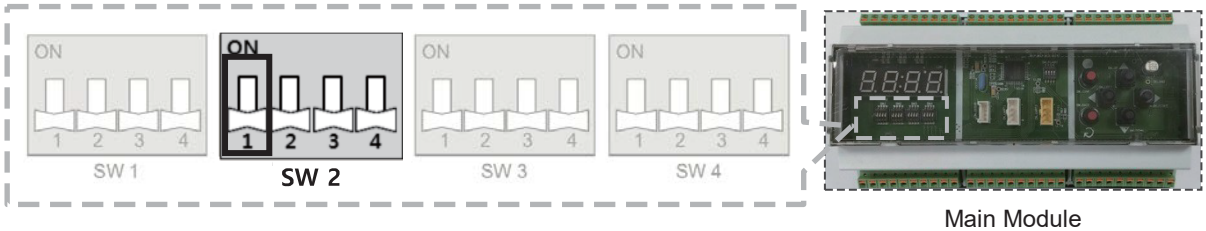
Note :

O : Applied, X : Not applied

1. LG Central controller is based on AC Smart IV and ACP IV

UI7 (Analog Input) – ODU Capacity Control #1

ODU capacity control #1 is available when DIP SW2-1 is Off. Each Master ODU has a different operating ratio as shown in the table below.



Main Module

1 System

Voltage [V]			ODU Capacity ratio [%]	Evaporator (Te)		Condenser (Tc)	
V	Min.	Max.		Temperature °F	Low pressure psi	Temperature °F	High pressure psi
<4.0	-	3.7	Operation Off	-	-	-	-
4.0	3.8	4.2	40	59.0	168.2	86.0	261.1
4.5	4.3	4.7	40	59.0	168.2	86.0	261.1
5.0	4.8	5.2	50	55.4	155.2	96.8	301.7
5.5	5.3	5.7	50	55.4	155.2	96.8	301.7
6.0	5.8	6.2	60	50.0	143.6	104.0	339.4
6.5	6.3	6.7	60	50.0	143.6	104.0	339.4
7.0	6.8	6.2	70	46.4	134.9	111.2	371.3
7.5	7.3	7.7	70	46.4	134.9	111.2	371.3
8.0	7.8	8.2	80	43.7	126.2	116.6	396.0
8.5	8.3	8.7	80	43.7	126.2	116.6	396.0
9.0	8.8	9.2	90	41.0	120.4	120.2	433.7
9.5	9.3	9.7	90	41.0	120.4	120.2	433.7
10.0	9.8	10.0	100	39.2	116	122.0	435.1

2 System

Voltage [V]	Total Capacity ratio [%]	Each ODU's capacity ratio [%]	
		ODU Master#1	ODU Master#2
<2.0	0	Operation Off	
2.0	20.0	40	0
2.5	25.0	50	0
3.0	30.0	60	0
3.5	35.0	70	0
4.0	40.0	40	40
4.5	45.0	40	50
5.0	50.0	50	50
5.5	55.0	50	60
6.0	60.0	60	60
6.5	65.0	60	70
7.0	70.0	70	70
7.5	75.0	70	80
8.0	80.0	80	80
8.5	85.0	80	90
9.0	90.0	90	90
9.5	95.0	90	100
10.0	100.0	100	100

Note :

1. ODU Capacity ratios mentioned in the table above are not exact.
2. Evaporative temperature / Condenser temperature may vary depending on system operating frequency, pressure option setting and piping installation conditions.
3. The evaporator temperature is based on target low pressure of compressor. The actual temperature at the evaporator may vary by pressure drop. Please contact your LG representative to design an AHU heat exchanger.

AHU COMMUNICATIONS KIT INSTALLATION

Main Module Settings

UI7 (Analog Input) – ODU Capacity Control #1 – continued

3 System

Voltage [V]	Total Capacity ratio [%]	Each ODU's capacity ratio [%]		
		ODU Master#1	ODU Master#2	ODU Master#3
<2.0	0.0	Operation Off		
2.0	26.7	40	0	40
2.5	30.0	50	0	40
3.0	33.3	60	0	40
3.5	36.7	70	0	40
4.0	40.0	40	40	40
4.5	46.7	40	50	50
5.0	50.0	50	50	50
5.5	56.7	50	60	60
6.0	60.0	60	60	60
6.5	66.7	60	70	70
7.0	70.0	70	70	70
7.5	76.7	70	80	80
8.0	80.0	80	80	80
8.5	86.7	80	90	90
9.0	90.0	90	90	90
9.5	96.7	90	100	100
10.0	100.0	100	100	100

4 System

Voltage [V]	Total Capacity ratio [%]	Each ODU's capacity ratio [%]			
		ODU Master#1	ODU Master#2	ODU Master#3	ODU Master#4
<2.0	0.0	Operation Off			
2.0	20.0	40	0	40	0
2.5	22.5	50	0	40	0
3.0	25.0	60	0	40	0
3.5	27.5	70	0	40	0
4.0	40.0	40	40	40	40
4.5	47.5	40	50	50	50
5.0	50.0	50	50	50	50
5.5	57.5	50	60	60	60
6.0	60.0	60	60	60	60
6.5	67.5	60	70	70	70
7.0	70.0	70	70	70	70
7.5	77.5	70	80	80	80
8.0	80.0	80	80	80	80
8.5	87.5	80	90	90	90
9.0	90.0	90	90	90	90
9.5	97.5	90	100	100	100
10.0	100.0	100	100	100	100

Note:

1. ODU Capacity ratios in the table above are not exact.
2. Evaporative temperature / Condenser temperature may vary depending on system operating frequency, pressure option setting, and piping installation conditions.
3. Evaporator temperature is based on target low pressure of compressor. Actual temperature at evaporator may varies by pressure drop. Please contact local sale person to design AHU heat exchanger.

UI7 (Analog Input) – ODU Capacity Control #2

ODU Capacity Control #2 is available when DIP SW2-1 is On. Each Master ODU has the same operating ratio as shown in the table below.

Main Module

Voltage (V)			ODU Capacity ratio (%)	Eva. Temp. (Te) °F	Cond. Temp. (Tc) °F
V	Min.	Max.			
<1.0	-	0.7	Operation Off	-	-
1.0	0.8	1.2	100	39.2	122.0
2.0	1.8	2.2	90	41.0	120.2
3.0	2.8	3.2	80	43.7	116.6
4.0	3.8	4.2	70	46.4	111.2
5.0	4.8	5.2	60	50.0	104.0
6.0	5.8	6.2	50	55.4	96.8
7.0	6.8	7.2	45	57.2	91.4
8.0	7.8	8.2	40	59.0	86.0
9.0>	8.8	-	Comp Off	-	-

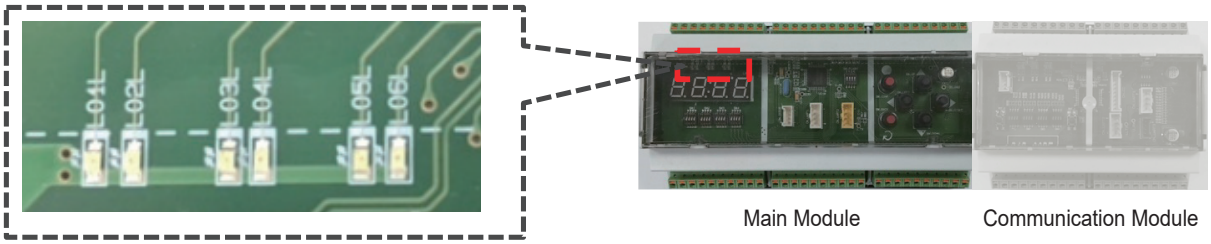
Note:

1. ODU Capacity ratios mentioned in the table above are not exact.
2. Evaporative temperature / Condenser temperature' may vary depending on system operating frequency, pressure option setting and piping installation conditions.
3. The evaporator temperature is based on target low pressure of compressor. The actual temperature at the evaporator may vary by pressure drop. Please contact your LG representative to design an AHU heat exchanger.

AHU COMMUNICATIONS KIT INSTALLATION

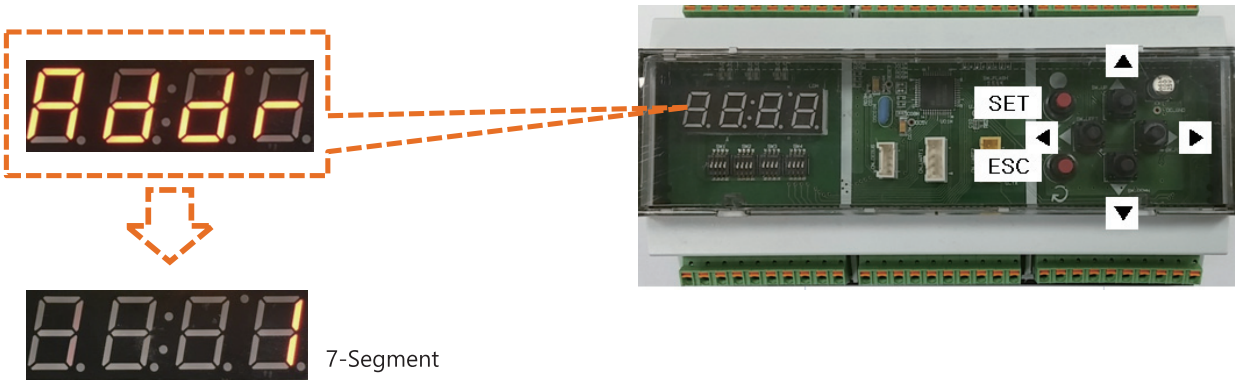
Main Module Settings

LED Display



Name	Port	Function
L01L	LED1	Module Comm. Tx
L02L	LED2	Module Comm. Rx
L03L	LED3	ODU Comm. Tx
L04L	LED4	ODU Comm. Rx
L05L	LED5	Modbus Comm. Tx
L06L	LED6	Modbus Comm. Rx

Main Module Address Setting



An address for the main module is needed when PAHCMS000 is connected to an LG central controller

The address of main module can be set within '1~247'. In this case, the address of the main module should be the same as the address in LG central controller.

Setting Method

- Press 'Set' button (red)
- Select 'Addr' in 7- Segment using ▲▼ buttons and then press the 'Set' button
- Press 'ESC' button to exit

RS485 Communication Port

Name	Port	Item	Electrical Spec.	Function
MULTI V IDU Comm.	RS485 CH2	MULTI V Comm. (IDU A/B)	Max 3280 ft, 2C x 18~16 AWG (shield wire)	Communication with MULTI V Outdoor unit
Single IDU Comm.	SINGLE N/SIG	Single split Comm. (IDU A/B)	Max 246 ft, 2C x 18~16 AWG (shield wire)	Communication with Single Split Outdoor unit

NTC Thermistor

Name	Port	Item	Electrical Spec.	Function
Thermistor Discharge	NTC RI2/G	Discharge air Thermistor	NTC 10 kΩ, 16.4 ft	Discharge Air temperature sensor
Thermistor Pipe in	NTC RI3/G	Pipe in (Liquid) Thermistor	NTC 5 kΩ, 16.4 ft	Inlet pipe (Liquid) Temp. sensor
Thermistor Pipe out	NTC RI4/G	Pipe out (Gas) Thermistor	NTC 5 kΩ, 16.4 ft	Outlet pipe (Gas) Temp. sensor

Remote Controller

Name	Port	Item	Electrical Spec.	Function
REMO	+12V/SIG/GND	Wire Remote Controller	Max 164 ft	Communication with Wired Remote Controller

Electronic Expansion Valve

Name	Port	Item	Electrical Spec.	Function
EEV	12 VDC/1/2/3/4	EEV Control	Max 32.8 ft	EEV Control

Note :
When a communication module (or PAHCMR000) is connected to the main module of PAHCMS000, DO and UI in communication module are not used.

AHU COMMUNICATIONS KIT INSTALLATION

Defrost Setting

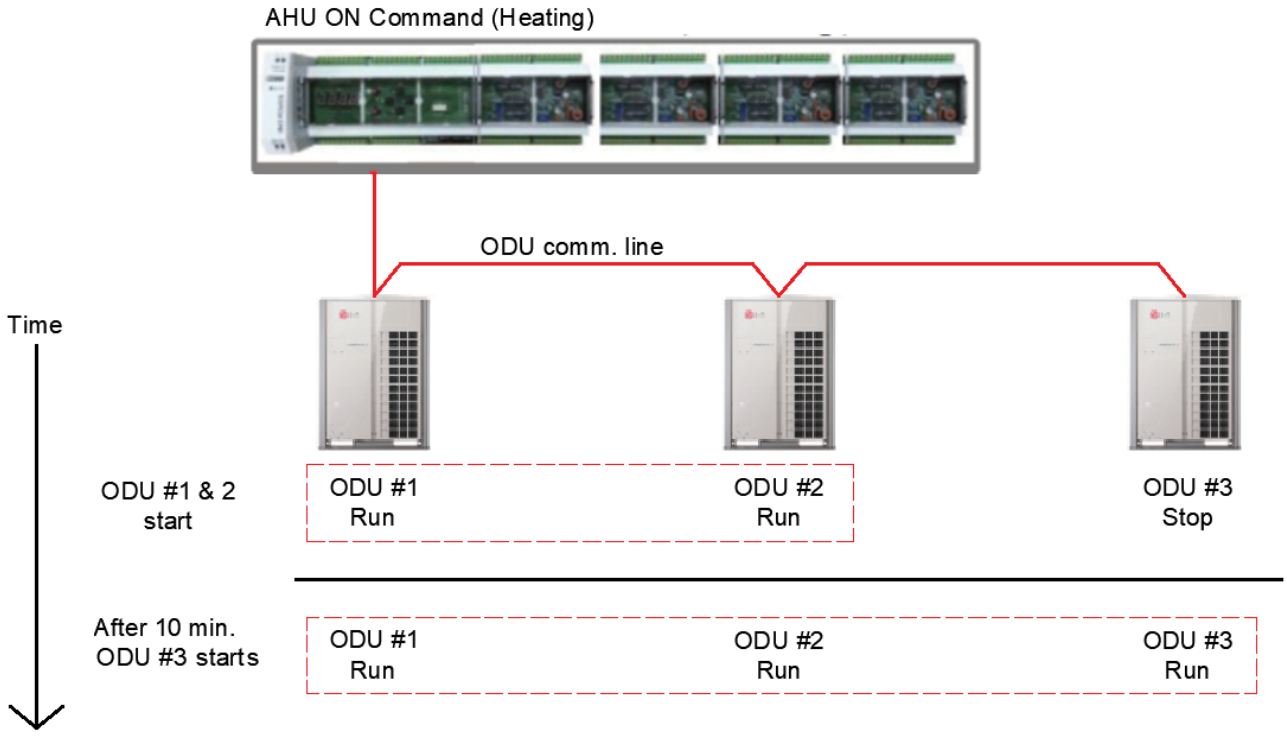
Defrost Operation

It is a function to prevent outdoor units from simultaneously entering defrost when two or more outdoor units are linked. The defrost operation function is only applied to the MULTI V outdoor unit (after MULTI V 5).

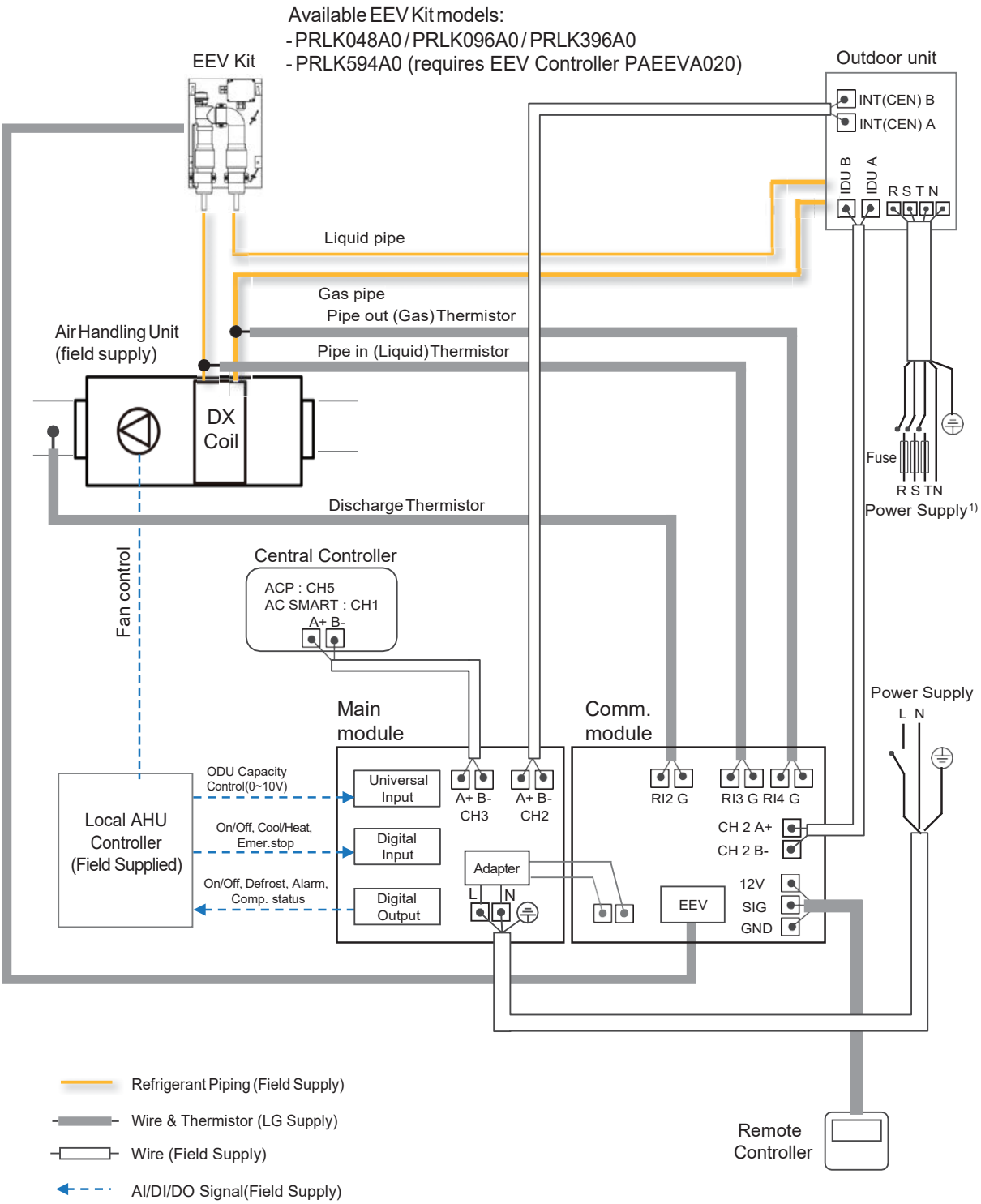
Sequential Startup Control of Outdoor Unit

- Operating condition : Power on → Heating operation command
- Stop condition : Power off or stop command
- Function operation
  1. This function is available when DIP switch is set to the Sequential Start Up.
  2. In order to prevent the outdoor unit from entering the defrosting at the same time of heating operation, only half of the outdoor unit is in operation and the remaining outdoor units are operated after 10 minutes when the operation command is received. (Sequential Start up is not operated in case of cooling operation)

Example ODU Startup Control



Multi V + EEV + DDC (Contact Signal)



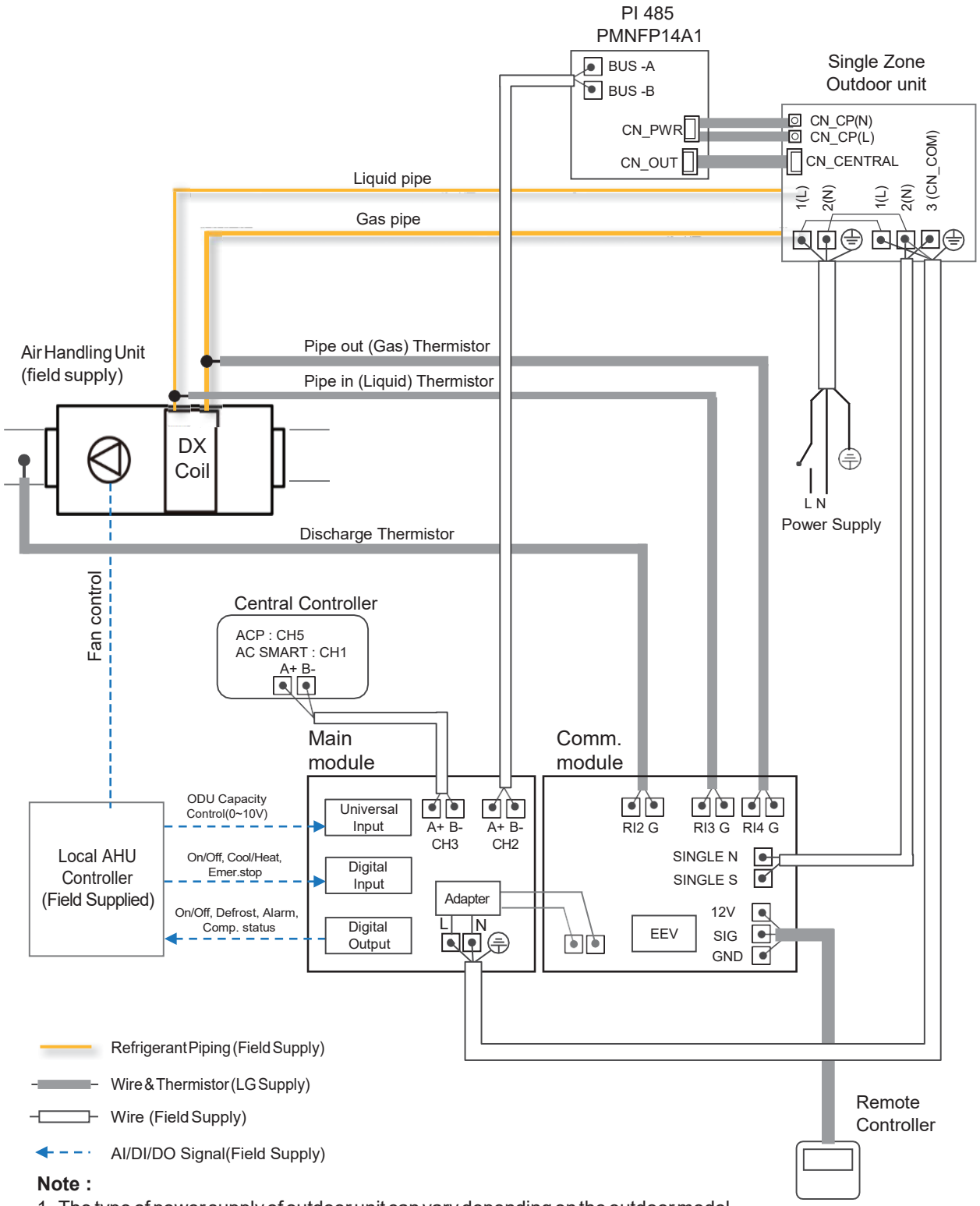
Note:

1. The type of power supply of outdoor unit can vary depending on the outdoor model.
2. Please make wiring between LG controller and outdoor unit with the same polarity.
3. LG controller can be optionally applied with DDC.

AHU COMMUNICATIONS KIT INSTALLATION

External Connection Diagrams

Single Zone + DDC (Contact Signal)



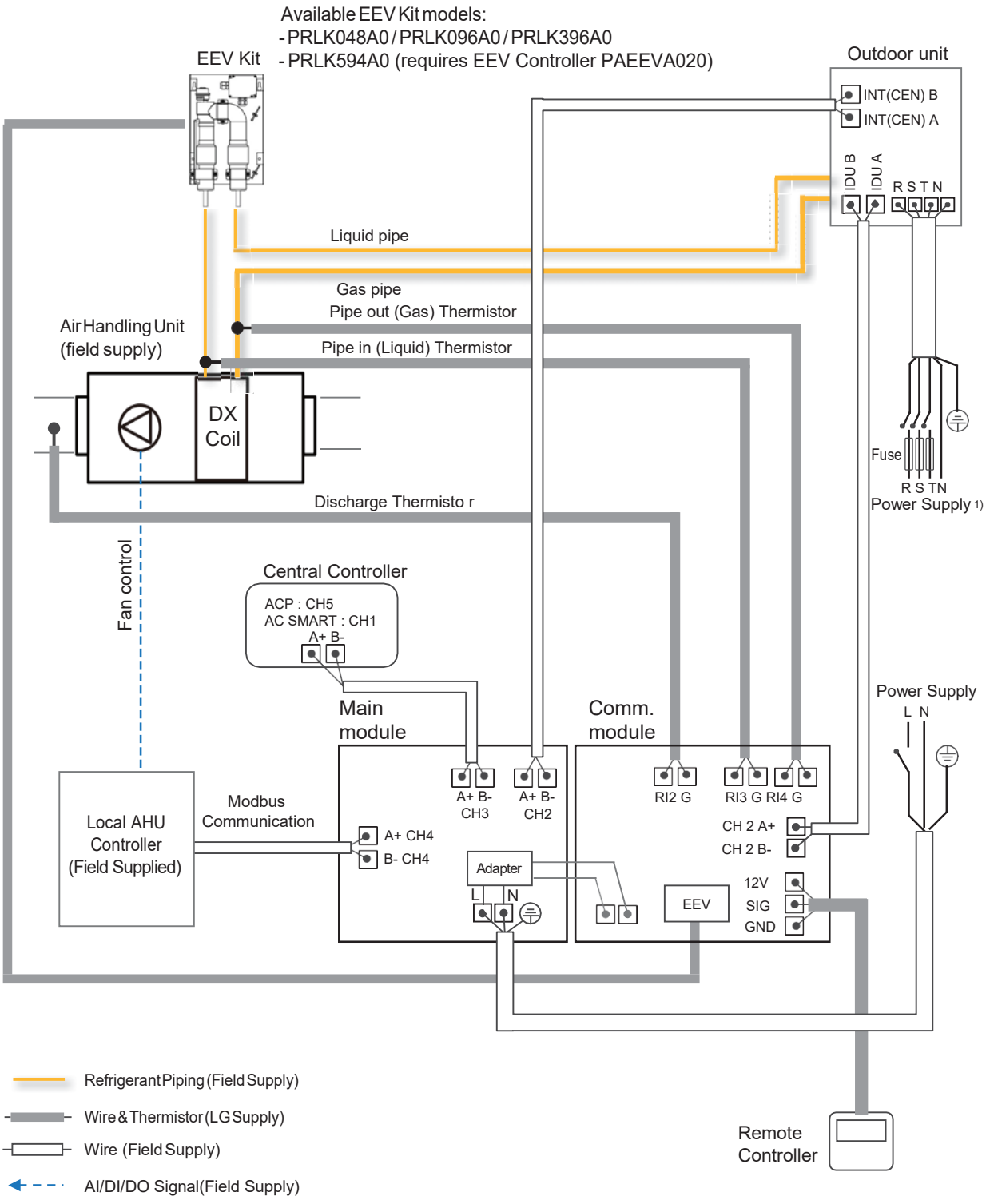
Note :

1. The type of power supply of outdoor unit can vary depending on the outdoor model.
2. Please make wiring between LG controller and outdoor unit with the same polarity.
3. LG controller can be optionally applied with DDC.

AHU COMMUNICATIONS KIT INSTALLATION

External Connection Diagrams

Multi V + EEV + LG Control / DDC (Contact Signal)



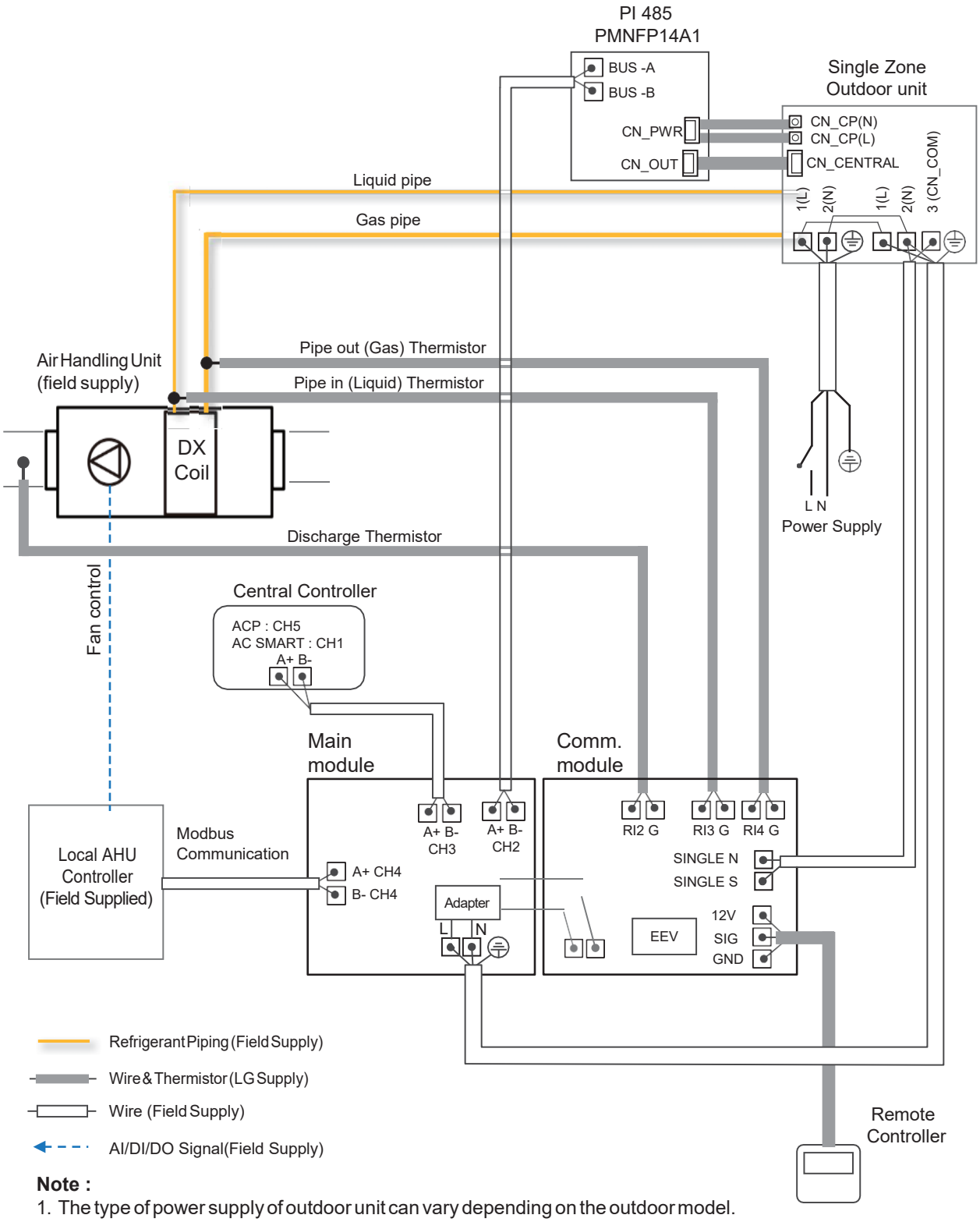
Note :

1. The type of power supply of outdoor unit can vary depending on the outdoor model.
2. Please make wiring between LG controller and outdoor unit with the same polarity.
3. LG controller can be optionally applied with DDC.

AHU COMMUNICATIONS KIT INSTALLATION

External Connection Diagrams

Single Zone + LG Control / DDC (Contact Signal)



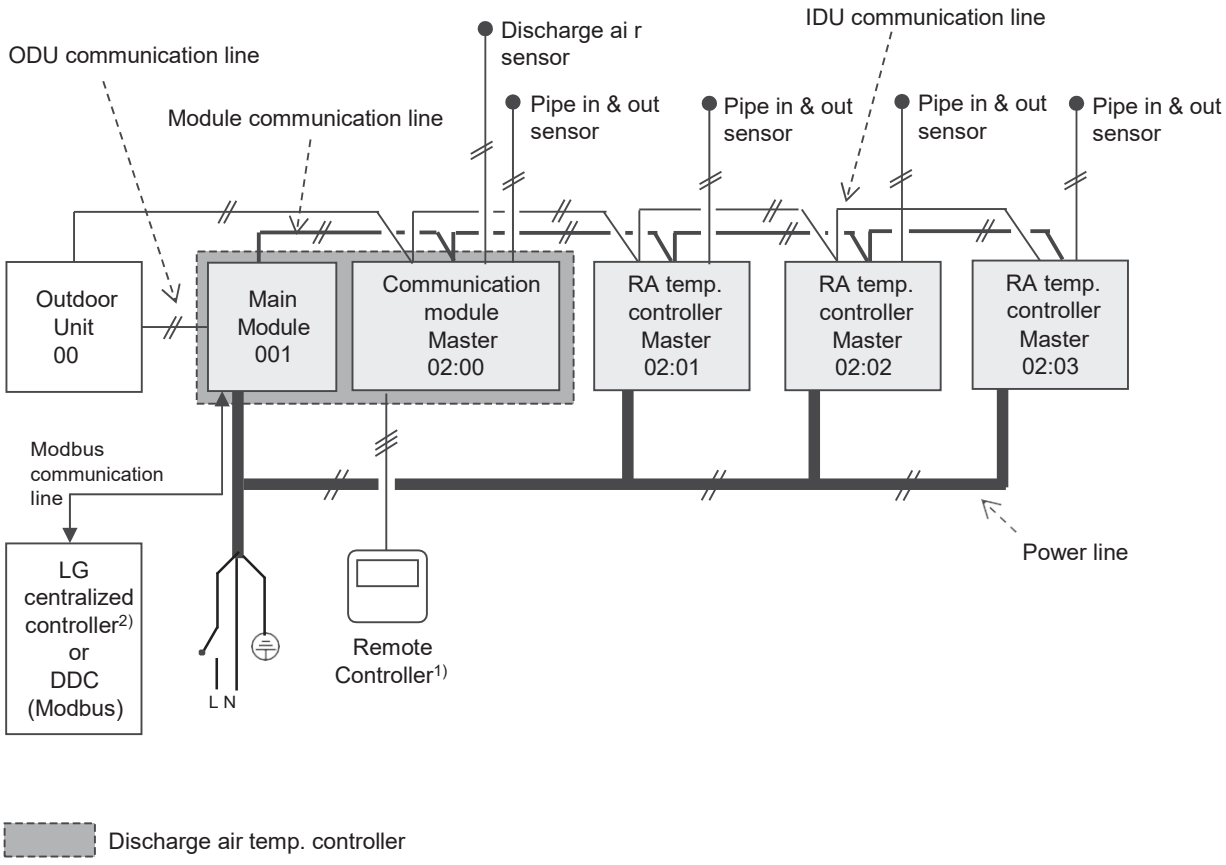
Note :

1. The type of power supply of outdoor unit can vary depending on the outdoor model.
2. Please make wiring between LG controller and outdoor unit with the same polarity.
3. LG controller can be optionally applied with DDC.

AHU COMMUNICATIONS KIT INSTALLATION

Discharge Air Temperature Controller

Case 1: One AHU with One ODU / Standalone or DDC by Modbus



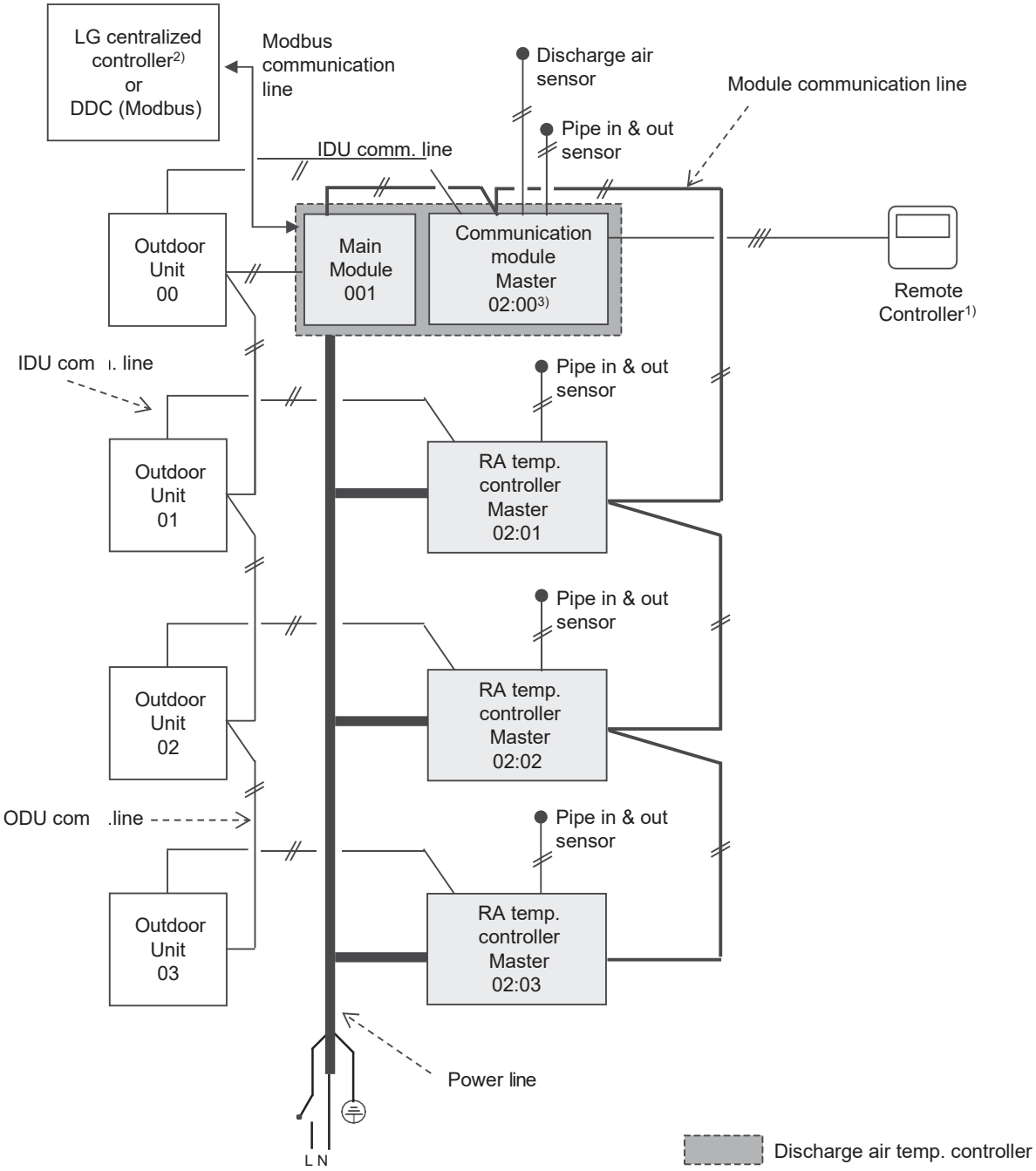
Note:

1. Remote controller should be connected to PAHCMS000. Remote controller connected to PAHCMR000 can only monitor status.
2. LG Central controller addressing for discharge air temp. controller should be set to the same address as the main module's address.
3. Address of Comm. module of PAHCMS000 (Central control address) must be set to '00'. The address for additional PAHCMR000 must be set with an order increasing by 1. Also ODU address must be the same as the paired AHU controller.
4. All PAHCMR000 units need to be set as Master mode.

AHU COMMUNICATIONS KIT INSTALLATION

Discharge Air Temperature Controller

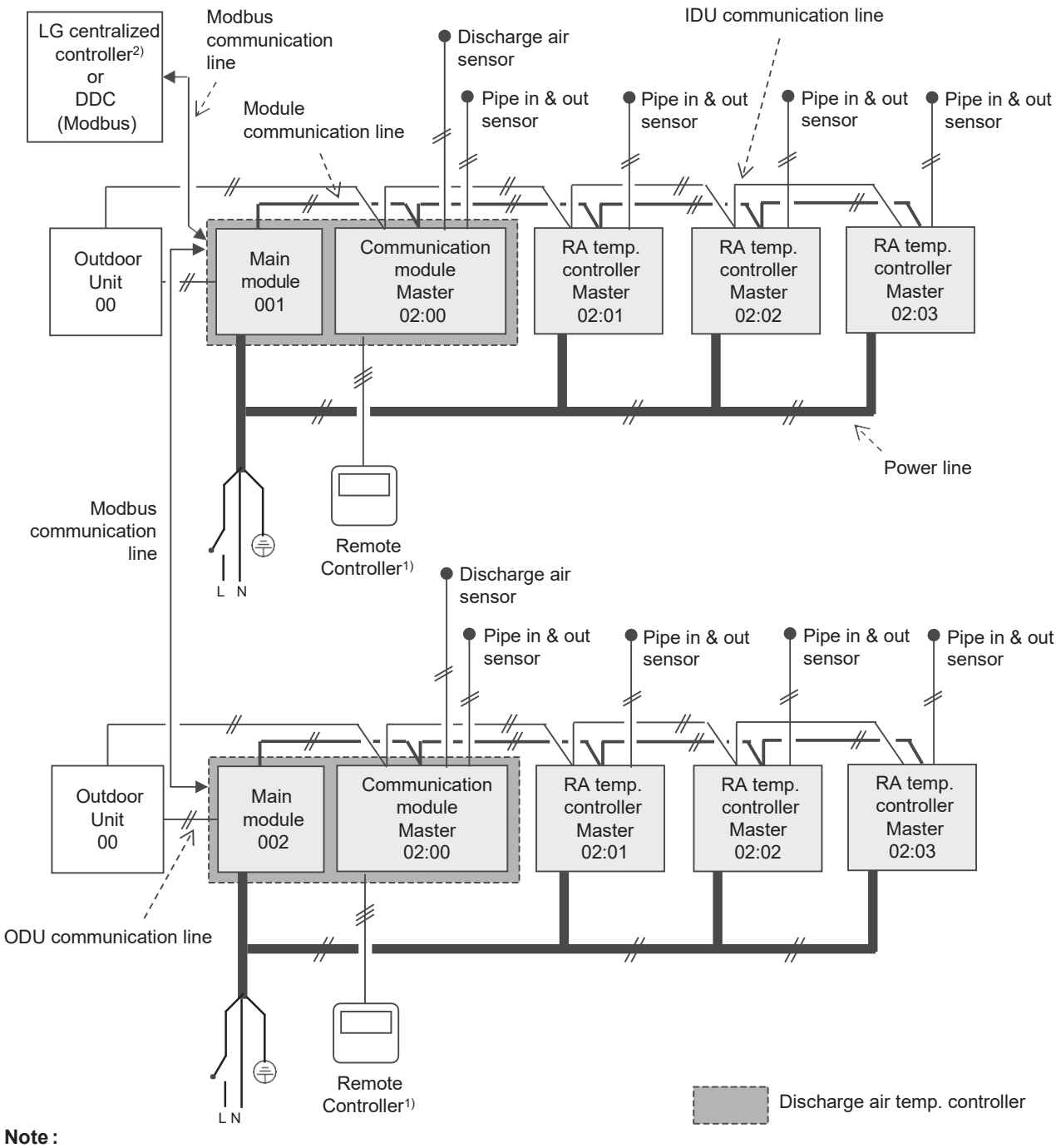
Case 2: One AHU with Multiple ODUs / Standalone or DDC by Modbus



Note:

1. Remote controller should be connected to PAHCMS000. Remote controller connected to PAHCMR000 can only monitor status.
2. LG Central controller addressing for discharge air temp. controller should be set to the same address as the main module's address.
3. Address of Comm. module of PAHCMS000 (Central control address) must be set to '00'. The address for additional PAHCMR000 must be set with an order increasing by 1. Also ODU address must be the same as the paired AHU controller.
4. All PAHCMR000 units need to be set as Master mode.

Case 3: Multiple AHUs / Standalone or DDC by Modbus



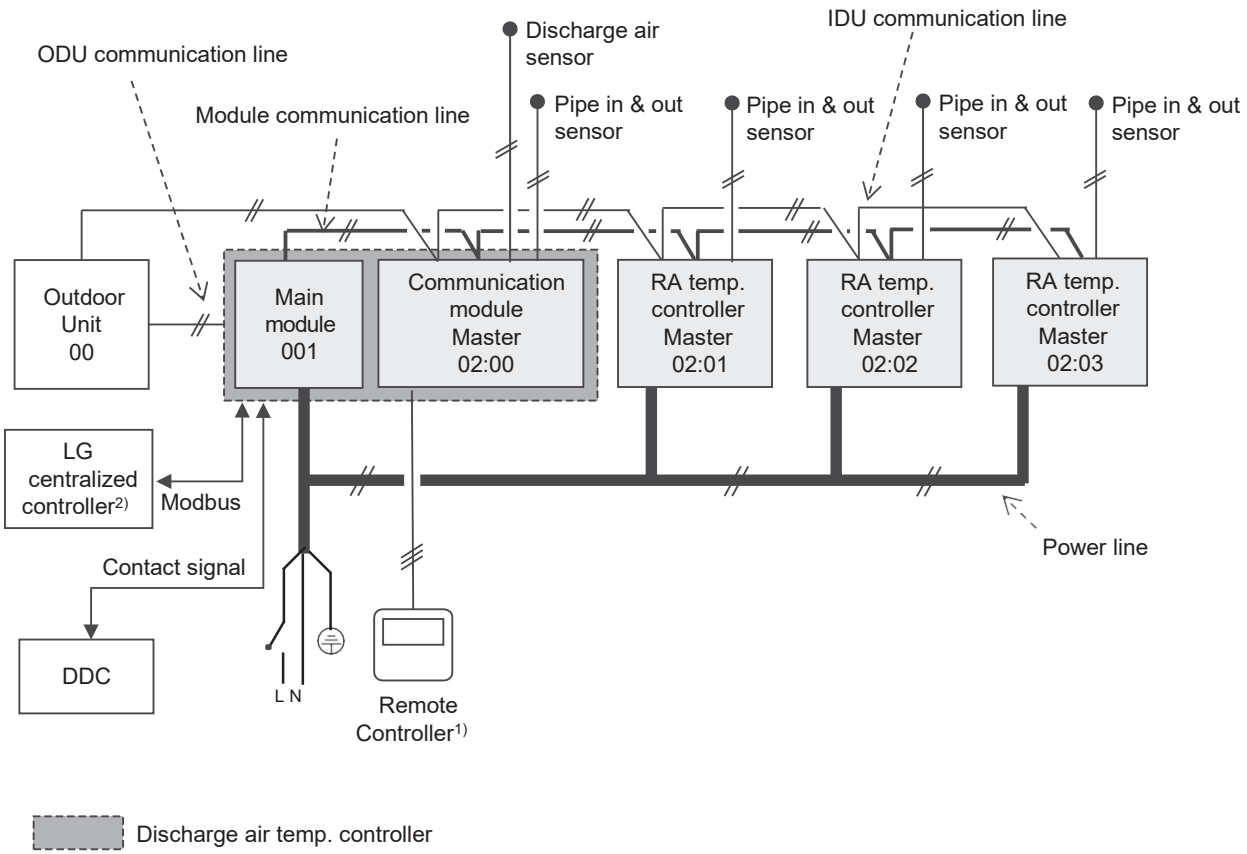
Note :

1. Remote controller should be connected to PAHCMS000. Remote controller connected to PAHCMR000 can only monitor status.
2. LG Central controller addressing for discharge air temp. controller should be set to the same address as the main module's address.
3. Address of Comm. module of PAHCMS000 (Central control address) must be set to '00'. The address for additional PAHCMR000 must be set with an order increasing by 1. Also ODU address must be the same as the paired AHU controller.
4. All PAHCMR000 units need to be set as Master mode.

AHU COMMUNICATIONS KIT INSTALLATION

Discharge Air Temperature Controller

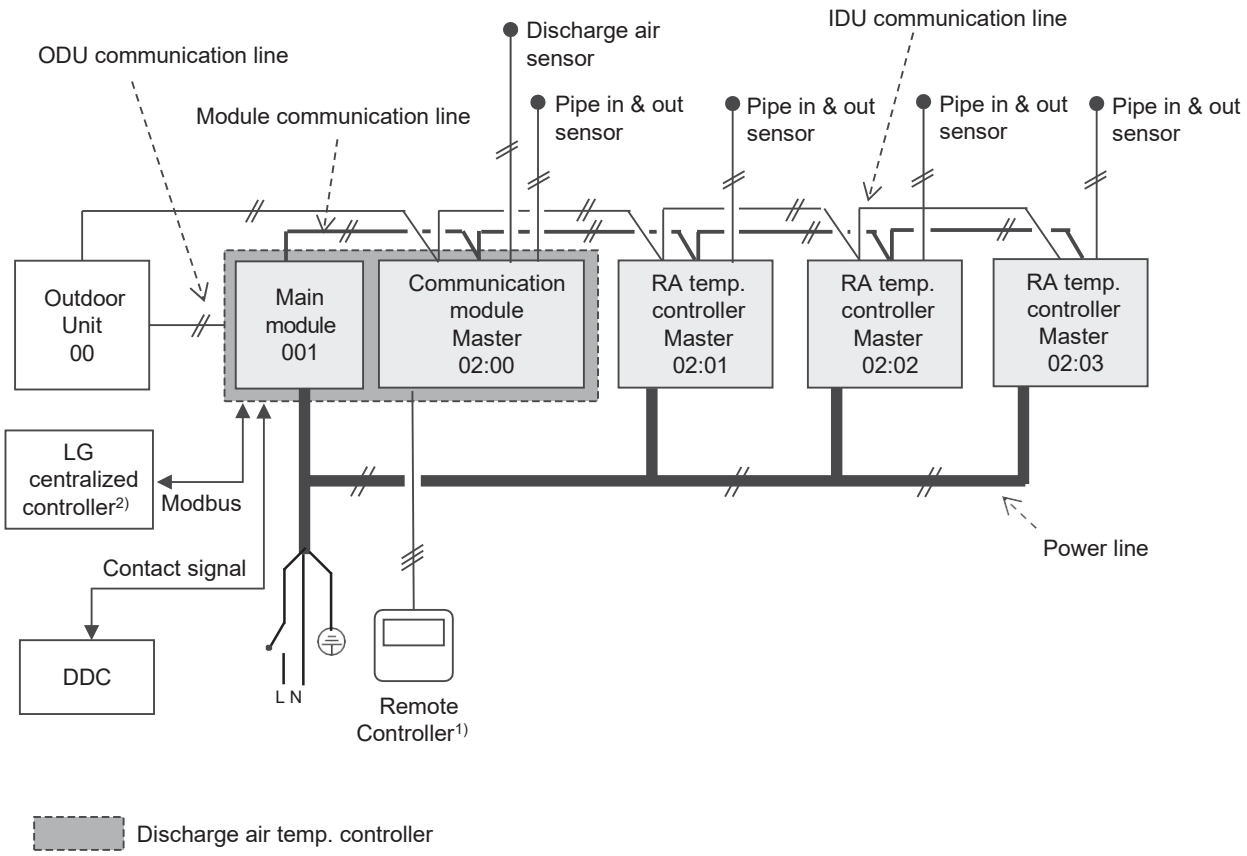
Case 4: One AHU / DDC by Contact Signal



Note:

1. Remote controller should be connected to PAHCMS000. Remote controller connected to PAHCMR000 can only monitor status.
2. LG Central controller addressing for discharge air temp. controller should be set to the same address as the main module's address.
3. Address of Comm. module of PAHCMS000 (Central control address) must be set to '00'. The address for additional PAHCMR000 must be set with an order increasing by 1. Also ODU address must be the same as the paired AHU controller.
4. All PAHCMR000 units need to be set as Master mode.

Case 5: One AHU with Multiple ODUs / DDC by Contact Signal



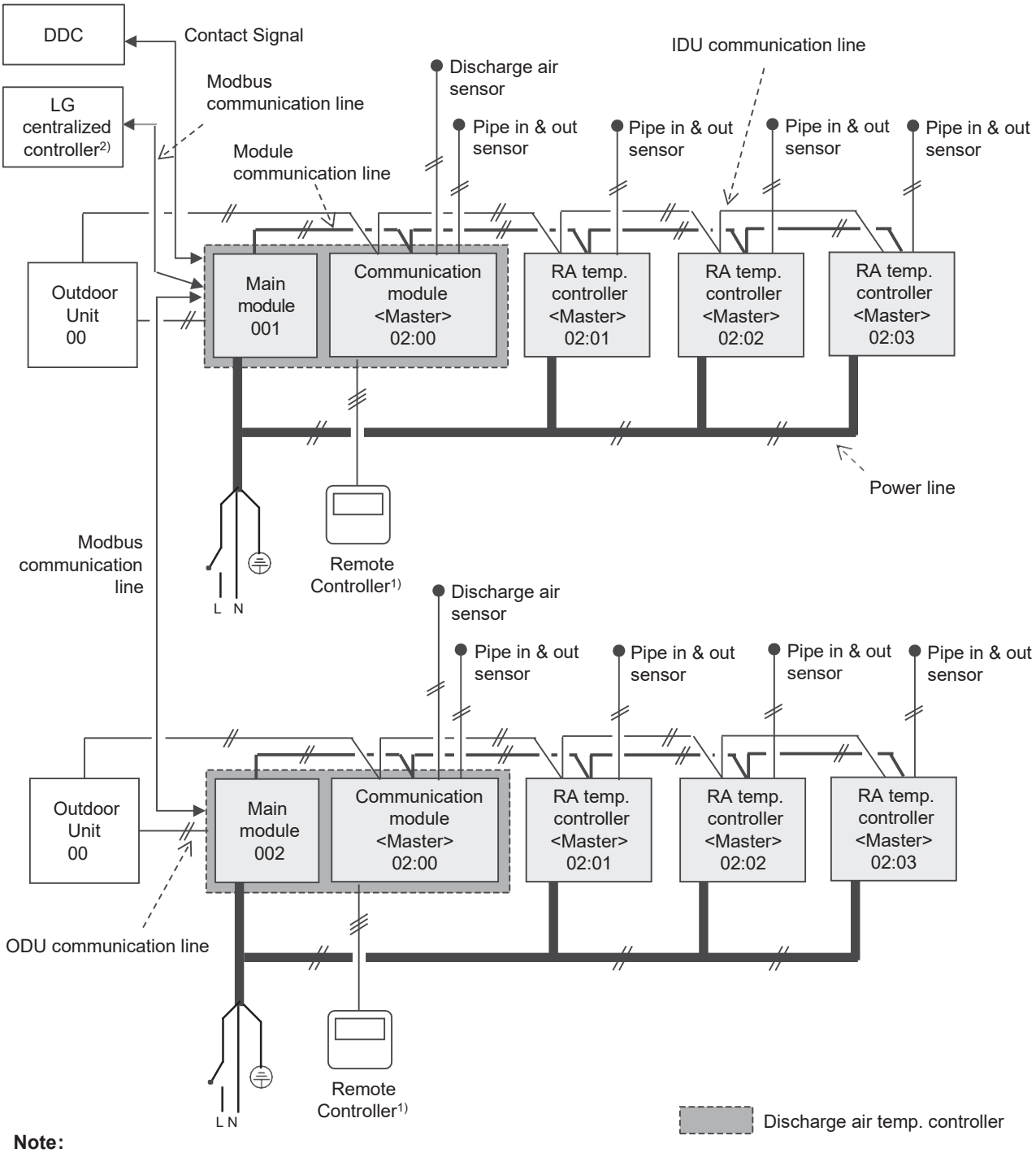
Note:

1. Remote controller should be connected to PAHCMS000. Remote controller connected to PAHCMR000 can only monitor status.
2. LG Central controller addressing for discharge air temp. controller should be set to the same address as the main module's address.
3. Address of Comm. module of PAHCMS000 (Central control address) must be set to '00'. The address for additional PAHCMR000 must be set with an order increasing by 1. Also ODU address must be the same as the paired AHU controller.
4. All PAHCMR000 units need to be set as Master mode.

AHU COMMUNICATIONS KIT INSTALLATION

Discharge Air Temperature Controller

Case 1: Multiple AHUs / DDC by Contact Signal



Note:

1. Remote controller should be connected to PAHCMS000. Remote controller connected to PAHCMR000 can only monitor status.
2. LG Central controller addressing for discharge air temp. controller should be set to the same address as the main module's address.
3. Address of Comm. module of PAHCMS000 (Central control address) must be set to '00'. The address for additional PAHCMR000 must be set with an order increasing by 1. Also ODU address must be the same as the paired AHU controller.
4. All PAHCMR000 units need to be set as Master mode.

Thermistor Locations

All thermistors (one [1] return air [room] thermistor and two [2] pipe thermistor) must be correctly installed to ensure proper AHU Communications Kit operation.

1. Return Air (Room) Thermistor: Install it at the AHU heat exchanger inlet in the return air stream.

2. Pipe In Thermistor: Install it behind the distributor on the coldest area in the heat exchanger (contact the heat exchanger manufacturer for the precise location).

3. Pipe Out Thermistor: Install it at the outlet of the heat exchanger as close as possible to the heat exchanger.

Note

System operation must be evaluated to determine if the AHU evaporator is protected against freezing up. Run a system test, and see if the AHU evaporator is freezing up.

Figure 10: Location of the Return Air (Room) Thermistor (AHU Product Appearance May Vary).

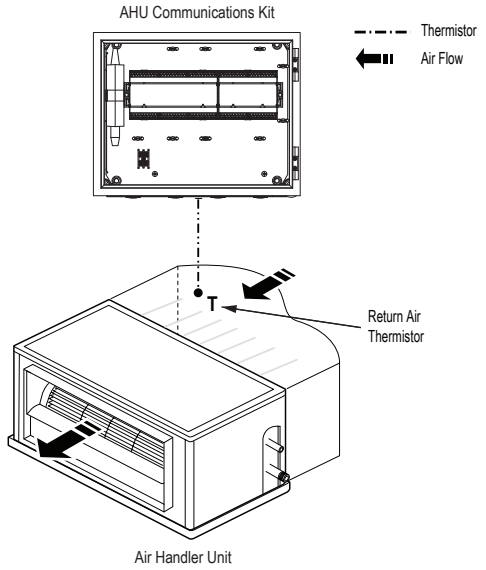
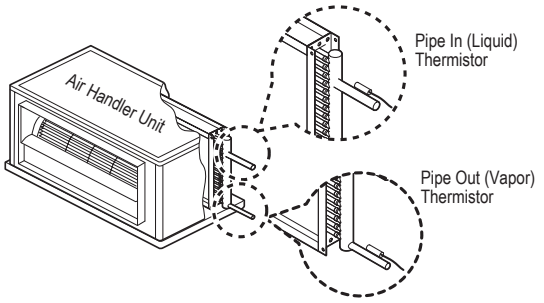


Figure 11: Locations of the Pipe Thermistors.



Thermistor Cable Installation

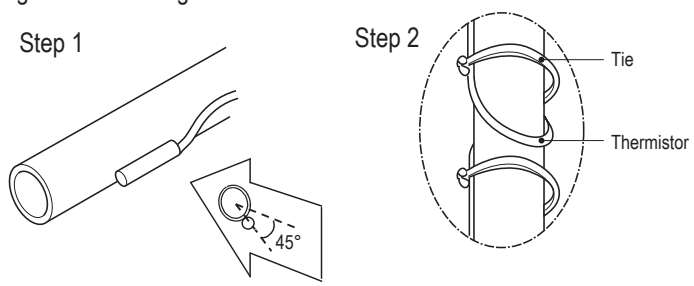
- Place the thermistor cables in a separate protective tube.

- Always add a pull-relief to the thermistor cable to avoid strain on the thermistor cable and loosening of the thermistor.

Note

Strain on the thermistor cable or loosening of the thermistor may result in a bad contact and incorrect temperature measurements. Thermistors must be securely attached for proper operation.

Figure 12: Securing the Thermistor Cable.



AHU COMMUNICATIONS KIT INSTALLATION

Thermistor Installation

Attaching the Pipe Thermistors

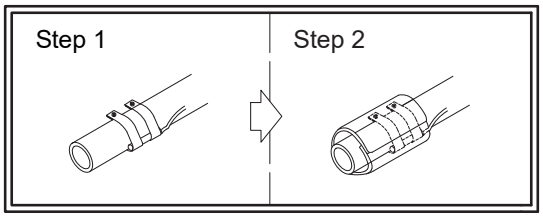
Note:

Thermistors must be securely attached with a pipe strap. The equipment will not operate properly if thermistors are not making good physical contact in the appropriate installation location.

1. Securely attach the thermistor to the pipe with a field-supplied pipe strap.

2. Insulate the thermistor with a field-supplied insulation sheet that is >5t.

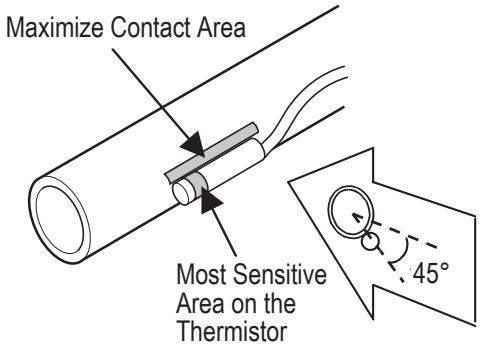
Figure 13: Steps to Attaching the Pipe Thermistors.



Tips for Attaching the Pipe In / Pipe Out Thermistors

- Put the thermistor cable in a separate protective tube.
- Always add a pull-relief to the thermistor cable to avoid strain on the thermistor cable and loosening of the thermistor. Strain on the thermistor cable or loosening of the thermistor can result in bad contact with the pipe and incorrect temperature measurement.

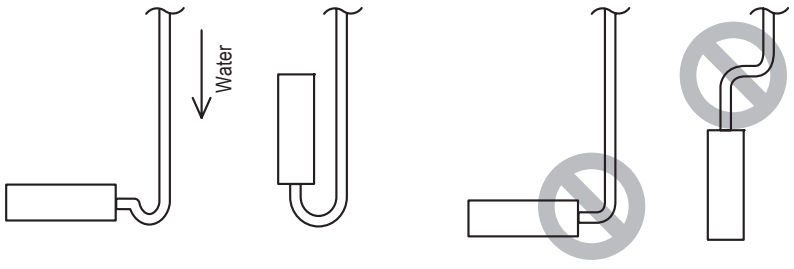
Figure 14: Thermistor Tip Contact Area.



- To avoid water accumulating on the thermistor tip, position the thermistor cable slightly below the thermistor tip, or install the thermistor tip parallel with the cable.

⃠ Do not include a 90° angle or a kink in the thermistor cable, nor install the thermistor tip upside down.

Figure 15: Positioning the Thermistor Cable and Tip.



Introduction

When used with the LG AHU Communications Kit (sold separately), the LG EEV Kit controls refrigerant flow between LG Multi V air-source or water-source units and a third-party air handler unit (AHU).

The EEV Kits for PAHCMS000 are offered in four sizes:

- PRLK048A0 supports 12 through 96 MBH (8 tons maximum)
- PRLK096A0 supports 96.1 through 192 MBH (16 tons maximum)
- PRLK396A0 supports 192.1 MBH through 396 MBH (32 ton maximum)
- PRLK594A0 supports 396.1 MBH through 594 MBH coils (48 ton maximum, requires EEV Controller Module PAEEVA020).

Figure 16: EEV Kit.

Specifications

Table 13: EEV Kit Specifications Table.

Model Number	PRLK048A0	PRLK096A0	PRLK396A0	PRLK594A0
For Use With	PAHCMR000 and PAHCMS000			PAHCMS000 with EEV Controller Module PAEEVA020
Power Supply Requirements	Powered by Air Handler Unit Communications Kit (12 VDC)			
Ambient Operating Temperature Range	-4 to 149F			
Ambient Operating Humidity Range	0 to 98% (Non-condensing)			
Dimensions (in., W x H x D)	8-5/8 x 15-15/16 x 3-5/16		13-25/32 x 7-3/32 x 13-39/64	16-1/8 x 7-3/32 x 13-39/64
Net Weight (lbs.)	6.8		11.0	15.4
Shipping Weight (lbs.)	7.9		12.1	16.5
Maximum Air Handler Unit Capacity (Btu/h)	96,000	192,000	396,000	594,000
Communications Cable	AWG 18 x 6 Stranded, Shielded Copper Wire			
Refrigerant Type	R410A			

Table 14: EEV Kit Compatibility Table.

EEV Kit	AHU Communication Kit	
	PAHCMR000	PAHCMS000
PRLK048A0 (8 tons max)	HP/HR	HP
PRLK096A0 (16 tons max)	HP	HP
PRLK396A0 (32 tons max)	HP	HP
PRLK594A0 (48 tons max)	NA	HP (requires EEV module)

HP = Heat Pump; HR = Heat Recovery

EEV Kit Design Parameters

- Maximum of one (1) EEV Kit can be connected to one (1) AHU Communications Kit.
- Minimum coil entering air temperature for heating mode is 41°F.
- Requires field-supplied six-conductor communication cable to connect to AHU Communications Kit.
- Maximum distance between EEV Kit and AHU Communications Kit is thirty-two (32) feet.
- Designed for indoor installations (field-supplied waterproof enclosure must be used when installing outdoors).

EEV KIT INSTALLATION

EEV Kit Parts

Figure 17: PRLK048A0 and PRLK096A0 EEV Parts.

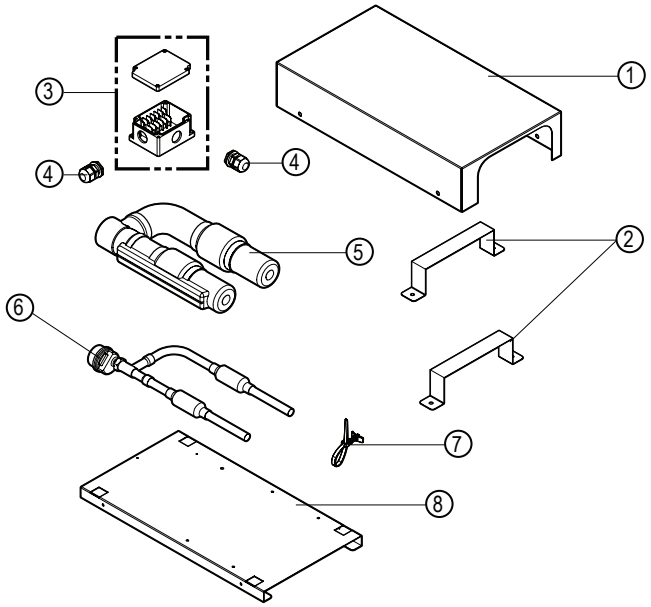


Table 15: PRLK048A0 and PRLK096A0 EEV Parts Table.

Diagram Label	Part Name	Quantity
1	Top Panel	One (1)
2	Bracket	Two (2)
3	Terminal Box	One (1)
4	Cable Connectors	Two (2)
5	Pipe Insulation	One (1)
6	Electronic Expansion Valve Assembly (EEV, Strainer, Tube)	One (1)
7	Support Tie	One (1)
8	Bottom Panel	One (1)

Figure 18: PRLK396A0 EEV Parts.

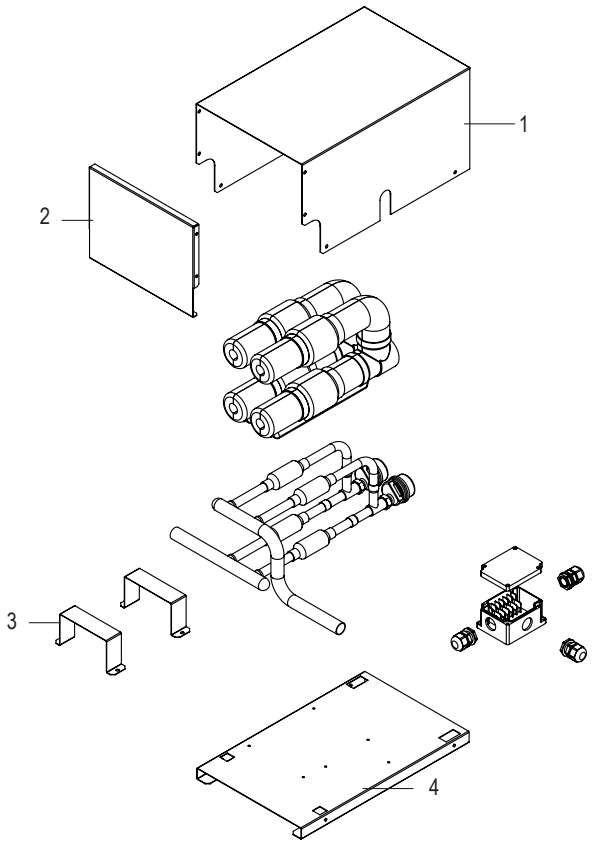


Table 16: PRLK396A0 EEV Parts Table.

Diagram Label	Part Name	Quantity
1	Panel A, Upper	One (1)
2	Panel B, Upper	One (1)
3	Bracket	Two (2)
4	Panel, Base	One (1)

Figure 19: PRLK594A0 EEV Parts.

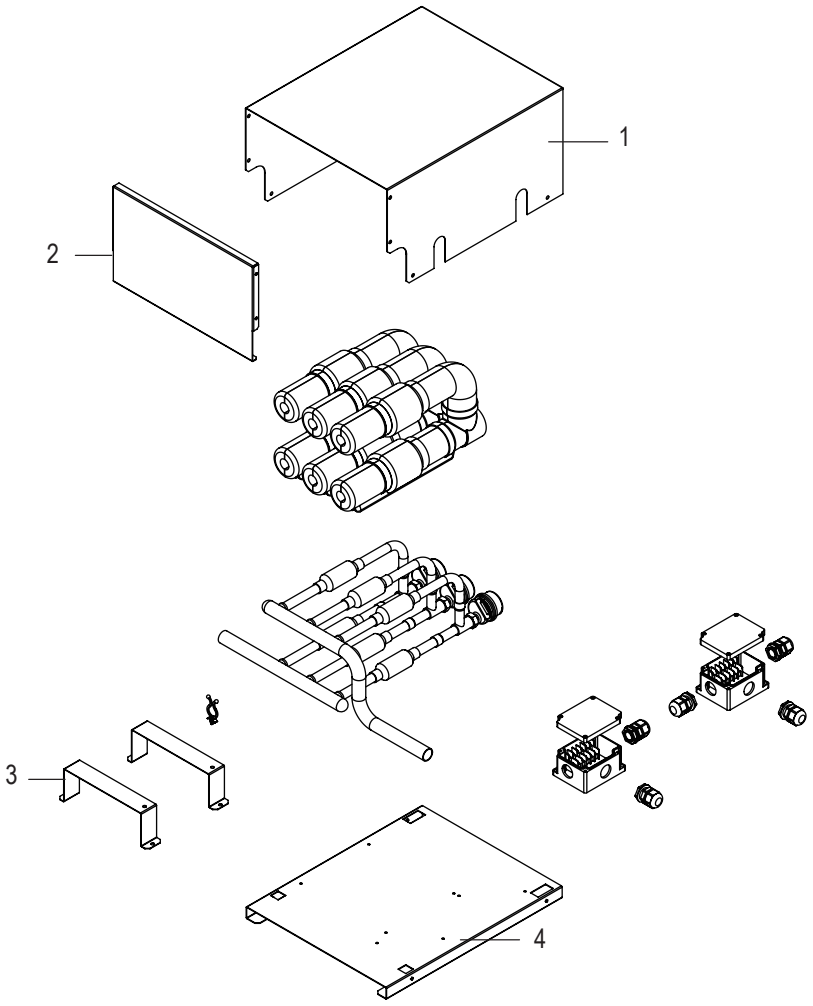


Table 17: PRLK594A0 EEV Parts Table.

Diagram Label	Part Name	Quantity
1	Panel A, Upper	One (1)
2	Panel B, Upper	One (1)
3	Bracket	Two (2)
4	Panel, Base	One (1)

EEV KIT INSTALLATION

Mounting the EEV Kit

Mounting the PRLK048A0/ PRLK096A0 EEV Kit

1. Remove the Top Panel by unscrewing the screws at the four (4) corners.
2. Using the Bottom Panel as a template, mark the location on the wall or ceiling where the holes for the screws should be placed. Drill the four (4) holes.
3. Attach the EEV Bottom Panel securely using four (4) field-supplied 1/4 inch long screws.

Figure 20: Removing the Screws.

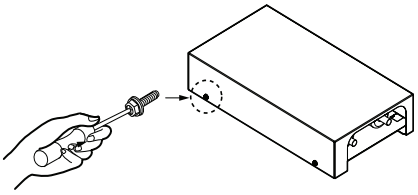
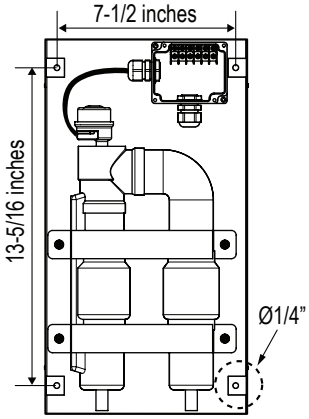
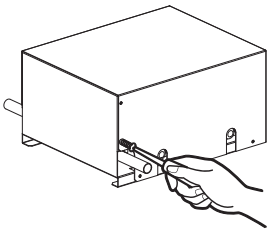


Figure 21: EEV Bottom Panel Hole Dimensions.

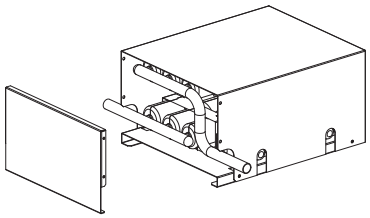


Mounting the PRLK396A0 / PRLK594A0 EEV Kit

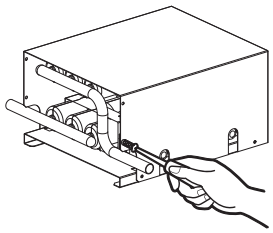
1. Remove the two screws from the EEV kit base plate



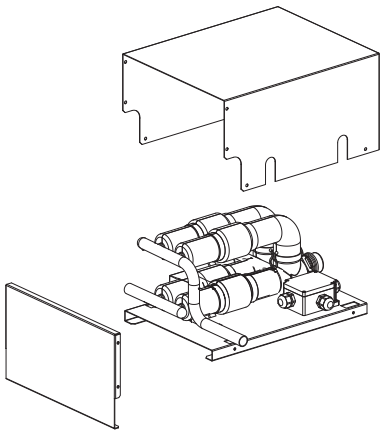
2. Remove the base plate.



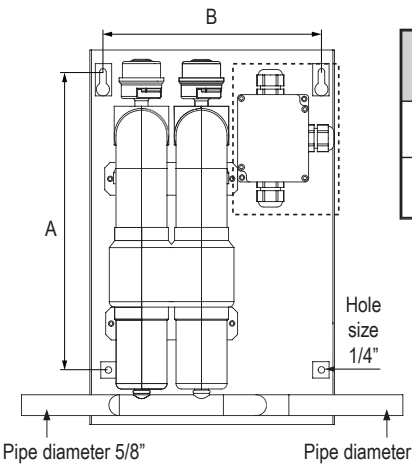
3. Remove the four screws from the cover plate



4. Remove the cover plate



5. Drill holes in the correct locations and use 4 field-provided screws to secure the EEV kit.



Model	length (inch)	
	A	B
PRLK396A0	10-3/4	7-1/2
PRLK594A0	10-3/4	7-1/2

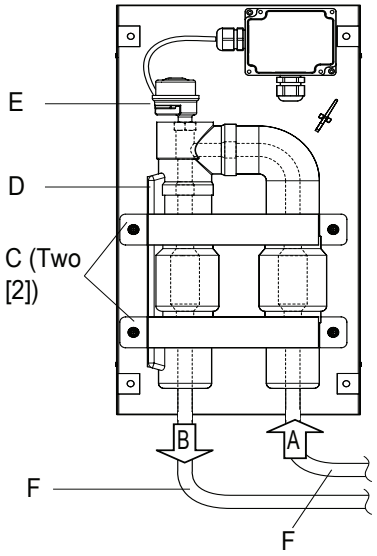
Preparing the Pipes

PRLK048A0 and PRLK096A0

1. Unscrew the four (4) M4 screws and detach the two (2) EEV Assembly pipe support brackets.
2. Remove the EEV Assembly; remove the pipe insulation from the EEV Assembly.
3. If cutting pipe, refer to the cutting instructions on the next page.
4. Braze the field-supplied inlet / outlet piping to the EEV Assembly. See next page for brazing instructions.

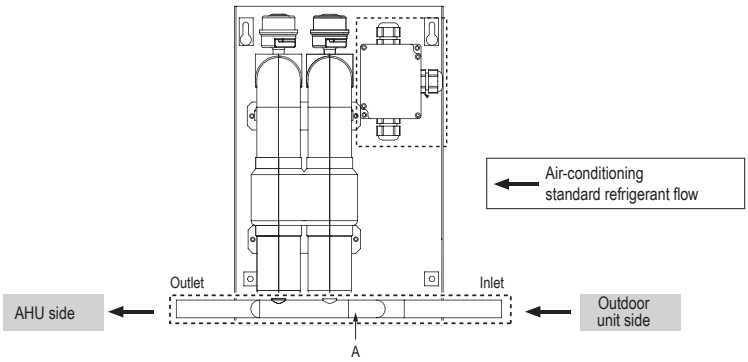
Figure 22: PRLK048A0 and PRLK096A0 EEV Kits.

A. Inlet Pipes from the Air Source / Water-Source Unit.
B. Outlet pipes to AHU Evaporator Coil.
C. Pipe Support Bracket.
D. Pipe Insulation.
E. EEV Assembly.
F. 1/2 Inch O.D. Field Piping (Inlet / Outlet).



PRLK396A0 / PRLK594A0

1 Check the inlet/outlet pipe before brazing the EEV KIT.



2 If cutting pipe, refer to the cutting instructions on the next page.

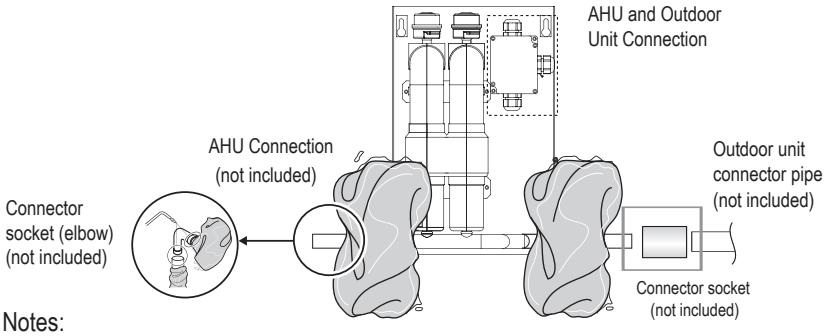
3 Braze the connector pipe (not provided) at the outdoor unit.

4 When connecting the outdoor unit's connector pipe and the EEV KIT pipe, be sure to use a socket (not provided) that meets the necessary specifications.

5 As the size of the EEV KIT pipe and the outdoor unit's connector pipe could vary, check the sizes beforehand and use a socket that meets the necessary specifications.

6 When brazing, make sure to follow safety precautions at all times.

7 Be sure to insulate pipe A after welding with insulation (15T or more).



Notes:

Be sure to pass nitrogen through when brazing. Failure to do so could cause the compressor to not function properly or become damaged.

It is essential that the pipe is wrapped with a wet towel before and after brazing. Failure to do so could result in equipment damage.

Use a protective panel or be especially cautious not to let welding sparks come in contact with the AHU panel.

After brazing, be sure to test for leakage.

Failure to properly insulate the pipe after welding may result in leakage.

EEV KIT INSTALLATION

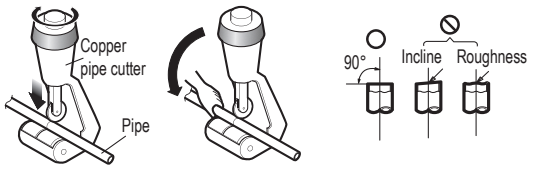
Brazing and Insulating the Piping

Cutting Pipe

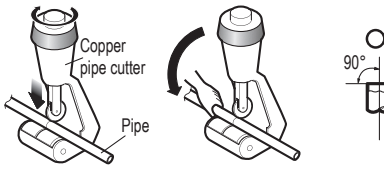
Notes:
The presence of burrs can result in refrigerant leakage.
Remove any burrs with a reamer.

Cutting dust could lead to malfunctioning if it gets inside the pipe.

1 Use a copper pipe cutter to cut the pipe in a straight line.



2 When cutting, tilt the pipe end downward to prevent burrs from getting inside the pipe. After cutting, use a reamer to remove any burrs from inside the pipe.



Brazing

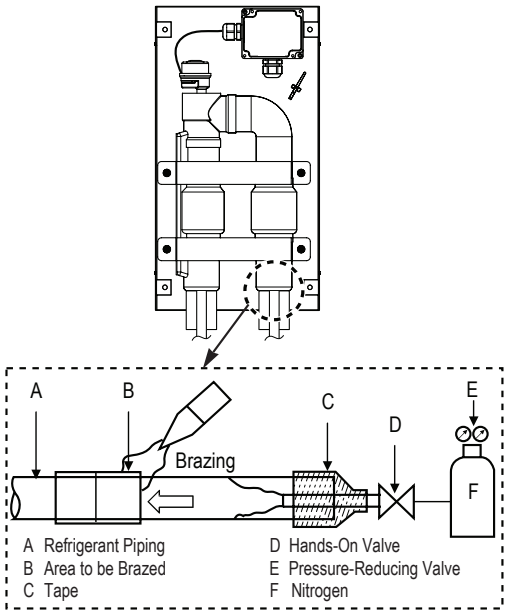
- Use a nitrogen purge set to 0.02 MPa while brazing.

Note

Brazing without a nitrogen purge will create a large amount of oxidization on the inside of the pipes, adversely affecting valves and compressors in the refrigerating system and preventing normal system operation.

- When brazing the field piping to the EEV Kit Assembly, use a wet cloth to protect and ensure that the main EEV body temperature does not exceed 248°F.
- Make sure that the other parts such as electrical box, support ties, and wiring are also protected from direct flames during brazing.
- After brazing is complete, use medical grade dry nitrogen and pressure test the refrigerant piping system to a minimum of 550 psi for a period of 24 hours. Pressurize the liquid, low pressure vapor, and high pressure vapor pipes (heat recovery systems only) of the air-source / water-source units concurrently. The test must be done with the air-source / water-source unit service valves closed. (For more details, refer to the manual of the respective air-source / water-source installation manuals.)

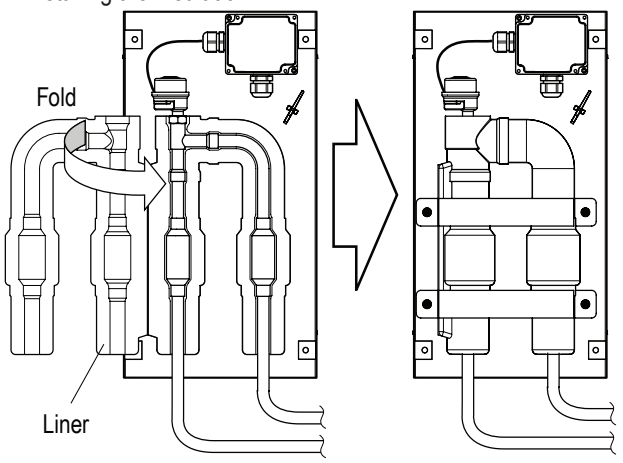
Figure 23: Brazing Field Piping to EEV Assembly.



Insulating the Piping

1. After brazing is complete, place the Pipe Insulation back on the EEV Assembly. Peel off the liner, fold the insulation as shown in the figure at right, and press down to seal.
2. Fully insulate the field piping up to the EEV Assembly. To avoid condensation, make sure there are no gaps between the field piping insulation and the EEV Assembly insulation. Finish the connection with tape.
3. To secure the EEV Assembly, re-install the two (2) pipe support brackets using the four (4) M4 screws.

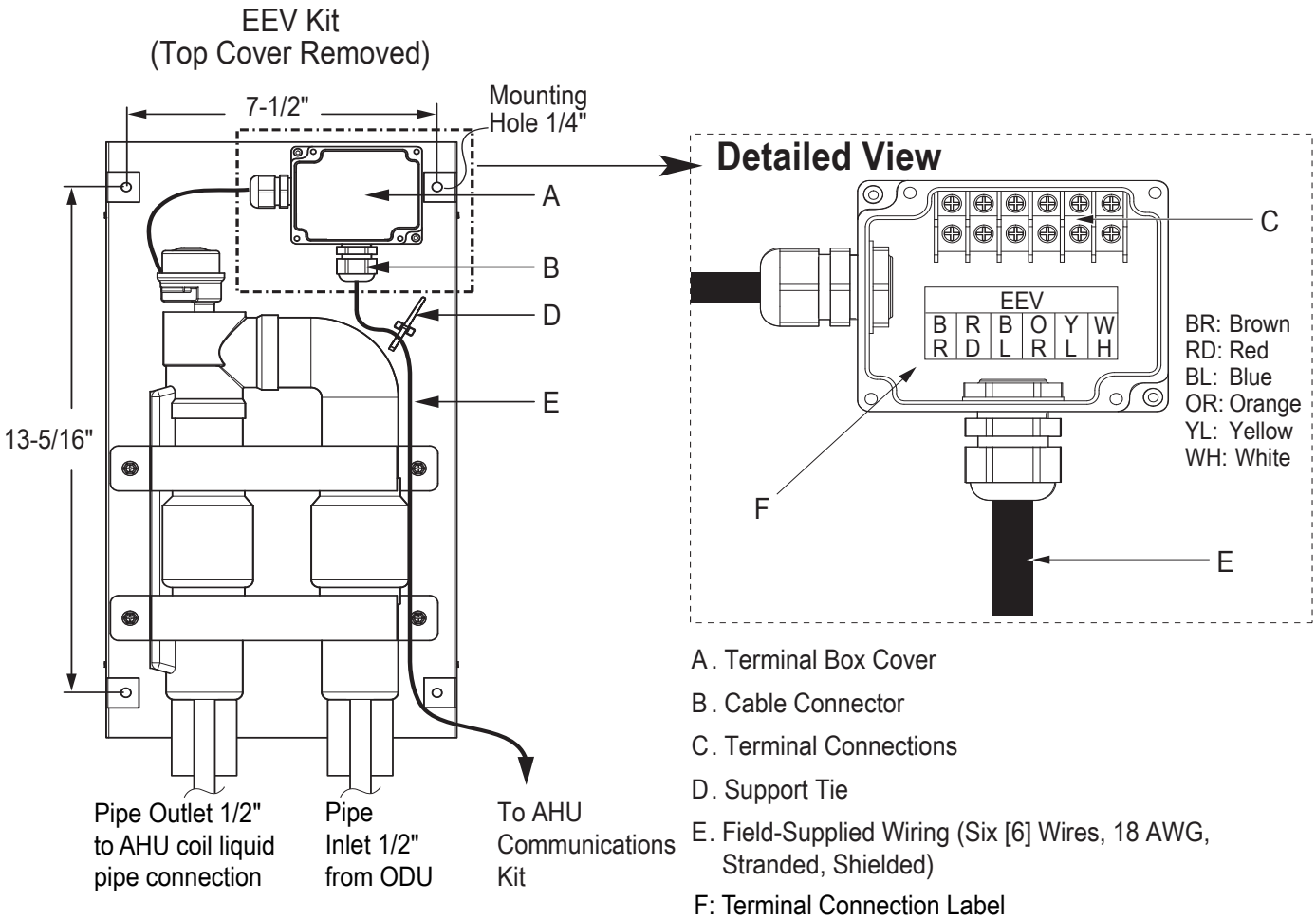
Figure 24: Installing the Insulation.



Wiring Installation

1. Open the terminal box cover (A) by unscrewing the four (4) M4 screws.
2. Run field-supplied wiring (six [6] wired, 18AWG, stranded, shielded copper) to / from the AHU Communications Kit through the cable connector on the EEV Kit.
3. Connect wiring to the terminal connections as shown (C), following the label and color codes pasted onto the bottom of the terminal box and listed on the AHU Communications Kit PCB diagram. Securely tighten all connections.
4. Route the wiring through and out the EEV Kit as shown, and secure with the support tie (D).
5. Re-install the terminal box cover (A) and secure with the four (4) M4 screws.
6. Taking care not to damage the field-supplied wiring or insulation, reattach EEV Kit top panel by securing with screws at four (4) corners.

Figure 25: PRLK048A0 and PRLK096A0 EEV Kit Wiring.



A. Terminal Box Cover

B. Cable Connector

C. Terminal Connections

D. Support Tie

E. Field-Supplied Wiring (Six [6] Wires, 18 AWG, Stranded, Shielded)

F: Terminal Connection Label

Note

Before connecting the field-supplied wiring, compare with the connection labels between EEV Kit and AHU Communications Kit. Connect the wiring according to the PCB diagram for the AHU Communications Kit. If the wiring is incorrect, the products will malfunction.

EEV KIT INSTALLATION

PRLK396A0 Wiring

Wiring Installation

1. Open the terminal box cover.
2. For PRLK396A0 / PRLK594A0, run the field-supplied wiring (six [6] wired, 18AWG, stranded, shielded copper) to / from the AHU Communications Kit through the cable connector on the EEV Kit.
3. Connect wiring to the terminal connections following the label and color codes pasted onto the bottom of the terminal box and shown below. Securely tighten all connections.
4. Route the wiring through and out the EEV Kit as shown, and secure with the support tie (D).
5. Re-install the terminal box cover and secure the cover with the four (4) screws.
6. Taking care not to damage the field-supplied wiring or insulation, reattach the EEV Kit Top Panel by securing it with the screws at the four (4) corners.

Figure 26: PRLK396A0 EEV Kit Wiring.

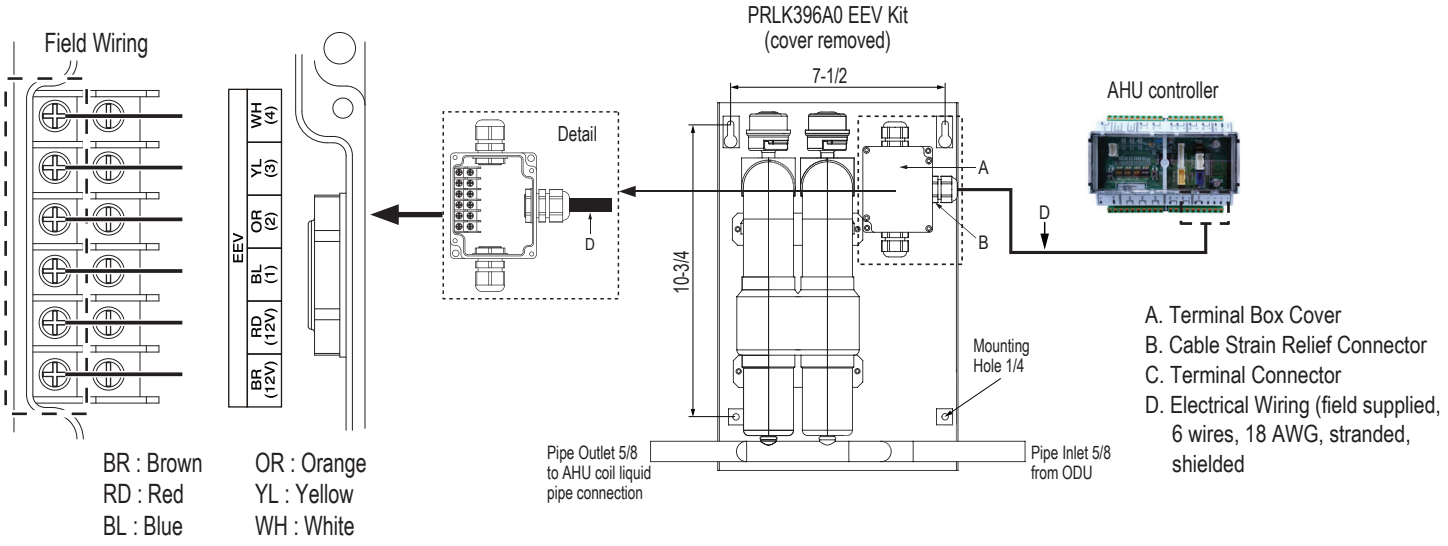
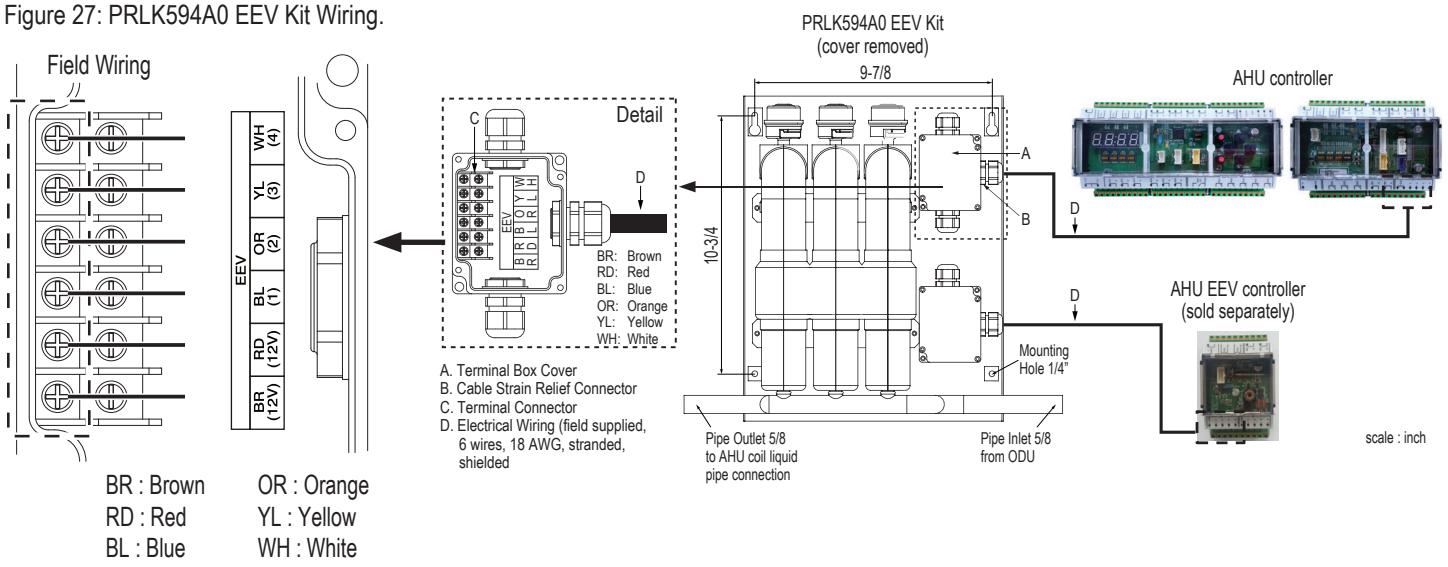


Figure 27: PRLK594A0 EEV Kit Wiring.



Individual Controller

Function List		PAHCMS000
Basic Function	Operating On / Off	O
	Operation Mode Control	Cooling / Heating only
	Desired Return Air Temperature Setting	X
	Return Air Temperature Display	X
	Desired Discharge Air Temperature Setting	60 ~ 80 °F
	Discharge Air Temperature Display	51.8 ~ 103.1 °F
	Fan Speed Control	X
	Auto Swing	-
	Vane Control (Louver Angle)	-
	Child Lock / All button Lock	X
Advanced Function	Schedule	O
	Partial Lock	X
	Dual Set point	X
	Pipe Temperature display	O [1]
	Error Code Display	O
	Defrost Status	Defrost / Normal
	Compressor Status	On / Off
	Filter Sign	-
	Error History	X
ETC	Unit of Temperature control	1.0 °F
	Electric Failure compensation	O

Note:
1. Pipe temperature display is unavailable on the Simple remote controller.
2. Control function is unavailable when Contact Signal control is used (DIP SW1-1 is Off).
3. A wired remote controller is also required if using a wireless remote controller.
4. Partial lock is available only with Premium remote controller.
5. Refer to the product manual of the remote controller.

EEV KIT INSTALLATION

Control Functions

LG Central Controller

Function List			PAHCMS000
Basic Function	Operating On/Off		O
	Operating Mode Control		Cooling / Heating only
	Desired Return Air Temperature Setting		X
	Return Air Temperature Display		X
	Desired Discharge Air Temperature Setting		60 ~ 80 °F
	Discharge Air Temperature Display		-58.0~212.0 °F
	Fan Speed Control		X
	Auto Swing		-
	All Lock		X
Additional function	Schedule		O
	Partial Lock		X
	Auto Change Over		X
	Set Back		X
	2 Set Auto Mode		X
	Pipe Temperature		X
	Error Code Display		O
	Defrost Status		X
	Outdoor unit Cycle Monitoring		X
	Filter Sign		-
	Emergency Stop		O
	Energy Navigation		X
Auto Control	Peak Control	Priority control	X
		ODU capacity control	X
	Time limit control		X
	Device Interlocking		X
Energy Report	Power Consumption		X
	Run time		X
	Sending Email / Save to PC or USB		X
History	Report		Error / Control
	Sending Email / Save to PC or USB		O
ETC	Unit of Temperature control		1.0 °F
	Remote Access		O

Note:
1. Control function is unavailable when Contact Signal control is used (DIP SW1-1 is Off).
2. PI485GW is required for Single Zone application.

Memory Map

Function Code

Code	Description	Register
0x01	Read Coils	00001~00008
0x02	Read Discrete inputs	10001~10030
0x03	Read Holding Registers	40001~40010
0x04	Read Input Registers	30001~30016
0x05	Write Single Coil	00001~00008
0x06	Write Single Holding Register	40001~40010

Memory Map

Register	Description	Function Code						Value explanation
		1	2	3	4	5	6	
00001	Operating On / Off	●	-	-	-	●	-	0: Off / 1: On
00002	Reserved	-	-	-	-	-	-	-
00003	Reserved	-	-	-	-	-	-	-
00004	Reserved	-	-	-	-	-	-	-
00005	Reserved	-	-	-	-	-	-	-
00006	Reserved	-	-	-	-	-	-	-
00007	Reserved	-	-	-	-	-	-	-
00008	Reserved	-	-	-	-	-	-	-
10001	Error Status	-	●	-	-	-	-	0: Normal / 1: Error
10002	Operation Status	-	●	-	-	-	-	0: Off / 1: On
10003	Defrost Status	-	●	-	-	-	-	0: Normal / 1: Defrost
10004	Reserved	-	-	-	-	-	-	-
10005	Reserved	-	-	-	-	-	-	-
10006	Reserved	-	-	-	-	-	-	-
10007	Reserved	-	-	-	-	-	-	-
10008	Reserved	-	-	-	-	-	-	-
10009	Reserved	-	-	-	-	-	-	-
10010	Reserved	-	-	-	-	-	-	-
10011	ODU#1 Operation Status	-	●	-	-	-	-	0: Off / 1: On
10012	ODU#1 Comp. Status	-	●	-	-	-	-	0: Off / 1: On
10013	ODU#1 Defrost Status	-	●	-	-	-	-	0: Normal / 1: Defrost
10014	ODU#1 Error Status	-	●	-	-	-	-	0: Normal / 1: Error
10015	ODU#2 Operation Status	-	●	-	-	-	-	0: Off / 1: On
10016	ODU#2 Comp. Status	-	●	-	-	-	-	0: Off / 1: On
10017	ODU#2 Defrost Status	-	●	-	-	-	-	0: Normal / 1: Defrost
10018	ODU#2 Error Status	-	●	-	-	-	-	0: Normal / 1: Error
10019	ODU#3 Operation Status	-	●	-	-	-	-	0: Off / 1: On
10020	ODU#3 Comp. Status	-	●	-	-	-	-	0: Off / 1: On
10021	ODU#3 Defrost Status	-	●	-	-	-	-	0: Normal / 1: Defrost
10022	ODU#3 Error Status	-	●	-	-	-	-	0: Normal / 1: Error
10023	ODU#4 Operation Status	-	●	-	-	-	-	0: Off / 1: On
10024	ODU#4 Comp. Status	-	●	-	-	-	-	0: Off / 1: On
10025	ODU#4 Defrost Status	-	●	-	-	-	-	0: Normal / 1: Defrost
10026	ODU#4 Error Status	-	●	-	-	-	-	0: Normal / 1: Error

EEV KIT INSTALLATION

Control Functions

Memory Map - continued

Register	Description	Function Code						Value explanation
		1	2	3	4	5	6	
10027	Reserved	-	-	-	-	-	-	-
10028	Reserved	-	-	-	-	-	-	-
10029	Reserved	-	-	-	-	-	-	-
10030	Reserved	-	-	-	-	-	-	-
30001	Error Code	-	-	-	●	-	-	1xxxx [2]
30002	Reserved	-	-	-	-	-	-	-
30003	Reserved	-	-	-	-	-	-	-
30004	Reserved	-	-	-	-	-	-	-
30005	Reserved	-	-	-	-	-	-	-
30006	Reserved	-	-	-	-	-	-	-
30007	Reserved	-	-	-	-	-	-	-
30008	Reserved	-	-	-	-	-	-	-
30009	Reserved	-	-	-	-	-	-	-
30010	Reserved	-	-	-	-	-	-	-
30011	RA Temp.	-	-	-	●	-	-	-50 ~ 100°C (x10)
30012	Reserved	-	-	-	-	-	-	-
30013	SA Temp.	-	-	-	●	-	-	-50 ~ 100°C (x10)
30014	Reserved	-	-	-	-	-	-	-
30015	Reserved	-	-	-	-	-	-	-
30016	Reserved	-	-	-	-	-	-	-
40001	Operation Mode	-	-	●	-	-	●	0: Cooling / 2: Fan / 4: Heating
40002	Capacity [1]	-	-	●	-	-	●	0, 2.0V~10V (x10, 0.5V)
40003	Cooling Target Temp.	-	-	●	-	-	●	15.6 ~ 30°C (x10, 1.0 °C)
40004	Heating Target Temp.	-	-	●	-	-	●	15.6 ~ 30°C (x10, 1.0 °C)
40005	Reserved	-	-	-	-	-	-	-
40006	Reserved	-	-	-	-	-	-	-
40007	Reserved	-	-	-	-	-	-	-
40008	Reserved	-	-	-	-	-	-	-
40009	Reserved	-	-	-	-	-	-	-
40010	Reserved	-	-	-	-	-	-	-

Note :

1. For capacity ratio, refer to the capacity setting table of UI7 (0 - 10V).
2. Error Code: 1 x xxx
   - x → Error Code
   - xxx → Module Number

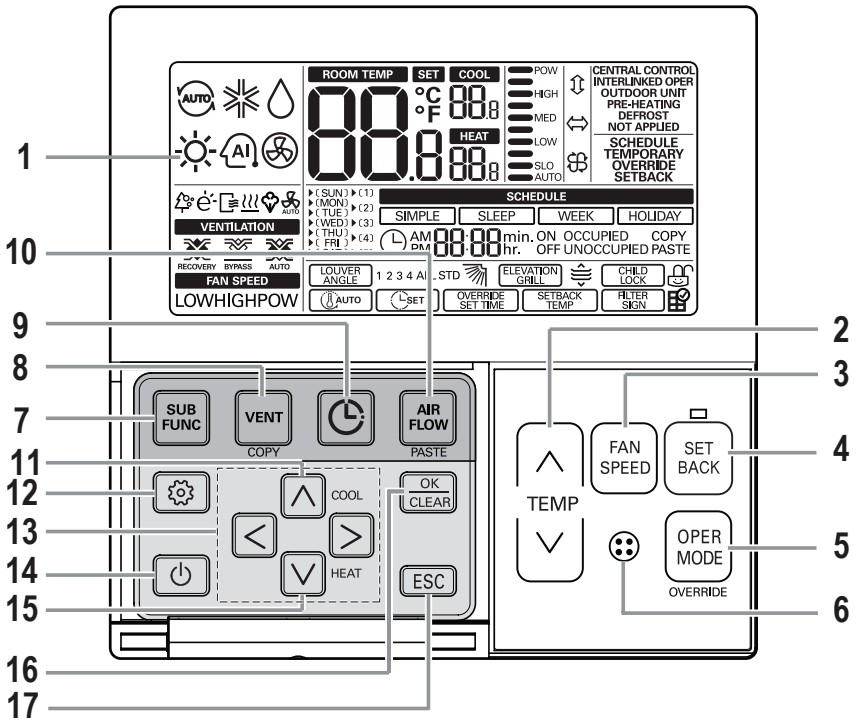
Testing

Before testing, make sure all information is understood completely, and follow the guidelines listed in this manual.

- Check the air-source / water-source unit refrigerant piping, additional refrigerant charge, maximum allowable piping length, and opening the shut-off valve. (For more detailed information, see the respective air-source / water-source unit installation manual).
- Operate the testing procedure.

1. Connect the power, and turn the system on.
2. Check remote controller for error codes.

Figure 28: Wired Remote Controller Buttons.



1. Operation indication screen
2. Set temperature button
3. Fan Speed button
4. Set back button
5. Operation mode selection button
6. Wireless receiver - some equipment are not equipped to receive the wireless signals
7. Sub-function button
8. Ventilation button
9. Reservation button
10. Air flow button
11. Cooling desired temperature
12. Function setting button
13. Up, Down, Left, Right button
14. On/Off button
15. Heating desired temperature
16. Setting/Cancel button
17. Exit button

Note

- *For more detailed function of the wired remote controller, refer to its Owner's / Installation Manual.*
- *Buttons 3, 4, 11, 12 on the wired remote controller do not operate.*

TROUBLESHOOTING

Troubleshooting

Table 18: Troubleshooting.

Problem	Cause	Solution
AHU Communications Kit Does Not Work	No Power	Check the power supply electrical connections and voltage.
	Wiring is Incorrect	Check the AHU Communications Kit electrical connections (see wiring diagram).
	AHU Communications Kit is Damaged	Check AHU Communications Kit electrical and mechanical components.
EEV Kit Does Not Work	Wiring is Incorrect	Check the EEV Kit electrical connections.
	Piping is Incorrect	Check the piping connections between the EEV Kit and the outdoor unit.

Error Codes

• The error code function indicates when an operation failure occurs in the system, and provides self-diagnosis about the type of error.

• The error code is displayed on the wired remote controller and the control board LED on the air-source heat pump unit.

• If two or more two errors occur simultaneously, the smallest of the error code numbers is displayed first.

• When the problem causing the error code to appear is fixed, then the error code will immediately stop displaying on the LED.

Table 19: Error Code Table.

Error Code	Description	Details
CH01	Return Air (Room) Thermistor Error	Return air (room) thermistor has disconnected from AHU, or has short circuited.
CH02	Pipe In Thermistor Error	Pipe in thermistor has disconnected from AHU, or has short circuited.
CH03	Communication Error Between Wired Remote Controller and AHU Communications Kit	No communication signal for more than three (3) minutes from the controller to the AHU Communications Kit.
CH05	Communication Error Between AHU Communications Kit and Air-Source / Water-Source Unit	No communication signal for more than five (5) consecutive minutes from AHU Communications Kit to the Air-Source Heat Pump Unit.
CH06	Pipe Out Thermistor Error	Pipe out thermistor has disconnected from AHU, or has short circuited.

Contact your LG representative if you have any questions about the AHU Communications Kit or its installation.

LG Electronics, U.S.A., Inc.
Commercial Air Conditioning Division
4300 North Point Parkway
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www.lg-vrf.com

LG Customer Information Center, Commercial Products
1-888-865-3026 USA
Follow the prompts for commercial A/C products.

IM_AHU_Comm_Kit_PAHCMS000_8_18