AHU CONVERSION KIT APPLICATION GUIDE

LG Air Conditioning Technologies

2025

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AHU Conversion Kit Application Guide

The purpose of this application guide is to provide an overview of the components and considerations required to integrate third-party air handling units (AHUs) with LG's Variable Refrigerant Flow (VRF) systems. By using LG's Multi V™ inverter compressor condensing units instead of conventional condensing units in direct expansion (DX) split systems, significant energy savings can be achieved.

Other necessary documents, such as the engineering manual, installation manual, and control integration approach, should be carefully reviewed by the design engineer to ensure that the installed system complies with the project engineer's design requirements and the VRF refrigerant cycle operating limitations set forth in this manual.

LG is not responsible for the selection of any third-party air handler (AHU) or components, including but not limited to refrigerant-to-air heat transfer devices, refrigerant-to-fluid heat transfer devices, refrigerant piping and accessories, and insulation. Refer to the selected third-party product's manufacturer documentation for pertinent information, including but not limited to proper sizing, coil selection, material selection, installation guidance, startup procedures, and warranty terms and conditions. .

This guide serves as a supplement to the LG engineering, installation, and product manuals. In the event of any discrepancies between this document and the manuals, the manuals shall take precedence. For more information or to obtain product documentation, please visit www.lghvac.com. .

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Introduction

Overview:

This application guide provides an overview of the application concepts, components, and considerations required to integrate third-party air handling units (AHUs) with LG's Variable Refrigerant Flow (VRF) systems. Utilizing LG's Multi V™ inverter compressor outdoor units (ODUs) in lieu of conventional condensing units in direct expansion (DX) split systems offers system design flexibility and greater heating and cooling performance..

VRF Application Design Engineer Responsibilities

It is essential for the design engineer to develop a well-defined sequence of operation, with particular attention to specifying the full-load air handler (coil) operating parameters as well as the off-season or unoccupied (coil) operating parameters. The design engineer should have a thorough understanding of the HVAC direct expansion refrigeration cycle and expertise in selecting and matching components for commercial built-up refrigeration systems. Coil selections must have a heat transfer capacity within 5% of the building load calculation. **Carefully review all relevant documentation, including the engineering manual, installation manual, and control integration guidelines, and third party coil engineering manuals obtained from the coil manufacturer to ensure the installed system meets customer requirements and operates as intended.**

Failure to abide by the information in this application guide may result in:

- **repeated compressor malfunction or failure;**
- **system malfunction; and/or**
- **loss of heating or cooling.**

Field-Built System Disclaimer

The air conditioning and heating systems incorporating this product are inherently field-built systems composed of devices and components from third-party manufacturers. The buyer assumes full responsibility for the proper application, engineering, and trouble-free operation of the field-engineered and assembled system.

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Buyer Agreement and Warranty Conditions

By purchasing this product, in addition to the terms and conditions contained in the **LG PRODUCT WARRANTY AND THE APPLICABLE AGREEMENT** between the Buyer and the Seller, the Buyer acknowledges and agrees that:

1. The product must be operated within the parameters outlined in this guide and the most recent revisions of the AHU Kit Engineering and Installation Manual.
2. Operating the system outside the design conditions specified in the design professional's drawings, documented sequence of operation, or the environmental criteria used for component selection may result in damage to compressors.

LG reserves the right to void or rescind all parts warranties for compressor-containing products if the system is operated outside the third-party coil engineering and selection criteria provided with the application for LG compressor containing product warranty design conditions. This includes, but is not limited to, operating the system outside the conditions defined in the design professional's drawings and specifications, the designer's documented sequence of operation, and/or the environmental conditions used to select and size components of the air conditioning and heating field-built system.

Basic Operation:

The LG AHU Kit consists of a communications controller component (Communications Kit) and a refrigeration metering component (EEV Kit), which modulates refrigerant flow through direct expansion (DX) coils or Communication Kit (Comm. Kit) provided by third-party manufacturers. The AHU Communication Kit controller receives temperature readings from two LG-provided refrigerant pipe sensors that measure the differential temperature change of the refrigerant passing through the coil. The Electronic Expansion Valve (EEV) then modulates the refrigerant flow rate to maintain a steady differential refrigerant temperature. The airflow rate over the coil is controlled by various methods, depending on the location of the air temperature sensor as specified by the design engineer.

System Architecture Basics

LG VRF outdoor units can be integrated with third-party air handlers, such as Dedicated Outdoor Air Systems (DOAS), conventional constant or variable volume units, multi-zone systems, double-duct systems, and 2-deck and 3-deck face-and-bypass configurations. The VRF outdoor unit can be configured to provide heating, cooling, and simultaneous cooling with reheat.

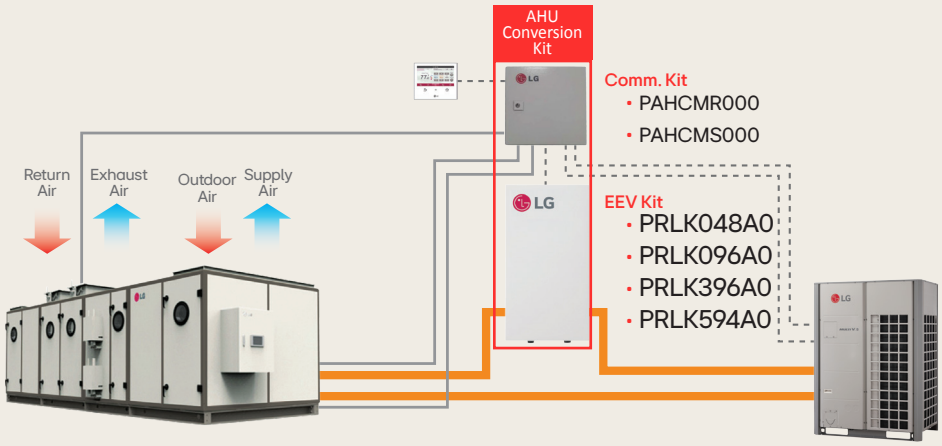


Figure 1 - LG Outdoor Unit with Third-Party Air Handlers

Thrid-Party Air Handlers can be integrated into VRF Systems containing other traditional VRF fan-coils (IDUs).

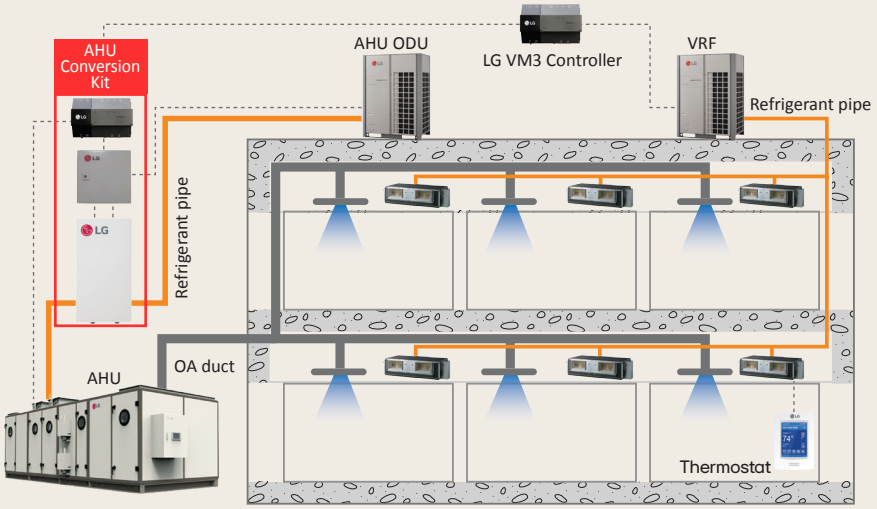
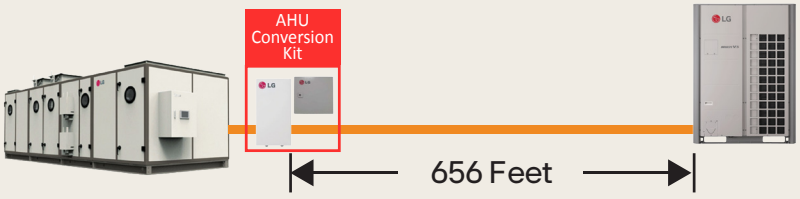


Figure 2 - Third-Party AHU with Traditional VFR

Piping Limitations



Maximum horizontal piping length: 656 Feet

Maximum elevation piping: 360 Feet

Figure 3 - Maximum allowable piping length

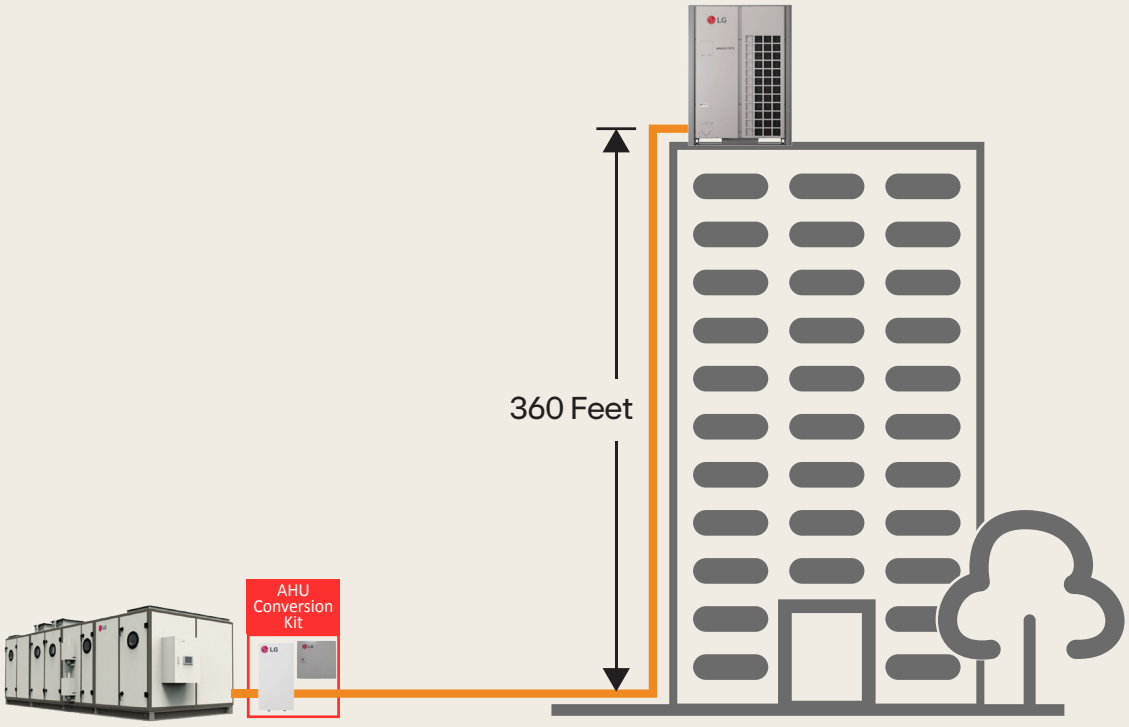


Figure 4 - Vertical Piping Distance

EEV Components Features

EEV KIT Products

Standard Features:

- Controls refrigerant flow between Multi V™ air or water source units and a Third-Party AHU
- Designed for indoor installations (field supplied water-proof enclosure must be used when installing outdoors)

Specifications	PRLK048A0	PRLK096A0	PRLK396A0	PRLK594A0
Max Ton Capacity	8 Tons	16 Tons	32 Tons	48 Tons
Btu Capacity	12 – 96 MBH	115 – 192 MBH	216 – 384 MBH	408 - 576 MBH
Minimum coil entering air temperature in heating mode[1]	41°F	41°F	41°F	41°F
Maximum distance between EEV and Comm. Kit	32 feet	32 feet	32 feet	32 feet
Maximum distance between EEV and coil	20 feet	20 feet	20 feet	20 feet
Maximum number of EEV kits that can be connected to Comm. Kit	1	1	1	1
System Compatibility Available Communication Control Kit	PAHCMR000 (HP or HR)	PAHCMR000 (HP or HR)	PAHCMR000 (HP)	PAHCMR000 Not Available
Options/EEV Kit Model: HP (Heat Pump) or HR (Heat Recovery)	PAHCMS000 (HP only)	PAHCMS000 (HP only)	PAHCMS000 (HP only)	PAHCMS000[1] (HP only)
Each EEV Kit comes with item below:				
Installation Manual				
Pipe In Temperature Sensor				
Pipe Out Temperature Sensor				

Table 1 - EEV Kits Tonnage and Content

[1]PRLK594A0 Kit comes with additional EEV Module (PAEEVA020) which requires field installation inside the PAHCMS000 controller enclosure.
See "Guide for application which AHU coil Entering Air Temperature is Lower than 41°F." on page 43.
MBH = thousand BTU's per hour

Capacity Index and Third-Party Coil Volume Range

Coil Volume Range (in3)

EEV Model	Tube Diameter: Capacity (MBH)	0.375 inch Min.	0.375 inch Max.	0.5 inch Min.	0.5 inch Max.
PRLK048A0	12	29.0	59.0	36.5	74.0
	15	36.2	73.8	45.6	92.5
	18	43.4	88.5	54.7	111.0
	24	57.9	118.0	73.0	148.0
	28	67.6	137.7	85.1	172.7
	36	86.9	177.0	109.4	222.1
	42	101.4	206.5	127.7	259.1
	48	115.9	236.0	145.9	296.1
	54	130.3	265.5	164.1	333.1
	76	183.4	373.7	231.0	468.8
	96	231.7	472.0	291.8	592.2
PRLK096A0	115	277.6	565.5	349.6	709.4
	134	323.4	658.9	407.3	826.6
	153	369.3	752.3	465.1	943.8
	172	415.2	845.7	522.8	1061.0
	192	463.5	944.1	583.6	1184.4
PRLK396A0	216	521.4	1062.1	656.6	1332.4
	240	579.3	1180.1	729.5	1480.5
	264	637.2	1298.1	802.5	1628.5
	288	695.2	1416.1	875.4	1776.6
	312	753.1	1534.1	948.4	1924.6
	336	811.0	1652.1	1021.3	2072.7
	360	869.0	1770.1	1094.3	2220.7
	384	926.9	1888.1	1167.2	2368.7
PRLK594A0	408	984.8	2006.1	1240.2	2516.8
	432	1042.8	2124.1	1313.1	2664.8
	456	1100.7	2242.2	1386.1	2812.9
	480	1158.6	2360.2	1459.0	2960.9
	504	1216.6	2478.2	1532.0	3109.0
	528	1274.5	2596.2	1604.9	3257.0
	552	1332.4	2714.2	1677.9	3405.1
	576	1390.4	2832.2	1750.8	3553.1

Table 2 - Third Party DX Coil Min/Max Volume per EEV Model

MBH = thousand BTU's per hour

Heat exchanger capacities are based on the following conditions :

1. Cooling
   - Indoor Ambient Temp. 80.6°FDB / 66.2 °FWB, Outdoor Ambient Temp. 95°F/ 75.2°FWB
   - Condensing temperature (tc) 113°F
2. Heating
   - Indoor Ambient Temp. 68°FDB / 59°FWB, Outdoor Ambient Temp. 44.6°FDB / 42.8°FWB
   - Hot gas inlet temperature 149°F, Condensing temperature (tc) 120°F

Communication

Communication Kits

The AHU Communications Kit bridges LG's air conditioning outdoor unit to a Third-Party Air Handling Unit (AHU). Its function is based on Return, Space or Supply/ Discharge Air temperature control. In installations where the AHU is designed with Direct Expansion (DX) Coil, the comm kit will control the supply air temperature or return air temperature by measuring the inlet and outlet temperatures of the DX coil and changing the operation of the outdoor unit and the expansion unit.

Standard Feature:

- Function: Allows communication between Third-Party air handling units and LG air source or water source units.
- Control Options: LG Wired Remote Controller, LG Central Controller, Multi-site controller (MS8000 - Edge 10), and Third-Party AHU Controller.
- Increases heating comfort by applying sequential defrost logic and simultaneous defrosting prevention logic of the outdoor unit (only with PAHCMS000).
- The AHU Communications Kit consists of a chassis, communication module and room (return) air thermistor.
- Steel case with NEMA 4 (weather proof enclosure)
- Requires 208-230 VAC, 1 phase power
- It controls the Electronic Expansion Valve (EEV, required, sold separately)

Models PAHCMR000 and PAHCMS000

Specifications	PAHCMR000	PAHCMS000
Can Connect with	Multiple AHU's with indoor units	One AHU (one DX Coil) and cannot connect with indoor units
Control Options	LG Wired Controller (required for LG controls), LG Central Controller, Third-Party AHU Controller	LG Wired Controller (required for LG Controls), LG Central Controller, Third-Party AHU Controller
System Compatibility	Heat Pump or Heat Recovery	Heat Pump only
AHU Coil Capacities	12 – 384 MBH for Multi V™ (41°F minimum entering air temp)	12 – 594 MBH for Multi V™ (41°F minimum entering air temp)
Return air thermistor Length	16.4 ft.	16.4 ft.
Controls	AHU Fan Control[1] H/M/L EEV Control[2,3]	EEV Control

Table 3 - Communication Kits

[1]Can control 3 speed or single speed Third-Party fan motor (requires relays or motor starter)
[2]PAHCMS000 should only be used with PRLK594A0 EEV Kit or Multi V S®
[3]When PAHCMR000 is used with Multi V™ 5, I/O controller (PRVC2) is recommended for ODU to accept the 0-10 volt capacity control signal.
When PAHCMR000 is used with Multi V WATER® 5, I/O controller (PWFCKN000) is recommended for ODU to accept the 0-10 volt capacity control signal.

Building Automation and Central Control Interface Options

- Dry contact function is embedded in the communication kits
- Modbus® Communication is possible without applying extra devices
- Multiple DX coil installation is possible for discharge air control

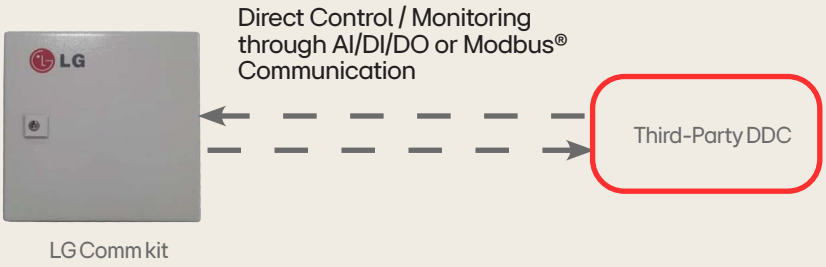


Figure 5 - Control & Monitoring

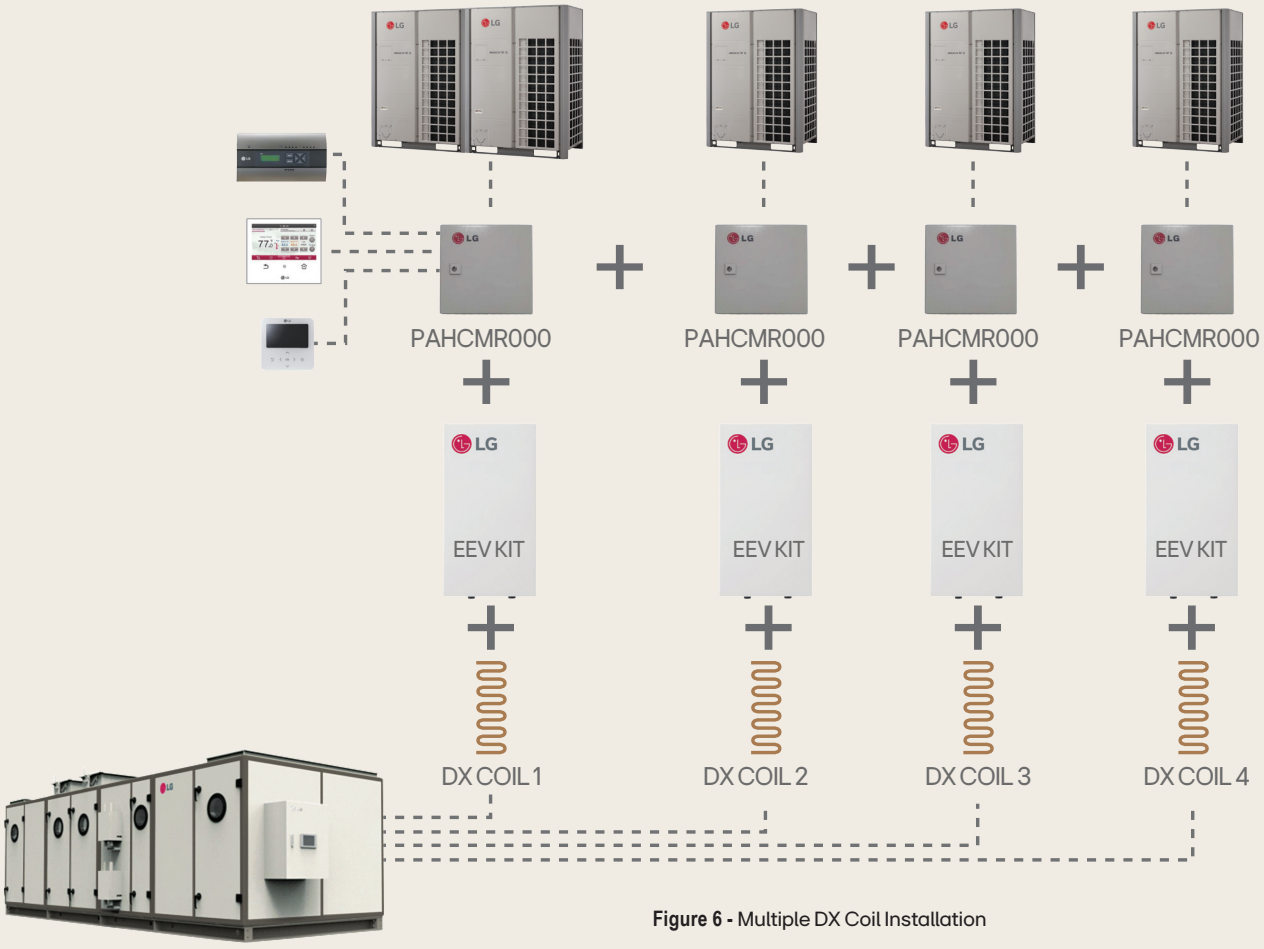


Figure 6 - Multiple DX Coil Installation

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Communication Kit Content quntity 1 each of the following:

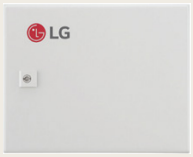
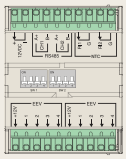
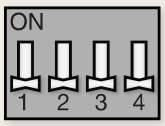
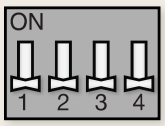
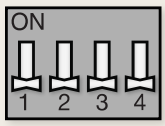
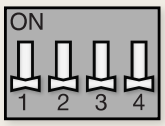
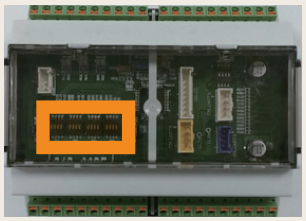
Part	PAHCMR000	PAHCMS000
Communication Kit	 Return Air	 Supply Air
Installation Manual		
Return Air (Room) Thermistor		
Additional EEV Module	None Required	 PAEEVA020[1]

Table 4 - Communication Kit Contents

[1]If PRLK594A0 EEV model is selected with PAHCMS000 Communication Kit, additional EEV Module (PAEEVA020) will be shipped which requires field installation inside the PAHCMS000 controller enclosure.

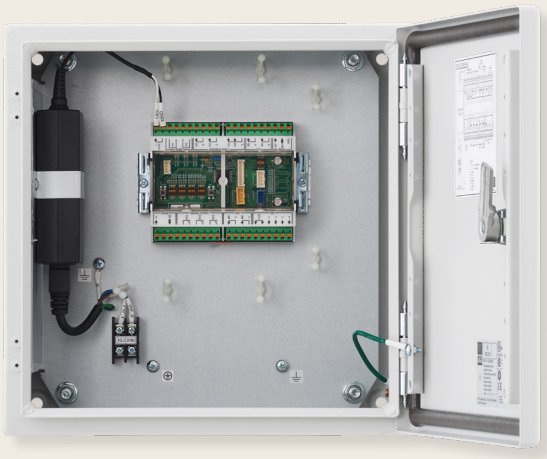
Communications Kit Configuration Settings

DIP Switch Settings – PAHCMR000

SW1	SW2	SW3	SW4	COMM MODULE
				

The default settings of all DIP switches is “OFF”

Table 5 - Default DIP Switch Settings for PAHCMR000 Comm Module



DIP Switch Settings – PAHCMR000

Switch#	No	Item	Setting		Note
SW1	1	ODU Type	Off	Multi V™ Comm.	Using Multi V™ outdoor unit
	2	Control Type	On	Communication	Controlled by DDC Modbus RTU or LG remote controllers & central controllers
			Off	Contact signal	Controlled by DDC through Contact signal LG Centralized controller can only monitor status
	3	DO Type	On	Fan Speed	DO1 : High, DO2 : Middle, DO3 : Low DO changes according to fan speed setting value
			Off	Status	DO1 : On/Off, DO2 : Defrost, DO3 : Alarm
	4	Fan Speed (TH. On/Off)	On	Fixed	Except when set to defrost, the fan runs at set fan speed.
			Off	Change	The fan speed will be changed according to TH on/off For more detail please check 'Digital Output - Fan Speed'
SW2	1	Room thermistor sensor reference setting	On	Remote control / Indoor unit / 2TH	Control according to value of remote control installer setting no.4 (refer to the remote control manual)
			Off	Indoor unit	-
	2	Reserved	-	-	-
	3/4	UI Setting	Off/Off	UI Setting #1	UI1 : Operation On/Off, UI2 : Heating/Cooling UI3 : Forced Thermo On/Off, UI4 : Target air temperature
			Off/On	UI Setting #2	UI1 : Operation On/Off, UI2 : Cooling only/Off UI3 : Heating only/Off, UI4 : Forced Thermo On and Off
			On/Off	Reserved	-
			On/On	UI Setting #4 [1]	UI1 : Operation On/Off UI2 : Heating/Cooling UI3 : Emergency stop
SW3	1	Group Main/ Sub (Return Air only)	On	Sub mode	Please see "9.3 Multiple module installation guide" for more detail
			Off	Main mode	Main mode is default for single AHU Controller installation. Please see "9.3 Multiple module installation guide" for more detail
	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 / Fan)
			On/Off	Cooling Only	Operation mode is Cooling only (Cooling / Fan)
			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

Table 6 - DIP Switch Settings Details for Comm Module

[1] 'UI setting #4' is available when 'Dip SW1-2', 'Dip SW2-3', and ' Dip SW2-4' are ON.

Set DIP Switch SW4 as appropriate for the capacity of your air handling unit.

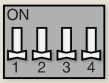
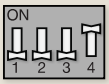
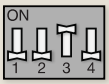
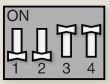
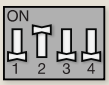
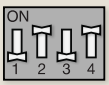
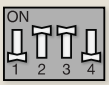
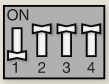
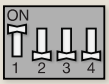
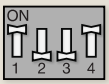
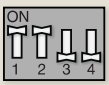
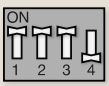
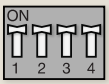
Switch Number 'On'	SW4 Dip Switch	Capacity (MBH) Multi V™
-		12
4		15
3		18
3,4		24
2		28
2,4		36
2,3		42
2,3,4		48
1		54
1,4		76
1,3		96
1,3,4		115
1,2		134
1,2,4		153
1,2,3		172
1,2,3,4		192

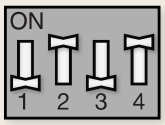
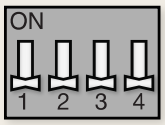
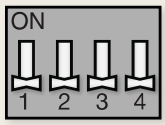
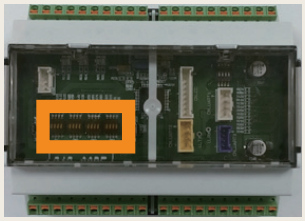
Table 7 - DIP Switch 4 Settings based on Capacity

NOTE:

1. To connect the PRLK396A0/PRLK594A0 (EEV kit) with Multi V™ outdoor unit, set Dip s/w 1, 2, 3 and 4 to ON (Set the capacity as 192 kBtu/h).
2. PAHCMR000 model can only be connected to PRLK048A0/PRLK096A0/PRLK396A0 EEV kit.
3. PAHCMS000 model can be connected to PRLK048A0/PRLK096A0/PRLK396A0 EEV kit and if you can add EEV module (PAEEVA020) separately, it can be connected to the PRLK594A0 EEV kit.

DIP Switch Applications with Thermostats – PAHCMR000

The figure below shows the DIP switch settings of the return air comm. kit when the LG controls is used. When the LG controls method is used, an LG wired controller is required and LG central controller is optional.

SW1	SW2	SW3	SW4	COMM MODULE
				

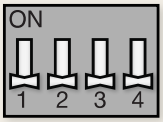
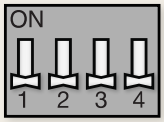
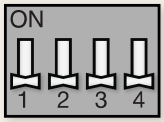
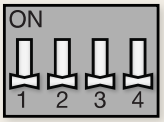
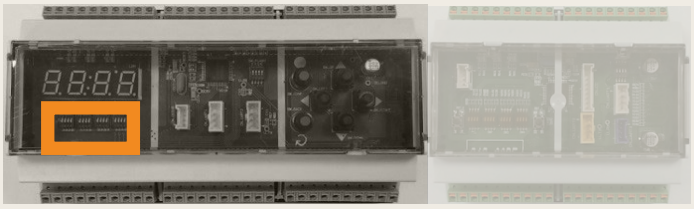
The default settings of all DIP switches is "OFF"

Table 8 - DIP Switch Settings for LG Thermostats

Return Air Kit Application Using LG Thermostat		
S/W name	No	Setting
SW1	1	Off
	2	On
	3	Off
	4	On
SW2	1	Off
	2	Off
	3	Off
	4	Off
SW3	1	Off
	2	Off
	3	Off
	4	Off

Table 9 - Return Air Kit DIP Switch Application using LG Thermostat

DIP Switch Settings – PAHCMS000

SW1	SW2	SW3	SW4	MAIN MODULE
				

The default settings of all DIP switches is "OFF"

Table 10 - Default DIP Switch Settings for PAHCMS000 Main Module

Switch#	No	Item	Setting		Note
SW1	1	Control Type	On	Communication	Controlled by DDC through Modbus or LG wired controller
			Off	Contact Signal	Controlled by DDC through Contact signal LG Centralized controller can only monitor status
	2	Discharge Temp. Control Type	On	Stand alone	LG remote controllers or DDC(Modbus) can control discharge air temperature by using LG discharge temperature sensor
			Off	Manual by DDC	DDC(Contact Signal or Modbus) can control discharge air temperature by ODU capacity control reffering to field supplied discharge temperature
	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	Monitoring/ Control	Modbus communication between main module and LG central controller
			Off	Monitoring only	LGAP AHU communication between main module and LG central controller (monitoring only)
SW2	1	ODU Capacity Control[1]	On	ODU Capacity Setting #2	ODU capacity control #2
		Reserved	Off	ODU Capacity Setting #1	ODU capacity control #1
	2	ODU Capacity% Control [3] and Prevent Derosting	On	ODU Capacit- Setting #3	ODU Capacity Control #3 (Priority is higher than SW2-1) & Enable the function for prevent defrosting at the same time
			Off	-	According to SW2-1 setting
	3	Reserved	-	-	-
	4	Reserved	-	-	-
SW3	1	Reserved	-	-	-
	2	Reserved	-	-	-
	3	Reserved	-	-	-
	4	Reserved	-	-	-
SW4	1	Emergency Stop [2]	On	Setting #2	System stops when the circuit(DI3-GND) is 'open'
			Off	Setting #1	System stops when the circuit(DI3-GND) is 'short'
	2	Reserved	-	-	-
	3	Reserved	-	-	-
	4	Reserved	-	-	-

Table 11 - DIP Switch Settings Details for PAHCMS000 Main Module

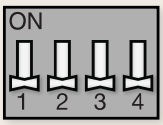
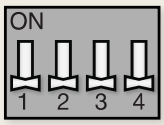
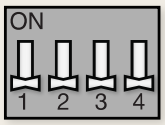
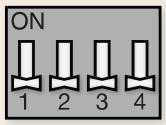
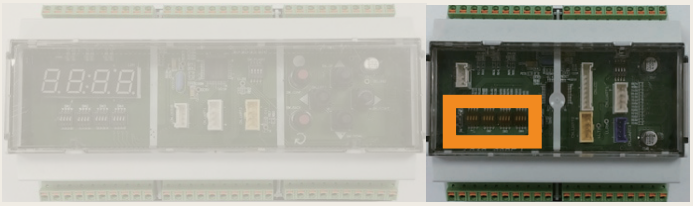
[1] Function of defrost operation type can be applied only to Multi V outdoor units (MULTI V™ 5 and after).

[2] Emergency Stop fuction is working regardless 'Control Type' setting (Dip Switch SW 1-1)

[3] Function of ODU capacity control(capacity % control) can be applied only to Multi V outdoor units(after MULTI V 5 model) and please check the below.

- Check the software version : Main PCB version of MULTI V 5 model is after version 1.43.0 and main module's version of AHU communication kit is after version 1.3.
- Set the function : MULTI V 5 model should be set function FN39 option1 or option2.
- (Dip SW NO.5 : ON → Set to 'FUNC' → Set to 'FN39' : Option 1 or Option 2)
- Please see the Multi V manual for more detail how to set this function (www.lghvac.com).
- In case of using the ODU capacity control(capacity % control), SW2-1(ODU Capacity control #1, #2) setting is ignored.

Communications Module DIP Switches

SW1	SW2	SW3	SW4	COMM MODULE
				

The default settings of all DIP switches is "OFF"

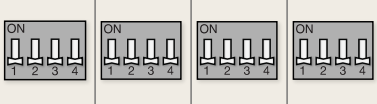
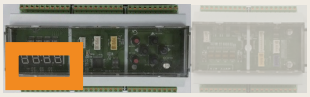
Table 12 - Default DIP Switch Settings for PAHCMS000 Comm Module

S/W name	No	Item	Setting		Note
SW1	1	ODU Type	Off	Multi V™ Comm	Using Multi V™ outdoor unit
	2	Control Type	On	Communication	Module Communication (it must be 'On', when Comm module is connected with Main Module, even if DDC controls Main Module by contract signal)
			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[1]	Off/Off	UI Setting #1	Not used
			Off/On	UI Setting #2	Not used
			On/Off	-	-
			On/On	-	-
SW3	1	Main/Sub	On	Sub mode	Not used
			Off	Main mode	Main 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™ Please refer to 'Table of SW4' in Return Air Temperature Control (PAHCMR000)

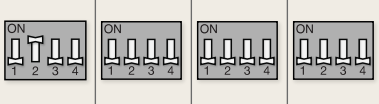
Table 13 - DIP Switch Settings Details for PAHCMS000 Comm Module

Do not change the reserved switch (It may malfunction).

DIP Switch Application with Thermostats – PAHCMS000

SW1	SW2	SW3	SW4	MAIN MODULE
				

The default settings of all DIP switches is “OFF”

SW1	SW2	SW3	SW4	COMM
				

The default settings of all DIP switches is “OFF”

Table 14 - Default DIP Switch Settings for PAHCMS000 Comm Module

MAIN Module DIP Switch		
S/W name	No	Setting
SW1	1	Off
	2	Off
	3	Off
	4	Off
SW2	1	Off
	2	Off
	3	Off
	4	Off
SW3	1	Off
	2	Off
	3	Off
	4	Off
SW4	1	Off
	2	Off
	3	Off
	4	Off

Communication Module DIP Switch		
S/W name	No	Setting
SW1	1	Off
	2	On
	3	Off
	4	Off
SW2	1	Off
	2	Off
	3	Off
	4	Off
SW3	1	Off
	2	Off
	3	Off
	4	Off
SW4	1	Off
	2	Off
	3	Off
	4	Off

Table 15 - Supply Air Kit (PAHCMS000) Application Using Third-Party Controller (DI and AI control)

NOTE: ODU Central control address must be set to “00”

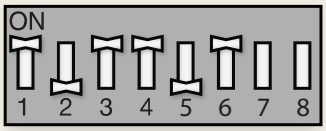
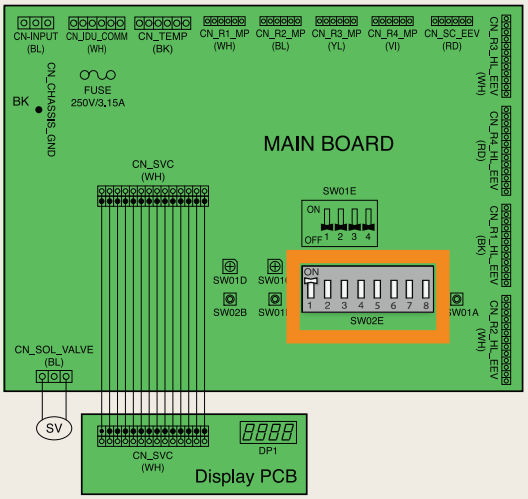
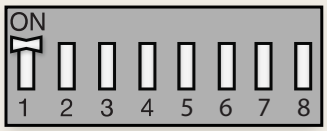
- ODU address and Comm module (right module) address must match eac other.
- The main module (left module) address is used for connecting BMS or LG central controller.
- The comm. module address is used for communicating with ODU for capacity control. If you set comm. module address “00”, also set ODU address “00”

  Ex.) ODU #1 (00) <----------> Comm. module #1 (00)

  ODU #2 (01) <----------> Comm. module #2 (01)
- Comm. Module (right module) default address is “00”
- Comm. Module (right module) address range is ”00”~”03”

AHU Communication Kit (Supply Air) PAHCMS000

DIP Switch Settings for Combining 3 HRU Ports

	SW02E	SW02E Port on PRHR033A
Setting for 3-Ports Combined	 Position 7 & 8 does not matter (ON/OFF)	
Manual Pipe Search	 Position 2 - 8 does not matter (ON/OFF)	

Note: Only manual pipe search can be done with this setting

Table 16 - SW02E Dip Switch

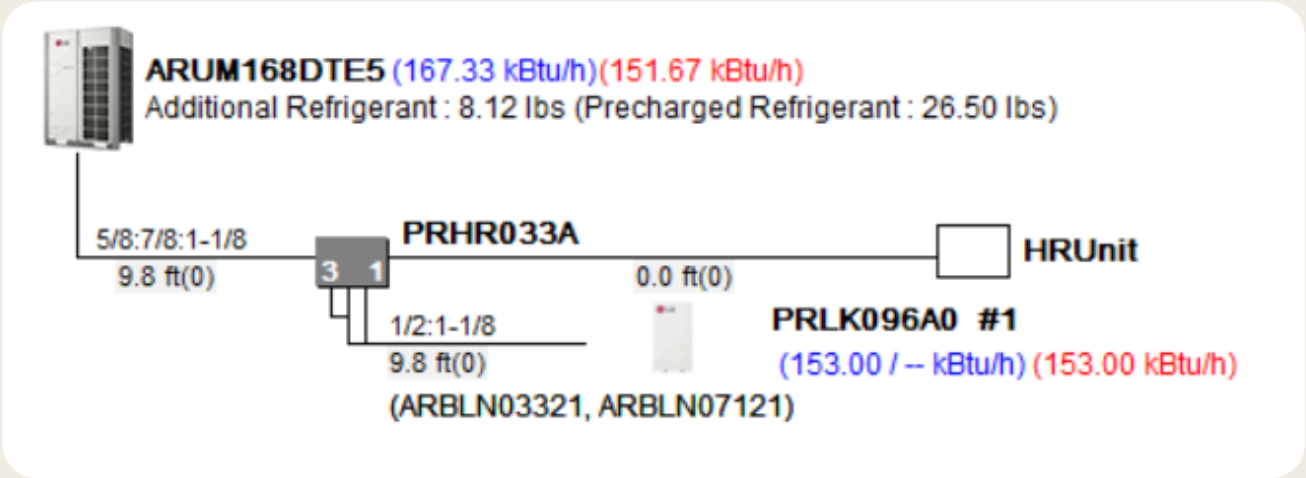


Figure 7 - LATS 3 HRU Port Diagram

Note: If all 3 ports of the HRU (PRHR033A) are piped together, the maximum capacity that HRU can deliver is 154 MBH.

Outdoor Unit Capacity Control Map

Target Pressure/Temperature Setting and ODU Capacity Control Map

Below tables are Function Code 8 ODU adjustments.

Multi V™ 5

Mode	Steps (Voltage)	% Full Load Capacity	Target Pressure (psi) & Target Temperature (°F)											
			Off (psi & °F)		OP1 (psi & °F)		OP2 (psi & °F)		OP3 (psi & °F)		OP4 (psi & °F)		OP5 (psi & °F)	
Cooling	1	100%	116.60	38.9	105.15	33.7	110.95	36.2	126.03	43.0	135.60	46.9	145.03	50.7
	2	90%	120.38	40.7	109.06	35.3	114.72	38.1	129.80	44.6	139.37	48.4	143.15	50.0
	3	80%	124.15	42.3	112.83	37.3	118.49	39.7	133.72	46.2	143.15	50.0	146.92	51.4
	4	70%	127.92	43.8	116.60	38.9	122.26	41.4	137.49	47.7	146.92	51.4	150.69	52.8
	5	60%	133.72	46.2	122.26	41.4	127.92	43.8	143.15	50.0	152.57	53.5	156.34	54.9
	6	50%	141.26	49.2	129.80	44.6	135.60	46.9	150.69	52.8	160.26	56.3	164.03	57.7
	7	45%	145.03	50.7	133.72	46.2	139.37	48.4	154.46	54.2	164.03	57.7	167.80	58.9
	8	40%	150.69	52.8	139.37	48.4	145.03	50.7	160.26	56.3	169.69	59.7	173.46	60.9

Table 17 - Multi V™ 5 Target Pressure/Temp Settings Cooling

Multi V™ 5

Mode	Steps (Voltage)	% Full Load Capacity	Target Pressure (psi) & Target Temperature (°F)											
			Off (psi & °F)		OP1 (psi & °F)		OP2 (psi & °F)		OP3 (psi & °F)		OP4 (psi & °F)		OP5 (psi & °F)	
Heating	1	100%	433.64	123.1	452.64	126.4	443.21	124.8	410.00	118.8	386.22	114.3	362.58	109.7
	2	90%	410.00	118.8	429.00	122.3	386.22	114.3	367.36	110.7	348.36	106.7	329.36	102.7
	3	80%	386.22	114.3	405.22	117.9	362.58	109.7	343.58	105.7	324.72	101.7	305.72	97.4
	4	70%	362.58	109.7	381.58	113.4	338.94	104.8	319.94	100.7	300.94	96.4	281.94	91.9
	5	60%	338.94	104.8	357.79	108.7	315.15	99.5	296.15	95.2	277.30	90.7	258.30	86.0
	6	50%	315.15	99.5	334.15	103.7	291.51	94.2	272.51	89.5	253.51	84.7	234.66	79.7
	7	45%	305.72	97.4	324.72	101.7	281.94	91.9	263.09	87.2	244.09	82.2	225.09	77.0
	8	40%	291.51	94.2	310.51	98.5	267.73	88.3	248.87	83.6	229.87	78.4	210.87	72.9

Table 18 - Multi V™ 5 Target Pressure/Temp Settings Heating

Multi V™ S

Mode	Steps (Voltage)	% Full Load Capacity	Target Pressure (psi) & Target Temperature (°F)											
			Off (psi & °F)		OP1 (psi & °F)		OP2 (psi & °F)		OP3 (psi & °F)		OP4 (psi & °F)		OP5 (psi & °F)	
Cooling	1	100%	116.60	38.9	101.38	31.9	107.18	34.7	122.26	41.4	131.69	45.4	139.37	48.5
	2	90%	120.38	40.7	105.15	33.7	110.95	36.2	126.03	43.0	135.60	46.9	143.15	50.0
	3	80%	124.15	42.3	109.06	35.3	114.72	38.1	129.80	44.6	139.37	48.5	146.92	51.4
	4	70%	127.92	43.8	112.83	37.3	118.49	39.8	133.72	46.2	143.15	50.0	150.69	52.8
	5	60%	133.72	46.2	118.49	39.8	124.15	42.7	139.37	48.5	148.80	52.1	156.34	54.9
	6	50%	141.26	49.2	126.03	43.0	131.69	45.4	146.92	51.4	156.34	54.9	164.03	57.7
	7	45%	145.03	50.7	129.80	44.6	135.60	46.9	150.69	52.8	160.26	56.3	167.80	58.9
	8	40%	150.69	52.8	135.60	46.9	141.26	49.2	156.34	54.9	165.92	58.6	173.46	60.9

Table 19 - Multi V S® Target Pressure/Temp Settings Cooling

Multi V™ S

Mode	Steps (Voltage)	% Full Load Capacity	Target Pressure (psi) & Target Temperature (°F)											
			Off (psi & °F)		OP1 (psi & °F)		OP2 (psi & °F)		OP3 (psi & °F)		OP4 (psi & °F)		OP5 (psi & °F)	
Heating	1	100%	433.64	123.1	452.64	126.4	410.00	118.8	391.00	115.3	372.00	111.6	353.15	107.7
	2	90%	410.00	118.8	429.00	122.3	386.22	114.3	367.36	110.7	348.36	106.7	329.36	102.7
	3	80%	386.22	114.3	405.22	117.9	362.58	109.7	343.58	105.7	324.72	101.7	305.72	97.4
	4	70%	362.58	109.7	381.58	113.4	338.94	104.8	319.94	101.0	300.94	96.4	281.94	91.9
	5	60%	338.94	104.8	357.79	108.7	315.15	99.5	296.15	95.2	277.30	90.7	258.30	86.0
	6	50%	315.15	99.5	334.15	103.7	291.51	94.2	272.51	89.5	253.51	86.2	234.66	79.7
	7	45%	305.72	97.4	324.72	101.7	281.94	91.9	263.09	87.2	244.09	82.2	225.09	77.0
	8	40%	291.51	94.2	310.51	98.5	267.73	88.3	248.87	83.5	229.87	78.4	210.87	72.9

Table 20 - Multi V S® Target Pressure/Temp Settings Heating

Multi V WATER® 5

Mode	Steps (Voltage)	% Full Load Capacity	Target Pressure (psi) & Target Temperature (°F)											
			Off (psi & °F)		OP1 (psi & °F)		OP2 (psi & °F)		OP3 (psi & °F)		OP4 (psi & °F)		OP5 (psi & °F)	
Cooling	1	100%	112.83	37.3	101.38	31.9	107.18	34.7	122.26	41.4	131.69	45.4	139.37	48.4
	2	90%	116.60	38.9	105.15	33.7	110.95	36.2	126.03	43.0	135.60	46.9	143.15	50.0
	3	80%	120.38	40.7	109.06	35.5	114.72	38.1	129.80	44.6	139.37	48.4	146.92	51.4
	4	70%	124.15	42.3	112.83	37.3	118.49	39.7	133.72	46.2	143.15	50.0	150.69	52.8
	5	60%	129.80	44.6	118.49	39.7	124.15	42.3	139.37	48.4	148.80	52.1	156.34	54.9
	6	50%	137.49	47.7	126.03	43.0	131.69	45.4	146.92	51.4	156.34	54.9	164.03	57.7
	7	45%	141.26	49.2	129.80	44.6	135.60	46.9	150.69	52.8	160.26	56.3	167.80	58.9
	8	40%	146.92	51.4	135.60	46.9	141.26	49.2	156.49	55.0	165.92	58.4	173.46	60.9

Table 21 - Multi V WATER® 5 Target Pressure/Temp Settings Cooling

Multi V WATER® 5

Mode	Steps (Voltage)	% Full Load Capacity	Target Pressure (psi) & Target Temperature (°F)											
			Off (psi & °F)		OP1 (psi & °F)		OP2 (psi & °F)		OP3 (psi & °F)		OP4 (psi & °F)		OP5 (psi & °F)	
Heating	1	100%	433.64	123.1	452.64	126.4	410.00	118.8	391.00	115.3	372.00	111.6	353.15	107.7
	2	90%	410.00	118.8	429.00	122.3	386.22	114.3	367.36	110.7	348.36	106.7	329.36	102.7
	3	80%	386.22	114.3	405.22	117.9	362.58	109.7	343.58	105.7	324.72	101.4	305.72	97.4
	4	70%	362.58	109.7	381.58	113.4	338.94	104.8	319.94	100.7	300.94	96.4	281.94	91.9
	5	60%	338.94	104.8	357.79	108.7	315.15	99.5	296.15	95.2	277.30	90.7	258.30	86.0
	6	50%	315.15	99.5	334.15	103.7	291.51	94.2	272.51	89.5	253.51	84.7	234.66	79.7
	7	45%	305.72	97.4	324.72	101.7	281.94	91.9	263.09	87.2	244.09	82.2	225.09	77.0
	8	40%	291.51	94.2	310.51	98.5	267.73	88.3	248.87	83.5	229.87	78.4	210.87	72.9

Table 22 - Multi V WATER® 5 Target Pressure/Temp Settings Heating

Communications and EEV kit Combinations

Combination Options

The table below shows the compatibilities of the communication kits with different outdoor units. The return air communication kit (PAHCMR000) and the supply air communication kit (PAHCMS000) are compatible with Multi V™ 5, Multi V S®, and Multi V WATER® 5.

Model		Multi V™ 5	Multi V™ S	Multi V WATER® 5
Communication Kit	PAHCMR000	✓	✓	✓
	PAHCMS000	✓	✓	✓

Table 23 - Comm Kit Compatibility with Outdoor Units

Figure 8 - Communication Kit Combination

EEV Kit Combination Ratio

Return Air Mixing - Traditional AHU (Maximum 25% Outside Air)

Combination	Total	AHU (RA Mixing)	Indoor Units	Expansion Kit Type
Pair (1 ODU to 1 AHU)	50 ~ 105%	~105%	-	EEV Kit
Multiple (1 ODU to multiple AHUs)	50 ~ 130%	~130%	-	EEV Kit
Multiple (1 ODU to multiple AHUs + indoor units)	50 ~ 130%	~50% (~100%, exclusively for Cooling only system)	~130%	EEV Kit

100% Fresh Air - DOAS (Dedicated Outside Air System)

Combination	Total	AHU (FAU)	Indoor Units	Expansion Kit Type
Pair (1 ODU to 1 AHU)	50 ~ 105%	~105%	-	EEV Kit
Multiple (1 ODU to multiple AHUs)	50 ~ 105%	~105%	-	EEV Kit
Multiple (1 ODU to multiple AHUs + indoor units)	50 ~ 105%	~50%	~105%	EEV Kit

Table 24 - EEV Kit Combination Ratio

Note: Combination ratio (%) = Sum of total capacity index / Outdoor unit rated cooling capacity

1. To use "Return Air Mixing" table, the 'on coil air temperature' should be within the operating range of indoor temperature. (Cooling : under 68 F WB. / Heating : over 59F DB.)
2. If the 'air on coil' have fresh air intake , the combination ratio should be complied with the "100 % Fresh Air" table.
3. In case of Hot Gas Reheat application, above AHU and IDU combination does not apply, and Indoor unit is Not allowed to be connected in the system.
4. In case of mixing AHU + Indoor unit, engineer must follow the above table combination % and contact application engineer for approval if over 50% combination is required on some projects. LATS does not pass the system if rules in the table are not followed.

System Architecture Examples

Return Air Control: 1-ODU System + 1 AHU (1 coil) + Controls

- LG thermostats with AHU conversion kit can only do single setpoint
- LG thermostats with AHU conversion kit cannot do auto switchover mode

1. 1-ODU System + 1 AHU (1 coil) + LG Control

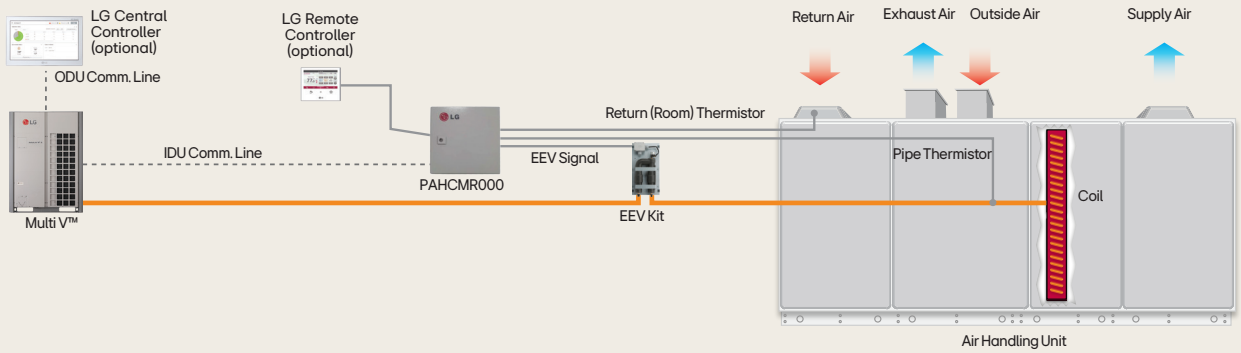


Figure 9 - ODU System + 1 AHU (1 coil) + LG Control

- 1 ODU can be connected with multiple EEV kits
- One EEV Kit for every one Communicatin Kit

2. 1-ODU System + 1 AHU (1 coil) + DDC (Modbus)

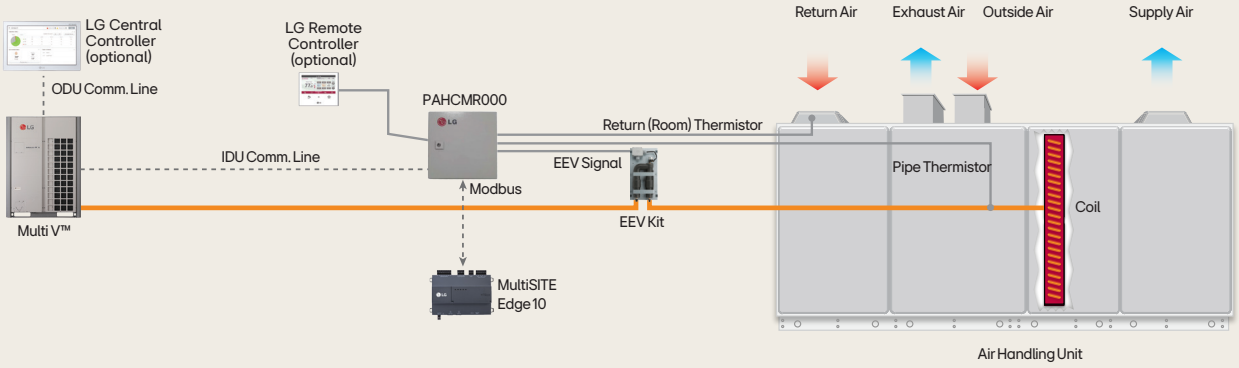


Figure 10 - 1-ODU System + 1 AHU (1 coil) + DDC (Modbus)

- 1 ODU can be connected with multiple EEV kits
- One EEV Kit for every one Communicatin Kit
- LG Remote Controller and LG Central Controller are optional for monitoring only

Modbus® is a registered trademark of SCHNEIDER ELECTRIC USA, INC.

Return Air Control: 1-ODU (Multi-Frame) System + 1 AHU (2 coil) + Controls

- LG thermostats with AHU conversion kit can only do single setpoint
- LG thermostats with AHU conversion kit cannot do auto switchover mode

1. 1-ODU System + 1 AHU (2 coils) + LG Control

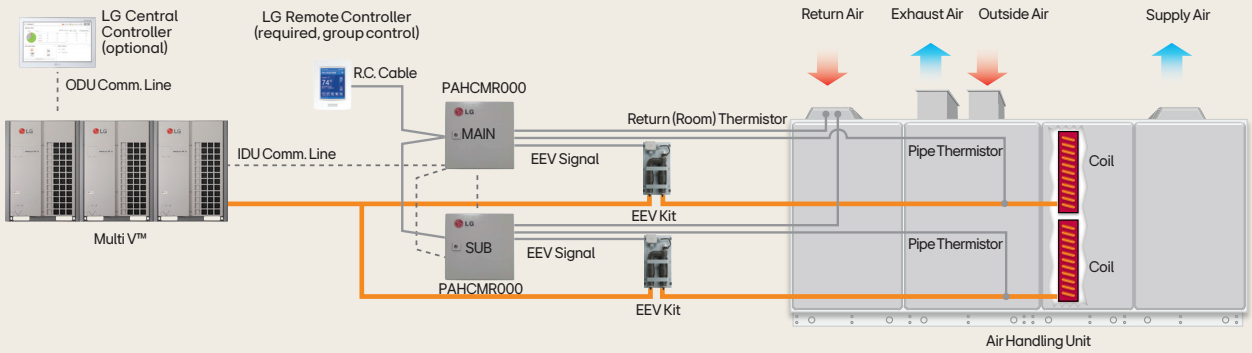


Figure 11 - 1-ODU (Multi-Frame) System + 1 AHU (2 coils) + LG Control

- 1 ODU can be connected with multiple EEV kits
- One EEV Kit for every one Communicatin Kit are necessary for each coil
- Group control of coils is needed normally

2. 1-ODU (Multi-Frame) System + 1 AHU (2 coils) + DDC (Modbus)

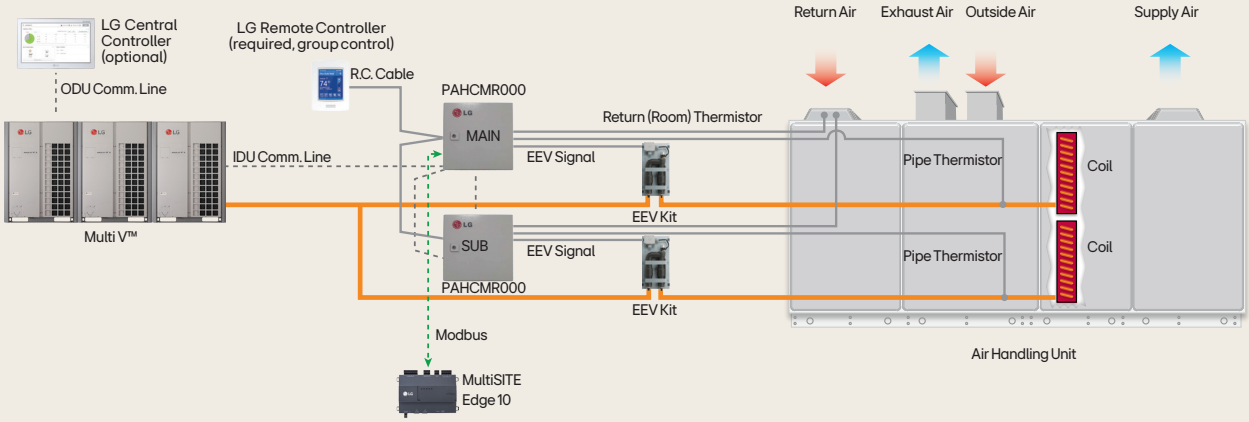


Figure 12 - 1-ODU (Multi-Frame) System + 1 AHU (2 coils) + DDC (Modbus)

- 1 ODU can be connected with multiple EEV kits
- One EEV Kit for every one Communicatin Kit are necessary for each coil
- Group control of coils is need normally

NOT Possible: Supply air control: 1 ODU + AHU kit/coil + IDU's (Traditional VRF connected to IDU not allowed in this application)

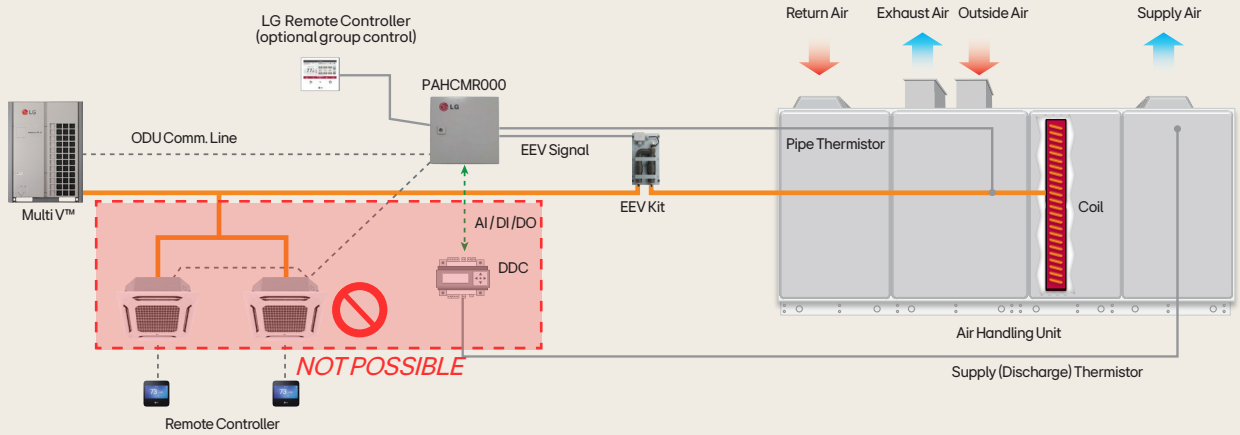


Figure 13 - Supply Air Control – 1-ODU System + 1 AHU (1 coil) + IDU's

- Supply air temperature control kit adjusts pressure (or AHU coil temperature)
- IDU capacity could be changed when supply air control kit controls AHU

Discharge Air Control: 1-ODU (Multi-Frame) System + 1 AHU (2 coils) + I/O Module + DDC Control

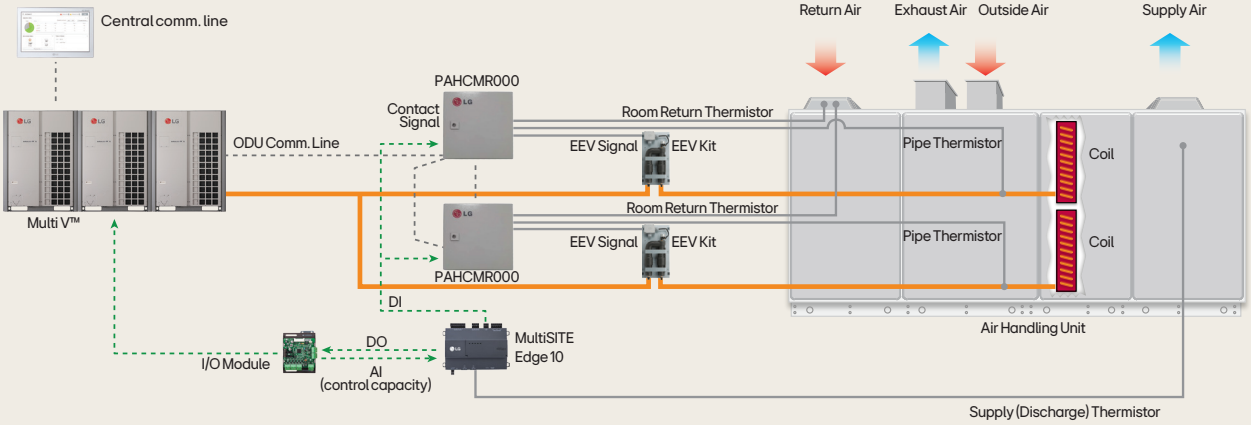


Figure 14 - Supply Air Control – 1-ODU (Multi-Frame) System + 1 AHU (2 coils) + I/O Module + DDC Control

- I/O Modules (PRVC2 and PWFCKN000) have capacity control feature built-in
- LG Central controller can be connected to ODU

Discharge Air Control: 2-ODU (Multi-Frame) System + 1 AHU (2 coils) + I/O Module + DDC Control

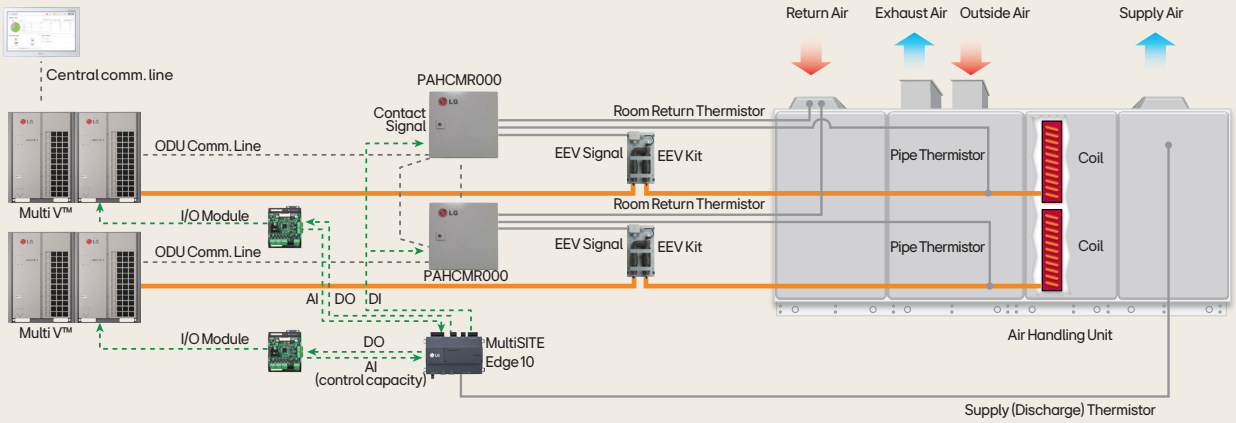
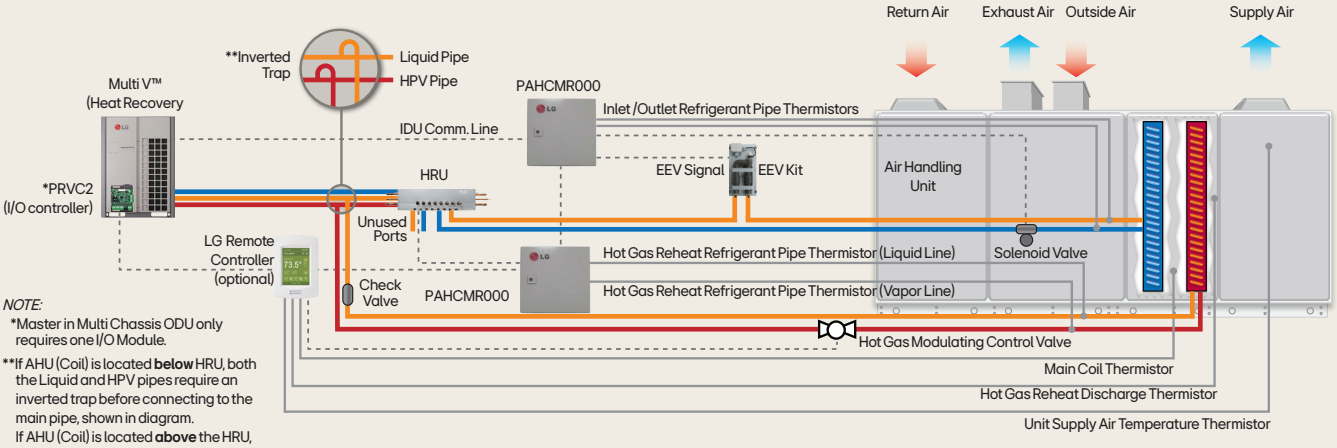


Figure 15 - Supply Air Control –2-ODU (Multi-Frame) System + 1 AHU (2 coils) + I/O Module + DDC Control

- I/O Modules (PRVC2 and PWFCKN000) have capacity control feature built-in
- Each ODU needs separate I/O Modules
- Only (1) DDC controller is required and can send out separate 0-10 volt signals to each I/O Module
- LG Central Controller can be connected to ODU

Dehumidification Application - Hot Gas Reheat System Piping Diagram



NOTE:
*Master in Multi Chassis ODU only requires one I/O Module.
If AHU (Coil) is located **below HRU, both the Liquid and HPV pipes require an inverted trap before connecting to the main pipe, shown in diagram.
If AHU (Coil) is located **above** the HRU, both Liquid and HPV pipes connect directly from top to the main pipe without inverted trap.

Figure 16 - Supply Air Control – 1-ODU System + 1 AHU (2 coils)

Dehumidification Application: Rule applies to Hot Gas Reheat Coil Selection and operation

1. Maximum total Reheat capacity demand should not exceed 25% of ODU capacity (Ensure the combination ratio remains at 100%, accounting for both the reheat and main coil capacities together).
2. Hot gas reheat coil selection must follow the heating coil refrigerant design parameters).
3. Refrigerant Pressure Drop for Reheat coil (HGRH): Under all operating conditions, the minimum refrigerant pressure drop should be 5 psi. (Target design value 7 psi).
4. When the humidity levels in the space require humidity control, the leaving air temperature should ideally be set to a "neutral air temperature," meaning it should be close to the desired room temperature, typically around 72°F, to avoid overcooling or overheating a space when the air is delivered. Thus, HGRH coil should be design to deliver neutral conditions (72°F to 75°F).

Example AHU Kit for Large AHU

Components Required

- LG Wired Controller
- PAHCMR000 Communication Kit
- EEV Kit
- Multi V™ ODU
- Third-Party AHU

Selecting in LATS HVAC

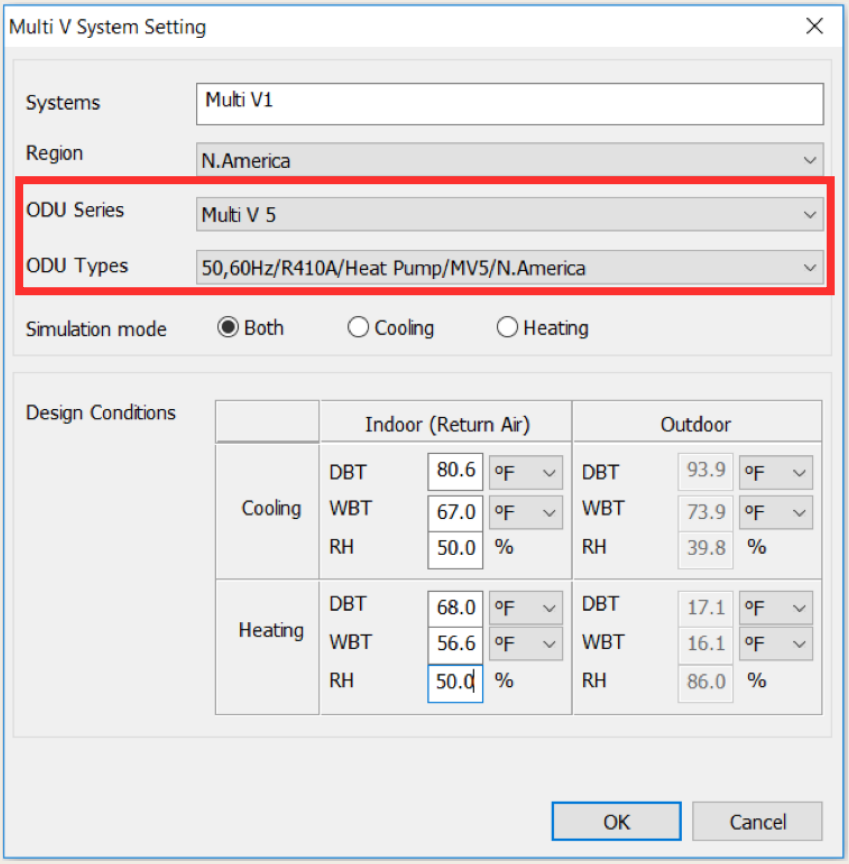


Figure 17 - Selecting ODU Series

When creating your LATS HVAC project, make sure to choose a Multi V™ Outdoor Unit.
Note that PAHCMS000 Units are only compatible with heat pump systems.

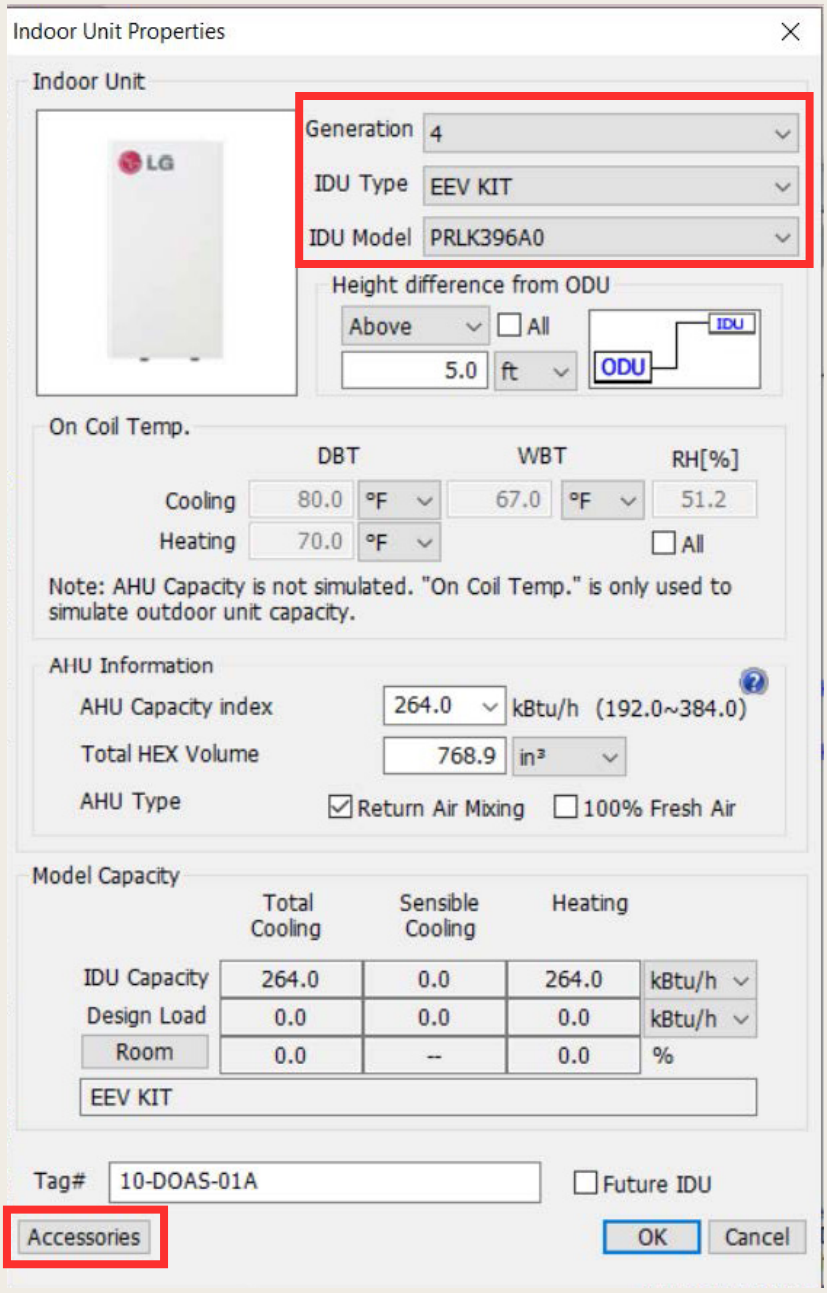


Figure 18 - Selecting EEV Kit

1. After getting a coil selection from the coil manufacturer, select an EEV kit with the default return air temperatures (80°F DB/67°F WB for cooling, 70°F DB for heating).
2. Next, select AHU capacity index to match the total cooling capacity and volume from the coil manufacturer.
3. LATS HVAC is not able to simulate AHU coil entering air conditions and can only be used for sizing the ODU and pipe for AHU kits.

After selecting the EEV Kit, click on "Accessories" to add the Comm. Kit and thermostat

AHU Conversion Kit for Small AHU

Components Required

- PAHCMR000 Communication Kit (Return Air)
- EEV Kit
- Multi V™ ODU
- LG wired controller
- Third-Party AHU

Selecting in LATS HVAC

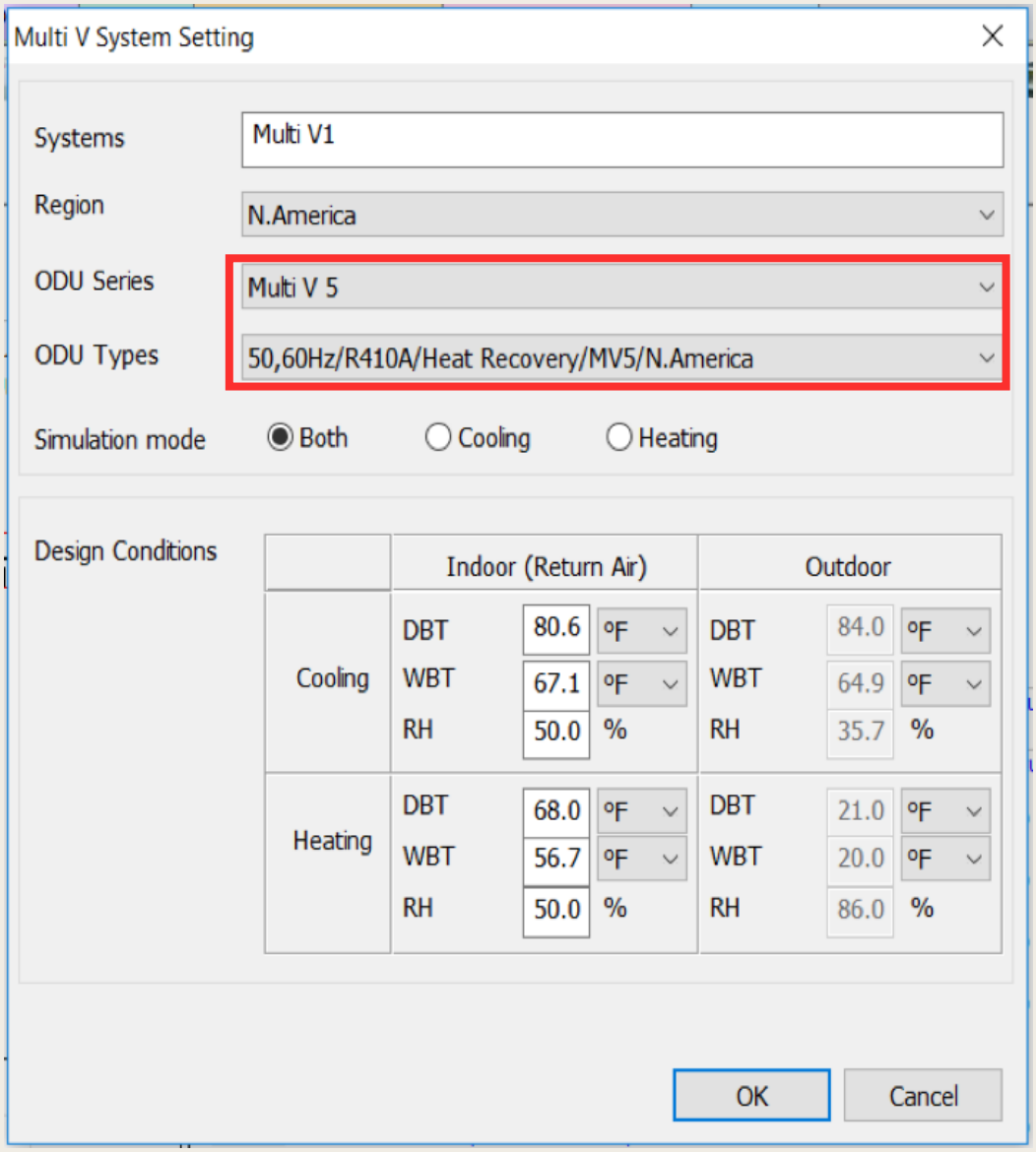


Figure 19 - Selecting Multi V™ Outdoor Unit

When creating your LATS-HVAC project, make sure to choose a Multi V™ Outdoor Unit.
Note: PAHCMR000 communication kit only compatible with two EEV kit models in Heat Recovery application: PRLK048A0 AND PRLK096A0

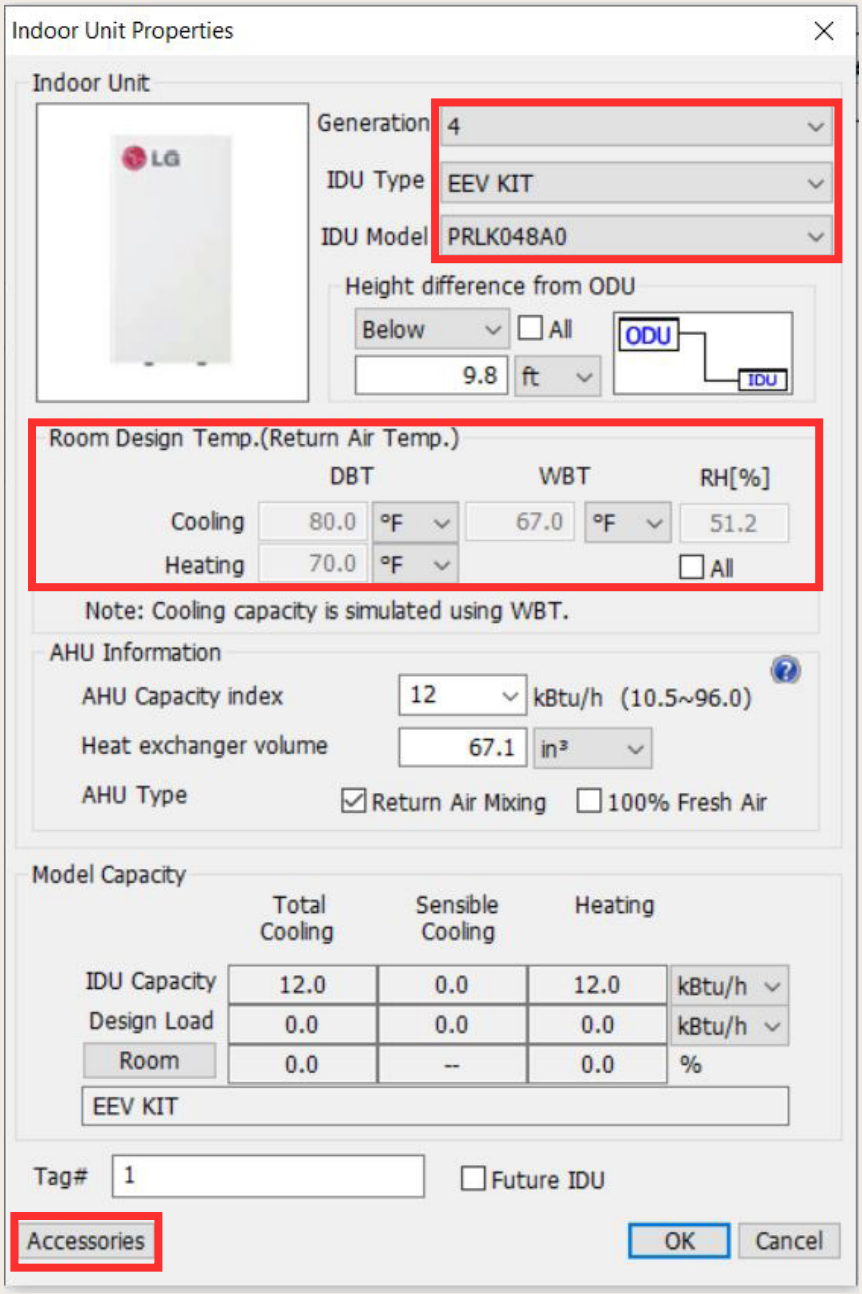


Figure 20 - Selecting EEV Kit

When selecting an indoor Unit, choose "EEV Kit" under IDU Type.

For Heat Recovery system, only two EEV Kit options available (PRLK48A0 and PRL096A0)

80°F / 67°F WB in cooling and 70°F in heating must always be used for return air temperatures

After selecting the EEV Kit, click on "Accessories" to add the Comm. Kit and thermostat

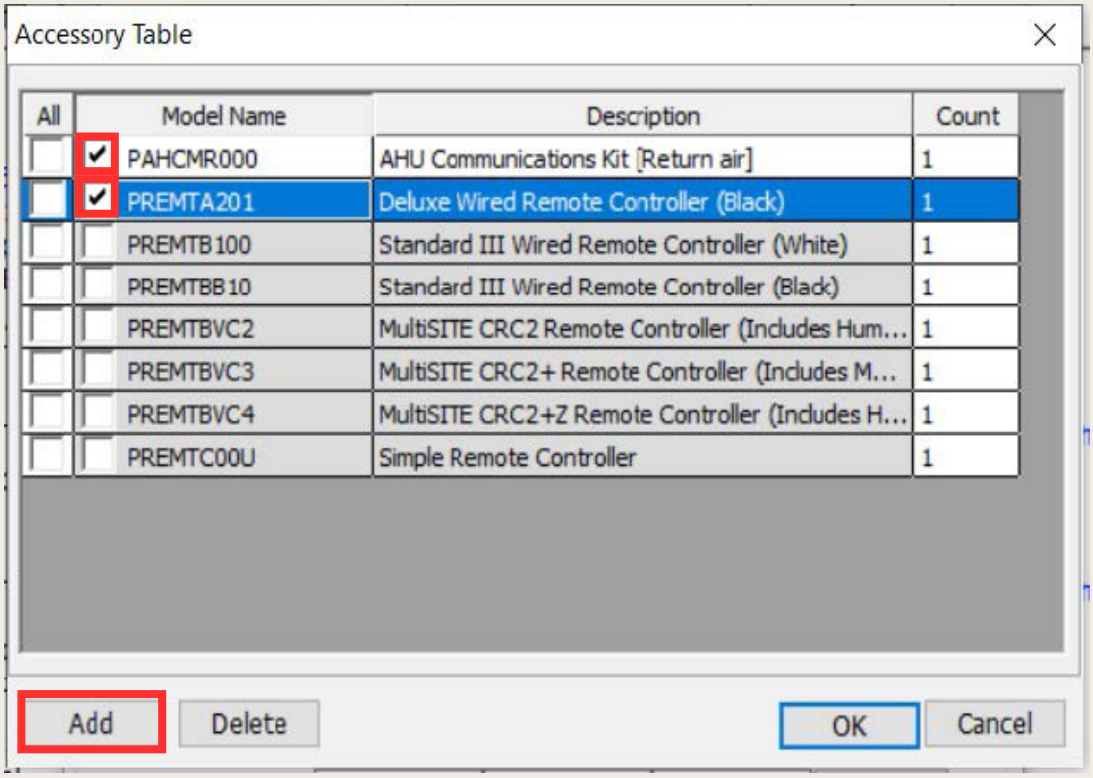


Figure 21 - Selecting Comm Kit for Wired LG Controllers

Choose the PAHCMR000 as the communication kit and one of the LG wired controllers, then click "Add" and "Ok".

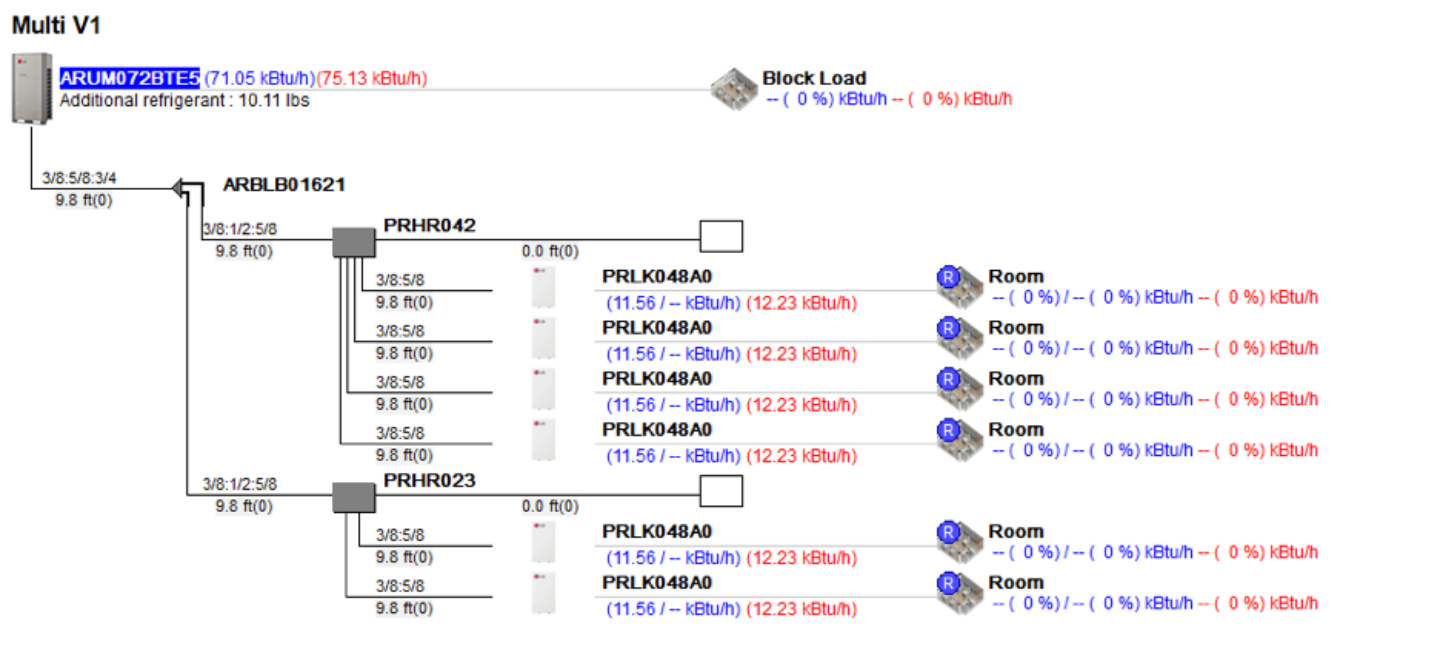


Figure 22 - LATS Example of Small AHU System

Here's an example of a Small AHU system in LATS-HVAC. The combination ratio should follow the rules in the combination ratio table ("Table 24 - EEV Kit Combination Ratio" on page 27).

AHU Conversion KIT Application Support

The engineering and selection of refrigerant coils are the responsibility of the LG Applied Representative or Distributor. The information provided herein is intended solely as a reference to assist with coil selection.

All final selections must be reviewed and approved by the coil manufacturer to ensure their suitability for the intended purpose and application.

The following pages outline **application support** for AHU-KITs, as well as the responsibilities of our business associates. We strongly recommend completing the steps detailed in this guide before ordering equipment, coils, valves, controllers, and related accessories.

The implementation of all AHU-KITs, including the selection of LG and non-LG components, is the responsibility of the LG Applied Representative or Distributor.

Design Required Considerations:

1. Ensure compliance with the specified design conditions and desired modes of operation.
2. Select an appropriate outdoor unit that is fully compatible with the AHU Kit(s).
3. Clearly define the desired sequence of operation for the AHU Kit application.
    a. Constant volume or variable air volume
    b. 100% outside, mixed, or recirculated air
4. Understand and evaluate the available control methods:
    a. Discharge leaving temperature, return air temperature, or room temperature
    b. LG control systems or third-party DDC control systems
5. Possess the necessary expertise to competently engineer refrigeration coils.
6. Select and arrange cooling, heating, and reheat coil banks to ensure compliance with all required parameter limitations and operational specifications:
    a. Match capacity and other mechanical design conditions
    b. Ensure proper coil face velocity and airflow distribution
    c. Match coil circuiting options based on application and sequence of operation
    d. Account for refrigerant pressure drops
    e. Ensure subcooling and superheat levels are suitable for proper heat pump operation
    f. Pair the EEV kit with the selected coil circuit(s)
    g. Confirm the system combination ratio does not exceed 100%
    h. Verify that the reheat coil load does not exceed 25% of the outdoor unit's corrected cooling capacity

7 Create accurate LATS HVAC Model

   a. Review physical arrangement of coils versus LATS HVAC layout system tree diagram

   b. The heating capacity of the reheat coil must match the specified reheat load

   c. Select reheat coils (and heating coils) with a minimum temperature of 100°F

   d. LATS currently does not support the Hot Gas Reheat (HGRH) piping method. Therefore, LATS must include an extra HRU dedicated to the reheat coil, allowing LATS to calculate the trim charge based on the HGRH coil volume. Contact a Product Support Engineer to provide a detailed piping diagram that indicates the location of piping before the HRU (Heat Recovery Unit).

   e. LATS will not model all LG-approved reheat coil piping strategies. In such cases, model the application in LATS by piping the coil to an HRU.

8. Ensure VRF system pipe segment sizes comply with LATS-specified pipe diameters and piping details.
9. Coil control strategies should reside within LG control products. For assistance, contact your designated Control Solution Manager. LG is committed to supporting AHU KIT applications and recommends conducting a systematic review of the application.

All pertinent information associated with the AHU KIT application shall be communicated to the designated Control Solutions Manager. The LG Applied Representative or Distributor shall submit the following documentation if available:

- Preliminary project scope and type of AHU KIT application
- LATS-HVAC file
- Mechanical equipment drawings associated with AHU
- Design drawings pertinent to the AHU KIT application
- LG Applied Representative sales engineer point of contact

AHU KIT Application Support Contacts

Design of the AHU-KIT application shall be reviewed by LG Application Engineers and control strategy reviewed-discussed with the designated Control Solutions Manager.

AHU-KIT Product Support

- Mike Mehrvarz
  ✉ mike.mehrvarz@lge.com

Control Solutions Managers

- North-West Central (David Spence)
  ✉ david.spence@lge.com
  ✆ (224) 575-2029
- East (Michael Whitford)
  ✉ michael.whitford@lge.com
  ✆ (678) 832-8790
- Southwest (Chris Morgan)
  ✉ chris.morgan@lge.com
  ✆ (469) 967-2318

Coil Design Parameters

AHU Module – Design Tips (Do's)

Things to review before designing a coil for heat pump operation since it will impact the coil circuiting:

1. Is the AHU a VAV AHU or constant volume? Most important to know.
2. What is the minimum LOAD for cooling shoulder season and the MINIMUM load for heating in the shoulder season? (i.e. how much turn-down in coil capacity will be needed)
3. Is the entering and leaving air temperature to/from each coil constant or does it vary?
4. Is the Application 100% OA or mix of OA and return air?
5. Is it a constant volume or VAV fan?
6. What are the minimum airflow settings on VAV boxes connected to the duct system (as a % of design airflow)?
7. Coil pipe connection diameter (cooling suction, hot gas heating/reheat) should match LATS tree diagram specified diameter.

LG does not manufacture Third-Party DX coil.**

- Number of rows, fins per inch, coil area, coil velocity and distributor design are determined by coil manufacturer or specifying engineer based on performance requirements and LG's design parameters
- Minimum coil entering temperature is 41°F for heating mode. Apply the application design conditions to size the coil to deliver the required design capacity. Make sure that the coil is selected in accordance with the coil parameters and refrigerant conditions outlined in page 41 & 42
- Sizing can be done based on cooling or heating requirements

  Note: Select the appropriate EEV kit by applying the designed coil volume (in^3) and pick the EEV model matches the volume table 2 on page 11
- Refrigerant Pressure Drop (RPD) in Cooling or Heat Pump Application

  1. Cooling only: RPD across coil range is 7.5 to 17.5 psi (RPD does not include nozzle/distributor)
  2. Heat Pump coil - Dual temperature control: First deign the DX coil (Evaporator) around 17.0 psi PD (RPD does not includes nozzle/distributor). Then design the same coil as a condenser coil (heating mode) with minimum PD of 5.0 psi
- Cooling (DX coil) Target RPD: Maximum 17.0 psi*
- Heating (Condenser) Target RPD: Minimum of 5.0 psi*

Consult with coil manufacture to meet the values by changing the coil circuiting and other coil characteristic such as Tube diameter. Recommended tube diameter is 3/8" and if the coil selected for a too large capacity coil, engineer may need to break down the capacity to smaller capacity per circuit in order to maintain the tube diameter in 3/8".

***** LG is NOT responsible for the selection of any third-party product (AHU) installed using this guide. Refer to the third party product selected for pertinent manufacturers' documentation for, but not limited to, proper sizing, coil selection, material selection, installation guidance, startup, warranty terms and conditions.***

Recommended Third-Party Coil Sizing Parameters:

Cooling Mode

- Evaporator Saturation Suction Temperature (SST) for coil is 43°F*
- Target Superheat Across Coil is 8°F
- Condensing (liquid) temperature for coil sizing is 100°F - 108°F

**If SST selection not possible at this value contact LG representative for option available in Function Code 8 Table to adjust target SST setting.*

Heating Mode

- Saturated Condensing Temperature (SCT) for coil range is 122°F
- Target Subcooling Across Coil is 20°F
- Standard minimum coil entering air temperature is 41°F for heating mode
- For 23°F to 41°F see LG product development bulletin #092920A
- Coil tube sizes should be 3/8" or 1/2" (Fisrt choice to design DX coil is 3/8"tube diameter)
- Coil volume should be within LG's minimum and maximum limits for a give capacity (see "Table 2 - Third Party DX Coil Min/ Max Volume per EEV Model" on page 11)
- Coil volume data is needed from coil manufacturer to calculate refrigerant trim charge amount
- Coil distributor and nozzle should be designed for equal distribution of refrigerant
- Pipe sizing rules are same rules as the connected ODU (see ODU Engineering Manual or updated LATS version)
- Maximum recommended combination ratio is 100% (see "Table 24 - EEV Kit Combination Ratio" on page 27)
- EEV Kits are not weather proof and must be protected from rain, snow, etc.
- See diagram for Pipe in sensor location

Field Supply Sensors (Thermistor)

Installation Instructions: First temperature sensor should be installed behind the distributor on the coldest pass of the DX coil (liquid line). Second temperature sensor should be install at the outlet of DX coil (Suction line). Both sensors must be properly secured and insulated.

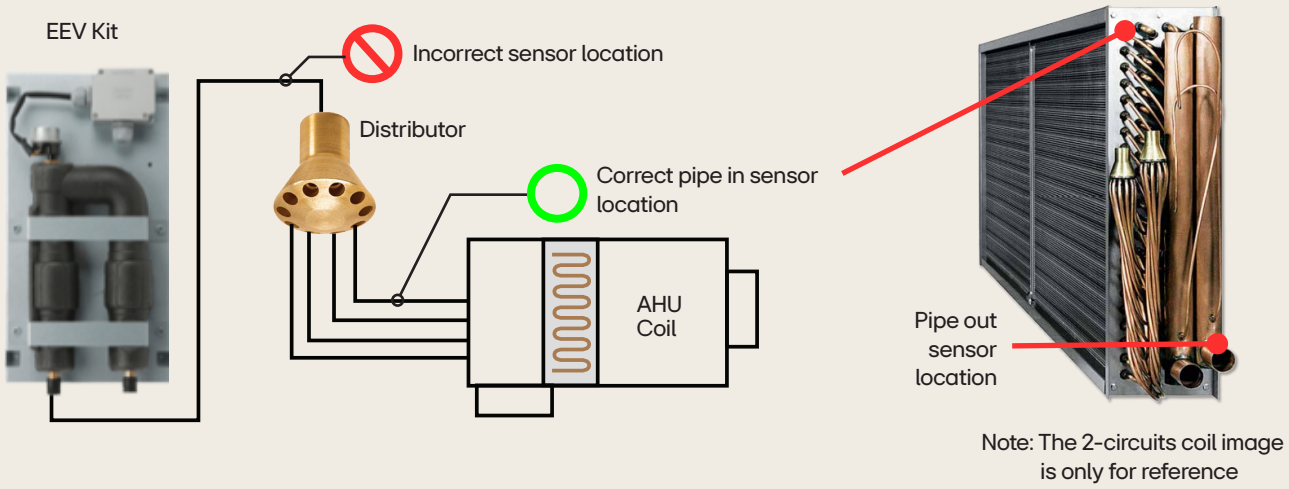


Figure 23 - Correct Pipe Sensor Location

AHU Module — Design Tips (Dont's)

- Do not design AHU coil**
- Rows, fins per inch, coil area, coil velocity are determined by coil manufacturer or specifying engineer
- Do not directly connect AHU fan motor (load) to AHU Comm Kit
- Fan motor control center (relays or starter) is required
- Do not exceed outdoor design temperature limits for outdoor units
- 14°F minimum outdoor temperature for simultaneous operation of Multi V™ 5
- 60°F maximum on heating mode
- Do not exceed air velocity of 550 FPM (feet per minute) to avoid blow off of condensate water into airstream

*** LG is NOT responsible for the selection of any third-party product (AHU) installed using this guide. Refer to the third party product selected for pertinent manufacturers' documentation for, but not limited to, proper sizing, coil selection, material selection, installation guidance, startup, warranty terms and conditions.*

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.

AHU Module DX Coil Sizing Parameters — Cooling

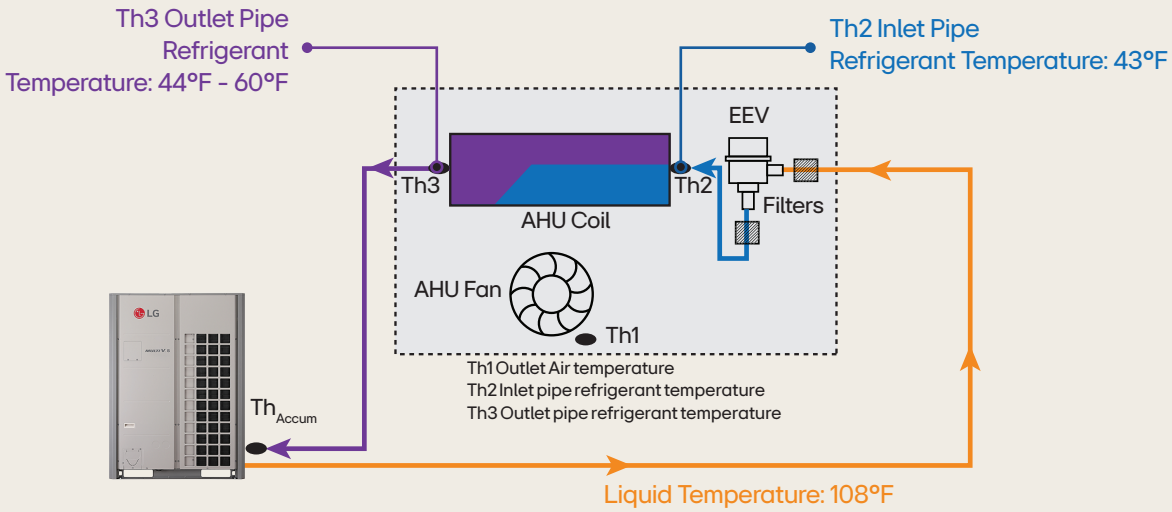


Figure 24 - System Performance in Cooling Mode

- The EEV pulses to maintain a constant superheat across the Indoor coil. Depending on Third-Party coil design and ambient conditions, the superheat may change.
- **Superheat(Cooling Mode) =**
  Outlet Pipe Refrigerant Temperature (Th3) — Inlet Pipe Refrigerant Temperature (Th2) = Target Value 8°F
- **Use 108°F** as the coil selection entering liquid temperature for ALL coil selections.

AHU Module DX Coil Sizing Parameters — Heating

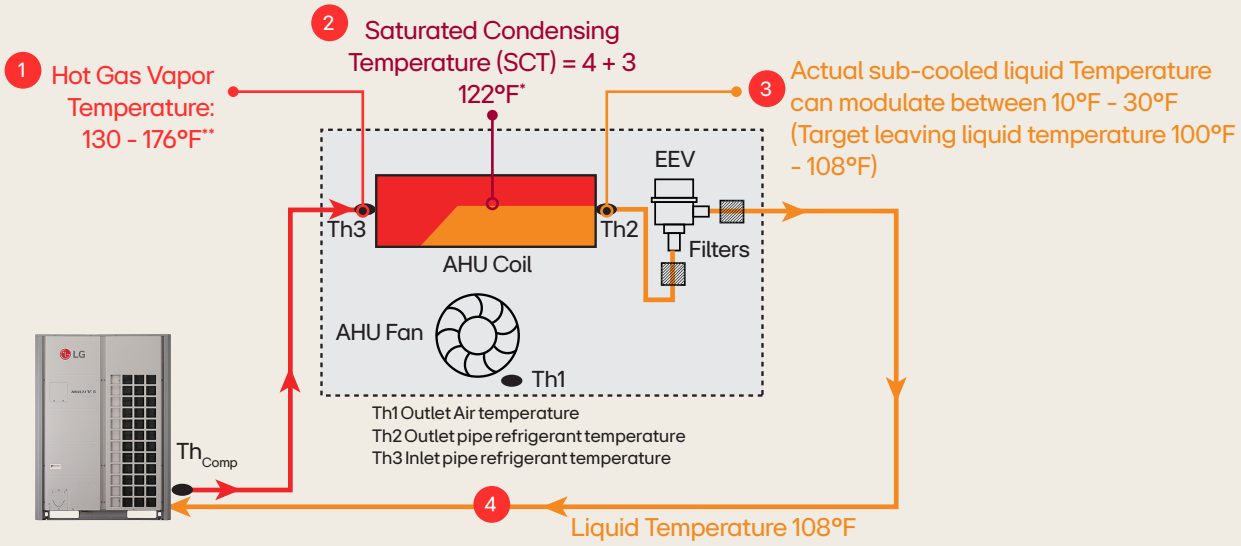


Figure 25 - System Performance in Heating Mode

*SCT is obtained by taking 100°F liquid temperature (set value) and adding sub-cooling value (varies). Use 20°F for selections.

**Suggestion to use 160°F at full load and 130°F at minimum unload coil design to be conservative (Range is 130°F - 176°F)

- The EEV pulses to maintain a constant subcooling across the Indoor coil. Depending on Third-Party coil design and ambient conditions, the superheat may change.
- Sub-cooling (Heating Mode) = Saturated Condensing Temp (SCT) – Leaving Liquid Temp(Th2) = Target Value 20°F
- Airflow (CFM) over the coil must match with coil selection. Air balance is critical to have the system cycle work properly.

Heating Coil Selections Notes:

- Use 108°F as the target leaving liquid temperature and 122°F condenser temperature for ALL coil selections.
- If Entering Air Temperatue (EAT) is above 59°F the coil selection software will produce a coil selection that will have a leaving liquid temperature between 108°F - 100°F with 14°F - 22°F subcooling
- If EAT is below 59°F the coil selection software will produce a coil selection that will have a leaving liquid temperature between 105°F - 95°F with 17°F - 27°F subcooling
- When selecting a coil at the design heating condition and maximum design air flow, use a value of 160°F for superheated vapor temperature in selection software and value of 14-22 degrees of sub-cooling. A successful full load coil selection will produce the specified LAT, at specified airflow rate and the leaving liquid temperature will be between 100°F and 108°F and the sub-cooling will be between 14 and 22 and refrigerant pressure drop at least 5.0 PSI.
- After successfully selecting the coil at design heating conditions, check to make sure the refrigeration circuit operates at lowest part load condition. To do this, keep the exact same physical parameters of the coil selected set the superheated vapor temperature at 130F° and set sub-cooling value at the same for the full load condition selection. A successful min load coil selection will produce the specified LAT (and not higher than), at the unloaded coil airflow rate and the leaving liquid temperature will be between 100°F and 108°F and the sub-cooling will be between 12 and 20 and refrigerant pressure drop at least 5.0 PSI.
- **Note 1:** If the entire face of the coil is active, the maximum airflow rate turn-down is 60% of full airflow.
- **Note 2:** In the case of VAV AHU coils, obtain the minimum Airflow setting for the VAV boxes that are connected to AHU system

Guide for application which AHU coil Entering Air Temperature is Lower than 41°F

Strategies to consider when the entering air temperature is between 23°F to 41°F

- Preheat entering air with an ERV or heating coil
- Mixed outdoor air with return air to raise the coil entering temperature
- Add a gas furnace or electric heating section to the AHU to provide heat in lieu of the DX coil

Guide to design system if above strategies not possible and entering air twemperature is between 23°F to 41°F

- AHU coil design airflow rate above 41°F max load ratio = 100%
- AHU coil design airflow rate below 41°F max load ratio not to exceed 50%
- To reduce the load ratio to 50% increase the ODU capacity to achieve a load ratio to not exceed 50% when the entering air temperature is less than 41°F (Air-source products) or the entering water temperature is less than 55°F (water source products). Optionally, to achieve the 50% limit on load ratio requirement, air handlers equipped with fan speed control may be slowed to achieve a maximum airflow rate that is half the design day rate AND maintain a coil face velocity of at least 300 FPM simultaneously.
- Where Load Ratio = Sum of IDU corrected capacity / ODU corrected capacity

Wiring Terminations

Supply Air Communication Kit - PAHCMS000

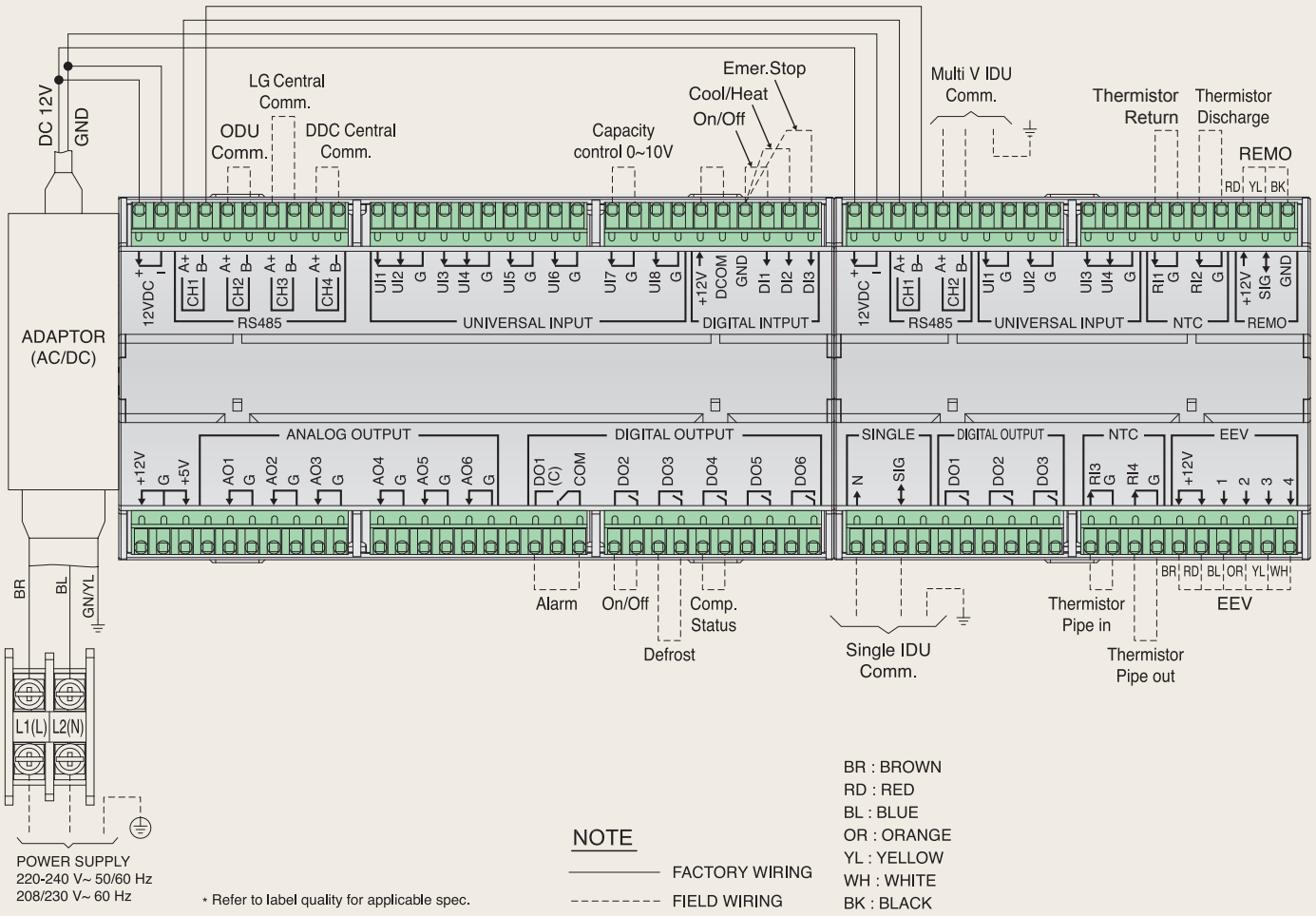
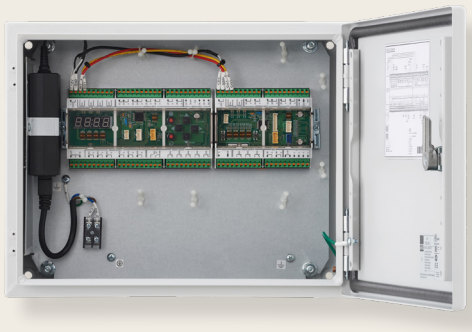
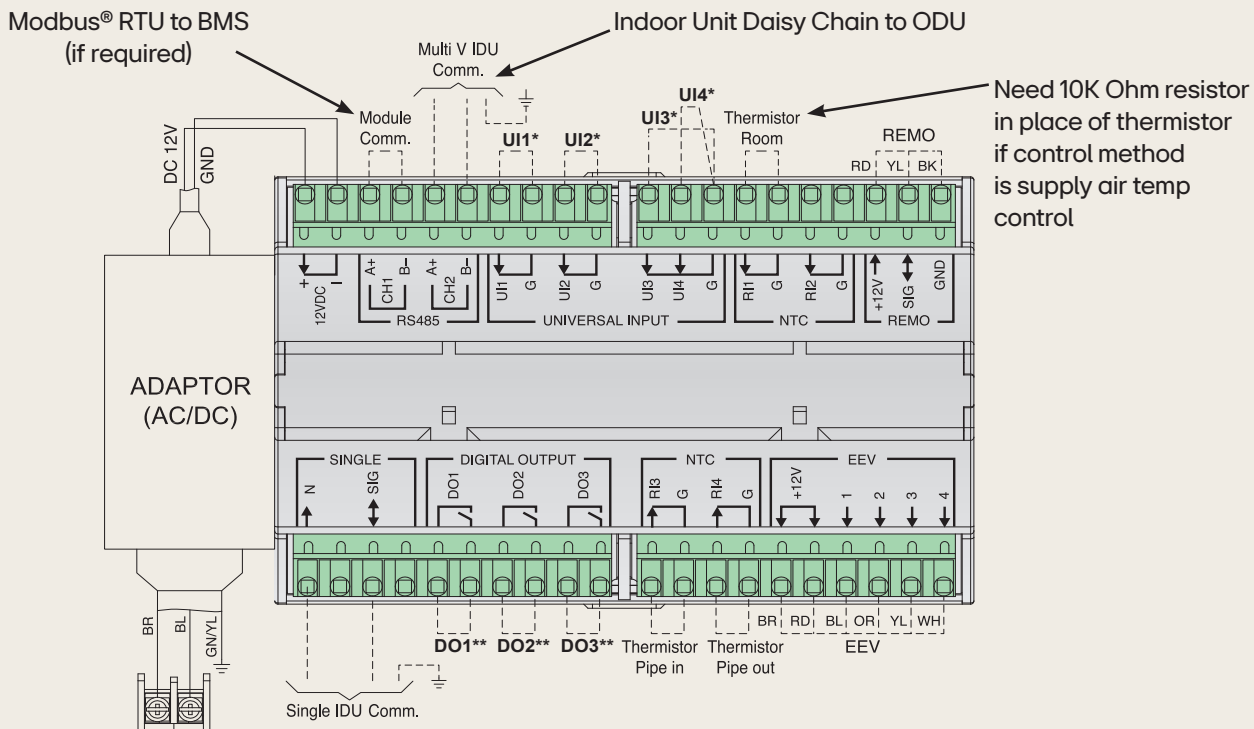


Figure 26 - PAHCMS000 Wiring



Return Air Communication Kit — PAHCMR000



* Set the UI1, UI2, UI3, and UI4 ports DIP switches as appropriate for your system

SW2 3/4	UI Setting	Off/Off	UI Setting #1	UI1 : Operation On/Off UI2 : Heating/Cooling UI3 : Forced Thermo On/Off UI4 : Target air temperature
		Off/On	UI Setting #2	UI1 : Operation On/Off UI2 : Cooling only/Off UI3 : Heating only/Off UI4 : Forced Thermo On and Off

** Set the DO1, DO2, and DO3 ports DIP switches as appropriate for your system

SW1 3	DO Type	On	Fan speed	DO1 : High DO2 : Middle DO3 : Low
		Off	Status	DO1 : On/Off *** DO2 : Defrost DO3 : Alarm

*** This output can be used to start/stop an AHU single-speed fan

Figure 27 - PAHCMR000 Wiring

- **Return Control** — Use return sensor or room button sensor input — DS2 = ON
- **Space Temperature Control** — Use LG remote in space — DS2 = ON
- **Contact Input Control** — Use BMS with external contact closure inputs — DS2 = OFF
- **Supply Air Control** — DS2 = ON
  - Use 1 — PRVC2 per main chassis in air source ODU
  - Use 1 — PWFCKN000 per main chassis in water source ODU
- **Modbus® Control** — Direct connect Modbus RTU to each RA module — DS2 = ON
- **BACnet® Control** — LG Gateway required for control & monitoring of IDU and ODU points — DS2 = ON

Field Wiring

Correct Wiring a 32-ton triple EEV kit (PRLK594AO) to a Return or Supply Air Kit

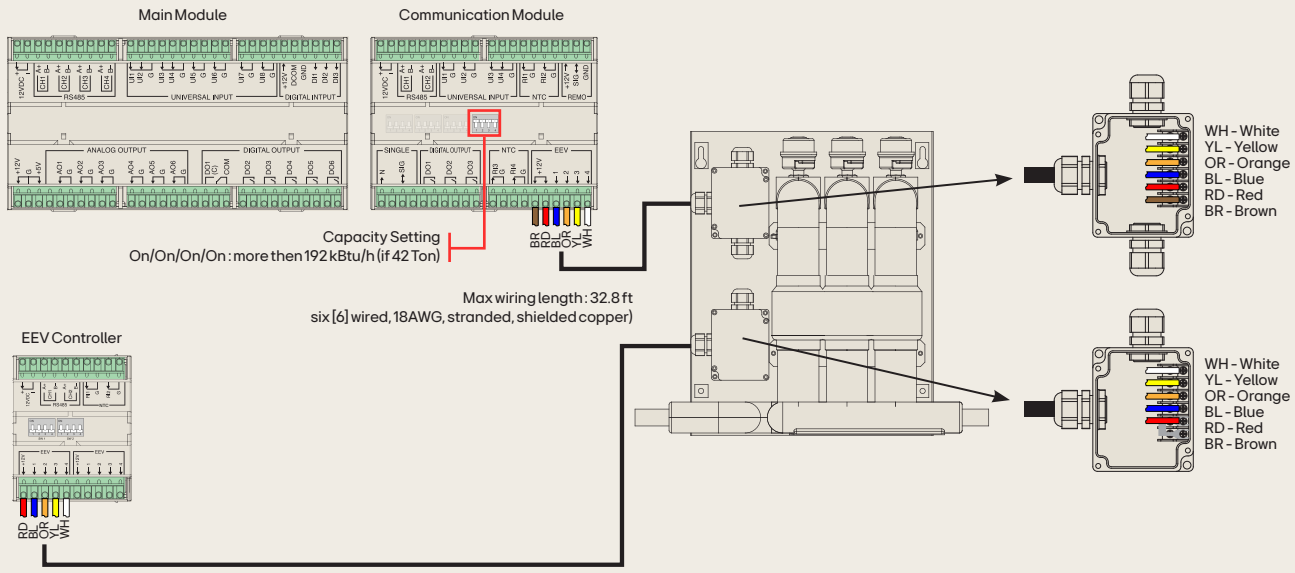


Figure 28 - Model PRLK594A0 Correct Electrical Connection

Pay attention to the connection between the terminal blocks in the EEV Kit and its designated controller module. - Failure to do so may result in component damage or fire.

Incorrect Field Wiring (PRLK594AO)

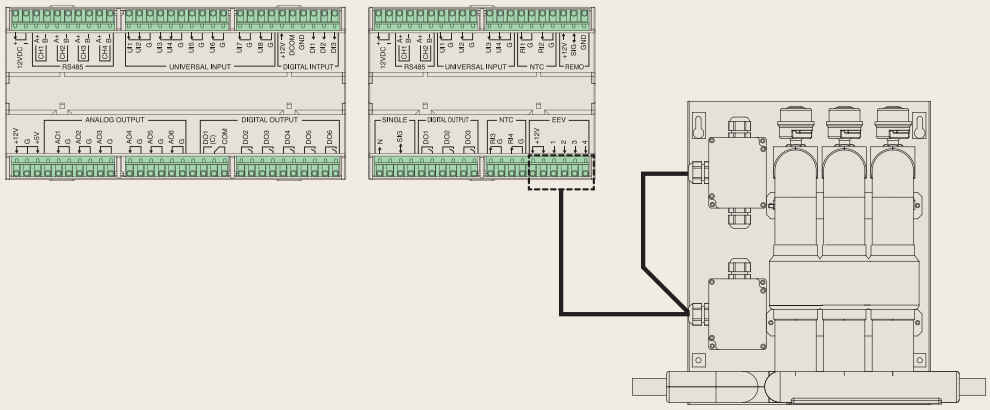
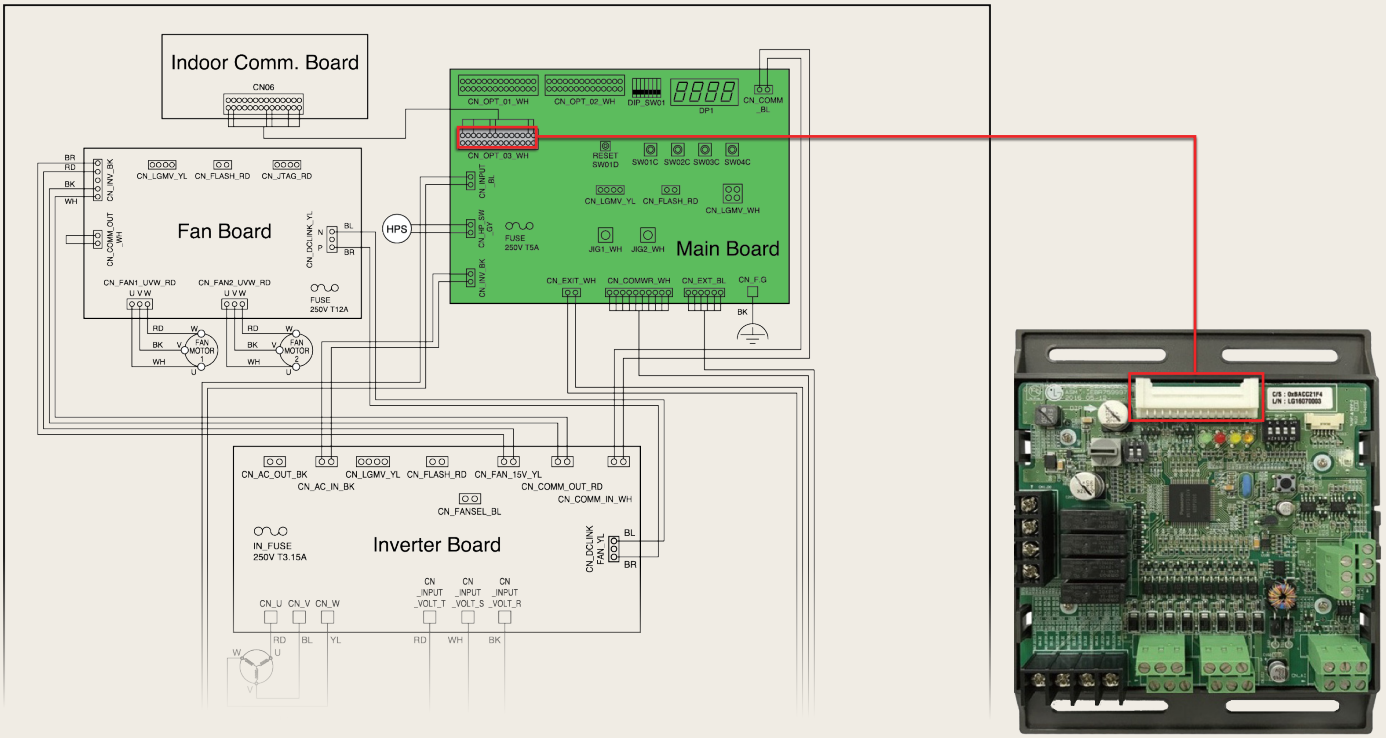


Figure 29 - Incorrect Electrical Connection

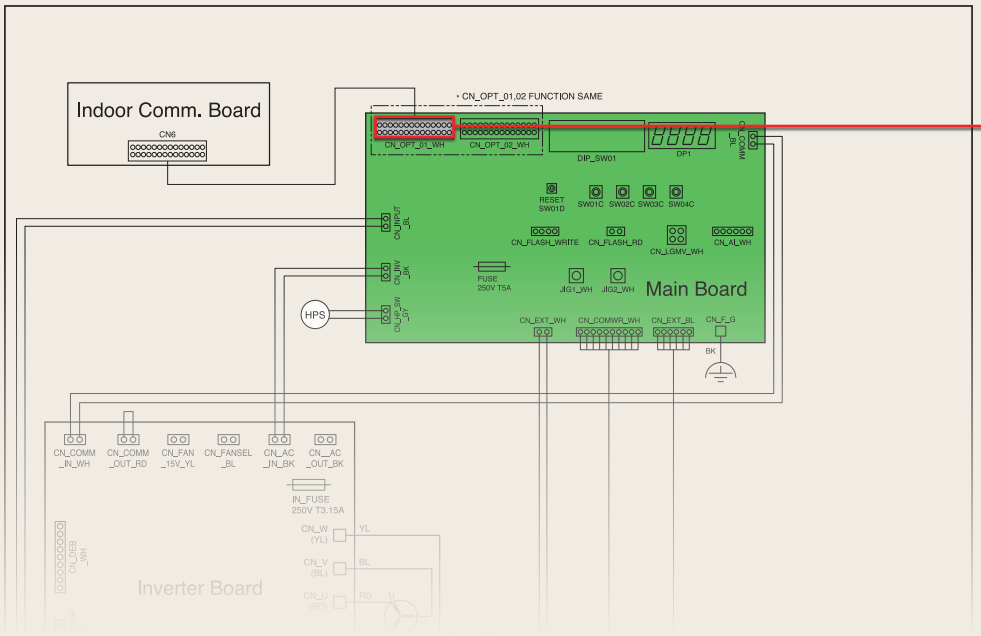
Do not connect to the AHU Controller directly after wiring two terminal blocks together inside of the EEV Kit.

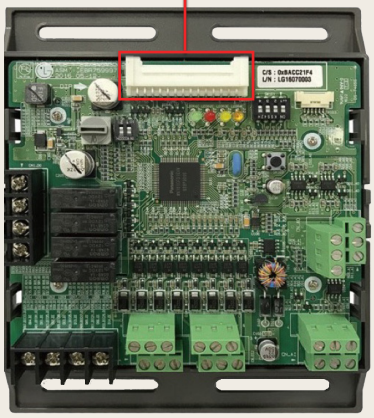
Multi V S® with PRVC2 Compressor Speed Controller

Multi V™ 5 (All Model Part Numbers)

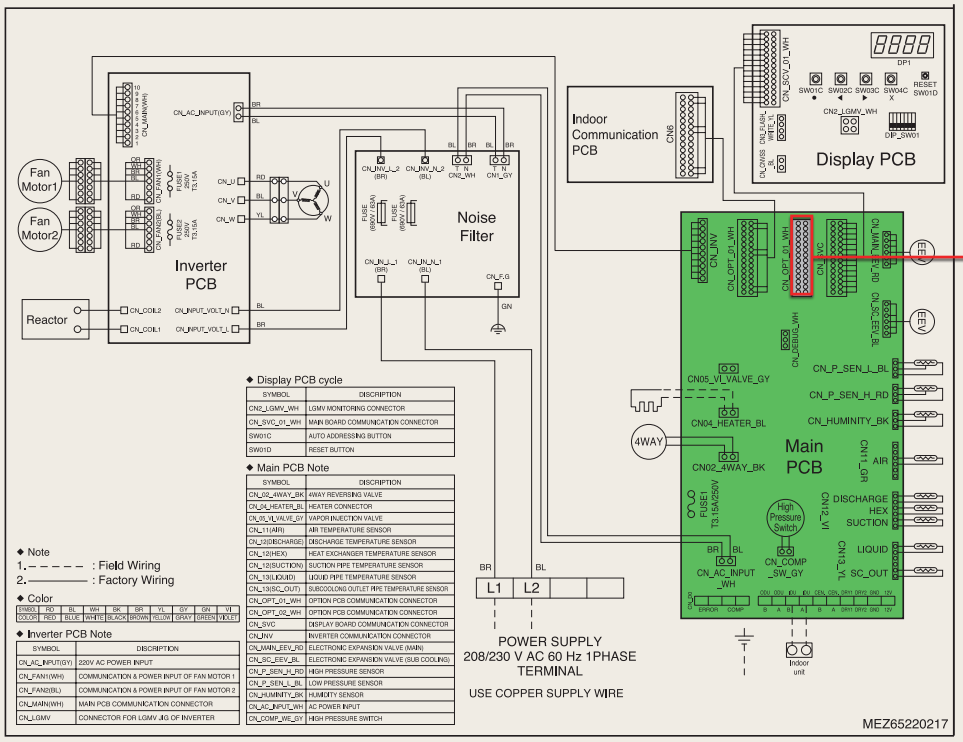


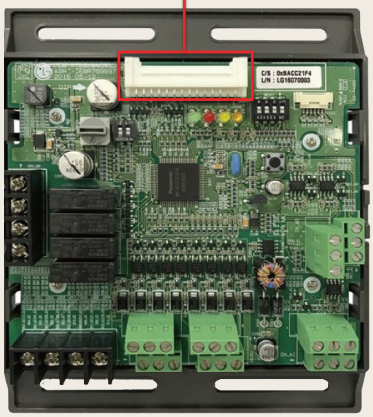
Multi V Water® 5





Multi V S® 5 Ton (ARUB060GSS4 and ARUN060GSS4)

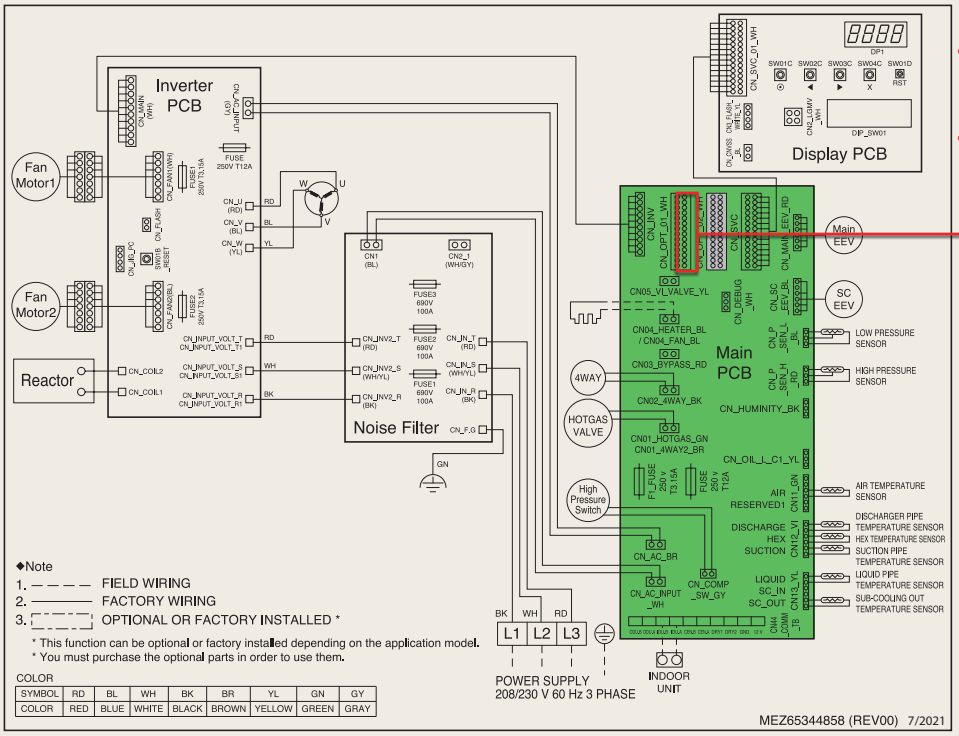


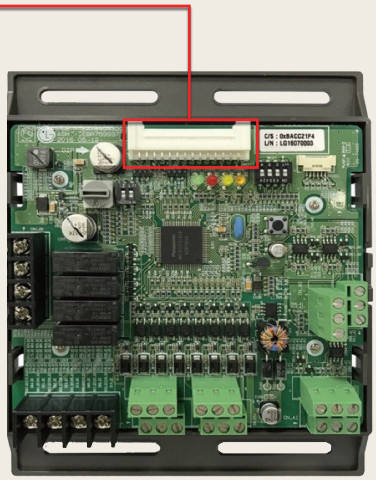


- Field fabricated bracket is required to mount PRVC2 inside Multi V S®
- PRVC2 will only provide I/O function for 0-10 volt Signal in Multi V S®

PRVC2 can be connected to Multi V S® to provide 0 – 10 Volt signal for AHU Kit applications.

Multi V S® 6 and 8 Ton (ARUN072BSS5, and ARUN096BSS5)





- Field fabricated bracket is required to mount PRVC2 inside Multi V S®
- PRVC2 will only provide I/O function for 0-10 volt Signal in Multi V S®

PRVC2 can be connected to Multi V S® to provide 0 – 10 Volt signal for AHU Kit applications.

NOTE: PRVC2 capacity control is not available for Multi V S under 5 ton.

Main Module Troubleshooting Guide

Error Code

Display			Title	Cause of Error
0	0	1	Air (Return/Discharge) Thermistor Error	Thermistor of Comm. Module Air Temperature is disconnected or has shorted circuit
0	0	2	Pipe In Thermistor Error	Pipe in thermistor of Comm. Module is disconnected or has shorted circuit
0	0	3	Communication error (Wired Remote Controller < Comm.Module)	No communication signal from the controller to the Comm. Module
0	0	5	Communication error (ODU Comm.Module)	No communication signal from Comm. Module Kit to the Outdoor Unit.
0	0	6	Pipe out Thermistor Error	Pipe has shorted out thermistor of Comm. Module is disconnected or circuit
2	4	2	Network error of Central controller	Wrong wiring or Main. Module Dip SW setting is not match with central controller setting
5	0	1	Communication error (Main.Module - Comm. Module)	Wiring is disconnected or No signal from Main Module to Comm. Module
5	1	1	Communication error (Main.Module - EEV Module)	Communication error Main ~ EEV.kit

Table 25 - Error Codes

Main Module Error Display

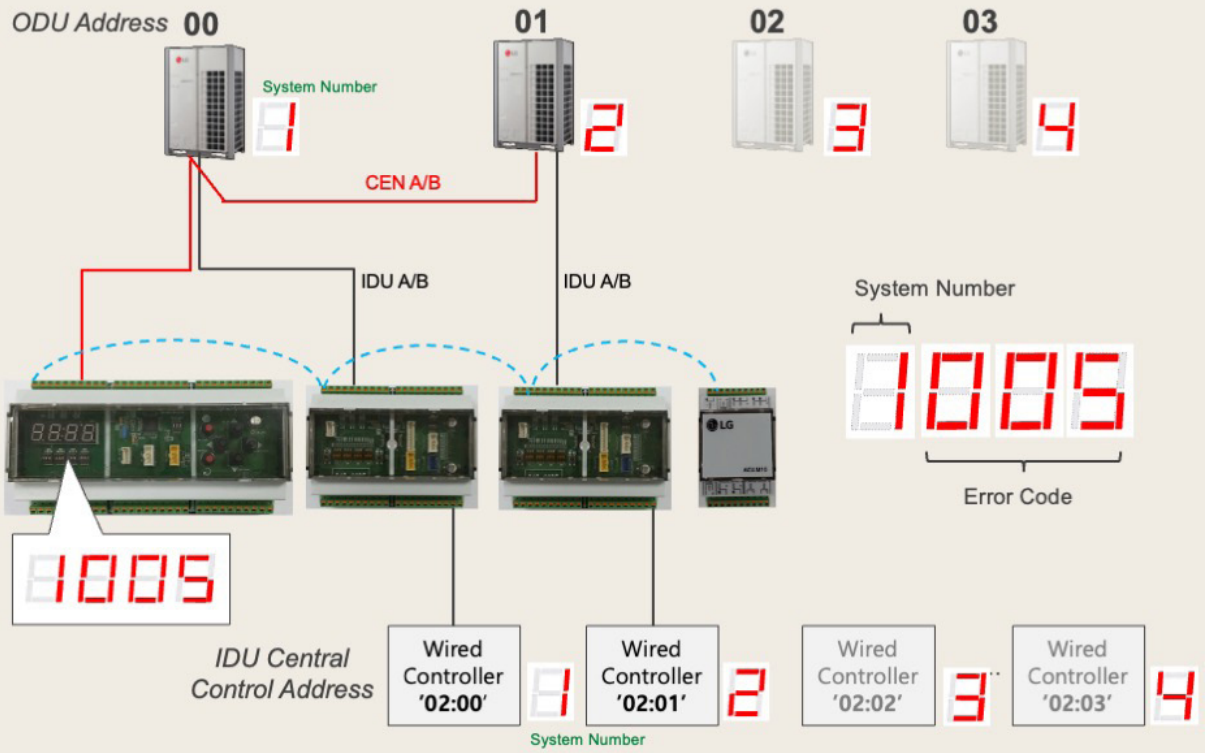


Figure 30 - Main Module Error Display

AHU Comm. Kit is not Cycling

Check list for PAHCMR000

1. Check Dip Switch 1-2

   1-1 LG Control or DDC Modbus®: it should be “On”

   1-2 DDC Contact Control: it should be “Off”

   1-3 Group Control Application: It should be “On” regardless control type

(For DDC control only)

2. Check UI1(Operation On/Off) Status: It should be “Short”

   (In case of UI Setting #1 – Dip Switch 2-4 is “Off”)

   2-1. Check whether Analog input level (0~10V) of UI4 is above 2V

      2-1-1. If UI4 input is less than 2V, UI3 (Forced on/off) should be On

   (In case of UI Setting #2 – Dip Switch 2-4 is “On”)

   2-2. Check UI4 (Forced on/off) input, it should be “On”

Check list for PAHCMS000

1. Check +12V-DCOM status whether “Short” (Non voltage input) or “Open” (12V Input)

2. Dip Switch 1-2 of All Comm. Module linked with Main Module Should be “On” regardless of control type

3. Check Dip Switch 1-1 of Main Module

   3-1. LG Control or DDC Modbus®: It should be “On”

   3-2. DDC Contract Control: It should be “Off

      3-2-1 Check DI 1 status, it should be “Short”

CH05 Communication Error Code (Comm. Module - ODU)

If wires are properly connected between ODU's IDU A-B and CH2 of Comm. Module, the problem comes from dip switch setting and wiring while Comm. Module power is on. Setting and wiring should be done while power is off.

Checklist

1. Check wiring between IDU A-B and CH2 of Comm. Module
2. If you modify setting or wiring while communication kit is powered you have to hit reset button in the comm. kit to have the changes accented.

CH03 Communication Error Code (Comm. Module — wired controller)

If you removed wired remote controller during operation, CH3 will occur, If not please check whether multiple Mains are set with one wired controller.

Checklist

1. If you removed wired controller during operation, please reset product

(In case of Group Control Application)

2. Main Unit should be one, Check Main and Sub setting (Dip switch 1-3 of Comm. Module)

   One Main Unit → Dip Switch 3-1 Off

   Sub Units → Dip Switch 3-1 On

CH242 Communication Error Code (Main Module - ODU)

CH242 happens with wrong wiring between ODU's CEN A-B and CH2 of Main module or wrong address setting. But rarely, if the input voltage from the adapter to Main module is not sufficient, it may occur CH242

Checklist

1. Check wiring between CEN A-B of ODU and CH2 of Main Module
2. Check ODU address using Dip Switch 5 of ODU (FN: ODU Address)

   ODU address should be within 0 to 1 And started from 0 to 3

3. Check Voltage level coming from the adapter if voltage level is lower than 12V, please replace the adapter

ODU Capacity Control Is Not Properly Operating

ODU capacity is controlled by the signal (ODU Capacity level) from Main Module. Main Module should know about ODU's address to control its capacity.

Checklist for PAHCMS000

1. Check wiring between CEN A-B of Main ODU and CH2 of Main Module
2. Check ODU's address and Comm. Module's address

   each system should start from 00 to 03 (00 → 01 → 02 → 03)

(ODU Capacity through LG's air thermistor (RI2 of Comm. Module)

3. Check Dip Switch 1-1 of Main Module: It should be "On"

   Check Dip Switch 1-2 of Main Module: It should be "On"

   Check Dip Switch 1-2 of Comm. Module: It should be "On"

   3-1. Check target pressure whether changing its level every 2 minute according to the gap between set temp and current supply air temperature sensing by LG's air thermistor

(ODU Capacity through third-party's air thermistor)

4. Check Dip Switch 1-1 of Main Module: It should be "Off"

   Check Dip Switch 1-2 of Main Module: It should be "Off"

   Check Dip Switch 1-2 of Comm. Module: It should be "On"

   4-1. Check the polarity of analog input

   UI7 → + (anode), G → - (cathode)

   4-2. Check the level of voltage input of UI7-G (Capacity Control) and compare LGMV's target pressure value.

   (Reference: "ODU Capacity Control Map" on page 23)

Compressor On/Off Is Different from Expected

AHU comm. Kit is based on IDU PCB, thus it also has option for selecting which air sensor will be used between AHU Comm. Kit's air thermistor (RI1 or RI2) or wired controller's

Checklist for the wired controller

(In case you installed wired remote controller)

Select air thermistor setting according to the application

04:01: Wired Controller

04:02: IDU (AHU Comm. Kit) air thermistor

04:03: Wired Controller and IDU

Notes

LG Electronics U.S.A., Inc.
Air Conditioning Technologies
4300 North Point Parkway, Alpharetta, GA 30022

Life's Good.

www.lghvac.com

WP_AHU_Conversion_Kit_Application_Guide_03_25