

AHU Communication Kit

0CAA0-02M (Replaces 0CAA0-02L)

LG

TOTAL HVAC

SOLUTION

PROVIDER

ENGINEERING PRODUCT DATA BOOK

AHU Communication Kit

Product Data

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1. Features

This product is a communication kit that bridges LG's air conditioning outdoor unit to a third party indoor unit functioning based on the return air temperature control. In installation scenes where AHU (Air Handling Unit) is designed with DX (Direct Expansion) Coil, the PAHCMR000 will control the return air temperature by measuring the inlet and outlet temperatures of the DX coil and acting on the outdoor unit and the expansion unit.

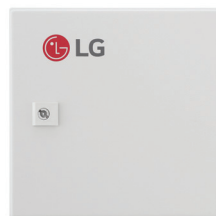
The features of Return air temperature control Communication Kit are as follows:

- It can be combined with various heat source products such as air heat source, water source, etc., and it provides wide capacity.
- It controls the EEV (Electronic Expansion Valve).
- It measures the return air temperature through the enclosed temperature sensor and controls the outdoor unit to secure the demanded return air temperature.
- It can be directly connected to DDC without a separate control module, so DDC can receive product control and status information through Modbus communication or by digital input and output.

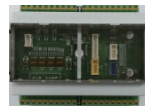
1.1 Return Air Temperature Control

■ Model Names : PAHCMR000 / PAHCMC000

Return air temperature communication kit consists of control box case and communication module.



<PAHCMR000>



<PAHCMC000>

1.2 Discharge Air Temperature Control

■ Model Names : PAHCMS000 / PAHCMM000+PAHCMC000

Discharge air temperature communication kit consists of control box case, main module and communication module. In the product package, main module and communication module are included.



<PAHCMS000>



<PAHCMM000(left) / PAHCMC000(right)>

2. Nomenclature

Model Name	P	AH	CM	R	000
No.	1	2	3	4	5

No.	Signification
1	Accessory with AHU P : Accessory model
2	Product Type I AH : for Air Handling Unit
3	Product Type II CM : Communication Module
4	Control Method R : Return air control S : Discharge (Supply) air control M : Main module C : Communication module
5	Serial Number

3. Specifications

3.1 Technical specifications

Model				PAHCMR000	PAHCMS000
Application				Return air temperature control	Discharge air temperature control
Outdoor unit				MULTI V, Single split	MULTI V, Single split
Dimensions	Unit	Width	mm	300	380
		Depth	mm	300	300
		Height	mm	155	155
	Packed unit	Width	mm	359	436
		Depth	mm	206	206
		Height	mm	354	357
Weight	Unit		kg	6.2	7.46
	Packed unit		kg	7.00	8.30
Casing	Color			Warm grey (RAL 7035)	Warm grey (RAL 7035)
	Material			Steel	Steel
	Certification Degree of Protection			IP 66 (EN 60529)	IP 66 (EN 60529)
				UL 508 Type 4 / NEMA 4	UL 508 Type 4 / NEMA 4
			IK 08 (EN 50102)	IK 08 (EN 50102)	
Power supply	Voltage		V	220~240	220~240
	Frequency		Hz	50/60	50/60
	Phase		P	1	1
Current	Rated		A	0.1	0.1
Composition	Controller			Communication module : 1 EA	Main Module : 1 EA Communication Module : 1 EA
	Terminal block	Power supply		Screw type (L / N, Ring type)	Screw type (L / N, Ring type)
		Communication		Spring push type (Pin type, JOBN153)	Spring push type (Pin type,JOBN153)
	Temp. Sensor	Liquid pipe		Q'ty : 1 EA (Pin type, 5m, Black)	Q'ty : 1 EA (Pin type, 5m, Black)
		Gas pipe		Q'ty : 1 EA (Pin type, 5m, Red)	Q'ty : 1 EA (Pin type, 5m, Red)
		Air		Q'ty : 1 EA (Pin type, 5m, Red)	Q'ty : 1 EA (Pin type, 5m, Red)
	Key		EA	1	1
Installation Manual		EA	1	1	
Wiring connection	Communication		EA	3	6
	Universal Input		EA	4	12(8*)
	Digital Input		EA	-	3
	Digital Output		EA	3	9(2*)
	Analogue Output		EA	-	6(6*)
	NTC(sensors)		EA	4(1*)	4(1*)
	Remote Controller		EA	1	1
	EEV Kit		EA	1	1
Product environment operation range	Ambient Temperature			-20 ~ 65 °CDB	-20 ~ 65 °CDB
	Humidity			0 ~ 98 %	0 ~ 98 %
Air temperature	Cooling(on coil air)			14 ~ 26 °CWB	14 ~ 26 °CWB
	Heating(on coil air)			5 ~ 24 °CDB	5 ~ 24 °CDB
	Outdoor unit condition			It is same condition as the outside air temperature operation range of outdoor unit PDB.	

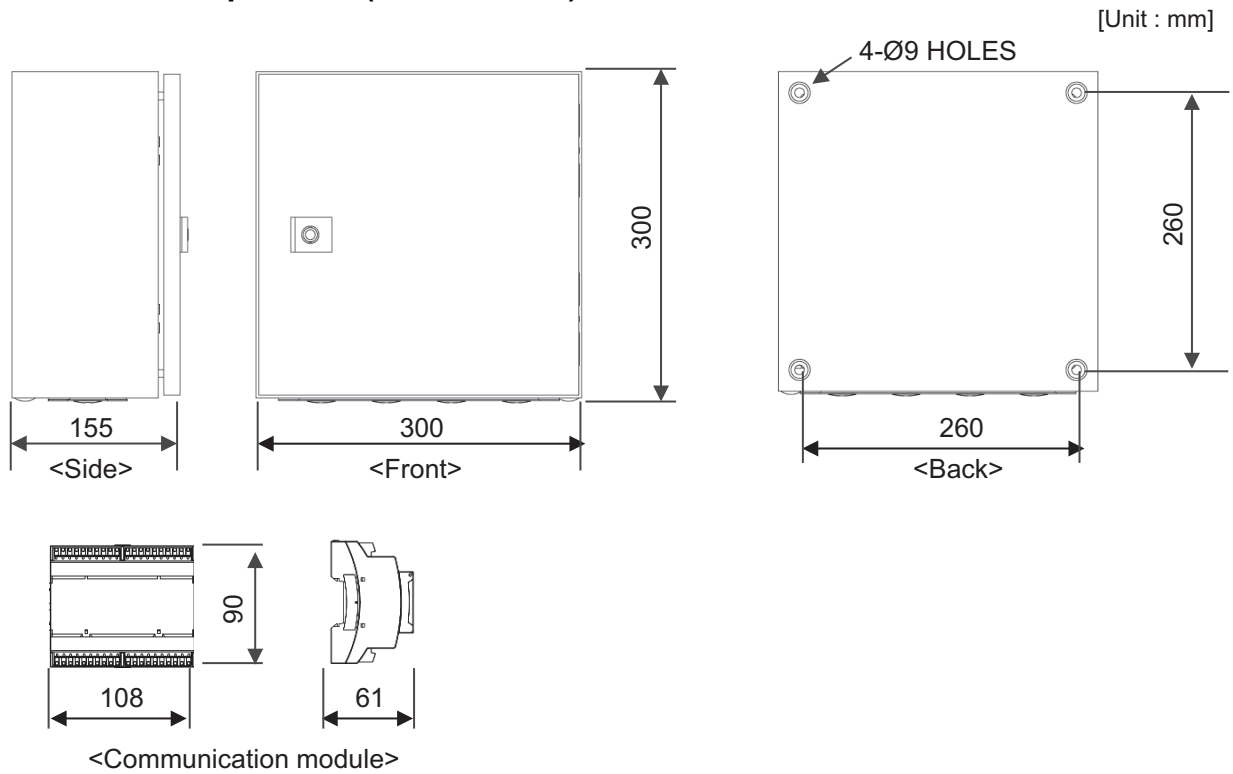
Note

- Maximum connectable PAHCMR000(Communication module) to discharge air temperature control(PAHCMS000) AHU communication Kit is less or equal than 3, i.e. 'PAHCMS000 x 1 + PAHCMR000 x 3 system' can control 4 circuits of the DX coil .
- Refrigerant Control : Electronic Expansion Valve (When connecting to a Single Split system, EEV Kit is not required.)
- * : Numbers in () are reserved

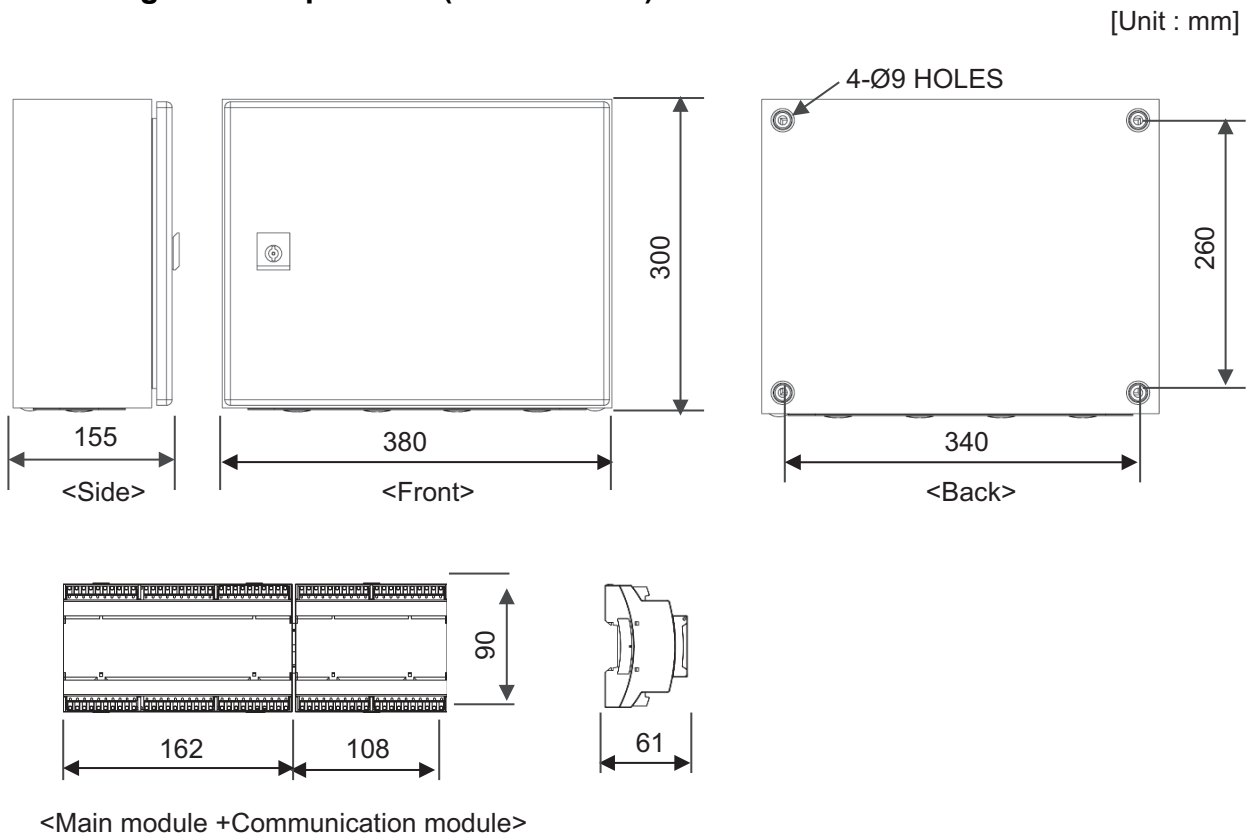
3. Specifications

3.2 Dimension

Return Air Temperature (PAHCMR000)



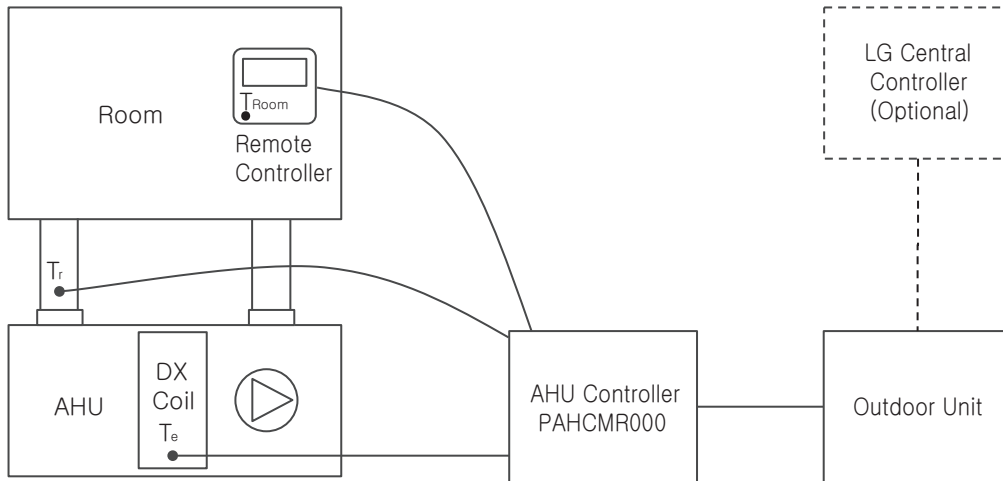
Dishcharge Air Temperature (PAHCMS000)



4. Solution Overview

4.1 Return Air Temperature Control

4.1.1 LG Control : Fixed $T_e + T_r$ or T_{Room}



A fixed evaporating or condensing temperature of a DX coil (T_e) can be controlled by either return air temperature (T_r) or room air temperature (T_{Room}). A fixed target evaporating or condensing temperature can be changed in MULTI V outdoor unit setting.

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
Control	Operating On/Off	O	O
	Operation Mode	O	O
	Return Air Temperature	O	O
	Discharge Air Temperature	X	X
	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	O	O
	Discharge Air Temperature	X	X
	Defrost status	O	X
	Error Alarm	O	O
	Compressor On/Off	O	X

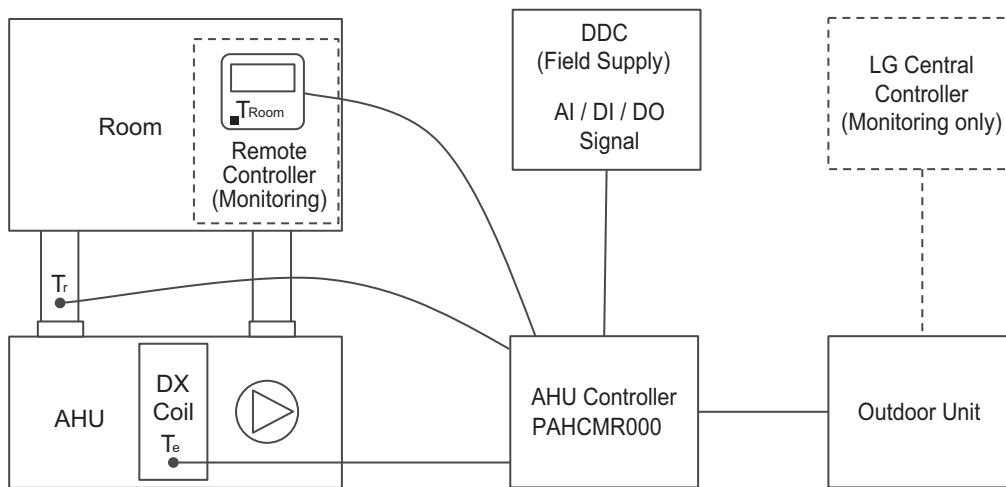
Note

1. O : Applied, X : Not applied , See detail model name in 'Accessory Compatibility List' in this PDB

2. * : Emergency Stop function is available for AC Ez Touch, AC Smart, ACP.

4. Solution Overview

4.1.2 DDC Control by Contact Signal : Fixed $T_e + T_r$ or T_{Room}



1) Note : When DDC control AHU Controller by contact signal, the control command of LG central controller will be disregarded.

The DDC controls return air temperature (T_r) or room air temperature (T_{Room}) by transferring AI / DI / DO signal to the AHU Communication Kit for Return air control. A fixed target evaporator or condensing temperature (T_e) can be changed in MULTI V outdoor setting. LG wired remote controller and LG Central Controller can be optionally applied, but only monitoring function is possible.

■ Required Item

	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

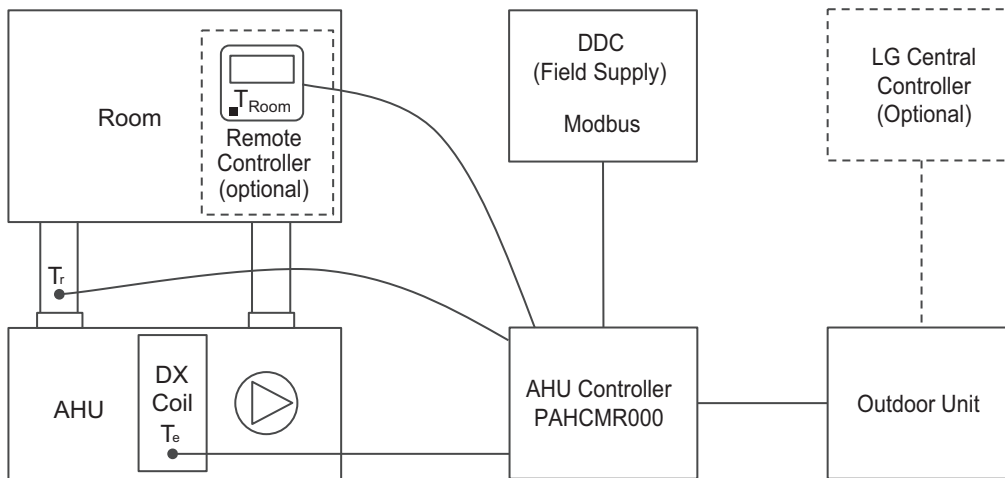
Function List		Contact Signal type (DDC)	LG Remote Controller	LG Central Controller
Control	Operating On/Off	O	X	X
	Operation Mode	O	X	X
	Return Air Temperature	O	X	X
	Discharge Air Temperature	X	X	X
	Forced Thermal On/Off	O	X	X
	Capacity Control	X	X	X
	Emergency Stop	X	X	X
Monitor	Operating On/Off	O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

Note

1. O : Applied, X : Not applied , See detail model name in 'Accessory Compatibility List' in this PDB

4. Solution Overview

4.1.3 DDC Control by Modbus RTU : Fixed T_e + T_r or T_{Room}



The DDC controls return air temperature (T_r) or room air temperature (T_{Room}) by transferring Modbus signal to the AHU Communication Kit for Return air control. To control room air, the LG wired controller can be purchased optionally. A fixed target evaporator or condensing temperature (T_e) can be changed in MULTI V and Single outdoor setting.

Required Item

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

Function List

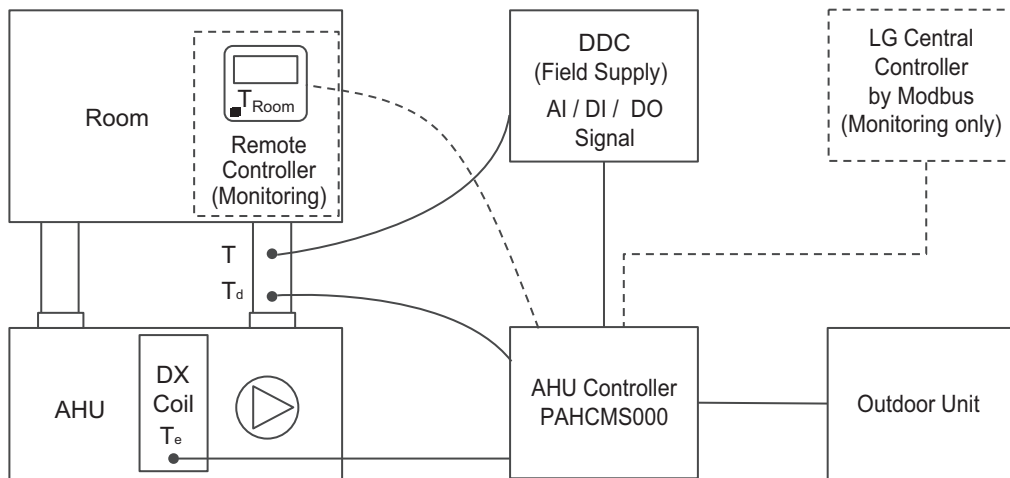
Function List		Modbus Comm. type (DDC)	LG Remote Controller	LG Central Controller
Control	Operating On/Off	O	O	O
	Operation Mode	O	O	O
	Return Air Temperature	O	O	O
	Discharge Air Temperature	X	X	X
	Forced Thermal On/Off	X	X	X
	Capacity Control	X	X	X
	Emergency Stop	X	X	O
Monitor	Operating On/Off	O	O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

Note

1. O : Applied, X : Not applied , See detail model name in 'Accessory Compatibility List' in this PDB

4. Solution Overview

4.2.2 DDC Control by Contact Signal : Variable $T_e + T_d$ (0~10 V)



The DDC can control the discharge air temperature by sending an analog input (0 to 10V) to AHU communication kit for discharge air control. The analog signal (Voltage) will adjust the target pressure (low or high) to which the outdoor unit is running hence increasing or decreasing the target temperature (T_e).

Required Item

	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

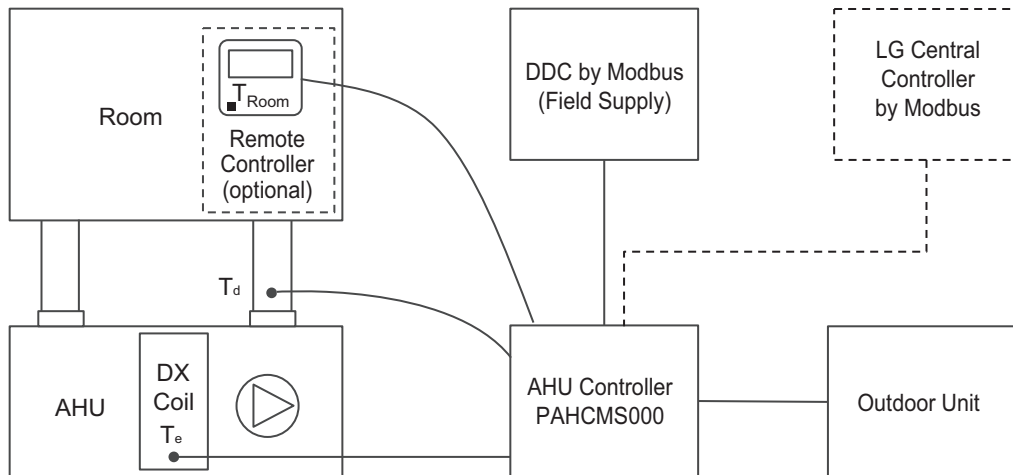
Function List		Contact Signal type (DDC)	LG Remote Controller	LG Central Controller
Control	Operating On/Off	O	X	X
	Operation Mode	O	X	X
	Return Air Temperature	X	X	X
	Discharge Air Temperature	X	X	X
	Capacity Control	O	X	X
	Emergency Stop	O	X	X
Monitor	Operating On/Off	O	O	O
	Operation Mode	X	O	O
	Return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

Note

1. O : Applied, X : Not applied , See detail model name in 'Accessory Compatibility List' in this PDB

4. Solution Overview

4.2.3 DDC Control by Modbus : Variable $T_e + T_d$



The DDC can control the discharge air temperature (T_d) by sending Modbus signal to AHU communication kit for discharge air control. The Modbus signal will adjust the target pressure(low or high) to which the outdoor unit is running hence increasing or decreasing the target temperature (T_e).

■ Required Item

	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
Control	Operating On/Off	O	O	△
	Operation Mode	O	O	△
	Return Air Temperature	X	X	X
	Discharge Air Temperature	O	O	△
	Capacity Control	O	X	X
	Emergency Stop*	X	X	△
Monitor	Operating On/Off	O	O	O
	Operation Mode	O	O	O
	Return Air Temperature	O	X	X
	Discharge Air Temperature	O	O	O
	Defrost status	O	O	X
	Error Alarm	O	O	O
	Compressor On/Off	O	O	X

Note

- O : Applied, X : Not applied, See detail model name in 'Accessory Compatibility List' in this PDB
- △ : LG Central Controller can control these functions also, but DDC should have main responsibility for control. See detail model name in 'Accessory Compatibility List' in this PDB

5. Capacity Index & Combination Ratio

5.1 Capacity Index

5.1.1 MULTI V

Capacity index		Heat exchanger capacity (kBtu/h)				Heat exchanger capacity (kW)			
		Cooling		Cooling		Cooling		Heating	
kBtu/h	kW	Min	Max	Min	Max	Min	Max	Min	Max
12.0	3.6	10.5	12.0	11.9	13.3	3.1	3.6	3.5	4.0
15.0	4.5	12.1	15.0	13.4	16.7	3.7	4.5	4.1	5.0
18.0	5.6	15.1	18.0	16.8	20.3	4.6	5.6	5.1	6.3
24.0	7.1	18.1	24.0	20.4	27.0	5.7	7.1	6.4	8.0
28.0	8.2	24.1	28.0	27.1	31.4	7.2	8.2	8.1	9.2
36.0	10.6	28.1	36.0	31.5	40.4	8.3	10.6	9.3	11.9
42.0	12.3	36.1	42.0	40.5	47.1	10.7	12.3	12.0	13.8
48.0	14.1	42.1	48.0	47.2	54.1	12.4	14.1	13.9	15.9
54.0	15.8	48.1	54.0	54.2	61.5	14.2	15.8	16.0	18.0
76.0	22.4	54.1	76.0	61.6	85.5	15.9	22.4	18.1	25.2
96.0	28.0	76.1	96.0	85.6	108.0	22.5	28.0	25.3	31.5
115.0	33.6	96.1	115.0	108.1	129.4	28.1	33.6	31.6	37.8
134.0	39.2	115.1	134.0	129.5	150.8	33.7	39.2	37.9	44.1
153.0	44.8	134.1	153.0	150.9	172.1	39.3	44.8	44.2	50.4
172.0	50.4	153.1	172.0	172.2	193.5	44.9	50.4	50.5	56.7
192.0	56.0	172.1	192.0	193.6	216.0	50.5	56.0	56.8	63.0

Note

Heat exchanger capacities are based on the following conditions :

1. Cooling
 - Indoor Ambient Temp. 27 °CDB / 19 °CWB, Outdoor Ambient Temp. 35° CDB / 24 °CWB
 - Condensing temperature (tc) 45 °C, Subcool (SC) 15 K, Evaporating temperature (te) 6 °C, Superheat (SH) 3 K
 - Interconnecting piping length 7.5 m and difference of elevation (outdoor ~ indoor unit) is 0 m.
2. Heating
 - Indoor Ambient Temp. 20 °CDB / 15 °CWB, Outdoor Ambient Temp. 7 °CDB / 6°CWB
 - Hot gas inlet temperature 65 °C, Condensing temperature (tc) 49 °C, Subcool (SC) 5 K
 - Interconnecting piping length 7.5 m and difference of elevation (outdoor ~ indoor unit) is 0 m.

CAUTION

In case of MULTI V model for EUROPE, the setting value of 'target pressure change' function should be set as below :

- Dip switch No. 5 of MULTI V 5 On >> FUNC >> FN8 (target pressure change) >> Heat >> Off (default OP4)

5.1.2 Single Split

Capacity index		Heat exchanger capacity (kBtu/h)				Heat exchanger capacity (kW)			
		Cooling		Cooling		Cooling		Heating	
kBtu/h	kW	Min	Max	Min	Max	Min	Max	Min	Max
9.0	2.5	6.5	9.0	9.0	10.8	2.0	2.5	2.5	3.2
12.0	3.5	9.1	12.0	10.9	13.7	2.6	3.5	3.3	4.0
18.0	5.0	12.1	18.0	13.8	19.4	3.5	5.0	4.1	6.0
24.0	7.1	18.1	24.0	19.5	25.4	5.1	7.1	6.1	7.5
30.0	8.0	24.1	30.0	25.5	33.8	7.2	8.0	7.6	9.0
36.0	10.0	30.1	36.0	33.9	40.3	7.9	10.0	9.1	11.2
42.0	12.5	36.1	42.0	40.4	47.0	10.1	12.5	11.3	14.0
48.0	14.0	42.1	48.0	47.1	56.2	12.6	14.0	14.1	15.8
60.0	15.0	48.1	60.0	56.3	67.2	14.1	15.0	15.9	16.8
70.0	19.0	60.1	70.0	67.3	82.5	14.9	19.0	16.9	22.4
85.0	23.0	70.1	85.0	82.6	99.8	19.1	23.0	22.5	27.0

Note

Heat exchanger capacities are based on the following conditions :

1. Cooling
 - Indoor Ambient Temp. 27 °CDB / 19 °CWB, Outdoor Ambient Temp. 35° CDB / 24 °CWB
 - Condensing temperature (tc) 45 °C, Subcool (SC) 15 K, Evaporating temperature (te) 6 °C, Superheat (SH) 3 K
 - Interconnecting piping length 7.5 m and difference of elevation (outdoor ~ indoor unit) is 0 m.
2. Heating
 - Indoor Ambient Temp. 20 °CDB / 15 °CWB, Outdoor Ambient Temp. 7 °CDB / 6°CWB
 - Hot gas inlet temperature 65 °C, Condensing temperature (tc) 49 °C, Subcool (SC) 5 K
 - Interconnecting piping length 7.5 m and difference of elevation (outdoor ~ indoor unit) is 0 m.

5. Capacity Index & Combination Ratio

5.2 Combination Ratio

Return Air Mixing

Combination	Total	AHU (RA Mixing)	Indoor Units	Expansion Kit
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

Combination	Total	AHU (FAU)	Indoor Units	Expansion Kit
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

Note

- Combination ratio (%)
= (Actual AHU capacity index + Indoor Unit capacity index) / Outdoor unit nominal cooling capacity

CAUTION

- To use "Return Air Mixing" table, the 'on coil air temperature' should be within the operating range of indoor temperature. (Cooling : under 20 °CWB. / Heating : over 15 °CDB.)
- If the 'air on coil' have fresh air intake , the combination ratio should be complied with the "100 % Fresh Air" table.

5.3 Outdoor Unit Compatibility

5.3.1 MULTI V

Model		MULTI V				MULTI V WATER		GHP
		i	5	IV	S	IV	S	
AHU Communication Kit	Return air temperature control	●	●	●	●	●	●	●
	Discharge air temperature control	●	●	●	●	●	X	X

Note

- When connecting to Single Split outdoor unit, please check the compatibility to the regional sales office.
- Discharge air temperature control AHU comm. Kit is not compatible with heat recovery system.

6. Expansion Valve Combination

6.1 Capacity Range

EEV Kit Model	Capacity index (kW)		AHU Communication Kit		Connection by ODU system	
	Minimum	Maximum	PAHCMR000	PAHCMS000	Heat pump	Heat Recovery
PRLK048A0	3.6	28	O	O	O	O
PRLK096A0	28.1	56	O	O	O	O (Max 33.7 kW)
PRLK396A0	56.1	112	O	O	O	X
PRLK594A0	112.1	168	X	O	O (with PAHCMS000)	X

Note

O : Applied, X : Not applied

6.2 Combination guide

Case	Combination	Compatibility	
		Return Air ¹⁾	Supply Air ²⁾
1	Multiple PRLK048A0 / PRLK096A0	O	O
2	Multiple PRLK048A0 / PRLK096A0 + IDUs ³⁾	O	X
3	PRLK396A0 + IDUs	X	X
4	PRLK594A0 + IDUs	X	X
5	PRLK396A0 + PRLK048A0 / PRLK096A0	X	X
6	PRLK594A0 + PRLK048A0 / PRLK096A0	X	X
7	PRLK396A0 + PRLK396A0 + PRLK396A0	O	O
8	PRLK396A0 + PRLK594A0	X	X
9	PRLK594A0 + PRLK594A0 ⁴⁾	X	O

Note

O : Applied, X : Not applied

1) Return Air is for PAHCMR000 / PAHCMM000(Communication Module)

2) Supply Air is for PAHCMS000 / PAHCMM000(Main Module) + PAHCMM000(Communication Module)

3) IDUs includes Hydro Kit / DX ERV / FAU(OAU)

4) Even in multiple Multi V system, one main module can connect up to two PRLK594A0 units.

e.g. '(Main Module #1 + Communication Module #1 + EEV Kit #1) + (Communication Module #2 + EEV Kit #2)'

CAUTION

- 1) IDUs/PRLK048A0/PRLK096A0 are can not be connected with PRLK396A0/PRK594A0(Big EEV) in the same ODU system.
- 2) In case of IDUs are connected with Discharge(Supply) air communication kit, the capacity of IDUs can be changed according to ODU capacity which is controlled by Discharge(Supply) air communication kit.

6. Expansion Valve Combination

6.3 DX Coil capacity selection guide

■ General

The capacity of DX coil can vary depending on design conditions. The diversity on DX coil capacity makes it difficult to match proper outdoor unit sizing. Often mismatching DX coil to LG outdoor system causes capacity issues on site.

To match DX coil with LG outdoor system properly,

Example of the heat exchanger (DX coil) capacity index selection procedure

1) **Step 1:**

AHU Manufacturer selects coil on air temperature with the following specifications from our side.

Use the parameters for refrigerant cycle below according to the main use of the coil.

Maximum allowed working pressure (MWP): 42 Bar.

• **For cooling:**

- Condensing temperature (T_c) 45 °C, Subcool (SC) 15K
- Evaporating temperature (T_e) 6 °C, Superheat (SH) 3K
- Outdoor air temperature 35°CDB/ 24°CWB.
- Pressure drop range : 70 ± 20kPa.
- Interconnecting piping length 7.5m and difference of elevation (outdoor ~ indoor unit) is 0 m.

• **For heating:**

- Hot gas inlet temperature 65 °C, Condensing temperature (T_c) 49 °C, Subcool (SC) 5
- Outdoor Air Temperature 7°CDB/ 6°CWB.
- Pressure drop range : 70 ± 20kPa.
- Interconnecting piping length 7.5m and difference of elevation (outdoor ~ indoor unit) is 0 m.

Note

- Always select pressure loss as close to maximum allowed at full capacity as possible to ensure good pressure loss at minimal capacity
- Estimated evaporator / condenser temperature should be considered at this stage according to 6.3.2 estimated DX coil temperature of this PDB.

2) **Step 2:**

Use the capacity calculated at Step 1 to select the right ODU or IDU Capacity size.

Always select the first bigger capacity from the table in 'Capacity Index' chapter with the obtained result from 'Step 1' of calculations.

If pipe length or difference is bigger than above please refer the ODU PDB for the capacity correction factor.

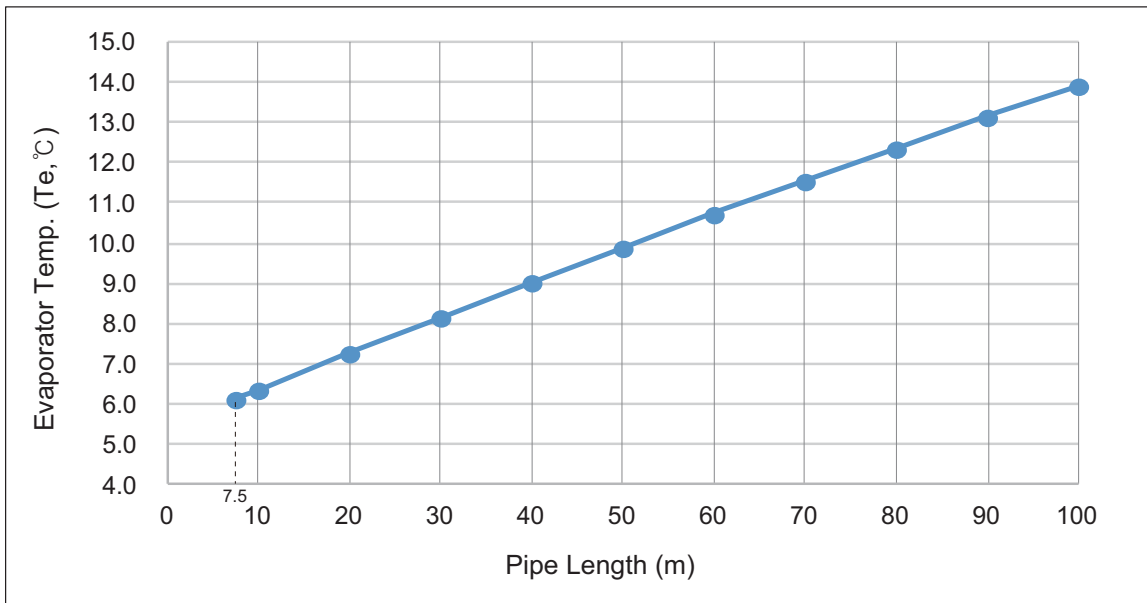
Note

- DX Coil capacity selection guide is commonly applied to the R410A model and R32 model considering LG design margin, and the capacity of the selected coil is considered the same.

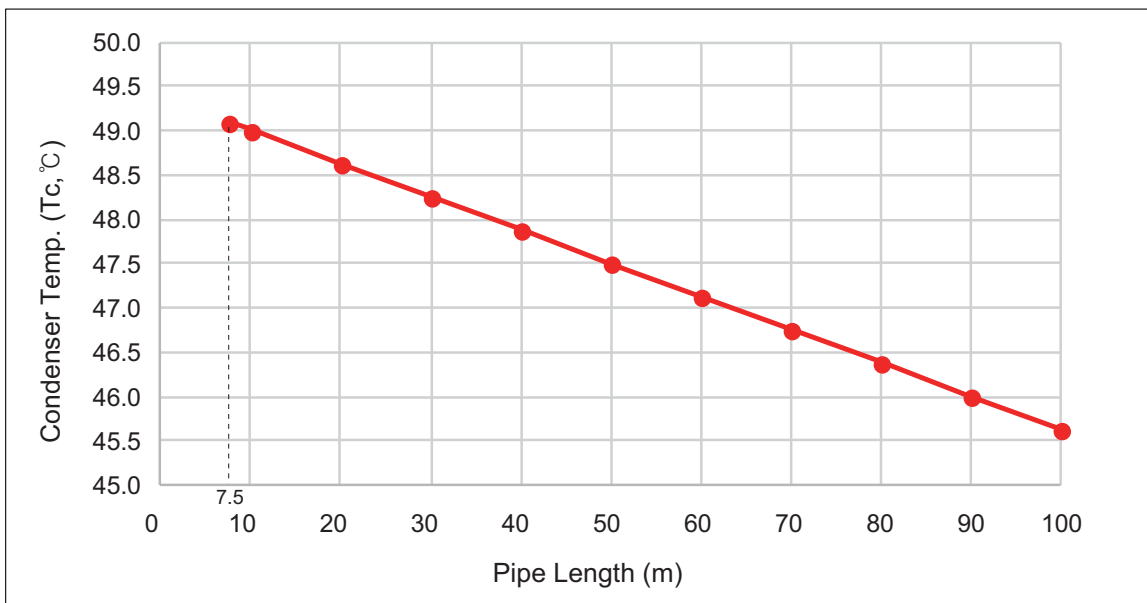
6. Expansion Valve Combination

■ Estimated DX coil temperature

◆ Estimated evaporator temperature (T_e) of DX Coil according to pipe length



◆ Estimated condenser temperature (T_c) of DX Coil according to pipe length



⚠ CAUTION

The actual estimated refrigerant temperature may vary according to pipe (equivalent) length, pipe type, installation conditions and operation status.

7. Accessory Compatibility List

Product	Model	Compatibility		Remark	
		PAHCMR000	PAHCMS000		
Wired Remote Controller	Simple	PQRCVCL0Q(W)	O	X	
	Simple for Hotel	PQRCHCA0Q(W)	X	X	
	Standard II (White)	PREMTB001	O	O	
	Standard II (Black)	PREMTBB01	O	O	
	Standard III (White)	PREMTB100	O	O	
	Standard III (Black)	PREMTBB10	O	O	
	Premium	PREMTA000(A/B)	O	X	
Dry contact	Simple Contact	PDRYCB000	X	X	
	2 Inputs Dry Contact (for Setback)	PDRYCB400	X	X	
	Dry Contact for Thermostat	PDRYCB300	X	X	
	Dry Contact for Modbus	PDRYCB500	X	X	
ETC	PI485GW	PMNFP14A1	△	△	△ : Required for Single Split unit
	Remote Temperature Sensor	PQRSTA0	X	X	
	Zone Controller	ABZCA	X	X	
	Electronic Thermostat	AQETC	X	X	
	CO2 Sensor	PES-C0RV0	X	X	
Central Controller	AC Ez	PQCSZ250S0	O	X	
	AC Ez Touch	PACEZA000	O	X	
	AC Smart IV ¹⁾	PACS4B000	O	△	△ : Monitoring only
	ACP IV ¹⁾	PACP4B000	O	△	
	AC Manager IV ¹⁾	PACM4B000	O ²⁾	△ ²⁾	
	AC Smart 5	PACS5A000	O	O	
	ACP 5	PACP5A000	O	O	
Gateway	AC Manager 5	PACM5A000	O ²⁾	△ ²⁾	△ : Monitoring only when DDC control by contact signal applied
	ACP BACnet ¹⁾	PQNFB17C0	O	△	△ : Monitoring only
	ACP Lonworks	PLNWKB000	O	X	
Power Consumption Distributor	AC Smart BACnet ¹⁾	PBACNA000	O	△	△ : Monitoring only
	PDI Standard	PPWRDB000	O	X	
	PDI Premium	PQNUD1S40	O	X	

Note

O : Applied, X : Not applied

1) If need to connect central controller IV series with PAHCMS000, ask to HQ.

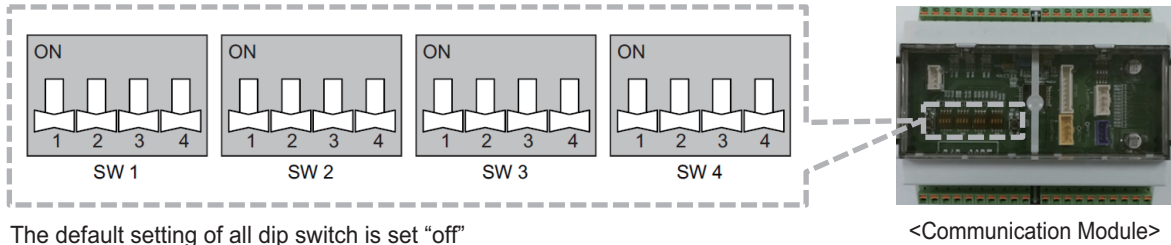
2) AC Manager can integrate ACPs or AC Smarts, ACP or AC Smart must be installed together.

8. Circuit Diagram & Setting

8.1 Return Air Temperature Control

PAHCMR000 / PAHCMC000

8.1.1 Function Setting Table of Dip Switch (Communication Module)



◆ Table of SW1~SW3

SW 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 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 (available when SW1-3 'On')	ON	Fixed	The fan will always be running as set fan speed except defrost. During defrost, the fan speed will change as low 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	-
	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 3)	UI1 : Operation On/Off UI2 : Heating/Cooling UI3 : Emergency stop			
SW3	1	Group Master/Slave (Return Air only)	ON	Slave mode	Please see "9.3 Multiple module installation guide" for more detail
			OFF	Master mode	Master 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

Note

- 1) Do not change the reserved switch (It may malfunction).
- 2) To use the group control, length of group control cable is max 50 m.
- 3) 'UI setting #4' is available when 'Dip SW1-2', 'Dip SW2-3', and 'Dip SW2-4' are ON.

8. Circuit Diagram & Setting

◆ Table of SW4

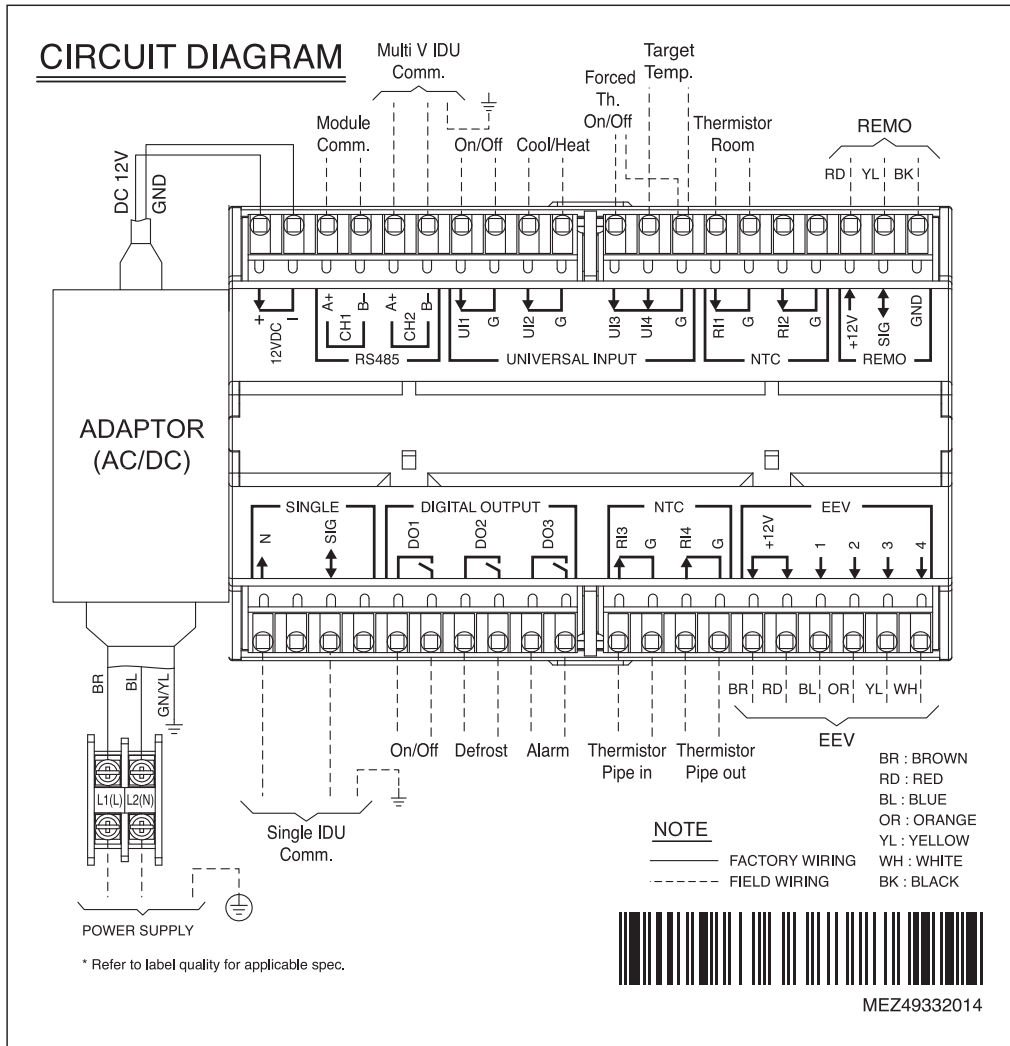
No	SW4				Capacity [kBtu/h]		Capacity [kW]	
	Dip 1	Dip 2	Dip 3	Dip 4	MULTI V	SINGLE	MULTI V	SINGLE
1	OFF	OFF	OFF	OFF	12.0	5.0	3.5	1.5
2	OFF	OFF	OFF	ON	15.0	7.0	4.5	2.1
3	OFF	OFF	ON	OFF	18.0	9.0	5.6	2.5
4	OFF	OFF	ON	ON	24.0	12.0	7.1	3.5
5	OFF	ON	OFF	OFF	28.0	15.0	8.2	4.2
6	OFF	ON	OFF	ON	36.0	18.0	10.6	5.0
7	OFF	ON	ON	OFF	42.0	24.0	12.3	7.1
8	OFF	ON	ON	ON	48.0	30.0	14.1	8.0
9	ON	OFF	OFF	OFF	54.0	36.0	15.8	10.0
10	ON	OFF	OFF	ON	76.0	42.0	22.4	12.5
11	ON	OFF	ON	OFF	96.0	48.0	28.0	14.0
12	ON	OFF	ON	ON	115.0	60.0	33.6	15.0
13	ON	ON	OFF	OFF	134.0	70.0	39.2	19.0
14	ON	ON	OFF	ON	153.0	85.0	44.8	23.0
15	ON	ON	ON	OFF	172.0	Reserved	50.4	Reserved
16	ON	ON	ON	ON	192.0	Reserved	56.0	Reserved

Note

- 1) If you want to connect the PRLK396A0/PRLK594A0 (EEV kit) with MULTI V outdoor unit, you have to set ON the Dip S/W 1, 2, 3 and 4 (Set the capacity as 192 kBtu/h).
- 2) PAHCMR000 model can only be connected to PRLK048A0/PRLK096A0/PRLK396A0 EEV kit.

8. Circuit Diagram & Setting

8.1.2 Circuit Diagram (Communication Module)



- The UI1, UI2, UI3 and UI4 ports / DO1, DO2, and DO3 ports have different functions for DIP switch settings, please refer to DIP switch settings.

◆ RS485/SINGLE Communication port

Name	Port	Contents	Electrical Spec.	Function
Module Comm.	RS485 CH1	DDC(Modbus) Comm.	Max. 500 m, 2C x (1.0~1.5) mm ² (shield wire)	Communication with DDC or Main module of PAHCMS000 model through Modbus protocol
MULTI V IDU Comm.	RS485 CH2	MULTI V IDU Comm. (IDU A/B)	Max 1 km 2C x (1.0~1.5) mm ² (shield wire)	Communication with MULTI V Outdoor unit
Single IDU Comm.	SINGLE N/SIG	Single IDU Comm. (IDU 2(N)/3)	Max 75 m 2C x (1.0~1.5) mm ² (shield wire)	Communication with Single Split Outdoor unit

◆ NTC Thermistor

Name	Port	Contents	Electrical Spec.	Function
Thermistor Room	NTC RI1/G	Room (Return) air thermistor	NTC 10 kΩ, 5 m	Return air temperature sensor
Thermistor Pipe in	NTC RI3/G	Pipe in (Liquid) thermistor	NTC 5 kΩ, 5 m	Inlet pipe (Liquid) Temp. sensor
Thermistor Pipe out	NTC RI4/G	Pipe out (Gas) thermistor	NTC 5 kΩ, 5 m	Outlet pipe (Gas) Temp. sensor

8. Circuit Diagram & Setting

■ Universal Input – UI Setting #1

: Dip SW 1-2 is OFF + Dip SW 2-3 is OFF + Dip SW 2-4 is OFF



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

<Communication Module>

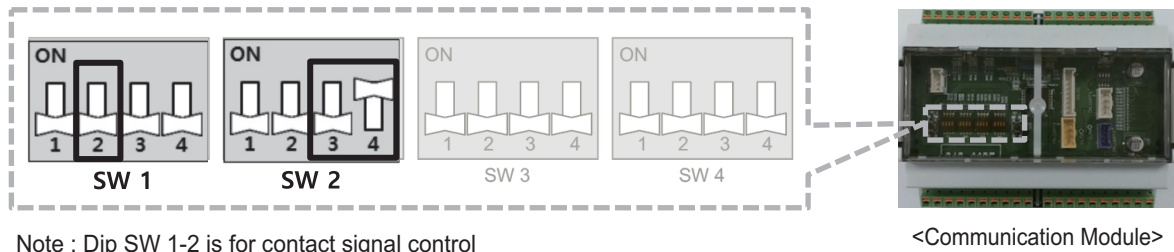
Name	Port	Value		Electrical Spec.	Function		
		Short	Open				
On / Off	UI1 (DI)	On	Off	Non voltage	Operation On/Off Control		
Cool / Heat	UI2 (DI)	Heating	Cooling	Non voltage	Heating/Cooling Operation Control if operation mode (Dip SW 3-2, 3-3) is set to cooling only mode, UI2 "Short" status will work 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.) ≤1.5 V, Target temp. and Room temp. is fixed like below		
					UI3 status = Thermal ON	Cooling mode Target temp = 16 °C, Room temp = 30 °C	Heating mode Target temp = 30 °C, Room temp = 16 °C
					UI3 status = Thermal OFF	Cooling mode Target temp = 30 °C, Room temp = 16 °C	Heating mode Target temp = 16 °C, Room temp = 30 °C
Target Temp.	UI4 (AI)	Voltage (V)		Electrical Spec. DC 0~10 V, 20 mA	Cooling Mode [°C]		Heating Mode [°C]
		1.5			UI3 short : 16 °C UI3 open : 30 °C		UI3 short : 30 °C UI3 open : 16 °C
		2.0			16		16
		2.5			17		17
		3.0			18		18
		3.5			19		19
		4.0			20		20
		4.5			21		21
		5.0			22		22
		5.5			23		23
		6.0			24		24
		6.5			25		25
		7.0			26		26
		7.5			27		27
		8.0			28		28
8.5		29		29			
9.0 ≤		30		30			

Note
Maintain previous value when getting intermediate value to UI4.

8. Circuit Diagram & Setting

■ Universal Input – UI Setting #2

: Dip SW 1-2 is OFF + Dip SW 2-3 is OFF + Dip SW 2-4 is ON



Name	Port	Value		Electrical Spec.	Function		
		Short	Open				
On / Off	UI1 (DI)	On	Off	Non voltage	Operation On/Off Control		
Forced Thermo On / Off	UI4 (DI)	Thermal On	Thermal Off	Non voltage	UI4 status = Thermal ON	Cooling mode Target temp = 16℃, Room temp = 30℃	Heating mode Target temp = 30℃, Room temp = 16℃
					UI4 status = Thermal OFF	Cooling mode Target temp = 30℃, Room temp = 16℃	Heating mode Target temp = 16℃, Room temp = 30℃

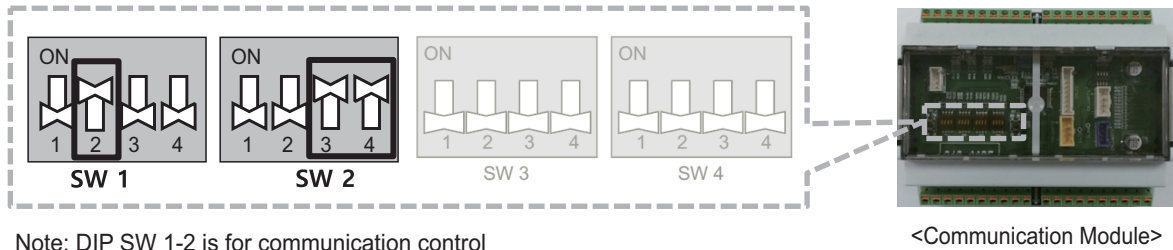
◆ Operation Mode Setting

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	

8. Circuit Diagram & Setting

■ Universal Input – UI Setting #4

: Dip SW 1-2 is ON + Dip SW 2-3 is ON + Dip SW 2-4 is ON



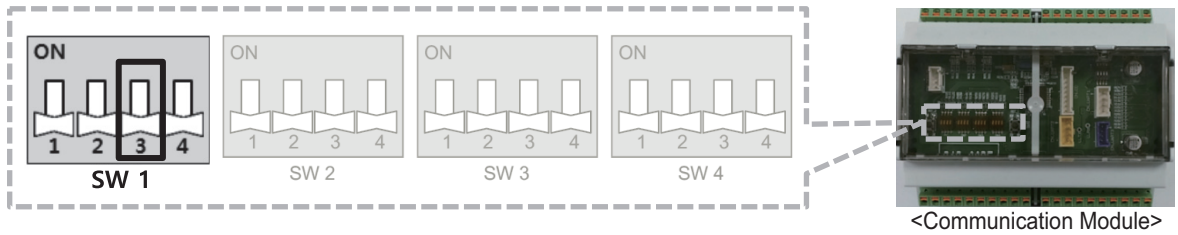
Name	Port	Value		Electrical Spec.	Function
		Short	Open		
On / Off	UI1 (DI)	On	Off	Non voltage	Operation On/Off Control
Cooling/Heating	UI2 (DI)	Heating	Cooling	Non voltage	Heating/Cooling mode operation control
Emergency stop	UI3 (DI)	Emergency stop	Normal	Non voltage	Emergency stop input

Note

These functions are operated when UI input state(On↔Off) is changed.

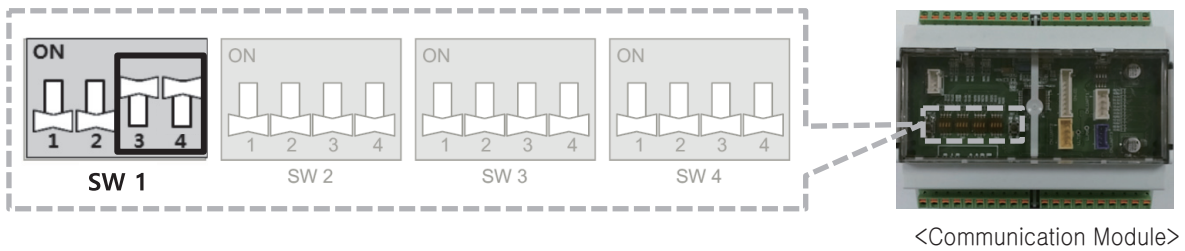
8. Circuit Diagram & Setting

■ Digital Output - Status : Dip SW 1-3 is OFF



Name	Port	Value		Electrical Spec.	Function
		Short	Open		
On / Off	DO1	On	Off	250 V AC / 1 A 30 V DC / 1 A	Operation On/Off Control
Defrost	DO2	Defrost	Normal		ODU Defrost Status(Only total defrost mode)
Alarm	DO3	Error	Normal		Error output status

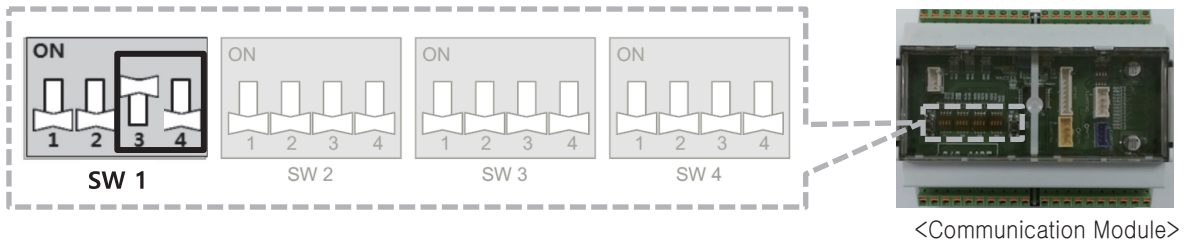
■ Digital Output - Fan Speed (Fixed) : Dip SW 1-3 is ON + Dip SW 1-4 is ON



Name	Port	Value		Electrical Spec.	Function
		Short	Open		
Fan_High	DO1	High	Operation Off	250 V AC / 1 A 30 V DC / 1 A	The fan will always be running as set fan speed except defrost. During defrost, the fan speed will change as low fan speed.
Fan_Mid	DO2	Mid			
Fan_Low	DO3	Low			

8. Circuit Diagram & Setting

- Digital Output – Fan Speed (Change)
: Dip SW 1-3 is ON + Dip SW 1-4 is OFF



◆ Cooling or Heating - TH ON

Name	Port	Value		Electrical Spec.	Function
		Short	Open		
Fan_High	DO1	High	-	250 V AC / 1 A 30 V DC / 1 A	DO ports output fan speed signal according to setting value.
Fan_Mid	DO2	Mid			
Fan_Low	DO3	Low			

◆ Cooling or Heating - TH OFF

Name	Port	Value		Electrical Spec.	Function
		Short	Open		
Fan_High	DO1	-	TH Off	250 V AC / 1 A 30 V DC / 1 A	DO 1,2 is 'Open', DO 3(Low) is 'short'
Fan_Mid	DO2	-	TH Off		
Fan_Low	DO3	TH Off	-		

◆ Heating - TH OFF or Defrost

Name	Port	Value		Electrical Spec.	Function
		Short	Open		
Fan_High	DO1	-	TH Off	250 V AC / 1 A 30 V DC / 1 A	1) During defrost, All DOs are 'Open' 2) The fan speed will be changed according to TH on/off In cooling mode, - The fan speed will be running as low fan during TH off - The fan speed will be running as set fan speed during TH on In heating mode, - The fan speed will be stopped during TH off temperature setting - The fan will be running for 20s during TH OFF - The fan speed will be running as set fan speed during TH on with pipe temp.
Fan_Mid	DO2	-	TH Off		
Fan_Low	DO3	-	TH Off		

8. Circuit Diagram & Setting

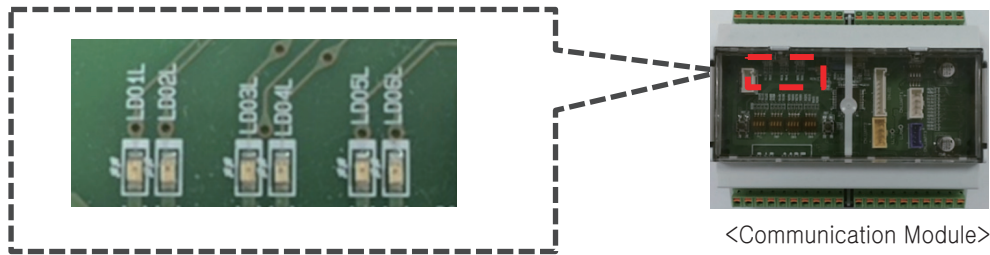
Remote Controller

Name	Port	Item	Electrical Spec.	Function
REMO	+12 V/SIG/GND	Wire Remote Controller	Max 50 m	Communication with Wired Remote Controller

EEV

Name	Port	Item	Electrical Spec.	Function
EEV	12 V DC/1/2/3/4	EEV Control	Max 5 m	EEV Control

LED Display



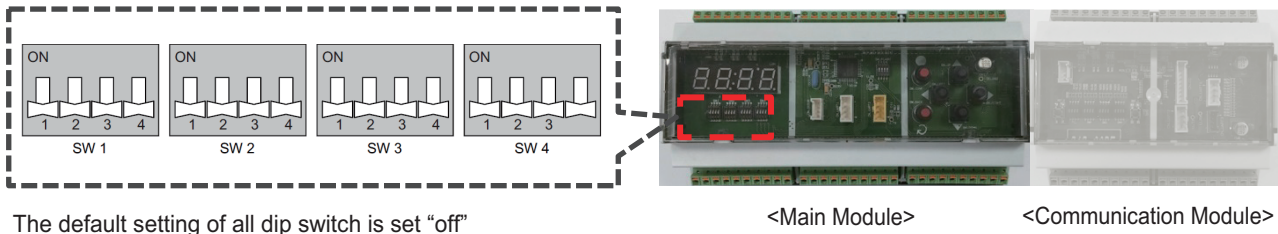
Name	Port	Function
LD01L	LED1	Modbus Comm. Tx
LD02L	LED2	Modbus Comm. Rx
LD03L	LED3	Inner Comm. Tx
LD04L	LED4	Inner Comm. Rx
LD05L	LED5	ODU Comm. (Repeat On/Off when communicating with ODU)
LD06L	LED6	Error Status (Repeat On/Off when error occurs)

8. Circuit Diagram & Setting

8.2 Discharge Air Temperature Control

PAHCMS000 / PAHCMM000+PAHCMC000

8.2.1 Function Setting Table of Dip Switch (Main Module)



The default setting of all dip switch is set "off"

<Main Module>

<Communication Module>

◆ Table of SW1~SW4

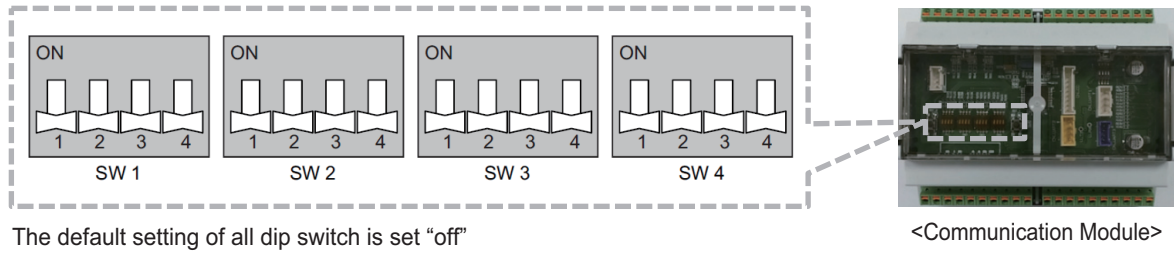
SW name	No	Item	Setting		Note
SW1	1	Control Type	On	Communication	Controlled by DDC through Modbus or LG Wired Remote Controller
			Off	Contact signal	Controlled by DDC through Contact signal LG Centralized controller can only monitor status
	2	Discharge Temp. Control Type	On	Stand alone	LG remote controllers 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 referring 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	LG Central Communication Type (CH3 of Main Module)	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	On	ODU Capacity Setting #2	ODU capacity control #2
			Off	ODU Capacity Setting #1	ODU capacity control #1
	2	ODU Capacity % Control ³⁾ & Prevent Derosting	On	ODU Capacity 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'
	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).
- 2) Emergency Stop function 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 AHUcomm. 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.
 - In case of using the ODU capacity control(capacity % control), SW2-1(ODU Capacity control #1, #2) setting is ignored.

8. Circuit Diagram & Setting

8.2.2 Function Setting Table of Dip Switch (Communication Module)



◆ Table of SW1~SW3

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	Module Communication (it must be 'On', when Comm module is connected with Main Module, even if DDC controls Main Module by contact 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	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 Please refer to 'Table of SW4' in Return Air Temperature Control (PAHCMR000)

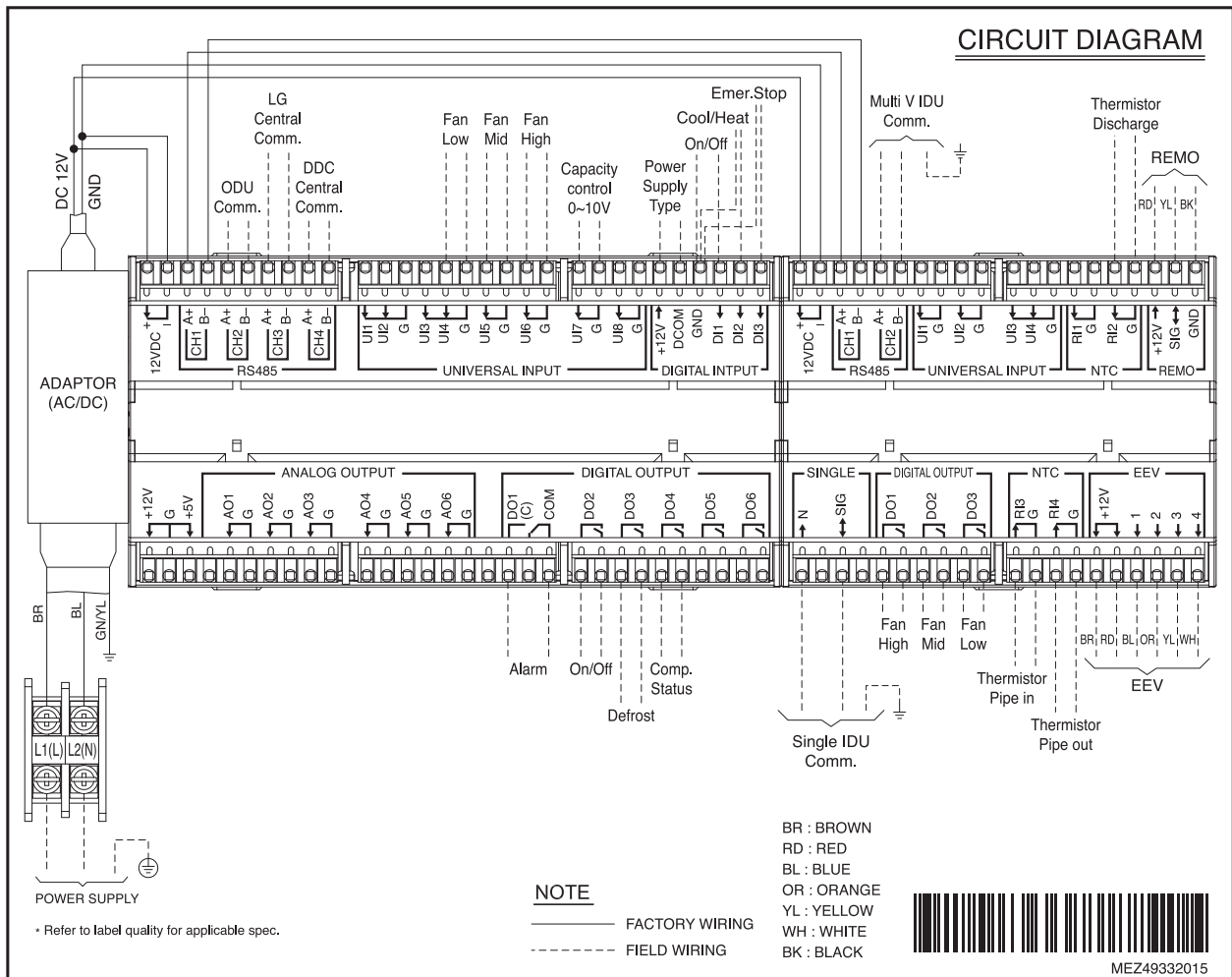
Note

- 1) Do not change the reserved switch(it may malfunction).

8. Circuit Diagram & Setting

8.2.3 Circuit Diagram

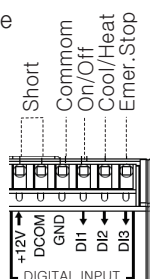
Main Module(Left)+Communication Module(right)



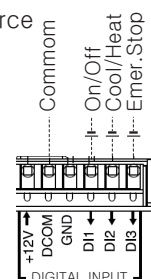
CAUTION

Please check the electrical specification of digital output (DO) of DDC whether 12 V DC or Non-voltage for 'DI Control'. According to the power source of DDC's DO(Digital Output), wirings method of DI(Digital Input) in AHU communication kit is different as below.

Internal Power Source (Non-Voltage)



External Power Source (12 V DC)



For detail wiring, please see "Digital Input - Internal power source", and Digital Input - External Power Source (12 V DC)" in this PDB

8. Circuit Diagram & Setting

[Function Setting of Main Module]

◆ RS485 Communication port

Name	Port	Contents	Electrical Spec.	Function
ODU Comm.	RS485 CH2	MULTI V : ODU Comm. (Gen A/B or INT A/B) Single : PI485 Gateway (BUS A/B)	Max 1km, 2C x (1.0~1.5) mm ² (shield wire)	Communication with MULTI V/Single split ODU for ODU Capacity control
LG Central Comm.	RS485 CH3	LG Central Comm.	Max 500 m, 2C x (1.0~1.5) mm ² (shield wire)	Communication with LG centralized controller through LGAP AHU Protocol
DDC Central Comm.	RS485 CH4	DDC(Modbus) Central Comm.	Max 500 m, 2C x (1.0~1.5) mm ² (shield wire)	Communication with DDC centralized controller through Modbus protocol

Note

Single PI485 Gateway (PMNFP14A1) is sold separately

■ Universal Input

• Digital Input

Name	Port	Value		Electrical Spec.	Function
		Short	Open		
Fan_High	UI4	Low	STOP	Non Voltage	Fan Speed Setting Input
Fan_Mid	UI5	Mid	STOP	Non Voltage	
Fan_Low	UI6	High	STOP	Non Voltage	

Note

UI is available when DIP SW1-1 is Off

• Analog Input

Name	Port	Value	Electrical Spec.	Function
Capacity Control0 ~ 10 V	UI7 (AI)	0 ~ 10 V Input	DC 0 ~ 10 V, 20 mA	ODU Capacity control input (0 ~ 10V) * When Temp. Control Type is 'Manual by DDC'(SW 1-2 : Off), below UI7 Table setting is available

Note

Please refer to the 'UI7(Analog Input) – ODU Capacity Control' of this PDB

• Digital Input - Internal Power Source (Non-voltage)

Name	Port	Value		Electrical Spec.	Function
		Short	Open		
On/Off	DI1 - GND	On	Off	Non voltage	Operation On/Off
Cool/Heat	DI2 - GND	Heating	Cooling	Non voltage	Operation Mode
Emer. Stop	DI3 - GND	Emergency Stop	Normal	Non voltage	Emergency Stop Input (Priority operation)
DI Control	+12 V -DCOM	Internal Power Source	External Power Source	Non voltage	Use internal power source for DI +12 V-DCOM should be "Short"

Note

DI1, DI2 are available when DIP SW 1-1 is Off.

DI3(Emergency Stop function) is available regardless of 'Control Type' setting.

• Digital Input - Internal Power Source (12 V DC)

Name	Port	Value		Electrical Spec.	Function
		Short	Open		
On/Off	DI1 - DCOM	On	Off	12 V DC 10 mA	Operation On/Off
Cool/Heat	DI2 - DCOM	Heating	Cooling	12 V DC 10 mA	Operation Mode
Emer. Stop	DI3 - DCOM	Emergency Stop	Normal	12 V DC 10 mA	Emergency Stop Input (Priority operation)
DI Control	+12 V -DCOM	Internal Power Source	External Power Source	Non voltage	Use internal power source for DI +12 V-DCOM should be "Open"

Note

DI1, DI2 are available when DIP SW 1-1 is Off.

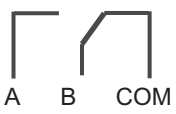

⚠ CAUTION

Please check the electrical specification of digital output (DO) of DDC controller whether 12 V DC or non-voltage for 'DI Control'.

According to the electrical spec. of DO of DDC controller, 'DI Control' should be set. If the wrong setting is made, DI does not work properly.

8. Circuit Diagram & Setting

■ Digital Output (Relay C contact)

Name	Port	Value	Electrical Spec.	Function
Alarm	DO1	- Normal Status  A B COM - Error Status  A B COM	30 V DC / 1 A 250 V AC / 1 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

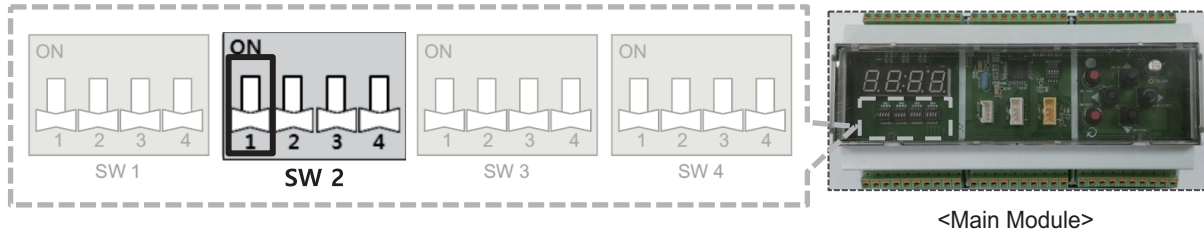
■ Digital Output

Name	Port	Value		Electrical Spec.	Function
		Short	Open		
On/Off	DO2	On	Off	250 V AC / 1 A 30 V DC / 1 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	-	-		-

8. Circuit Diagram & Setting

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

: Dip SW 2-1 is OFF



◆ 1 System

Voltage (V)	ODU Capacity Range (%)	Target Pressure ¹⁾ (kPa)	
		Cooling Mode	Heating Mode
0.0	Operation Off	-	-
4.0	40	1039	2010
4.5	40	1039	2010
5.0	50	974	2173
5.5	50	974	2173
6.0	60	922	2337
6.5	60	922	2337
7.0	70	882	2500
7.5	70	882	2500
8.0	80	856	2663
8.5	80	856	2663
9.0	90	830	2827
9.5	90	830	2827
10.0	100	804	2990

Note

- 1) : This target pressure is default value of ODU. Target pressure is depend on the ODU target pressure setting Fn8.
 - Please refer to ODU's manual for more information about how to set the target pressure.
 - ODU Capacity ratios mentioned in the table above are not exact.
 - 'Evaporative temperature / Condenser temperature' may vary depending on system operation frequency, pressure option setting and piping installation conditions.
 - Single Split ODU is only supporting <1 System> table.

◆ 2 System or more

Voltage (V)	Total Capacity ratio [%]			Each ODU's capacity ratio [%]			
	2 System	3 System	4 System	ODU Master#1	ODU Master#2	ODU Master#3	ODU Master#4
0.0	0	0.0	0.0	Operation Off	Operation Off	Operation Off	Operation Off
2.0	20	26.7	20.0	40	0	40	0
2.5	25	30.0	22.5	50	0	50	0
3.0	30	33.3	25.0	60	0	60	0
3.5	35	36.7	27.5	70	0	70	0
4.0	40	40.0	40.0	40	40	40	40
4.5	45	46.7	47.5	40	50	40	50
5.0	50	50.0	50.0	50	50	50	50
5.5	55	56.7	57.5	50	60	50	60
6.0	60	60.0	60.0	60	60	60	60
6.5	65	66.7	67.5	60	70	60	70
7.0	70	70.0	70.0	70	70	70	70
7.5	75	76.7	77.5	70	80	70	80
8.0	80	80.0	80.0	80	80	80	80
8.5	85	86.7	87.5	80	90	80	90
9.0	90	90.0	90.0	90	90	90	90
9.5	95	96.7	97.5	90	100	90	100
10.0	100	100.0	100.0	100	100	100	100

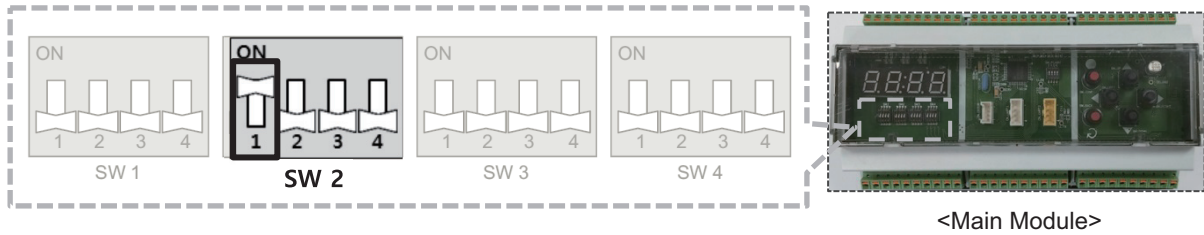
⚠ CAUTION

The actual temperature at the evaporator may vary by pressure drop. Please contact a local sale person to design an AHU heat exchanger.

8. Circuit Diagram & Setting

■ UI7(Analog Input) – ODU Capacity Control #2

: Dip SW 2-1 is ON



◆ 1 System

Voltage (V)	ODU Capacity Range (%)	Target Pressure ¹⁾ (kPa)	
		Cooling Mode	Heating Mode
0.0	Operation Off	-	-
1.0	100	804	2990
2.0	90	830	2827
3.0	80	856	2663
4.0	70	882	2500
5.0	60	922	2337
6.0	50	974	2173
7.0	45	1000	2108
8.0	40	1039	2010
9.0	Operation Off	-	-
10.0	Operation Off	-	-

Note

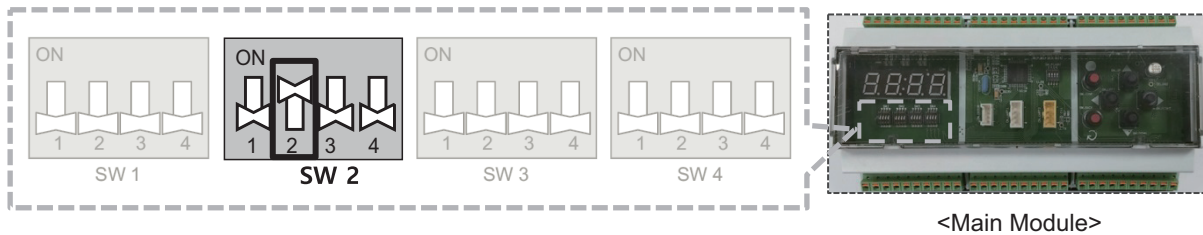
- 1) : This target pressure is default value of ODU. Target pressure is depend on the ODU target pressure setting Fn8.
 - Please refer to ODU's manual for more information about how to set the target pressure.
 - 'Evaporative temperature / Condenser temperature' may vary depending on system operation frequency, pressure option setting and piping installation conditions.

⚠ CAUTION

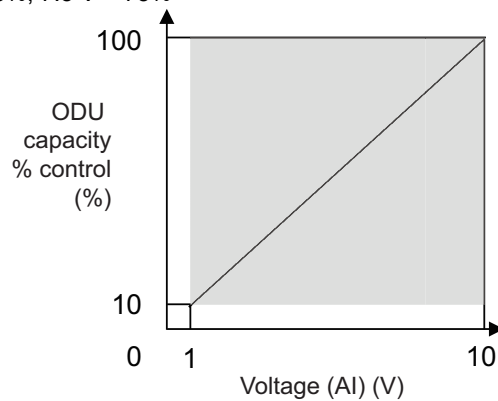
The actual temperature at the evaporator may vary by pressure drop. Please contact a local sale person to design an AHU heat exchanger.

8. Circuit Diagram & Setting

■ UI7(Analog Input) – ODU Capacity Control #3 : Dip SW 2-2 is ON



ODU capacity range (%) is from 10% to 100%, the controllable range is 5%, and It can change % according to analog input voltage(V). Ex) 1 V = 10%, 3.5 V = 35%, 7.5 V = 75%



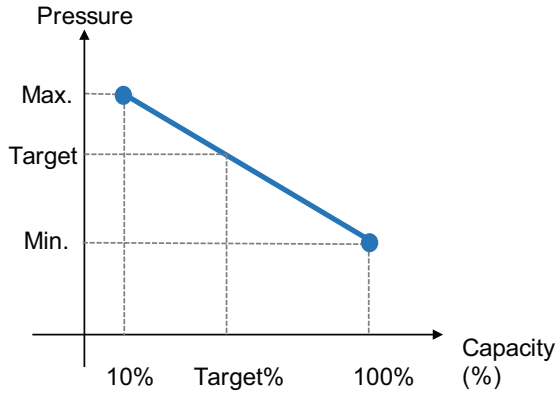
<ODU Capacity control range(%)>

Note

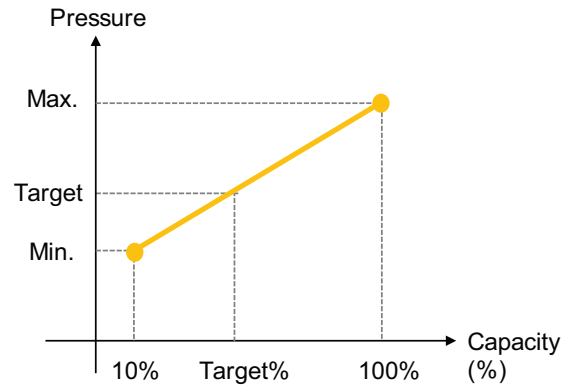
- 1) Evaporative temperature and Condensing temperature may vary depending on system operation conditions and piping installation conditions.
- 2) Function of ODU capacity control(capacity % control) can be applied only to Multi V outdoor units(after MULTI V 5 model) and please check the below.
 - Check the software version : Main PCB version of MULTI V 5 model is after version 1.43.0 and main module's version of AHU comm. 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.

8. Circuit Diagram & Setting

◆ ODU Target Pressure



<ODU target pressure range at cooling mode>



<ODU target pressure range at heating mode>

Voltage (V)	ODU Capacity Range (%)	Target Pressure ¹⁾ (kPa)	
		Cooling Mode	Heating Mode
10.0	100	804	2990
9.5	95	830	2958
9.0	90	856	2925
8.5	85	882	2859
8.0	80	908	2827
7.5	75	935	2794
7.0	70	948	2761
6.5	65	974	2696
6.0	60	1000	2663
5.5	55	1026	2631
5.0	50	1052	2598
4.5	45	1078	2565
4.0	40	1105	2500
3.5	35	1131	2467
3.0	30	1157	2435
2.5	25	1183	2402
2.0	20	1209	2337
1.5	15	1235	2304
1.0	10	1261	2271

Note

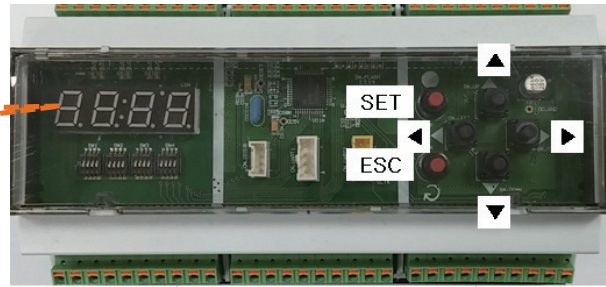
- 1) These target pressures are based on Multi V ODU default setting value. It can change using Multi V ODU function.
 - Cooling/Heating min. ~ max. pressure ranges are changed by Multi V ODU function Fn39.
- 2) Evaporative temperature and Condensing temperature may vary depending on system operation conditions and piping installation conditions.
- 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 comm. 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.

8. Circuit Diagram & Setting

■ Main Module Address Setting



7-Segment



<Main Module>

An address for the main module is needed when PAHCMS000 is connected to LG central controller or DDC by Modbus. The address of main module can be set within '1~247 in decimal number'. In this case, the address of the main module should be the same as the Modbus address in LG central controller or DDC.

◆ Setting Method

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

⚠ CAUTION

Note that LG central controller are using hexadecimal number. Please check the address of main module is matching to the address of LG central controller or DDC when using Modbus protocol.

Otherwise, PAHCMS000 will not operate properly.

ex) The address of main module '13' (decimal number)

' The address of LG central controller should be '0D' (Hexadecimal number)

8. Circuit Diagram & Setting

[Function Setting of Communication Module]

◆ RS485/SINGLE Communication port

Name	Port	Contents	Electrical Spec.	Function
MULTI V IDU Comm.	RS485 CH2	MULTI V IDU Comm. (IDU A/B)	Max 1 km 2C x (1.0~1.5) mm ² (shield wire)	Communication with MULTI V Outdoor unit
Single IDU Comm.	SINGLE N/SIG	Single IDU Comm. (IDU 2(N)/3)	Max 75 m 2C x (1.0~1.5) mm ² (shield wire)	Communication with Single Split Outdoor unit

◆ NTC Thermistor

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

■ Remote Controller

Name	Port	Item	Electrical Spec.	Function
REMO	+12 V/SIG/GND	Wire Remote Controller	Max 50 m	Communication with Wired Remote Controller

■ EEV

Name	Port	Item	Electrical Spec.	Function
EEV	12 V DC/1/2/3/4	EEV Control	Max 5 m	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.

8. Circuit Diagram & Setting

8.2.4 Defrost Operation

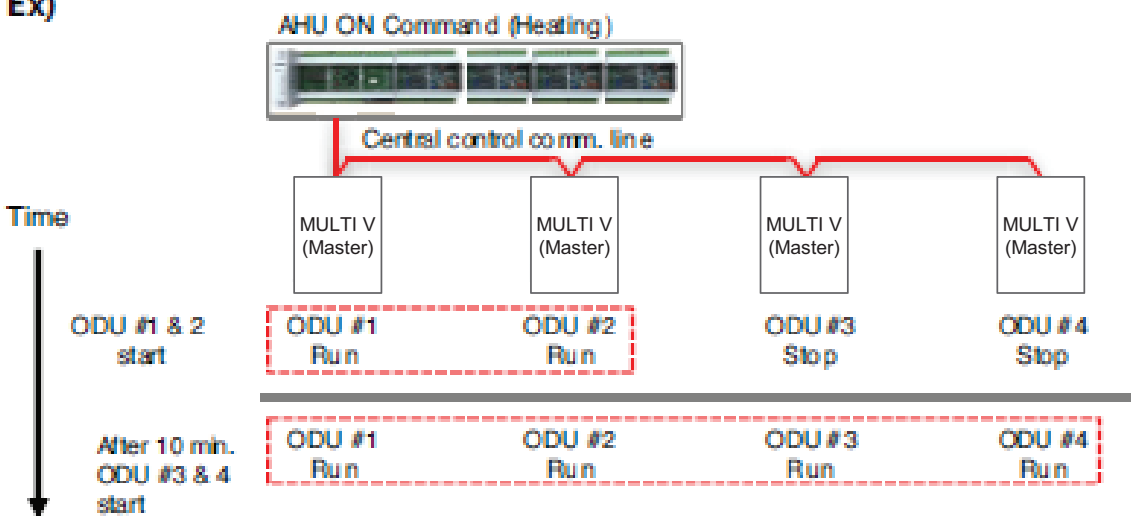
It is a function to prevent outdoor units from simultaneously entering defrost when two or more outdoor units are linked. The defrost operation function is only applied to the MULTI V outdoor unit(after MULTI V 5).

■ Sequential Start Up control of outdoor unit

- Operating condition : Power on → Heating operation command
- Stop condition : Power off or stop command
- Function operation
 - This function is available when DIP switch is set to the Sequential Start Up.
 - 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)
 - Sequence of start up operation

Number of Outdoor unit in 1 system	Initial start up	Start up after 10 min
2	1 ODUs	Another 1 ODU
3	2 ODUs	Another 1 ODU
4	2 ODUs	Another 2 ODUs

Ex)

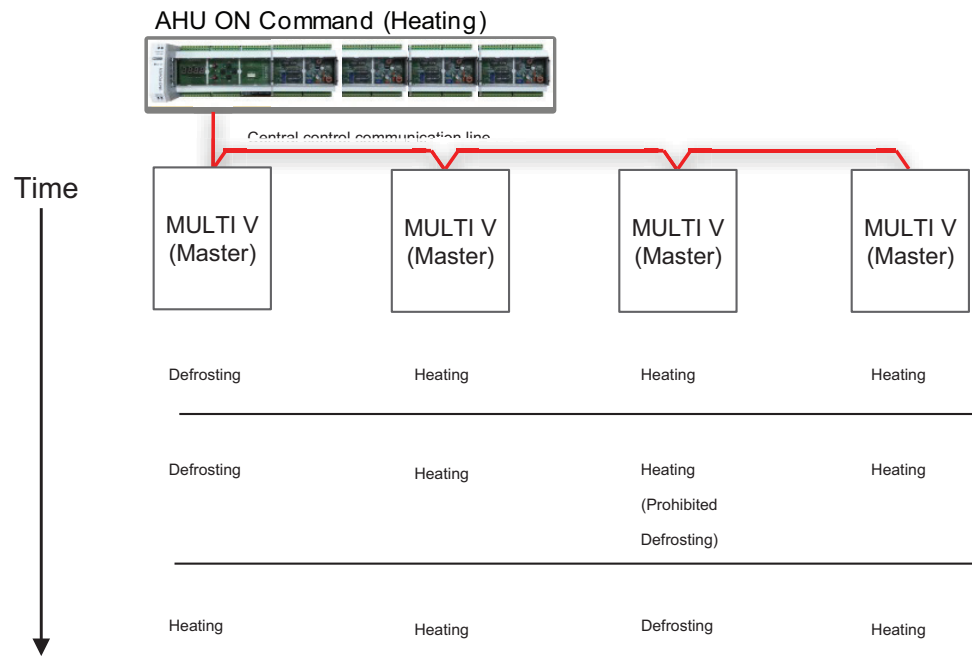


8. Circuit Diagram & Setting

■ The function for prevent defrosting at the same time

- Operating condition : Power on → Heating operation command
- Stop condition : Power off or stop command
- Function operation
 - Main module send the defrost prohibition signal to all ODU connection with main module.
 - If the main module receive the request of defrost from specific ODU unit, it send the defrost permission signal to specific ODU and send the defrost prohibition signal to other ODUs.
 - If the main module receive the defrost completion signal from specific ODU or in case of the all ODUs are not defrost mode, it send the defrost prohibition signal to all ODUs.

Ex)



Note

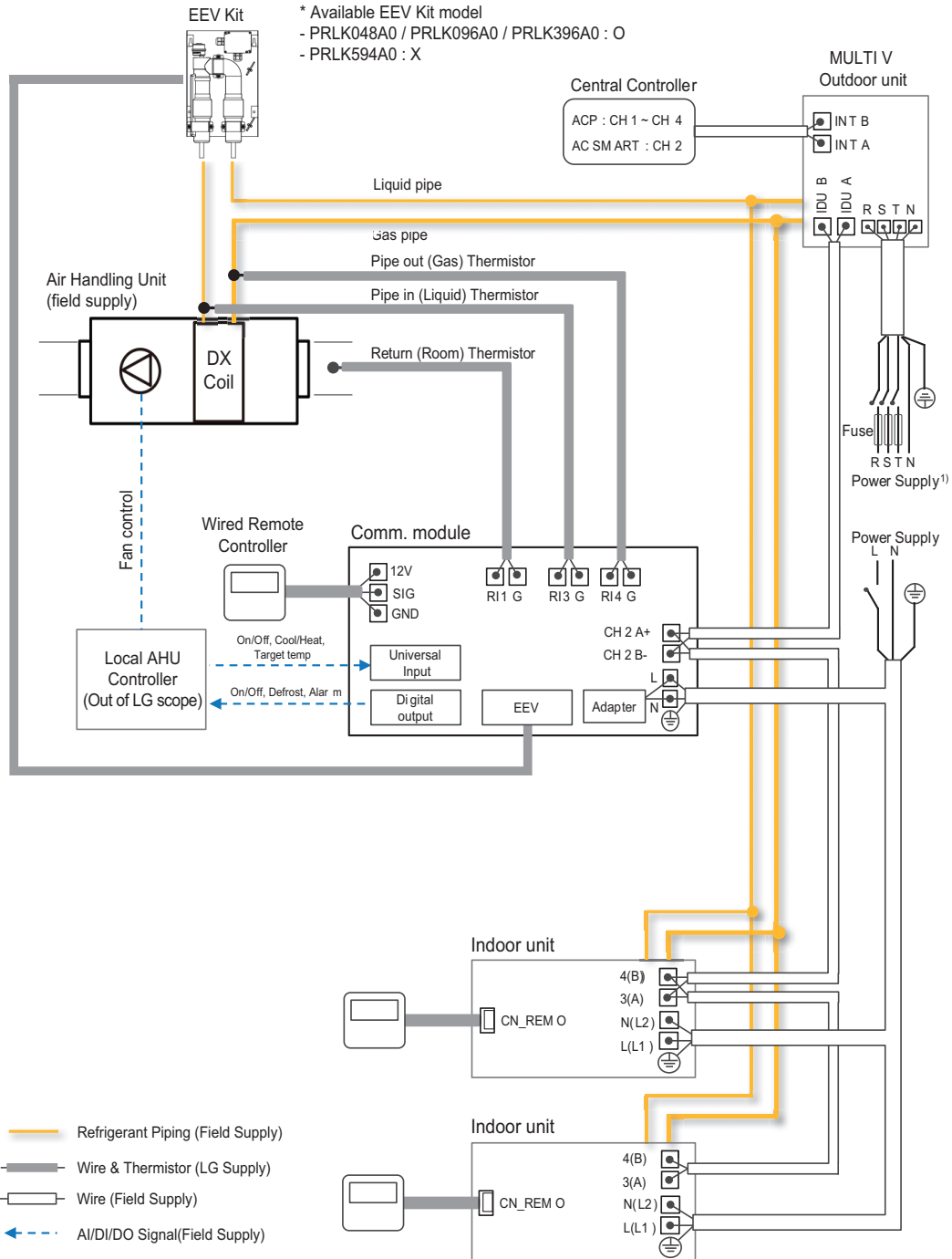
This function can be applied only to Multi V outdoor units(after MULTI V 5 model) and please check the below.

- 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 comm. kit is after version 1.3.
- Set the function : MULTI V 5 model should be set SVC SE28(DIP SW NO.5 : ON → Set to 'SVC' → Set to 'SE28' : ON) Please see the Multi V manual for more detail how to set this function.
- Based on Outdoor Unit cycle, the maximum running defrost variable can be changed.
- Total number of units operating in defrosting may be changed by Multi V ODU cycle in each system to protect the system.

9. External Diagram

9.1 Return Air Temperature Control (PAHCMR000)

9.1.1 MULTI V + EEV Kit + DDC (Contact Signal)

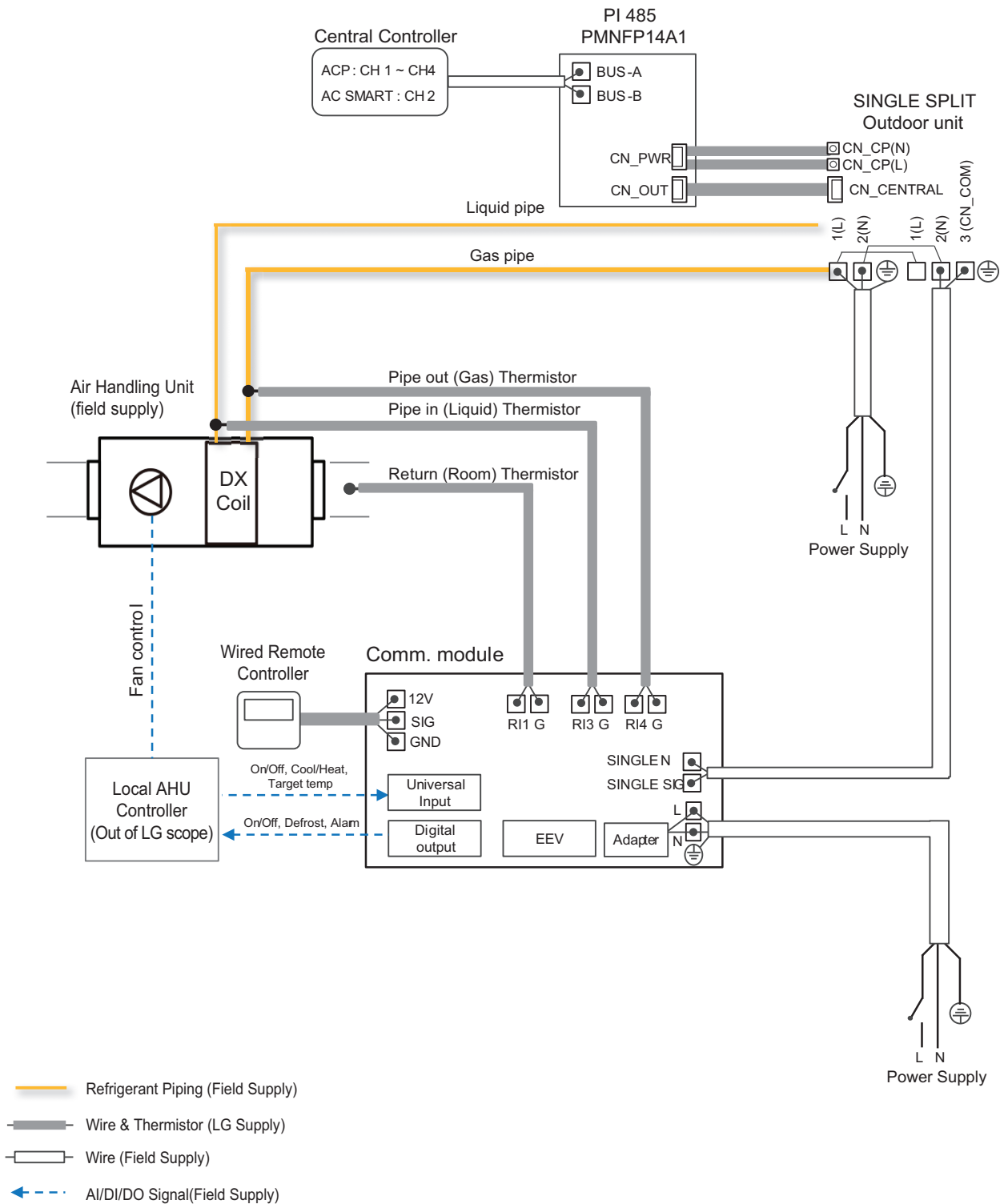


Note

- 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.

9. External Diagram

9.1.2 SINGLE SPLIT + DDC (Contact Signal)

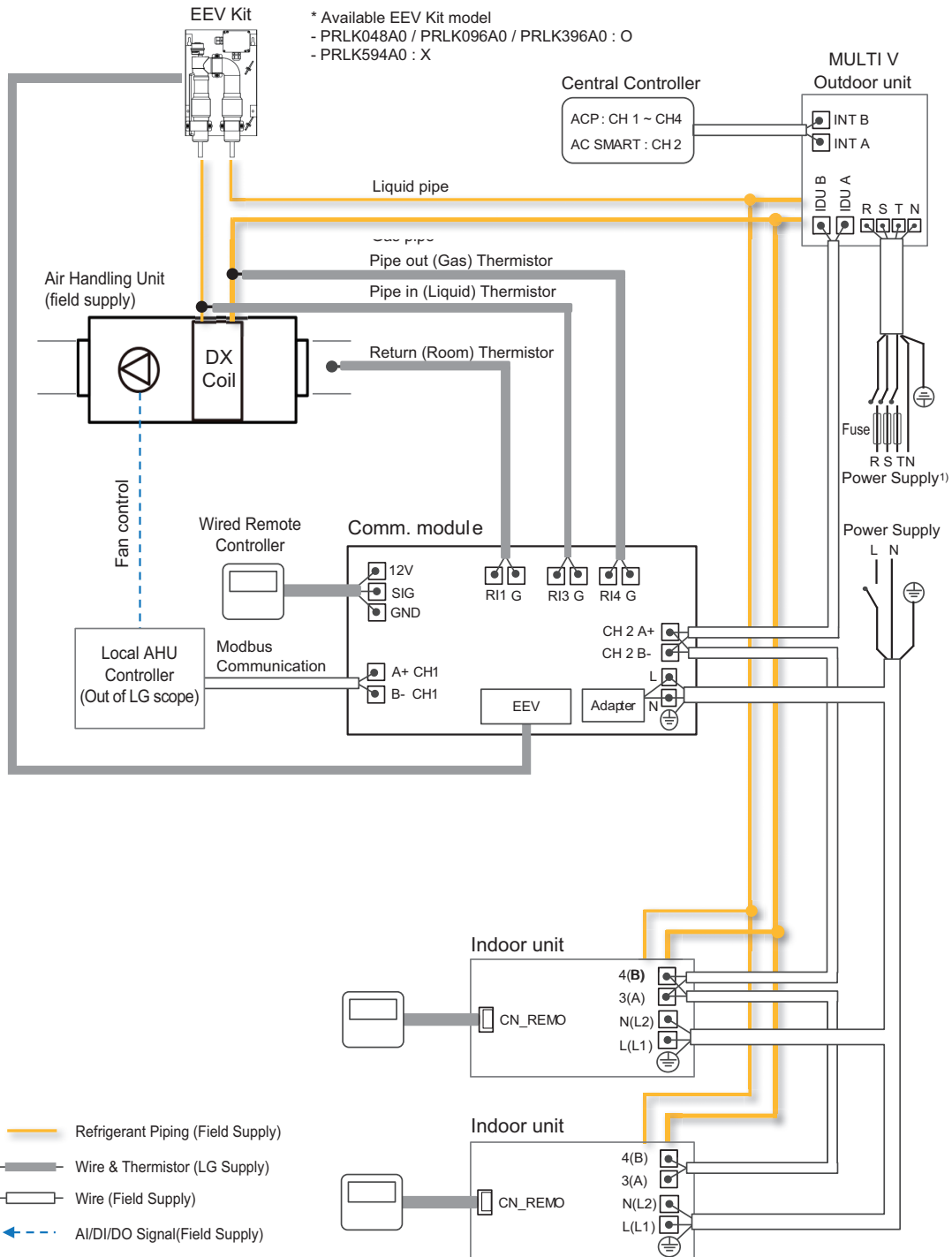


Note

- 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.

9. External Diagram

9.1.3 MULTI V + EEV Kit + LG Control/DDC (Modbus RTU)

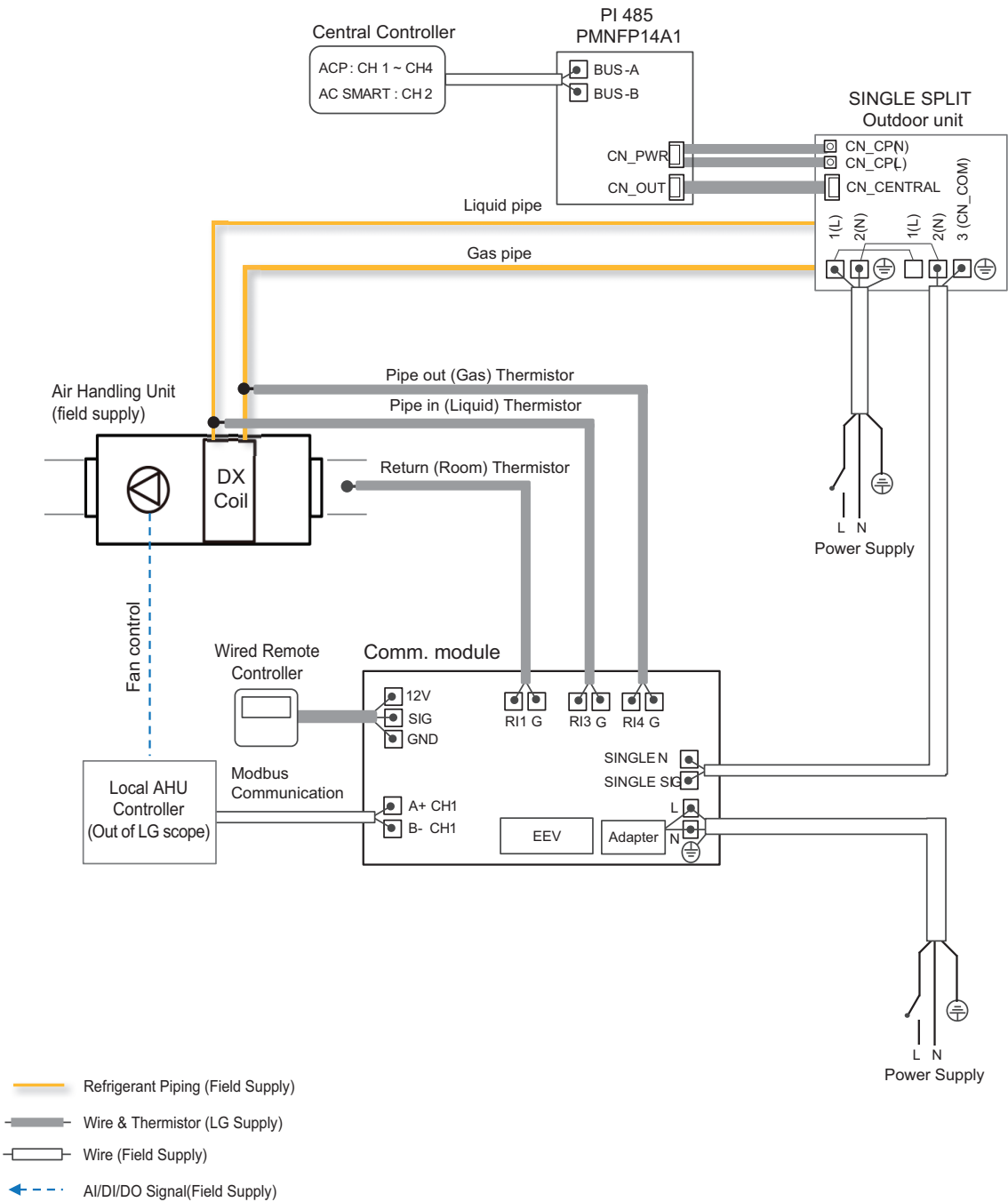


Note

- 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.

9. External Diagram

9.1.4 SINGLE SPLIT + LG Control/DDC (Modbus RTU)



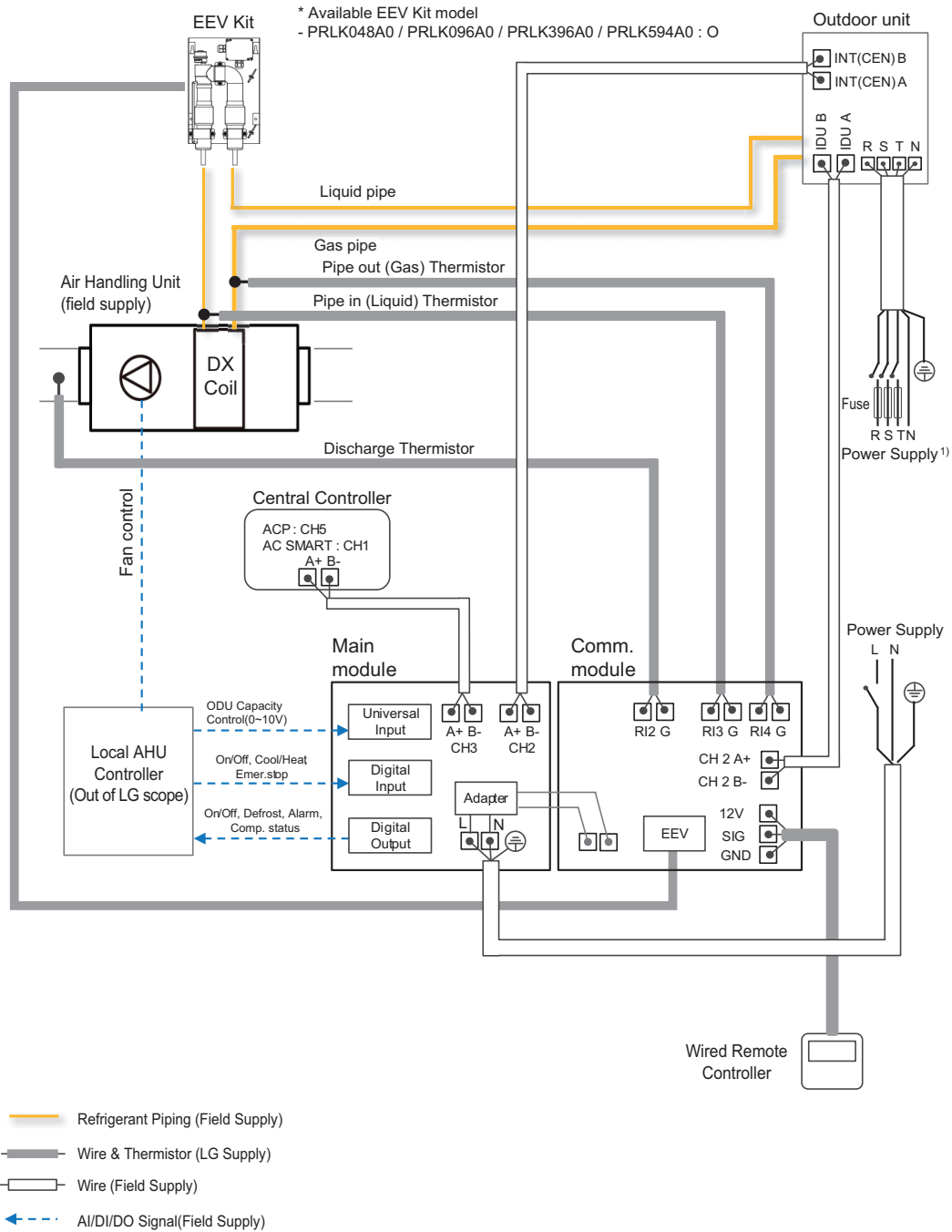
Note

- 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.

9. External Diagram

9.2 Discharge Air Temperature Control (PAHCMS000)

9.2.1 MULTI V + EEV + DDC (Contact signal)

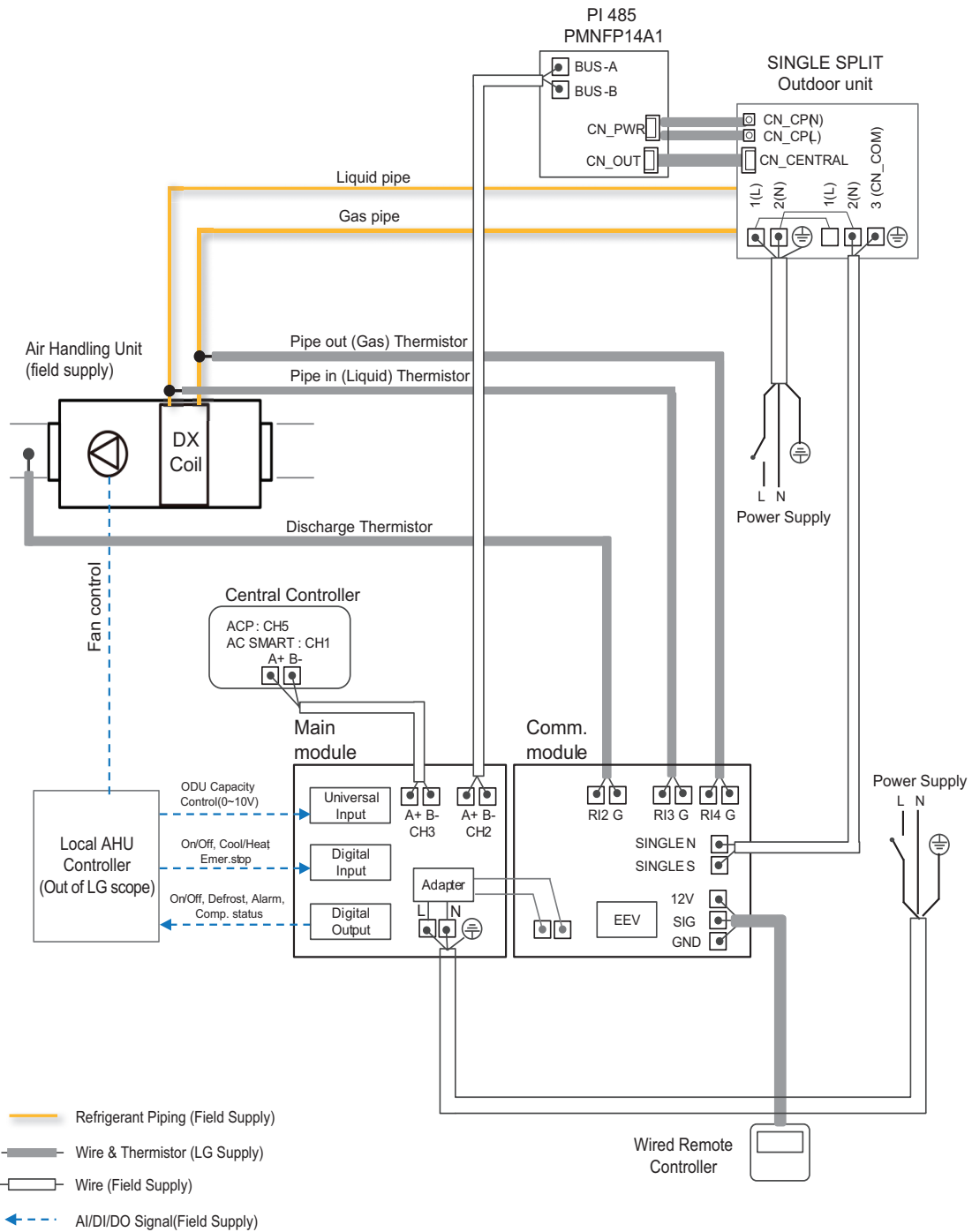


Note

- 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.

9. External Diagram

9.2.2 Single Split + DDC (Contact signal)

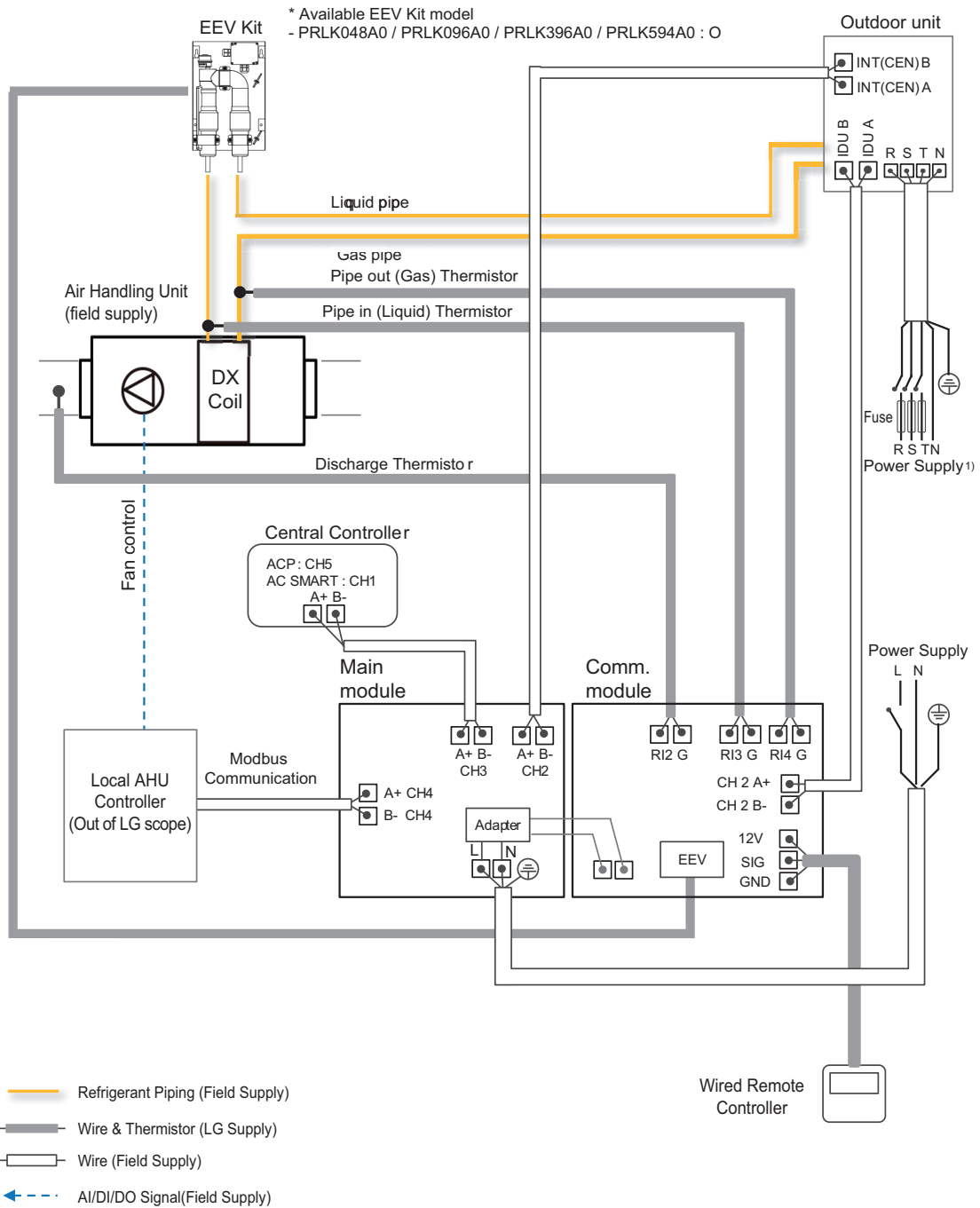


Note

- 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.

9. External Diagram

9.2.3 MULTI V + EEV + LG Control/DDC (Modbus RTU)

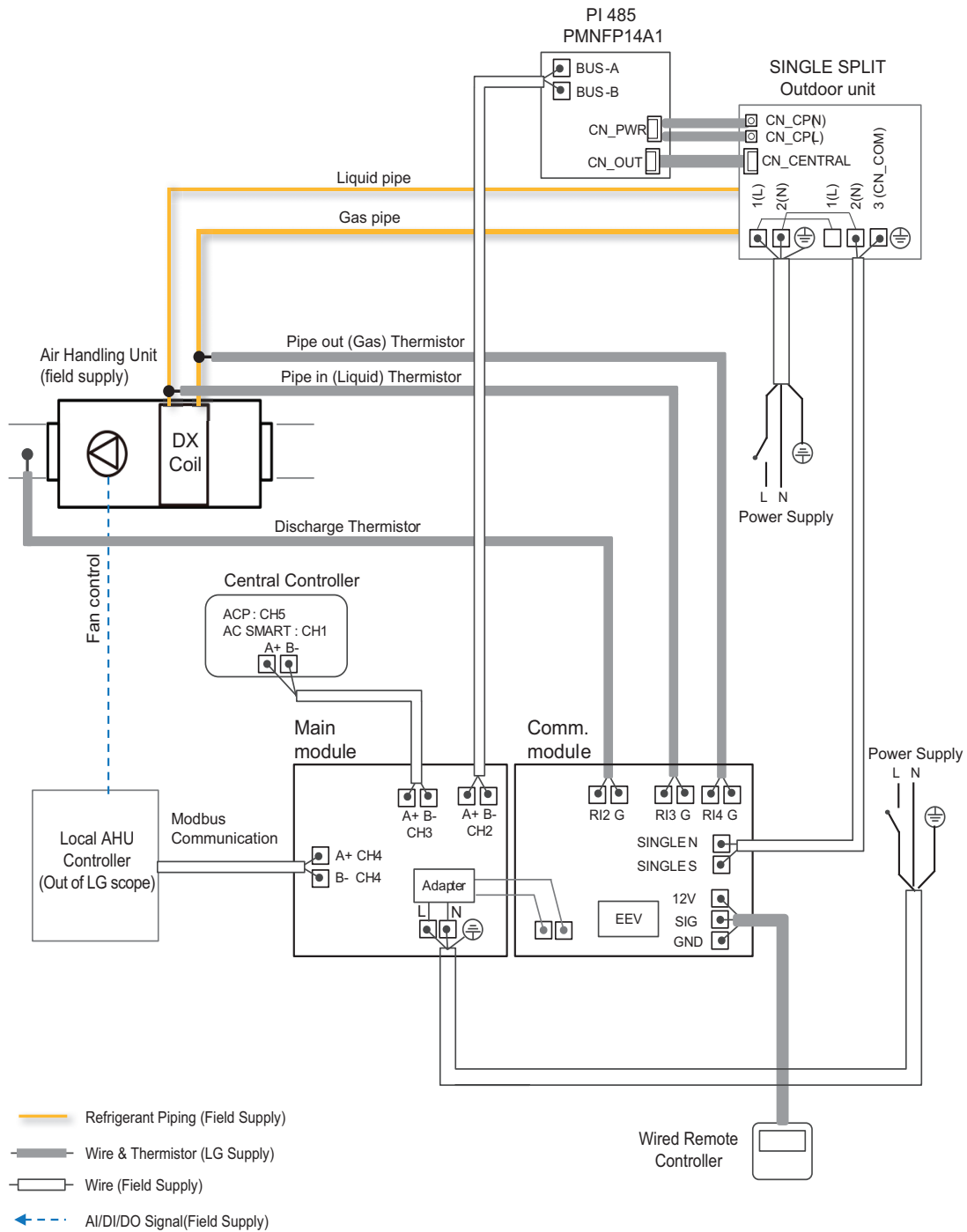


Note

- 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.

9. External Diagram

9.2.4 Single Split + LG Control/DDC (Modbus RTU)



Note

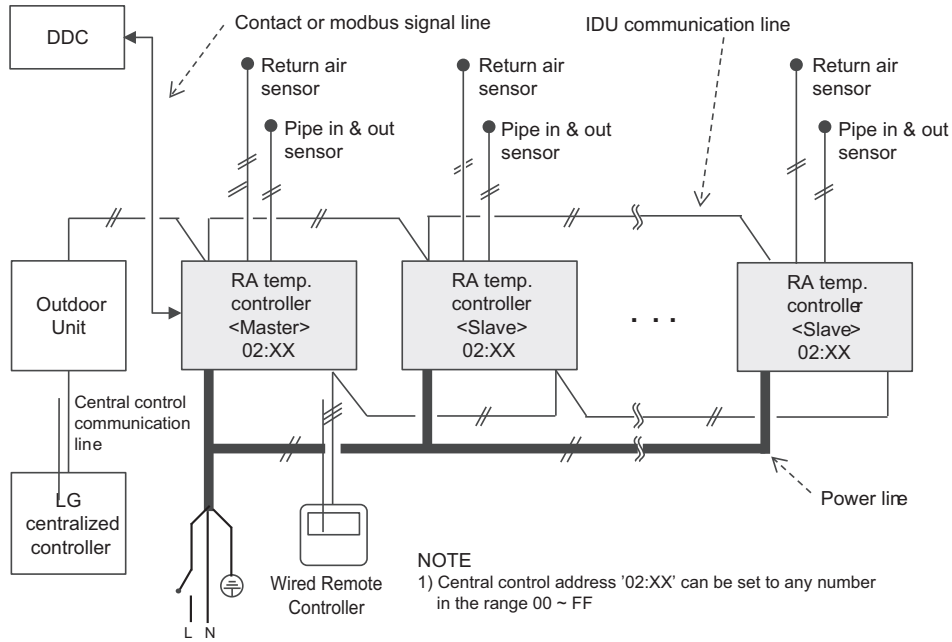
- 1) The type of power supply of outdoor unit can vary depending on the outdoor model.
- 2) Please make wiring between LG controller and outdoor unit with the same polarity.
- 3) LG controller can be optionally applied with DDC.

9. External Diagram

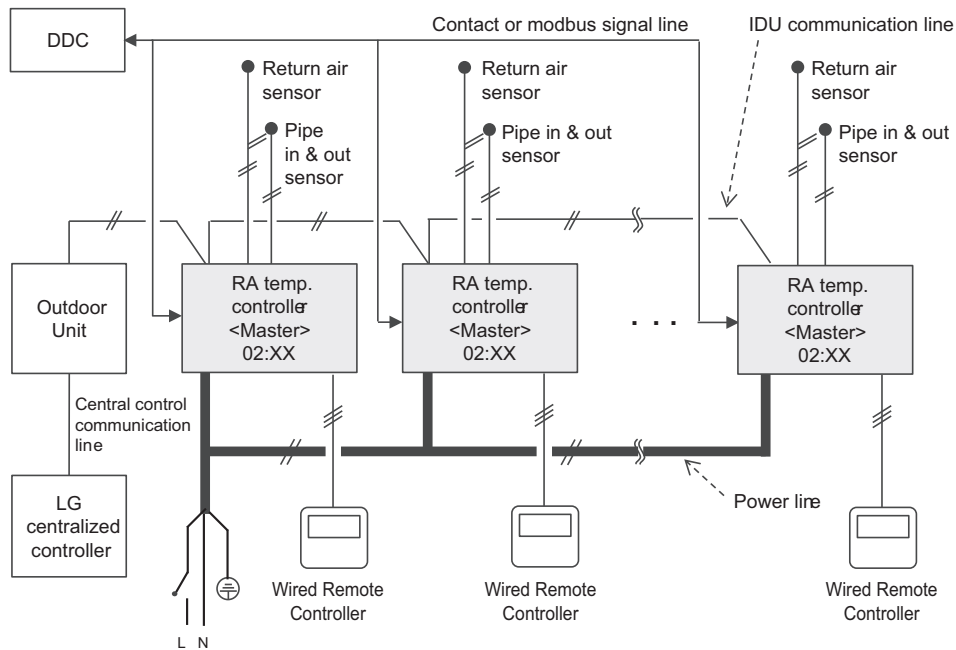
9.3 Multiple module installation guide

9.3.1 Return air temperature controller

■ Case 1 : One AHU



■ Case 2 : Multiple AHUs



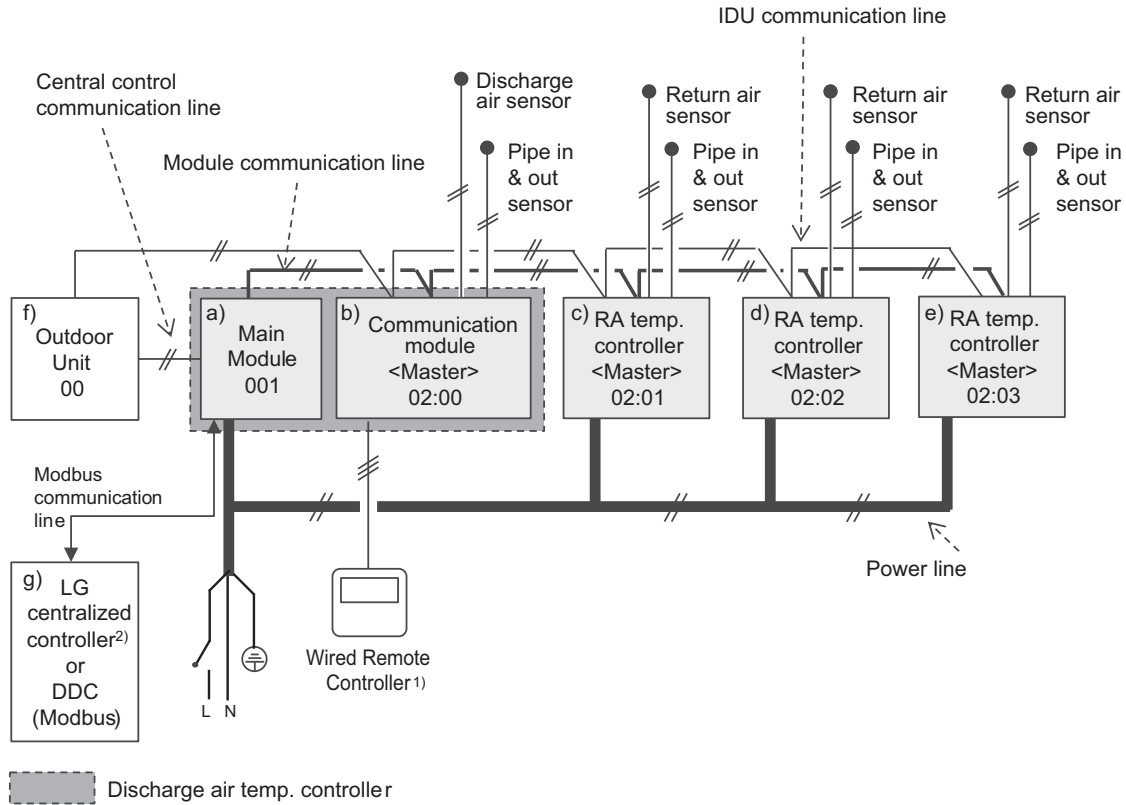
Note

Central control address '02:XX' can be set to any number in the range 00 ~ FF.

9. External Diagram

9.3.2 Discharge air temperature controller

■ Case 1 : One AHU with Multiple coils / LG Control or DDC by Modbus



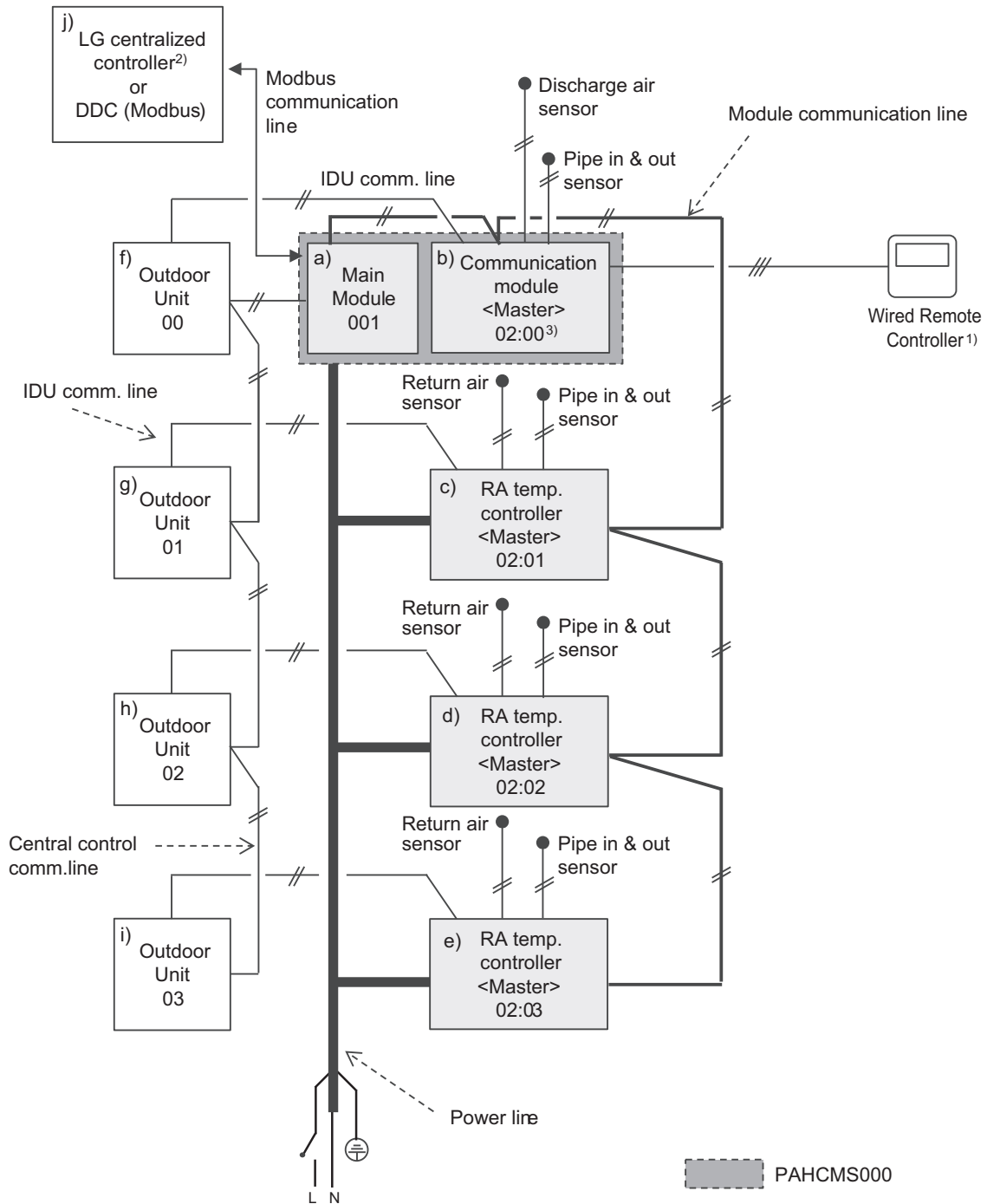
Name	Address to set	Address input method	Note
a) Main Module	1	by tact switch of Main module	For the Modbus communication - Please see "Main Module Address Setting"
b) Communication Module	00 (Fixed)	by remote controller	Please go to "Address Setting" of Installer setting. - Function code 02
c) RA temp. Controller #1	01 (Fixed)		
d) RA temp. Controller #2	02 (Fixed)		
e) RA temp. Controller #3	03 (Fixed)		
f) Outdoor Unit	00 (Fixed)	by tact switch of outdoor unit.	The address of outdoor unit should be same as communication Module of PAHCMS000 - Please see "ODU installation manual"
g) LG Central Controller	1	by central controller's installation function	It should be matched with Main module's address.

Note

- 1) Remote controller should be connected to PAHCMS000 and remote controller connected to PAHCMR000 unit can only monitor status.
- 2) LG Central controller addressing for discharge air temp. controller should be set as the same address of 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.
- 5) Return air sensors connected RA temp. controller (PAHCMR000) do not need to installed at the duct. They work as dummy sensors.

9. External Diagram

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



Note

This case is ONLY for MultiV product.

9. External Diagram

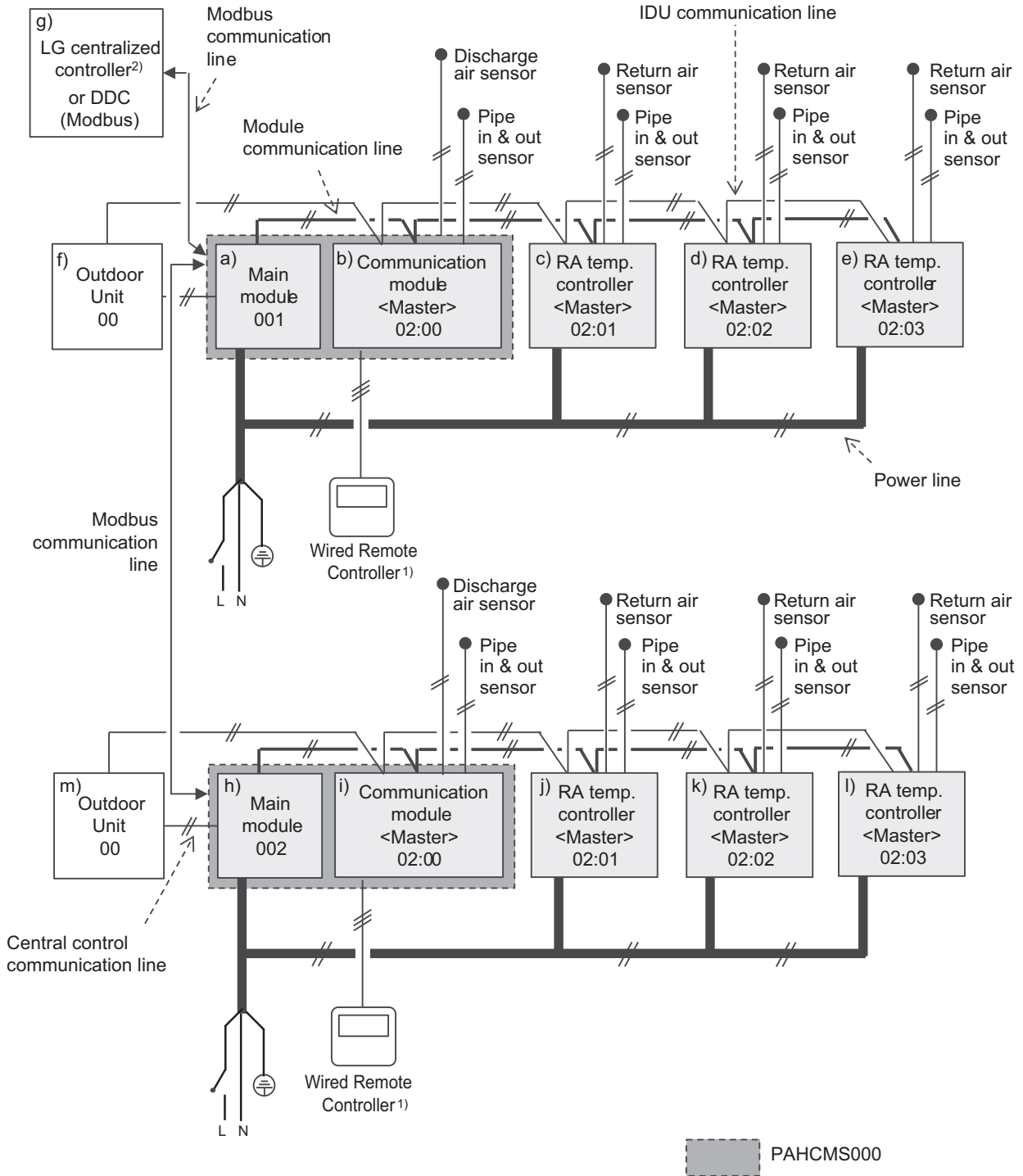
Name		Address to set	Address input method	Note
a)	Main Module	1	by tact switch of Main module	For the Modbus communication - Please see "Main Module Address Setting"
b)	Communication Module	00 (Fixed)	by remote controller	Please go to "Address Setting" of Installer setting. - Function code 02
c)	RA temp. Controller #1	01 (Fixed)		
d)	RA temp. Controller #2	02 (Fixed)		
e)	RA temp. Controller #3	03 (Fixed)		
f)	Outdoor Unit #1	00 (Fixed)	by tact switch of outdoor unit.	The address of outdoor unit should be same as communication Module of PAHCMS000 - Please see "ODU installation manual"
g)	Outdoor Unit #2	01 (Fixed)		
h)	Outdoor Unit #3	02 (Fixed)		
i)	Outdoor Unit #4	03 (Fixed)		
j)	LG Central Controller Of DDC	1	by central controller's installation function	It should be matched with Main module's address.

Note

- 1) Remote controller should be connected to PAHCMS000 and remote controller connected to PAHCMR000 unit can only monitor status.
- 2) LG Central controller addressing for discharge air temp. controller should be set as the same address of 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.
- 5) Return air sensors connected RA temp. controller (PAHCMR000) do not need to installed at the duct. They work as dummy sensors.

9. External Diagram

Case 3 : Multiple AHUs with Multiple coils / LG Control or by DDC by Modbus



9. External Diagram

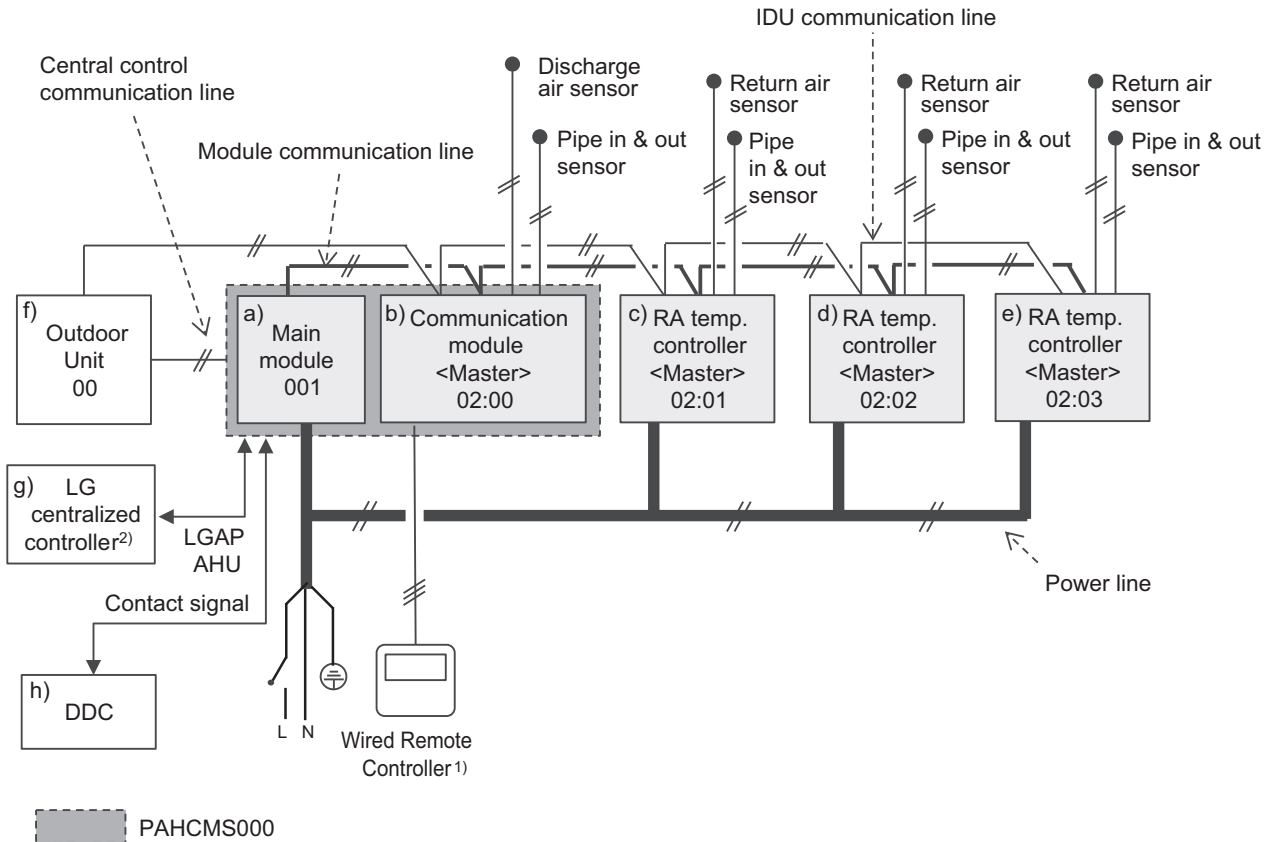
Name		Address to set	Address input method	Note
a)	Main Module	1	by tact switch of Main module	For the Modbus communication - Please see "Main Module Address Setting"
b)	Communication Module	00 (Fixed)	by remote controller	Please go to "Address Setting" of Installer setting. - Function code 02
c)	RA temp. Controller #1	01 (Fixed)		
d)	RA temp. Controller #2	02 (Fixed)		
e)	RA temp. Controller #3	03 (Fixed)		
f)	Outdoor Unit	00 (Fixed)	by tact switch of outdoor unit.	The address of outdoor unit should be same as communication Module of PAHCMS000 - Please see "ODU installation manual"
g)	LG Central Controller	01	by central controller's installation function	It should be matched with Main module's address.
h)	Main Module	2	by tact switch of Main module	For the Modbus communication - Please see "Main Module Address Setting"
i)	Communication Module	00 (Fixed)	by remote controller	Please go to "Address Setting" of Installer setting. - Function code 02
j)	RA temp. Controller #1	01 (Fixed)		
k)	RA temp. Controller #2	02 (Fixed)		
l)	RA temp. Controller #3	03 (Fixed)		
m)	Outdoor Unit	00 (Fixed)	by tact switch of outdoor unit.	The address of outdoor unit should be same as communication Module of PAHCMS000 - Please see "ODU installation manual"
g)	LG Central Controller	02	by central controller's installation function	It should be matched with Main module's address.

Note

- 1) Remote controller should be connected to PAHCMS000 and remote controller connected to PAHCMR000 unit can only monitor status.
- 2) LG Central controller addressing for discharge air temp. controller should be set as the same address of 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.
- 5) Return air sensors connected RA temp. controller (PAHCMR000) do not need to installed at the duct. They work as dummy sensors.

9. External Diagram

Case 4 : One AHU / DDC by Contact Signal



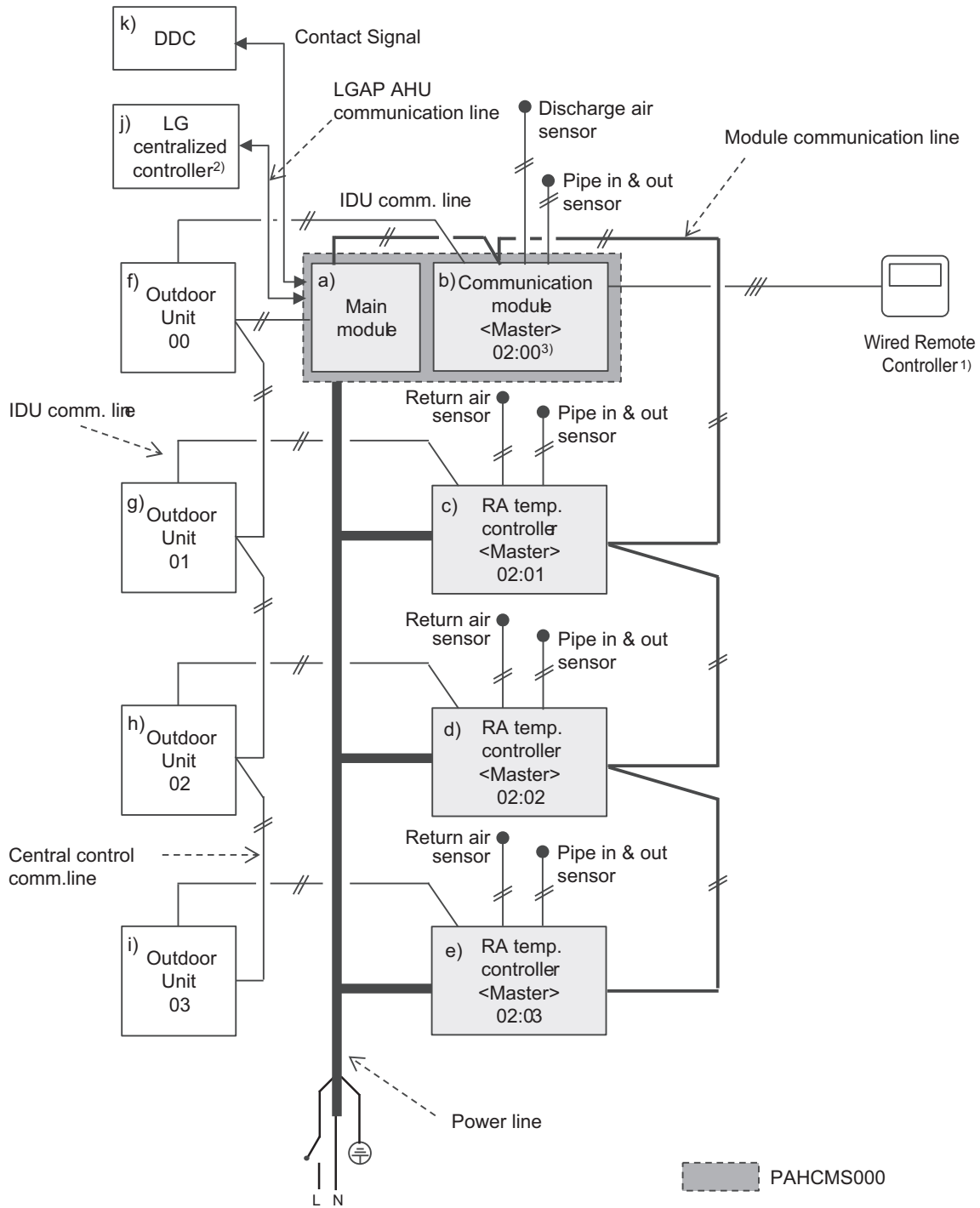
Name	Address to set	Address input method	Note
a) Main Module	1	by tact switch of Main module	For the Modbus communication - Please see "Main Module Address Setting"
b) Communication Module	00 (Fixed)	by remote controller	Please go to "Address Setting" of Installer setting. - Function code 02
c) RA temp. Controller #1	01 (Fixed)		
d) RA temp. Controller #2	02 (Fixed)		
e) RA temp. Controller #3	03 (Fixed)		
f) Outdoor Unit	00 (Fixed)	by tact switch of outdoor unit.	The address of outdoor unit should be same as communication Module of PAHCMS000 - Please see "ODU installation manual"
g) LG Central Controller	1	by central controller's installation function	It should be matched with Main module's address.
h) DDC			Don't care

Note

- 1) Remote controller should be connected to PAHCMS000 and remote controller connected to PAHCMR000 unit can only monitor status.
- 2) LG Central controller addressing for discharge air temp. controller should be set as the same address of 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.
- 5) Return air sensors connected RA temp. controller (PAHCMR000) do not need to installed at the duct. They work as dummy sensors.

9. External Diagram

Case 5 : One AHU with Multiple ODU's / DDC by Contact Signal



9. External Diagram

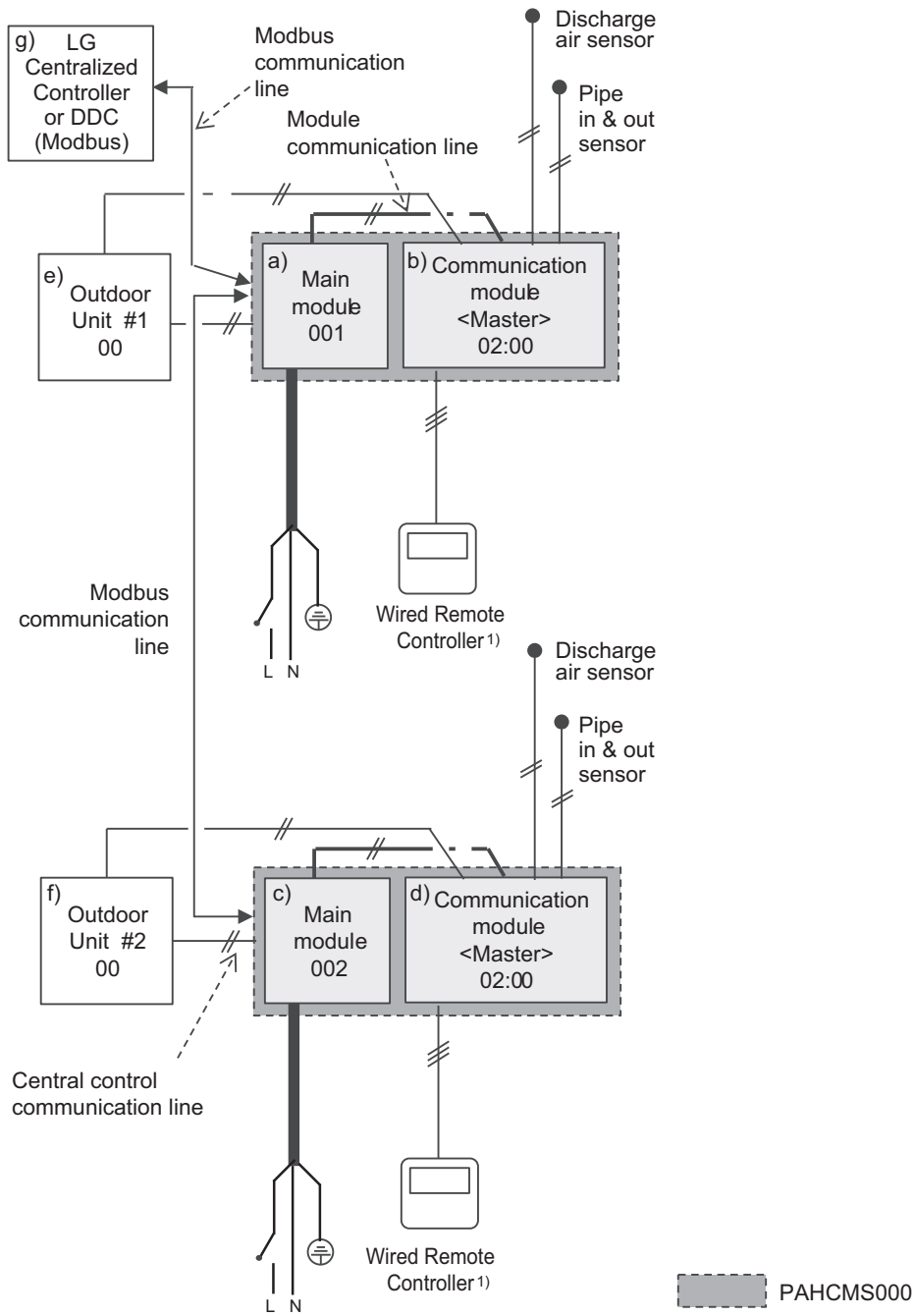
Name		Address to set	Address input method	Note
a)	Main Module	1	by tact switch of Main module	For the Modbus communication - Please see "Main Module Address Setting"
b)	Communication Module	00 (Fixed)	by remote controller	Please go to "Address Setting" of Installer setting. - Function code 02
c)	RA temp. Controller #1	01 (Fixed)		
d)	RA temp. Controller #2	02 (Fixed)		
e)	RA temp. Controller #3	03 (Fixed)		
f)	Outdoor Unit #1	00 (Fixed)	by tact switch of outdoor unit.	The address of outdoor unit should be same as communication Module of PAHCMS000 - Please see "ODU installation manual"
g)	Outdoor Unit #2	01 (Fixed)		
h)	Outdoor Unit #3	02 (Fixed)		
i)	Outdoor Unit #4	03 (Fixed)		
j)	LG Central Controller	1	by central controller's installation function	It should be matched with Main module's address.
h)	DDC			Don't care

Note

- 1) Remote controller should be connected to PAHCMS000 and remote controller connected to PAHCMR000 unit can only monitor status.
- 2) LG Central controller addressing for discharge air temp. controller should be set as the same address of 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.
- 5) Return air sensors connected RA temp. controller (PAHCMR000) do not need to installed at the duct. They work as dummy sensors.

9. External Diagram

Case 6 : One AHU with multiple coils / DDC by Modbus



9. External Diagram

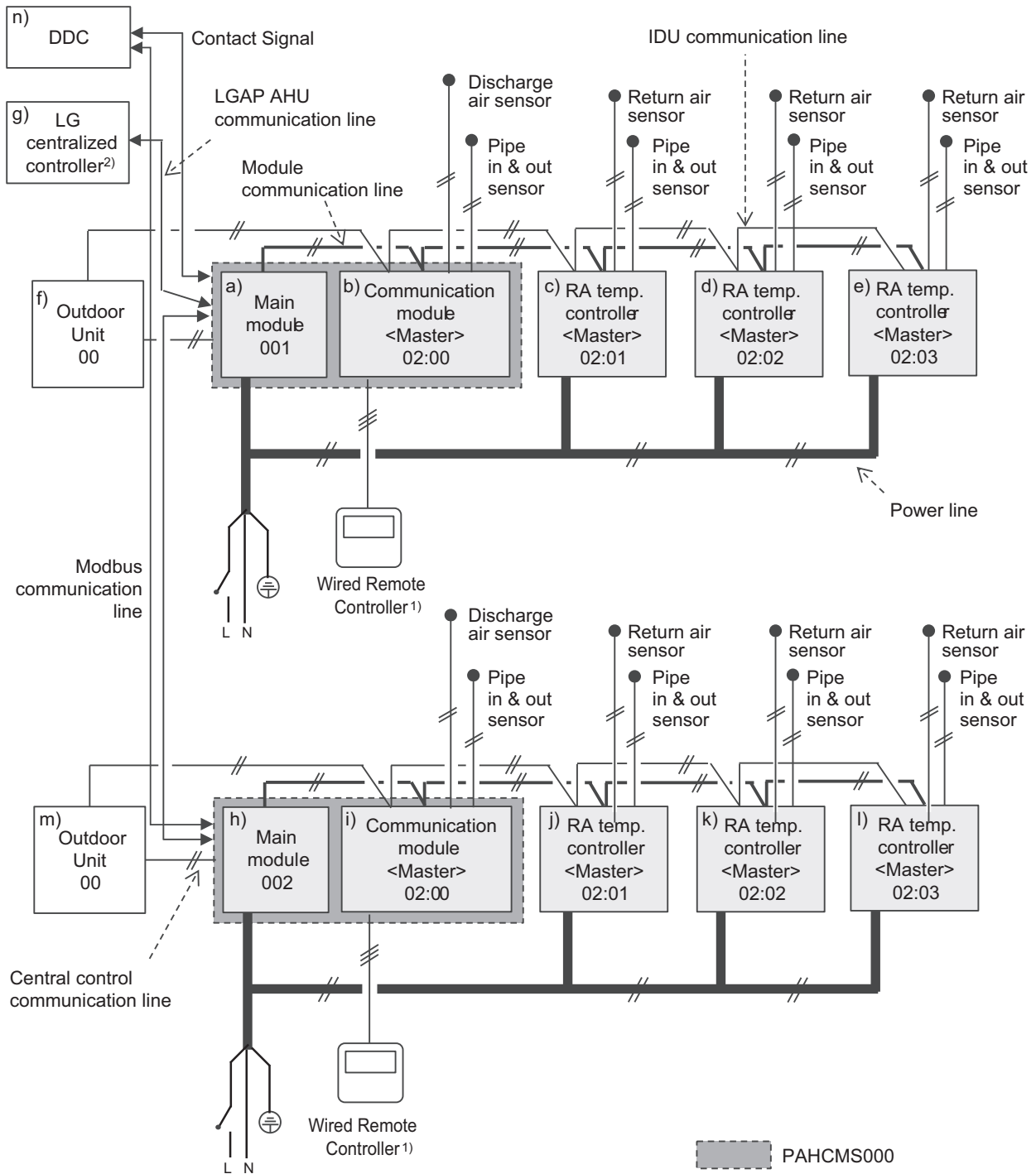
Name		Address to set	Address input method	Note
a)	Main Module #1	1	by tact switch of Main module	For the Modbus communication - Please see "Main Module Address Setting"
b)	Communication Module #1	00 (Fixed)	by remote controller	Please go to "Address Setting" of Installer setting. - Function code 02
c)	Main Module #2	2	by tact switch of Main module	For the Modbus communication - Please see "Main Module Address Setting"
d)	Communication Module #2	00 (Fixed)	by remote controller	Please go to "Address Setting" of Installer setting. - Function code 02
e)	Outdoor Unit #1	00 (Fixed)	by tact switch of outdoor unit.	The address of outdoor unit should be same as communication Module of PAHCMS000 - Please see "ODU installation manual"
f)	Outdoor Unit #2	00 (Fixed)	by tact switch of outdoor unit.	The address of outdoor unit should be same as communication Module of PAHCMS000 - Please see "ODU installation manual"
g)	LG Central Controller	1	by central controller's installation function	It should be matched with Main module's address.

Note

- 1) Remote controller should be connected to PAHCMS000 and remote controller connected to PAHCMR000 unit can only monitor status.
- 2) LG Central controller addressing for discharge air temp. controller should be set as the same address of 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.

9. External Diagram

Case 7 : Multiple AHUs / DDC by Contact Signal



9. External Diagram

Name		Address to set	Address input method	Note
a)	Main Module	1	by tact switch of Main module	For the Modbus communication - Please see "Main Module Address Setting"
b)	Communication Module	00 (Fixed)	by remote controller	Please go to "Address Setting" of Installer setting. - Function code 02
c)	RA temp. Controller #1	01 (Fixed)		
d)	RA temp. Controller #2	02 (Fixed)		
e)	RA temp. Controller #3	03 (Fixed)		
f)	Outdoor Unit	00 (Fixed)	by tact switch of outdoor unit.	The address of outdoor unit should be same as communication Module of PAHCMS000 - Please see "ODU installation manual"
g)	LG Central Controller	1 and 2	by central controller's installation function	It should be matched with Main module's address.
n)	DDC	Don't care		
h)	Main Module	2	by tact switch of Main module	For the Modbus communication - Please see "Main Module Address Setting"
i)	Communication Module	00 (Fixed)	by remote controller	Please go to "Address Setting" of Installer setting. - Function code 02
j)	RA temp. Controller #1	01 (Fixed)		
k)	RA temp. Controller #2	02 (Fixed)		
l)	RA temp. Controller #3	03 (Fixed)		
m)	Outdoor Unit	00 (Fixed)	by tact switch of outdoor unit.	The address of outdoor unit should be same as communication Module of PAHCMS000 - Please see "ODU installation manual"

Note

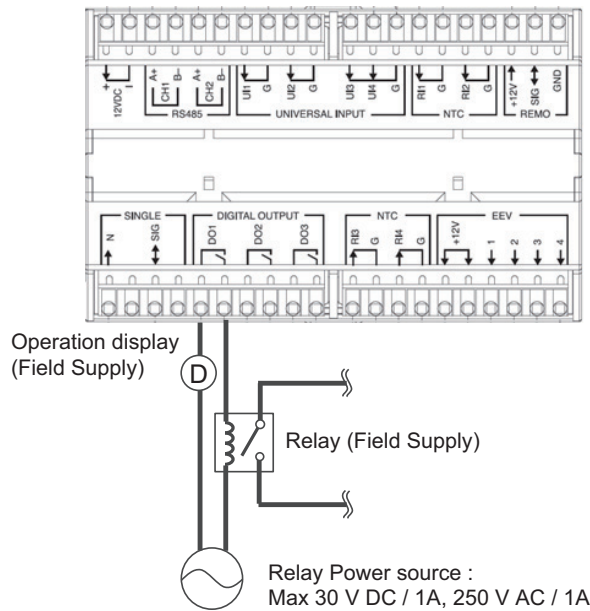
- 1) Remote controller should be connected to PAHCMS000 and remote controller connected to PAHCMR000 unit can only monitor status.
- 2) LG Central controller addressing for discharge air temp. controller should be set as the same address of the main module's address.
- 3) Address of Comm. module of PAHCMS000 (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.
- 5) Return air sensors connected RA temp. controller (PAHCMR000) do not need to installed at the duct. They work as dummy sensors.
They work as dummy sensors.

9. External Diagram

9.4 Fan & Alarm interlock guide

Return air temperature controller

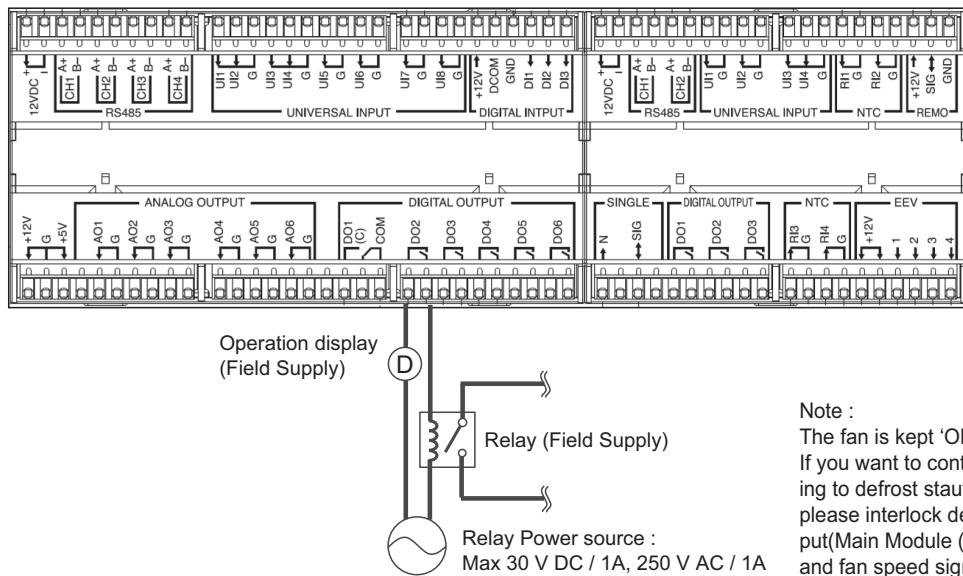
If DO Type setting(SW 1-3) set as 'Status', fan operating signal can be interfaced with operation status signal at 'DO 1' in 'DIGITAL OUTPUT'



Note :
The fan is kept 'ON' during operation, If you want to turn off the fan during TH off or defrost or control by fan speed, please refer to dip switch setting SW1-3&SW1-4 of Comm. module

Discharge air temperature controller

Fan operating signal can be interfaced with operation status signal at 'DO 2' in 'DIGITAL OUTPUT' of main module.



Note :
The fan is kept 'ON' during operation, If you want to control the fan according to defrost status and fan speed, please interlock defrost signal output(Main Module (Main Module DO 3) and fan speed signal output (Comm. Module DO 1 ~ 3)

10. Control Function

10.1 By Individual Controller

	Function List	PAHCMR000	PAHCMS000
Basic Function	Operating On / Off	O	O
	Operation Mode Control	Cooling / Heating only	Cooling / Heating only
	Desired Return Air Temperature Setting	16~30 ℃	X
	Return Air Temperature Display	11~39.5 ℃	X
	Desired Discharge Air Temperature Setting	X	16 ~ 30 ℃ ⁴⁾ 12 ~ 50 ℃ ⁵⁾
	Discharge Air Temperature Display	X	11 ~ 39.5 ℃ ⁴⁾ 0 ~ 100 ℃ ⁵⁾
	Fan Speed Control	O ¹⁾	X
	Child Lock / All button Lock	X	X
Advanced Function	Schedule	O	O
	Partial Lock	O	X
	Dual Set point	X	X
	Pipe Temperature display	O ²⁾	O ²⁾
	Error Code Display	O	O
	Defrost Status	Defrost / Normal	Defrost / Normal
	Compressor Status	On / Off	On / Off
	Filter Sign	-	-
	Error History	O ³⁾	X
ETC	Unit of Temperature control	1 ℃ / 0.5 ℃	1 ℃ / 0.5 ℃
	Electric Failure compensation	O	O

Note

- Please see Chapter 7 for the compatibility of each product with AHU controller
- Control function is unavailable when Control Type of AHU controller is Contact Signal(Dip SW1-2 of PAHCMR000 or SW1-1 of PAHCMS000 is off)
- For using Wireless remote controller, Wired remote controller is required(Standard III doesn't has a receiver for wireless remote controller)
- Partial Lock function is available only with Standard III/Premium remote controller
- For more details, please refer to the product manual of remote controller
 - 1) For fan speed control, it is necessary to set Dip SW 1-3 'On'
 - 2) Pipe temperature display is unavailable in Simple remote controller
 - 3) Error history is available with Standard III remote controller only
 - 4) Wired remote controller standard II.
 - 5) Wired remote controller standard III after version 2.10.5a.

10. Control Function

10.2 By LG Central Controller

Function List		PAHCMR000	PAHCMS000	
Basic Function	Operating On/Off	O	O	
	Operating Mode Control	Cooling / Heating only	X	
	Desired Return Air Temperature Setting	16.0 ~ 30.0 °C ¹⁾	X	
	Return Air Temperature Display	-50.0 ~ 100.0 °C	X	
	Desired Discharge Air Temperature Setting	X	16.0 ~ 30.0 °C	
	Discharge Air Temperature Display	X	-50.0 ~ 100.0 °C	
	Fan Speed Control	O ²⁾	X	
	All Lock	O	X	
Additional function	Schedule	O	O	
	Partial Lock	O	X	
	Pipe Temperature	O ^{3) 4) 5)}	X	
	Error Code Display	O	O	
	Defrost Status	X	X	
	Outdoor unit Cycle Monitoring	O ^{3) 4) 5)}	X	
	Emergency Stop	O ⁴⁾	O	
Auto Control	Peak Control	Priority control	O ^{4) 5)}	X
		ODU capacity control	X	X
	Time limit control	O ^{4) 5)}	X	
	Device Interlocking	O ^{4) 5)}	X	
Energy Report	Power Consumption	X	X	
	Run time	O ^{4) 5)}	X	
	Save to PC or USB	O ^{4) 5)}	X	
History	Report	Error ⁴⁾ / Control ^{4) 5)}	Error / Control	
	Save to PC or USB	O ^{4) 5)}	O	
ETC	Unit of Temperature control	1 °C / 0.5 °C	1 °C / 0.5 °C	
	Remote Access	O ^{4) 6)}	O	

Note

- Please see Chapter 7 for the compatibility of each product with AHU controller
- Control function is unavailable when Control Type of AHU controller is Contact Signal (Dip SW1-2 of PAHCMR000 or SW1-1 of PAHCMS000 is off)
- PI485GW is required for connecting Single Split
 - 1) This range can be varied depending on central controller type
 - 2) For fan speed control, it is necessary to set Dip SW 1-3 'On'
 - 3) This function may not be available for a certain outdoor unit type
 - 4) This function is not available with AC Ez
 - 5) This function is not available with AC Ez Touch
 - 6) Internet connection is required to access central controller from outside

10. Control Function

10.3 BMS protocol

10.3.1 BACnet points of PAHCMR000

■ AHU Control / Monitor point

No.	Name	Object Name (XX : Unit Address Number)	Object Type	Unit					
				TEXT-0	TEXT-1	TEXT-2	TEXT-3	TEXT-4	TEXT-5
1	On/Off (Setting)	ac_StartStopCommand_XX	BO	Stop(0)	Start(1)				
2	On/Off (Status)	ac_StartStopStatus_XX	BI	Stop(0)	Start(1)				
3	Lock (Setting)	ac_LockCommand_XX	BO	Permit(0)	Prohibit(1)				
4	Lock (Status)	ac_LockStatus_XX	BI	Permit(0)	Prohibit(1)				
5	Operation Mode (Setting)	ac_AirConModeCommand_XX	MO		Cool(1)		Fan(3)		Heat(5)
6	Operation Mode (Status)	ac_AirConModeStatus_XX	MI		Cool(1)		Fan(3)		Heat(5)
7	Fan Speed(Setting) ¹⁾	ac_FanSpeedCommand_XX	MO		Low(1)	Middle(2)	High(3)		
8	Fan Speed(Status) ¹⁾	ac_FanSpeedStatus_XX	MI		Low(1)	Middle(2)	High(3)		
9	Set Room Temperature	ac_SetRoomTemp_XX	AV	℃ (16~30℃)					
10	Room Temperature	ac_RoomTemp_XX	AI	℃ (-99~99℃)					
11	Alarm	ac_Alarm_XX	BI	Normal(0)	Abnormal(1)				
12	Error Code	ac_MalfunctionCode_XX	AI	0~255 (Refer to the LG Error code list)					
13	Set Temperature (Status)	ac_SetTempStatus_XX	AI	℃ (16~30℃)					
14	Set Upper Temperature (Setting)	ac_TempRangeUpperLimitCommand_XX	AV	℃ (16~30℃)					
15	Set Lower Temperature (Setting)	ac_TempRangeLowerLimitCommand_XX	AV	℃ (16~30℃)					
16	Set Upper Temperature (Status)	ac_TempRangeUpperLimitStatus_XX	AI	℃ (16~30℃)					
17	Set Lower Temperature (Status)	ac_TempRangeLowerLimitStatus_XX	AI	℃ (16~30℃)					
18	Mode Lock (Setting)	ac_ModeLockCommand_XX	BO	Permit(0)	Prohibit(1)				
19	Mode Lock (Status)	ac_ModeLockStatus_XX	BI	Permit(0)	Prohibit(1)				
20	Fan Lock (Setting)	ac_FanLockCommand_XX	BO	Permit(0)	Prohibit(1)				
21	Fan Lock (Status)	ac_FanLockStatus_XX	BI	Permit(0)	Prohibit(1)				
22	Thermo Status (Status)	ac_ThermoStatus_XX	BI	Off(0)	On(1)				

Note

- ACP BACnet gateway is required for BACnet protocol
- In case of PAHCMS000, BACnet protocol is not supported
- For more details, refer to the manual of control product
 - 1) For fan speed control, it is necessary to set Dip SW 1-3 'On'

10. Control Function

■ Outdoor unit Monitor point

No.	Name	Object Name (XX : Unit Address Number)	Object Type	Unit					
				TEXT-0	TEXT-1	TEXT-2	TEXT-3	TEXT-4	TEXT-5
1	Compressor Operation Status	outdoor_CompOperStatus_XX	BI	Stop(0)	Run(1)				
3	Inverter Fan 1 frequency	outdoor_InverterFanFreq_XX	AI	-					
4	High Pressure	outdoor_HighPressure_XX	AI	-					
5	Low Pressure	outdoor_LowPressure_XX	AI	-					
6	Suction Temperature	outdoor_SuctionTemp_XX	AI	℃					
7	Liquid Pipe Temperature	outdoor_LiquidPipeTemp_XX	AI	℃					
8	Heat Exchanger Temperature	outdoor_HexTemp_XX	AI	℃					
9	Outdoor EEV	outdoor_OutdoorEEV_XX	AI	-					
10	Subcool EEV	outdoor_SubCoolEEV_XX	AI	-					
11	Hot Gas Valve	outdoor_HotgasValue_XX	BI	Stop(0)	Run(1)				
12	Inverter Discharge Temperature	outdoor_InverterDischargeTemp_XX	AI	℃					
13	Outdoor Temperature	outdoor_OutdoorTemp_XX	AI	℃					
14	Operation Mode	outdoor_OperationMode_XX	MI		STOP(1)	COOL(2)	HEAT(3)		

Note

- ACP BACnet gateway is required for BACnet protocol
 - In case of PAHCMS000, BACnet protocol is not supported
 - For more details, refer to the manual of control product

10. Control Function

■ Modbus points of PAHCMR000

◆ Function Code

Code	Description	Register
0x01	Read Coils	00001~00008
0x02	Read Discrete inputs	10001~10008
0x03	Read Holding Registers	40001~40010
0x04	Read Input Registers	30001~30008
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	All Button Lock	●	-	-	-	●	-	0: Unlock / 1: Lock
00004	Mode Lock	●	-	-	-	●	-	0: Unlock / 1: Lock
00005	Fan Speed Lock	●	-	-	-	●	-	0: Unlock / 1: Lock
00006	Target Temp. Lock	●	-	-	-	●	-	0: Unlock / 1: Lock
00007	Error	●	-	-	-	-	-	0: Normal / 1: Error
00008	Reserved	-	-	-	-	-	-	-
10001	Comp Status	-	●	-	-	-	-	0: Off / 1: On
10002	Defrost Status	-	●	-	-	-	-	0: Normal / 1: Defrost
10003	Oil Return	-	●	-	-	-	-	0: Normal / 1: Oil Return
10004	Reserved	-	-	-	-	-	-	-
10005	Reserved	-	-	-	-	-	-	-
10006	Reserved	-	-	-	-	-	-	-
10007	Reserved	-	-	-	-	-	-	-
10008	Reserved	-	-	-	-	-	-	-
30001	Error Code	-	-	-	●	-	-	0~255
30002	RA Temp.	-	-	-	●	-	-	-50.0℃~100.0℃ (x10)
30003	Reserved	-	-	-	-	-	-	-
30004	Pipe In Temp.	-	-	-	●	-	-	-50.0℃~100.0℃ (x10)
30005	Pipe Out Temp.	-	-	-	●	-	-	-50.0℃~100.0℃ (x10)
30006	Capacity	-	-	-	●	-	-	0~255 [kBtu]
30007	Reserved	-	-	-	-	-	-	-
30008	Reserved	-	-	-	-	-	-	-
40001	Operation Mode	-	-	●	-	-	●	0: Cooling / 2: Fan / 4: Heating
40002	Fan Speed	-	-	●	-	-	●	1: Low / 2: Middle / 3: High
40003	Target Temp.	-	-	●	-	-	●	16.0℃~30.0℃ (x10, 1℃)
40004	Target Temp. Upper Range	-	-	●	-	-	●	16.0℃~30.0℃ (x10, 1℃)
40005	Target Temp. Lower Range	-	-	●	-	-	●	16.0℃~30.0℃ (x10, 1℃)
40006	Reserved	-	-	-	-	-	-	-
40007	Reserved	-	-	-	-	-	-	-
40008	Reserved	-	-	-	-	-	-	-
40009	Reserved	-	-	-	-	-	-	-
40010	Reserved	-	-	-	-	-	-	-

Note

- 1) Configuration is that the baud rate is 9600bps, parity is none and stop bit is 1.
- 2) To change the slave address, please see Chapter8. Main module Address Setting).

10. Control Function

■ Modbus points of PAHCMS000

◆ Function Code

Code	Description	Register
0x01	Read Coils	0001~0008
0x02	Read Discrete inputs	1001~10030
0x03	Read Holding Registers	4001~40010
0x04	Read Input Registers	3001~30016
0x05	Write Single Coil	0001~0008
0x06	Write Single Holding Register	4001~40028

◆ 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
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.	-	-	-	●	-	-	-50.0℃~100.0℃ (x10)
30012	Reserved	-	-	-	-	-	-	-
30013	SA Temp.	-	-	-	●	-	-	-50.0℃~100.0℃ (x10)

10. Control Function

Register	Description	Function Code						Value explanation
		1	2	3	4	5	6	
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.	-	-	●	-	-	●	16 ~ 30℃ (x10, 1℃) ³⁾ , 12 ~ 50℃ (x10, 1℃) ⁴⁾
40004	Heating Target Temp.	-	-	●	-	-	●	16 ~ 30℃ (x10, 1℃) ³⁾ , 12 ~ 50℃ (x10, 1℃) ⁴⁾
40005	Reserved	-	-	-	-	-	-	-
40006	Reserved	-	-	-	-	-	-	-
40007	Reserved	-	-	-	-	-	-	-
40008	Reserved	-	-	-	-	-	-	-
40009	Reserved	-	-	-	-	-	-	-
40010	Reserved	-	-	-	-	-	-	-
40028	Fan Speed	-	-	●	-	-	●	1 : Low / 2 : Middle / 3 : High

Note

- 1) Regarding capacity ratio, you can refer to the Capacity setting table of UI7(0~10V) of PAHCMS000
- 2) Error Code : 1 x yyy (x : Module Number , yyy : Error Code)
- 3) In case of connecting a wired remote controller standard II, this range of target temperature can be set.
- 4) In case of connecting a wired remote controller standard III, this range of target temperature can be set.

11. Appendix

■ Calculation of additional refrigerant

◆ For Multi V(VRF) System

With R410a refrigerant ODU, for each dm^3 of volume 0.2941 kg must be added, to the amount calculated for pipe length. With R32 refrigerant ODU, for each dm^3 of volume 0.2172 kg must be added, to the amount calculated for pipe length.

◆ For Single Split System

With R410a refrigerant ODU, for each dm^3 of volume 0.2941 kg must be added, to the amount calculated for pipe length.

With R32 refrigerant ODU, for each dm^3 of volume 0.2172 kg must be added, to the amount calculated for pipe length. And in case Single Split models you have to take into account some additional information: Prefilled amount for pipe, prefilled amount for IDU and maximum total amount of the system.

◆ The calculation is the following:

Pre charge Amount included *pre charged pipe length(A) - IDU CF (B) + additional charging amount for piping length.*

$$\{(Total\ pipe\ length - charge\ less\ pipe\ length\ (C)) \times [kg/m]\ (D)\} + AHU\ additional\ charging\ amount\ (E) \\ \leq Maximum\ refrigerant\ amount\ of\ total\ system\ (F)$$

The total of Unit, Pipe and AHU Coil may never exceed the maximum refrigerant amount of the total system (E). This means, although the max pipe length is longer, pipe length may be limited due to the total system amount possible with Single Split units.

- Example) Model UU48W (R410A),
 - Maximum Pipe length : 75 m, Total pipe length for this example : 30 m, AHU coil volume (dm^3)
 - » Pre charge Amount included pre charged pipe length(A) : 3.40 kg, IDU C.F. (B) : 1.20 kg
 - » Changeless pipe length (C) : 7.50 m
 - Additional charge amount for pipe (D) : 0.040 kg/m
 - Additional charge amount for coil (E) : 0.2941 kg/ dm^3 for R410A refrigerant
 - » Maximum total refrigerant amount (F) : 6.10 kg
 - » Additional refrigerant amount is,

$$3.40 - 1.20 + \{ (30 - 7.50) \times 0.040 \} + (AHU\ Coil\ volume(\text{dm}^3) \times 0.2941) \leq 6.10\ \text{kg}$$



Air Solution

LG Electronics Inc, 128, Yeoui-daero,
Yeongdeungpo-gu, Seoul, Korea
(07336)
<http://partner.lge.com>

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The air conditioners manufactured by LG have received ISO9001 certificate for quality assurance and ISO14001 certificate for environmental management system.
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