MULTI V 5

Trouble Shooting Guide Book

LG Electronics

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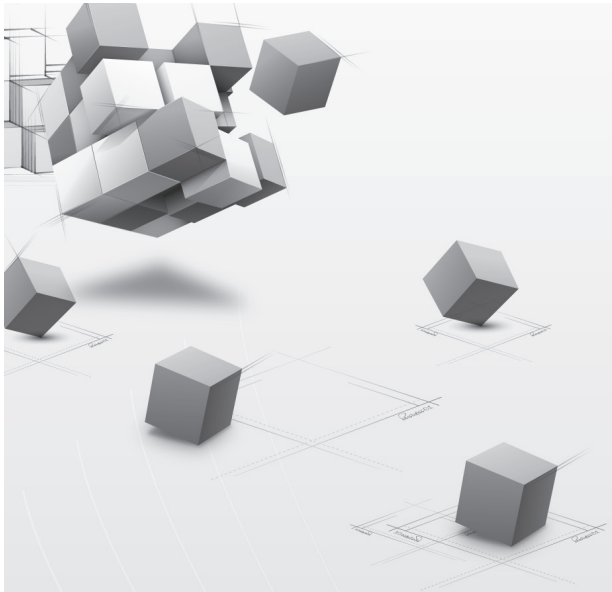

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Trouble Shooting Guide Book

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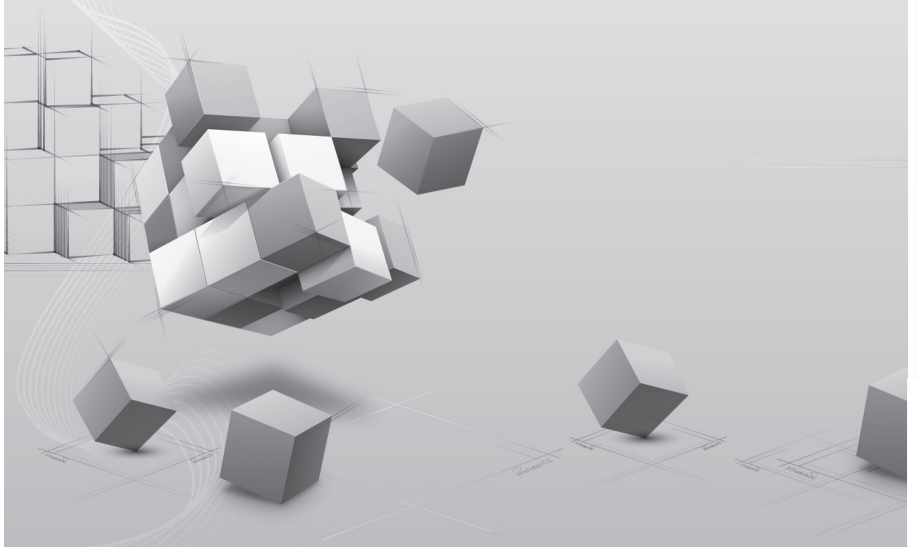
I . Basic Part



1. Unit Conversion

Power

	kcal/h	Btu/h	(US) RT	(Japan) RT	kW	HP	Nominal HP
kcal/h	1	3.986	0.0003306	0.0003012	0.001162	0.00155	0.0004
Btu/h	0.252	1	0.0000833	0.0000759	0.000293	0.00039	0.0001
(US) RT	3,024	12,000	1	0.91	3.51628	4.69	1.251
(Japan) RT	3,320	13,174.6	1,097	1	3.861	5.149	1.373
kW	860	3,412	0.2843	0.259	1	1.333	0.3555
HP	640	2,559.5	0.213	0.1942	0.75	1	0.2667
Nominal HP	2,400	9,598.1	0.799	0.728	2.81	3.75	1

Pressure

	kgf/cm^2	bar	Pa	atm	lbf/in^2 (psi)
kgf/cm^2	1	0.98065	98,066.5	0.9678	14.2233
bar	1.0197	1	100,000	0.9869	14.5028
Pa	0.0000102	0.00001	1	0.00001	0.000145
atm	1.0332	1.01325	101,325	1	14.6959
lbf/in^2 (psi)	0.0703	0.06894	6894.7	0.068	1

2. Temperature Vs. Pressure of Ref.

Saturation temperature vs. saturation pressure table for each refrigerant

Absolute pressure = Guage pressure(kPa) + 101.325(kPa)

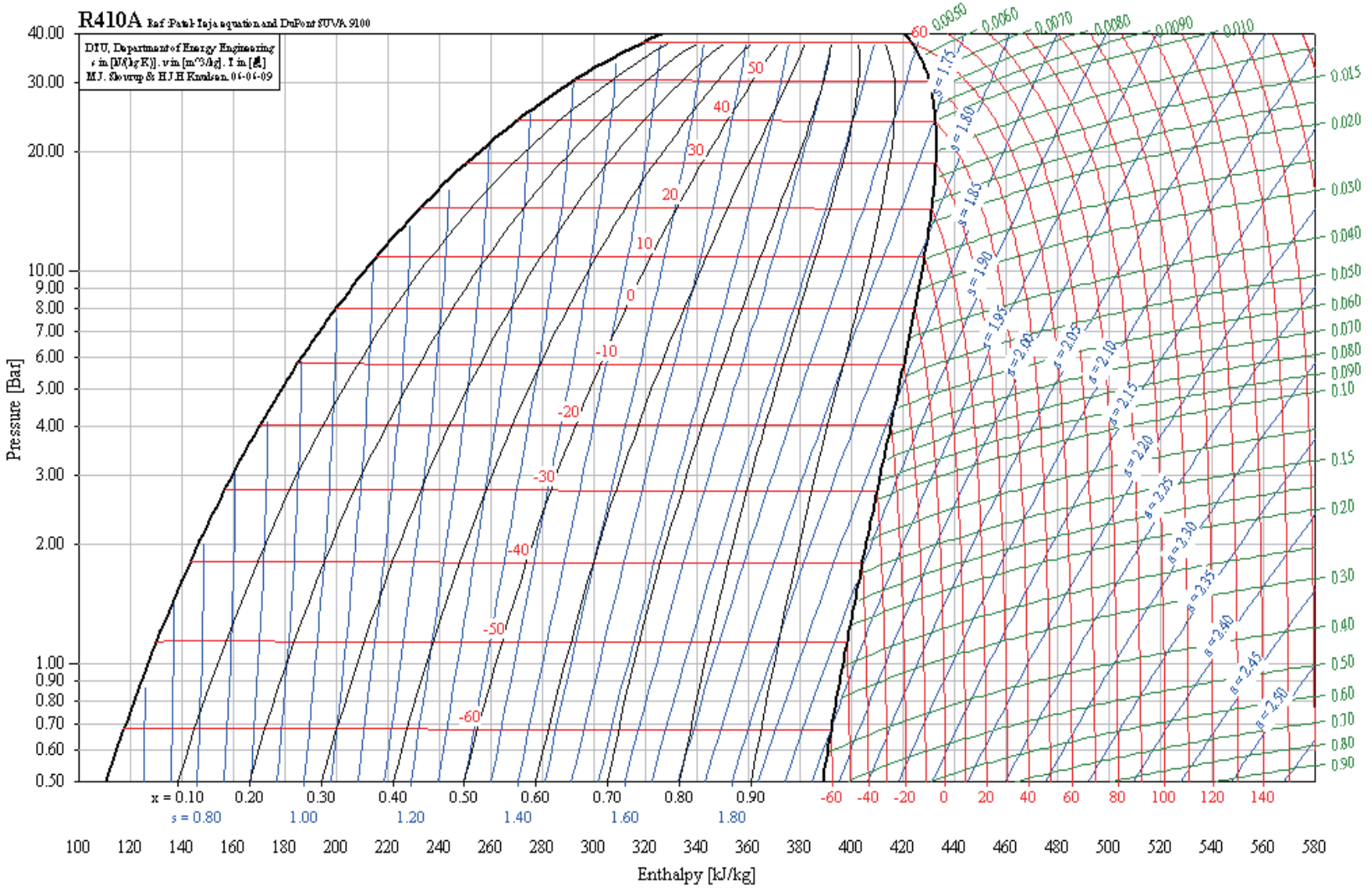
kPa : kgf/cm^2 x 101.97

R410A					
Temp.	Relative pressure(kPaG)		Relative pressure	Temp.(°C)	
°C	Saturated Liquid	Saturated Gas	kPaG	Saturated Liquid	Saturated Gas
-30	169.62	168.91	170	-30.09	-30.02
-25	229.70	228.81	230	-25.08	-25.01
-20	299.57	298.46	300	-20.06	-19.99
-15	380.23	378.87	380	-15.09	-15.01
-10	472.75	471.09	470	-10.21	-10.12
-5	578.21	576.21	580	-4.98	-4.89
0	697.76	695.38	700	0.04	0.13
5	832.60	829.77	830	4.86	4.96
10	983.94	980.63	980	9.84	9.94
15	1153.09	1149.25	1150	14.88	14.98
20	1341.39	1336.98	1350	20.18	20.29
25	1550.25	1545.26	1550	24.98	25.08
30	1781.19	1775.59	1800	30.36	30.47
35	2035.78	2029.59	2000	34.30	34.42
40	2315.76	2309.03	2300	39.71	39.82
45	2623.00	2615.82	2600	44.62	44.73
50	2959.61	2952.13	2950	49.84	49.95
55	3328.02	3320.49	3400	55.91	56.01
60	3731.18	3724.00	3700	59.61	59.70
65	4173.11	4166.98	4200	65.28	65.34
70	4746.09	4706.31	4700	70.17	70.17

Saturation temperature vs. saturation pressure table for each refrigerant

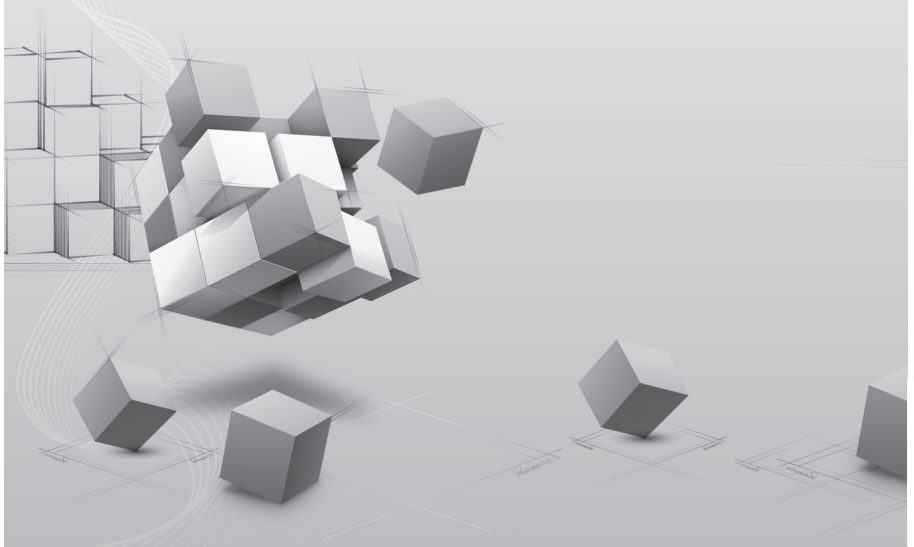
R134a		
Temp.	Pressure	
°C	kPa	kgf/cm^2
-25	5.58	0.06
-20	31.92	0.33
-15	63.12	0.64
-10	99.79	1.02
-5	142.54	1.45
0	192.00	1.96
5	248.85	2.54
10	313.79	3.20
15	387.53	3.95
20	470.81	4.80
25	564.42	5.76
30	669.11	6.82
35	785.74	8.01
40	915.13	9.33
50	1261.00	12.40
60	1579.24	16.10
70	2013.87	20.54

3. P-H Diagram_R410A



MULTI V 5

Ⅱ. Multi V 5 Introduction



1. Nomenclature

Multi V 5 Outdoor Unit

ARU N 260 L T E 5

- 5 : Model Generation
- E : High Efficiency, S : Standard Efficiency
- T : Top Discharge — Air Discharge Type
- L : Electrical Ratings
  - B : 3Ø, 220V, 50Hz
  - D : 3Ø, 480V, 50Hz
  - L : 3Ø, 380-415V, 50Hz / 3Ø, 380V, 60Hz
- 260 : Total Cooling Capacity in Horse Power(HP) unit
  - E X) 10HP → '100'
  - (For only 22, 24, 26HP)
  - In case of single unit → '220', '240', '260'
  - In case of series unit → '221', '241', '261'
- N : Combination of Inverter Type and Cooling Only, Heat pump or Heat Recovery
  - M : Inverter, Heat Pump and Heat Recovery
  - N : Inverter, Heat Pump
  - V : Inverter, Cooling Only
- ARU : MULTI V. System with Outdoor Unit using R410A

Multi V 5 Outdoor Unit (Tropical)

ARU N 100 L E H 5

- 5 : Model Generation
- H: High Ambient Temperature
- E : Efficiency
  - E : High Efficiency, T : Standard Efficiency
- L : Electrical Ratings
  - L : 3Ø, 380-415 V, 50 Hz / 3Ø, 400V, 60 Hz
- 100 : Total Cooling Capacity in Horse Power(HP) unit
  - E X) 10HP → '100'
  - (For only 22, 24, 26HP)
  - In case of single unit → '220', '240', '260'
  - In case of series unit → '221', '241', '261'
- N : Combination of Inverter Type and Cooling Only, Heat pump or Heat Recovery
  - N : Inverter, Heat Pump
- ARU : MULTI V. System with Outdoor Unit using R410A

Multi V 5 Indoor Unit

ARN U 07 G TU A 4

- 4 : Serial Number
- A : Combinations of functions
  - A:Basic function
  - L:Neo Plasma(Wall Mounted)
  - C:Plasma(Ceiling Cassette)
  - G: Low Static
  - U : Floor Standing without Case
  - ART COOL Type Panel Color
  - SB/SC - R:Mirror V:Silver W:White
  - Z : Fresh Air Intake Unit
- TU : Chassis Name
- G : Electrical Ratings
  - 2:1Ø, 220V, 60Hz
  - 6:1Ø, 220 - 240V, 50Hz
  - G:1Ø, 220 - 240V, 50Hz / 1Ø, 220V, 60Hz
- 07 : Total Cooling Capacity in Horse Power(HP) unit
  - E X) 5,000 Btu/h Class → '05'
  - 18,000 Btu/h Class → '18'
- U : Combination of Inverter Type and Cooling Only or Heat Pump
  - U: DC Inverter and H/P and C/O
- ARN : MULTI V. System with Outdoor Unit using R410A
  - ARN : Global line-up
  - CRN : Brazil line-up only

Multi V 5 HR Unit

PRHR 04 2

- 2 : Serial Number
- 04 : The No. of connected branches
  - 02 : For 2 branches
  - 03 : For 3 branches
  - 04 : For 4 branches
  - 06 : For 6 branches
  - 08 : For 8 branches
- PRHR : HR Unit connecting to MULTI V. Heat Recovery System Outdoor Unit using R410A
  - PRHR : Global line-up

2. Line Up / Capacity

Multi V 5 Indoor Unit

■ Standard Model

Category		Chassis Name	Capacity(Btu/h(kW))																	
			5k	7k	9k	12k	15k	18k	21k	24k	28k	30k	36k	42k	48k	54k	60k	76k	96k
			1.6	2.2	2.8	3.6	4.5	5.6	6.2	7.1	8.2	9.0	10.6	12.3	14.1	15.8	17.5	22.4	28.0
Wall Mounted Unit	Standard	SJ	○	●	●	●	●												
		SK						●		●									
		SV										●	●						
ARTCOOL	Mirror	SJ	○	●	●	●	●												
		SK						●		●									
	Gallery	SF		●	●	●													
Ceiling Mounted Cassette	1 Way	TU		●	●	●													
		TT						●		●									
	2 Way	TS			●	●		●		●									
	4 Way Mini	TR	○	●	●	●													
		TQ					●	●	●										
	Dual Vane 4-Way	TP-B								●	●	●							
		TM-A											●	●	●				
	Dual Vane 4-Way High sensible	TM-A	●	●	●	●	●	●		●	●		●	●	●				
	4 Way (compact)	TR			●		●												
	Round	TY								●			●		●				
Ceiling Concealed Duct	High Sensible	M2		●	●	●	●												
		M3						●		●	●								
		B8											●	●	●			●	●
	High Static	B8																	
		M1		●	●	●	●	●		●									
		M2									●		●	●					
		M3													●	●			
	High Static(2)	BH		●	●	●	●	●		●	●								
		M3													●	●			
	Low Static	L1	○	●	●														
		L2				●	●	●											
		L3							●	●									
	Low Static (Slim)	L4	○	●	●														
		L5				●	●	●											
		L6							●	●									
Floor Standing Unit	With Case	CE		○	●	●	●												
		CF						●		●									
	Without Case	CE		○	●	●	●												
		CF						●		●									
Ceiling & Floor Convertible Unit		VE			●	●													
Console		QA		●	●	●	●												
Fresh Air Intake Unit		B8																●	●
Ceiling Suspended Unit		VM1						●		●									
		VM2											●		●				

Note

- ○ : It can be combined with EHP(Multi V series) only.
- ● : It can be combined with EHP(Multi V series) or GHP.
- In matters of combination with Outdoor unit system, refer the PDB of that outdoor units.
- Indoor Units greater than 54k can not be combined with Multi V S system.
- This product contains Fluorinated Greenhouse Gases.(R410A)

■ Compact Model

Category		Chassis Name	Capacity(Btu/h(kW))	
			9k(2.8)	15k(4.5)
Ceiling cassette	4 Way	TR	○	○

※ In matters of combination with Outdoor unit system, refer the PDB of that outdoor units.
※ This product contains Fluorinated Greenhouse Gases.(R410A)

Multi V 5 Outdoor Unit

CHASSIS	Model Name	Model
UXA	ARUM080LTE5 ARUM100LTE5 ARUM120LTE5	
UXB	ARUM140LTE5 ARUM160LTE5 ARUM180LTE5 ARUM200LTE5 ARUM220LTE5 ARUM240LTE5 ARUM260LTE5	
UXA UXA	ARUM221LTE5 ARUM241LTE5	
UXA UXB	ARUM261LTE5 ARUM280LTE5 ARUM300LTE5 ARUM320LTE5 ARUM340LTE5 ARUM360LTE5	
UXB UXB	ARUM380LTE5 ARUM400LTE5 ARUM420LTE5 ARUM440LTE5 ARUM460LTE5 ARUM480LTE5	
UXB UXB UXA	ARUM500LTE5 ARUM520LTE5 ARUM540LTE5 ARUM560LTE5 ARUM580LTE5 ARUM600LTE5	
UXB UXB UXB	ARUM620LTE5 ARUM640LTE5 ARUM660LTE5 ARUM680LTE5 ARUM700LTE5 ARUM720LTE5	
UXB UXB UXB UXA	ARUM740LTE5 ARUM760LTE5 ARUM780LTE5 ARUM800LTE5 ARUM820LTE5 ARUM840LTE5	
UXB UXB UXB UXB	ARUM860LTE5 ARUM880LTE5 ARUM900LTE5 ARUM920LTE5 ARUM940LTE5 ARUM960LTE5	

※ Detail combinations of each model refer to PDB.

CHASSIS	Model Name	Model
UXA	ARUN080LTE51) ARUN100LTE5 ARUN120LTE5	
UXB	ARUN140LTE5 ARUN160LTE5 ARUN180LTE5 ARUN200LTE5 ARUN220LTE5 ARUN240LTE5 ARUN260LTE5	
UXA UXA	ARUN221LTE5 ARUN241LTE5	
UXA UXB	ARUN261LTE5 ARUN280LTE5 ARUN300LTE5 ARUN320LTE5 ARUN340LTE5 ARUN360LTE5	
UXB UXB	ARUN380LTE5 ARUN400LTE5 ARUN420LTE5 ARUN440LTE5 ARUN460LTE5 ARUN480LTE5	
UXB UXB UXA	ARUN500LTE5 ARUN520LTE5 ARUN540LTE5 ARUN560LTE5 ARUN580LTE5 ARUN600LTE5	
UXB UXB UXB	ARUN620LTE5 ARUN640LTE5 ARUN660LTE5 ARUN680LTE5 ARUN700LTE5 ARUN720LTE5	
UXB UXB UXB UXA	ARUN740LTE5 ARUN760LTE5 ARUN780LTE5 ARUN800LTE5 ARUN820LTE5 ARUN840LTE5	
UXB UXB UXB UXB	ARUN860LTE5 ARUN880LTE5 ARUN900LTE5 ARUN920LTE5 ARUN940LTE5 ARUN960LTE5	

Note 1) ARUN080LTE5 is not available in South America region.

※ Detail combinations of each model refer to PDB.

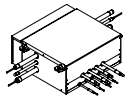
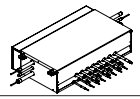
CHASSIS	Model Name	Model
UXA	ARUV096*TE5 ARUV121*TE5	
UXB	ARUV144*TE5 ARUV168*TE5 ARUV192*TE5 ARUV216*TE5 ARUV241*TE5 ARUV264*TE5	
UXB UXA	ARUV288*TE5 ARUV312*TE5 ARUV336*TE5 ARUV360*TE5	
UXB UXB	ARUV384*TE5 ARUV408*TE5 ARUV432*TE5 ARUV456*TE5 ARUV480*TE5	
UXB UXB UXA	ARUV504*TE5 ARUV530*TE5 ARUV554*TE5 ARUV578*TE5 ARUV603*TE5	
UXB UXB UXB	ARUV626*TE5 ARUV650*TE5 ARUV674*TE5 ARUV698*TE5 ARUV723*TE5	
UXB UXB UXB UXA	ARUV747*TE5 ARUV771*TE5 ARUV795*TE5 ARUV819*TE5 ARUV844*TE5	
UXB UXB UXB UXB	ARUV867*TE5 ARUV891*TE5 ARUV915*TE5 ARUV939*TE5 ARUV964*TE5	

※ Detail combinations of each model refer to PDB.

CHASSIS	Model Name	Model
UXA	ARUN080LEH5 ARUN100LEH5	
UXB	ARUN120LEH5 ARUN140LEH5 ARUN160LEH5 ARUN180LEH5 ARUN200LEH5	
UXB UXA	ARUN220LEH5 ARUN240LEH5	
UXB UXB	ARUN260LEH5 ARUN280LEH5 ARUN300LEH5 ARUN320LEH5 ARUN340LEH5 ARUN360LEH5 ARUN380LEH5 ARUN400LEH5	
UXB UXB UXB	ARUN420LEH5 ARUN440LEH5 ARUN460LEH5 ARUN480LEH5 ARUN500LEH5 ARUN520LEH5 ARUN540LEH5 ARUN560LEH5 ARUN580LEH5 ARUN600LEH5	

※ Detail combinations of each model refer to PDB.

HR Unit

Model	Chassis	Branches Number
PRHR023		2
PRHR033		3
PRHR043		4
PRHR063		6
PRHR083		8

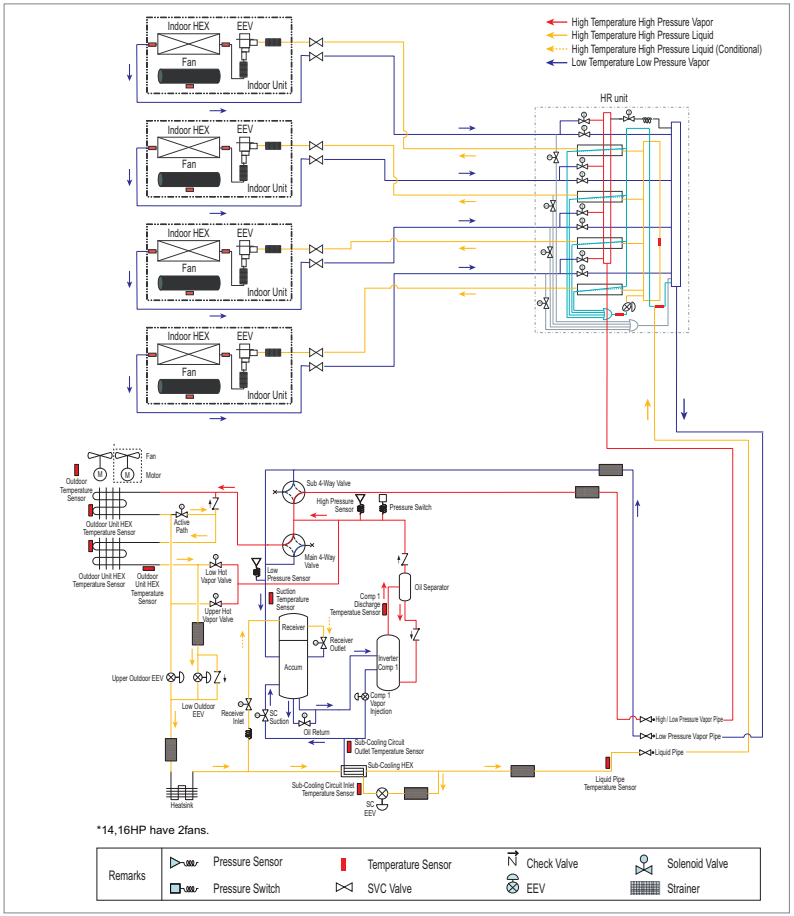
3. Piping Diagrams

3.1. Heat Pump and Heat Recovery (ARUM***LTE5)

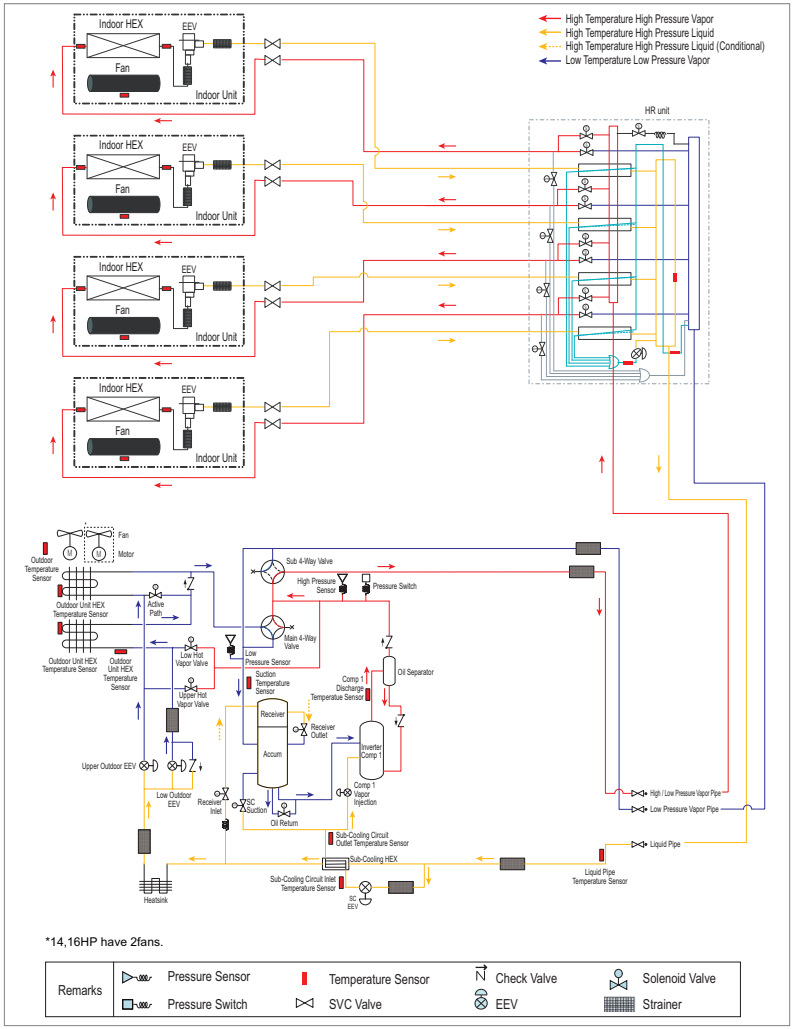
8 / 10 / 12 / 14 / 16 HP (1 Comp)

Heat Recovery System

■ Cooling Operation



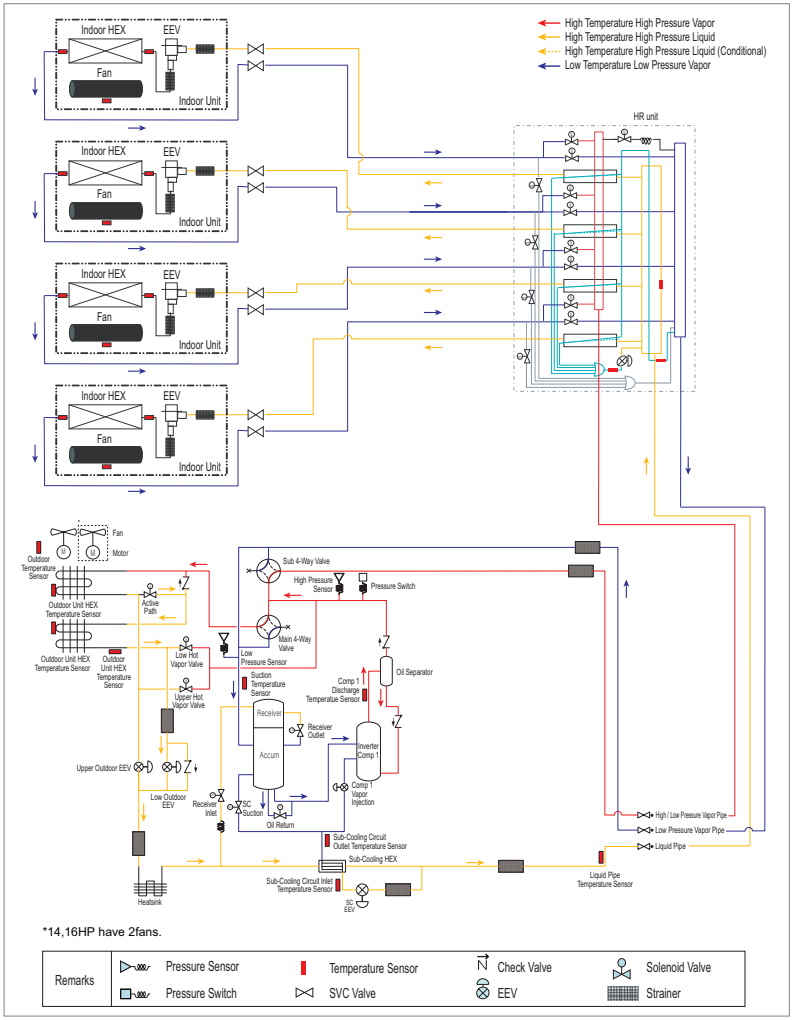
■ Heating Operation



*14,16HP have 2fans.

Remarks							
	Pressure Sensor	Temperature Sensor	Check Valve	Solenoid Valve
	Pressure Switch	SVC Valve	EEV	Strainer

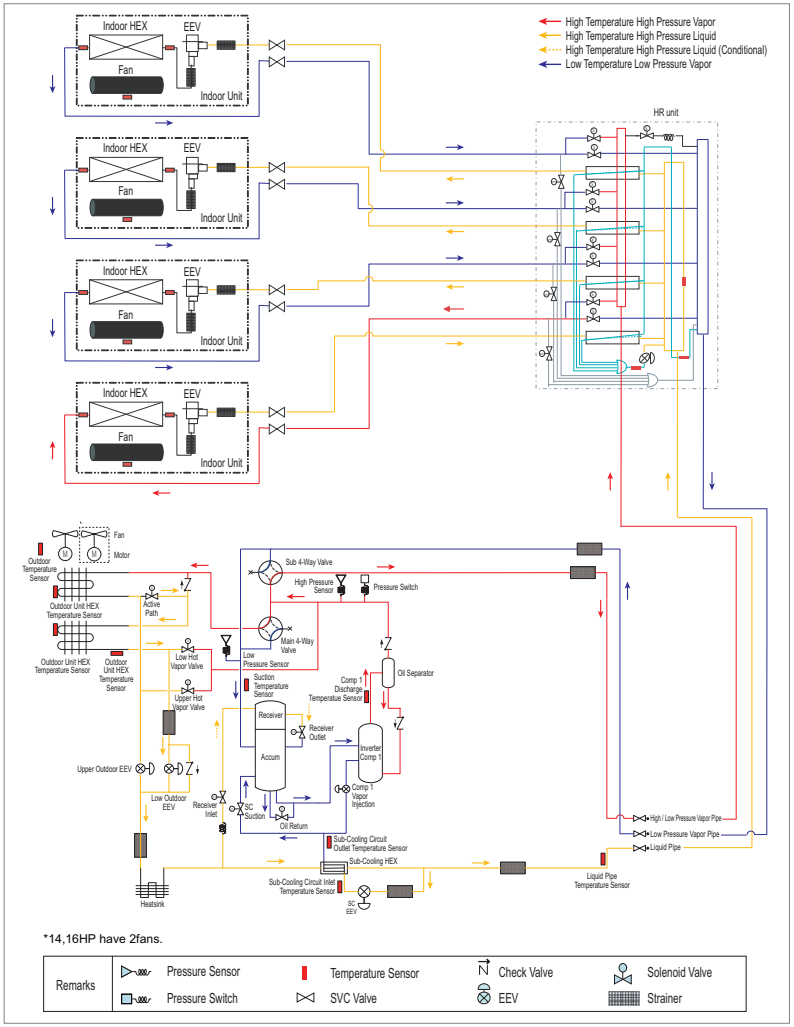
■ Oil Return/ Defrost Operation



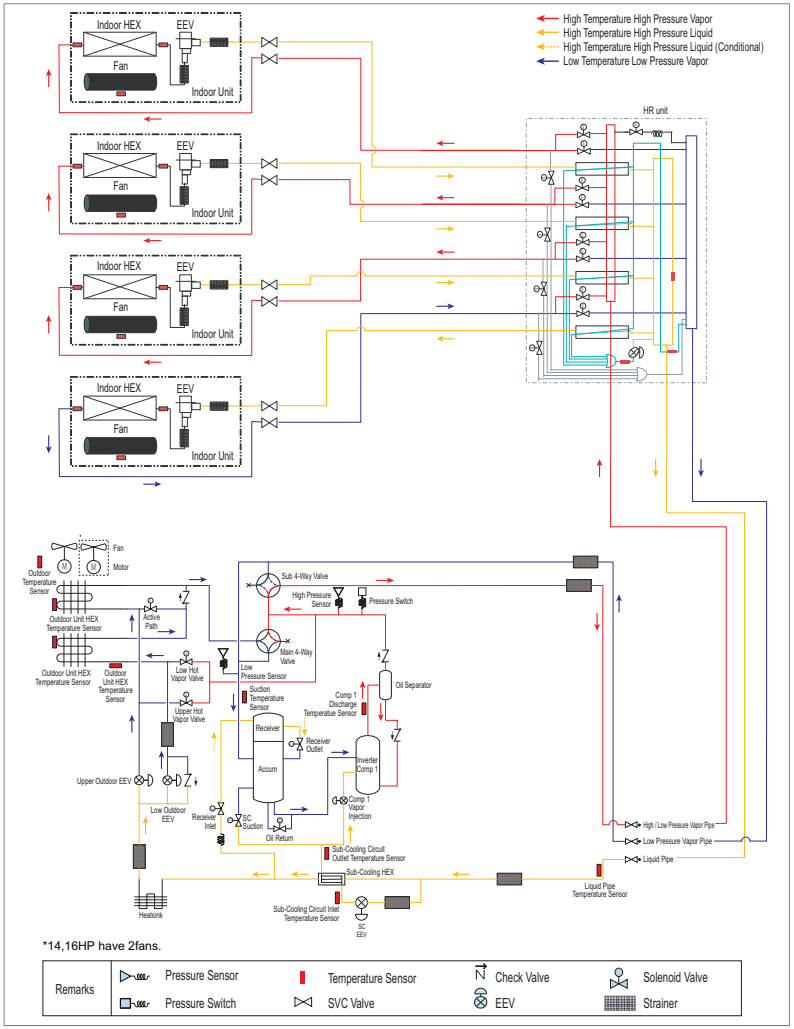
*14,16HP have 2fans.

Remarks							
	Pressure Sensor	Temperature Sensor	Check Valve	Solenoid Valve
	Pressure Switch	SVC Valve	EEV	Strainer

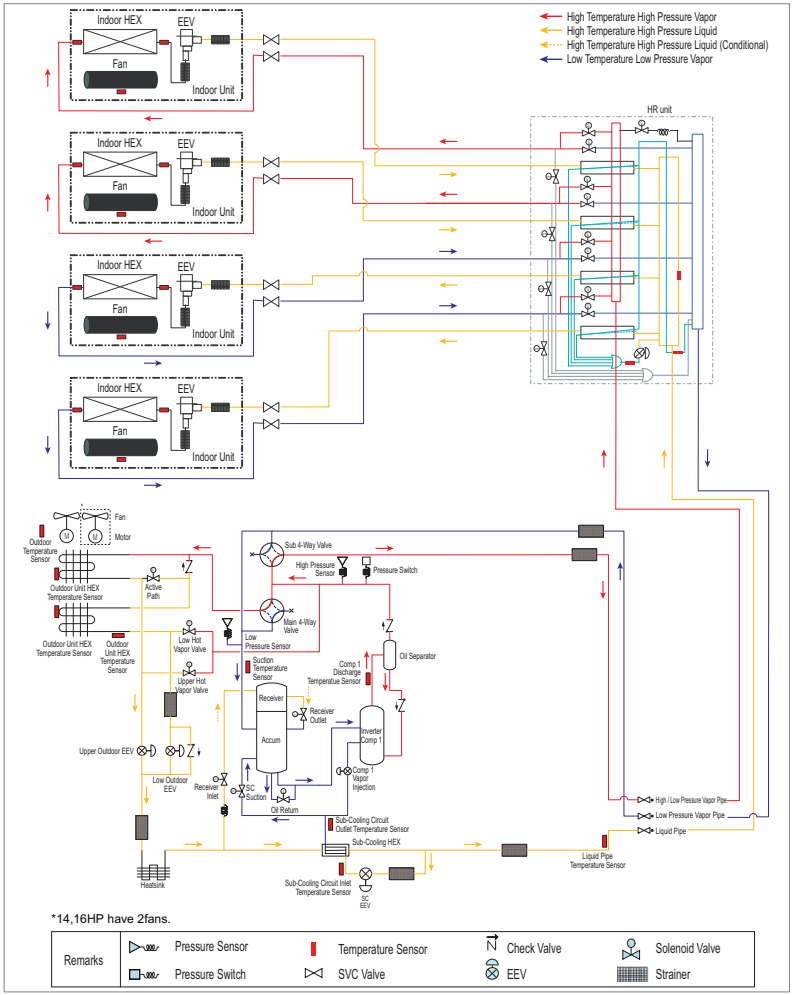
■ Cooling-based Simultaneous Operation



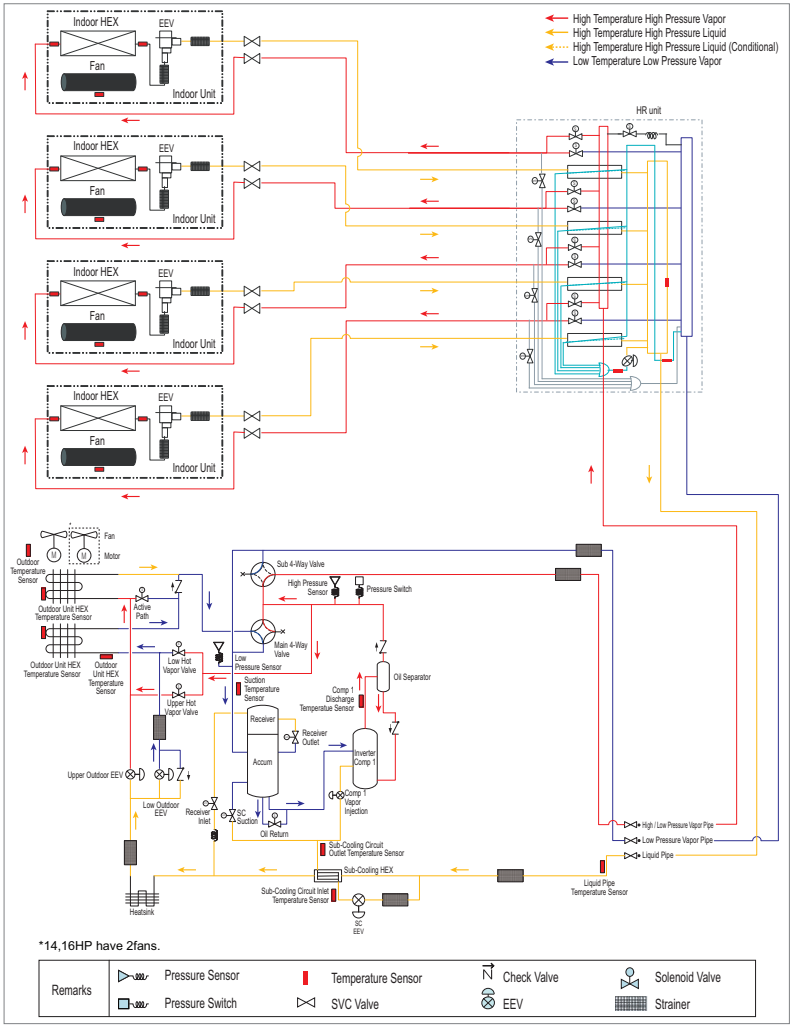
■ Heating-based Simultaneous Operation



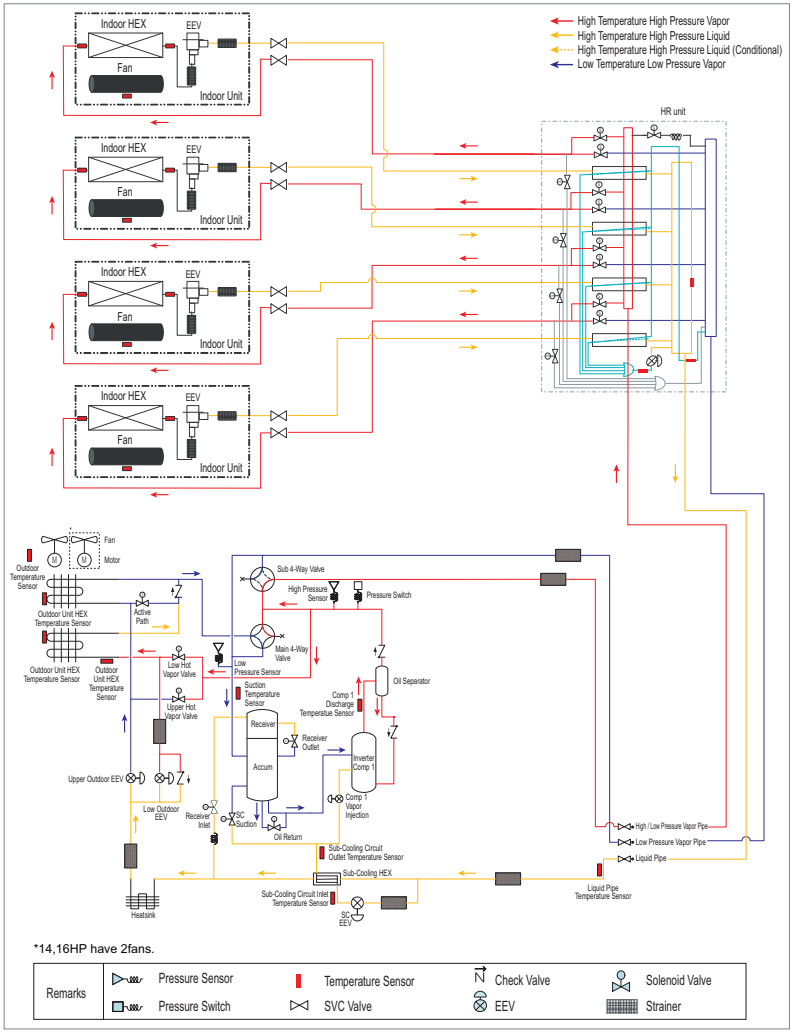
■ Balanced Simultaneous Operation



■ Upper HEX Defrost Operation

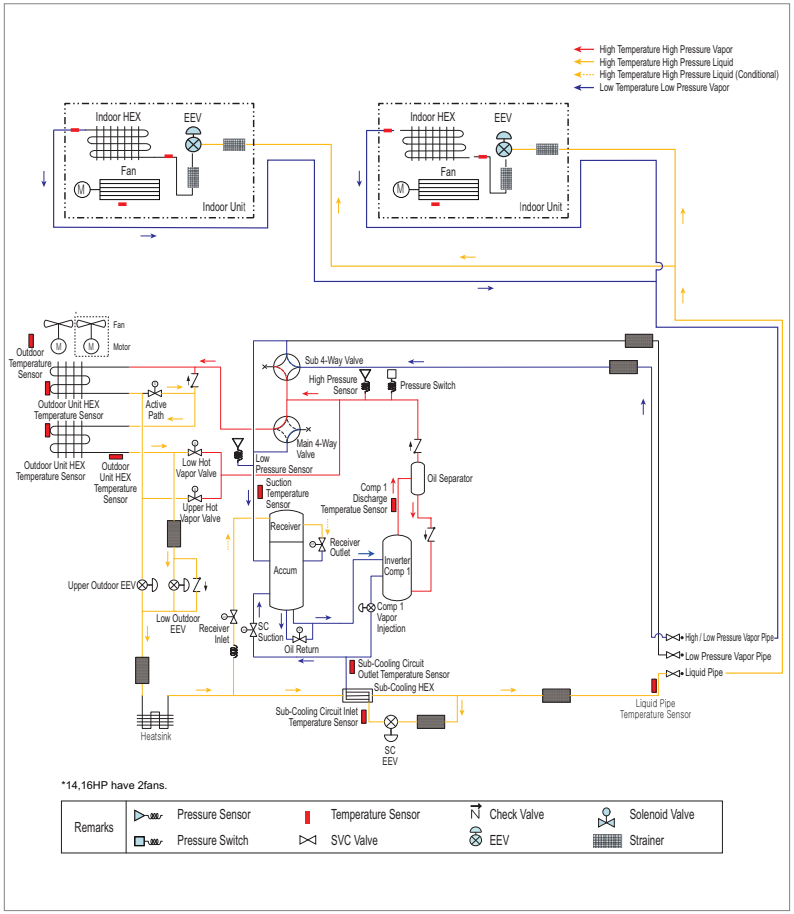


■ Low HEX Defrost Operation

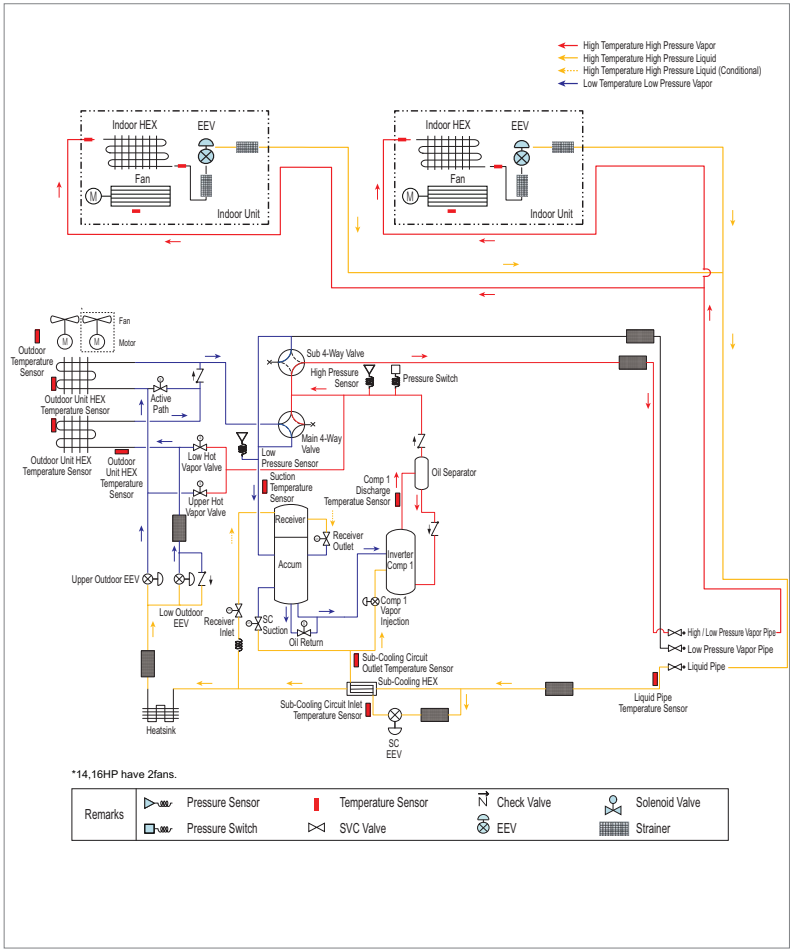


Heat Pump System

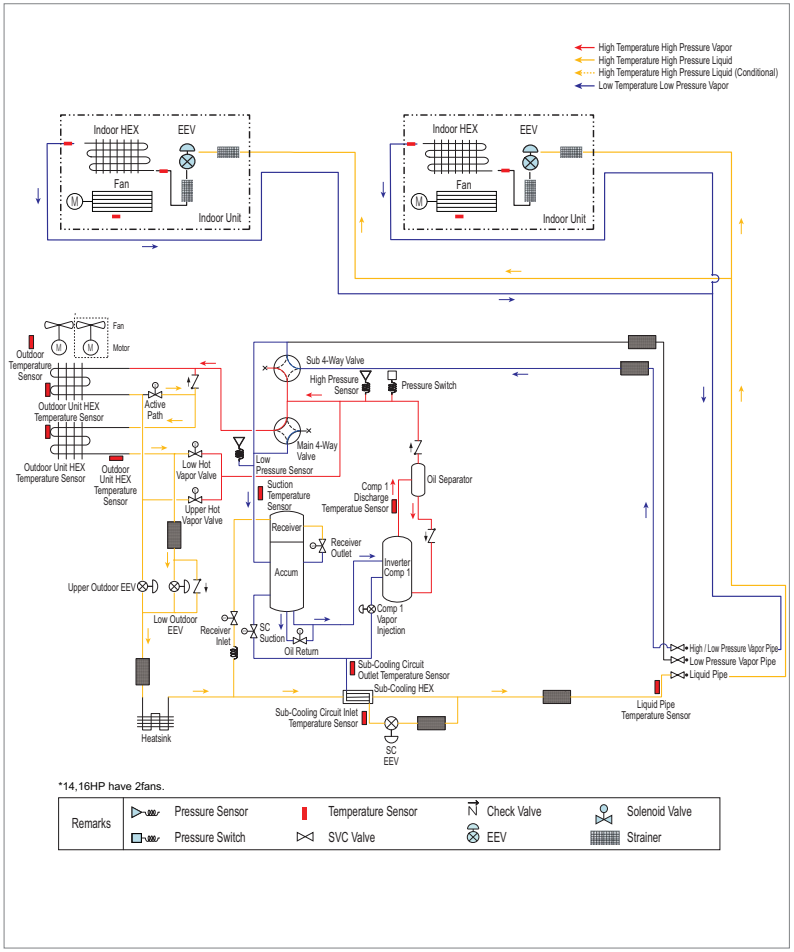
■ Cooling Operation



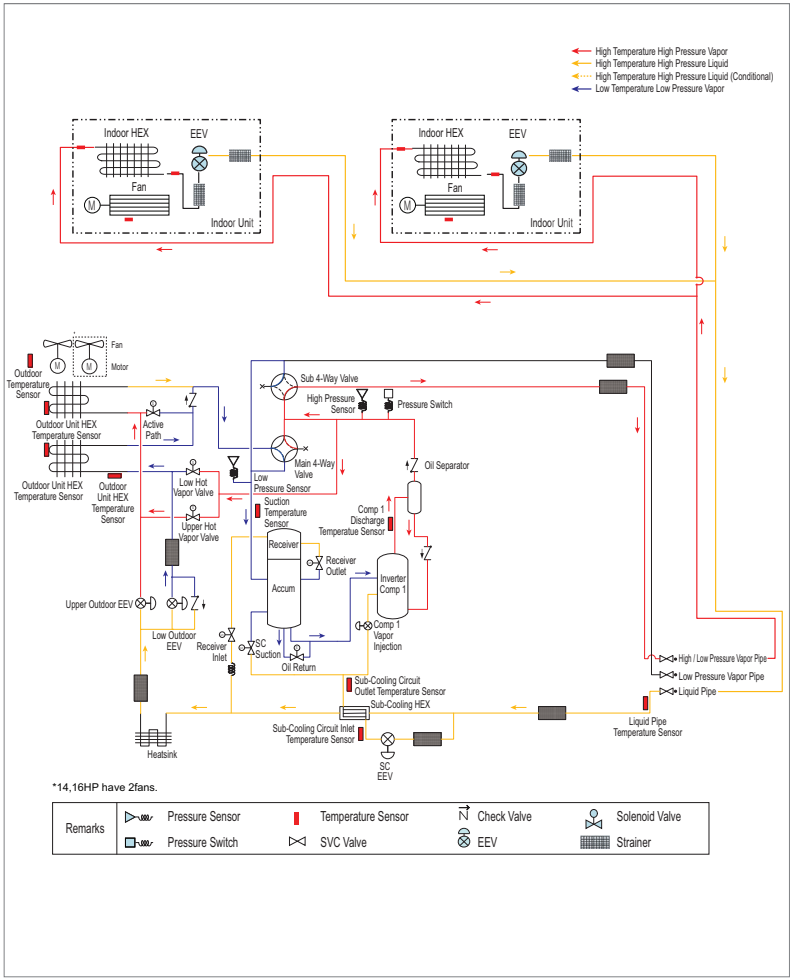
■ Heating Operation



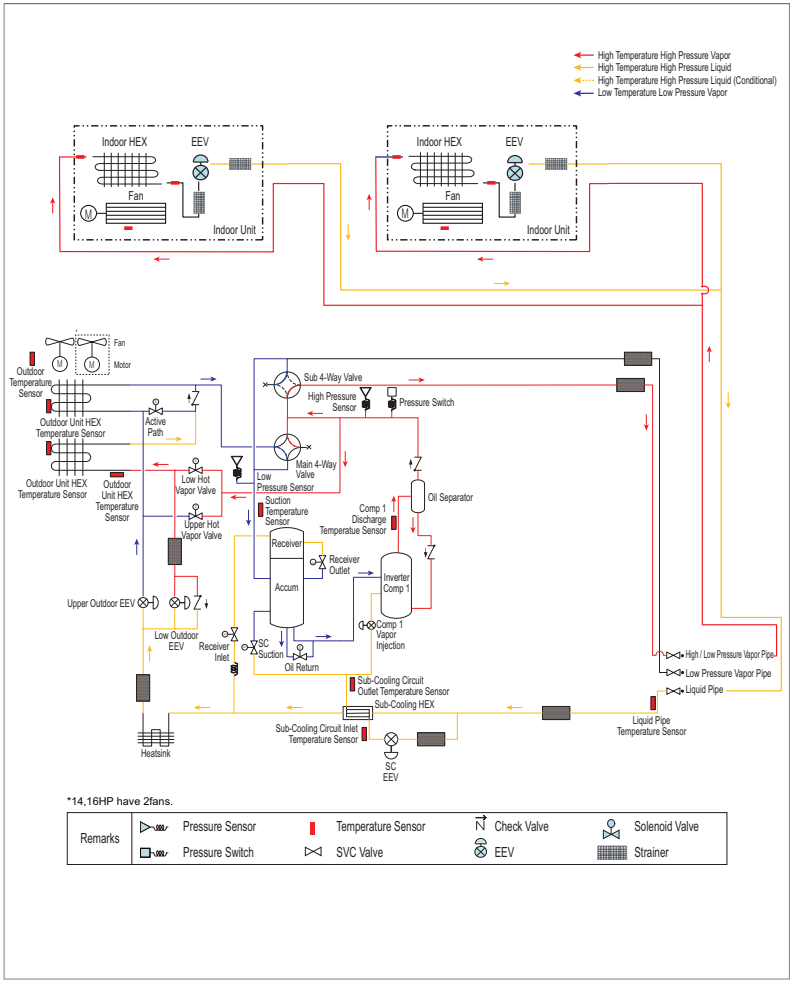
■ Oil Return/ Defrost Operation



■ Upper HEX Defrost Operation



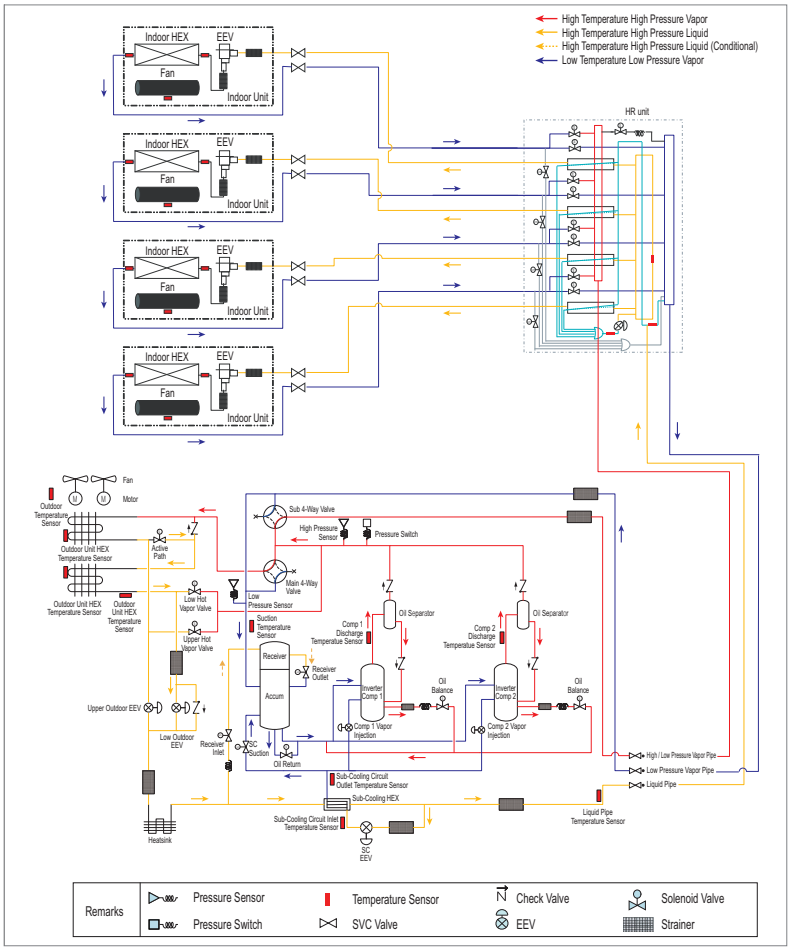
■ Low HEX Defrost Operation



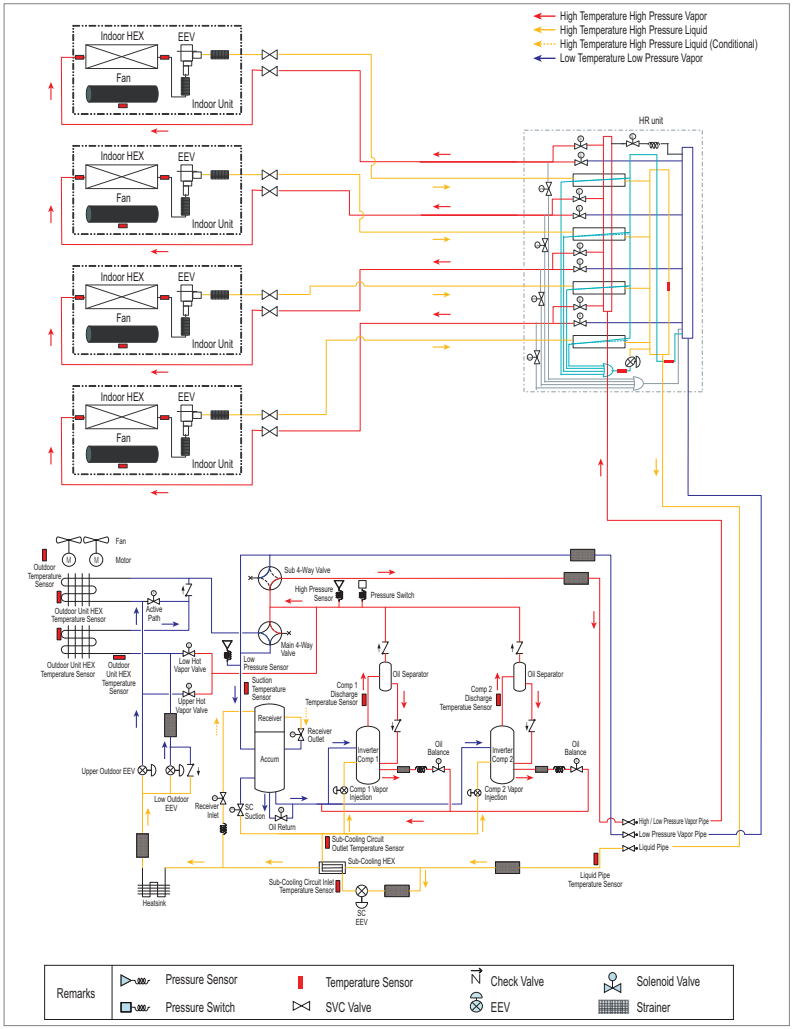
18 / 20 / 22 / 24 / 26HP (2 Comp)

Heat Recovery System

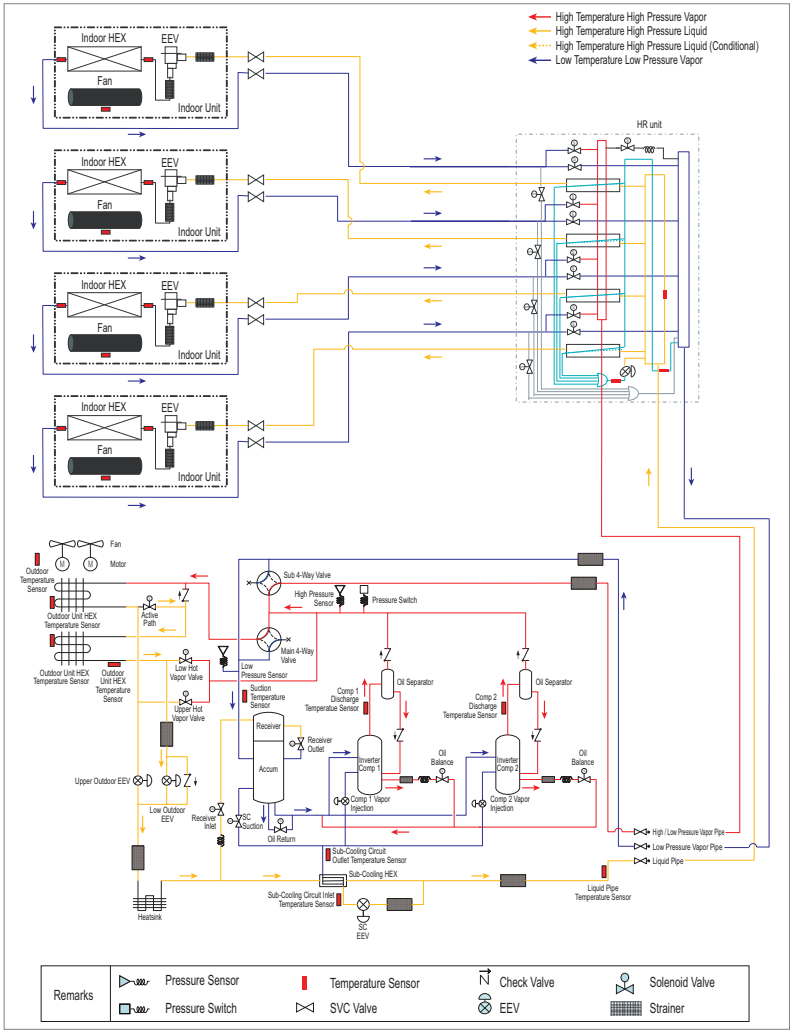
■ Cooling Operation



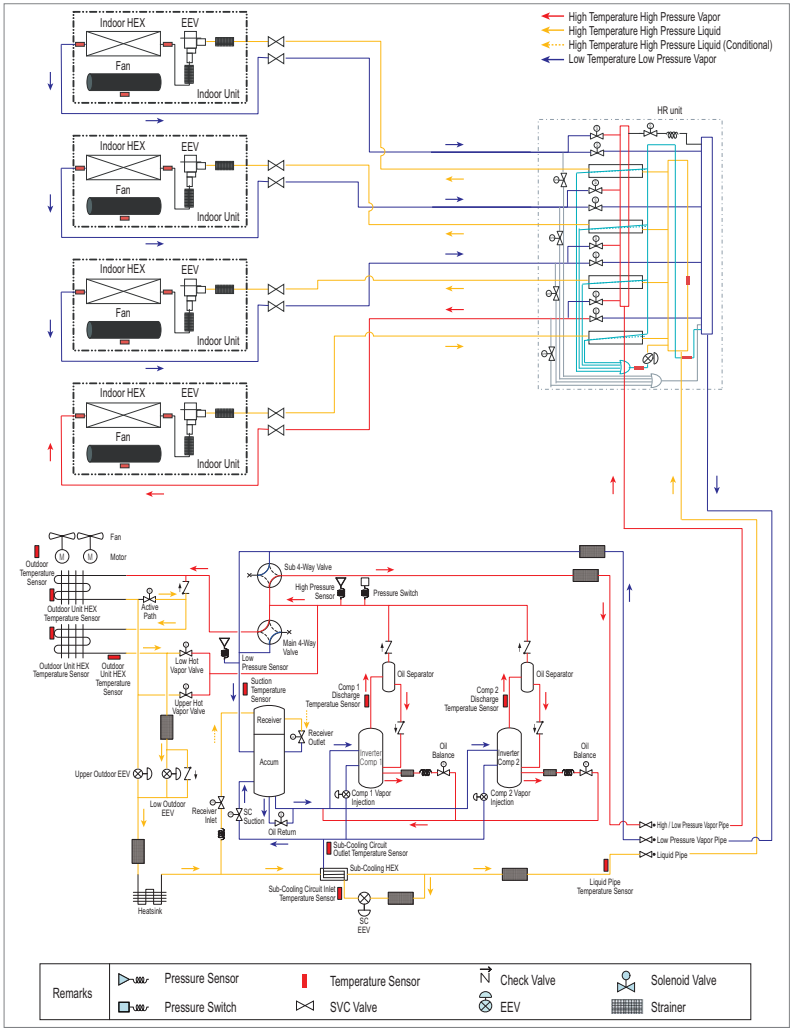
■ Heating Operation



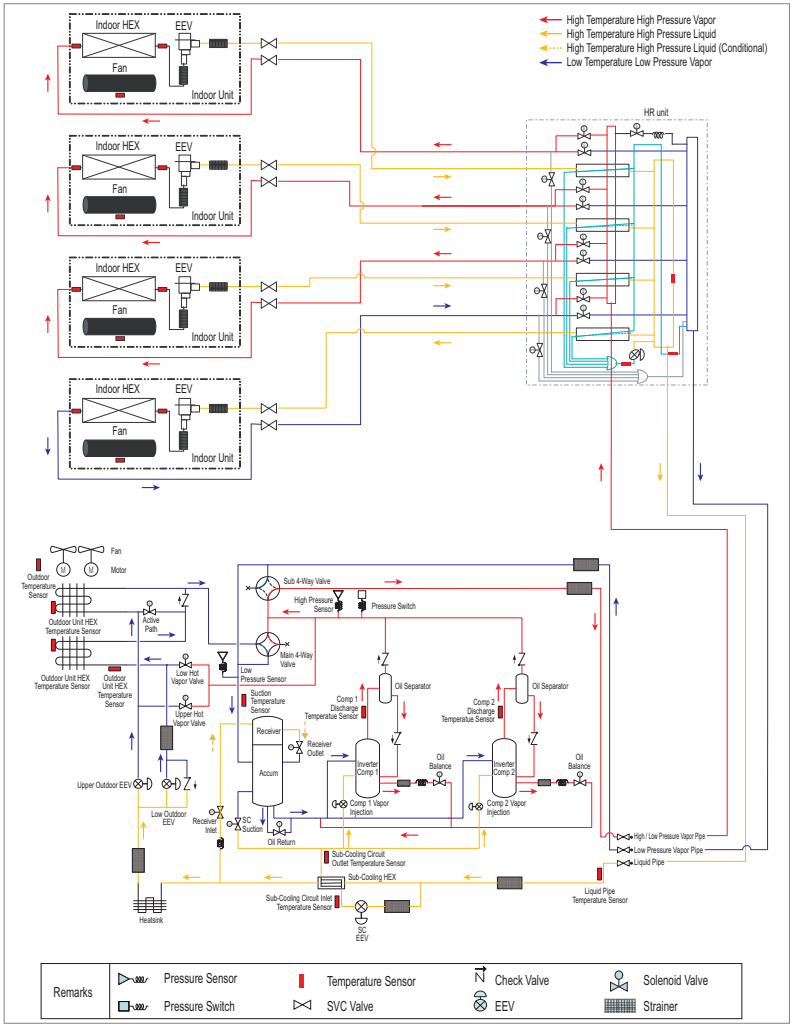
■ Oil Return/ Defrost Operation



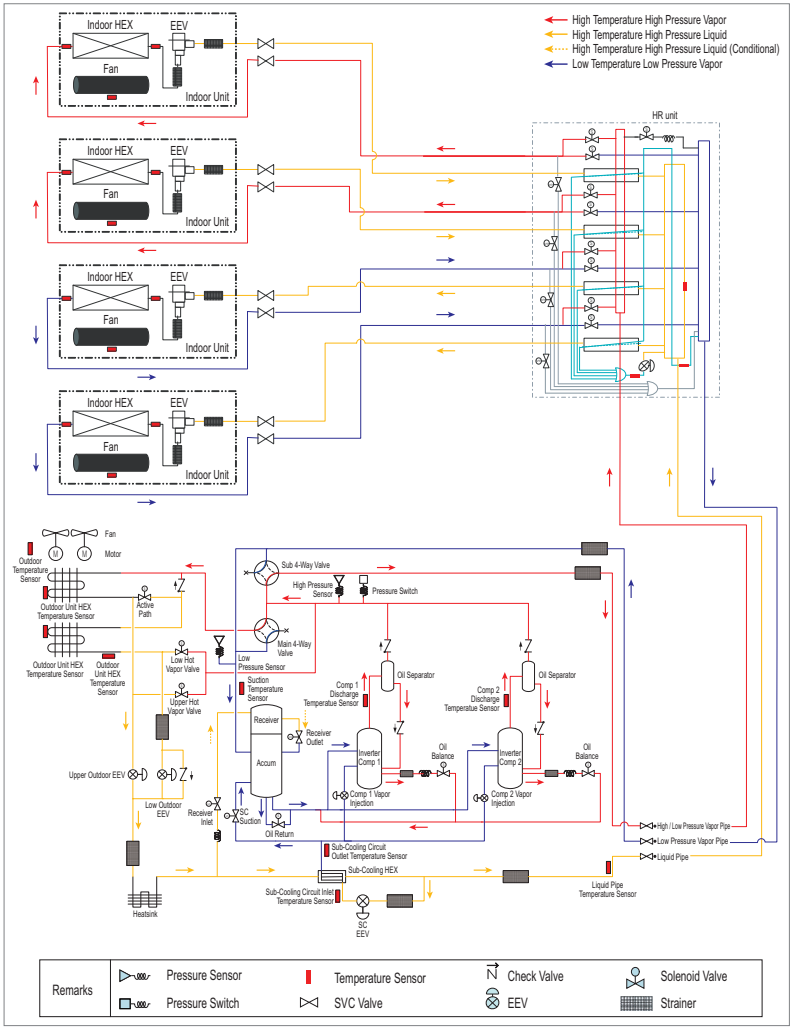
■ Cooling-based Simultaneous Operation



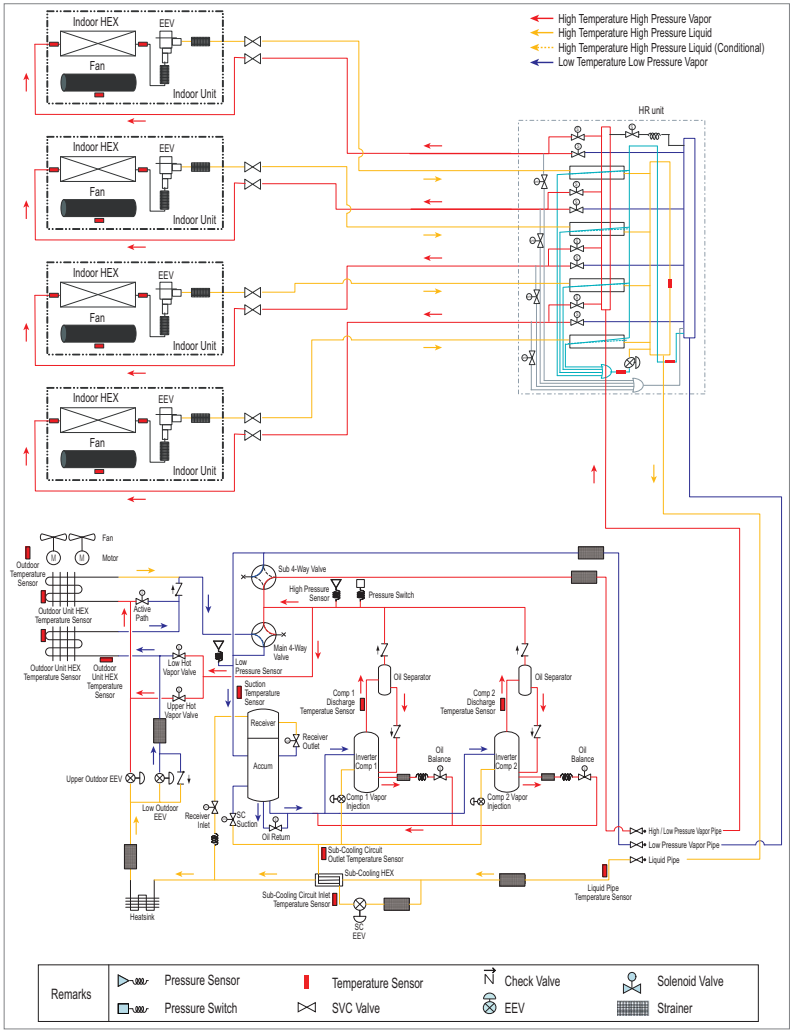
■ Heating-based Simultaneous Operation



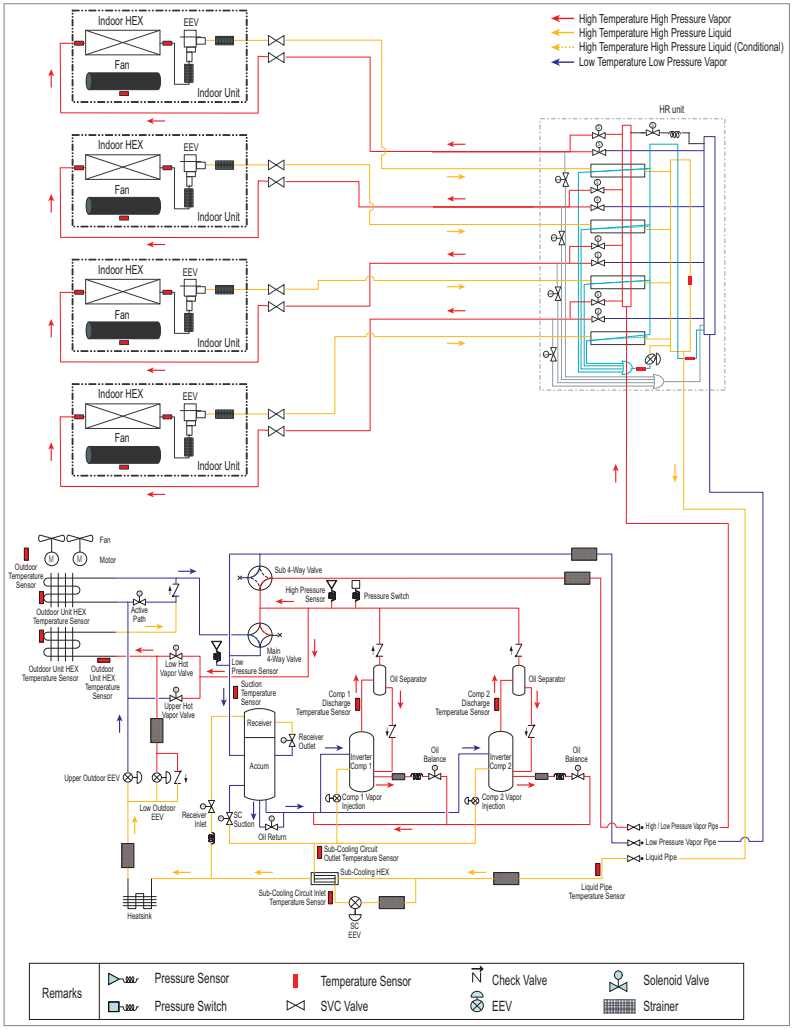
■ Balanced Simultaneous Operation



■ Upper HEX Defrost Operation

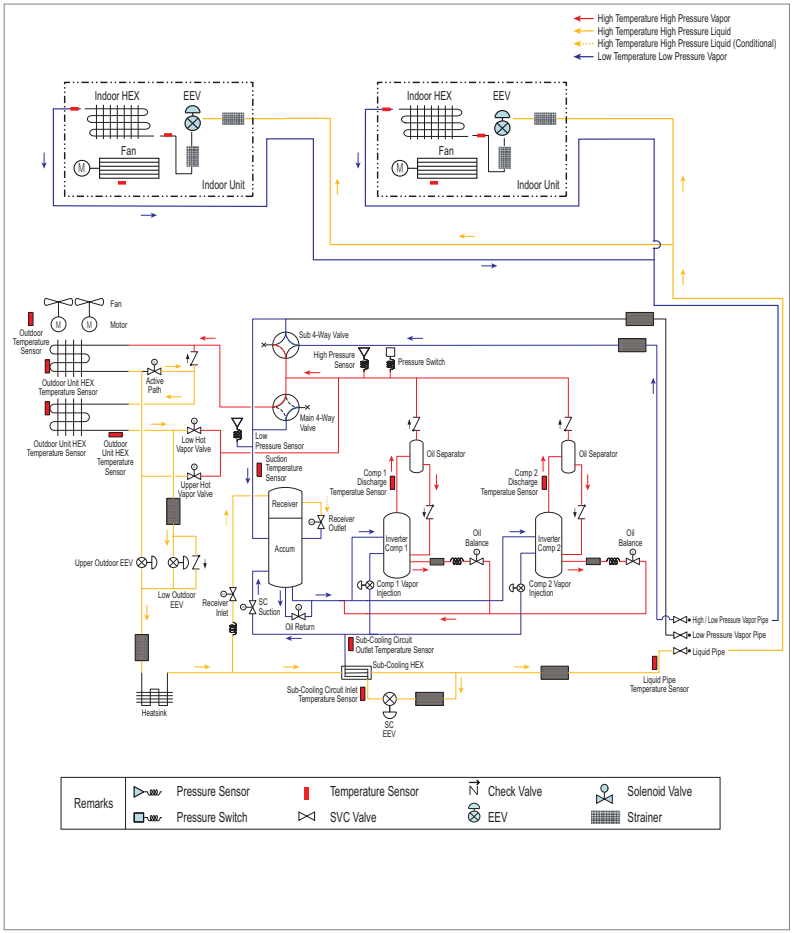


■ Low HEX Defrost Operation

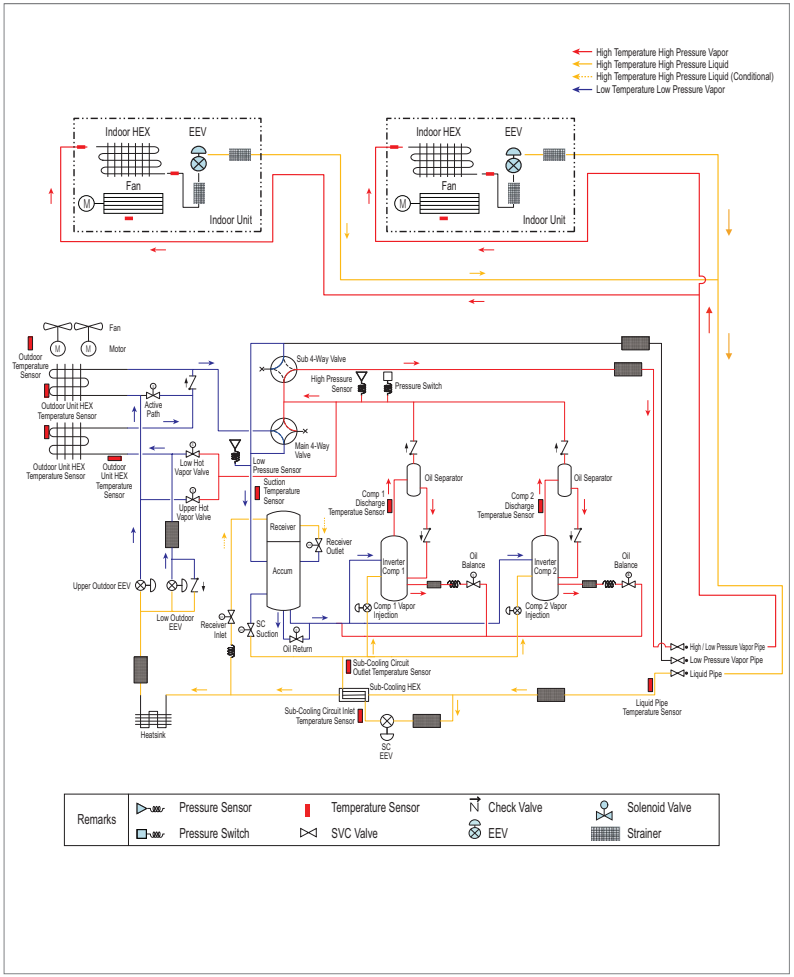


Heat Pump System

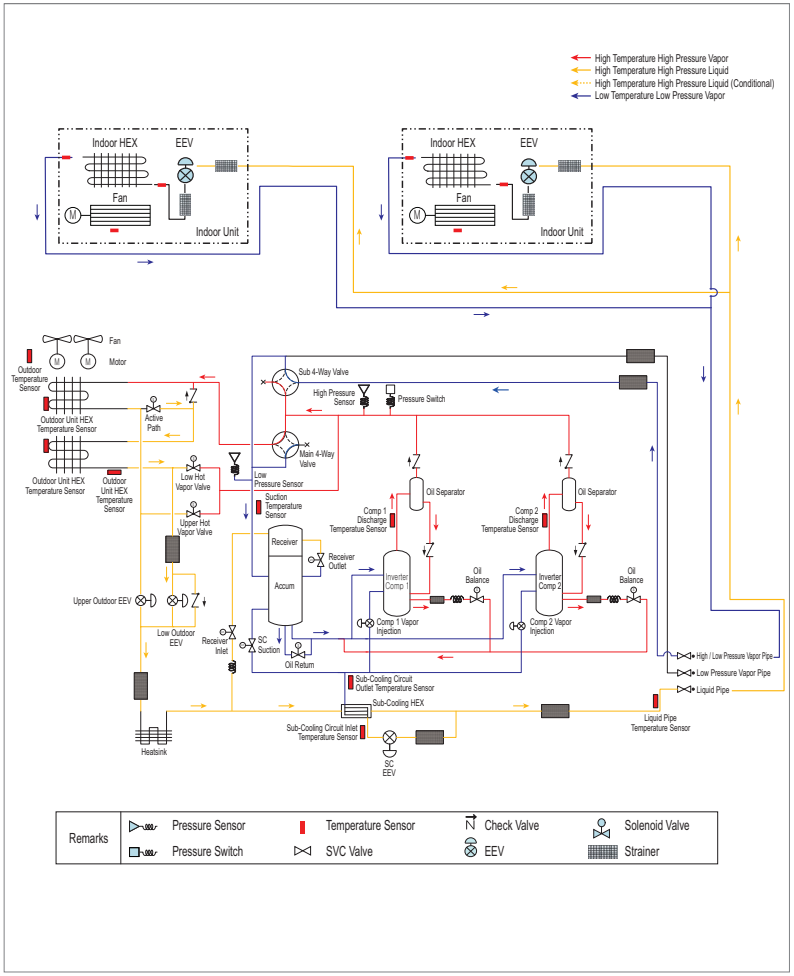
■ Cooling Operation



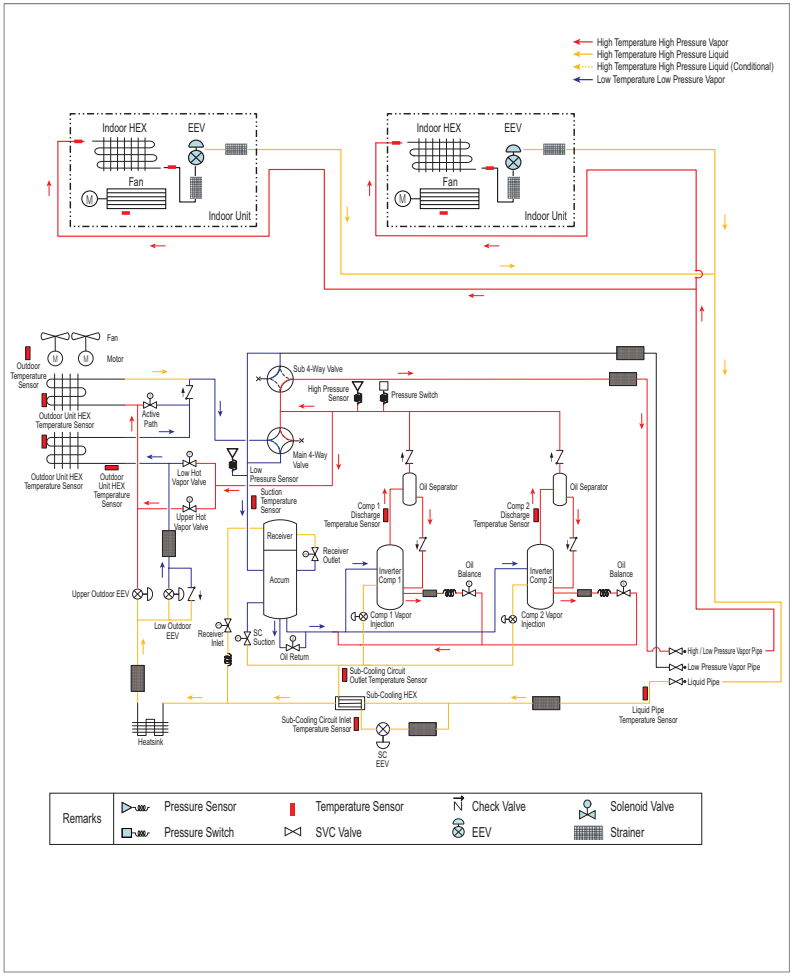
■ Heating Operation



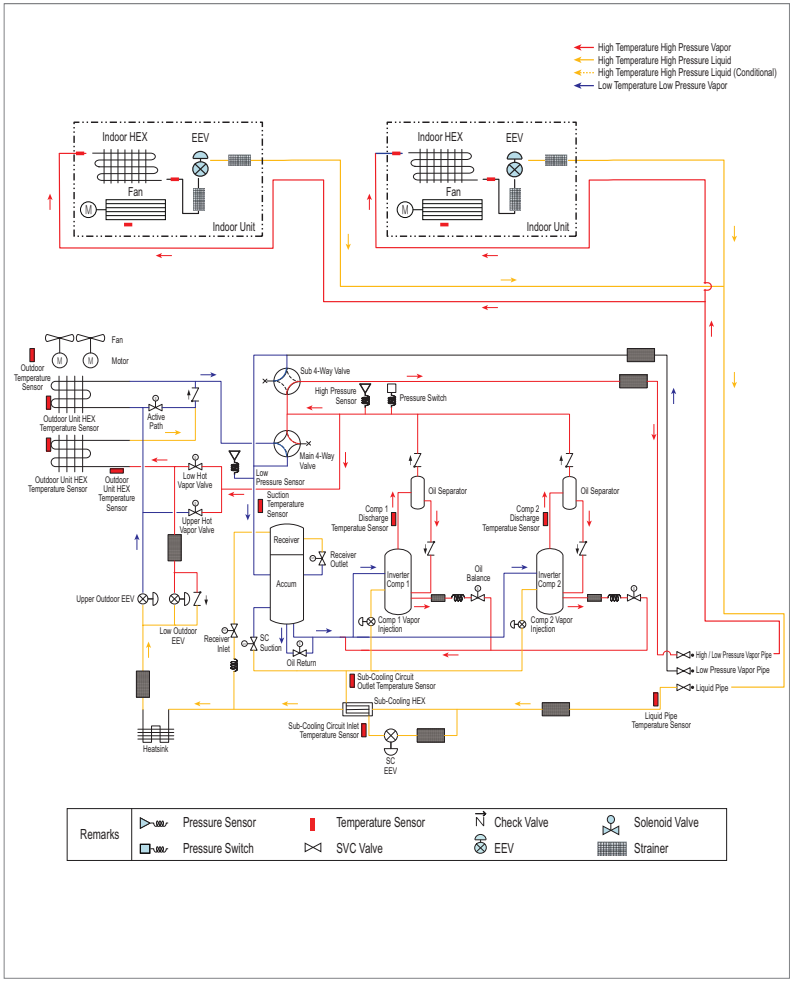
■ Oil Return/ Defrost Operation



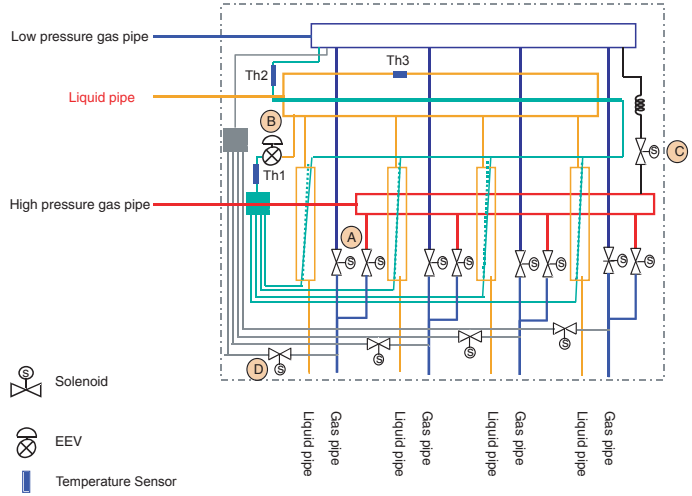
■ Upper HEX Defrost Operation



■ Low HEX Defrost Operation



HR Unit



Symbol	Description	PCB Connector
Th1	Sub Cooling In Temperature Sensor	SN_SEN_02(SC_IN)
Th2	Sub Cooling Out Temperature Sensor	SN_SEN_02(SC_OUT)
Th3	Luquid Receiver Temperature Sensor	SN_SEN_02(LIQUID)

Ⓐ : To be switched operation between cooling and heating by two Solenoid valve

Ⓑ : To be used decreasing noise according to sub-cooling of inlet and outlet of indoor unit (Simultaneous operation)

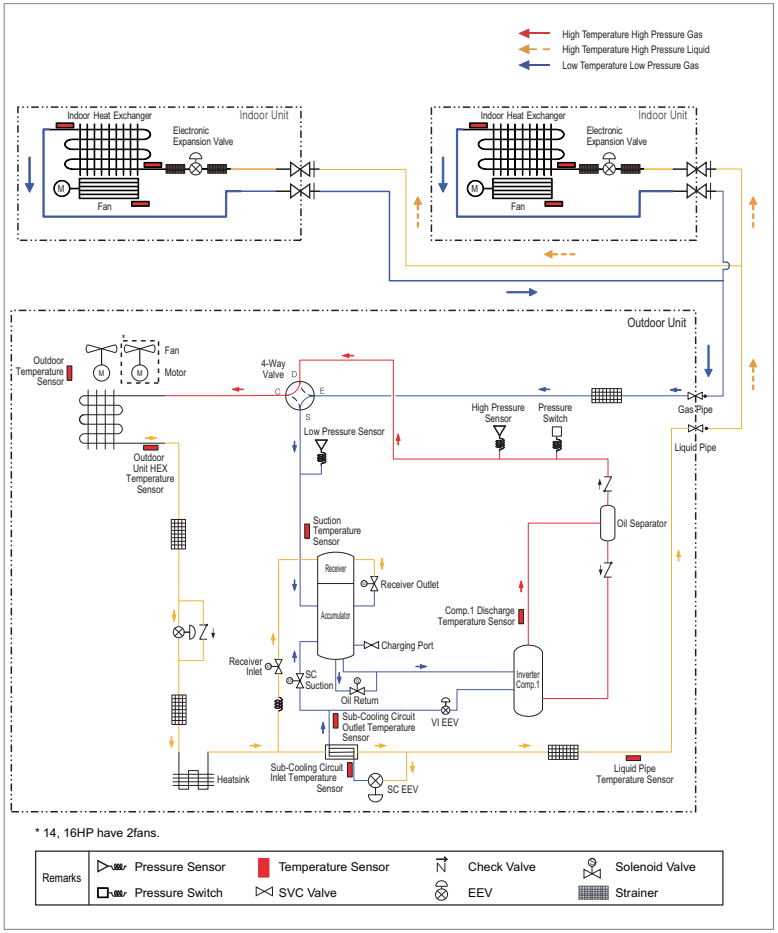
Ⓒ : To prevent liquid charging between high pressure gas valve and HR unit at cooling mode

Ⓓ : To be controlled the pressure between high and low pressure pipe during operation switching

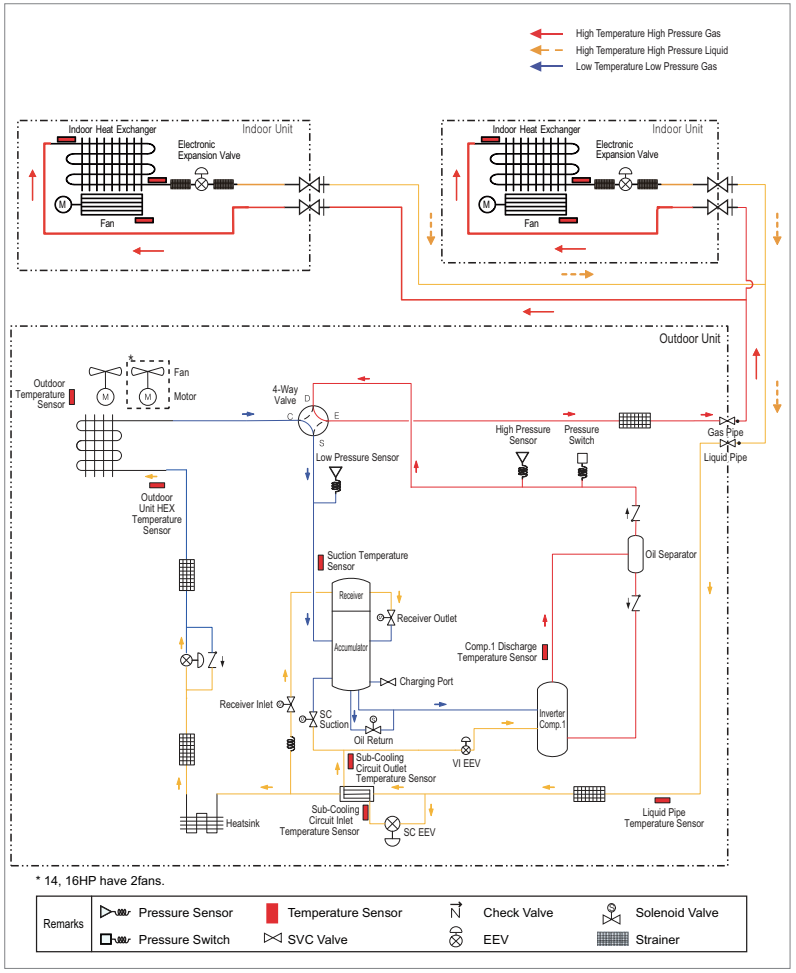
3.2. Heat Pump (ARUN***LTE5)

8 / 10 / 12 / 14 / 16 HP (1 Comp)

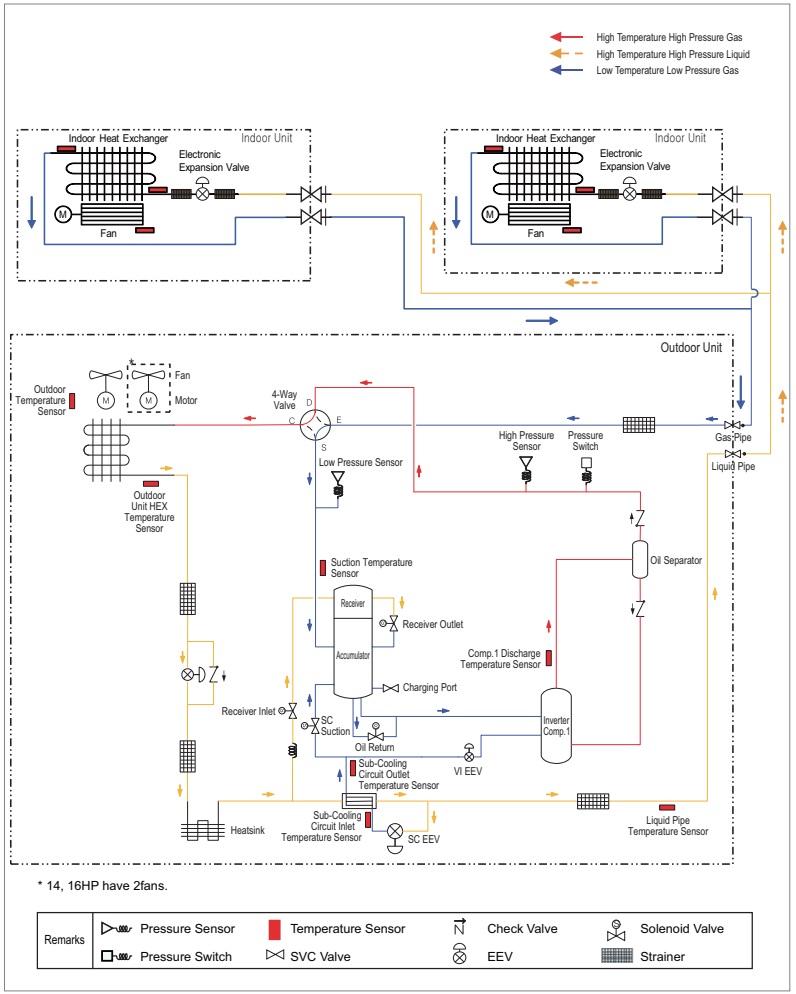
■ Cooling Operation



■ Heating Operation



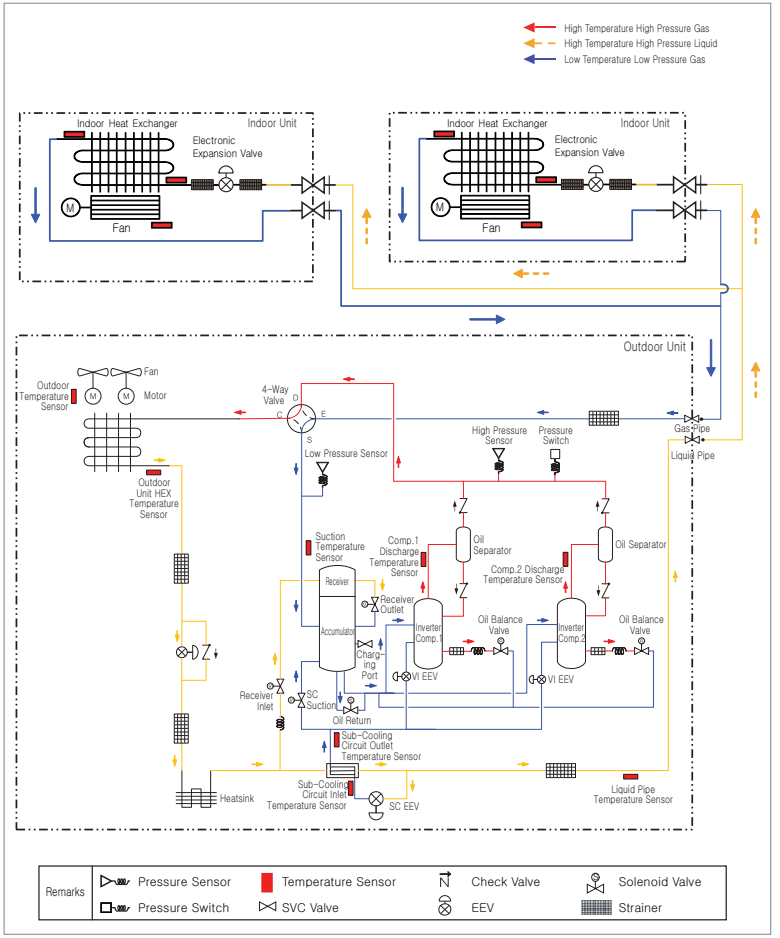
■ Oil Return/ Defrost Operation



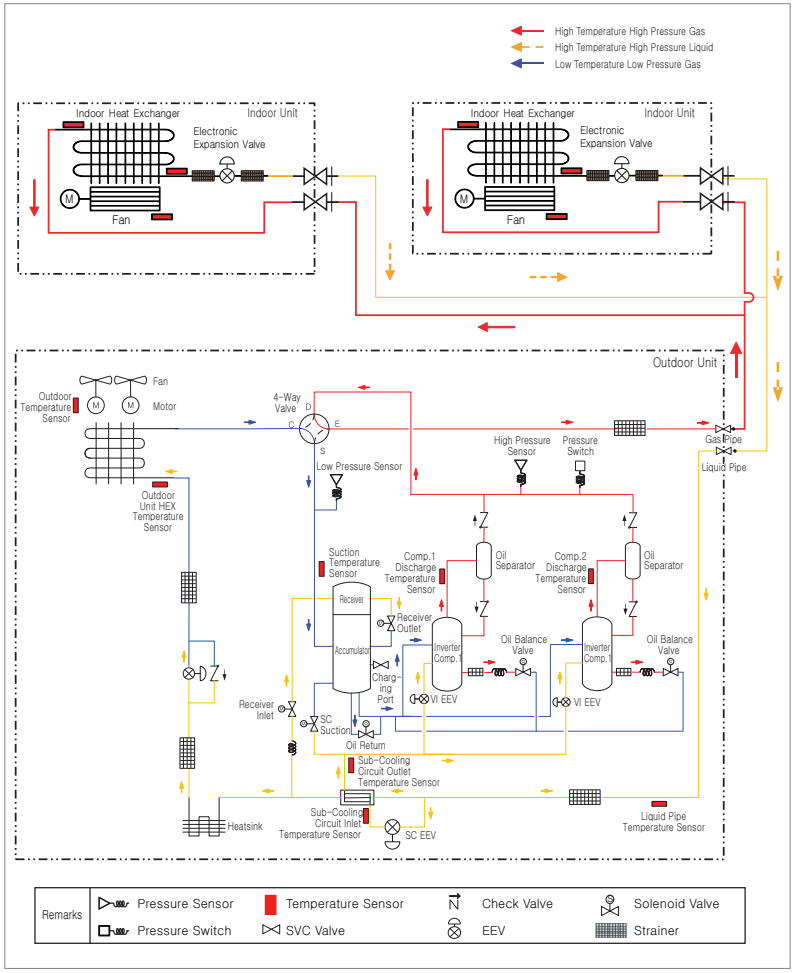
* 14, 16HP have 2fans.

18 / 20 / 22 / 24 / 26 HP (2 Comp)

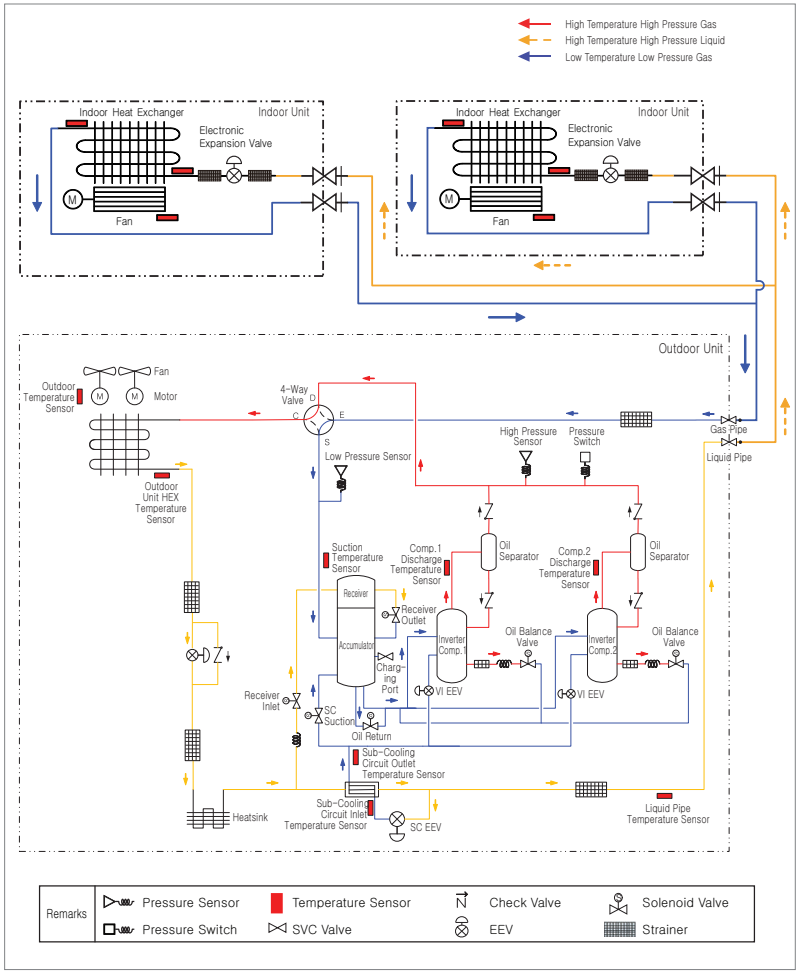
■ Cooling Operation



■ Heating Operation



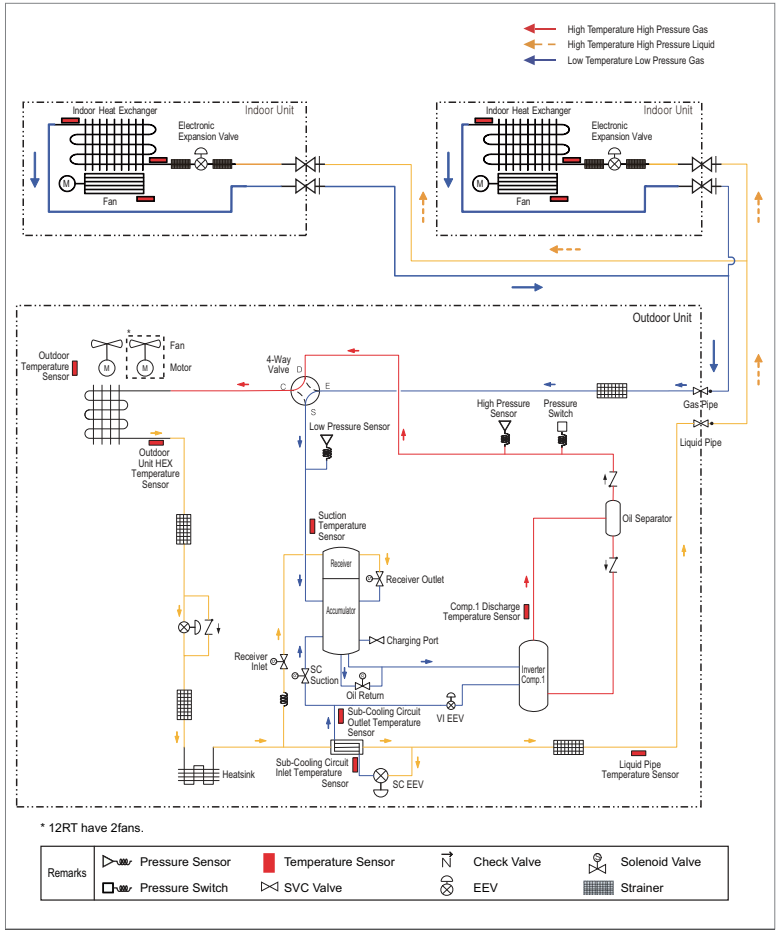
■ Oil Return/ Defrost Operation



3.3. Cooling Only (ARUV***B/DTE5)

8 / 10 / 12 RT (1 Comp)

■ Cooling / Oil Return Operation

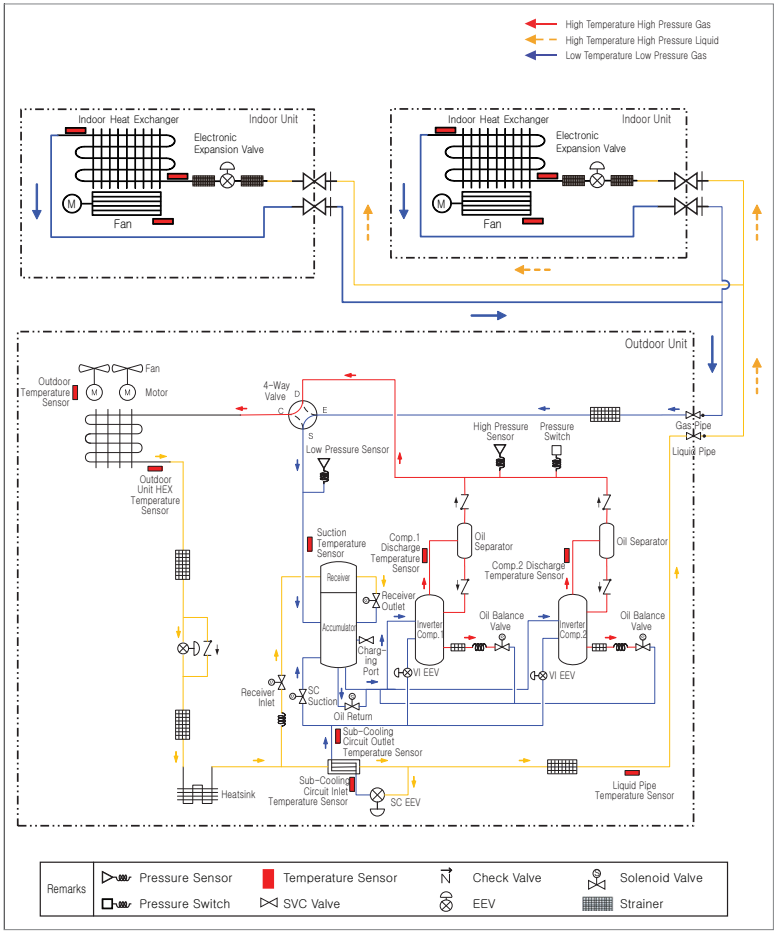


* 12RT have 2fans.

Remarks							
	Pressure Sensor	Temperature Sensor	Check Valve	Solenoid Valve
	Pressure Switch	SVC Valve	EEV	Strainer

14 / 16 / 18 / 20 / 22 RT (2 Comp)

■ Cooling / Oil Return Operation

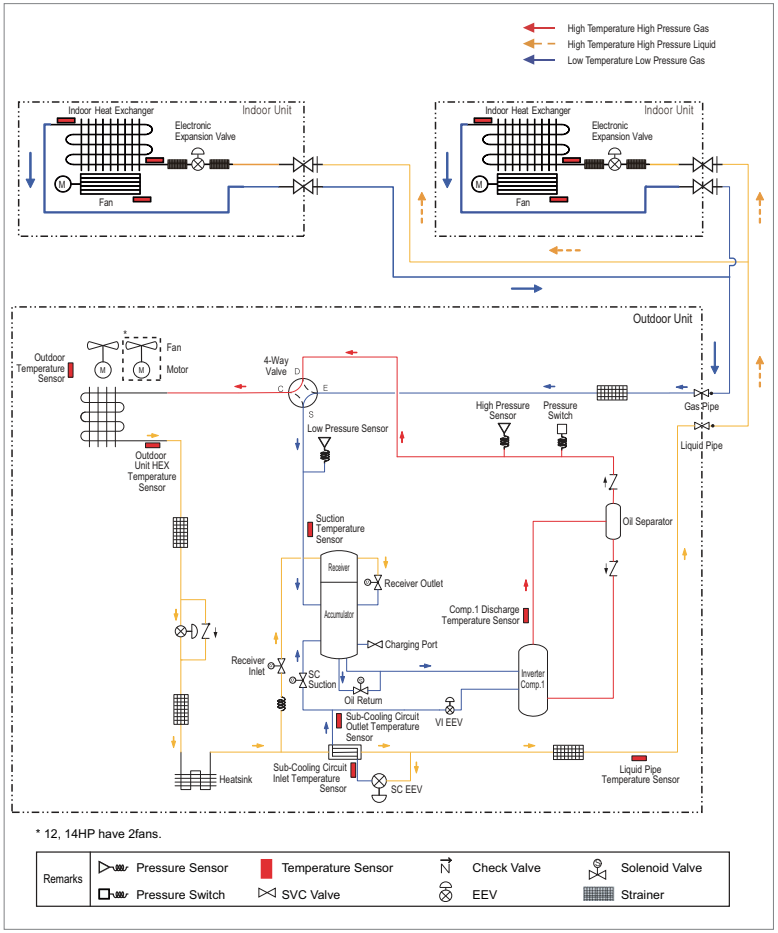


Remarks							
	Pressure Sensor	Temperature Sensor	Check Valve	Solenoid Valve
	Pressure Switch	SVC Valve	EEV	Strainer

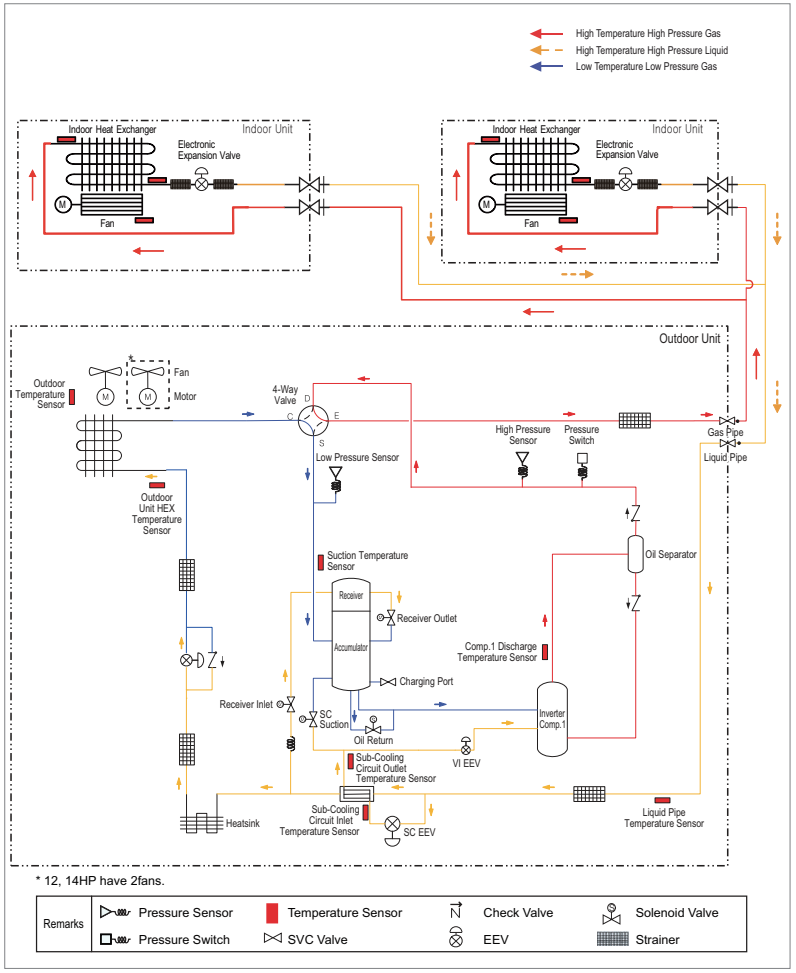
3.4. Tropical Heat Pump (ARUN***LEH5)

8 / 10 / 12 / 14 HP (1 Comp)

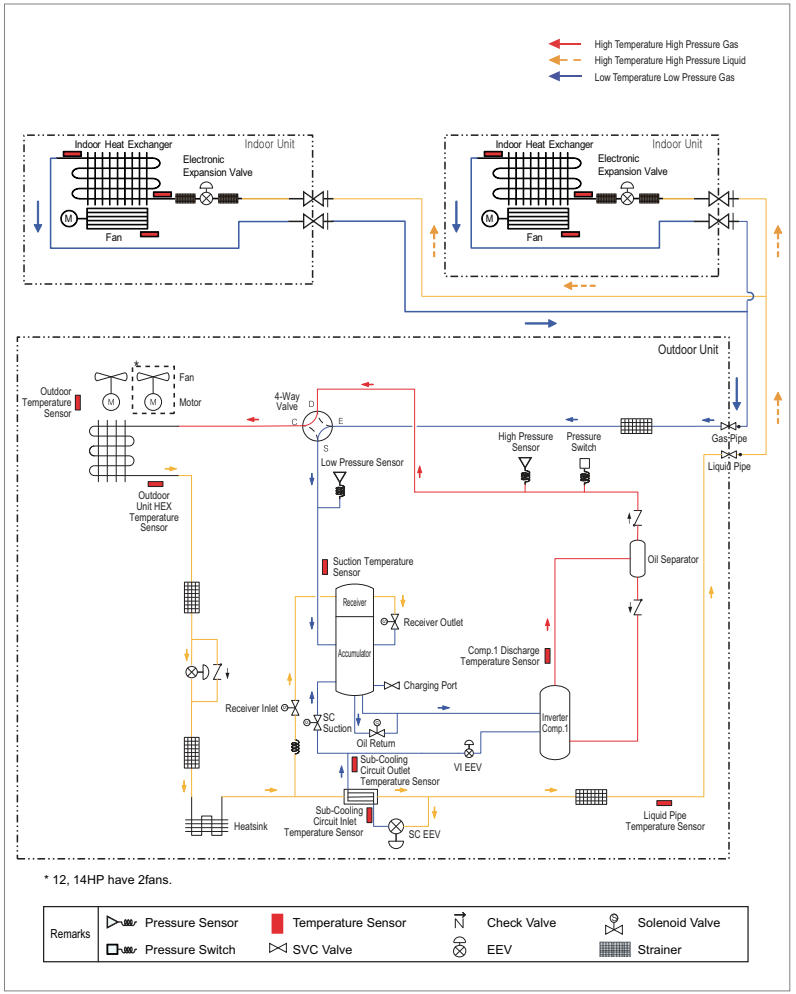
■ Cooling Operation



■ Heating Operation



■ Oil Return/ Defrost Operation

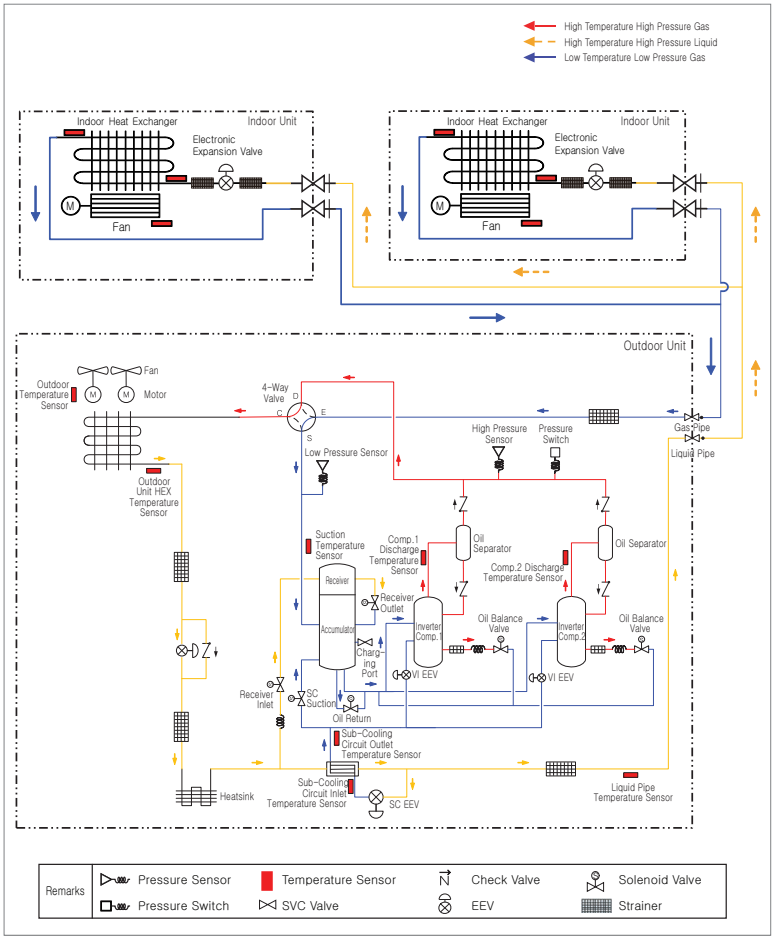


* 12, 14HP have 2fans.

Remarks							
	Pressure Sensor	Temperature Sensor	Check Valve	Solenoid Valve
	Pressure Switch	SVC Valve	EEV	Strainer

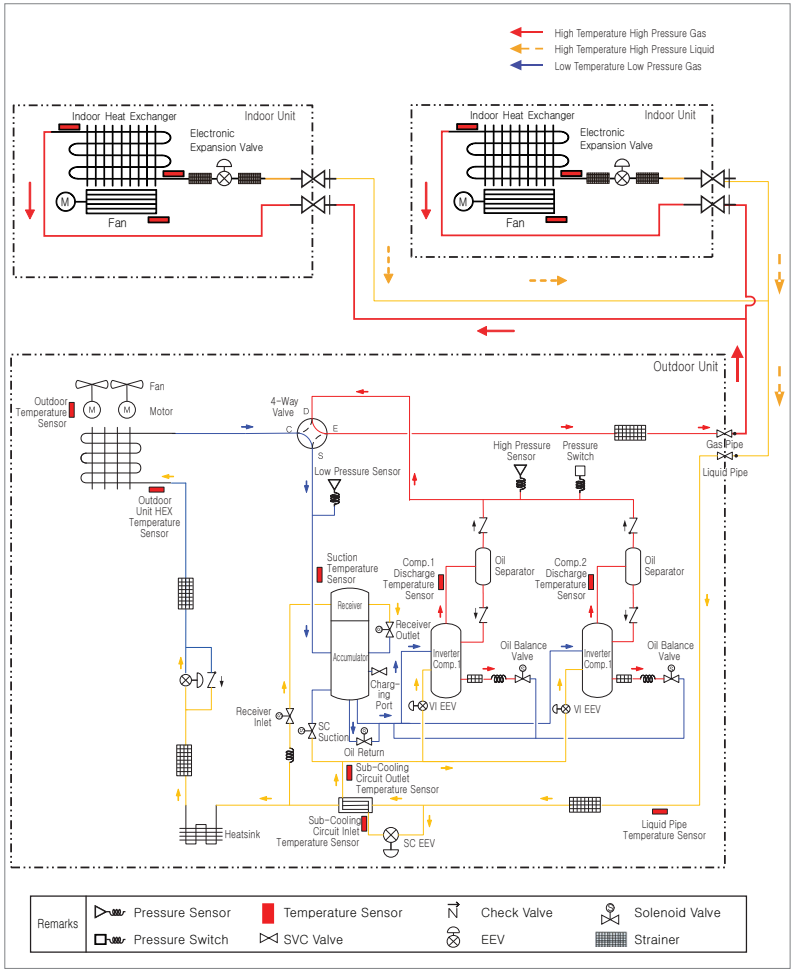
16 / 18 / 20 HP (2 Comp)

■ Cooling Operation

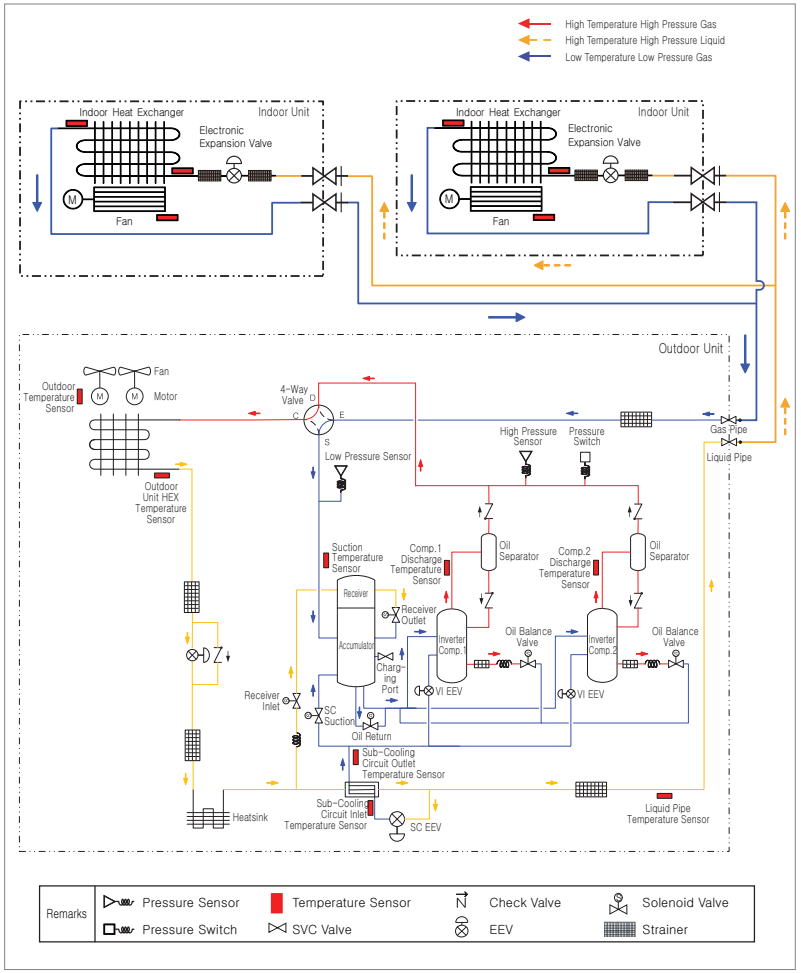


Remarks							
	Pressure Sensor	Temperature Sensor	Check Valve	Solenoid Valve
	Pressure Switch	SVC Valve	EEV	Strainer

■ Heating Operation

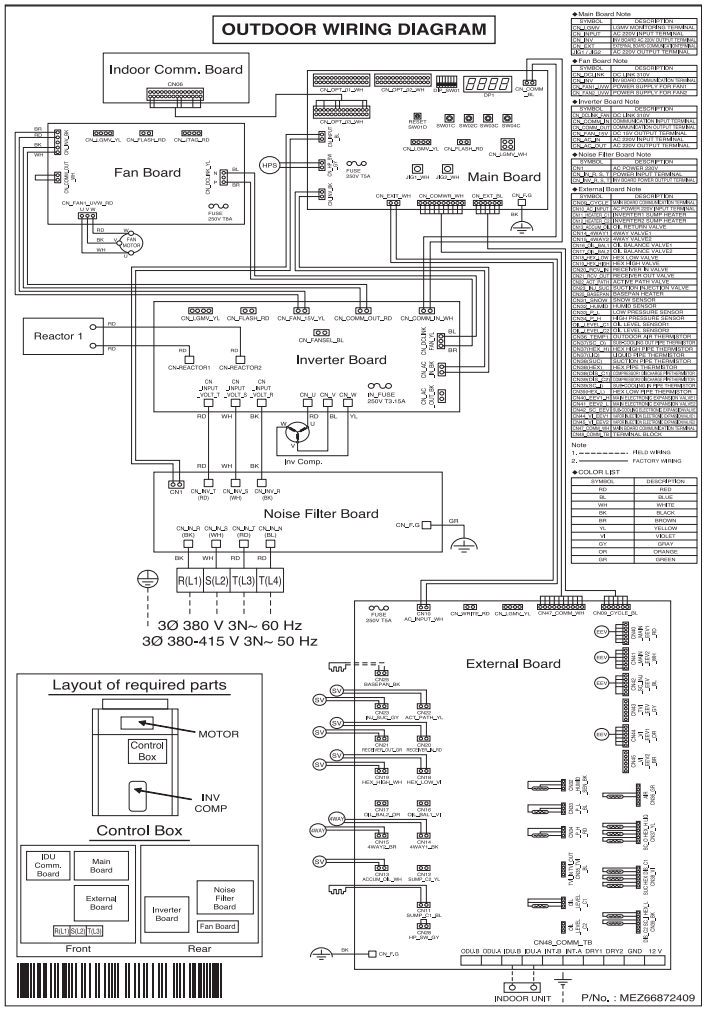


■ Oil Return/ Defrost Operation

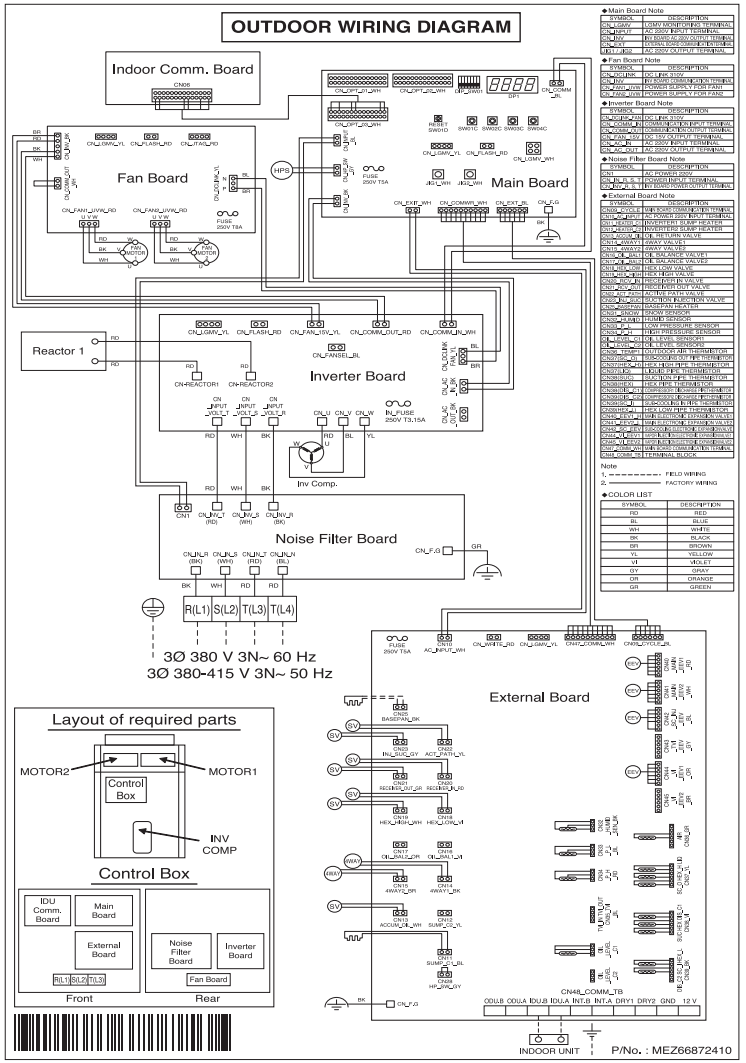


4.1. Heat Pump and Heat Recovery (ARUM***LTE5)

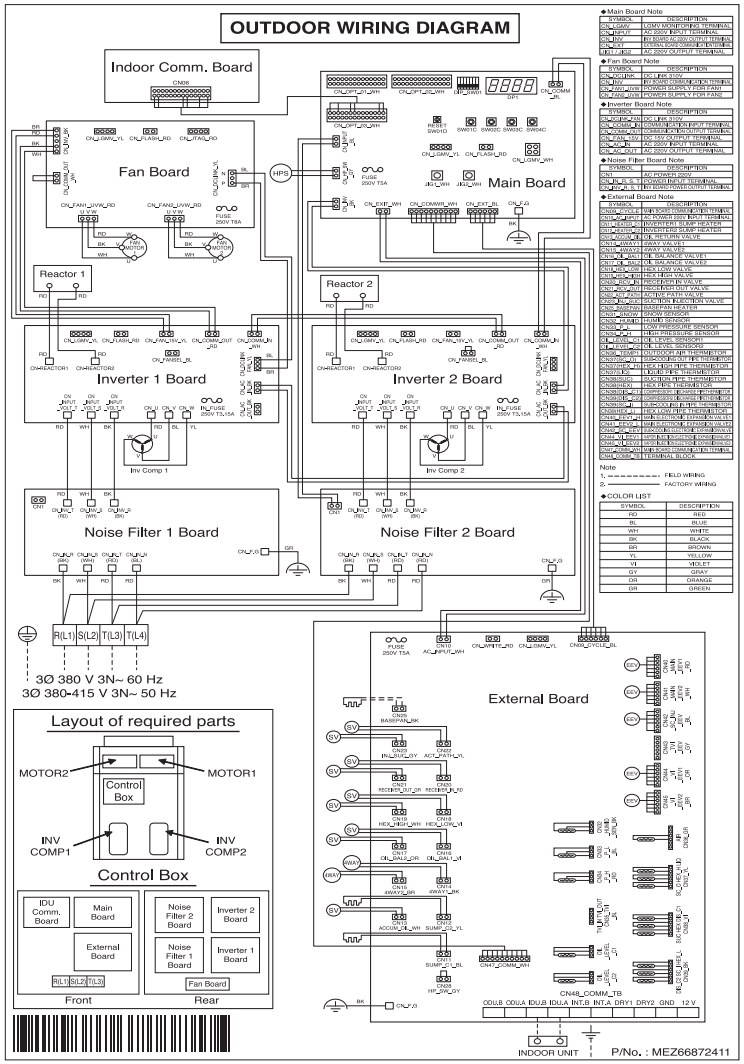
8 / 10 / 12 HP (UXA, 1 Comp)



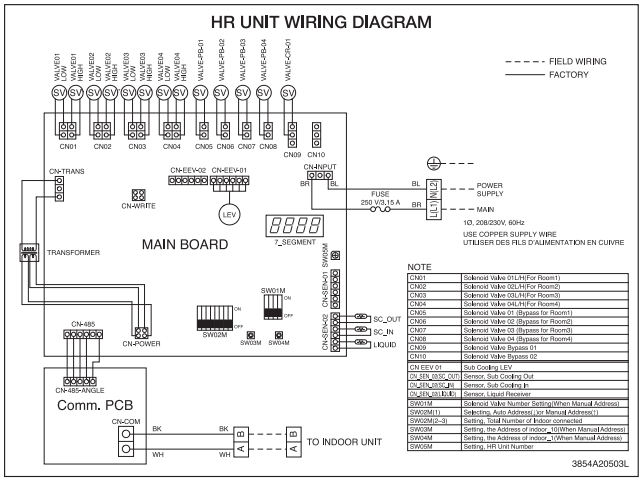
14 / 16 HP (UXB, 1 Comp)



18 / 20 / 22 / 24 / 26HP (UXB, 2 Comp)



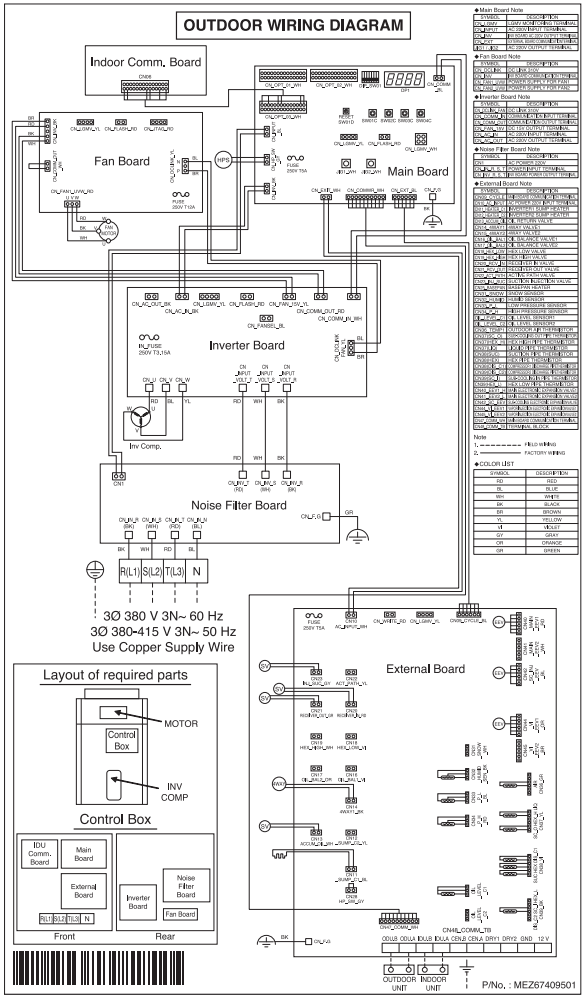
HR Units



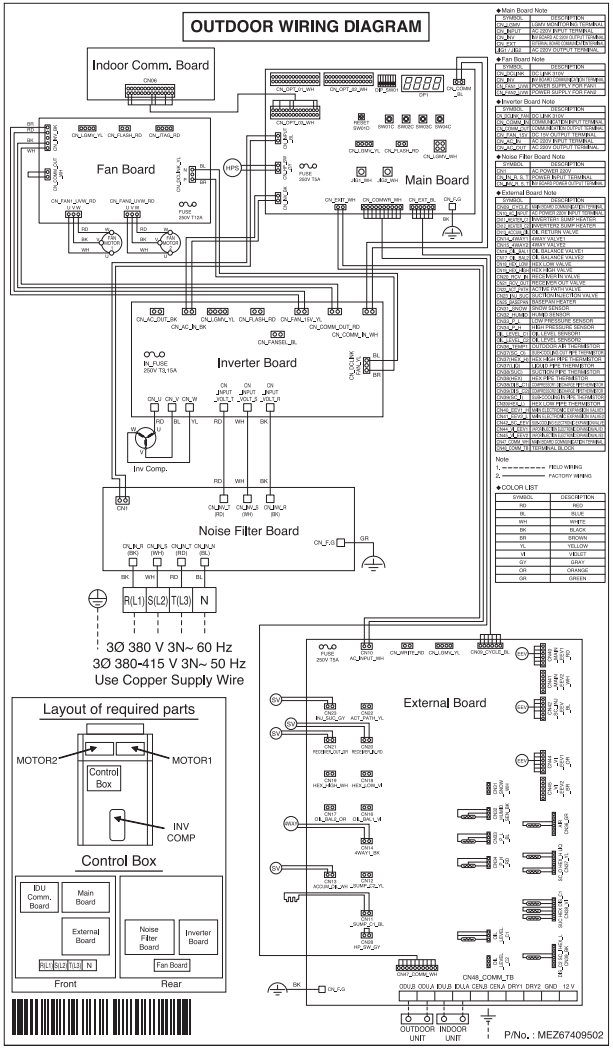
CN01	Solenoid Valv 01 L/H(For Room1)
CN02	Solenoid Valv 02 L/H(For Room2)
CN03	Solenoid Valv 03 L/H(For Room3)
CN04	Solenoid Valv 04 L/H(For Room4)
CN05	Solenoid Valv 01 L/H(Bypass for Room1)
CN06	Solenoid Valv 02 L/H(Bypass for Room2)
CN07	Solenoid Valv 03 L/H(Bypass for Room3)
CN08	Solenoid Valv 04 L/H(Bypass for Room4)
CN09	Solenoid Valv Bypass 01
CN10	Solenoid Valv Bypass 02
CN EEV 01	Sub Cooling LEV
CN_WEN_02(SC_OUT)	Sensor, Sub Cooling Out
CN_WEN_02(SC_IN)	Sensor, Sub Cooling In
CN_WEN_02(LIQUID)	Sensor, Liquid Receiver
SW01M	Solenoid Valve Number Setting(When Manual Address)
SW02M(1)	Selecting, Auto Address(↓) or Manual Address(↑)
SW02M(2~3)	Setting, Total Number of Indoor connected
SW03M	Setting, the Address of indoor_10(When Manual Address)
SW04M	Setting, the Address of indoor_1(When Manual Address)
SW05M	Setting, HR Unit Number

4.2. Heat Pump (ARUN***LTE5)

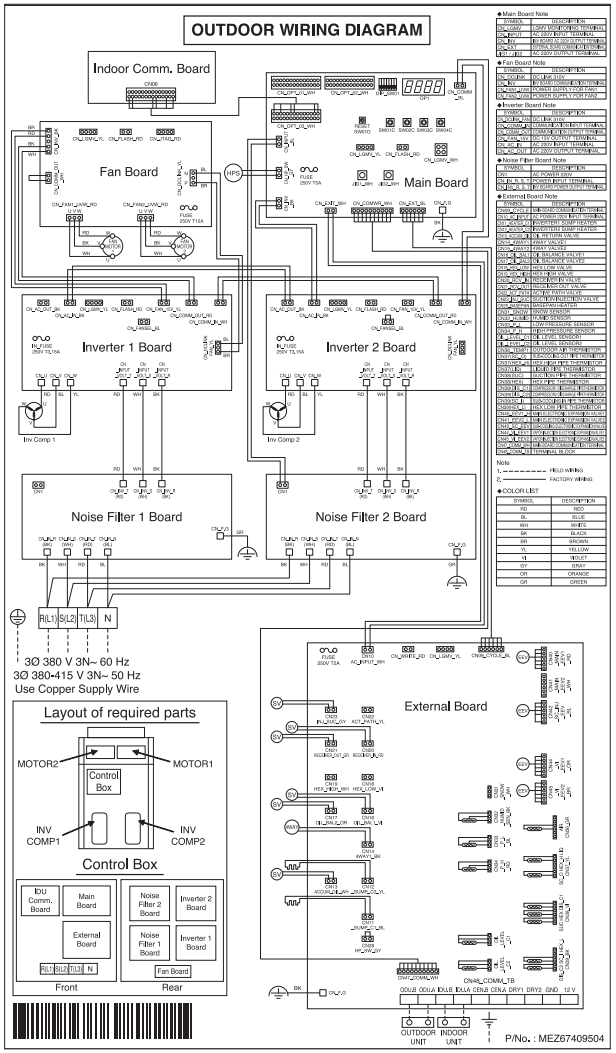
8 / 10 / 12 HP (UXA, 1 Comp)



14 / 16 HP (UXB, 1 Comp)

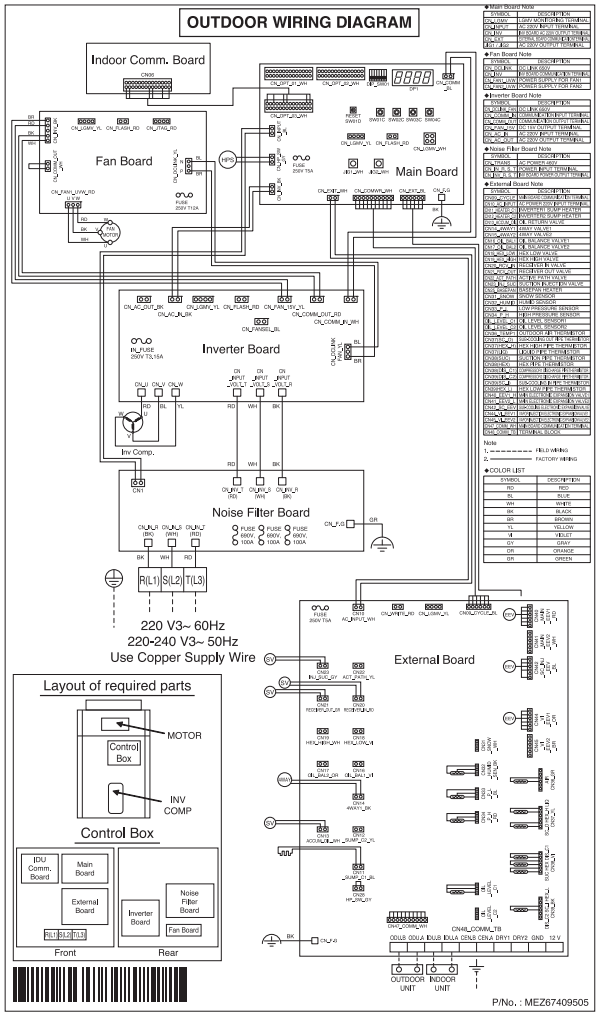


18 / 20 / 22 / 24 / 26 HP (UXB, 2 Comp)

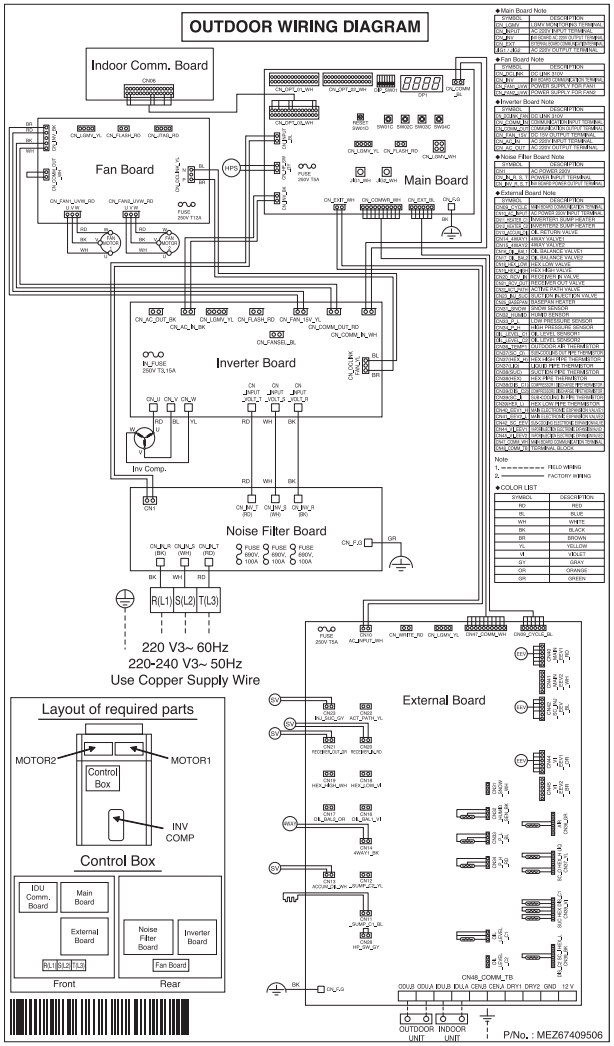


4.3. Cooling Only (ARUV***B/DTE5)

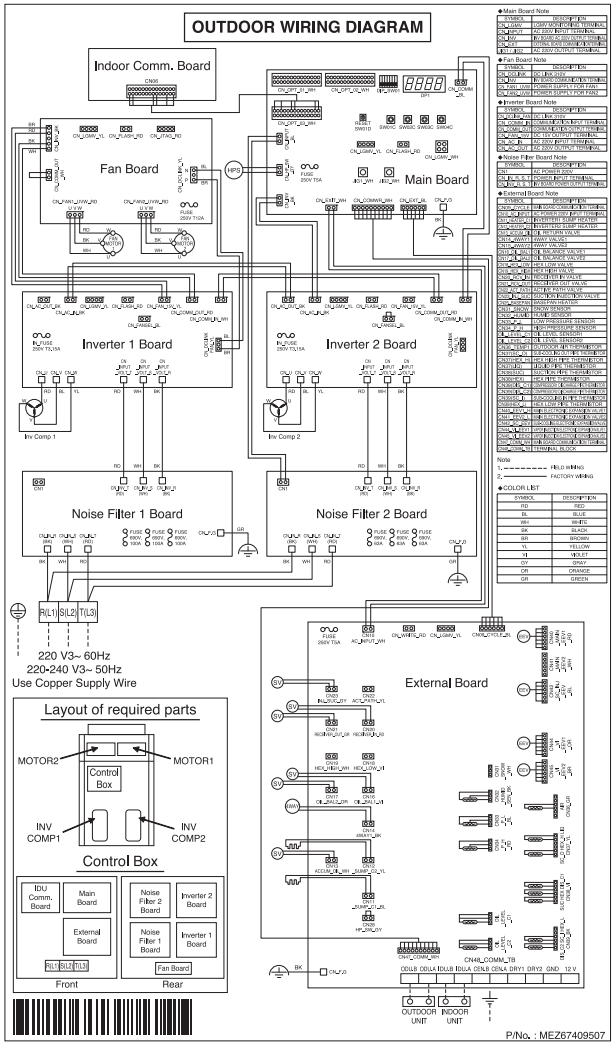
220V_8 / 10 RT (UXA, 1 Comp)



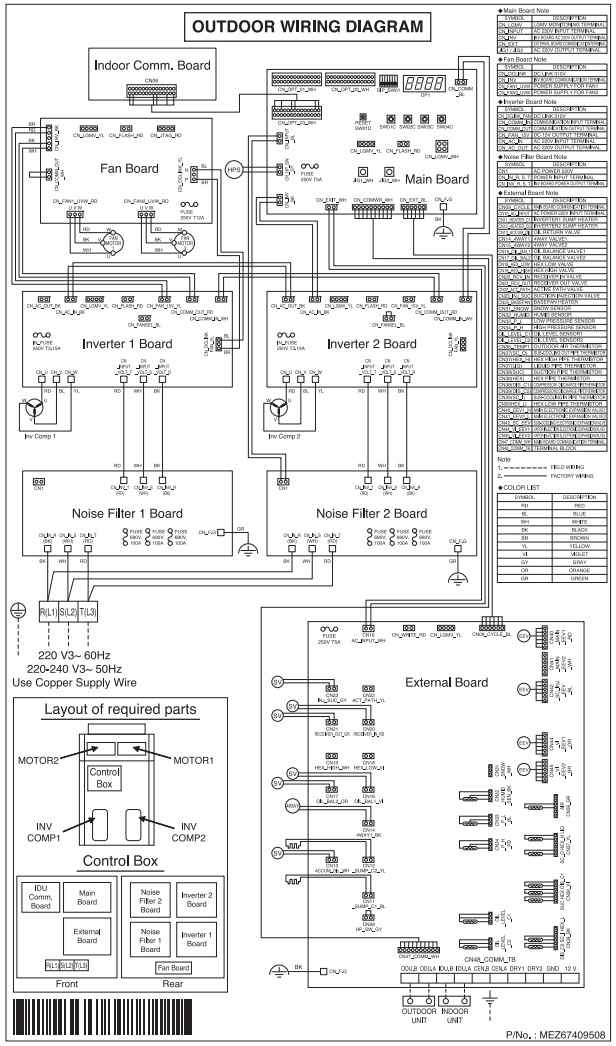
220V_12 RT (UXB, 1 Comp)



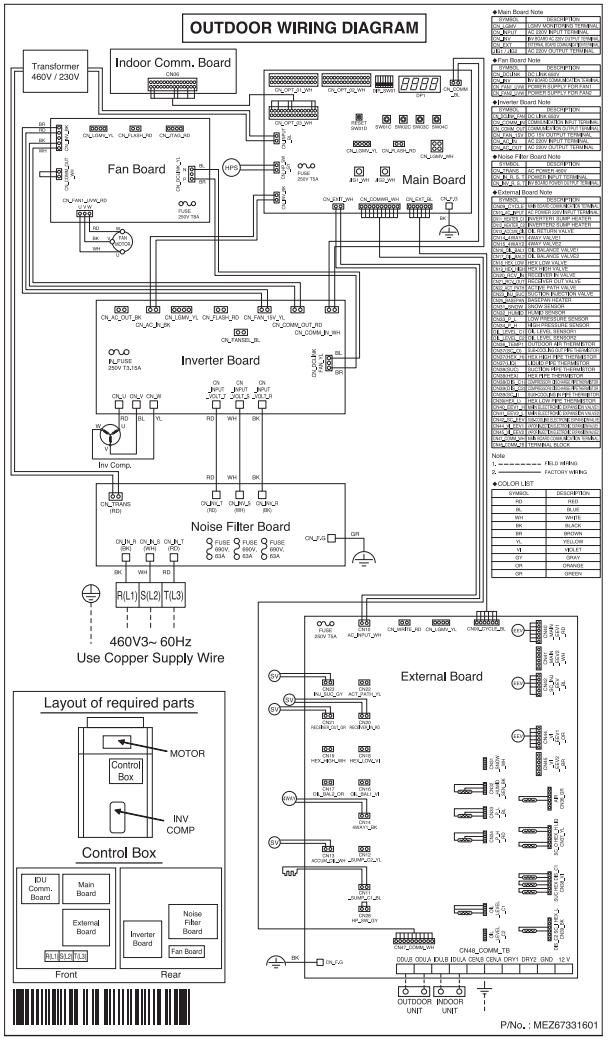
220V_14 RT (UXB, 2 Comp)



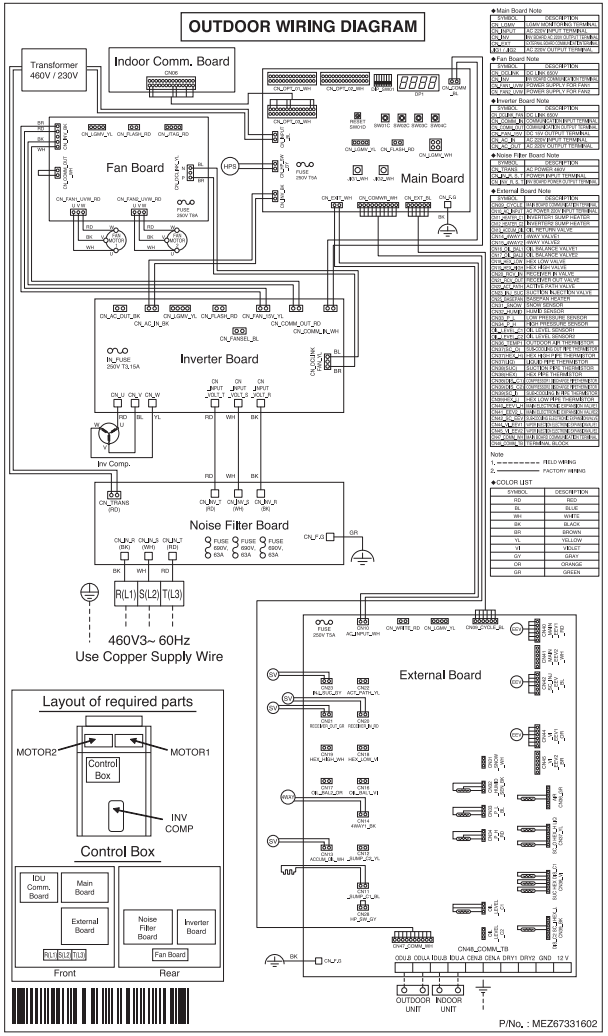
220V_16 / 18 / 20 / 22 RT (UXB, 2 Comp)



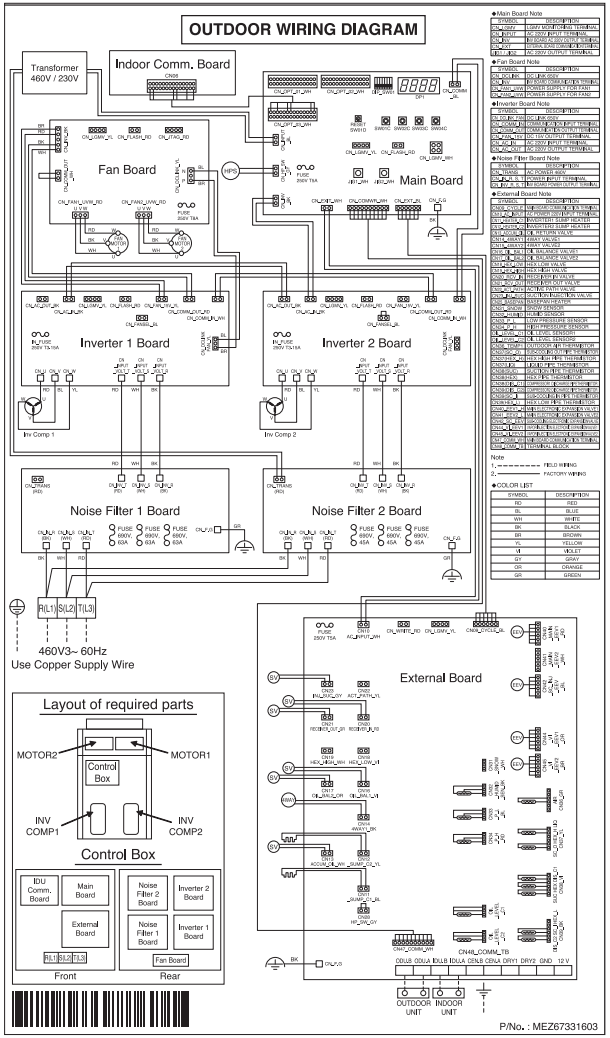
460V_8 / 10 RT (UXA, 1 Comp)



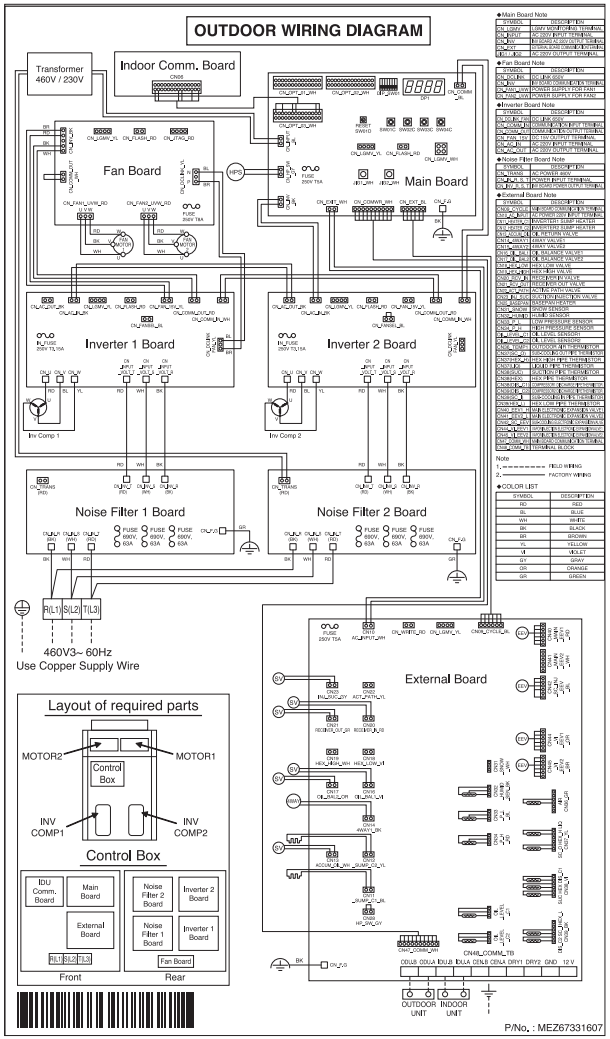
460V_12 RT (UXB, 1 Comp)



460V_14 RT (UXB, 2 Comp)

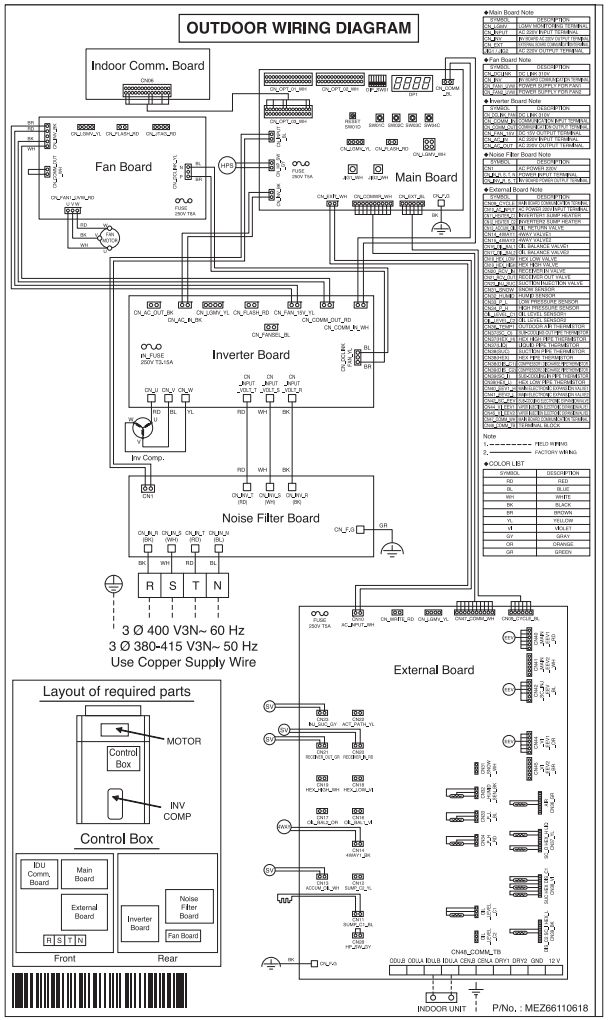


460V_16 / 18 / 20 / 22 RT (UXB, 2 Comp)

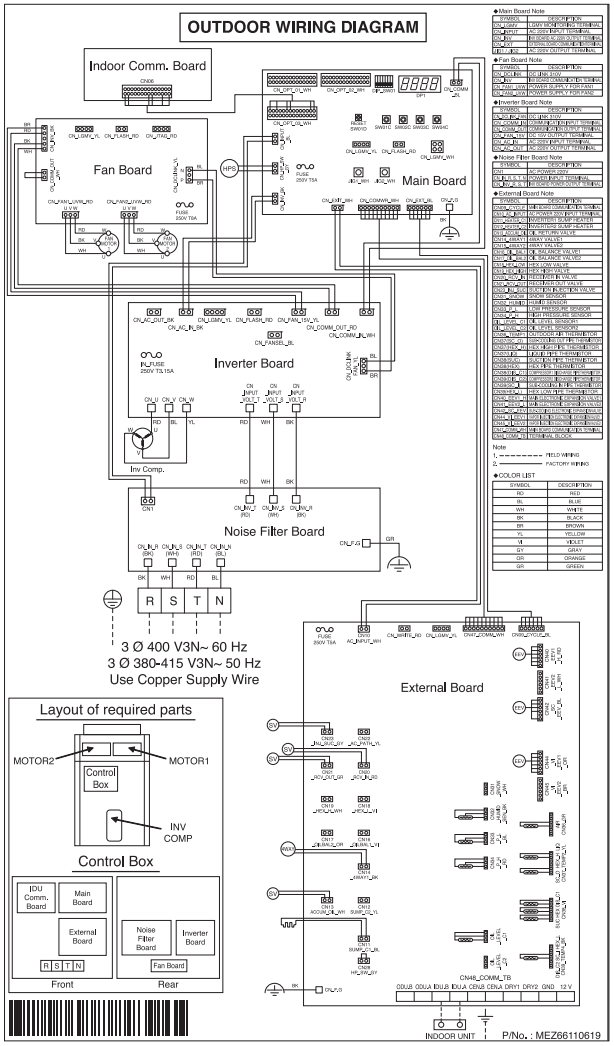


4.4. Tropical Heat Pump (ARUN***LEH5)

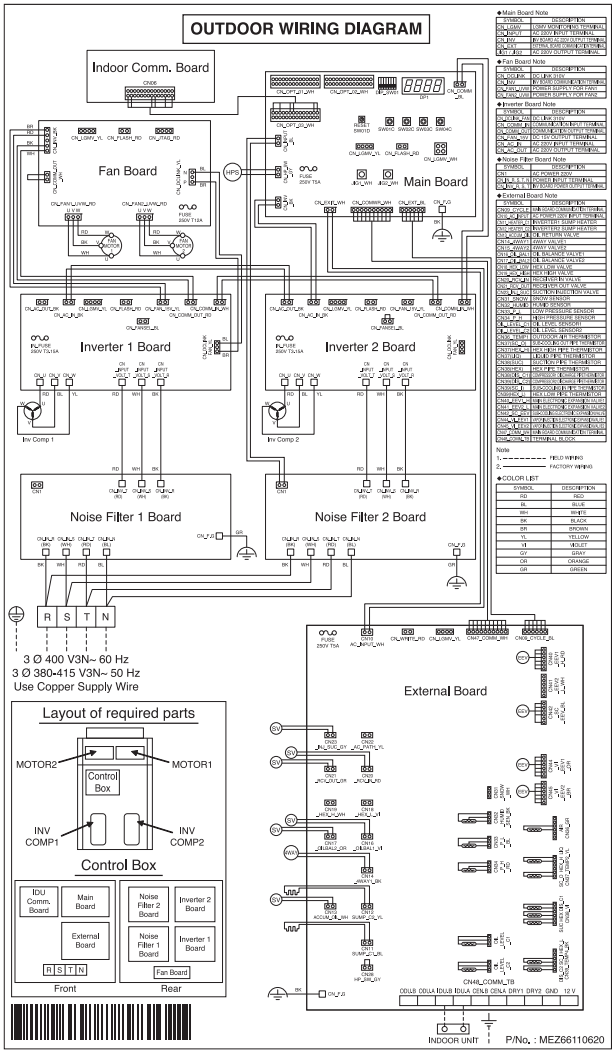
8 / 10 HP (UXA, 1 Comp)



12 / 14 HP (UXB, 1 Comp)

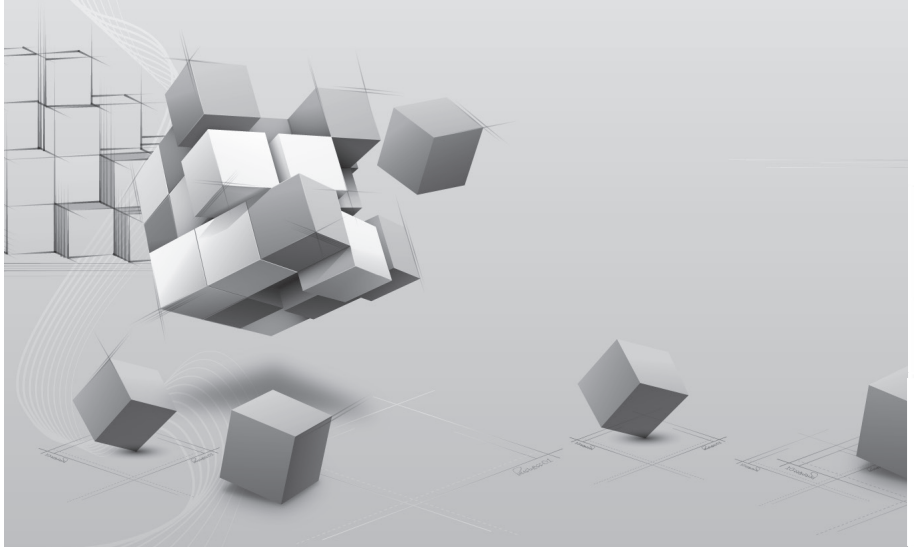


16 / 18 / 20 HP (UXB, 2 Comp)



MULTI V 5

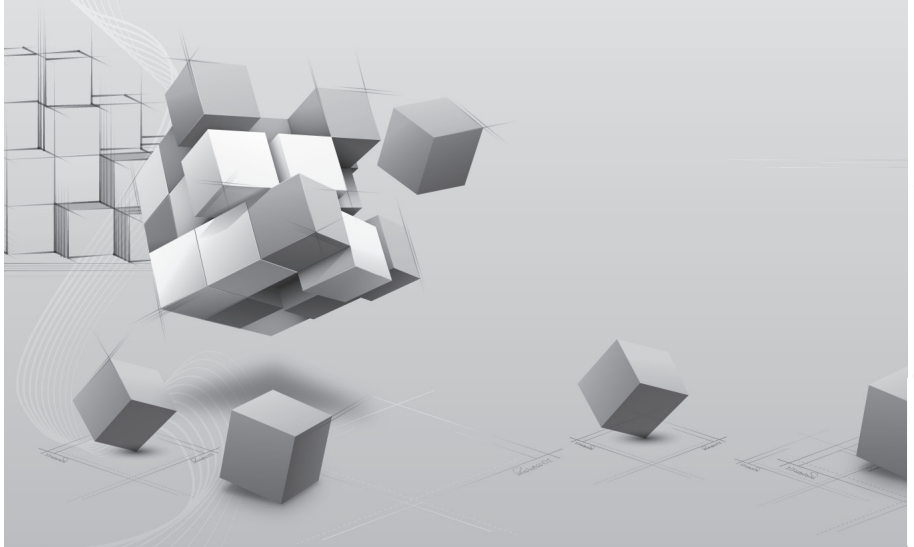
Ⅲ. Trouble Shooting Guide



MULTI V 5

Ⅲ. Trouble Shooting Guide

Checking Point



1. LGMV

Mode	No.	Item	Unit	R410a Normal condition	R410a Abnormal condition	Cause & Check Point
Cooling	1	High Pressure	kPa	2000~3600	Above 3800	Overcharging, Outdoor Fan lock
					Below 1800	Ref. Leakage or Ref. Shortage except condition of very low ambient operation
	2	Low Pressure	kPa	500~1000	Above 1300	Overcharging
					Below 400	Ref. Leakage or Ref. Shortage, Comm Line Wrong connection
	3	Indoor EEV	Pulse	200~600	Above 1000	Ref. Leakage or Ref. Shortage
					Below 100	Overcharging, Indoor Pipe Temp. Sensor Defect
	4	Outdoor EEV	Pulse	32/2000(Normal)	-	Normal Mode(In case of two EEV mode) : Upper EEV → full close Lower EEV → full open
				2000/32 (Cooling low temp.)		Low Temp Mode (In case of two EEV mode) : Upper EEV → full open Lower EEV → full close
	5	Indoor pipe △T △T = Outlet - Inlet	℃	0~10	Below -1	Below 0°C : EEV leakage, Malfunction Above 10°C : EEV clogging, Malfunction, Pipe Clogging, Wrong Piping Both in and out high : EEV stuck (full close), wrong piping
	6	Indoor pipe Inlet, Outlet	℃	6~15	above 17	Ref. Leakage or Ref. Shortage
						Indoor Path Clogging
						EEV Fault, Indoor Pipe Temp, Sensor Defect
Heating	7	High Pressure (Cooling)	kPa	2300~3300	Above 3400	Overcharging, Comm Line Wrong connection
						Indoor Fan Lock
					below 2200	Ref. Leakage or Ref. Shortage
	8	Low Pressure	kPa	200~1200	Above 1300	Overcharging
					below 120	Ref. Leakage or Ref. Shortage, Outdoor EEV Fault
	9	Indoor EEV	Pulse	150~1350	-	
	10	Outdoor EEV	Pulse	200~800	Above 1500	Ref. Leakage or Ref. Shortage
					Below 150	Overcharging
Common	11	Comp, Discharge T	℃	60~100	Above 105	Ref. Leakage or Ref. Shortage or Compressor failure
	12	Suction Superheat (Tsuc-Tdew)	℃	Above 0.5	below 0	SC EEV Fault, Overcharging
						EEV Fault
	13	Discharge Superheat (Tdis-Tbub)	℃	Above 15	Below 5	Wrong piping, Outdoor unit SC EEV Fault, Outdoor unit SC HEX inner leakage, HR unit SC EEV Fault, Overcharging, Discharge temp. sensor fault (Refer to CH150 Trouble guide in detail)

- The value of LGMV in steady-state condition after driving more than 80% of the indoor unit
- The above value is not the absolute value, it can be changed according to the installation environment and operating condition.
- The above causes are the most common causes, there can be other possible causes.

2. Lack of Cooling

2.1 Not reach target low pressure

Checking Item	Symptom	Judgment	Countermeasure
Inlet temp. of indoor unit	≥ 14 ℃	Refrigerant shortage	Check the indoor EEV opening pulse. When the opening pulse is small or closed, please lower the degree of superheat of the corresponding indoor unit
			Check the indoor unit EEV
			Check the liquid pipe blocking or the foreign substances in the strainer.
			Check indoor unit with bypass flow (Confirm total flow while changing full / partial / single operation)
The degree of superheat of indoor unit	≥ 5 ℃	Cooling overload	Recheck the load design, Check the ambient air flow, (if duct type) inlet / outlet chamber installation
		Refrigerant shortage	Check the amount of refrigerant
		Defective temp. sensor of indoor unit	Check the temperature sensor of indoor unit
		Defective EEV of indoor unit	Check the indoor unit EEV
	Discharge temp. is normal under full operation but discharge temp. is abnormal under partial operation	Bypass on indoor flow	If the liquid pipe and the gas pipe are connected to a place without an indoor unit, separate the connected pipe.

※ The inlet temperature of the indoor unit: When the present low pressure reaches the target low pressure, the inlet temperature of the indoor unit should be not more than evaporation temperature + 10 ℃.

※ The degree of superheat of indoor unit (It may be different depending on the outdoor unit control)
> 2 ℃ : EEV Open
< 2 ℃ : EEV Close

2.2 Not reach target low pressure

Checking Item	Symptom	Judgment	Countermeasure
Comp. max Hz operation	Not reach the target low pressure under full / partial / single operation	Bypass by defective outdoor valve	Check the outdoor valve
	Not reach the target low pressure under full operation, but reach the target low pressure under partial operation	Lack of outdoors capacity	
Not max Hz operation		Compressor protection control operation	
Fan. max RPM operation	Compressor operation limit by excessive high pressure drop	High outdoor temperature	
		Defective installation of outdoor unit	Check the outdoor installation environment
		Excessive foreign substance of outdoor heat exchanger	Remove the foreign substance
Not max. RPM operation	Not reach max. RPM under max. RPM display on the LGMV	Difective of fan motor, motor shaft, fan fixing screw, fan balance and fan breakage	
		Fan heatsink temperature limit	Check the amount of thermal grease between the fan PCB and the heat sink.
		Fan lock	Remove foreign substance around the fan operation.

※ Compressor operation: The compressor controls the Hz to reach the target low pressure during the cooling operation.
- If the compressor does not reach the target low pressure while the compressor is operating at Max. Hz, the outdoor capacity is insufficient compared to the indoor load or the flow is bypassed.
- If the compressor is not in Max Hz operation, it is in emergency control to limit compressor operation.

※ Fan operation: During cooling operation, the fan controls the RPM to match the target high pressure.
- If the present high pressure is higher than the target high pressure, the RPM is raised.
- If the present high pressure is lower than the target high pressure, the RPM is decreased.

3. Lack of Heating

3.1 Reach target high pressure

Checking Item	Symptom	Judgment	Countermeasure
The degree of subcooling of indoor unit	≥ 10 °C	Refrigerant overcharging	Check the amount of refrigerant
		Heating overload	Recheck the load design, Check the ambient air flow, (if duct type) inlet / outlet chamber installation
		Defective temp. sensor of indoor unit	Check the temperature sensor of indoor unit
		Defective EEV of indoor unit	Check the indoor unit EEV
		Defective installation of indoor unit	Check the indoor installation environment

※ The degree of subcooling of indoor unit (It may be different depending on the outdoor unit control)
> 5 °C : EEV Open
< 5 °C : EEV Close

3.2 Not reach target high pressure

Checking Item	Symptom	Judgment	Countermeasure
Comp. max Hz operation	Not reach the target low pressure under full / partial / single operation	Bypass by defective outdoor valve	Check the outdoor valve
	Not reach the target high pressure under full operation, but reach the target low pressure under partial operation	Lack of outdoors capacity	
Not max Hz operation		Compressor protection control operation	
	Excessive low pressure drop	Heating low pressure control operation	
Fan. max RPM operation	Compressor operation limit by excessive low pressure drop	Low outdoor temperature	
		Defective installation of outdoor unit	Check the outdoor installation environment
		Excessive foreign substance of outdoor heat exchanger	Remove the foreign substance
Not max. RPM operation	Not reach max. RPM under max. RPM display on the LGMV	Difective of fan motor, motor shaft, fan fixing screw, fan balance and fan breakage	
		Fan heatsink temperature limit	Check the amount of thermal grease between the fan PCB and the heat sink.
		Fan lock	Remove foreign substance around the fan operation.

※ Compressor operation : The compressor controls the Hz to reach the target high pressure during the heating operation.
- If the compressor does not reach the target high pressure while the compressor is operating at Max. Hz, the outdoor capacity is insufficient compared to the indoor load or excessive low outdoor temp. the flow is bypassed.
- If the compressor is not in Max Hz operation, it is in emergency control to limit compressor operation.

※ Fan operation : During heating operation, the fan controls the RPM to match the target low pressure.
- If the present low pressure is lower than the target low pressure, the RPM is raised.
- If the present low pressure is lower than the target low pressure, the RPM is decreased.

4. Check The Amount of Refrigerant

4.1 Cooling

Item	Refrigerant shortage	Refrigerant overcharging
Indoor unit EEV	• EEV open (approx. 1000pls or more) • Refrigerant noise	EEV close (approx. 100pls or less)
The degree of superheat (@ indoor unit) (Pipeout Temp. - Pipein Temp.)	above 5 ℃	• over 20 ℃ (@ single operation) • over 25 ℃ (@ full operation)
Low pressure	below target low pressure	above target low pressure
High pressure	below target high pressure	High pressure limit * Even if the compressor Hz is low, easily increase high pressure)
The degree of subcooling (@ outdoor unit)	• below 5 ℃ (@ single operation) • below 10 ℃ (@ full operation)	• below 25 ℃ (@ single operation) • below 20 ℃ (@ full operation)
Inverter discharge temperature	high	low
The degree of suction superheat	above target degree	below target degree

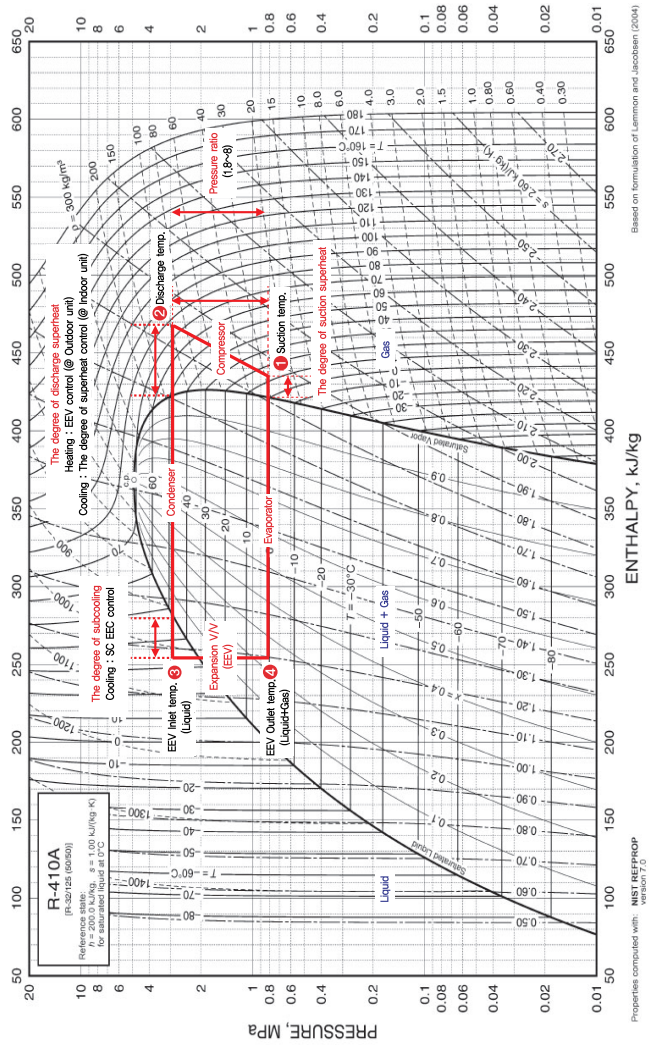
※ The table above is not an absolute measure of the amount of refrigerant. Please judge comprehensively with other factors.

4.2 Heating

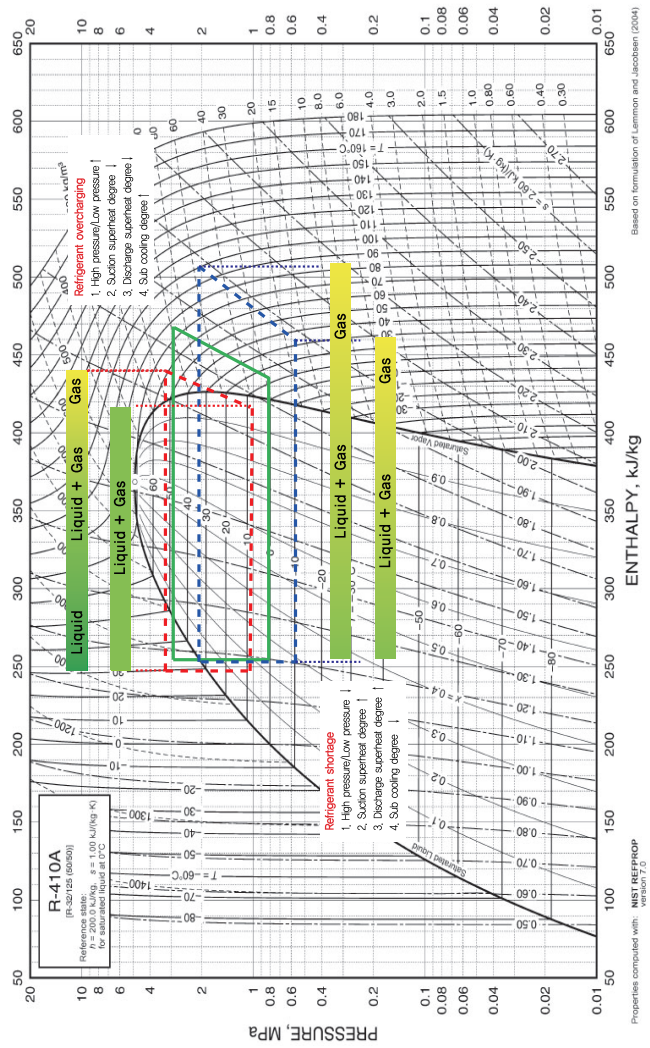
Item	Refrigerant shortage	Refrigerant overcharging
Indoor unit EEV	EEV close (approx. 200 pls or less)	EEV open (approx. 1350 pls)
Low pressure	below target low pressure	above target low pressure
High pressure	Low pressure limit	High pressure limit * Even if the compressor Hz is low, easily increase high pressure
Inverter discharge temperature	High (approx. 100 ℃ or more) * If the compressor Hz is low, the temperature may be low even if the refrigerant is insufficient)	Low * But not always low, depending on the cycle)
The degree of suction superheat	above target degree	below target degree

※ The table above is not an absolute measure of the amount of refrigerant. Please judge comprehensively with other factors.

4.3 Normal cycle



4.4 Abnormal cycle (Refrigerant Overcharging / Shortage)



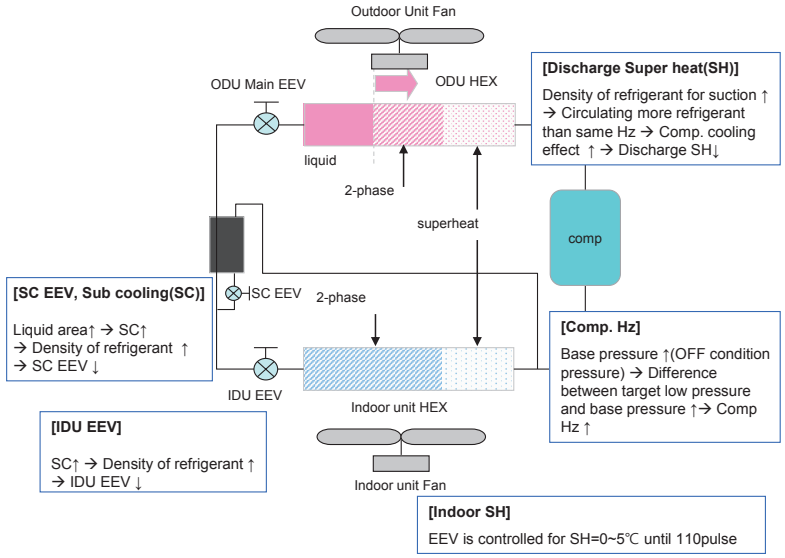
5. Cycle Changes by amount of refrigerant

5.1 Cooling cycle

5.1.1 A cycle changes by refrigerant overcharging

When overcharging a refrigerant more than necessary, an extra refrigerant will be stored in condensing HEX and liquid pipe because of high density. Overcharged refrigerant can make changing the cycle as below.
To make clear distinction, all IDU's should be operated, and wait at least 20 minutes after system started until cycle is stabilized

- ODU HEX : Accumulation of refrigerant in condensing area → Increasing liquid area (SC ↑) → Performance ↓ → High Pressure ↑
- ODU Fan: RPM ↑ to reduce high pressure



* In case of refrigerant shortage, cycle will show opposite response.

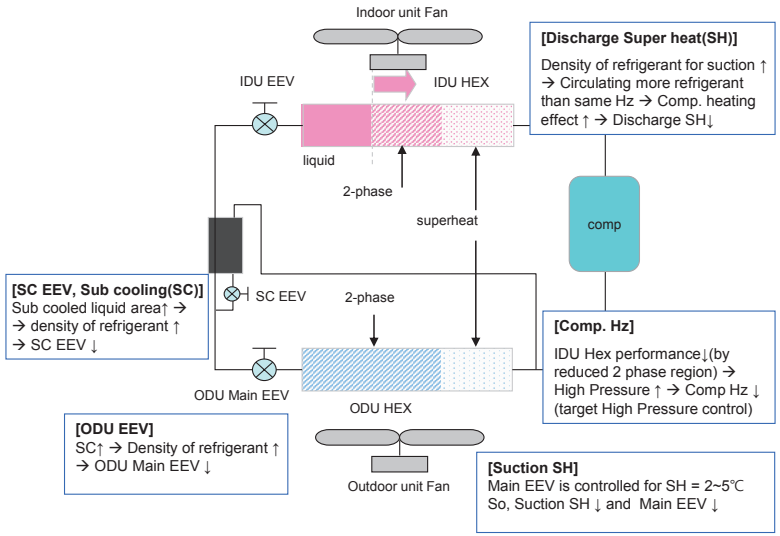
5.2 Heating cycle

5.2.1 A cycle changes by refrigerant overcharging

When overcharging a refrigerant more than necessary, an extra refrigerant will be stored in condensing HEX and liquid pipe because of high density. Overcharged refrigerant can make changing the cycle as below.
To make clear distinction, all IDU's should be operated, and wait at least 20 minutes after system started until cycle is stabilized

- ODU HEX: Accumulation of refrigerant in condensing area → Increasing liquid area (SC ↑) → Performance ↓ → High Pressure ↑
- ODU EEV: EEV pulse ↓ for preventing liquid compression

* In some cases, mal-distribution of ref. among indoor units causes lack of ref. supply to specific IDUs, thus EEV pulse can be increased regardless of ref. conditions.



* In case of refrigerant shortage, cycle will show opposite response.

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III. Trouble Shooting Guide

Self-Diagnosis Function

1. Error Code Display

Self-Diagnosis Function

Error Indicator

- This function indicates types of failure in self-diagnosis and occurrence of failure for air condition.
- Error mark is displayed on display window of indoor units and wired remote controller, and 7-segment LED of outdoor unit control board as shown in the table.
- If more than two troubles occur simultaneously, lower number of error code is first displayed.
- After error occurrence, if error is released, error LED is also released simultaneously.

Error Display

1st,2nd,3rd LED of 7-segment indicates error number, 4th LED indicates unit number.(* = 1: Master, 2: Slave 1, 3: Slave 2, 4: Slave 3)

Ex) 1051 : Error occurrence with error number 105 at No. 1 outdoor unit (=Master unit)
In case of indoor unit error occurrence, the error number is only shown at remote controller without 7 segment LED of outdoor unit.

Ex) CH ⟶ 01 : Error occurrence with error number 01 (at remote controller)
In case of compressor error occurrence, 7 segment LED of outdoor unit control board will display its error number alternately with compressor number.

Ex) 213 ⟶ C23 : It means that compressor error occurred with Error No. 21 at No. 3 Outdoor unit (=Slave2)

Display				Title	Cause of Error
Indoor unit related error	0	1	-	Air temperature sensor of indoor unit	Air temperature sensor of indoor unit is open or short
	0	2	-	Inlet pipe temperature sensor of indoor unit	Inlet pipe temperature sensor of indoor unit is open or short
	0	3	-	Communication error : wired remote controller ↔ indoor unit	Failing to receive wired remote controller signal in indoor unit PCB
	0	4	-	Drain pump	Malfunction of drain pump
	0	5	-	Communication error : (Gen2) IDU ↔ ODU (Gen4) IDU main ↔ IDU local modem	Failing to receive the signal : (Gen2) from ODU (Gen4) from IDU local modem
	0	6	-	Outlet pipe temperature sensor of indoor unit	Outlet pipe temperature sensor of indoor unit is open or short
	0	8	-	Hydro Kit Hot water storage tank Temperature sensor	Pipe temperature sensor is open or short
	0	9	-	Indoor EEPROM Error	In case when the serial number marked on EEPROM of Indoor unit is 0 or FFFFFF
	1	0	-	Poor fan motor operation	Disconnecting the fan motor connector / Failure of indoor fan motor lock
	1	1	-	Communication error : Hydro Kit Indoor unit ↔ Inv.PCB	Failing to receive Inv. PCB signal in indoor unit
	1	2	-	Hydro Kit Inv.PCB error	Hydro Kit Inv.PCB error
	1	3	-	Hydro Kit Solar heat piping temperature sensor error	Pipe temperature sensor is open or short
	1	4	-	Hydro Kit Indoor unit Flow switch error	Flow switch flow detection error
	1	5	-	Hydro Kit Liquid pipe Strange overheat Error	Temperature sensor defective or hot water inflow
	1	6	-	Hydro KitIndoor unit Inlet and Outlet pipe Temperature sensor Error	Pipe temperature sensor is open or short
	1	7	-	Hydro Kit Indoor unit Inlet pipe Temperature sensor Error Outside air Introduction duct Inlet pipe Temperature sensor Error	Pipe temperature sensor is open or short
	1	8	-	Hydro Kit Indoor unit Outlet pipe Temperature sensor Error	Pipe temperature sensor is open or short
	2	3	0 -	Refrigerant leakage sensing error	Malfunction of Refrigerant Sensor
	2	3	7 -	Communication error between IDU and ODU local modem	Failing to receive the signal from ODU local modem
	2	3	8 -	Communication error between ODU modem and ODU PCB	Failing to receive receive the signal from outdoor unit packet
Outdoor unit related error	2	1	*	Outdoor Unit Inverter Compressor IPM Fault	Master Outdoor Unit Inverter Compressor Drive IPM Fault
	2	2	*	Inverter PCB Input Over Current(RMS) of Master Outdoor Unit	Master Outdoor Unit Inverter PCB Input Current excess (RMS)
	2	3	*	Outdoor Unit Inverter Compressor DC Link Low or High Voltage	System is turned off by Master Outdoor Unit DC Link Low/High Voltage.
	2	4	*	Outdoor Unit High Pressure Switch	System is turned off by Master Outdoor Unit high pressure switch.
	2	5	*	Outdoor Unit Input Voltage High/ Low Voltage	Over 537V or below 247V (ARUM***LTE5) Over 310V or below 143V (ARUM***BTE5) Over 598V or below 320V (ARUM***DTE5)
	2	6	*	Outdoor Unit Inverter Compressor Start Failure	The first start failure by Outdoor Unit Inverter Compressor abnormality or Compressor locked
	2	9	*	Outdoor Unit Inverter Compressor Over Current	Outdoor Unit Inverter Compressor Fault OR Drive Fault
	3	2	*	Outdoor Unit Inverter Compressor1 High Discharge Temperature	Outdoor Unit Inverter Compressor1 High Discharge Temperature
	3	3	*	Outdoor Unit Inverter Compressor2 High Discharge Temperature	Outdoor Unit Inverter Compressor2 High Discharge Temperature
	3	4	*	High Pressure of Outdoor Unit	High Pressure of Outdoor Unit
	3	5	*	Low Pressure of Outdoor Unit	Low Pressure of Outdoor Unit
	4	0	*	Outdoor Unit Inverter Compressor CT Sensor Fault	Outdoor Unit Inverter Compressor CT Sensor open or short
	4	1	*	Outdoor Unit Inverter Compressor1 Discharge Temperature Sensor Fault	Outdoor Unit Inverter Compressor Discharge Temperature Sensor open or short
	4	2	*	Outdoor Unit Low Pressure Sensor Fault	Outdoor Unit Low Pressure Sensor open or short
	4	3	*	Outdoor Unit High Pressure Sensor Fault	Outdoor Unit High Pressure Sensor open or short
	4	4	*	Outdoor Unit Air Temperature Sensor Fault	Outdoor Unit Air Temperature Sensor open or short
	4	5	*	Outdoor Unit Heat Exchanger Temperature Sensor(Front side) Fault	Outdoor Unit Heat Exchanger Temperature Sensor(Front side) open or short
	4	6	*	Outdoor Unit Suction Temperature Sensor Fault	Outdoor Unit Suction Temperature Sensor open or short

Display				Title	Cause of Error
Outdoor unit related error	4	7	*	Outdoor Unit Inverter Compressor2 Discharge Temperature Sensor Fault	Outdoor Unit Inverter Compressor2 Discharge Temperature Sensor open or short
	4	9	*	Outdoor Unit Faulty IPM Temperature Sensor	Outdoor Unit IPM Temperature Sensor short/open
	5	0	*	Omitting connection of R, S, T power of Outdoor Unit	Omitting connection of outdoor unit
	5	1	*	Excessive capacity of indoor units	Excessive connection of indoor units compared to capacity of Outdoor Unit
	5	2	*	Communication error : inverter PCB → Main PCB	Failing to receive inverter signal at main PCB of Outdoor Unit
	5	3	*	Communication error : indoor unit → Main PCB of Outdoor Unit	Failing to receive indoor unit signal at main PCB of Outdoor Unit.
	5	7	*	Communication error : Main PCB → inverter PCB	Failing to receive signal main PCB at inverter PCB of Outdoor Unit
	5	9	*	Mixing Installation of slave Outdoor Unit	Mixing Installation of Old Slave Outdoor Unit and New Slave Outdoor Unit
	6	0	*	Inverter PCB EEPROM Error of Master Outdoor Unit	Access Error of Inverter PCB of Outdoor Unit
	6	2	*	Outdoor Unit Inverter Heatsink High Temperature	System is turned off by Outdoor Unit Inverter Heatsink High Temperature
	6	5	*	Outdoor Unit Inverter Heatsink Temperature Sensor Fault	Outdoor Unit Inverter Heatsink Temperature Sensor open or short
	6	7	*	Outdoor Unit Fan Lock	Restriction of Outdoor Unit
	7	1	*	Inverter CT Sensor Error of Master Outdoor Unit	Inverter CT Sensor open or short of Outdoor Unit
	7	5	*	Outdoor Unit Fan CT Sensor Error	Outdoor Unit Fan CT Sensor open or short
	7	7	*	Outdoor Unit Fan Over Current Error	Outdoor Unit Fan Current is over 6A
	7	9	*	Outdoor Unit Fan Start Failure Error	The first start failure by Outdoor Unit Fan abnormality or Fan locked
	8	6	*	Outdoor Unit Main PCB EEPROM Error	Communication Fail Between Outdoor Unit Main MICOM and EEPROM or omitting EEPROM
	8	7	*	Outdoor Unit Fan PCB EEPROM Error	Communication Fail Between Outdoor Unit Fan MICOM and EEPROM or omitting EEPROM
	1	0	4	*	Communication Error Between Outdoor Unit and Other Outdoor Unit	Failing to receive Slave Unit signal at main PCB of Outdoor Unit
	1	0	5	*	Outdoor Unit Fan PCB Communication Error	Failing to receive fan signal at main PCB of Outdoor unit

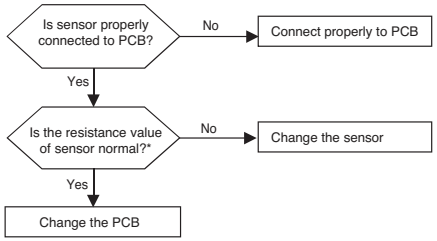
Display					Title	Cause of Error
Outdoor unit related error	1	0	6	*	Outdoor Unit Fan IPM Fault Error	Instant Over Current at Outdoor Unit Fan IPM
	1	0	7	*	Outdoor Unit Fan DC Link Low Voltage Error	Outdoor Unit Fan DC Link Input Voltage is under 380V
	1	1	3	*	Outdoor Unit Liquid pipe Temperature Sensor Error	Liquid pipe temperature sensor of Outdoor Unit is open or short
	1	1	4	*	Outdoor Unit Subcooling Inlet Temperature Sensor Error	Outdoor Unit Subcooling Inlet Temperature Sensor Error
	1	1	5	*	Outdoor Unit Subcooling Outlet Temperature Sensor Error	Outdoor Unit Subcooling Outlet Temperature Sensor Error
	1	1	6	*	Outdoor Unit Oil Level Sensor Error	Oil Level Sensor of Outdoor Unit is open or short
	1	4	5	*	Outdoor unit Main Board - External Board communication Error	Outdoor unit Main Board - External Board communication Error
	1	5	0	*	Outdoor Unit Discharge Superheat not satisfied	Outdoor Unit Compressor Discharge Superheat not satisfied during 5 Min.
	1	5	1	*	Failure of operation mode conversion at Outdoor Unit	Failure of operation mode conversion at Outdoor Unit
	1	5	3	*	Outdoor Unit Heat Exchanger Temperature Sensor(upper part) Fault	Outdoor Unit Heat Exchanger Temperature Sensor (upper part) Fault
	1	5	4	*	Outdoor Unit Heat Exchanger Temperature Sensor(lower part) Fault	Outdoor Unit Heat Exchanger Temperature Sensor(lower part) open or short
	1	8	2	*	Outdoor unit External Board Main-Sub Micom communication Error	Outdoor Unit Main Board Main-Sub Micom communication failed
	1	8	7	*	Hydro - Kit P,HEX bursting error	Inlet water temperature is below 5 degree or water temperature error during defrosting operation.
	1	9	3	*	Outdoor Unit Fan Heatsink High Temperature	System is turned off by Outdoor Unit Fan Heatsink High Temperature
	1	9	4	*	Outdoor Unit Fan Heatsink Temperature Sensor Fault	Outdoor Unit Fan Heatsink Temperature Sensor open or short
HR Unit related error	0	5	1	C+#HR	Excessive connection of indoor unit to HR unit	Indoor unit capacity exceed
	2	0	0	1	Master Outdoor Unit Main PCB EEPROM Error	Communication Fail Between Master Outdoor Unit Main MICOM and EEPROM or omitting EEPROM
	2	0	1	C+#HR	Master Outdoor Unit Fan PCB EEPROM Error	Communication Fail Between Master Outdoor Unit Fan MICOM and EEPROM or omitting EEPROM
	2	0	2	C+#HR	HR unit1 Sub Cooling Pipe sensor error	Sub Cooling Pipe In sensor of HR unit open or short
	2	0	3	C+#HR	HR unit1 Sub Cooling Pipe Out sensor error	Sub Cooling Pipe Out sensor of HR unit. open or short
	2	0	4	C+#HR	Communication error	Failing to receive HR unit signal at outdoor unit
	2	0	5	C+#HR	Communication error between HR unit and the upgraded 485 modem	Failing to receive signal at HR unit PCB
	2	0	6	C+#HR	Duplicate address error of HR unit	Duplicated setting at the 4 series of HR unit
Network error	2	4	2	*	Network error of cntral controller	Communication wiring defect

C: HR unit #: HR unit Number * : Unit(1: Master, 2: Slave1, 3: Slave2, 4: Slave3)

2. Error Code Check

Error No.	Error Type	Error Point	Main Reasons
01	Air temperature sensor error	Sensor is open/short	1. Indoor unit PCB wrong connection! 2. Indoor unit PCB failure! 3. Sensor problem (main reason)
02	Gas side temperature sensor error		
06	Liquid side temperature sensor error		
08	Water tank temperature sensor error		
16	Water inlet & outlet temperature sensor error		
17	Water inlet temperature sensor error		
18	Water outlet temperature sensor error		

■ Error diagnosis and countermeasure flow chart



Check resistance value of sensor

* In case the air temperature sensor resistance value is more than 200 kΩ (4.7V) or less than 800 Ω (0.3V), Error occurs
In case the pipe temperature sensor resistance value is more than 100 kΩ (4.7V) or less than 300 Ω (0.2V), Error occurs

- If the resistance value of the temperature sensor changes according to temperature, and the following resistance values are displayed based on the current temperature, it is normal. (±5% error)

R-T Table (Resistance-Temperature)

Pipe temperature sensor

Temp (°C)	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	30	35
Resistance (kΩ)	102.17	73.49	53.55	39.5	29.48	22.24	16.95	13.05	10.14	7.94	6.28	5	4.01	3.24
Volt (V)	4.714	4.611	4.481	4.322	4.131	3.91	3.661	3.389	3.102	2.808	2.515	2.232	1.965	1.717

Temp (°C)	40	45	50	55	60	65	70	75	80	85	90	95	100
Resistance (kΩ)	2.64	2.16	1.78	1.48	1.23	1.03	0.87	0.74	0.63	0.54	0.46	0.4	0.34
Volt (V)	1.493	1.293	1.116	0.962	0.828	0.714	0.615	0.531	0.459	0.397	0.345	0.3	0.262

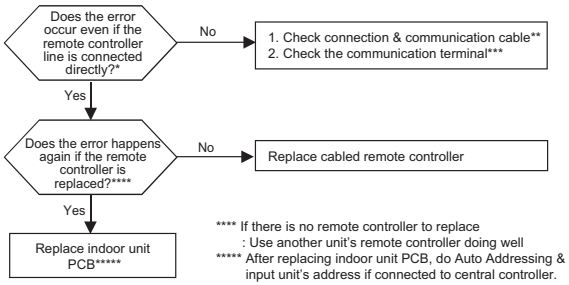
Air temperature sensor

Temp (°C)	-30	-25	-20	-15	-10	-5	0	5	10	15	20	25	30	35
Resistance (kΩ)	204.35	146.97	107.09	79	58.95	44.47	33.9	26.09	20.27	15.89	12.55	10	8.03	6.49
Volt (V)	4.72	4.62	4.492	4.336	4.149	3.931	3.685	3.416	3.131	2.838	2.546	2.262	1.994	1.745

Temp (°C)	40	45	50	55	60	65	70	75	80	85	90	95	100
Resistance (kΩ)	5.28	4.32	3.56	2.95	2.46	2.06	1.74	1.47	1.25	1.07	0.92	0.79	0.68
Volt (V)	1.519	1.316	1.137	0.981	0.846	0.729	0.628	0.542	0.469	0.406	0.353	0.307	0.268

Error No.	Error Type	Error Point	Main Reasons
03	No communication between cabled remote controller & indoor unit	The remote controller did not receive the signal from indoor unit during specific time	1. Remote controller fault 2. Indoor unit PCB fault 3. Connector fault, Wrong connection 4. Communication cable problem

■ Error diagnosis and countermeasure flow chart

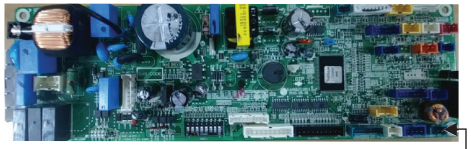


**** If there is no remote controller to replace
: Use another unit's remote controller doing well
***** After replacing indoor unit PCB, do Auto Addressing & input unit's address if connected to central controller. (All the indoor units connected should be turned on before Auto Addressing)

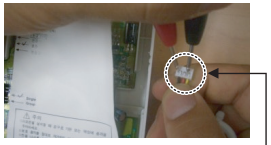
[*] Direct connection of remote controller

If the error occur even if the remote controller line is connected directly, check connection & communication cable

[**] Check connection & communication cable



CN-REMO : Remote controller connection
❊ The PCB can differ from model to model. Check from the right source.

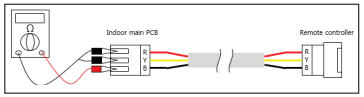


Checking communication cable connection status

• Check cable : Contact failure of connected portion or extension of cable are main cause Check any surrounded noise (Check the distance with main power cable)
→ Make safe distance from the devices generate electromagnetic wave

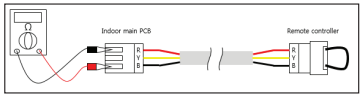
How to check communication cable
1. Check the indoor main PCB and wired remote control first.
2. Disconnect the “CN-REMO” connector of the indoor PCB.
3. Disconnect the “CN-REMO” connector of the wired remote controller.
4. Set the tester range to Ω.

[How to check short circuit]

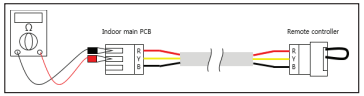


If the resistance value between each terminal is measured several kΩ, the connection wire is short-circuited.
→ Replace the connecting wire.

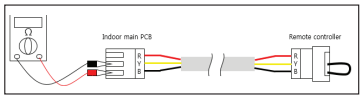
[How to check disconnection]



1. Jump the black(B) and red(R) terminals of the wired remote control connector to the copper wire.
2. Measure the resistance value of the indoor main PCB black(B) and red(R).
→ If the resistance is less than a few Ω, it is normal.



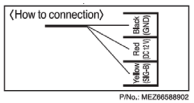
1. Jump the yellow(Y) and red(R) terminals of the wired remote control connector to the copper wire.
2. Measure the resistance value of the indoor main PCB yellow(Y) and red(R).
→ If the resistance is less than a few Ω, it is normal.

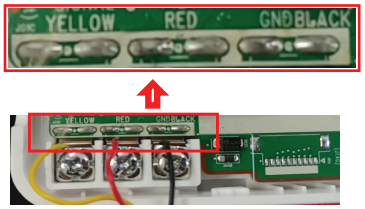


1. Jump the yellow(Y) and black(B) terminals of the wired remote control connector to the copper wire.
2. Measure the resistance value of the indoor main PCB yellow(Y) and black(B).
→ If the resistance is less than a few Ω, it is normal.

[***] Check the communication terminal

DC 12 V	Red
Signal	Yellow
GND	Black





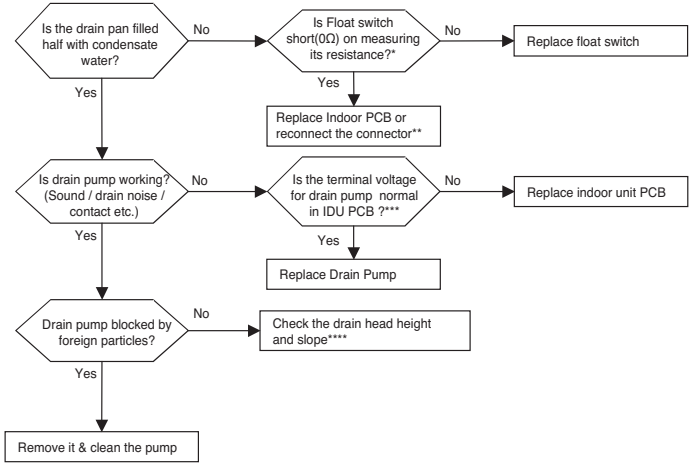
If the wire color does not match during the cable connection, it will not work.

⚠ WARNING

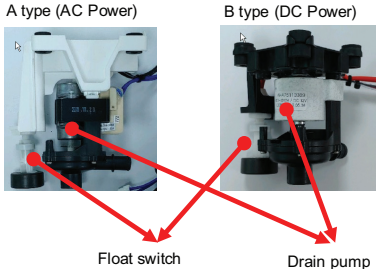
There is a risk electric shock. Make sure to cut off power during the installation or service. If the wire color does not match during the cable connection, it will not work.

Error No.	Error Type	Error Point	Main Reasons
04	Drain pump error	Float switch is open due to rising of condensate water level because of drain pump fault or drain pipe clogging.	1. Improper drain pipe location, clogging of drain pipe 2. Drain pump/float switch fault 3. Connection of float terminal is abnormal 4. Indoor unit PCB fault

■ Error diagnosis and countermeasure flow chart



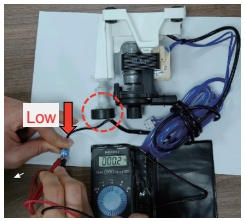
Type of Drain pump



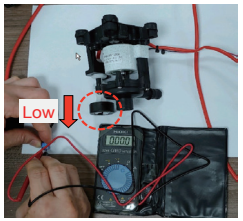
[*] Check resistance of float switch

Float is low position

1. A type (AC Power)

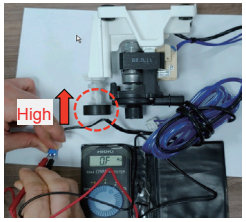


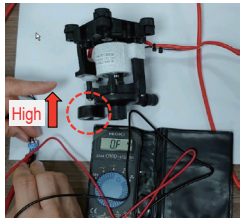
2. B type (DC Power)



If the condensate water is not filled, → Resistance must be “0” Ω (short)

Float is high position (ref.)

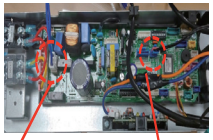


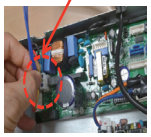


Resistance must be “OF” or “OL” (Open)

[**] Check the PCB connector

1. A type (AC Power)

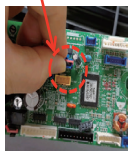




Drain pump (CN_D_PUMP)

Float switch (CN_FLOAT)

2. B type (DC Power)

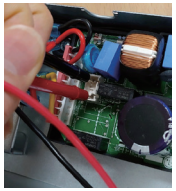


Drain pump (CN_DCDRAIN)

Float switch (CN_FLOAT)

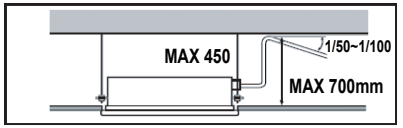
After checking the assembly status, re-assemble if abnormality is found.

[***] Check the terminal voltage of indoor unit PCB



After removing the float switch, check the drain pump supply voltage.
Check the AC 220V or DC 12V output voltage.

[***] Check the drain head height and slope



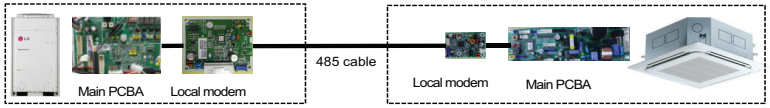
Standard of drain pump head height / slope

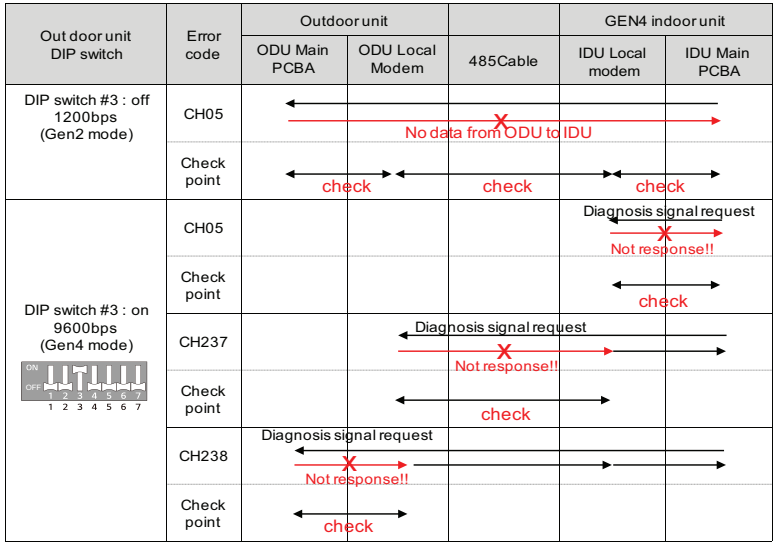
If the maximum head height is exceeded, the drain pump may not be able to raise the condensate and if the gradient is poor, it can flow back into the product

Case of draft failure

■ Error diagnosis and countermeasure flow chart

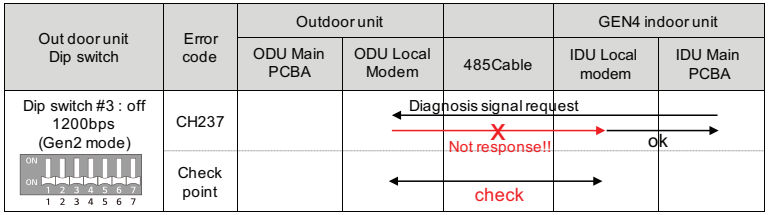
Error No.	Error Type	Error Point	Main Reasons
05	Communication error between IDU and ODU (Gen 2)	The indoor unit did not receive the signal from ODU over 3 min continuously.	1. When automatic address setting is not implemented 2. Communication line is not connected 3. Communication line is shorted 4. Indoor communication circuit failure 5. Outdoor unit communication circuit failure 6. When the separation distance between power line and communication line is not enough
	Communication error between IDU main and IDU local modem (Gen4)	The indoor unit did not receive the signal from IDU local modem over 3 min continuously.	
237	Communication error between IDU and ODU local modem	The indoor unit did not receive the signal from ODU local modem over 3 min continuously.	
238	Communication error between ODU modem and ODU PCB	The indoor unit did not receive the signal from outdoor unit packet over 3 min continuously.	





Communication judgment failure case:

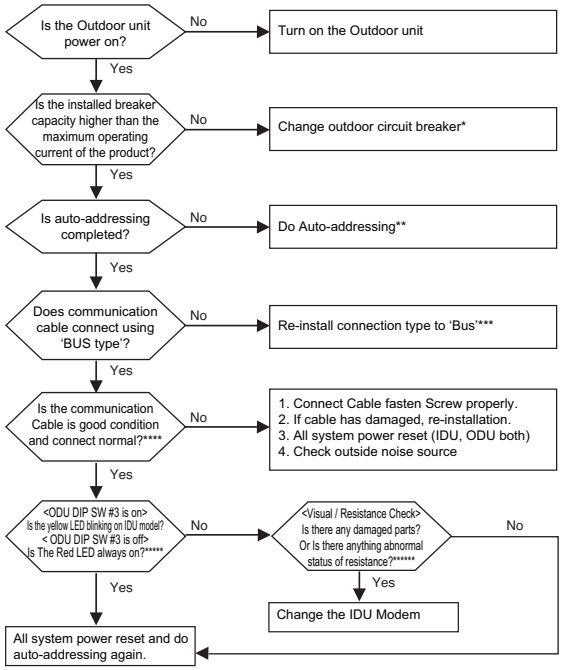
If the indoor unit fails communication judgment after power-reset CH237 may occur at GEN2 mode.



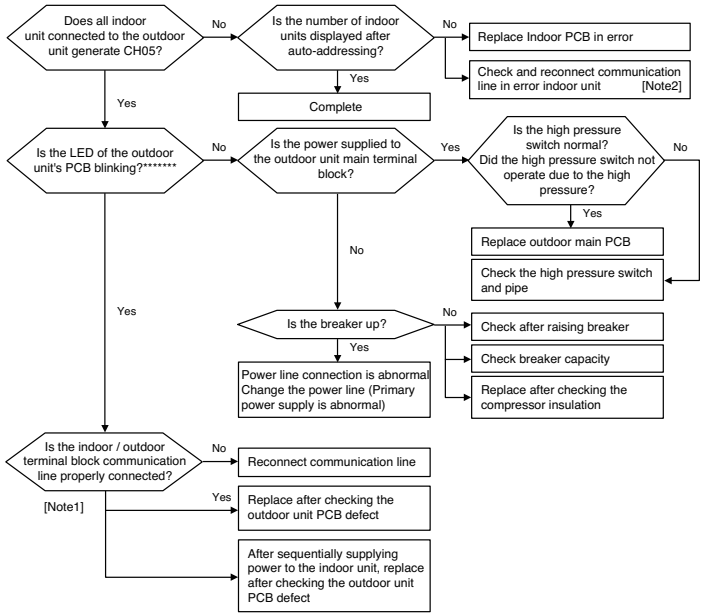
CH05 occurs in all indoor units → Check Outdoor Unit
CH05 occurs in some indoor units → Check Indoor Unit

■ Error diagnosis and countermeasure flow chart

Check Indoor Unit



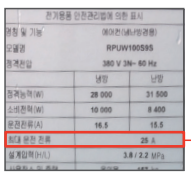
Check Outdoor Unit



[*] Check Breaker's Capacity

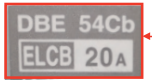
If the breaker capacity is smaller than the maximum current of the product, the breaker may trip during product operation.

1. Check product's max operating current
2. Check breaker's capacity



Outdoor unit Label

Maximum operating current



Capacity of the circuit breaker

Circuit breaker for Outdoor unit

[**] Do Auto-addressing

The ways Auto Addressing

1) Power Off the all of IDU and ODU.
- Make Sure Wait more than 10 min for Discharge the Capacitor.
- Make Sure DIP switch #03 is On Before Power On(Gen4 Comm.) ①

2) Power On the all of IDU and ODU.
- Turn on the outdoor unit breaker, and then turn on the indoor unit breaker at least 3 minutes later.

3) Progress the Auto addressing by Press Red Button of ODU. ②
- Make Sure Wait more than 3 min after All of Unit Power On.
- Make Sure All of IDU is Standby Mode (Do not operate)

4) Wait more than 3 min to Check the Error is happened.
- Compare the actual number of IDU and the number of recognized IDU
- No Error and Normal Operate, Installation setting is complete.

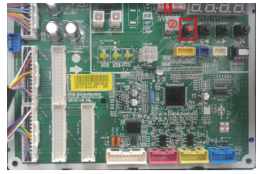
①

②

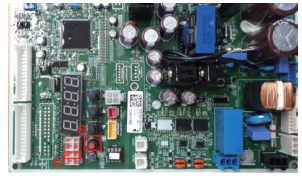
CAUTION

Make sure that if you change DIP switch #03 state then you must do re-auto addressing. Otherwise CH53 error can be happened.

Multi V 4 HP/HR, Water4 HP/HR etc.



Multi V 5



CH53 error with IDU address increase on LGMV display

Model: Multi V Models

Problem

1) DIP switch #03 Off State (OUD-IDU communication speed: 1200bps)

↓

2) Auto Addressing was done (IDU Address setting was completed)

↓

3) DIP switch #03 was changed from Off to On state **without ODU/IDU Reset** (IDU communication speed set to 9600bps)

↓

4) Re-Auto Addressing was **NOT** done.

↓

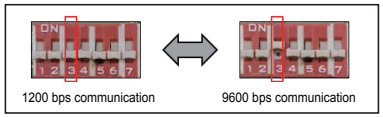
5) ODU recognized all IDUs automatically and allocated new address numbers to all IDUs

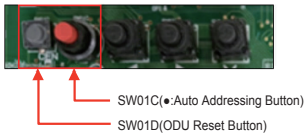
↓

6) Because a addressed IDU number has been doubled, IDU communication error (CH53) can be happened.

SVC Solution

Perform the re-auto addressing

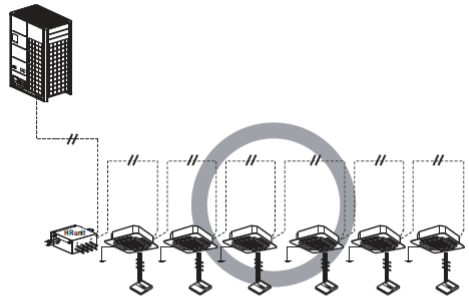




[***] Connection type of communication cable

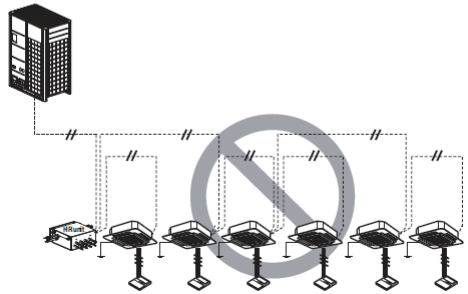
[BUS type]

Connection of communication cable must be installed like below figure between indoor unit to outdoor unit.



[STAR type]

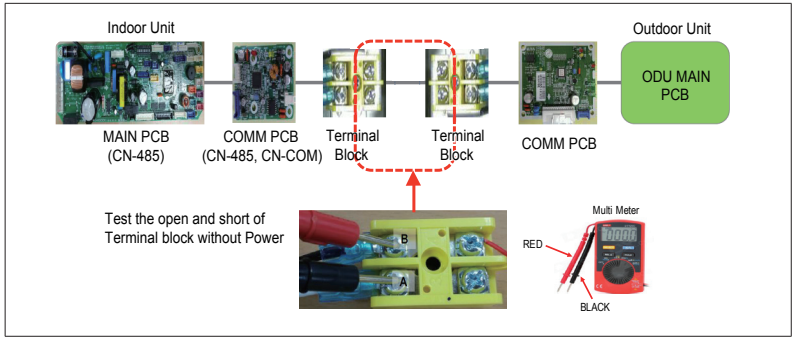
Abnormal operation can be caused by communication defect, when connection of communication cable is installed like below figure.



[****] Wiring Condition Check

Test the open and short of Terminal block without Power.

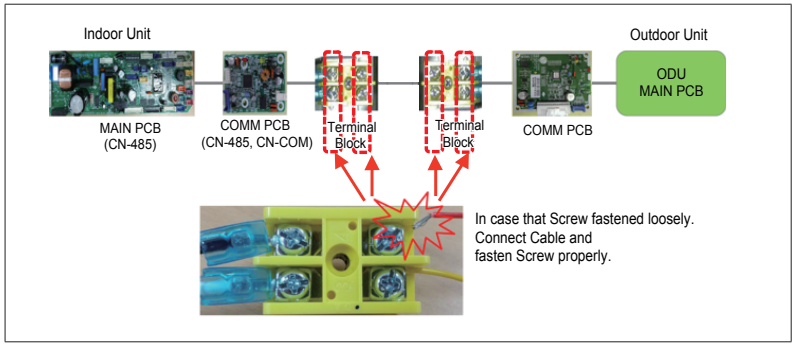
1. Short wiring test : If A,B is short (alarm)
   → There is contact point between cable A and B
2. Resistance test : If A,B is open, Both side Cable is wrong wiring
   → There is disconnected point in wiring A or B (Inspect Connector, Cable, Terminal block)



Defective parts: Cable

Checklist	Multi Meter			Measured value	
Check Point	Mode	BLACK	RED	Normal	Abnormal
Cable short	·)))	A	B	-	Short
Disconnect / Broken wire	Ω	A	B	kΩ value	Open

Check IDU Control Box Terminal Block



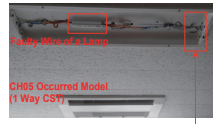
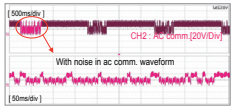
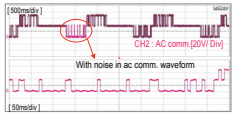
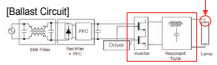
Defective parts: Wiring Installation

Checklist	Multi Meter			Measured value	
Check Point	Mode	BLACK	RED	Normal	Abnormal
Terminal block Screw	N/A (Visual check)			Fastened	Loosely

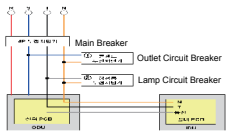
Outside Noise Source Check Guide

Category	Check Point	Action
Outside Noise Source	Installation Environment Check 1. Check connected other products in the same switch board - Check the type of other product Ex) Welding Machine / Fluorescent Lamp Ballast / Electric Boiler etc. - Check power connections (For 3 phases, check R,S,T,N phase voltages) Ex) When the main power is 3 phases 4 lines in a switch board, Fluorescent lamp uses S-N, Air-conditioner uses T-N, etc. - Check a ground connection is used or not 2. Check installed other products around IDU/ODU - Check the distance between other products and IDU/ODU - Check a possibility that other products are contacted with IDU/ODU panel	- When other products cause the problem, request to change the cause - When a line of other projects cause, request to repair the cause.
	Check IDU/ODU Abnormal Voltage 1. Check IDU/ODU voltages applied (with a portable tester) - L-G,N-G,L-N voltage check 2. Check 2.1 again when you turn on and off other products such as welding machines 3. If the error or abnormal voltage is re-occurred, check the products or faulty contact point	
	Refer to Field Cases 1. CH05 caused by a faulty wire contact of a fluorescent lamp ballast (App.1) 2. CH05 caused by fluorescent lamp noise (App.2)	

App.1 CH05 Caused by a Faulty Wire Contact of a Fluorescent Lamp Ballast

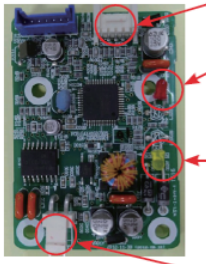
Field Info.	Review of Causes	Action
Faulty Status & Info. 1) Status : Intermittence of CH05 error 2) Address : Lab facility, Busan 3) Visit : 1st '15.2.6 / 2nd '15.2.10	Visit Check - Interview: Intermittence of CH05 error - ODU T/Block N-G voltage is 300V → L-N is 230V normal - When fluorescent lamps are turned on, CH05 error was reappeared	Action Activity - Inform the faulty contact of the lamp to customer - A lamp repairman visited/fixed the problem(2/9) → After the fix, CH05 is not appeared any more
Relevant Model 1) Model : LTUW403SU 2) Order : 501KCNL07831(ODU)	CH05 Cause Reason - A faulty wire contact of the lamp ballast causes CH05 : the ballast wire was contacted with a flame of the lamp → Ballast switching noise enters to IDU/ODU comm. - See wave forms when Lamp if On/Off 1) Lamp On → CH05 occurs	
Set Environment - The distance btw IDU&ODU is 20M - 2 fluorescent lamps are installed around the indoor unit (1 Way CST)		
IDU/ODU Install Scene  [Outdoor] [Indoor]	2) Lamp Off/After fix the problem → Non CH05 	[Ballast Circuit]  * Ballast Inverter Output - DC 310 ~ 400V - 20 ~50kHz Switching Freq.

App.2 CH05 Caused by a Fluorescent Lamp Noise

Field Info.	Review of Causes	Action
Faulty Status & Info. 1) Status: Intermittence of CH05 error 2) Address: Billiard-room, Change-won	CH05 Cause Reason 1) Noise of fluorescent lamps distorted comm. data → The noise entered to the voltage of IDU/ODU comm. caused CH05	Action Activity - Change power lines of lamp and outlet → Separate PCB and lamp power
Relevant Model 1) Model : LP-H2108D(3Φ4W) 2) Order : 905KAYR00010(ODU)		
Set Environment - The distance between IDU&ODU is 20M - Fluorescent lamps are installed a lot in the room	2) Lamp On Waveform  [ODU Input Voltage] [AC Comm.] - Confirmed the noise when to check ODU input voltage → Input noise affects AC conmm.	<table><tr><th></th><th>Before</th><th>After</th></tr><tr><td>Outlet</td><td>S-N</td><td>T-N</td></tr><tr><td>Lamp</td><td>T-N</td><td>S-N</td></tr></table> * The outlet breaker is not used now - After change the line connection, there is no error anymore.
IDU/ODU Install Scene 		

[*****] IDU modem Description and LED Check

■ Local IDU Modem



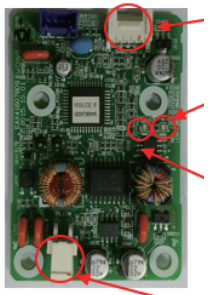
Connector to main PCB

For 9600 bps comm., the red LED will always turn on.
For 1200 bps comm., the red LED will always turn off after power reset and 3 min. later
* The communication speed can be set by dip switch in ODU

When the indoor unit is sending the signal to other unit, this LED will be flickering.
If the LED is always off, please check below.
1) Check the connector between local modem and main PCB.
2) Do auto addressing from ODU if the communication speed is 1200 bps.
→ In case of 1200 bps, indoor unit will not response when there' s no address.

EBR65990101

RS485 Bus connector to other modem or ODU



Connector to main PCB

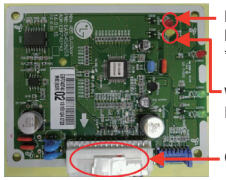
For 9600 bps comm., the red LED will always turn on.
For 1200 bps comm., the red LED will always turn off after power reset and 3 min. later
* The communication speed can be set by dip switch in ODU

When the indoor unit is sending the signal to other unit, this LED will be flickering.
If the LED is always off, please check below.
1) Check the connector between local modem and main PCB
2) Do auto addressing from ODU if the communication speed is 1200 bps.
→ In case of 1200 bps, indoor unit will not response when there' s no address.

EBR80820301

RS485 Bus connector to other modem or ODU

■ Local ODU modem



For 9600 bps comm., the red LED will always turn on.
For 1200 bps comm., the red LED will always turn off after power reset and 3 min. later
* The communication speed can be set by dip switch in ODU

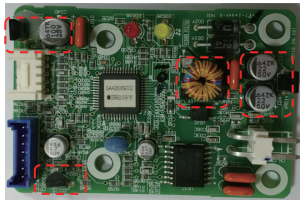
When the outdoor unit is sending the signal to IDU, this LED will be flickering.
If the LED is always off, check the connector between local modem and main PCB.

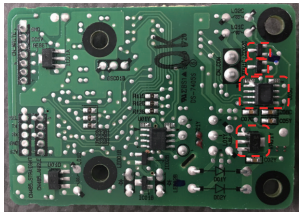
Connector to main PCB

Indoor unit local modem check guide

Check IDU local modem (Visual check)

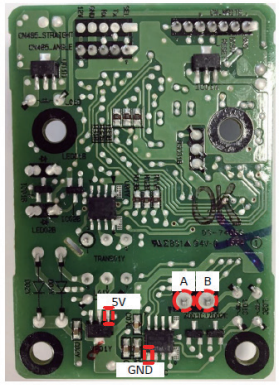
■ EBR65990101





Checklist		Measured value	
Check Point	Appearance	Normal	Abnormal
Transformer		Good	Broken wire
Capacitor		Good	Broken
Regulator		Good	Broken Lead
Communication IC		Good	Broken or Burnt 
TVS Diode		Good	Broken or Burnt 

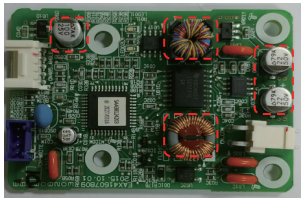
Defective parts : IDU local modem

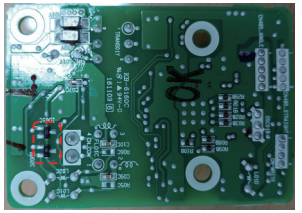


Checklist	Multi Meter			Measured value	
Check Point	Mode	BLACK	RED	Normal	Abnormal
A, B Resistance	Ω	A	B	250KΩ ~ 350KΩ	Open or 200KΩ ↓
A, GND Resistance	Ω	GND	A	1MΩ ↑	500KΩ ↓
B, GND Resistance	Ω	GND	B	1MΩ ↑	500KΩ ↓
5V, GND Resistance	Ω	GND	5V	3KΩ ↑	2KΩ ↓

Defective parts : IDU local modem

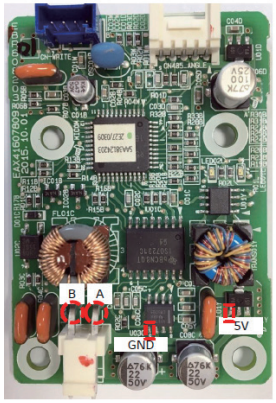
■ EBR80820301





Checklist		Measured value	
Check Point	Appearance	Normal	Abnormal
Transformer		Good	Broken wire
Capacitor		Good	Broken
Noise Filter		Good	Broken wire
Communication IC		Good	Broken or Burnt 
TVS Diode		Good	Broken or Burnt 

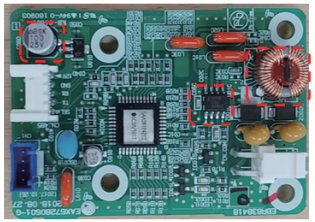
Defective parts : IDU local modem

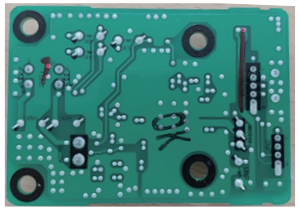


Checklist	Multi Meter			Measured value	
Check Point	Mode	BLACK	RED	Normal	Abnormal
A, B Resistance	Ω	A	B	250KΩ ~ 350KΩ	Open or 200KΩ ↓
A, GND Resistance	Ω	GND	A	1MΩ ↑	500KΩ ↓
B, GND Resistance	Ω	GND	B	1MΩ ↑	500KΩ ↓
5V, GND Resistance	Ω	GND	5V	3KΩ ↑	2KΩ ↓

Defective parts : IDU local modem

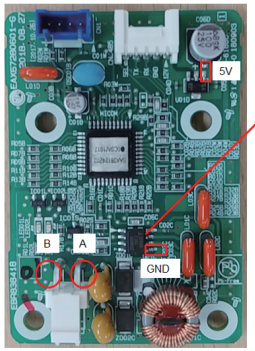
■ EBR83841801

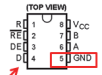




Checklist		Measured value	
Check Point	Appearance	Normal	Abnormal
Capacitor		Good	Broken
Noise Filter		Good	Broken wire
Communication IC		Good	Broken or Burnt 

Defective parts : IDU local modem





Checklist	Multi Meter			Measured value	
Check Point	Mode	BLACK	RED	Normal	Abnormal
A, B Resistance	Ω	A	B	250KΩ ~ 350KΩ	Open or 200KΩ ↓
A, GND Resistance	Ω	GND	A	1MΩ ↑	500KΩ ↓
B, GND Resistance	Ω	GND	B	1MΩ ↑	500KΩ ↓
5V, GND Resistance	Ω	GND	5V	3KΩ ↑	2KΩ ↓

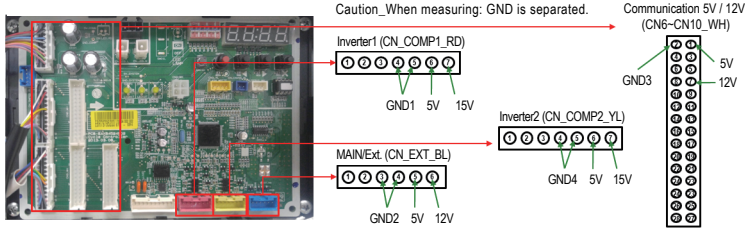
Defective parts : IDU local modem

PCB inspection guide for each error code due to Multi V 4 SMPS PCB failure

SMPS PCB should be checked when checking the error code below.

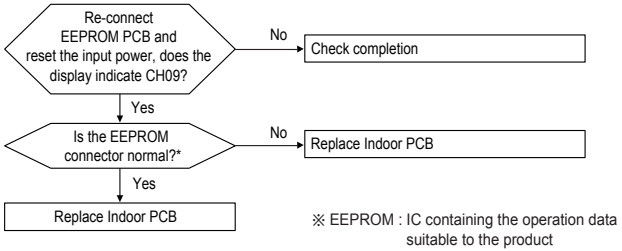
Possible error or failure because of SMPS PCB failure		SMPS output voltage (DC voltage)	Measure point (on Main PCB)			Measured value	
			Connector reference	Multi meter (+)	Multi meter (GND)	Normal	Abnormal
CH21	Inverter IPM Fault	Inverter 15V	Inverter1: CN_COMP1_RD Inverter2: CN_COMP2_YL	7 pin	4 or 5 pin	14.5V~15.5V	14.5V↓
CH23	Inverter DC Link low voltage						
CH106	Fan IPM Fault						
CH107	Fan DC Link low voltage						
CH194	Fan heatsink temperature sensor						
CH52	Communication between Main and Inverter	Inverter 5V		6 pin	4 or 5 pin	4.5V~5.5V	4.5V↓
CH105	Communication between Fan and Inverter						
CH05	Communication between ODU and IDU	Communication 5V or Main / External 5V	Comm. 5V: CN6~10_WH Main/External 5V : CN_EXT_BL	Comm. 5V: 1 pin Main/External 5V: 5 pin	Comm. 5V: 2 pin Main/External 5V: 3 or 4 pin	4.5V~5.5V	4.5V↓
CH53	Communication between ODU and IDU						
CH204	Communication between ODU and HR Unit						
CH237	Communication between 485 modems						
CH242	Communication between ODU and Central controller						
No central controller (AC Ez) power supply		Communication 12V	Comm. 5V: CN6~10_WH	7 pin	2 pin	11.5V~12.5V	11.5V↓
Valve and EEV do not work. Abnormal cooling/heating and possible high/low pressure error		Main / External 12V	Main/External 5V: CN_EXT_BL	6 pin	3 or 4 pin	11.5V~12.5V	11.5V↓

Multi V 4 Main PCB

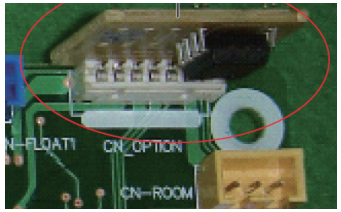


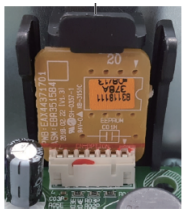
Error No.	Error Type	Error Point	Main Reasons
09	Indoor unit EEPROM error	Error occur in EEPROM of the Indoor PCB	1. Error developed in communication between the micro- processor and the EEPROM on the surface of the PCB. 2. ERROR due to the EEPROM damage

■ Error diagnosis and countermeasure flow chart



※ EEPROM : IC containing the operation data suitable to the product

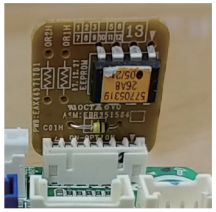




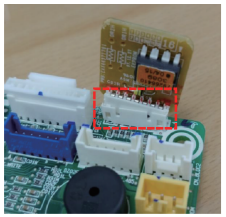
- Check if the option PCB is properly connected.
- Replace the indoor unit PCB, and then make sure to perform Auto addressing and input the address of central control.

[*] Check the EEPROM Connector (CN_OPTION)

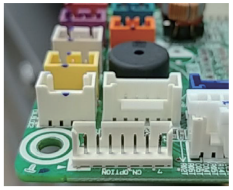
Check the Connector damage, Pin bending, Pin corrosion.



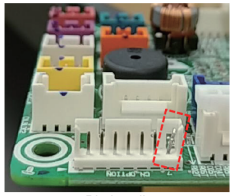
Good Connect



Wrong Connect



Normal Pin

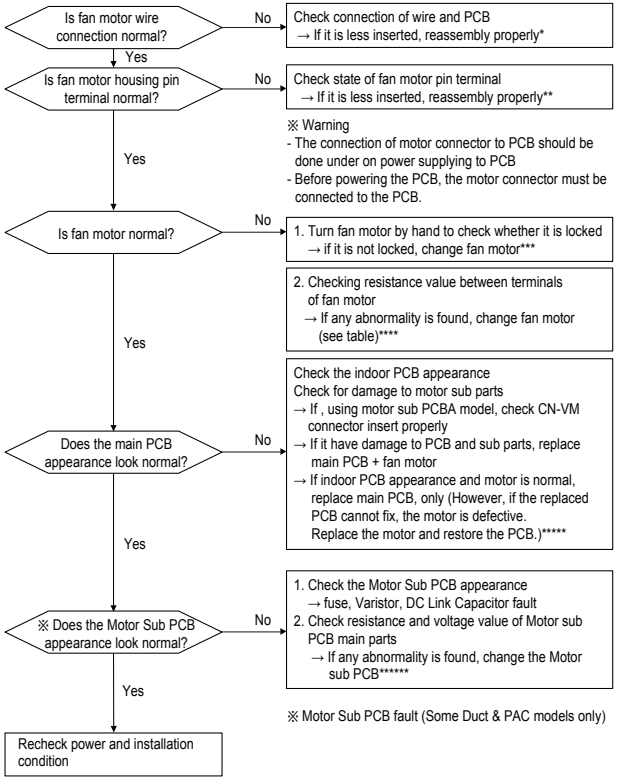


Pin bending

Pin Corroded

Error No.	Error Type	Error Point	Main Reasons
10	Indoor unit BLDC fan motor failure	Indoor BLDC fan motor feedback signal is absent (for 50 sec.)	1. Motor connector connection fault 2. Indoor PCB fault 3. Fan lock by external factors 4. Motor Sub PCB fault (Some Duct&PAC models only)

■ Error diagnosis and countermeasure flow chart



[*] Check connection of wire and PCB

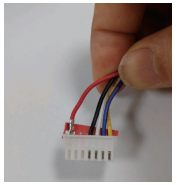
If it is less inserted, reassembly properly.

Less inserted

Correct insertion

[**] Check state of fan motor pin terminal

If it is less inserted, reassembly properly.
When the pin terminal shape is defective, the motor should be replaced.



Less inserted

[***] Turn fan motor by hand to check whether it is locked

If it is not locked, change fan motor

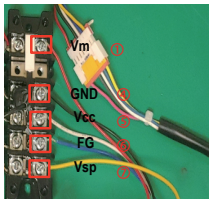
[****] Checking resistance value between terminals of fan motor

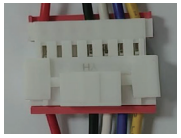
How to measure resistance between terminals

How to use the tester

1) Black(-) : ④ Connect

2) Red: (+): ①,⑤,⑥,⑦ Each connect





① ④⑤⑥⑦

Measure	Tester	
	+(Red)	-(Black)
Vm	①	④
Vcc	⑤	④
FG	⑥	④
Vsp	⑦	④

* When measuring resistance value, black No. 4 pin is always measured as (-) because the value is different according to +-direction.

* If any abnormality is found, change fan motor (see table)

Checking resistance value between terminals of fan motor

Table 1. Resistance value of BLDC Motor terminal (PCB internal type, 5 wires)

※ Since the precise resistance value is not measured or continuously fluctuates due to the fine movement of the fan, when measuring the resistance of the fan, measure it after removing the fan or after restraining (not moving) the fan.

[Unit kΩ] Resistance value ± 20%

Motor P/No.	Vm(+)~GND(-) ① - ④	Vcc(+)~GND(-) ⑤ - ④	FG(+)~GND(-) ⑥ - ④	Vsp(+)~GND(-) ⑦ - ④
4681A20091A	∞	48	∞	152
4681A20091B	∞	48	∞	152
4681A20091J/U	∞	122	∞	280
4681A20091K/V	∞	122	∞	280
4681A20091L	∞	38	∞	240
4681A20091Q	∞	Over 1	∞	241
4681A20091S	∞	Over 1	∞	241
4681A20091W	∞	Over 1	∞	69.22
4681A20091Z	∞	122	∞	280
4681A20122A/C	∞	38	∞	240
4681A20122B	∞	Over 1	∞	241
4681A20168A	∞	38	∞	240
4681A20168B	∞	38	∞	240
4681A20168G	∞	Over 1	∞	51.24
4681A20168H	∞	Over 1	∞	51.24
4681A20169A	∞	60	∞	250
4681A20169B	∞	60	∞	250
4681A20169C	∞	60	∞	250
4681A20169E	∞	45	∞	145
4681A20169E	∞	100	∞	150
4681A20172A/J	∞	60	∞	250
4681A20172B/K	∞	60	∞	250
4681A20172D	∞	60	∞	250
4681A20172E	∞	60	∞	250
4681A20172F	∞	60	∞	250
4681A20172L	∞	110.3	20MΩ ↑	244
4681A20172Q	∞	48	∞	83.25
4681A20172R	∞	Over 1	∞	83.25
4681A20172S	∞	44	∞	51.24
4681A20172T	∞	60	∞	250

Table 2. Resistance value of BLDC Motor terminal (PCB internal type, 5 wires)

※ Since the precise resistance value is not measured or continuously fluctuates due to the fine movement of the fan, when measuring the resistance of the fan, measure it after removing the fan or after restraining (not moving) the fan.

[Unit kΩ] Resistance value ± 20%

Motor P/No.	Vm(+)~GND(-) ① - ④	Vcc(+)~GND(-) ⑤ - ④	FG(+)~GND(-) ⑥ - ④	Vsp(+)~GND(-) ⑦ - ④
4681A20172U	∞	60	∞	250
4681A20172X	∞	46	∞	51.24
4681A20172Y	∞	46	∞	51.24
4681A20172Z	∞	Over 1	∞	51.24
4681A20197A	∞	60	∞	250
4681A20197B	∞	60	∞	250
4681A20198A	∞	48	∞	152
4681A20198B	∞	Over 1	∞	73.56
4681A20198C	∞	Over 1	∞	73.56
4681A20198D	∞	38	∞	240
4681F72001D	∞	38	∞	240
4681F72001E	∞	38	∞	240
4681F72001F	∞	38	∞	240
EAU36288415	∞	32.7	∞	90
EAU36288418	∞	32	∞	78.43
EAU36288424	∞	11.9	∞	50.8
EAU37067101	∞	Over 1.45	∞	Over 69
EAU37067103/09/16	∞	Over 1.45	∞	Over 69
EAU37067104	∞	Over 1.45	∞	Over 69
EAU37067105	∞	Over 1.45	∞	Over 69
EAU37067106	∞	Over 1.45	∞	Over 69
EAU37067107	∞	Over 1.45	∞	Over 69
EAU37067108	∞	Over 1.45	∞	Over 69
EAU37067110	∞	Over 1.45	∞	Over 69
EAU37067113/14/17	∞	Over 1.45	∞	Over 69
EAU37067118	∞	Over 1.45	∞	Over 69
EAU37067119	∞	Over 1.45	∞	Over 69
EAU37067120	∞	Over 1.45	∞	Over 69
EAU57945701/02	∞	38	∞	240
EAU57945705	∞	38	∞	240

*Variance: Fixed If It's defected

Table 3. Resistance value of BLDC Motor terminal (PCB internal type, 5 wires)

※ Since the precise resistance value is not measured or continuously fluctuates due to the fine movement of the fan, when measuring the resistance of the fan, measure it after removing the fan or after restraining (not moving) the fan.

[Unit kΩ] Resistance value ± 20%

Motor P/No.	Vm(+)~GND(-) ① - ④	Vcc(+)~GND(-) ⑤ - ④	FG(+)~GND(-) ⑥ - ④	Vsp(+)~GND(-) ⑦ - ④
EAU57945710	∞	*Variance	∞	200
EAU57945711	∞	*Variance	∞	200
EAU57945712	∞	*Variance	∞	200
EAU60905401	∞	60	∞	250
EAU60905402	∞	Over 1	∞	69.99
EAU60905403	∞	47	∞	78.43
EAU60905404	∞	126	20MΩ↑	42
EAU60905410	∞	12	∞	42
EAU61863301	∞	60	∞	250
EAU61883001	∞	Over 1	∞	78.43
EAU61883002	∞	Over 1	∞	241
EAU61883003	∞	1	∞	232.5
EAU61883004	∞	1	∞	232.5
EAU62004001	∞	O.L (Open)	∞	191
EAU62004002	∞	O.L (Open)	∞	191
EAU62004005	∞	O.L (Open)	∞	191
EAU62004009	∞	O.L (Open)	∞	191
EAU62004010	∞	*Variance	∞	200
EAU62004011	∞	*Variance	∞	200
EAU62023301	∞	Over 1	∞	51.24
EAU62023302	∞	Over 1	∞	51.24
EAU62023304	∞	Over 1	∞	51.24
EAU62124101	∞	Over 1	∞	84.47
EAU62124102	∞	Over 1	∞	84.47
EAU62125901	∞	122	∞	280
EAU62243901	∞	38	∞	240
EAU62243902	∞	48	∞	152
EAU62243903	∞	48	∞	152
EAU62243907	∞	38	∞	240
EAU62243912	∞	*Variance	∞	200

*Variance: Fixed If It's defected

Table 4. Resistance value of BLDC Motor terminal (PCB internal type, 5 wires)

※ Since the precise resistance value is not measured or continuously fluctuates due to the fine movement of the fan, when measuring the resistance of the fan, measure it after removing the fan or after restraining (not moving) the fan.

[Unit kΩ] Resistance value ± 20%

Motor P/No.	Vm(+)~GND(-) ① - ④	Vcc(+)~GND(-) ⑤ - ④	FG(+)~GND(-) ⑥ - ④	Vsp(+)~GND(-) ⑦ - ④
EAU62243913	∞	*Variance	∞	190
EAU62263201	∞	122	∞	280
EAU62283301	∞	37	∞	290
EAU62283303	∞	47	∞	153
EAU62283304	∞	47	∞	153
EAU62543502	∞	39	∞	69.22
EAU62843006	∞	*Variance	∞	200
EAU62843007	∞	*Variance	∞	200
EAU62843008	∞	*Variance	∞	200
EAU62843009	∞	*Variance	∞	200
EAU62843010	∞	*Variance	∞	200
EAU62903301	∞	48	∞	153
EAU62903303	∞	12	∞	244
EAU62903304	∞	11.7	∞	244
EAU62943701	∞	38	∞	240
EAU62983001	∞	*Variance	∞	200
EAU62983002	∞	39.5	∞	225
EAU62983003	∞	*Variance	∞	200
EAU62983004	∞	39.5	∞	225
EAU62983005	∞	*Variance	∞	200
EAU62983006	∞	*Variance	∞	200
EAU63343501	∞	Over 1	∞	51.24
EAU63483801	∞	Over 1	∞	51.24
EAU63483802	∞	Over 1	∞	51.24
EAU63563101	∞	Over 1	∞	51.24

*Variance: Fixed If It's defected

Checking resistance value between terminals of fan motor

Table. Resistance value of BLDC Motor terminal (PCB external type, 3 wires)

※ As resistance value between external coil type of PCB varies according to temperature, make sure that resistance value of UV / UW / VW is same by referring to resistance value below.
※ When measuring FAN fastening state resistance, the exact resistance value is not measured or continuously fluctuates due to minute FAN movement. So measure after removing FAN or after FAN restraint (not to move)

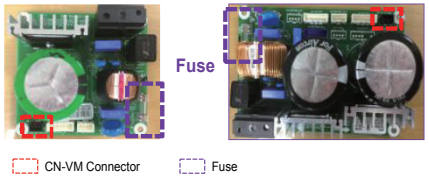
[Measured at 25 °C]

Motor P/No	U-V [Ω]	U-W [Ω]	V-W [Ω]
EAU43080007	11.8±7%		
EAU43080010	11.8±7%		
EAU43080013	11.8±7%		
EAU43080015	11.2±7%		
EAU43080016	11.8±7%		
EAU43080021	13.0±7%		
EAU43080022	4.2±7%		
EAU43080023	11.8±7%		
EAU43080024	11.8±7%		
EAU43080025	15.0±7%		
EAU43080026	4.20±7%		
EAU43080027	11.2±7%		
EAU43080030	12.2±7%		
EAU43080032	5.5±7%		
EAU43080033	11.7±7%		
EAU43080034	13.0±7%		

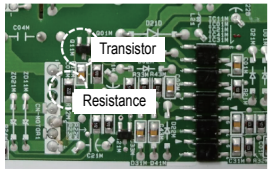
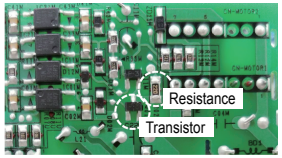
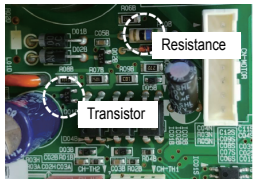
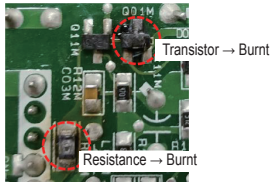
Motor P/No	U-V [Ω]	U-W [Ω]	V-W [Ω]
EAU43080035	15.0±7%		
EAU43080036	11.7±7%		
EAU43080037	12.2±5%		
EAU43080038	5.5±7%		
EAU43080039	15.1±5%		
EAU57945708	71.9±5%		
EAU60905408	52.5±5%		
EAU60905411	43.1±5%		
EAU60905419	45.6±5%		
EAU62543701	43.1±5%		
EAU62543703	43.1±5%		
EAU62543704	43.1±5%		
EAU62543707	43.1±5%		
EAU63383601	40.0±5%		
EAU63383602	40.0±5%		
EAU63383604	22.2±5%		
EAU63503502	15.1±5%		

[*****] Check the indoor PCB appearance / Check for damage to motor sub parts

Motor sub parts check point

1 Motor Sub PCB	2 Motor Sub PCB
	

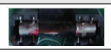
Check PCB appearance - Old PCBA Version Only

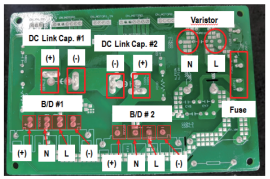
Duct Main PCB(Normal)	CST Main PCB(Normal)
	
Wall Mounted Main PCB(Normal)	**Damaged(Resistance, Transistor)**
	

[******] Motor Sub PCB Guide

Check IDU Communication PCB

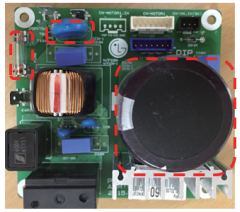
■ 6871A20912G, J, Q, R

Checklist		Measured value	
Check Point	Appearance	Normal	Abnormal
Fuse		Good	Broken
Varistor		Good	Broken
DC Link Capacitor		Good	Broken

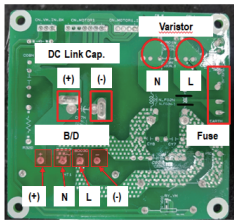


Checklist	Multi Meter			Measured value	
Check Point	Mode	BLACK	RED	Normal	Abnormal
Fuse	ıı))	Both sides		1MΩ↑	Short or 1kΩ↓
Varistor	Ω	N	L	1MΩ↑	Short or 1kΩ↓
Bridge Diode	→|	B/D (+)	L	0.35V ~ 0.7V	Non-normal
			N		
		L	B/D (-)		
		N			
DC Link Capacitor	Ω	(-)	(+)	1MΩ↑	Short or 1kΩ↓

■ EBR720596



Checklist		Measured value	
Check Point	Appearance	Normal	Abnormal
Fuse		Good	Broken
Varistor		Good	Broken
DC Link Capacitor		Good	Broken



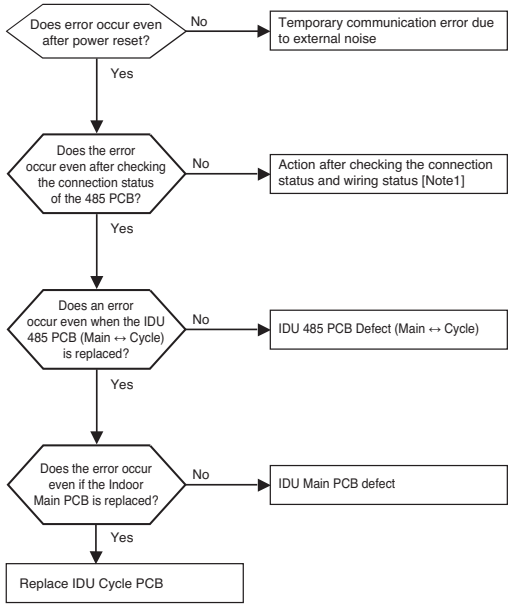
Checklist	Multi Meter			Measured value	
Check Point	Mode	BLACK	RED	Normal	Abnormal
Fuse	·)))	Both sides		1MΩ↑	Short or 1kΩ↓
Varistor	Ω	N	L	1MΩ↑	Short or 1kΩ↓
Bridge Diode	⊣◀	B/D (+)	L	0.35V ~ 0.7V	Non-normal
			N		
		L	B/D (-)		
		N			
DC Link Capacitor	Ω	(-)	(+)	1MΩ↑	Short or 1kΩ↓

⚠ WARNING

The connection of motor connector to PCB should be done under no power supplying to PCB.

Error No.	Error Type	Error Point	Main Reasons
11	Communication Error Between IDU Cycle PCB and IDU Main PCB	The IDU Main PCB does not receive Cycle PCB signal for certain period.	1. Bad Connector connection and contact 2. Indoor Cycle PCB board defect 3. Indoor 485 PCB (Main ↔ Cycle)

■ Error diagnosis and countermeasure flow chart

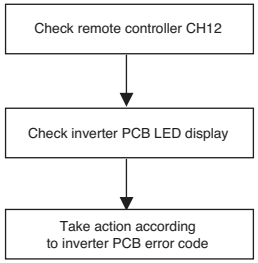


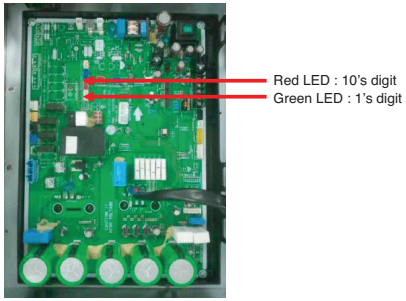
[Note1]
Checking the condition of the wire:
It occurs mainly when the contact of the connection part is bad or the remote control wire is extended and used. Check the influence of ambient noise (isolated from the power cable) and separate it from the equipment generating electromagnetic waves.

Error No.	Error Type	Error Point	Main Reasons
12	Inverter PCB error*	Error occurrence in inverter PCB	1. Connector connection defect 2. Inverter compressor error 3. Pressure sensor error

- If inverter PCB error occurs, remote controller No. 12 error is displayed, and detail error display can be checked using LED of the inverter PCB.
- Error display
  Red LED means error no. 10's digit, and green LED means 1's digit, and when red and green simultaneously blink, it means 100's unit.
  Ex) After red and green LED simultaneously blink, red LED blinks 1 time, and green LED blinks 5 times
  : error no. 115
  * Refer to [Inverter PCB Error Code List]

■ Error diagnosis and countermeasure flow chart



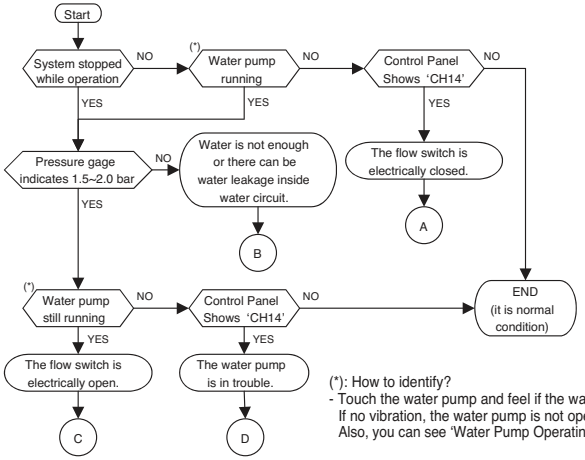


Inverter PCB Error Code List

Error No.	Error Type	Main Reasons
21	Inverter compressor IPM defect	Inverter compressor drive IPM defect / inverter compressor defect
22	Inverter compressor overcurrent	Increase of inverter compressor CT value
23	Inverter compressor DC Link low voltage	After inverter activation relay is ON, DC voltage recharge defect
25	High/low Inverter input voltage	Inverter input voltage exceeds the unit limit and lasts for 4 sec. (173V ~ 289V)
26	Inverter compressor activation failure	Inverter compressor error, causing initial activation failure
27	Inverter PSC/PFC Fault Error	Error by overcurrent at inverter input
28	Inverter DC Link high voltage error	Inverter DC voltage recharge, causing compressor OFF
29	Inverter compressor overcurrent	Inverter compressor activation failure or increase of CT value
32	Excessive rise of inverter compressor discharge temperature	Excessive rise of inverter compressor discharge temperature, causing compressor OFF
34	Excessive rise of high pressure of inverter compressor	Excessive rise of high pressure of inverter compressor, causing compressor OFF
35	Excessive drop of low pressure of inverter compressor	Excessive drop of low pressure of inverter compressor, causing compressor OFF
36	Low pressure ratio error of inverter compressor	High pressure/low pressure ratio of inverter compressor is maintained at below 1.8 for 3 min. or more
40	Inverter compressor CT sensor defect	Inverter compressor CT sensor defect
41	Inverter compressor discharge pipe temperature sensor defect	Inverter compressor discharge temperature sensor disconnection or short circuit
42	Low pressure sensor defect of inverter compressor	Low pressure sensor disconnection or short circuit of inverter compressor
43	High pressure sensor defect of inverter compressor	High pressure sensor disconnection or short circuit of inverter compressor
44	Inverter inside air temperature sensor defect	Inverter inside air temperature sensor disconnection or short circuit
46	Inverter compressor suction pipe temperature sensor defect	Inverter compressor suction temperature sensor disconnection or short circuit
53	Communication error(Hydro Kit main PCB, Outdoor unit Inverter PCB)	Outdoor unit does not receive signal from indoor unit
60	Inverter PCB EEPROM error	Inverter PCB EEPROM error
62	Excessive rise of inverter heatsink temperature	Inverter PCB heat generation, causing the rise of heatsink temperature
65	Inverter heatsink temperature sensor defect	Inverter heatsink temperature sensor disconnection or short circuit
73	Overcurrent (Peak) detected at inverter input	Error by overcur'rent detection at inverter input

Error No.	Error Type	Error Point	Main Reasons
14	Flow Switch error	Abnormal working of flow switch	1. Pump fault 2. Low water flow 3. Flow switch fault (*)

■ Error diagnosis and countermeasure flow chart



(*): How to identify?
- Touch the water pump and feel if the water pump is vibrating.
  If no vibration, the water pump is not operating.
  Also, you can see 'Water Pump Operating Icon( )' at control panel.

A
- Although there is not water flow inside water circuit, the flow switch detects as if water is flowing. It is due to electrically closed (or short) of flow switch or the contact of flow switch is mechanically stuck.
- Replace the flow switch.

B
- Check if water inside water circuit is fully charged. Pressure gage at the indoor unit should indicate 1.5~2.0 bar.
- Also, as the hand of the pressure gage is not react so fast according to water charging, check the pressure gage again.
- Otherwise, there can be water leakage inside water circuit. Examine if water circuit is completely sealed.

C
- Although water is well flowing, the flow switch can not detect water flow. It is due to electrically) open of flow switch or the contact of flow switch is mechanically broken.
- Replace the flow switch.

D
- Replace the water pump.
- Also, check the water quality if there are particles that can yield locking at the shaft of the water pump.

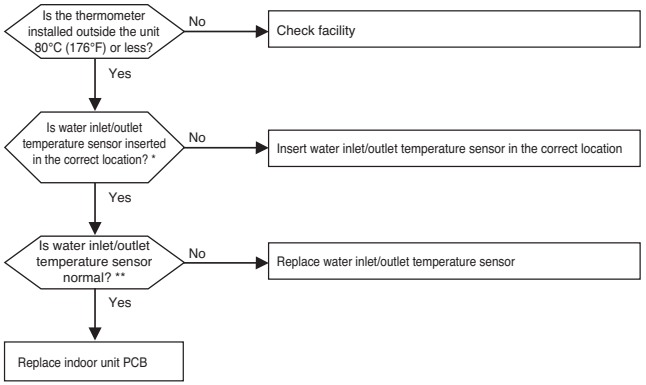
(*) Flow switch status test

Flow switch open.
Multi meter will display 0.FMΩ(∞Ω)

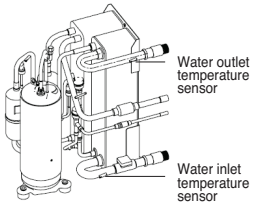
Flow switch off.
→Multi meter will display 0.4Ω

Error No.	Error Type	Error Point	Main Reasons
15	Water pipe overheated	Water outlet temperature is above 85°C(185°F)	1. High temperature of water inflow 2. Temperature sensor defect 3. Indoor unit PCB fault

■ Error diagnosis and countermeasure flow chart



* Water inlet/outlet temperature sensor location

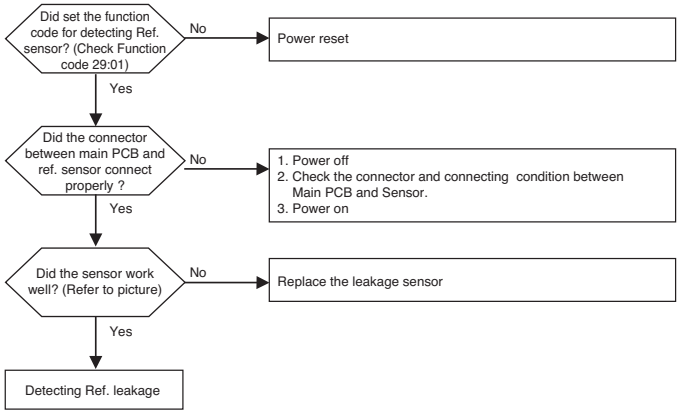


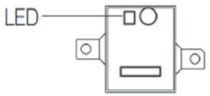
** If the resistance value of the temperature sensor changes according to temperature, and the following resistance values are displayed based on the current temperature, it is normal. (±5% error)
- Water tank temperature sensor:
  10°C(50°F)=10kΩ : 25°C(77°F)=5kΩ : 50°C(122°F)=1.8kΩ
- Water inlet/outlet temperature sensor:
  10°C(50°F)=10kΩ : 25°C(77°F)=5kΩ : 50°C(122°F)=1.8kΩ
- Gas/Liquid side temperature sensor:
  10°C(50°F)=10kΩ : 25°C(77°F)=5kΩ : 50°C(122°F)=1.8kΩ
- Air temperature sensor:
  10°C(50°F)=20.7kΩ : 25°C(77°F)=10kΩ : 50°C(122°F)=3.4kΩ

Measuring the resistance value of the temperature sensor

Error No.	Error Type	Error Point	Main Reasons
230	Refrigerant leakage sensing error	Detecting the error of the Ref. sensor.	1. Function code setting without Ref. sensor 2. Malfunction of Rf. Sensor 3. Detecting the leakage of Ref.

■ Error diagnosis and countermeasure flow chart

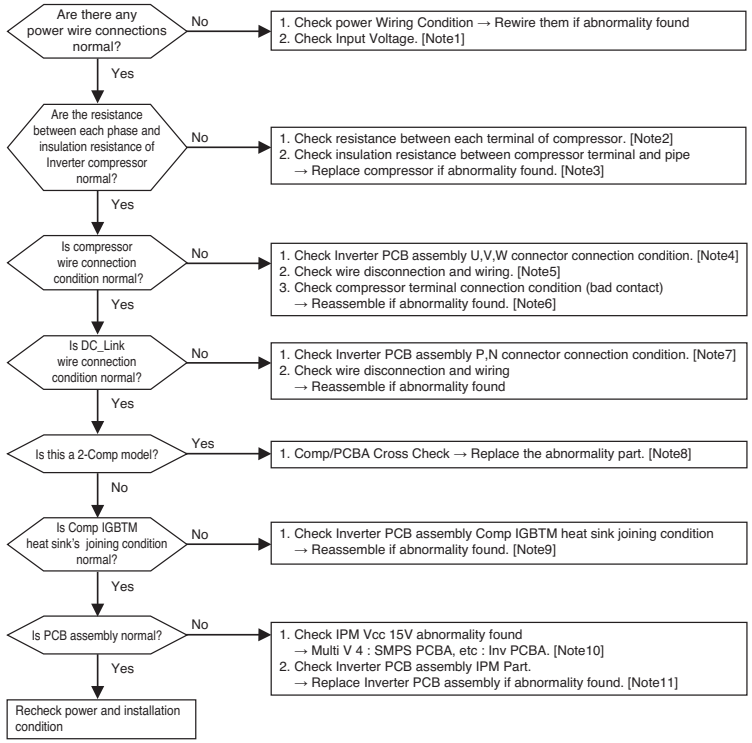




Normal status: Blinking Green LED or both Green and Red LED on.
Error status: the green and red LED blink alternately.

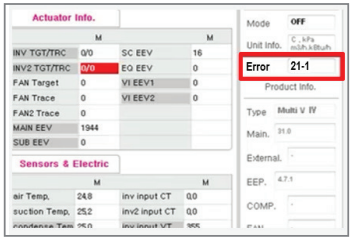
Error No.	Error Type	Error Point	Main Reasons
21*	Inverter PCB Assy. IPM Fault occur	IPM self protection circuit activation (Overcurrent/IPM overheating/Vcc low voltage)	1. Over current detection at Inverter compressor(U,V,W) 2. Compressor damaged (insulation damaged/Motor damaged) 3. IPM overheating(Heat sink disassembled) 4. Inverter compressor terminal disconnected or loose 5. Inverter PCB assembly damaged 6. ODU input current low 7. IPM Vcc low voltage

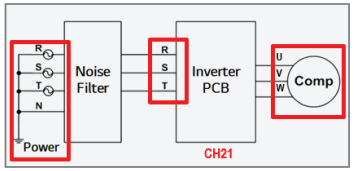
■ Error diagnosis and countermeasure flow chart



Error Code Check

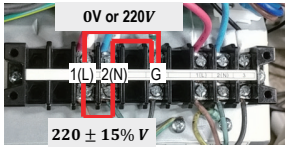
Check for errors through Main PCB or LGMV
- Error occurred in inverter PCB
- Input power, inverter PCB, power and compressor can cause problems.





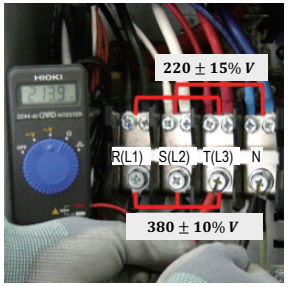
[Note 1] Check R/S/T/N Wiring Condition

1-Phase



1. Check the condition and wiring of the L/N/G cables.
2. Check that power is normally supplied to outdoor unit and then measure voltage between phases.
   L-N: 220 ± 15% V
   L-G, N-G: 0V or 220V

3-Phase

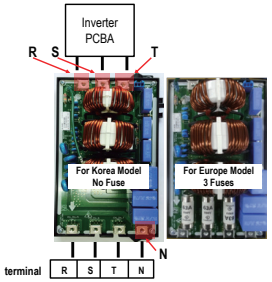


1. Check the condition and wiring of the R/S/T/N cables.
2. Check that power is normally supplied to outdoor unit and then measure voltage between phases.
   R-N, S-N, T-N: 220 ± 15% V
   R-S, R-T, T-S: 380 ± 10% V

Check input Voltage (3-Phase 4-Wire)

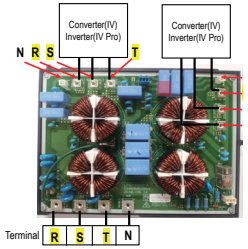
Defective parts : Fuse or Input voltage
(For 380V models, The Fuse is applied only to Europe.)

Multi V 5



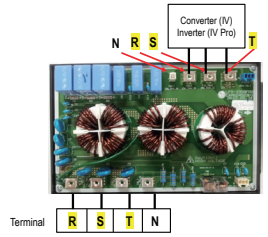
Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage (3-Phase /3-Wire 380V)	~ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		
Input Voltage (3-Phase /4-Wire 220V)	~ AC	R	N	220V ± 15%	
		S	N		
		T	N		

Multi V 4, Pro, 2 Inverter



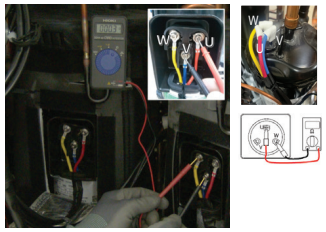
Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage	~ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		

Multi V 4,Pro, 1 Inverter



Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage	~ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		

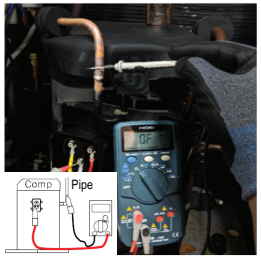
[Note 2] Check resistance between each terminal of compressor



Check the resistance of the U, V, W terminal as follows.
If the resistance values are the same(about 20% ↓), compressor can be judged as normal.
If the resistance values are the different(about 20% ↑), check it again after removing all wires.
Nevertheless, If the values are different, compressor can be judged as abnormal.

※ This picture is different according to the product.

[Note 3] Check insulation resistance between compressor terminal and pipe

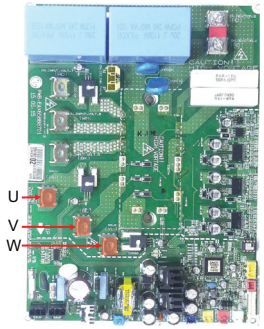


Measure insulation resistance between compressor piping and each terminal (U, V, W)
(Normal : 1MΩ or more)

※ If compressor has not been running for a long time, it may be different from normal value.
※ Remove the U, V, W wire of the compressor when measuring resistance.

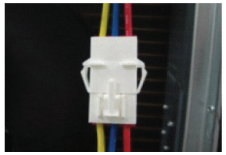
[Note 4] Check Inverter PCB assembly U, V, W connector connection condition

Multi V 4 / Pro / 5 (Screw Type)



[Note 5] Check wire disconnection and wiring

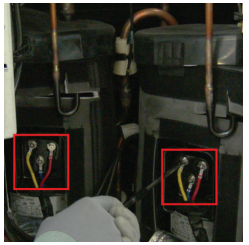
Comp Wire connection



Sometimes there is a Comp Wire connection usage model.

1. Check the status of Comp Wire connection.
2. Check that PCB wire and Compressor wire are same color.

[Note 6] Check compressor terminal connection condition (bad contact)

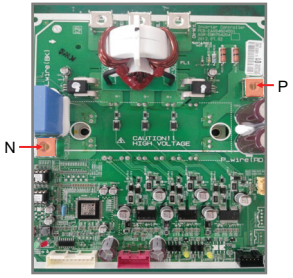


Check after power off Check condition and wiring of U, V, W cables.

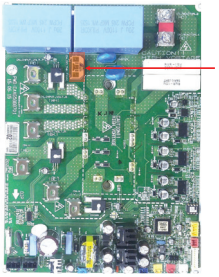
※ This picture is different according to the product.

[Note 7] Check Inverter PCB assembly P, N connector connection condition

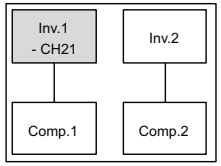
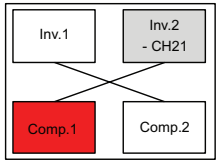
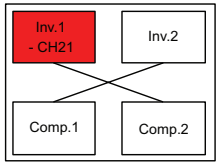
Multi V 4 (Screw Type)



Multi V 5 (Connector Type)



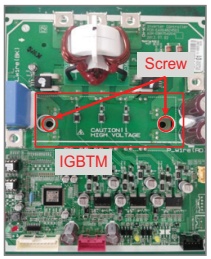
[Note 8] Comp/PCBA Cross Check

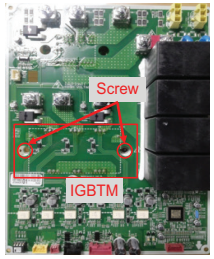
General connection status	Status after cross-connection
Ex) Inv.1 CH21 display CH211 is displayed on the Main PCBA 	1) If Inv.2 CH21 display, Compessor1 is defective (CH212 is displayed on the Main PCBA)  2) If Inv.1 CH21 display consistently, Inv1 PCBA is defective (CH211 is displayed on the Main PCBA) 

※ Be sure to turn off the product and change the wiring.

[Note 9] Check Inverter PCB assembly Comp IGBTM heat sink joining condition

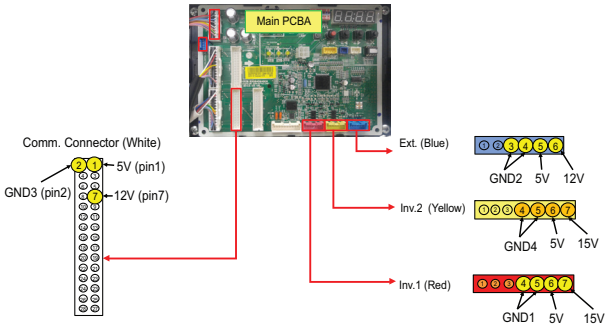
Check IGBTM heat sink joining state





※ This picture is different according to the product.

[Note 10] In case of power on: DC Voltage Check (SMPS Voltage, Multi V 4,Pro)



Before check DC voltage, Remove these three wire (Red, Yellow, Blue)

※ In case of abnormal voltage output, should replace SMPS PCBA (Don't replace Main PCBA.)
※ Precautions: DC Power & GND is different for each output.
Defective parts : SMPS PCBA

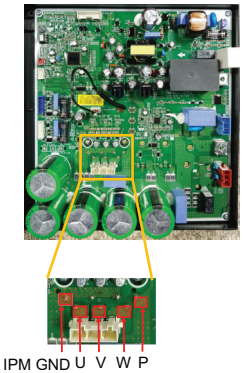
SMPS PCB should be checked when checking the error code below.

Possible error or failure because of SMPS PCB failure		SMPS output voltage (DC voltage)	Measure point (on Main PCB)			Measured value	
			Connector reference	Multi meter (+)	Multi meter (GND)	Normal	Abnormal
CH21	Inverter IPM Fault	Inverter 15V	Inverter1: CN_COMP1_RD Inverter2: CN_COMP2_YL	7 pin	4 or 5 pin	14.5V~15.5V	14.5V↓
CH23	Inverter DC Link low voltage						
CH106	Fan IPM Fault						
CH107	Fan DC Link low voltage						
CH194	Fan heatsink temperature sensor						
CH52	Communication between Main and Inverter	Inverter 5V		6 pin	4 or 5 pin	4.5V~5.5V	4.5V↓
CH105	Communication between Fan and Inverter						
CH05	Communication between ODU and IDU	Communication 5V or Main / External 5V	Comm. 5V: CN6~10_WH Main/External 5V : CN_EXT_BL	Comm. 5V: 1 pin Main/External 5V: 5 pin	Comm. 5V: 2 pin Main/External 5V: 3 or 4 pin	4.5V~5.5V	4.5V↓
CH53	Communication between ODU and IDU						
CH204	Communication between ODU and HR Unit						
CH237	Communication between 485 modems						
CH242	Communication between ODU and Central controller						
No central controller (AC Ez) power supply		Communication 12V	Comm. 5V: CN6~10_WH	7 pin	2 pin	11.5V~12.5V	11.5V↓
Valve and EEV do not work. Abnormal cooling/heating and possible high/low pressure error		Main / External 12V	Main/External 5V: CN_EXT_BL	6 pin	3 or 4 pin	11.5V~12.5V	11.5V↓

[Note 11] Check Inverter PCB assembly IPM normality

Single, Multi

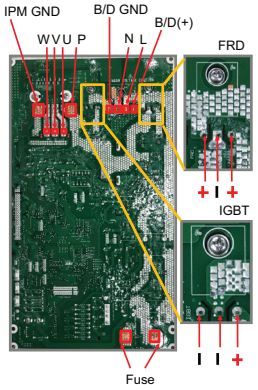
■ 6kW Gen2



Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
IPM	⊣◀	P	U	0.35V ~ 0.7 V	Non-normal
			V		
			W		
		U	IPM GND		
		V			
		W			

1. Remove connecter from the PCB
2. Set Diode Voltage measuring mode(⊣◀) in Multi-Tester
3. Measure P~U / P~V / P~W Voltage (refer to picture)
4. Measure U~GND / V~GND / W~GND Voltage (refer to picture)
5. The IPM is deeded to be damaged if the measured value is significantly different from the picture

■ 2.5kW Gen2

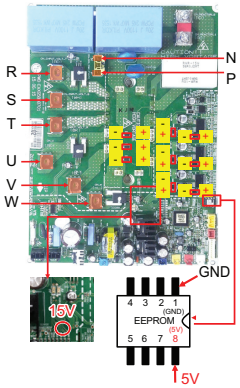


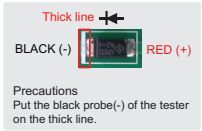
Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Fuse	·)))	Both sides		Short	Open
Bridge Diode	⊣◀	B/D (+)	L	0.35V ~ 0.7 V	Non-normal
			N		
		L	B/D GND		
		N			
FRD	⊣◀	-	+		
IGBT		-	+		
IPM	⊣◀	P	U		
			V		
			W		
		U	IPM GND		
		V			
		W			

1. Remove connecter from the PCB (Only PCBA check)
2. Set measuring mode in Multi-Tester
3. Measure part. (refer to picture)
4. If the measured value is significantly different from the normal value, judge the part abnormality

In case of power off: Check PCBA

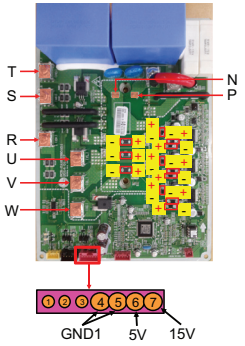
■ Inverter: Multi V 5

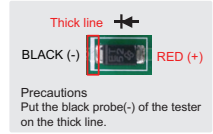




Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IGBTM	⊣◆⊢	P	U	0.3V ~ 0.7 V	Non-normal
			V		
			W		
		U	N		
		V			
		W			
		P	R		
			S		
			T		
		R	N		
		S			
		T			
Diode (12EA)	⊣◆⊢	-	+	0.3 ~ 0.7 V	Non-normal

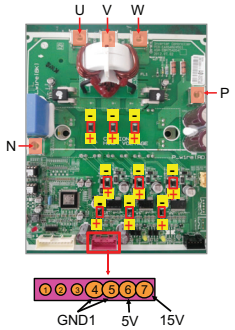
■ Inverter: Multi V Pro

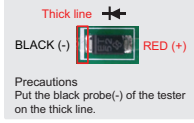




Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IGBTM	⊣◆⊢	P	U	0.3V ~ 0.7 V	Non-normal
			V		
			W		
		U	N		
		V			
		W			
		P	R		
			S		
			T		
		R	N		
		S			
		T			
Diode (12EA)	⊣◆⊢	-	+	0.3 ~ 0.7 V	Non-normal

■ Inverter: Multi V 4

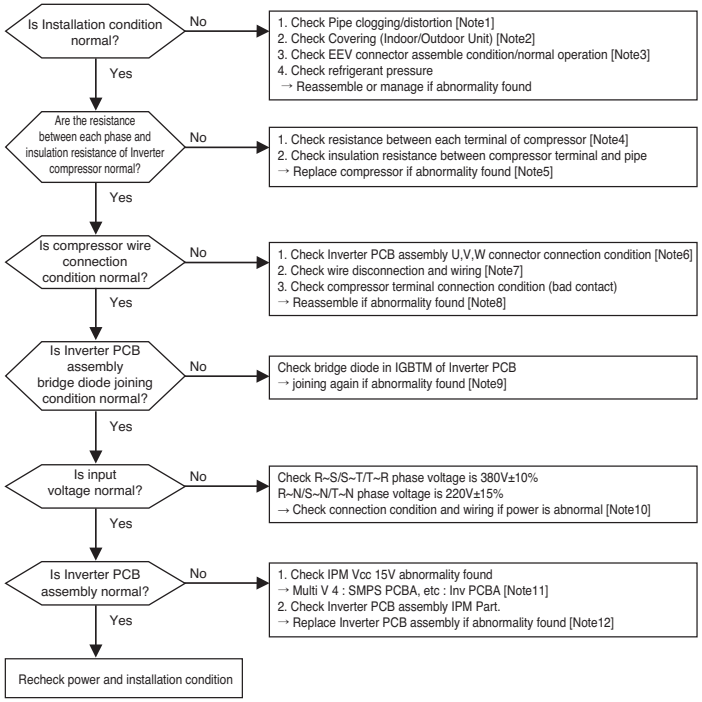




Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IGBTM	⊣◆⊢	P	U	0.3V ~ 0.7 V	Non-normal
			V		
			W		
		U	N		
		V			
		W			
Diode (9EA)	⊣◆⊢	-	+	0.3 ~ 0.7 V	Non-normal

Error No.	Error Type	Error Point	Main Reasons
22*	AC Input Current Over Error	Inverter PCB Assembly input 3 phase power current is over limited value(24A)	1. Overload operation (Pipe clogging/ Covering/EEV defect/Ref. over-charge) 2. Compressor damage(Insulation damage/Motor damage) 3. Input voltage low 4. Power Line Misconnection 5. Inverter PCB Assembly damage (Input current sensing part)

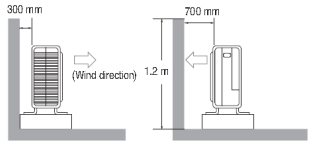
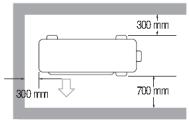
■ Error Diagnosis and Countermeasure Flow Chart



[Note 1] Check Pipe clogging/distortion

Check Pipe state

[Note 2] Check Covering (Indoor/Outdoor Unit)

When the front/back has a wall (1 side)	When the front/back/left/right have walls (3 sides)
	

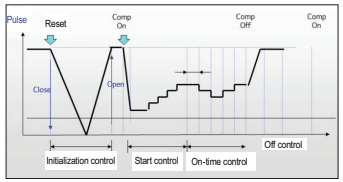
Cause of Trouble	Condition	Mechanism of Fault Generation
Whirlwind	Blocking of the front part of outdoor devices	Frequent turning-off of the compressor: Inflow of high-temperature air generated by outdoor fans into the air conditioner → Wrong influence to the system in over-load state
	Installation of outdoor devices in narrow space	
Shielding	Blocking of the lateral suction point on the wall of the outdoor devices. Foreign substances in the heat exchanger and obstacles in the surrounding.	Frequent turning-off of the compressor: Elevation of the pipe temperature due to reduced wind velocity → Wrong influence to the system in over-load state
Corrosion	Possible infiltration of moisture / highly humid area	Corrosion of heat exchanger : → Reduced operation efficiency → Transfer of troubles to other parts

※ It should be clear around Indoor/Outdoor unit

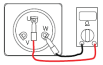
[Note 3] Check EEV connector assemble condition/normal operation

When you reset PCB power, initial EEV opens and closes again, and hold EEV valve on your hand, you should feel it vibrating. (EEV is abnormal if vibration is not felt)

* EEV operation



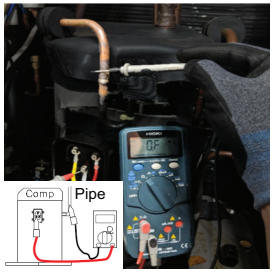
[Note 4] Check resistance between each terminal of compressor



Check the resistance of the U, V, W terminal as follows.
If the resistance values are the same (about 20% ↓), compressor can be judged as normal.
If the resistance values are the different (about 20% ↑), check it again after removing all wires. Nevertheless, If the values are different, compressor can be judged as abnormal.

※ This picture is different according to the product.

[Note 5] Check insulation resistance between compressor terminal and pipe



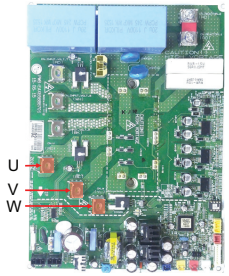
Measure insulation resistance between compressor piping and each terminal (U, V, W) (Normal : 1MΩ or more)

※ If compressor has not been running for a long time, it may be different from normal value.

※ Remove the U, V, W wire of the compressor when measuring resistance.

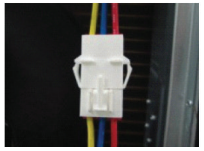
[Note 6] Check Inverter PCB assembly U,V,W connector connection condition

Multi V 4 / Pro / 5 (Screw Type)



[Note 7] Check wire disconnection and wiring

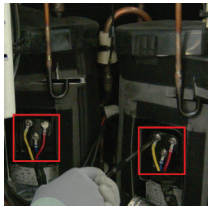
Comp Wire connection



Sometimes there is a Comp Wire connection usage model.

1. Check the status of Comp Wire connection.
2. Check that PCB wire and Compressor wire are same color.

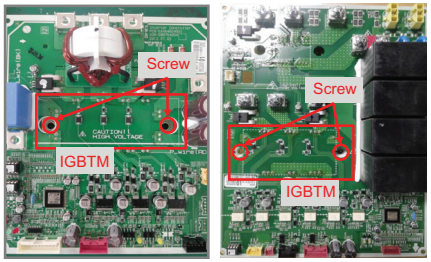
[Note 8] Check compressor terminal connection condition (bad contact)



Check after power off Check condition and wiring of U, V, W cables.

※ This picture is different according to the product

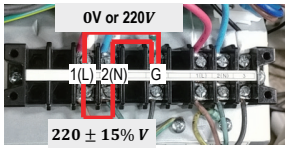
[Note 9] Check Inverter PCB assembly Comp IGBTM heat sink joining condition



Check IGBTM heat sink joining state
※ This picture is different according to the product

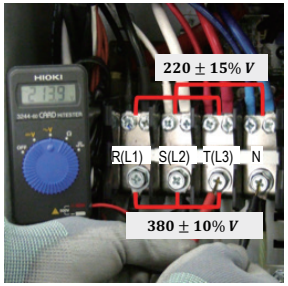
[Note 10] Check R/S/T/N Wiring Condition

1-Phase



1. Check the condition and wiring of the L/N/G cables.
2. Check that power is normally supplied to outdoor unit and then measure voltage between phases.
   L-N: 220 ± 15% V
   L-G, N-G: 0V or 220V

3-Phase

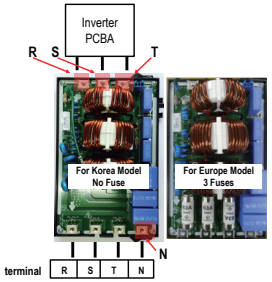


1. Check the condition and wiring of the R/S/T/N cables.
2. Check that power is normally supplied to outdoor unit and then measure voltage between phases.
   R-N, S-N, T-N: 220 ± 15% V
   R-S, R-T, T-S: 380 ± 10% V

Check input Voltage (3-Phase 4-Wire)

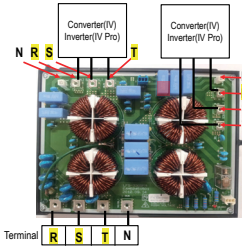
Defective parts : Fuse or Input voltage
(For 380V models, The Fuse is applied only to Europe.)

Multi V 5



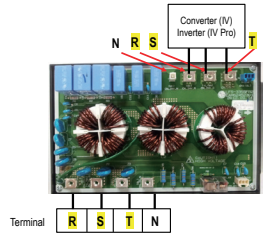
Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage (3-Phase /3-Wire 380V)	~ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		
Input Voltage (3-Phase /4-Wire 220V)	~ AC	R	N	220V ± 15%	
		S	N		
		T	N		

Multi V 4, Pro, 2 Inverter



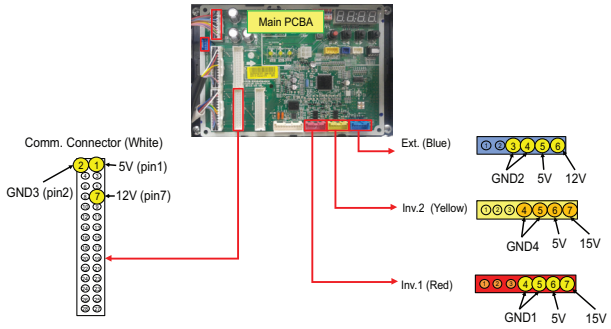
Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage	~ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		

Multi V 4, Pro, 1 Inverter



Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage	~ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		

[Note 11] In case of power on: DC Voltage Check (SMPS Voltage, Multi V 4,Pro)



Before check DC voltage, Remove these three wire (Red, Yellow, Blue)

※ In case of abnormal voltage output, should replace SMPS PCBA (Don't replace Main PCBA.)
※ Precautions: DC Power & GND is different for each output.
Defective parts : SMPS PCBA

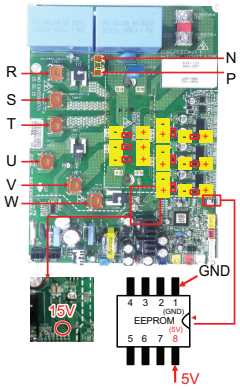
SMPS PCB should be checked when checking the error code below.

Possible error or failure because of SMPS PCB failure		SMPS output voltage (DC voltage)	Measure point (on Main PCB)			Measured value	
			Connector reference	Multi meter (+)	Multi meter (GND)	Normal	Abnormal
CH21	Inverter IPM Fault	Inverter 15V	Inverter1: CN_COMP1_RD Inverter2: CN_COMP2_YL	7 pin	4 or 5 pin	14.5V~15.5V	14.5V↓
CH23	Inverter DC Link low voltage						
CH106	Fan IPM Fault						
CH107	Fan DC Link low voltage						
CH194	Fan heatsink temperature sensor						
CH52	Communication between Main and Inverter	Inverter 5V		6 pin	4 or 5 pin	4.5V~5.5V	4.5V↓
CH105	Communication between Fan and Inverter						
CH05	Communication between ODU and IDU	Communication 5V or Main / External 5V	Comm. 5V: CN6~10_WH Main/External 5V : CN_EXT_BL	Comm. 5V: 1 pin Main/External 5V: 5 pin	Comm. 5V: 2 pin Main/External 5V: 3 or 4 pin	4.5V~5.5V	4.5V↓
CH53	Communication between ODU and IDU						
CH204	Communication between ODU and HR Unit						
CH237	Communication between 485 modems						
CH242	Communication between ODU and Central controller						
No central controller (AC Ez) power supply		Communication 12V	Comm. 5V: CN6~10_WH	7 pin	2 pin	11.5V~12.5V	11.5V↓
Valve and EEV do not work. Abnormal cooling/heating and possible high/low pressure error		Main / External 12V	Main/External 5V: CN_EXT_BL	6 pin	3 or 4 pin	11.5V~12.5V	11.5V↓

[Note 12] Check Inverter PCB assembly IPM normality

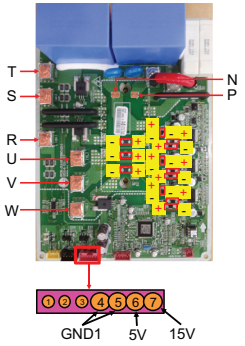
In case of power off: Check PCBA

■ Inverter: Multi V 5



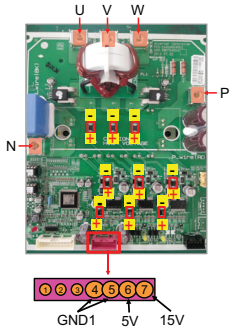
Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IGBTM	⊣◆⊢	P	U	0.3V ~ 0.7 V	Non-normal
			V		
			W		
		N	U		
			V		
			W		
		P	R		
			S		
			T		
		N	R		
			S		
			T		
Diode (12EA)	⊣◆⊢	-	+	0.3 ~ 0.7 V	Non-normal

■ Inverter: Multi V Pro



Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IGBTM	⊣◆⊢	P	U	0.3V ~ 0.7 V	Non-normal
			V		
			W		
		N	U		
			V		
			W		
		P	R		
			S		
			T		
		N	R		
			S		
			T		
Diode (12EA)	⊣◆⊢	-	+	0.3 ~ 0.7 V	Non-normal

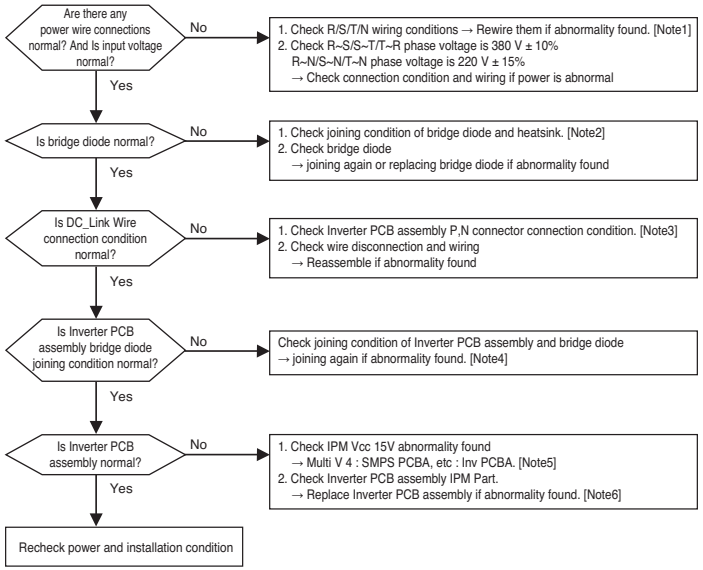
■ Inverter: Multi V 4



Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IGBTM	⊣◆⊢	P	U	0.3V ~ 0.7 V	Non-normal
			V		
			W		
		N	U		
			V		
			W		
Diode (9EA)	⊣◆⊢	-	+	0.3 ~ 0.7 V	Non-normal

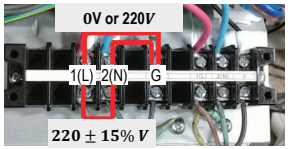
Error No.	Error Type	Error Point	Main Reasons
23*	Inverter PCB DC Link High/Low Voltage	1. Inverter PCB DC voltage not charging 2. Inverter PCB DC Link voltage exceeds the limit	1. DC Link terminal misconnection/terminal contact fault (loose) 2. Condenser damage 3. Inverter PCB assembly damage(DC Link voltage sensing part) 4. Input voltage is abnormal (R, S, T, N) 5. Power connection is abnormal (N phase missing)

■ Error Diagnosis and Countermeasure Flow Chart



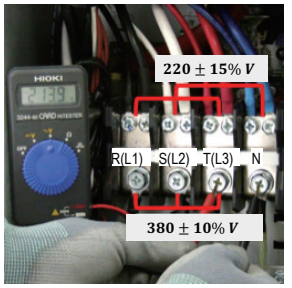
[Note 1] Check R/S/T/N Wiring Condition

1-Phase



1. Check the condition and wiring of the L/N/G cables.
2. Check that power is normally supplied to outdoor unit and then measure voltage between phases.
   L-N: 220 ± 15% V
   L-G, N-G: 0V or 220V

3-Phase

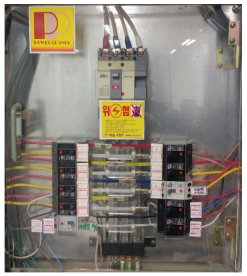


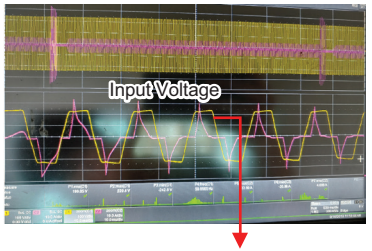
1. Check the condition and wiring of the R/S/T/N cables.
2. Check that power is normally supplied to outdoor unit and then measure voltage between phases.
   R-N, S-N, T-N: 220 ± 15% V
   R-S, R-T, T-S: 380 ± 10% V

Distribution Box Inspection

CH23 or CH27 may occur due to input voltage distortion

1. When using 220V voltage in 3-phase power supply, check whether the voltage between lines is balanced.
   (Check R-N, S-N, T-N voltage during product operation)
2. Check if another product with a large load is connected to the same power supply.



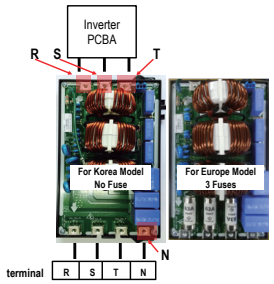


CH23 or CH27 occurs when input voltage distortion occurs

Check input Voltage (3-Phase 4-Wire)

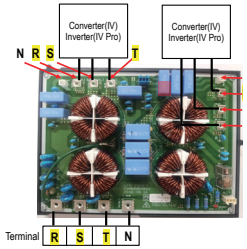
Defective parts : Fuse or Input voltage
(For 380V models, The Fuse is applied only to Europe.)

Multi V 5



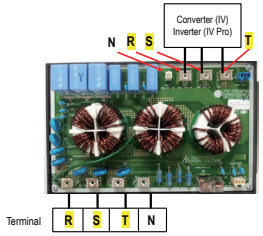
Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage (3-Phase /3-Wire 380V)	~ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		
Input Voltage (3-Phase /4-Wire 220V)	~ AC	R	N	220V ± 15%	
		S	N		
		T	N		

Multi V 4, Pro, 2 Inverter



Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage	~ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		

Multi V 4,Pro, 1 Inverter

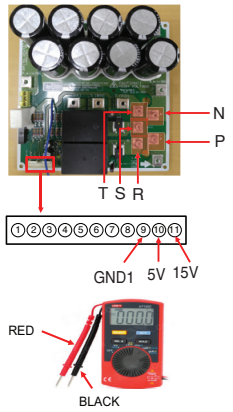


Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage	~ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		

[Note 2] Check bridge diode

1. Check joining condition of bridge diode and heatsink.
2. Check bridge diode.
   → Joining again or replacing bridge diode if abnormality found.

■ How to check Converter PCBA



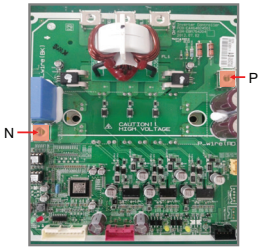
Defective parts : Converter PCBA

Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
Bridge Diode	→|←	P	R	0.38 V ~ 0.7V	Non-normal
			S		
			T		
		N	R		
			S		
			T		

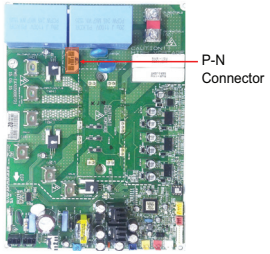
※ Multi Meter : Be careful of the probe color.

[Note 3] Check Inverter PCB assembly P, N connector connection condition

■ Multi V 4 (Screw Type)

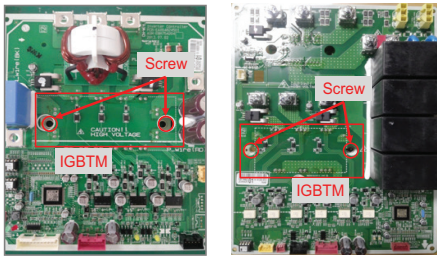


■ Multi V 5 (Connector Type)



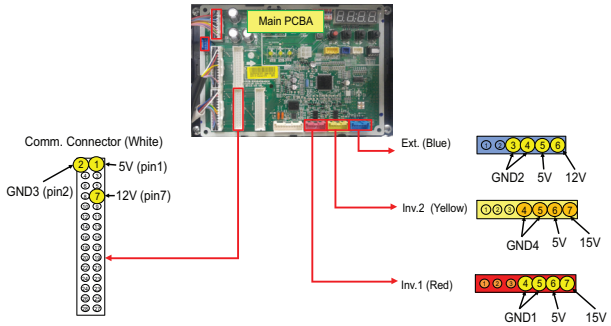
[Note 4] Check Inverter PCB assembly Comp IGBTM heat sink joining condition

Check IGBTM heat sink joining state



※ This picture is different according to the product.

[Note 5] In case of power on: DC Voltage Check (SMPS Voltage, Multi V 4, Pro)



Before check DC voltage, Remove these three wire (Red, Yellow, Blue)

※ In case of abnormal voltage output, should replace SMPS PCBA (Don't replace Main PCBA.)
※ Precautions: DC Power & GND is different for each output.
Defective parts : SMPS PCBA

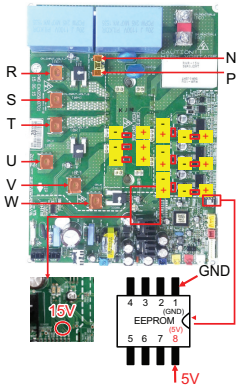
SMPS PCB should be checked when checking the error code below.

Possible error or failure because of SMPS PCB failure		SMPS output voltage (DC voltage)	Measure point (on Main PCB)			Measured value	
			Connector reference	Multi meter (+)	Multi meter (GND)	Normal	Abnormal
CH21	Inverter IPM Fault	Inverter 15V	Inverter1: CN_COMP1_RD Inverter2: CN_COMP2_YL	7 pin	4 or 5 pin	14.5V~15.5V	14.5V↓
CH23	Inverter DC Link low voltage						
CH106	Fan IPM Fault						
CH107	Fan DC Link low voltage						
CH194	Fan heatsink temperature sensor						
CH52	Communication between Main and Inverter	Inverter 5V		6 pin	4 or 5 pin	4.5V~5.5V	4.5V↓
CH105	Communication between Fan and Inverter						
CH05	Communication between ODU and IDU	Communication 5V or Main / External 5V	Comm. 5V: CN6~10_WH Main/External 5V : CN_EXT_BL	Comm. 5V: 1 pin Main/External 5V: 5 pin	Comm. 5V: 2 pin Main/External 5V: 3 or 4 pin	4.5V~5.5V	4.5V↓
CH53	Communication between ODU and IDU						
CH204	Communication between ODU and HR Unit						
CH237	Communication between 485 modems						
CH242	Communication between ODU and Central controller						
No central controller (AC Ez) power supply		Communication 12V	Comm. 5V: CN6~10_WH	7 pin	2 pin	11.5V~12.5V	11.5V↓
Valve and EEV do not work. Abnormal cooling/heating and possible high/low pressure error		Main / External 12V	Main/External 5V: CN_EXT_BL	6 pin	3 or 4 pin	11.5V~12.5V	11.5V↓

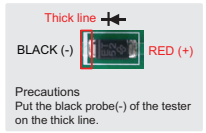
[Note 6] Check Inverter PCB assembly IPM normality

In case of power off: Check PCBA

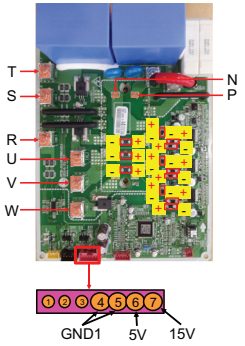
■ Inverter: Multi V 5

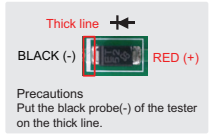


Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IGBTM	⊣◆⊢	P	U	0.3V ~ 0.7 V	Non-normal
			V		
			W		
		N	U		
			V		
			W		
		P	R		
			S		
			T		
		N	R		
			S		
			T		
Diode (12EA)	⊣◆⊢	-	+	0.3 ~ 0.7 V	Non-normal



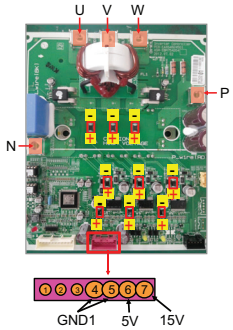
■ Inverter: Multi V Pro

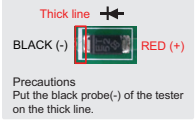




Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IGBTM	⊣◆⊢	P	U	0.3V ~ 0.7 V	Non-normal
			V		
			W		
		N	U		
			V		
			W		
		P	R		
			S		
			T		
		N	R		
			S		
			T		
Diode (12EA)	⊣◆⊢	-	+	0.3 ~ 0.7 V	Non-normal

■ Inverter: Multi V 4

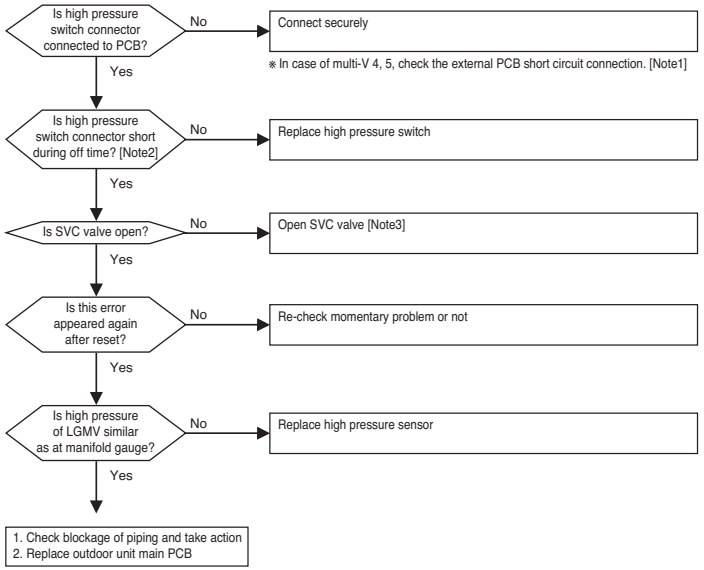




Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IGBTM	⊣◆⊢	P	U	0.3V ~ 0.7 V	Non-normal
			V		
			W		
		N	U		
			V		
			W		
Diode (9EA)	⊣◆⊢	-	+	0.3 ~ 0.7 V	Non-normal

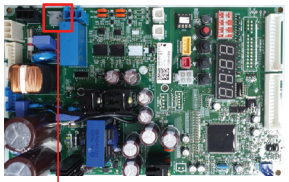
Error No.	Error Type	Error Point	Main Reasons
24*	Excessive rise of discharge pressure in outdoor compressor	Compressor off due to the high pressure switch in outdoor unit	1. Defective high pressure switch 2. Defective fan of indoor unit or outdoor unit 3. Check valve of compressor clogged 4. Pipe distortion due to the pipe damage 5. Refrigerant overcharge 6. Defective EEV at the indoor or outdoor unit. 7. Covering or clogging(Outdoor covering during the cooling mode /Indoor unit filter clogging during the heating mode) 8. SVC valve clogging 9. Defective outdoor PCB 10. Defective active path valve

■ Error Diagnosis and Countermeasure Flow Chart



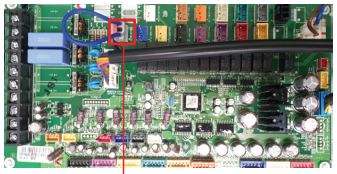
[Note 1] Check connection of main PCB high pressure switch connector

Multi V 5 Main PCB



High pressure switch connector

Multi V 5 External PCB



Short circuit connection
(Gray terminal, CN28_HP_SW_GY)

[Note 2] Check short with high pressure switch connector

Short: High pressure switch is normal
Open: High pressure switch is abnormal
→ Change new high pressure switch.

[Note 3] Check service valve

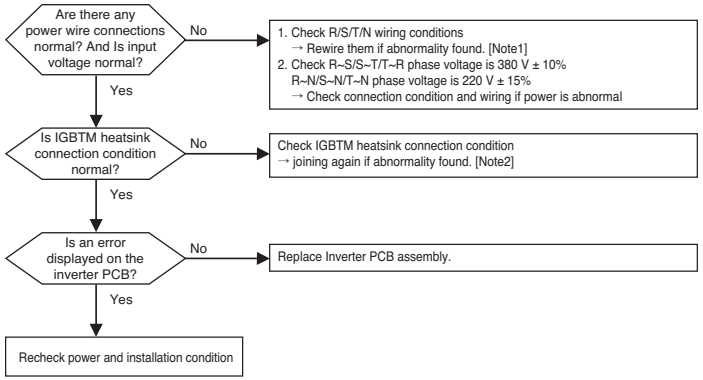
Open the valve if service valve is closed.

Closed

Open

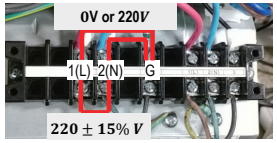
Error No.	Error Type	Error Point	Main Reasons
25*	Input Voltage high/low	Input voltage is over limited value of the product (304 V or less, 536 V or more)	1. Input voltage abnormal (T-N, R-S, S-T, T-R) 2. Outdoor unit Inverter PCB assembly damage(input voltage sensing part) 3. N phase line disconnection

■ Error Diagnosis and Countermeasure Flow Chart



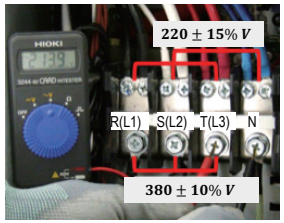
[Note 1] Check R/S/T/N Wiring Condition

1-Phase



1. Check the condition and wiring of the L/N/G cables.
2. Check that power is normally supplied to outdoor unit and then measure voltage between phases.
   L-N: 220 ± 15% V
   L-G, N-G: 0V or 220V

3-Phase

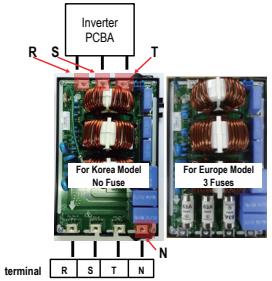


1. Check the condition and wiring of the R/S/T/N cables.
2. Check that power is normally supplied to outdoor unit and then measure voltage between phases.
   R-N, S-N, T-N: 220 ± 15% V
   R-S, R-T, T-S: 380 ± 10% V

Check input Voltage (3-Phase 4-Wire)

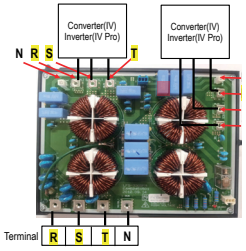
Defective parts : Fuse or Input voltage
(For 380V models, The Fuse is applied only to Europe.)

Multi V 5



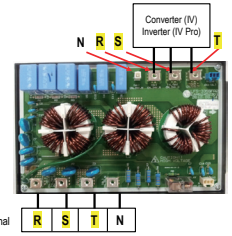
Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage (3-Phase /3-Wire 380V)	~ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		
Input Voltage (3-Phase /4-Wire 220V)	~ AC	R	N	220V ± 15%	
		S	N		
		T	N		

Multi V 4, Pro, 2 Inverter



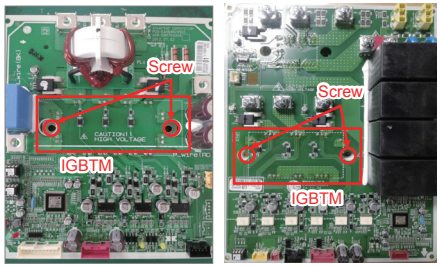
Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage	~ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		

Multi V 4, Pro, 1 Inverter



Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage	~ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		

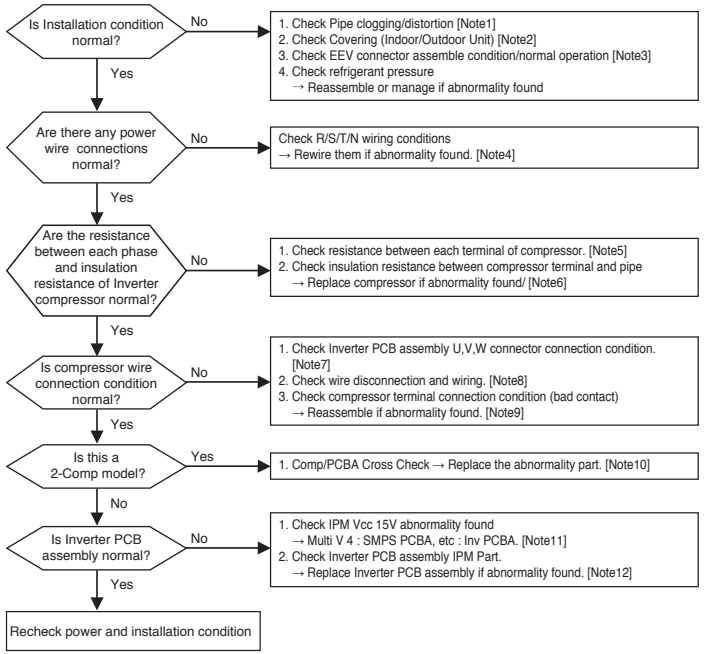
[Note2] Check Inverter PCB assembly Comp IGBTM heat sink joining condition



※ This picture is different according to the product

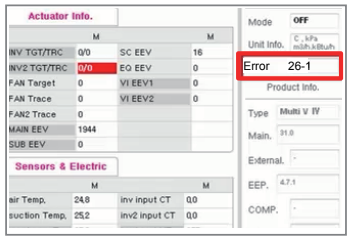
Error No.	Error Type	Error Point	Main Reasons
26*	Inverter compressor starting failure Error	Starting failure because of compressor abnormality	1. Overload operation (Pipe clogging/Covering/EEV defect/ Ref. overcharge) 2. Compressor damage (Insulation damage/Motor damage) 3. Compressor wiring fault 4. ODU Comp PCB damage (CT)

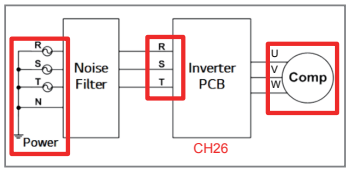
■ Error Diagnosis and Countermeasure Flow Chart



Error Code Check

Check for errors through Main PCB or LGMV
- Error occurred in inverter PCB
- Input power, inverter PCB, power and compressor can cause problems.

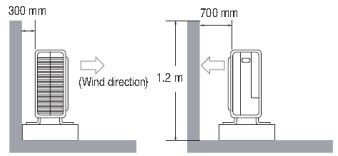
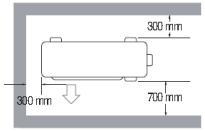




[Note1] Check Pipe clogging/distortion

Check Pipe state

[Note2] Check Covering (Indoor/Outdoor Unit)

When the front/back has a wall (1 side)	When the front/back/left/right have walls (3 sides)
	

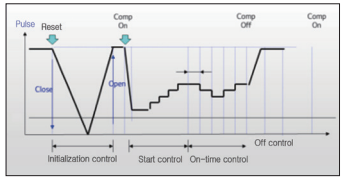
Cause of Trouble	Condition	Mechanism of Fault Generation
Whirlwind	Blocking of the front part of outdoor devices	Frequent turning-off of the compressor : Inflow of high-temperature air generated by outdoor fans into the air conditioner → Wrong influence to the system in over-load state
	Installation of outdoor devices in narrow space	
Shielding	Blocking of the lateral suction point on the wall of the outdoor devices. Foreign substances in the heat exchanger and obstacles in the surrounding.	Frequent turning-off of the compressor: Elevation of the pipe temperature due to reduced wind velocity → Wrong influence to the system in over-load state
Corrosion	Possible infiltration of moisture / highly humid area	Corrosion of heat exchanger : → Reduced operation efficiency → Transfer of troubles to other parts

※ It should be clear around Indoor/Outdoor unit

[Note 3] Check EEV connector assemble condition/normal operation

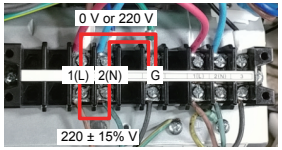
When you reset PCB power, initial EEV opens and closes again, and hold EEV valve on your hand, you should feel it vibrating. (EEV is abnormal if vibration is not felt)

* EEV operation



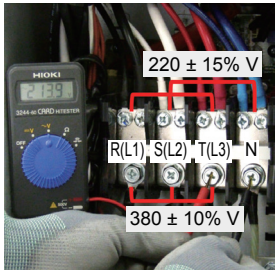
[Note 4] Check R/S/T/N Wiring Condition

1-Phase



1. Check the condition and wiring of the L/N/G cables.
2. Check that power is normally supplied to outdoor unit and then measure voltage between phases.
   L-N: 220 ± 15% V
   L-G, N-G: 0V or 220V

3-Phase

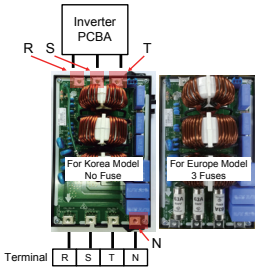


1. Check the condition and wiring of the R/S/T/N cables.
2. Check that power is normally supplied to outdoor unit and then measure voltage between phases.
   R-N, S-N, T-N: 220 ± 15% V
   R-S, R-T, T-S: 380 ± 10% V

Check input Voltage (3-Phase 4-Wire)

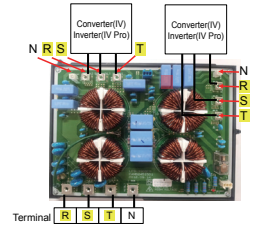
Defective parts : Fuse or Input voltage
(For 380V models, The Fuse is applied only to Europe.)

Multi V 5



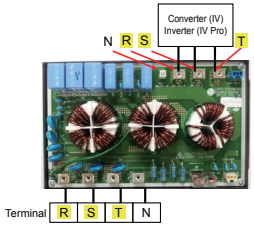
Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage (3-Phase /3-Wire 380V)	≂ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		
Input Voltage (3-Phase /4-Wire 220V)	≂ AC	R	N	220V ± 15%	
		S	N		
		T	N		

Multi V 4, Pro, 2 Inverter



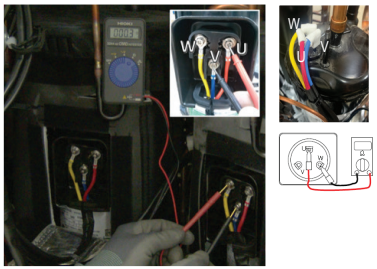
Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage	≂ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		

Multi V 4,Pro, 1 Inverter



Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage	≂ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		

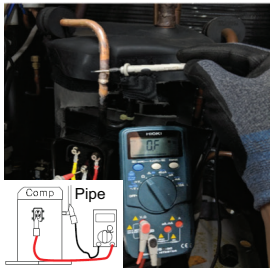
[Note 5] Check resistance between each terminal of compressor



Check the resistance of the U, V, W terminal as follows.
If the resistance values are the same (about 20% ↓), compressor can be judged as normal.
If the resistance values are the different (about 20% ↑), check it again after removing all wires.
Nevertheless, If the values are different, compressor can be judged as abnormal.

※ This picture is different according to the product.

[Note 6] Check insulation resistance between compressor terminal and pipe



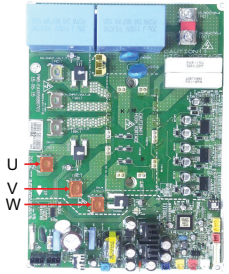
Measure insulation resistance between compressor piping and each terminal (U, V, W) (Normal : 1MΩ or more)

※ If compressor has not been running for a long time, it may be different from normal value.

※ Remove the U, V, W wire of the compressor when measuring resistance.

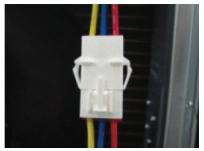
[Note 7] Check Inverter PCB assembly U, V, W connector connection condition

Multi V 4 / Pro / 5 (Screw Type)



[Note 8] Check wire disconnection and wiring

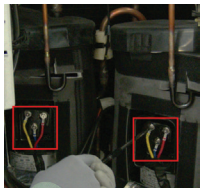
Comp Wire connection



Sometimes there is a Comp Wire connection usage model.

1. Check the status of Comp Wire connection.
2. Check that PCB wire and Compressor wire are same color.

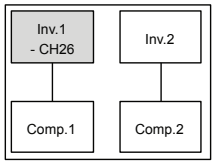
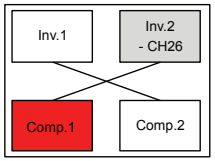
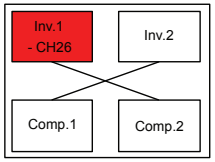
[Note 9] Check compressor terminal connection condition (bad contact)



Check after power off Check condition and wiring of U, V, W cables.

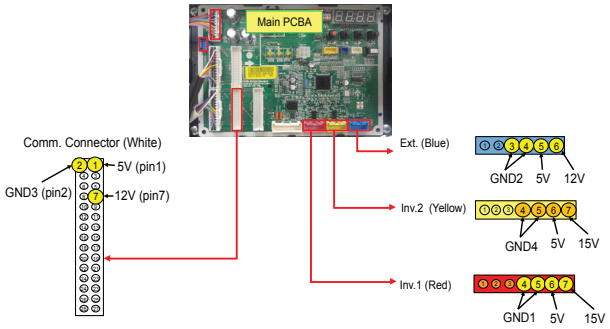
※ This picture is different according to the product

[Note 10] Comp/PCBA Cross Check

General connection status	Status after cross-connection
Ex) Inv.1 CH26 display CH261 is displayed on the Main PCBA 	1) If Inv.2 CH26 display, Compessor1 is defective (CH262 is displayed on the Main PCBA)  2) If Inv.1 CH26 display consistently, Inv1 PCBA is defective (CH261 is displayed on the Main PCBA) 

※ Be sure to turn off the product and change the wiring.

[Note 11] In case of power on: DC Voltage Check (SMPS Voltage, Multi V 4, Pro)



Before check DC voltage, Remove these three wire (Red, Yellow, Blue)

※ In case of abnormal voltage output, should replace SMPS PCBA (Don't replace Main PCBA.)
※ Precautions: DC Power & GND is different for each output.
Defective parts : SMPS PCBA

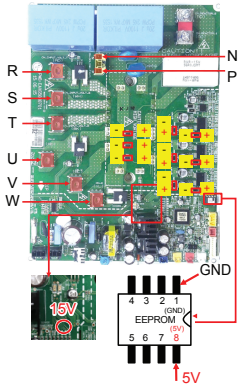
SMPS PCB should be checked when checking the error code below.

Possible error or failure because of SMPS PCB failure		SMPS output voltage (DC voltage)	Measure point (on Main PCB)			Measured value	
			Connector reference	Multi meter (+)	Multi meter (GND)	Normal	Abnormal
CH21	Inverter IPM Fault	Inverter 15V	Inverter1: CN_COMP1_RD Inverter2: CN_COMP2_YL	7 pin	4 or 5 pin	14.5V~15.5V	14.5V↓
CH23	Inverter DC Link low voltage						
CH106	Fan IPM Fault						
CH107	Fan DC Link low voltage						
CH194	Fan heatsink temperature sensor						
CH52	Communication between Main and Inverter	Inverter 5V		6 pin	4 or 5 pin	4.5V~5.5V	4.5V↓
CH105	Communication between Fan and Inverter						
CH05	Communication between ODU and IDU	Communication 5V or Main / External 5V	Comm. 5V: CN6~10_WH Main/External 5V: CN_EXT_BL	Comm. 5V: 1 pin Main/External 5V: 5 pin	Comm. 5V: 2 pin Main/External 5V: 3 or 4 pin	4.5V~5.5V	4.5V↓
CH53	Communication between ODU and IDU						
CH204	Communication between ODU and HR Unit						
CH237	Communication between 485 modems						
CH242	Communication between ODU and Central controller						
No central controller (AC Ez) power supply		Communication 12V	Comm. 5V: CN6~10_WH	7 pin	2 pin	11.5V~12.5V	11.5V↓
Valve and EEV do not work. Abnormal cooling/heating and possible high/low pressure error		Main / External 12V	Main/External 5V: CN_EXT_BL	6 pin	3 or 4 pin	11.5V~12.5V	11.5V↓

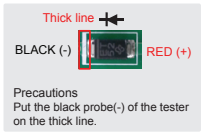
[Note 12] Check Inverter PCB assembly IPM normality

In case of power off: Check PCBA

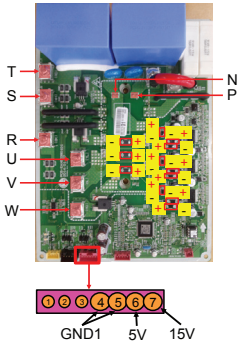
■ Inverter: Multi V 5

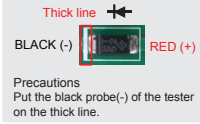


Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IGBTM	⊣◆⊢	P	U	0.3V ~ 0.7 V	Non-normal
			V		
			W		
		N	U		
			V		
			W		
		P	R		
			S		
			T		
		N	R		
			S		
			T		
Diode (12EA)	⊣◆⊢	-	+	0.3 ~ 0.7 V	Non-normal



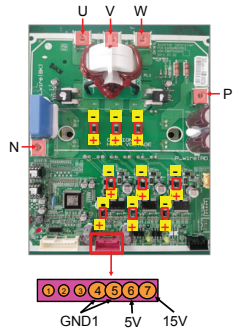
■ Inverter: Multi V Pro

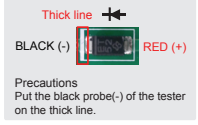




Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IGBTM	⊣◆⊢	P	U	0.3V ~ 0.7 V	Non-normal
			V		
			W		
		N	U		
			V		
			W		
		P	R		
			S		
			T		
		N	R		
			S		
			T		
Diode (12EA)	⊣◆⊢	-	+	0.3 ~ 0.7 V	Non-normal

■ Inverter: Multi V 4

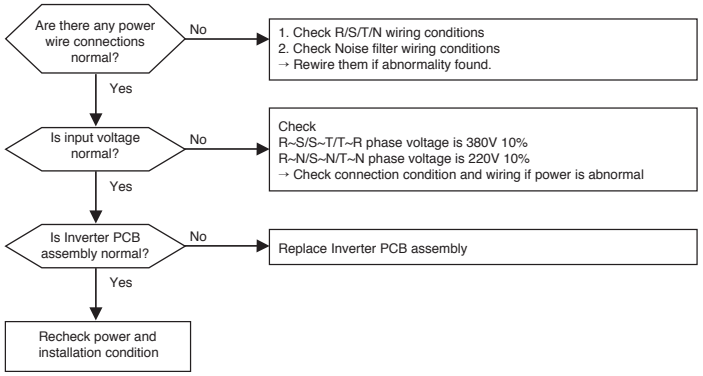




Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IGBTM	⊣◆⊢	P	U	0.3V ~ 0.7 V	Non-normal
			V		
			W		
		N	U		
			V		
			W		
Diode (9EA)	⊣◆⊢	-	+	0.3 ~ 0.7 V	Non-normal

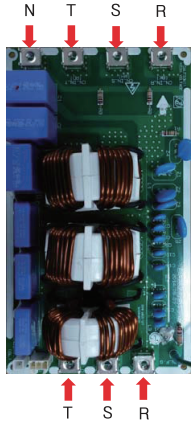
Error No.	Error Type	Error Point	Main Reasons
28*	Inverter DC link high voltage error	Inv PCB DC link voltage supplied over 780V	1. Input voltage abnormal (R,S,T,N) 2. ODU Comp PCB damage (DC Link voltage sensing part)

■ Error Diagnosis and Countermeasure Flow Chart



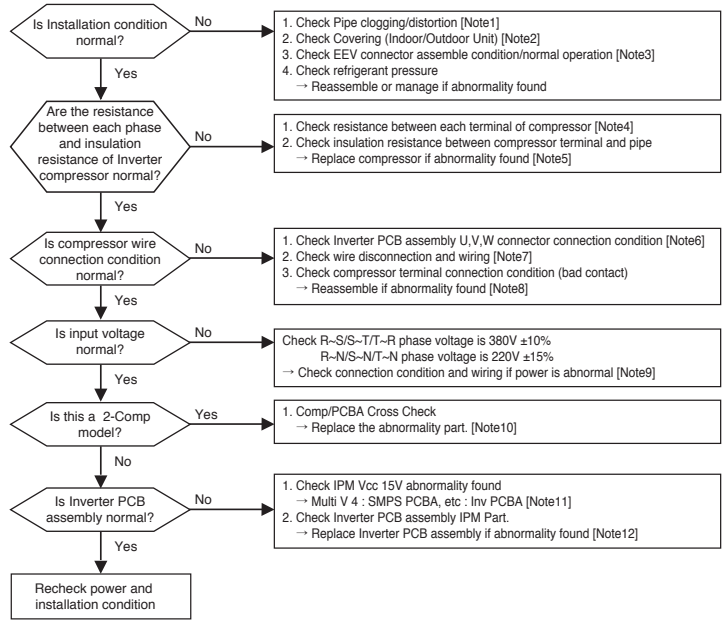
* Measuring input voltage

* Noise filter wiring

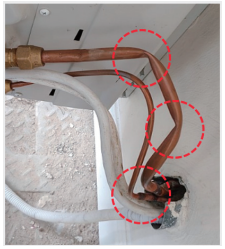


Error No.	Error Type	Error Point	Main Reasons
29*	Inverter compressor over current	Inverter compressor input current is over 30A	1. Overload operation (Pipe clogging/Covering/EEV defect/ Ref.overcharge) 2. Compressor damage(Insulation damage/Motor damage) 3. Input voltage low 4. ODU Inverter PCB assembly damage

■ Error Diagnosis and Countermeasure Flow Chart

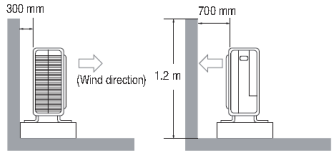
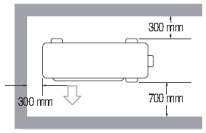


[Note 1] Check Pipe clogging/distortion



Check Pipe state

[Note 2] Check Covering (Indoor/Outdoor Unit)

When the front/back has a wall (1 side)	When the front/back/left/right have walls (3 sides)
	

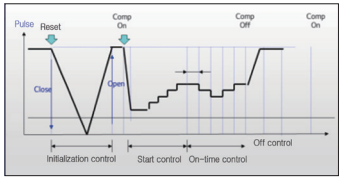
Cause of Trouble	Condition	Mechanism of Fault Generation
Whirlwind	Blocking of the front part of outdoor devices	Frequent turning-off of the compressor: Inflow of high-temperature air generated by outdoor fans into the air conditioner → Wrong influence to the system in over-load state
	Installation of outdoor devices in narrow space	
Shielding	Blocking of the lateral suction point on the wall of the outdoor devices. Foreign substances in the heat exchanger and obstacles in the surrounding.	Frequent turning-off of the compressor: Elevation of the pipe temperature due to reduced wind velocity → Wrong influence to the system in over-load state
Corrosion	Possible infiltration of moisture / highly humid area	Corrosion of heat exchanger: → Reduced operation efficiency → Transfer of troubles to other parts

※ It should be clear around Indoor/Outdoor unit

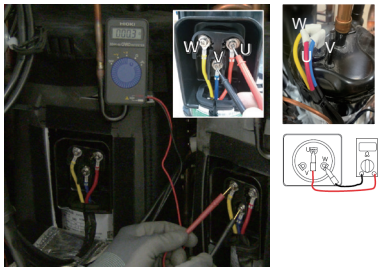
[Note 3] Check EEV connector assemble condition/normal operation

When you reset PCB power, initial EEV opens and closes again, and hold EEV valve on your hand, you should feel it vibrating. (EEV is abnormal if vibration is not felt)

* EEV operation



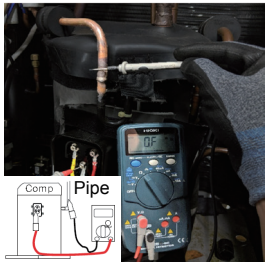
[Note 4] Check resistance between each terminal of compressor



Check the resistance of the U, V, W terminal as follows.
If the resistance values are the same (about 20% ↓), compressor can be judged as normal.
If the resistance values are the different (about 20% ↑), check it again after removing all wires.
Nevertheless, If the values are different, compressor can be judged as abnormal.

※ This picture is different according to the product.

[Note 5] Check insulation resistance between compressor terminal and pipe



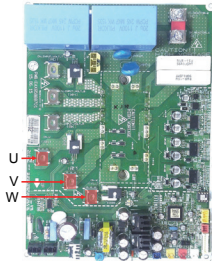
Measure insulation resistance between compressor piping and each terminal (U, V, W) (Normal : 1MΩ or more)

※ If compressor has not been running for a long time, it may be different from normal value.

※ Remove the U, V, W wire of the compressor when measuring resistance.

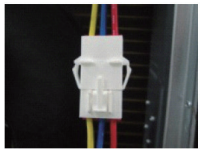
[Note 6] Check Inverter PCB assembly U,V,W connector connection condition

Multi V 4 / Pro / 5 (Screw Type)



[Note 7] Check wire disconnection and wiring

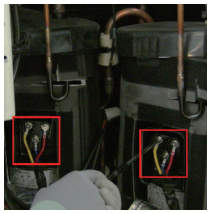
Comp Wire connection



Sometimes there is a Comp Wire connection usage model.

1. Check the status of Comp Wire connection.
2. Check that PCB wire and Compressor wire are same color.

[Note 8] Check compressor terminal connection condition (bad contact)

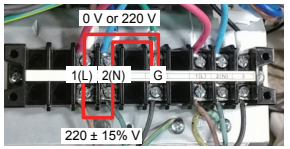


Check after power off Check condition and wiring of U, V, W cables.

※ This picture is different according to the product

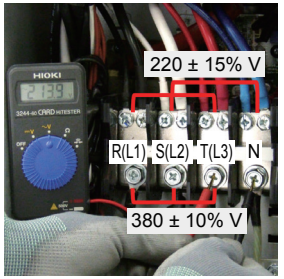
[Note 9] Check R/S/T/N Wiring Condition

1-Phase



1. Check the condition and wiring of the L/N/G cables.
2. Check that power is normally supplied to outdoor unit and then measure voltage between phases.
   L-N: 220 ± 15% V
   L-G, N-G: 0V or 220V

3-Phase

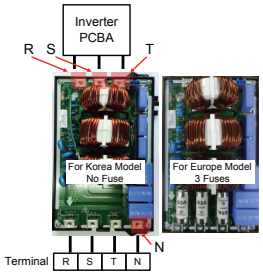


1. Check the condition and wiring of the R/S/T/N cables.
2. Check that power is normally supplied to outdoor unit and then measure voltage between phases.
   R-N, S-N, T-N: 220 ± 15% V
   R-S, R-T, T-S: 380 ± 10% V

Check input Voltage (3-Phase 4-Wire)

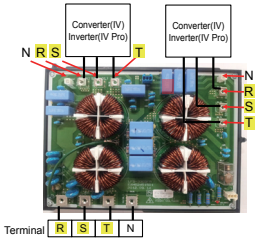
Defective parts : Fuse or Input voltage
(For 380V models, The Fuse is applied only to Europe.)

Multi V 5



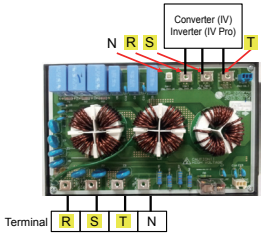
Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage (3-Phase /3-Wire 380V)	~ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		
Input Voltage (3-Phase /4-Wire 220V)	~ AC	R	N	220V ± 15%	
		S	N		
		T	N		

Multi V 4, Pro, 2 Inverter



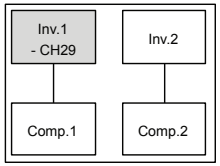
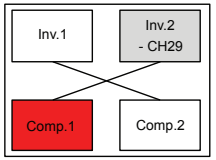
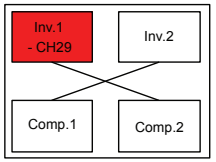
Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage	~ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		

Multi V 4, Pro, 1 Inverter



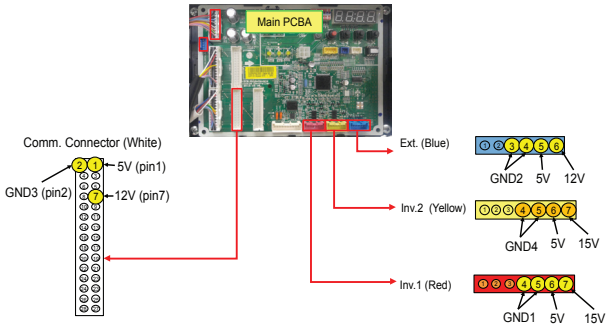
Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage	~ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		

[Note 10] Comp/PCBA Cross Check

General connection status	Status after cross-connection
Ex) Inv.1 CH29 display CH291 is displayed on the Main PCBA 	1) If Inv.2 CH29 display, Compessor1 is defective (CH292 is displayed on the Main PCBA)  2) If Inv.1 CH29 display consistently, Inv1 PCBA is defective (CH291 is displayed on the Main PCBA) 

※ Be sure to turn off the product and change the wiring.

[Note11] In case of power on: DC Voltage Check (SMPS Voltage, Multi V 4,Pro)



Before check DC voltage, Remove these three wire (Red, Yellow, Blue)

※ In case of abnormal voltage output, should replace SMPS PCBA (Don't replace Main PCBA.)
※ Precautions: DC Power & GND is different for each output.
Defective parts : SMPS PCBA

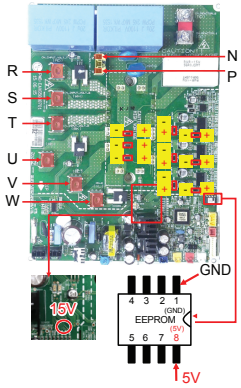
SMPS PCB should be checked when checking the error code below.

Possible error or failure because of SMPS PCB failure		SMPS output voltage (DC voltage)	Measure point (on Main PCB)			Measured value	
			Connector reference	Multi meter (+)	Multi meter (GND)	Normal	Abnormal
CH21	Inverter IPM Fault	Inverter 15V	Inverter1: CN_COMP1_RD Inverter2: CN_COMP2_YL	7 pin	4 or 5 pin	14.5V~15.5V	14.5V↓
CH23	Inverter DC Link low voltage						
CH106	Fan IPM Fault						
CH107	Fan DC Link low voltage						
CH194	Fan heatsink temperature sensor						
CH52	Communication between Main and Inverter	Inverter 5V		6 pin	4 or 5 pin	4.5V~5.5V	4.5V↓
CH105	Communication between Fan and Inverter						
CH05	Communication between ODU and IDU	Communication 5V or Main / External 5V	Comm. 5V: CN6~10_WH Main/External 5V: CN_EXT_BL	Comm. 5V: 1 pin Main/External 5V: 5 pin	Comm. 5V: 2 pin Main/External 5V: 3 or 4 pin	4.5V~5.5V	4.5V↓
CH53	Communication between ODU and IDU						
CH204	Communication between ODU and HR Unit						
CH237	Communication between 485 modems						
CH242	Communication between ODU and Central controller						
No central controller (AC Ez) power supply		Communication 12V	Comm. 5V: CN6~10_WH	7 pin	2 pin	11.5V~12.5V	11.5V↓
Valve and EEV do not work. Abnormal cooling/heating and possible high/low pressure error		Main / External 12V	Main/External 5V: CN_EXT_BL	6 pin	3 or 4 pin	11.5V~12.5V	11.5V↓

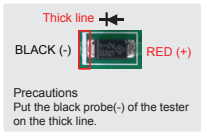
[Note 12] Check Inverter PCB assembly IPM normality

In case of power off: Check PCBA

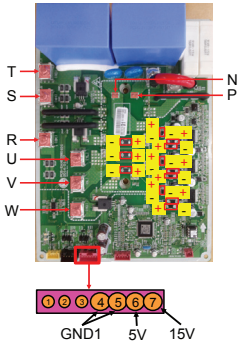
■ Inverter: Multi V 5

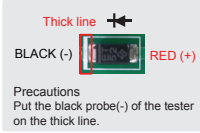


Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IGBTM	⊣◆⊢	P	U	0.3V ~ 0.7 V	Non-normal
			V		
			W		
		N	U		
			V		
			W		
		P	R		
			S		
			T		
		N	R		
			S		
			T		
Diode (12EA)	⊣◆⊢	-	+	0.3 ~ 0.7 V	Non-normal



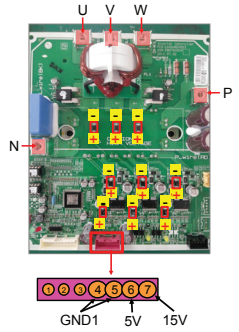
■ Inverter: Multi V Pro

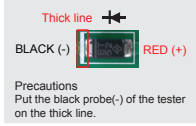




Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IGBTM	⊣◆⊢	P	U	0.3V ~ 0.7 V	Non-normal
			V		
			W		
		N	U		
			V		
			W		
		P	R		
			S		
			T		
		N	R		
			S		
			T		
Diode (12EA)	⊣◆⊢	-	+	0.3 ~ 0.7 V	Non-normal

■ Inverter: Multi V 4

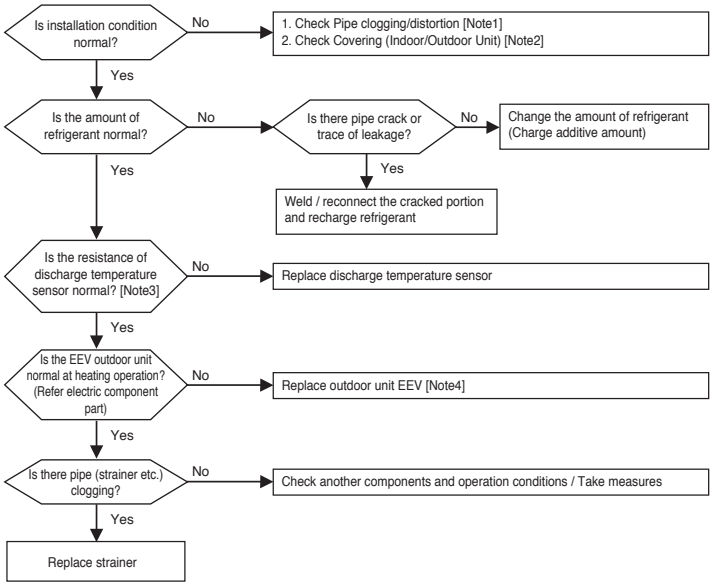




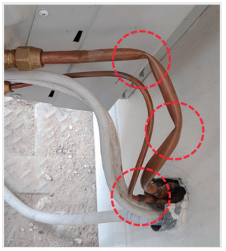
Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IGBTM	⊣◆⊢	P	U	0.3V ~ 0.7 V	Non-normal
			V		
			W		
		N	U		
			V		
			W		
Diode (9EA)	⊣◆⊢	-	+	0.3 ~ 0.7 V	Non-normal

Error No.	Error Type	Error Point	Main Reasons
32*	Over-increase discharge temperature of inverter compressor 1 at main outdoor unit	Compressor is off because of over-increase discharge temperature of inverter compressor 1	1. Temperature sensor defect of inverter compressor 1 discharge pipe 2. Refrigerant shortage / leak 3. EEV defect 4. Liquid injection valve defect
33*	Over-increase discharge temperature of inverter compressor 2 at main outdoor unit	Compressor is off because of over-increase discharge temperature of inverter compressor 2	1. Temperature sensor defect of inverter compressor 2 discharge pipe 2. Refrigerant shortage / leak 3. EEV defect 4. Liquid injection valve defect

■ Error Diagnosis and Countermeasure Flow Chart

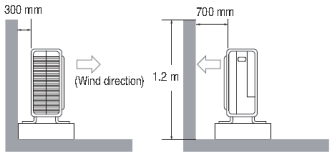
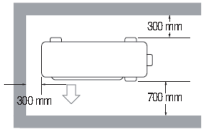


[Note 1] Check Pipe clogging/distortion



Check Pipe state

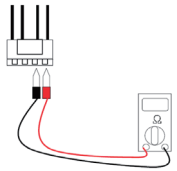
[Note 2] Check Covering (Indoor/Outdoor Unit)

When the front/back has a wall (1 side)	When the front/back/left/right have walls (3 sides)
	

Cause of Trouble	Condition	Mechanism of Fault Generation
Whirlwind	Blocking of the front part of outdoor devices	Frequent turning-off of the compressor: Inflow of high-temperature air generated by outdoor fans into the air conditioner → Wrong influence to the system in over-load state
	Installation of outdoor devices in narrow space	
Shielding	Blocking of the lateral suction point on the wall of the outdoor devices. Foreign substances in the heat exchanger and obstacles in the surrounding.	Frequent turning-off of the compressor: Elevation of the pipe temperature due to reduced wind velocity → Wrong influence to the system in over-load state
Corrosion	Possible infiltration of moisture / highly humid area	Corrosion of heat exchanger: → Reduced operation efficiency → Transfer of troubles to other parts

[Note 3] Check resistance value of sensor

If the resistance value of the temperature sensor changes according to temperature, and the following resistance values are displayed based on the current temperature, it is normal. (±10% error)



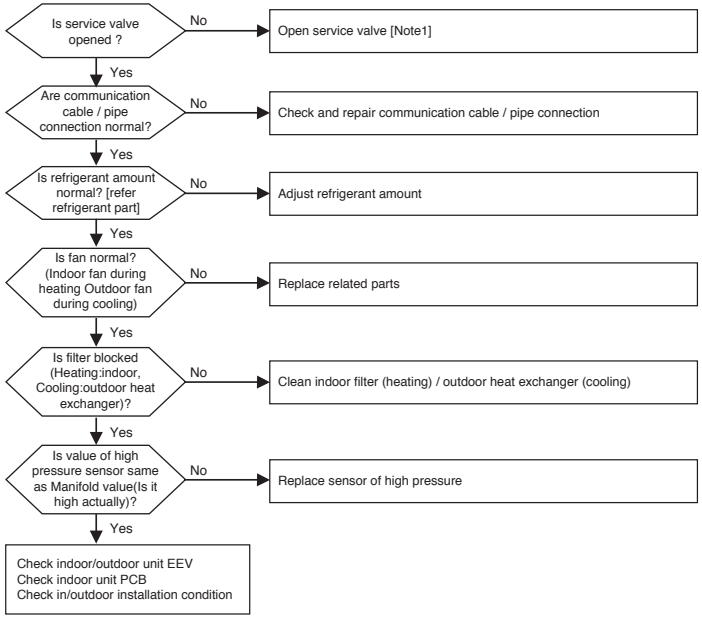
Sensor	Resistance value (±10%)			
	10°C (50°F)	25°C (77°F)	50°C (122°F)	100°C (212°F)
Discharge temperature sensor	362 kΩ	200 kΩ	82 kΩ	18.5 kΩ

[Note 4] Check EEV connector assemble condition/normal operation

When you reset PCB power, initial EEV opens and closes again, and hold EEV valve on your hand, you should feel it vibrating.
(EEV is abnormal if vibration is not felt)

Error No.	Error Type	Error Point	Main Reasons
34*	Over-increase of discharge pressure of compressor	Error happens because of 10 times successive compressor off due to overincrease of high pressure by high pressure sensor	1. Defect of high pressure sensor 2. Defect of indoor or outdoor unit fan 3. Deformation because of damage of refrigerant pipe 4. Over-charged refrigerant 5. Defective indoor / outdoor unit EEV 6. When blocked - Outdoor unit is blocked during cooling - Indoor unit filter is blocked during heating 7. SVC valve is clogged 8. PCB defect of outdoor unit 9. Indoor unit's pipe temperature defect 10. Indoor unit pipe temperature sensor defect

■ Error Diagnosis and Countermeasure Flow Chart



[Note 1] Check service valve

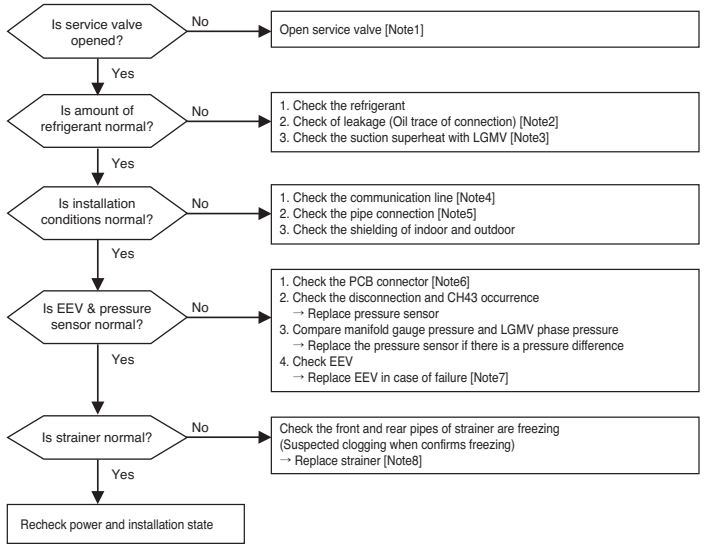
Open the valve if service valve is closed.

Closed

Open

Error No.	Error Type	Error Point	Main Reasons
35*	Excessive drop of discharge pressure of compressor	Error happens because of 10 times successive compressor off due to excessive drop of low pressure by the low pressure sensor	1. Defective low pressure sensor 2. Defective outdoor/indoor unit fan 3. Refrigerant shortage/leakage 4. Deformation because of damage of refrigerant pipe 5. Defective indoor / outdoor unit EEV 6. Covering / clogging (outdoor unit covering during the cooling mode/ indoor unit filter clogging during heating mode) 7. SVC valve clogging 8. Defective outdoor unit PCB 9. Defective indoor unit pipe sensor

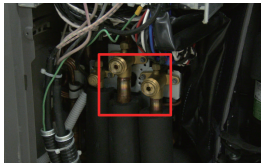
■ Error Diagnosis and Countermeasure Flow Chart

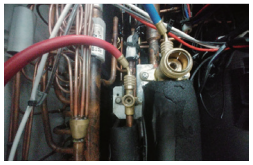


[Note 1] Check if SVC Valve is open

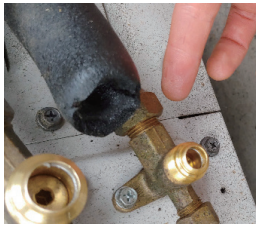
If the ring is about 2 cm inside the pipe, SVC valve is closed.
Turn counterclockwise to open SVC valve.

※ These valves are fragile and break easily.

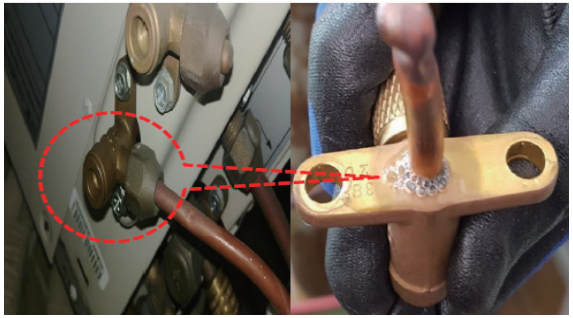




[Note 2] Check the refrigerant leakage



There is a trace of compressor oil stain on the area where the refrigerant has leaked.



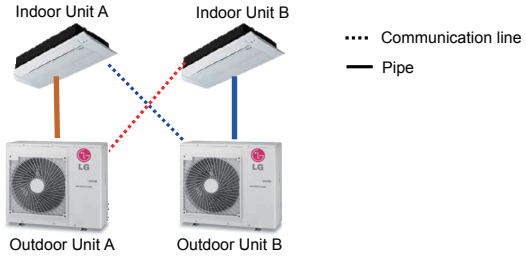
[Note 3] Check the Indoor superheat with LGMV

• Refrigerant shortage: Temperature difference between Eva in and Eva out (Indoor superheat) is large

[Note 4] Check the communication line

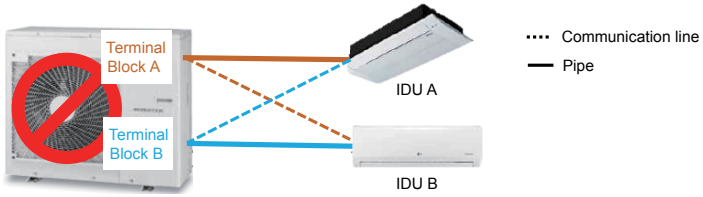
Incorrect Installation Cases (Cross-connect)

1. Single Model (Install multiple Single products on one site)
   When the communication line and connection piping are installed incorrectly as above.
   (The piping is connected to outdoor unit A, and the communication line is connected to outdoor unit B)
   - When IDU A is turned on, the refrigerant goes to IDU and IDU A occurs the lack of cooling.
   - IDU B occurs CH35 due to circulation of the refrigerant only when the indoor fan is not operating.



2. Multi Model

   When A is turned on, the refrigerant goes to B and A occurs the lack of cooling.
   IDU B occurs CH35 due to circulation of the refrigerant only when the indoor fan is not operating.

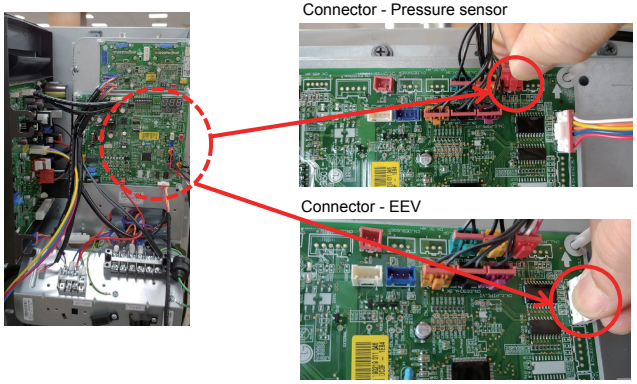


[Note 5] Check Pipe clogging/distortion

Check Pipe state

[Note 6] Check the PCB connector

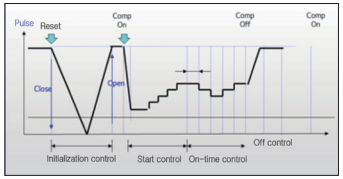
※ C/Box assy may vary by model



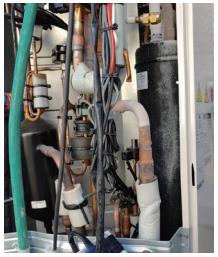
[Note 7] Check EEV connector assemble condition/normal operation

When you reset PCB power, initial EEV opens and closes again, and hold EEV valve on your hand, you should feel it vibrating. (EEV is abnormal if vibration is not felt)

* EEV operation



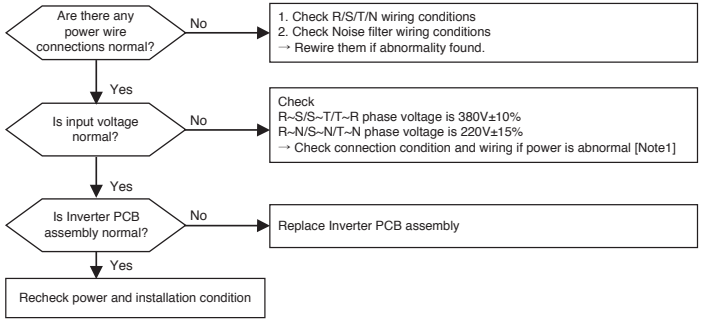
[Note 8] Check if pipe is freezing



Check if the front and rear pipes of strainer are freezing

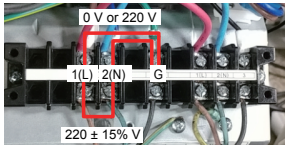
Error No.	Error Type	Error Point	Main Reasons
40*	Inverter compressor CT sensor error	Micom input voltage isn't within 2.5V ±0.3V at initial state of power supply	1. Input voltage abnormal (T-N) 2. DC power part damage (DC 5V) 3. Outdoor unit's inverter PCB damage (CT sensing part)

■ Error Diagnosis and Countermeasure Flow Chart



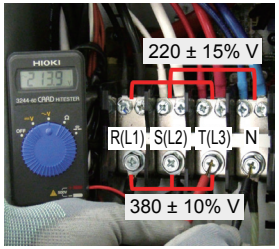
[Note 1] Check R/S/T/N Wiring Condition

1-Phase



1. Check the condition and wiring of the L/N/G cables.
2. Check that power is normally supplied to outdoor unit and then measure voltage between phases.
   L-N: 220 ± 15% V
   L-G, N-G: 0V or 220V

3-Phase

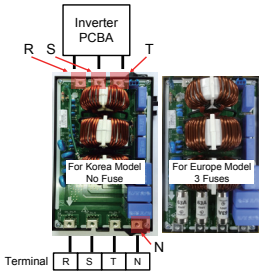


1. Check the condition and wiring of the R/S/T/N cables.
2. Check that power is normally supplied to outdoor unit and then measure voltage between phases.
   R-N, S-N, T-N: 220 ± 15% V
   R-S, R-T, T-S: 380 ± 10% V

Check input Voltage (3-Phase 4-Wire)

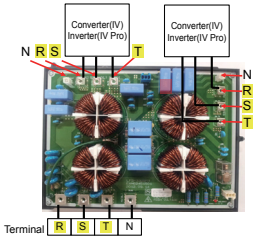
Defective parts : Fuse or Input voltage
(For 380V models, The Fuse is applied only to Europe.)

Multi V 5



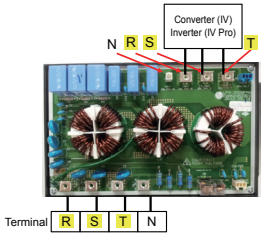
Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage (3-Phase /3-Wire 380V)	~ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		
Input Voltage (3-Phase /4-Wire 220V)	~ AC	R	N	220V ± 15%	
		S	N		
		T	N		

Multi V 4, Pro, 2 Inverter



Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage	~ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		

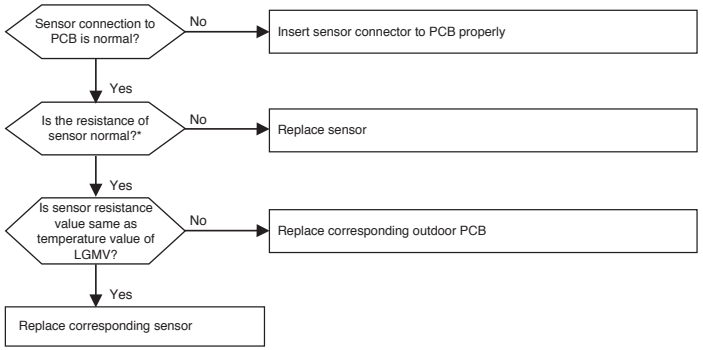
Multi V 4, Pro, 1 Inverter



Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage	~ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		

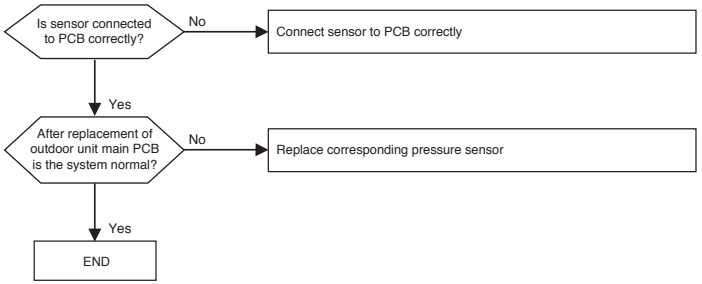
Error No.	Error Type	Error Point	Main Reasons
41*	Compressor1 discharge pipe temperature sensor error	Sensor measurement value is abnormal (Open/Short)	1. Defective connection of the compressor1 discharge pipe temperature sensor 2. Defective discharge pipe compressor sensor of the compressor1 (open/short) 3. Defective outdoor PCB
47*	Compressor2 discharge pipe temperature sensor error	Sensor measurement value is abnormal (Open/Short)	1. Defective connection of the compressor1 discharge pipe temperature sensor 2. Defective discharge pipe compressor sensor of the compressor1 (open/short) 3. Defective outdoor PCB

■ Error Diagnosis and Countermeasure Flow Chart

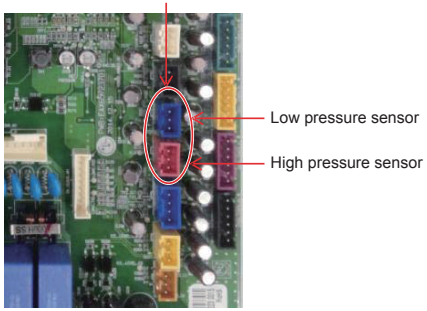


Error No.	Error Type	Error Point	Main Reasons
42*	Sensor error of low pressure	Abnormal value of sensor (Open/Short)	1. Bad connection of low pressure sensor connector 2. Defect of low pressure sensor connector (Open/Short) 3. Defect of outdoor PCB
43*	Sensor error of high pressure	Abnormal value of sensor (Open/Short)	1. Bad connection of high pressure sensor connector 2. Defect of high pressure sensor connector (Open/Short) 3. Defect of outdoor PCB

■ Error Diagnosis and Countermeasure Flow Chart



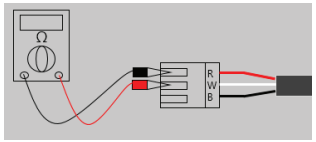
Pressure sensor connector



* This picture is different by each model or PCB drive
- Check Pressure sensor connecting state and insert properly (Refer to circuit diagram)

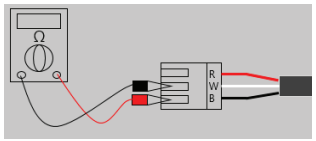
■ Check resistance value of sensor

[Measure the resistance value of pressure sensor terminal red(R) and white(W)]



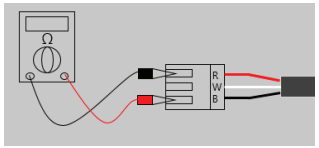
If the resistance value between red(R) and white(W) is measured several MΩ, Sensor is judged to normal.

[Measure the resistance value of pressure sensor terminal white(W) and black(B)]



If the resistance value between white(W) and black(B) is measured several MΩ, Sensor is judged to normal.

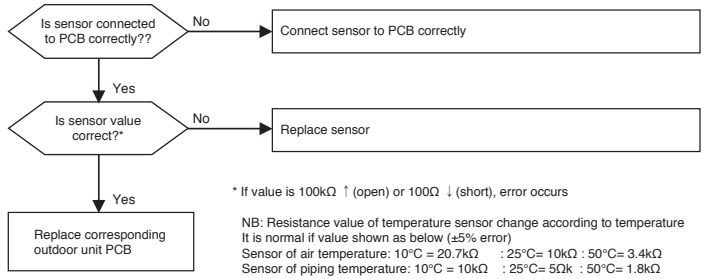
[Measure the resistance value of pressure sensor terminal red(R) and black(B)]



If the resistance value between red(R) and black(B) is measured about 100 Ω(±10%), Sensor is judged to normal.

Error No.	Error Type	Error Point	Main Reasons
44*	Sensor error of outdoor air temperature	Abnormal value of sensor (Open/Short)	1. Bad connection of air temperature connector 2. Defect of air temperature connector(Open/Short) 3. Defect of outdoor PCB
45*	Piping temperature sensor error of heat exchanger in master & slave outdoor unit heat exchanger (A,B)	Abnormal value of sensor (Open/Short)	1. Bad connection of air temperature connector 2. Defect of air temperature connector(Open/Short) 3. Defect of outdoor PCB
46*	Compressor suction temperature sensor error	Abnormal value of sensor (Open/Short)	1. Bad connection of air temperature connector 2. Defect of air temperature connector(Open/Short) 3. Defect of outdoor PCB
49*	Outdoor Unit IPM Temperature Sensor Fault	Outdoor Unit IGBTM Temperature Sensor Open or Short	1. Bad connection of air temperature connector 2. Defect of air temperature connector(Open/Short) 3. Defect of outdoor PCB

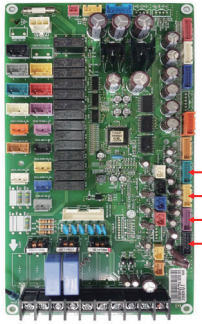
■ Error Diagnosis and Countermeasure Flow Chart



Error No.	Error Type	Error Point	Main Reasons
153*	Outdoor Unit Upper Heat Exchanger Temperature Sensor Fault	Outdoor Unit Upper Heat Exchanger Temperature Sensor open or short	1. Temperature Sensor Connecting Fault 2. Temperature Sensor(Open/Short) 3. Main PCB Fault
154*	Outdoor Unit Low Heat Exchanger Temperature Sensor Fault	Outdoor Unit Low Heat Exchanger Temperature Sensor open or short	1. Temperature Sensor Connecting Fault 2. Temperature Sensor(Open/Short) 3. Main PCB Fault

■ Check the terminal

Multi V 5

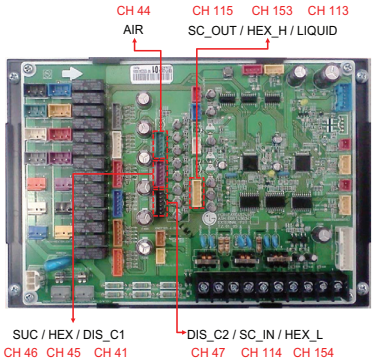


Error No. (Pin No.)
- 44(5,6)
- 113(1,2) 153(3,4) 115(5,6)
- 41(1,2) 45(3,4) 46(5,6)
- 154(1,2) 114(3,4) 47(5,6)

Check the connector connection (external PCB)

Error code	Type	Ω(25°C)
CH 41, 47	D-Pipe temp	200kΩ
CH 44	Air temp	10kΩ
CH 45, 46, 113, 114, 115, 153, 154	Pipe temp	5kΩ

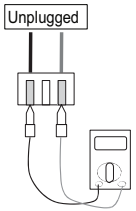
Multi V 4, pro



Check the connector connection (external PCB)

Error code	Type	Ω(25°C)
CH 41, 47	D-Pipe temp	200kΩ
CH 44	Air temp	10kΩ
CH 45, 46, 113, 114, 115, 153, 154	Pipe temp	5kΩ

■ Check the resistance

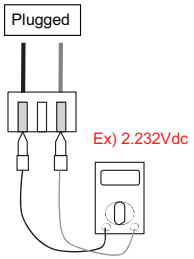


Check the resistance value of each sensor
If the values are different from the table, replace the sensor.

Temperature	Air	Pipe	D-Pipe
	Resistance	Resistance	Resistance
10°C(50°F)	20.7kΩ	10kΩ	362kΩ
25°C(77°F)	10kΩ	5kΩ	200kΩ
50°C(122°F)	3.4kΩ	1.8kΩ	82kΩ

* Check the following pages for resistance values of all temperatures

■ Check the voltage



Check temperature using measured voltage
Ex) If measured pipe sensor voltage is 2.232Vdc, temperature is 25°C.

Sensor Resistance Table

Pipe Temp

Temp (°C)	Resistance (kΩ)	Volt (V)
-30	102.17	4.714
-25	73.49	4.611
-20	53.55	4.481
-15	39.5	4.322
-10	29.48	4.131
-5	22.24	3.91
0	16.95	3.661
5	13.05	3.389
10	10.14	3.102
15	7.94	2.808
20	6.28	2.515
25	5	2.232
30	4.01	1.965
35	3.24	1.717
40	2.64	1.493
45	2.16	1.293
50	1.78	1.116
55	1.48	0.962
60	1.23	0.828
65	1.03	0.714
70	0.87	0.615
75	0.74	0.531
80	0.63	0.459
85	0.54	0.397
90	0.46	0.345
95	0.4	0.3
100	0.34	0.262

Air Temp

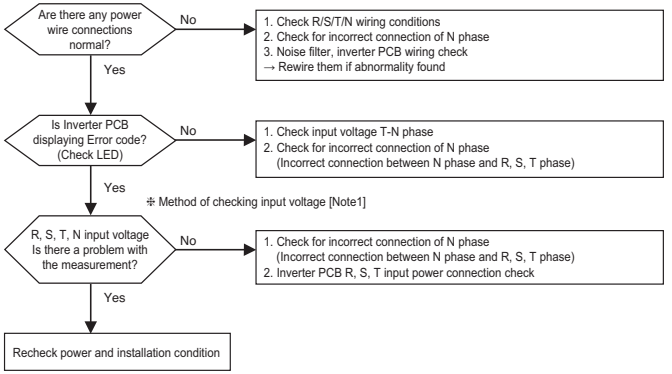
Temp (°C)	Resistance (kΩ)	Volt (V)
-30	204.35	4.72
-25	146.97	4.62
-20	107.09	4.492
-15	79	4.336
-10	58.95	4.149
-5	44.47	3.931
0	33.9	3.685
5	26.09	3.416
10	20.27	3.131
15	15.89	2.838
20	12.55	2.546
25	10	2.262
30	8.03	1.994
35	6.49	1.745
40	5.28	1.519
45	4.32	1.316
50	3.56	1.137
55	2.95	0.981
60	2.46	0.846
65	2.06	0.729
70	1.74	0.628
75	1.47	0.542
80	1.25	0.469
85	1.07	0.406
90	0.92	0.353
95	0.79	0.307
100	0.68	0.268

D-Pipe Temp

Temp (°C)	Resistance (kΩ)	Volt (V)
-30	2845.99	4.969
0	585.66	4.851
5	465.17	4.814
10	372.49	4.77
15	300.58	4.717
20	244.33	4.657
25	200	4.587
30	164.79	4.508
35	136.64	4.418
40	113.98	4.318
45	95.62	4.208
50	80.65	4.088
55	68.38	3.958
60	58.27	3.82
65	49.88	3.674
70	42.9	3.522
75	37.05	3.365
80	32.14	3.205
85	27.99	3.043
90	24.46	2.88
95	21.46	2.719
100	18.89	2.561
110	14.79	2.255
120	11.72	1.972
130	9.4	1.716
140	7.62	1.487
150	6.24	1.287

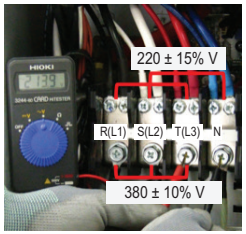
Error No.	Error Type	Error Point	Main Reasons
50*	ODU 3phase power omission error	Omitting one or more of R,S,T input power	1. Input Voltage abnormal (R,S,T,N) 2. Check power Line connection condition 3. Main PCB damage 4. Inverter PCB input current sensor fault

■ Error Diagnosis and Countermeasure Flow Chart

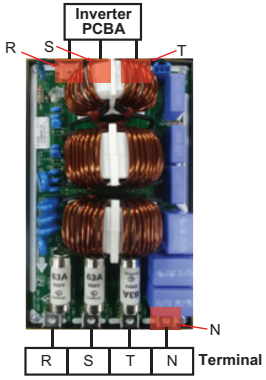


[Note1] Check R/S/T/N Wiring Condition

3-Phase 4 wire (380V)



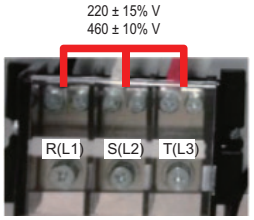
1. Check the condition and wiring of the R/S/T/N cables.
2. Check that power is normally supplied to outdoor unit and then measure voltage between phases.



Defective parts : Fuse or Input voltage

Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage (3-Phase / 3-Wire 380V)	~ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		
Input Voltage (3-Phase / 4-Wire 220V)	~ AC	R	N	220V ± 15%	
		S	N		
		T	N		

3-Phase 3 wire (220V or 460V)



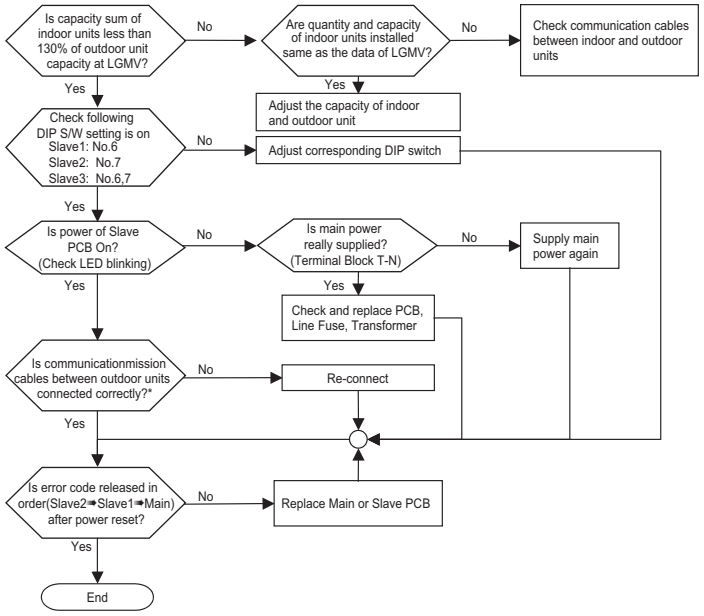
1. Check the condition and wiring of the R/S/T/ cables.
2. Check that power is normally supplied to outdoor unit and then measure voltage between phases.

Defective parts : Fuse or Input voltage

Rated input voltage	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
220V	~ AC	R	S	220V ± 15%	Non-normal
		R	T		
		S	T		
460V	~ AC	R	S	460V ± 10%	
		R	T		
		T	T		

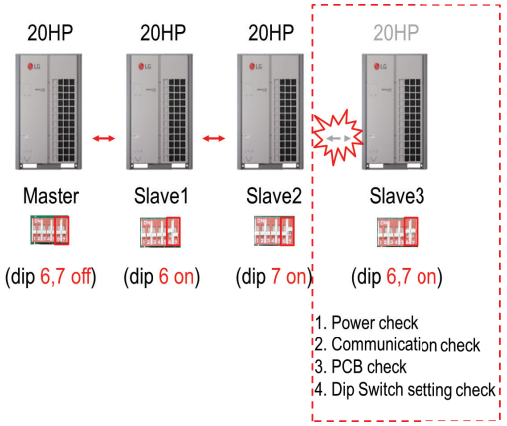
Error No.	Error Type	Error Point	Main Reasons
51*	Over-Capacity (Sum of indoor unit capacity is more than outdoor capacity)	Prevention of installation of indoor devices exceed-ing the capacity of outdoor device	1. More than the combination ratio of the outdoor unit capacity 2. Wrong connection of communication cable/ piping 3. Control error of slave outdoor unit Dip switch 4. Power supply defect of slave unit PCB 5. Defect of outdoor unit PCB

■ Error diagnosis and countermeasure flow chart



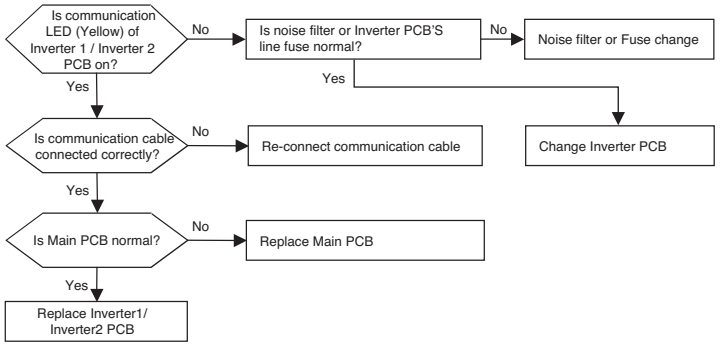
* In order to check communication cables between outdoor units,
check in order as below : PCB connectors ➡ terminal block ➡ communication cables

※ Master unit calculates sum of ODU capacity.
But if there is no communicating between ODUs or dip switch setting error, total ODU capacity is less than designed.

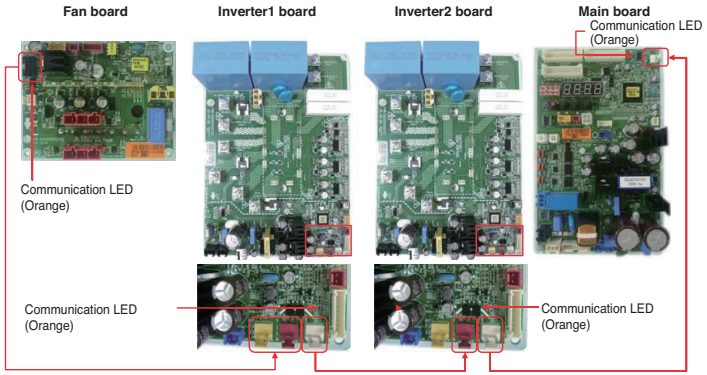


Error No.	Error Type	Error Point	Main Reasons
52*	Communication error between (Inverter1/ Inverter2 PCB → Main PCB)	Main PCB of Master unit can't receive signal from Inverter1/ Inverter2 PCB	1. Power cable or communication cable is not connected 2. Defect of outdoor Main PCB or Comp1/ Comp2 PCB

■ Error diagnosis and countermeasure flow chart



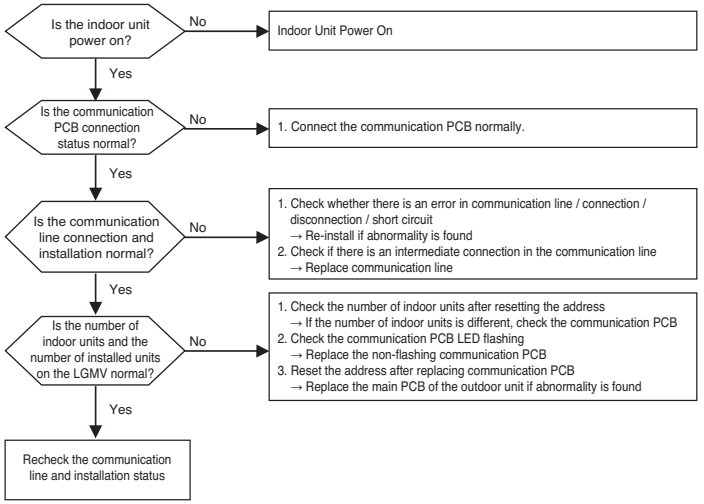
* The method of checking Main PCB and Inverter 1 / Inverter 2 PCB
(If normal, communication LED blinks)



- Re-connect communication cable if abnormality found

Error No.	Error Type	Error Point	Main Reasons
53*	Communication error(IDU Main PCB → ODU Main PCB)	When the master outdoor unit main PCB does not receive the indoor unit signal	1. Communication line not connected 2. Communication line disconnection or short circuit 3. Indoor unit power off 4. Outdoor main PCB and Indoor PCB is abnormal 5. Intermediate connection of communication line (not soldered)

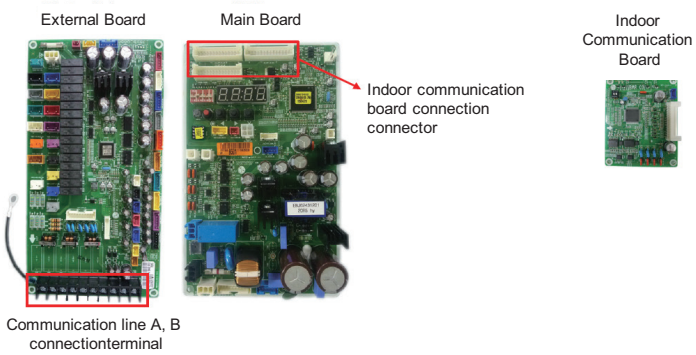
■ Error diagnosis and countermeasure flow chart



In the case of CH53, most of the errors are associated with indoor power failure and CH05. So it do not actually affect the operation of the indoor unit itself.
Therefore, you can check in the same way as CH05, and refer to as below with the above flowchart.

- If the number of indoor units checked when setting Auto-addressing is the same as the number of indoor units checked when checking LGMV After checking the number of indoor unit communication, check that the LED of the corresponding indoor unit communication PCB is blinking. If it doesn't blink, you should consider replacing the communication PCB.
- If the number of indoor units checked when setting Auto-addressing differs from the number of indoor units checked when checking LGMV
  ① Check if the power is supplied to the indoor unit.
  ② If there is no problem with the power of all indoor units, reset Auto-addressing
  ③ If the address is different even after setting Auto-addressing, consider replacing the indoor unit PCB or communication PCB for which the address is not set.

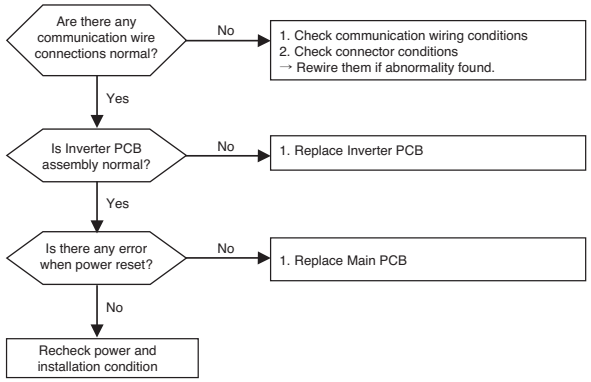
When changing indoor PCB, it is necessary to set Auto-addressing, and if there is a central controller, it is necessary to input the central control address of the indoor unit.

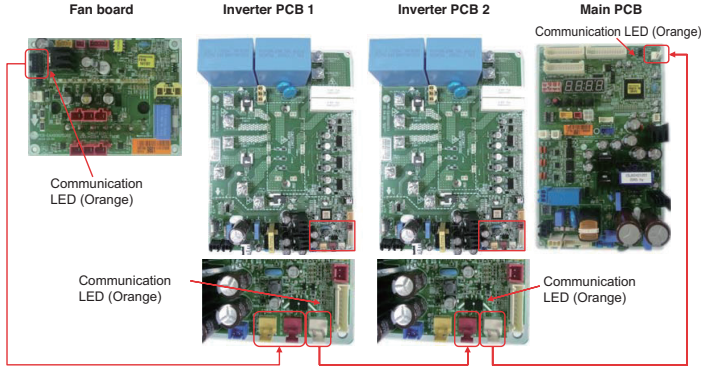


Wiring Fault Case

Error No.	Error Type	Error Point	Main Reasons
57*	Communication error : Main PCB → Inverter PCB	Failing to receive inverter signal at main PCB of Outdoor Unit	1. Bad Connection Between Inverter PCB and Comp PCB 2. Communication Wire Noise Effect 3. Outdoor unit Main PCB Damage 4. Outdoor unit Inverter PCB Damage

■ Error diagnosis and countermeasure flow chart

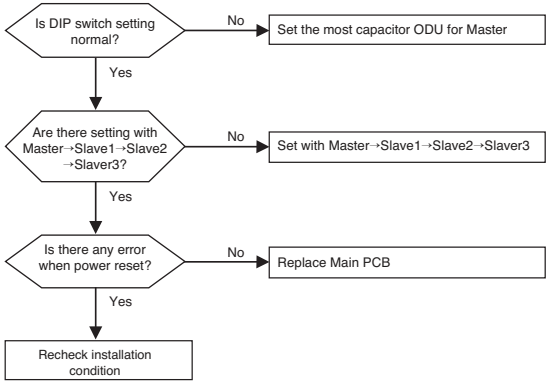




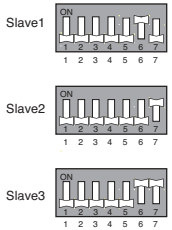
- Re-connect communication cable if abnormality found

Error No.	Error Type	Error Point	Main Reasons
59*	Series combination Error	Series Installation of Slave Outdoor Unit Larger Than Master Capacity	DIP Switch Setting Error

■ Error diagnosis and countermeasure flow chart



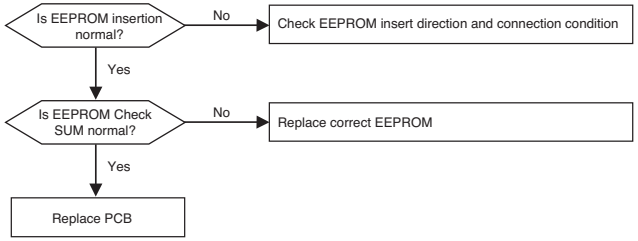
*** DIP Switch Setting**



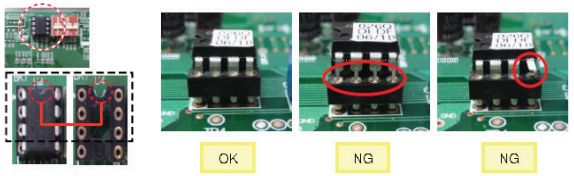
Error No.	Error Type	Error Point	Main Reasons
60*	Inverter PCB EEPROM error	EEPROM Access error and Check SUM error	1. EEPROM contact defect/wrong insertion 2. Different EEPROM Version 3. ODU Inverter PCB assembly damage

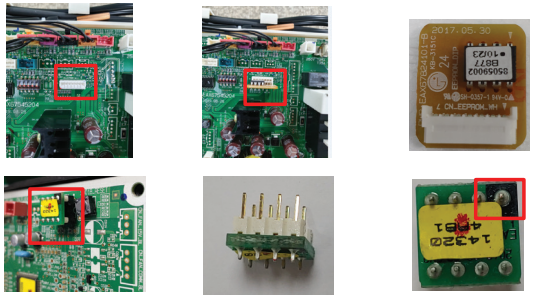
※ EEPROM : IC containing the operation data suitable to the product

■ Error diagnosis and countermeasure flow chart



Check EEPROM insert direction and connection condition



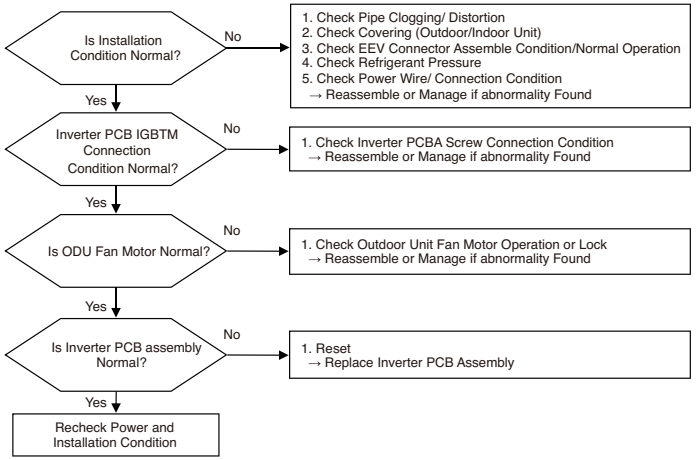


* EEPROM is different as each model.

1. Check EEPROM Indication whether the marking line matches the direction of EEPROM inserted into the socket.
2. Make sure that the EEPROM assembly is in close contact (non-contact)
3. Make sure the EEPROM Lead pin is pulled out of the socket

Error No.	Error Type	Error Point	Main Reasons
62*	Inverter PCB Heat-sink Temperature High	Heatsink tempera-ture is over standard value. (Value is different as each model)	1. Inverter PCB IGBTM Connection Condition Abnormal 2. Outdoor Unit Fan Motor Operation Abnormal 3. Outdoor Unit Inverter PCB Assembly Defect 4. Overload Operation (Pipe Clogging/ Covering/ EEV Defect/Ref. Overcharge)

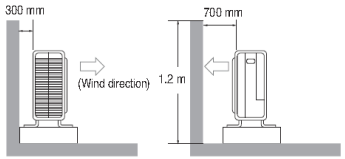
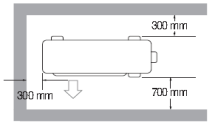
■ Error diagnosis and countermeasure flow chart



Check Pipe clogging/distortion

Check Pipe state

Check Covering (Indoor/Outdoor Unit)

When the front/back has a wall (1 side)	When the front/back/left/right have walls (3 sides)
	

Cause of Trouble	Condition	Mechanism of Fault Generation
Whirlwind	Blocking of the front part of out-door devices	Frequent turning-off of the compressor: Inflow of high-temperature air generated by outdoor fans into the air conditioner → Wrong influence to the system in over-load state
	Installation of outdoor devices in narrow space	
Shielding	Blocking of the lateral suction point on the wall of the outdoor devices Foreign substances in the heat exchanger and obstacles in the surrounding	Frequent turning-off of the compressor: Elevation of the pipe temperature due to reduced wind velocity → Wrong influence to the system in over-load state
Corrosion	Possible infiltration of moisture / highly humid area	Corrosion of heat exchanger → Reduced operation efficiency → Transfer of troubles to other parts

It should be clear around Indoor/Outdoor unit

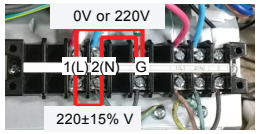
Check EEV connector assemble condition/normal operation

When the front/back has a wall (1 side)

When you reset PCB power, initial EEV opens and closes again, and hold EEV valve on your hand, you should feel it vibrating.

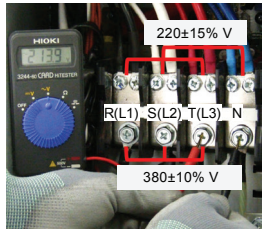
Check R/S/T/N Wiring Condition

1-Phase



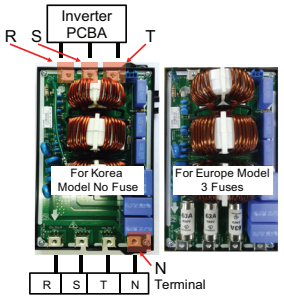
1. Check the condition and wiring of the L/N/G cables.
2. Check that power is normally supplied to outdoor unit and then measure voltage between phases.
   L-N : 220±15% V / L-G ,N-G :0V or 220V

3-Phase



1. Check the condition and wiring of the R/S/T/N cables.
2. Check that power is normally supplied to outdoor unit and then measure voltage between phases.
   R-N, S-N, T-N : 220±15% V
   R-S, R-T, T-S : 380±10% V

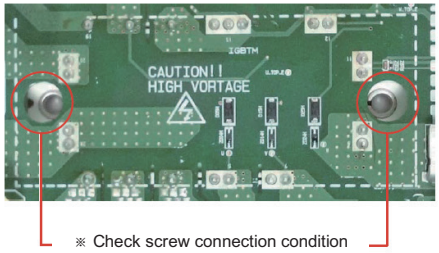
Check input Voltage (3-Phase/4-Wire, Multi V 5)



Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage (3-Phase / 3-Wire 380V)	~ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		
Input Voltage (3-Phase / 4-Wire 220V)	~ AC	R	N	220V ± 15%	
		S	N		
		T	N		

Defective parts : Fuse or Input voltage
(For 380V models, The Fuse is applied only to Europe.)

Check inverter PCBA screw connection condition

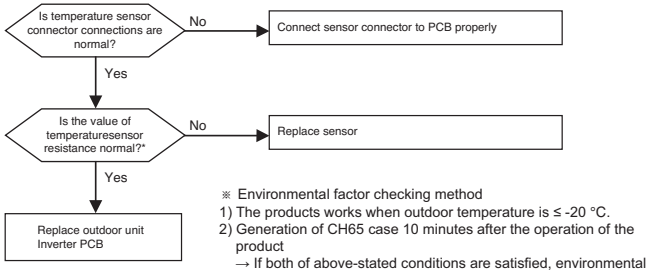


※ Check screw connection condition

Reassemble or manage if abnormality found

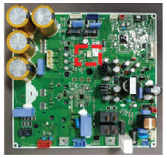
Error No.	Error Type	Error Point	Main Reasons
65*	Inverter PCB Power Module sensor error	Abnormal sensor resistance value (Open/Short)	1. Defective temperature sensor connection 2. Defective temperature sensor(Open / Short) 3. Defective outdoor unit PCB

■ Error diagnosis and countermeasure flow chart

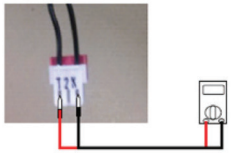


※ Environmental factor checking method
1) The products works when outdoor temperature is ≤ -20 °C.
2) Generation of CH65 case 10 minutes after the operation of the product
→ If both of above-stated conditions are satisfied, environmental factor is the cause.

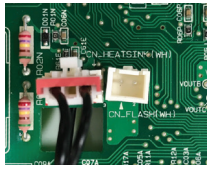
Check resistance value of sensor



[Detail]
CN_HEATSINK_WH
U3 Chassis, 6kW Drive



[Detail]
CN_HEATSINK(WH)
U4 Chassis, 4kW Drive

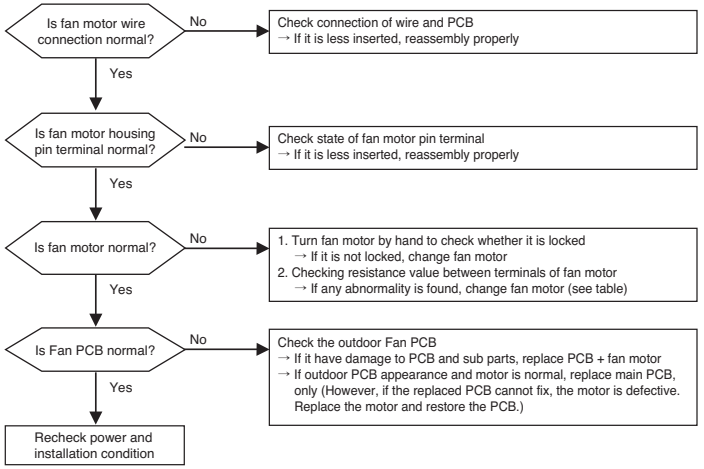


* In case the value is more than 100 kΩ (open) or less than 100 Ω (short), Error occurs

Sensor checking method
1. Power off
2. Measure the resistance using a tester
3. Measure the resistance Heat sink Temp point (based on 25kΩ, 10kΩ ± 5%)

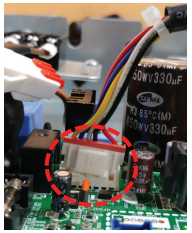
Error No.	Error Type	Error Point	Main Reasons
67*	Fan Lock Error	Fan RPM is 10RPM or less for 5 sec. when ODU fan starts or 40 RPM or less after fan starting.	1. Fan motor defect / assembly condition abnormal 2. Wrong connection of fan motor connector (U,V,W output) 3. Reversing rotation after RPM target apply 4. Fan PCB assembly defect 5. Fan lock by Heavy Snowfall.

■ Error diagnosis and countermeasure flow chart



Check connection of wire and PCB

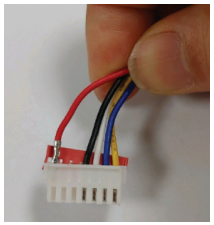
Less inserted



Correct insertion

If it is less inserted, reassembly properly

Less inserted



If it is less inserted, reassembly properly.
When the pin terminal shape is defective, the motor should be replaced.

Turn fan motor by hand to check whether it is locked

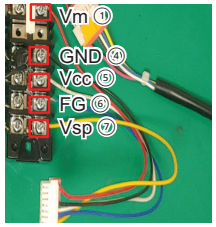
If it is not locked, change fan motor

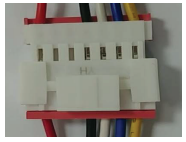
Checking resistance value between terminals of fan motor

How to measure resistance between terminals

1) Black(-) : ④ Connect

2) Red: (+): ①,⑤,⑥,⑦ Each connect

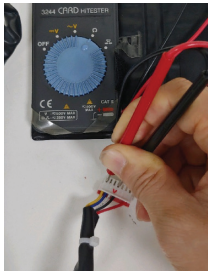




① ④⑤⑥⑦

Measure	Tester	
	+ (Red)	- (Black)
Vm	①	④
Vcc	⑤	④
FG	⑥	④
Vsp	⑦	④

* When measuring resistance value, black No. 4 pin is always measured as (-) because the value is different according to +-direction.



If any abnormality is found, change fan motor (see table)

Checking resistance value between terminals of fan motor

Table 1. Resistance value of BLDC Motor terminal (PCB internal type, 5 wires)

※ Since the precise resistance value is not measured or continuously fluctuates due to the fine movement of the fan, when measuring the resistance of the fan, measure it after removing the fan or after restraining (not moving) the fan.

[Unit kΩ] Resistance value ± 20%

Motor P/No.	Vm(+)~GND(-) ① - ④	Vcc(+)~GND(-) ⑤ - ④	FG(+)~GND(-) ⑥ - ④	Vsp(+)~GND(-) ⑦ - ④
4681A20091A	∞	48	∞	152
4681A20091B	∞	48	∞	152
4681A20091J/U	∞	122	∞	280
4681A20091K/V	∞	122	∞	280
4681A20091L	∞	38	∞	240
4681A20091Q	∞	Over 1	∞	241
4681A20091S	∞	Over 1	∞	241
4681A20091W	∞	Over 1	∞	69.22
4681A20091Z	∞	122	∞	280
4681A20122A/C	∞	38	∞	240
4681A20122B	∞	Over 1	∞	241
4681A20168A	∞	38	∞	240
4681A20168B	∞	38	∞	240
4681A20168G	∞	Over 1	∞	51.24
4681A20168H	∞	Over 1	∞	51.24
4681A20169A	∞	60	∞	250
4681A20169B	∞	60	∞	250
4681A20169C	∞	60	∞	250
4681A20169E	∞	45	∞	145
4681A20169E	∞	100	∞	150
4681A20172A/J	∞	60	∞	250
4681A20172B/K	∞	60	∞	250
4681A20172D	∞	60	∞	250
4681A20172E	∞	60	∞	250
4681A20172F	∞	60	∞	250
4681A20172L	∞	110.3	20MΩ ↑	244
4681A20172Q	∞	48	∞	83.25
4681A20172R	∞	Over 1	∞	83.25
4681A20172S	∞	44	∞	51.24
4681A20172T	∞	60	∞	250

Table 2. Resistance value of BLDC Motor terminal (PCB internal type, 5 wires)

※ Since the precise resistance value is not measured or continuously fluctuates due to the fine movement of the fan, when measuring the resistance of the fan, measure it after removing the fan or after restraining (not moving) the fan.

[Unit kΩ] Resistance value ± 20%

Motor P/No.	Vm(+)~GND(-) ① - ④	Vcc(+)~GND(-) ⑤ - ④	FG(+)~GND(-) ⑥ - ④	Vsp(+)~GND(-) ⑦ - ④
4681A20172U	∞	60	∞	250
4681A20172X	∞	46	∞	51.24
4681A20172Y	∞	46	∞	51.24
4681A20172Z	∞	Over 1	∞	51.24
4681A20197A	∞	60	∞	250
4681A20197B	∞	60	∞	250
4681A20198A	∞	48	∞	152
4681A20198B	∞	Over 1	∞	73.56
4681A20198C	∞	Over 1	∞	73.56
4681A20198D	∞	38	∞	240
4681F72001D	∞	38	∞	240
4681F72001E	∞	38	∞	240
4681F72001F	∞	38	∞	240
EAU36288415	∞	32.7	∞	90
EAU36288418	∞	32	∞	78.43
EAU36288424	∞	11.9	∞	50.8
EAU37067101	∞	Over 1.45	∞	Over 69
EAU37067103/09/16	∞	Over 1.45	∞	Over 69
EAU37067104	∞	Over 1.45	∞	Over 69
EAU37067105	∞	Over 1.45	∞	Over 69
EAU37067106	∞	Over 1.45	∞	Over 69
EAU37067107	∞	Over 1.45	∞	Over 69
EAU37067108	∞	Over 1.45	∞	Over 69
EAU37067110	∞	Over 1.45	∞	Over 69
EAU37067113/14/17	∞	Over 1.45	∞	Over 69
EAU37067118	∞	Over 1.45	∞	Over 69
EAU37067119	∞	Over 1.45	∞	Over 69
EAU37067120	∞	Over 1.45	∞	Over 69
EAU57945701/02	∞	38	∞	240
EAU57945705	∞	38	∞	240

*Variance: Fixed If It's defected

Table 3. Resistance value of BLDC Motor terminal (PCB internal type, 5 wires)

※ Since the precise resistance value is not measured or continuously fluctuates due to the fine movement of the fan, when measuring the resistance of the fan, measure it after removing the fan or after restraining (not moving) the fan.

[Unit kΩ] Resistance value ± 20%

Motor P/No.	Vm(+)~GND(-) ① - ④	Vcc(+)~GND(-) ⑤ - ④	FG(+)~GND(-) ⑥ - ④	Vsp(+)~GND(-) ⑦ - ④
EAU57945710	∞	*Variance	∞	200
EAU57945711	∞	*Variance	∞	200
EAU57945712	∞	*Variance	∞	200
EAU60905401	∞	60	∞	250
EAU60905402	∞	Over 1	∞	69.99
EAU60905403	∞	47	∞	78.43
EAU60905404	∞	126	20MΩ↑	42
EAU60905410	∞	12	∞	42
EAU61863301	∞	60	∞	250
EAU61883001	∞	Over 1	∞	78.43
EAU61883002	∞	Over 1	∞	241
EAU61883003	∞	1	∞	232.5
EAU61883004	∞	1	∞	232.5
EAU62004001	∞	O.L (Open)	∞	191
EAU62004002	∞	O.L (Open)	∞	191
EAU62004005	∞	O.L (Open)	∞	191
EAU62004009	∞	O.L (Open)	∞	191
EAU62004010	∞	*Variance	∞	200
EAU62004011	∞	*Variance	∞	200
EAU62023301	∞	Over 1	∞	51.24
EAU62023302	∞	Over 1	∞	51.24
EAU62023304	∞	Over 1	∞	51.24
EAU62124101	∞	Over 1	∞	84.47
EAU62124102	∞	Over 1	∞	84.47
EAU62125901	∞	122	∞	280
EAU62243901	∞	38	∞	240
EAU62243902	∞	48	∞	152
EAU62243903	∞	48	∞	152
EAU62243907	∞	38	∞	240
EAU62243912	∞	*Variance	∞	200

*Variance: Fixed If It's defected

Table 4. Resistance value of BLDC Motor terminal (PCB internal type, 5 wires)

※ Since the precise resistance value is not measured or continuously fluctuates due to the fine movement of the fan, when measuring the resistance of the fan, measure it after removing the fan or after restraining (not moving) the fan.

[Unit kΩ] Resistance value ± 20%

Motor P/No.	Vm(+)~GND(-) ① - ④	Vcc(+)~GND(-) ⑤ - ④	FG(+)~GND(-) ⑥ - ④	Vsp(+)~GND(-) ⑦ - ④
EAU62243913	∞	*Variance	∞	190
EAU62263201	∞	122	∞	280
EAU62283301	∞	37	∞	290
EAU62283303	∞	47	∞	153
EAU62283304	∞	47	∞	153
EAU62543502	∞	39	∞	69.22
EAU62843006	∞	*Variance	∞	200
EAU62843007	∞	*Variance	∞	200
EAU62843008	∞	*Variance	∞	200
EAU62843009	∞	*Variance	∞	200
EAU62843010	∞	*Variance	∞	200
EAU62903301	∞	48	∞	153
EAU62903303	∞	12	∞	244
EAU62903304	∞	11.7	∞	244
EAU62943701	∞	38	∞	240
EAU62983001	∞	*Variance	∞	200
EAU62983002	∞	39.5	∞	225
EAU62983003	∞	*Variance	∞	200
EAU62983004	∞	39.5	∞	225
EAU62983005	∞	*Variance	∞	200
EAU62983006	∞	*Variance	∞	200
EAU63343501	∞	Over 1	∞	51.24
EAU63483801	∞	Over 1	∞	51.24
EAU63483802	∞	Over 1	∞	51.24
EAU63563101	∞	Over 1	∞	51.24

*Variance: Fixed If It's defected

Checking resistance value between terminals of fan motor

Table. Resistance value of BLDC Motor Coil line (PCB external type, 3 wires)

※ As resistance value between external coil type of PCB varies according to temperature, make sure that resistance value of UV / UW / VW is same by referring to resistance value below.
※ When measuring FAN fastening state resistance, the exact resistance value is not measured or continuously fluctuates due to minute FAN movement. So measure after removing FAN or after FAN restraint (not to move)

[Measured at 25 °C]

Motor P/No	U-V [Ω]	U-W [Ω]	V-W [Ω]
EAU43080007	11.8±7%		
EAU43080010	11.8±7%		
EAU43080013	11.8±7%		
EAU43080015	11.2±7%		
EAU43080016	11.8±7%		
EAU43080021	13.0±7%		
EAU43080022	4.2±7%		
EAU43080023	11.8±7%		
EAU43080024	11.8±7%		
EAU43080025	15.0±7%		
EAU43080026	4.20±7%		
EAU43080027	11.2±7%		
EAU43080030	12.2±7%		
EAU43080032	5.5±7%		
EAU43080033	11.7±7%		
EAU43080034	13.0±7%		

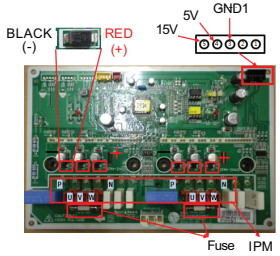
Motor P/No	U-V [Ω]	U-W [Ω]	V-W [Ω]
EAU43080035	15.0±7%		
EAU43080036	11.7±7%		
EAU43080037	12.2±5%		
EAU43080038	5.5±7%		
EAU43080039	15.1±5%		
EAU57945708	71.9±5%		
EAU60905408	52.5±5%		
EAU60905411	43.1±5%		
EAU60905419	45.6±5%		
EAU62543701	43.1±5%		
EAU62543703	43.1±5%		
EAU62543704	43.1±5%		
EAU62543707	43.1±5%		
EAU63383601	40.0±5%		
EAU63383602	40.0±5%		
EAU63383604	22.2±5%		
EAU63503502	15.1±5%		

Check the outdoor PCB

Cause	How to check	Checklist			
		Check Point	Normal	Abnormal	Defective parts
Fan. PCBA damaged	Check Fan. PCBA appearance	Appearance	Good	Damage	Fan. PCBA
	Check Fuse	Fuse	Short	Open	
	Measure 5V,15V line	5V, 15V Resistance	10kΩ↑	1kΩ↓ ~ 0Ω	
	IPM (Check IGBT)	P-U,V,W / N-U,V,W	0.38V ~ 0.7V	Non-normal	
	Inverter Drive circuit (Check diode)	Diode	0.38V ~ 0.7V	Non-normal	
Inverter PCBA damaged	Check Inverter PCBA appearance	Appearance	Good	Damage	Inverter PCBA
	Measure 5V,15V line	5V, 15V Resistance	10kΩ↑	1kΩ↓ ~ 0Ω	
	IGBTM (Check IGBT)	P-U,V,W / N-U,V,W	0.38V ~ 0.7V	Non-normal	
	Inverter Drive circuit (Check diode)	Diode	0.38V ~ 0.7V	Non-normal	

■ How to check Fan PCBA

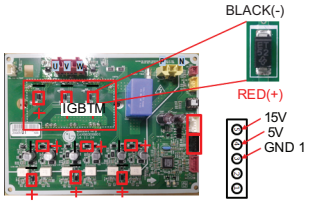
1) Multi V 4 Fan



※ Multi Meter : Be careful of the probe color

Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Fuse	)))	Both sides		Short	Open
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IPM	⊣⊢	P	U	0.38V ~ 0.7V	0.2V ↓ or Short
			V		
			W		
		U	N		
		V			
		W			
Diode (6EA)	⊣⊢	-	+	0.38V ~ 0.7V	0.2V ↓ or Short

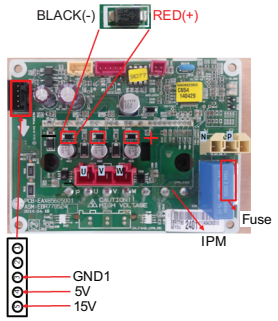
2) Multi V 575V Fan



※ Multi Meter : Be careful of the probe color

Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Fuse	)))	Both sides		Short	Open
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IPM	⊣⊢	P	U	0.38V ~ 0.7V	0.2V ↓ or Short
			V		
			W		
		U	N		
		V			
		W			
Diode (6EA)	⊣⊢	-	+	0.38V ~ 0.7V	0.2V ↓ or Short

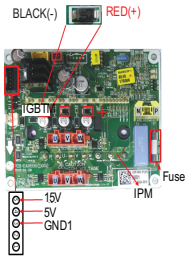
3) Multi V 4 Pro Fan



※ Multi Meter : Be careful of the probe color

Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Fuse	)))	Both sides		Short	Open
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IPM	⊣⊢	P	U	0.38V ~ 0.7V	0.2V ↓ or Short
			V		
			W		
		U	N		
		V			
		W			
Diode (6EA)	⊣⊢	-	+	0.38V ~ 0.7V	0.2V ↓ or Short

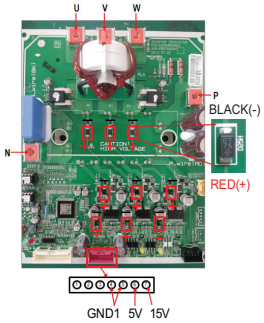
4) Multi V 5 Fan



※ Multi Meter : Be careful of the probe color

Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Fuse	•)))	Both sides		Short	Open
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IPM	→|←	P	U	0.38V ~ 0.7V	0.2V ↓ or Short
			V		
			W		
		U	N		
		V			
		W			
Diode (6EA)	→|←	-	+	0.38V ~ 0.7V	0.2V ↓ or Short

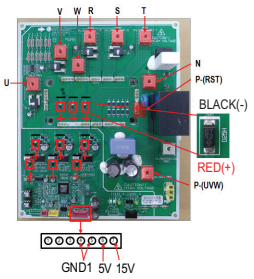
5) Multi V 4 Inverter



※ Multi Meter : Be careful of the probe color

Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IGBTM	→|←	P	U	0.38V ~ 0.7V	Non-normal
			V		
			W		
		U	N		
		V			
		W			
Diode (9EA)	→|←	-	+	0.38V ~ 0.7V	Non-normal

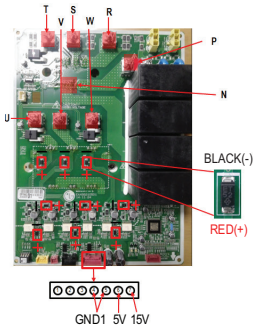
6) Multi V 4 220V Model Inverter



※ Multi Meter : Be careful of the probe color

Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IGBTM	→|←	P-(UVW)	U	0.38V ~ 0.7V	Non-normal
			V		
			W		
		U	N		
		V			
		W			
		P-(RST)	R		
			S		
			T		
		R	N		
		S			
		T			
Diode (9EA)	→|←	-	+	0.38V ~ 0.7V	Non-normal

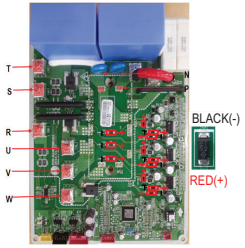
7) Multi V 4 575V Model Inverter



※ Multi Meter : Be careful of the probe color

Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IGBTM	→|←	P-(UVW)	U	0.38V ~ 0.7V	Non-normal
			V		
			W		
		U	N		
		V			
		W			
		P-(RST)	R		
			S		
			T		
		R	N		
		S			
		T			
Diode (9EA)	→|←	-	+	0.38V ~ 0.7V	Non-normal

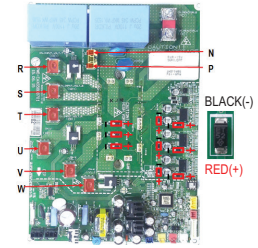
8) Multi V 4 Pro Inverter



※ Multi Meter : Be careful of the probe color

Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IGBTM	⊣◂	P-(UVW)	U	0.38V ~ 0.7V	Non-normal
			V		
			W		
		U	N		
		V			
		W			
		P-(RST)	R		
			S		
			T		
		R	N		
		S			
		T			
Diode (9EA)	⊣◂	-	+	0.38V ~ 0.7V	Non-normal

9) Multi V 5 Inverter

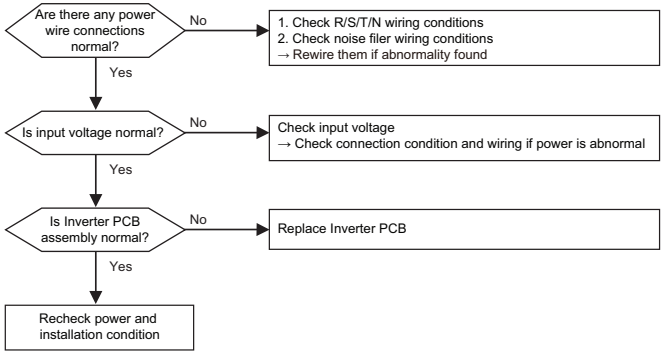


※ Multi Meter : Be careful of the probe color

Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
5V part Resistance	Ω	GND	5V	1kΩ↑	1kΩ↓ ~ 0Ω
15V part Resistance	Ω	GND	15V	10kΩ↑	10kΩ↓ ~ 0Ω
IGBTM	⊣◂	P-(UVW)	U	0.38V ~ 0.7V	Non-normal
			V		
			W		
		U	N		
		V			
		W			
		P-(RST)	R		
			S		
			T		
		R	N		
		S			
		T			
Diode (9EA)	⊣◂	-	+	0.38V ~ 0.7V	Non-normal

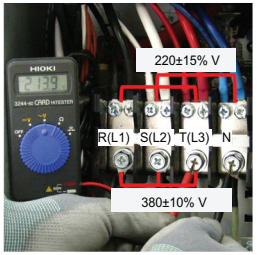
Error No.	Error Type	Error Point	Main Reasons
71*	PFC CT Sensor Error	Micom input voltage isn't within standard value at initial state of power supply	1. Input voltage is abnormal (R-N) 2. Outdoor unit Inverter PCB damage (CT sensing part)

■ Error diagnosis and countermeasure flow chart

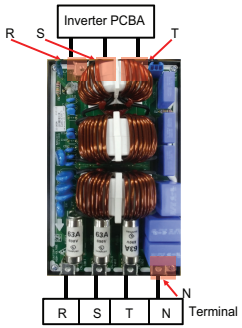


Check R/S/T/N Wiring Condition

3Ø Phase 4-wire (380V)



1. Check the condition and wiring of the R/S/T/N cables.
2. Check that power is normally supplied to outdoor unit and then measure voltage between phases.

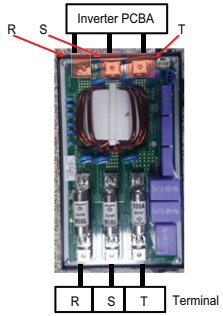


Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
Input Voltage (3-Phase / 3-Wire 380V)	≂ AC	R	S	380V ± 10%	Non-normal
		R	T		
		S	T		
Input Voltage (3-Phase/ 4-Wire 220V)	≂ AC	R	N	220V ± 15%	
		S	N		
		T	N		

Defective parts : Fuse or Input voltage

3Ø Phase 3-wire (220V or 460V)

1. Check the condition and wiring of the R/S/T/ cables.
2. Check that power is normally supplied to outdoor unit and then measure voltage between phases.

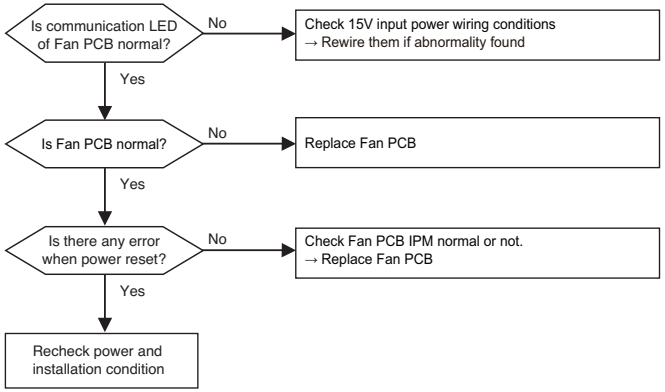


Check Point	Multi Meter			Measured value	
	Mode	BLACK	RED	Normal	Abnormal
220V	≂ AC	R	S	220V ± 15%	Non-normal
		R	T		
		S	T		
460V	≂ AC	R	S	460V ± 10%	
		R	T		
		T	T		

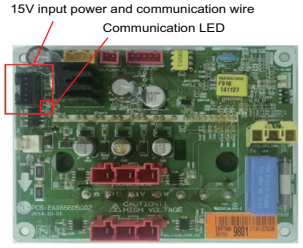
Defective parts : Fuse or Input voltage

Error No.	Error Type	Error Point	Main Reasons
75*	Fan CT Sensor Error	Micom's offset of fan motor phase current is not standard value	1. Input Voltage is abnormal (not 15V) 2. Fan PCB assembly defect 3. Power wire open and connecting fault 4. Inverter PCB assembly defect

■ Error diagnosis and countermeasure flow chart



Check DC input power

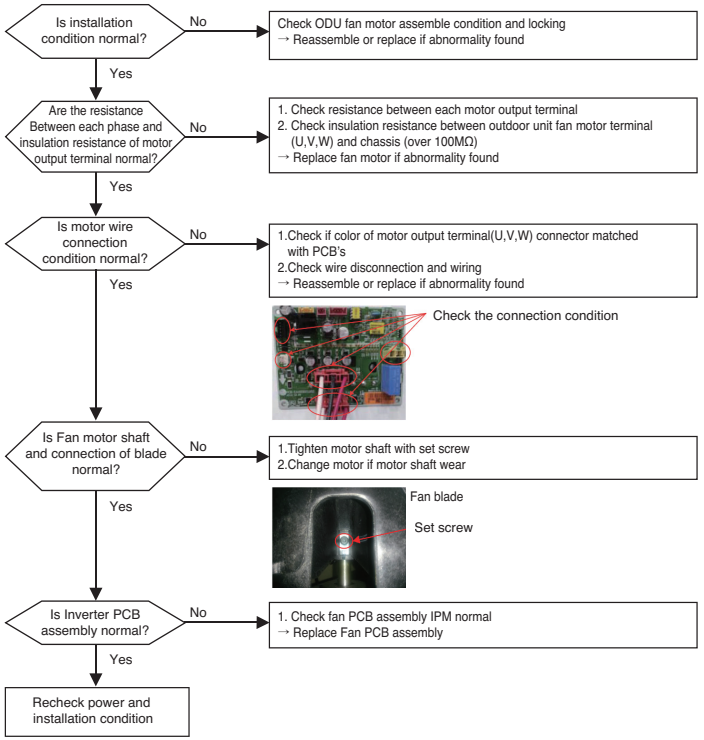


Check DC Input power 15V on Inverter PCB

* In case the value is more than 100 kΩ (open) or less than 100 Ω (short), Error occurs

Error No.	Error Type	Error Point	Main Reasons
77*	Fan Over Current Error	Output current is over standard value	1. Overload operation 2. Fan Motor defect 3. Fan PCB assembly defect 4. Fan Motor connector insert defect 5. Condenser icing or blocking
79*	Fan Starting Failure Error	Fan Motor initial starting failure	1. Fan motor defect/ assemble condition abnormal 2. Fan motor connector misconnection(U,V,W ouput) 3. Fan PCB defect

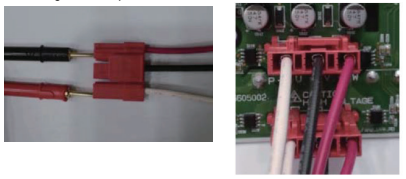
■ Error diagnosis and countermeasure flow chart



Check Fan motor phase resistance

1. Check resistance between each motor output terminal.
   → If the resistance values are the same, the motor can be judged as normal.

Measuring fan motor phase resistance



Ex)

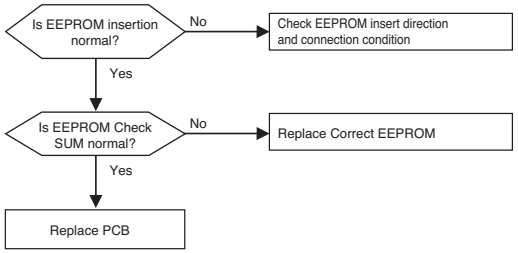
Chassis	UXA	UXB
Resistance	15 ± 7 % Ω	13 ± 7 % Ω

2. Check insulation resistance between Outdoor unit fan motor terminal (U,V,W) and chassis (over 100MΩ)
   → Reassemble or replace if abnormality found

Measuring insulation resistance between fan terminal & chassis

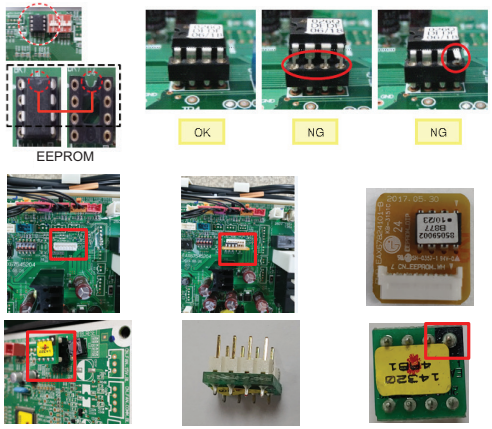
Error No.	Error Type	Error Point	Main Reasons
86*	Main PCB EE-PROM error	EEPROM Access error and Check SUM error	1. EEPROM contact defect / wrong insertion 2. Different EEPROM Version 3. Each PCB assembly damage (Inverter, Main, Fan)
87*	Fan PCB EEPROM Error		

■ Error diagnosis and countermeasure flow chart



Check EEPROM insert direction and connection condition

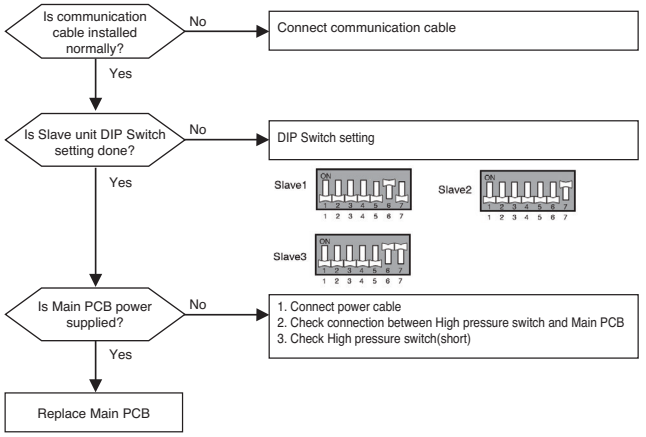
1. Check EEPROM Indication whether the marking line matches the direction of EEPROM inserted into the socket.
2. Make sure that the EEPROM assembly is in close contact (non-contact)
3. Make sure the EEPROM Lead pin is pulled out of the socket



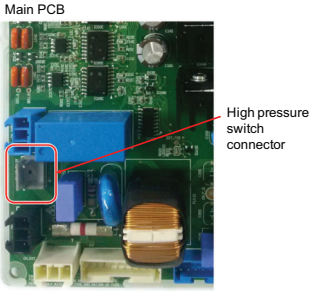
* EEPROM is different as each model.

Error No.	Error Type	Error Point	Main Reasons
104*	Communication Error Between Outdoors	Master and Slave display error code and own unit number which is not com-municated. (Ex. Master-104 1, Slave1-104 2, Slave2-104 3)	1. Loose connection of power cable/ communi-cation cable (Open/Short) 2. Defect of each outdoor unit PCB

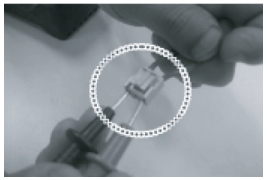
■ Error diagnosis and countermeasure flow chart



Check connection between High pressure switch and Main PCB

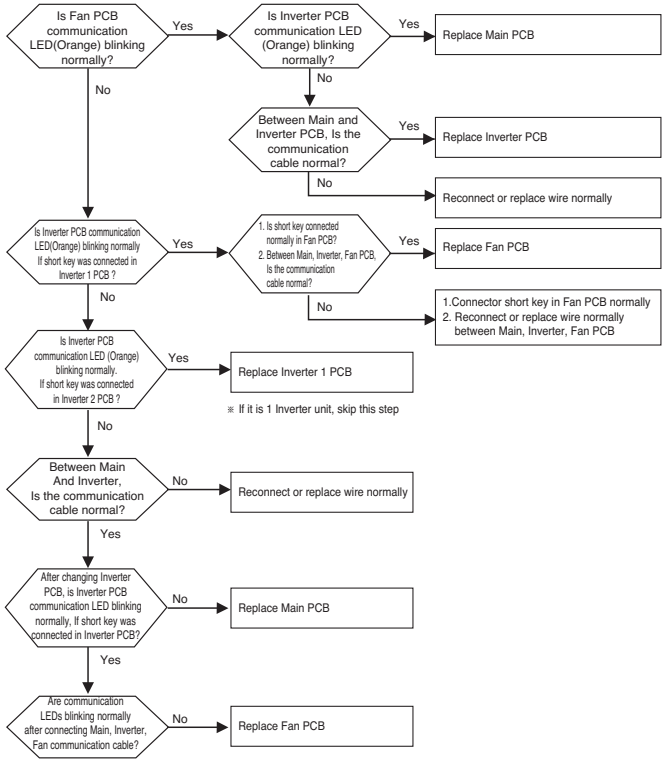


Check if the high pressure switch is short



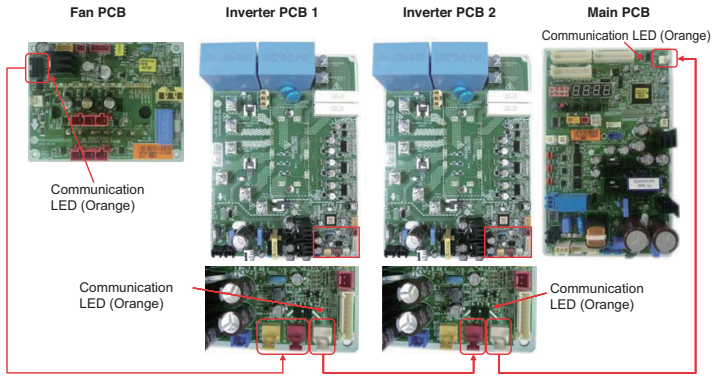
Error No.	Error Type	Error Point	Main Reasons
105*	Communication error (Main PCB ↔ Fan PCB, Inverter PCB)	When the Main PCB does not receive a signal due to the disconnection of the communication line between Main, Inverter, Fan PCB	1. Wrong connection between Main, Inverter, Fan PCB 2. Outdoor unit Main, Inverter, or Fan PCB defect 3. Overload caused by connecting two or more central controllers to the External PCB 12V power line

■ Error diagnosis and countermeasure flow chart

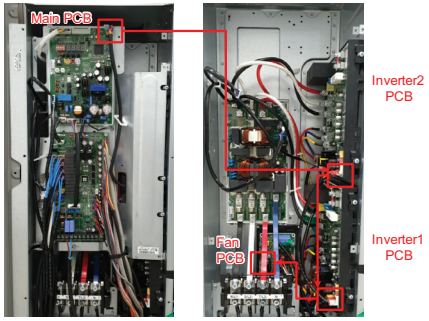


* The method of checking Main PCB and Inverter1/Inverter2 PCB
: If normal, communication LED blinks

Check Communication Cable Connection

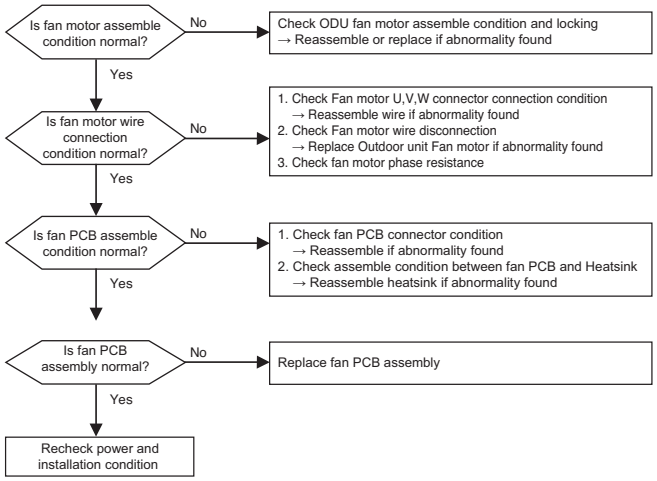


- Re-connect communication cable if abnormality found



Error No.	Error Type	Error Point	Main Reasons
106*	ODU Fan PCB IPM Fault	IPM protection circuit activation (over current)	1. Overload operation (Pipe clogging/Covering/ EEV defect/Ref. overcharge 2. ODU fan motor assemble condition abnormal (Coil disconnection/Short/Insulation damage) 3. Fan PCB assembly defect

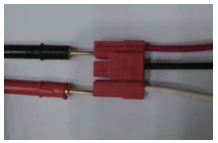
■ Error diagnosis and countermeasure flow chart

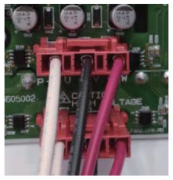


Check Fan motor phase resistance

1. Check resistance between each motor output terminal.
   → If the resistance values are the same, the motor can be judged as normal.

Measuring fan motor phase resistance





Ex)

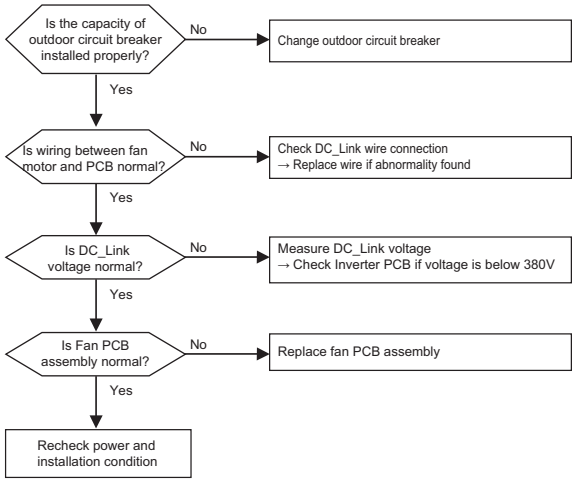
Chassis	UXA	UXB
Resistance	15 ± 7 % Ω	13 ± 7 % Ω

2. Check insulation resistance between Outdoor unit fan motor terminal (U,V,W) and chassis (over 100MΩ)
   → Reassemble or replace if abnormality found

Measuring insulation resistance between fan terminal & chassis

Error No.	Error Type	Error Point	Main Reasons
107*	Fan DC link low voltage	The voltage of fan DC link is lower than standard value	1. Overload operation (Pipe clogging / Covering / EEV defect / Ref. overcharge) 2. Outdoor unit Fan motor assemble condition abnormal (Coil disconnection / Short / Insulation damage) 3. Fan PCB assembly defect

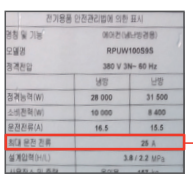
■ Error diagnosis and countermeasure flow chart



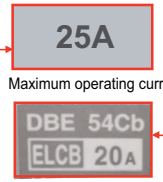
• Check Breaker's Capacity

If the breaker capacity is smaller than the maximum current of the product, the breaker may trip during product operation.

1. Check product's max operating current
2. Check breaker's capacity



Outdoor unit Label



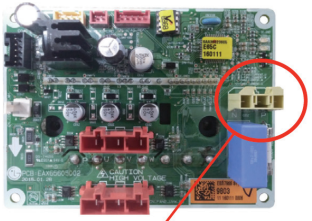
Maximum operating current

Capacity of the circuit breaker

Circuit breaker for Outdoor unit

• Check DC_Link wire connection

DC voltage connection



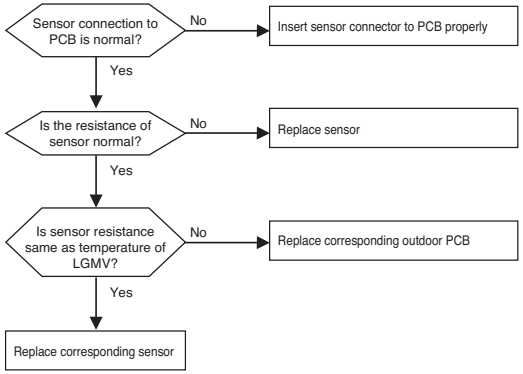
Input Voltage [V]	DC Link Voltage [V]
380 ±10% (342 ~ 418)	540 ±20% (432 ~ 648)
220 ±10% (198 ~ 242)	310 ±20% (248 ~ 372)
460 ±10% (414 ~ 506)	650 ±20% (520 ~ 780)

DC Volt connected

- Replace wire if abnormality found

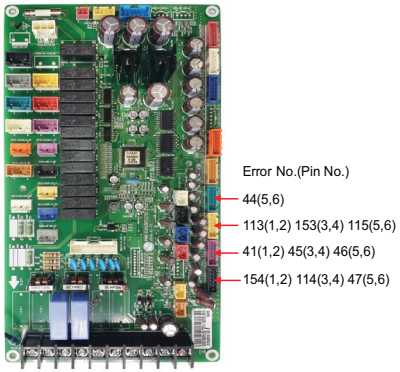
Error No.	Error Type	Error Point	Main Reasons
113*	Outdoor unit liquid pipe (condenser) temperature sensor error	Abnormal sensor resistance value (Open/Short)	1. Defective temperature sensor connection 2. Defective temperature sensor(Open / Short) 3. Defective outdoor unit PCB
114*	Outdoor Unit Subcooling Inlet Temperature Sensor Error	Abnormal sensor resistance value (Open/Short)	1. Defective temperature sensor connection 2. Defective temperature sensor(Open/Short) 3. Defective outdoor PCB
115*	Outdoor Unit Subcooling Outlet Temperature Sensor Error	Abnormal sensor resistance value (Open/Short)	1. Defective temperature sensor connection 2. Defective temperature sensor(Open/Short) 3. Defective outdoor PCB

■ Error diagnosis and countermeasure flow chart



■ Check the terminal

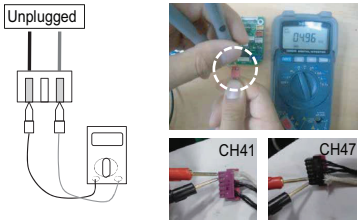
Multi V 5



Check the connector connection (external PCB)

Error code	Type	Ω(25°C)
CH 41, 47	D-Pipe temp	200kΩ
CH 44	Air temp	10kΩ
CH 45, 46, 113, 114, 115, 153, 154	Pipe temp	5kΩ

■ Check the resistance

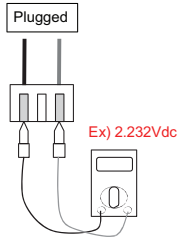


Check the resistance value of each sensor
If the values are different from the table, replace the sensor.

Temperature	Air	Pipe	D-Pipe
	Resistance	Resistance	Resistance
10°C(50°F)	20.7kΩ	10kΩ	362kΩ
25°C(77°F)	10kΩ	5kΩ	200kΩ
50°C(122°F)	3.4kΩ	1.8kΩ	82kΩ

* Check the following pages for resistance values of all temperatures

■ Check the voltage



Check temperature using measured voltage
Ex) If measured pipe sensor voltage is 2.232Vdc, temperature is 25°C.

Sensor Resistance Table

Pipe Temp

Temp (°C)	Resistance (kΩ)	Volt (V)
-30	102.17	4.714
-25	73.49	4.611
-20	53.55	4.481
-15	39.5	4.322
-10	29.48	4.131
-5	22.24	3.91
0	16.95	3.661
5	13.05	3.389
10	10.14	3.102
15	7.94	2.808
20	6.28	2.515
25	5	2.232
30	4.01	1.965
35	3.24	1.717
40	2.64	1.493
45	2.16	1.293
50	1.78	1.116
55	1.48	0.962
60	1.23	0.828
65	1.03	0.714
70	0.87	0.615
75	0.74	0.531
80	0.63	0.459
85	0.54	0.397
90	0.46	0.345
95	0.4	0.3
100	0.34	0.262

Air Temp

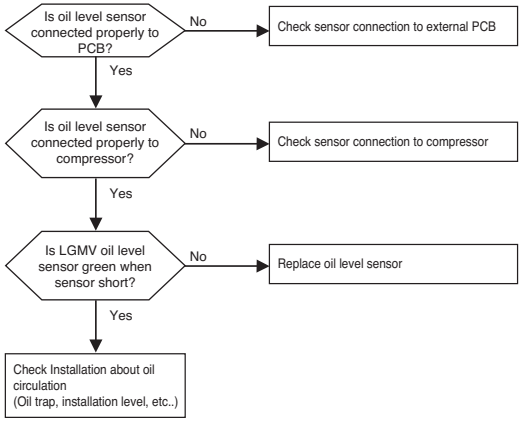
Temp (°C)	Resistance (kΩ)	Volt (V)
-30	204.35	4.72
-25	146.97	4.62
-20	107.09	4.492
-15	79	4.336
-10	58.95	4.149
-5	44.47	3.931
0	33.9	3.685
5	26.09	3.416
10	20.27	3.131
15	15.89	2.838
20	12.55	2.546
25	10	2.262
30	8.03	1.994
35	6.49	1.745
40	5.28	1.519
45	4.32	1.316
50	3.56	1.137
55	2.95	0.981
60	2.46	0.846
65	2.06	0.729
70	1.74	0.628
75	1.47	0.542
80	1.25	0.469
85	1.07	0.406
90	0.92	0.353
95	0.79	0.307
100	0.68	0.268

D-Pipe Temp

Temp (°C)	Resistance (kΩ)	Volt (V)
-30	2845.99	4.969
0	585.66	4.851
5	465.17	4.814
10	372.49	4.77
15	300.58	4.717
20	244.33	4.657
25	200	4.587
30	164.79	4.508
35	136.64	4.418
40	113.98	4.318
45	95.62	4.208
50	80.65	4.088
55	68.38	3.958
60	58.27	3.82
65	49.88	3.674
70	42.9	3.522
75	37.05	3.365
80	32.14	3.205
85	27.99	3.043
90	24.46	2.88
95	21.46	2.719
100	18.89	2.561
110	14.79	2.255
120	11.72	1.972
130	9.4	1.716
140	7.62	1.487
150	6.24	1.287

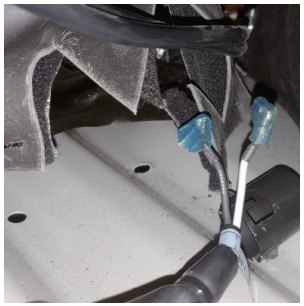
Error No.	Error Type	Error Point	Main Reasons
116*	Compressor low oil level error	Compressor low oil level	Continuous compressor low oil level Oil level sensor fault

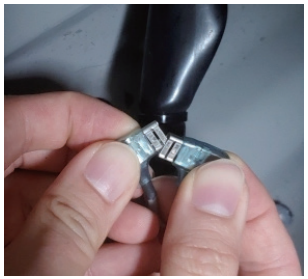
■ Error diagnosis and countermeasure flow chart



Check sensor connection to compressor

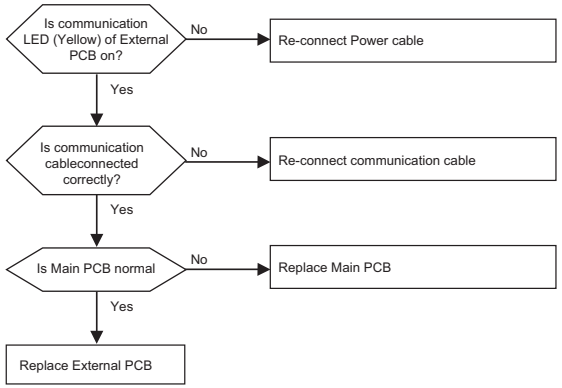
Check sensor open/short with LGMV Green light means oil is in (sensor short)



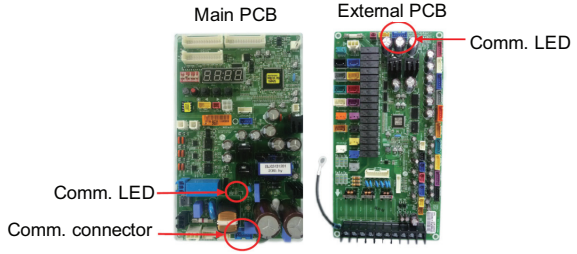


Error No.	Error Type	Error Point	Main Reasons
145*	Communication error (Main PCB → External PCB)	Cycle controller of Master unit can't receive signal from External controller	Cycle controller of Master unit can't receive signal from External controller

■ Error diagnosis and countermeasure flow chart

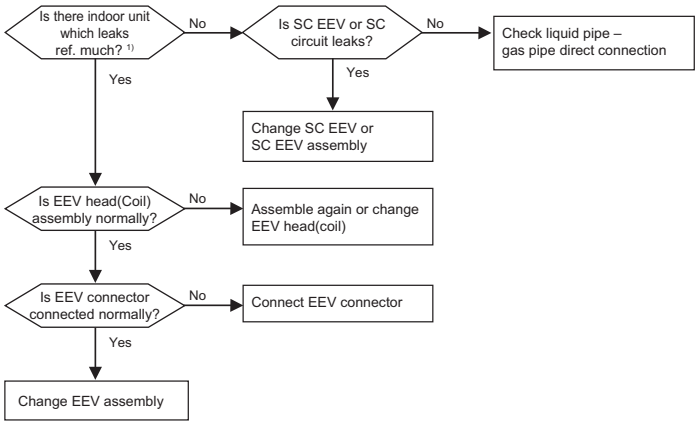


* The Method of checking Main PCB and External PCB
(If normal, communication LED blinks)



Error No.	Error Type	Error Point	Main Reasons
150*	Discharge super-heat low error	Discharge super-heat is under 3°C (liquid back)	Check liquid bypass 1. Individual power of indoor unit is open during operation 2. Indoor unit EEV fault(ref. leak much) 3. Indoor unit EEV connector disconnected. 4. SC EEV fault(ref. leak much) 5. Liquid pipe - gas pipe direct connection

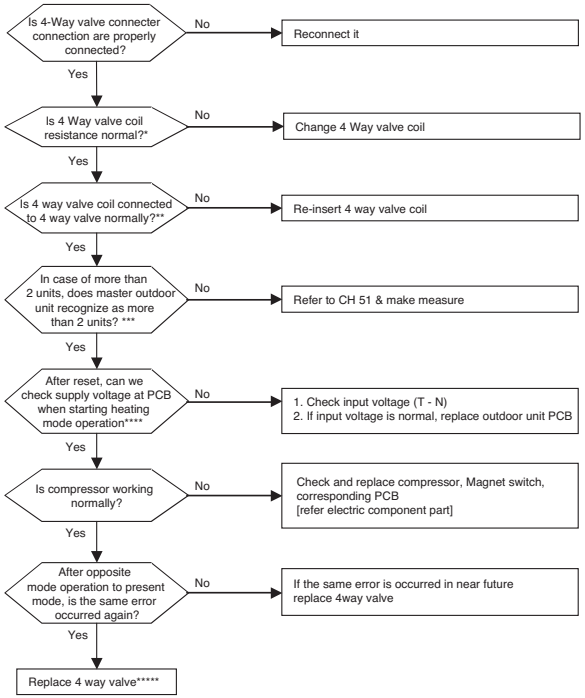
■ Error diagnosis and countermeasure flow chart



* Ref. leakage much: Both pipe in, pipe out temp. is under 10°C during unit is off(EEV 40pls) Also, big refrigerant flow noise occurred.

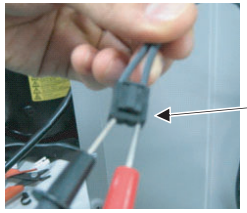
Error No.	Error Type	Error Point	Main Reasons
151*	Function error of outdoor 4way (reversing valve)	Function error of 4way (reversing valve) in Main or Slave outdoor units	1. Wrong operation of 4way valve because of sludge etc. inflow 2. No pressure difference because of compressor fault 3. Wrong installation of In/outdoor common pipe 4. Defect of 4way valve 5. Input power is abnormal (T-N)

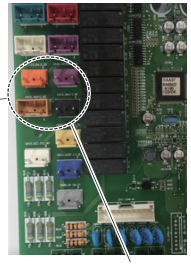
■ Error diagnosis and countermeasure flow chart



* Measure the resistance of 4way valve

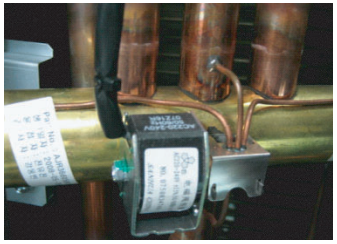
- If measured resistance is abnormal, change 4way valve coil.
- Check insulation resistance between outdoor unit 4way valve and chassis (over 100MΩ)
  → Reassemble or replace if abnormality found





** Check 4way valve coil connection

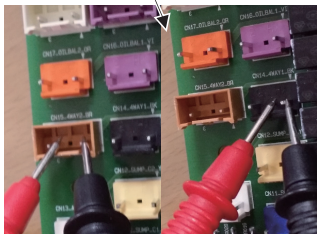
- Confirm the 4way valve coil is inserted to the end
- If 4way valve coil connection is abnormal, re-insert 4way valve coil.



**** Check the output voltage of PCB when starting heating mode

- Location of 4way valve connector on Main PCB(marked as 4way,CN09)

**** Check the output voltage of terminal socket during heating operation



- If measured voltage is abnormal, replace outdoor unit PCB

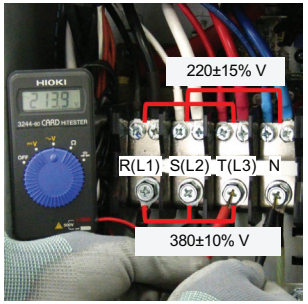
*** Refer to Outdoor unit information at Main PCB 7-segment
When power is supplied in order as follow (Slave2 → Slave1 → Mater)
ODU information is displayed one after the other at main PCB 7-segment

1. Model ID: 8HP : 8 / 10HP : 10 / 12HP : 12 / 14HP : 14 / 16HP : 16 / 18HP : 18 / 20HP : 20
2. Total Capacity: Displayed with HP
3. ODU Type: Cooling only : 1 / Heat pump : 2 / Heat Recovery : 3
4. Power type: 380V : 38 / 460V : 46 / 220V : 22
5. Model type (The model type can be changed)
   Tropical : 6 / North America : 30 / South America Heat Recovery : 35
   Europe : 40 / Asia + South America Standard : 50 / South America Heat Recovery : 35

***** Checking method for outdoor unit of 3unit system (Master + Slave1 + Slave2)

- Close all the SVC valves of high / low pressure
- Operate system
- Check the difference of high and low pressure with LGMV for each unit (Master, Slave1, Slave2)
- If there is a unit in which the difference is not increased then the 4way valve of that unit is defective

Check input voltage

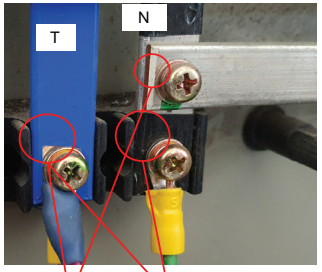


Measure input voltage between T and N (using for valve power)

- If power is normal (220±15% V), replace outdoor unit PCB (External PCB)
- If power is abnormal, check input power condition and environment

Poor case of input power (Contact resistance problem)

Experience of poor power equipment



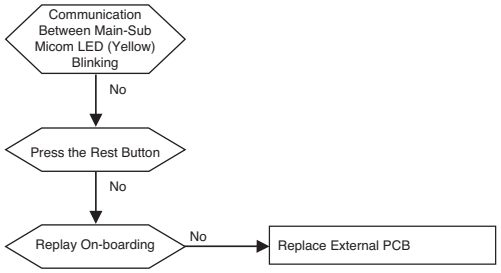
T-N 220V

T-N 75V
(Without removing N-phase insulation coating)

Cause of abnormal input voltage:
Poor contact occurs by connecting the power line without removing the N-phase insulation coating of the busbar
→ When using T-N phase voltage (Fan motor operating), the voltage is down, resulting in a malfunction of the 4way valve

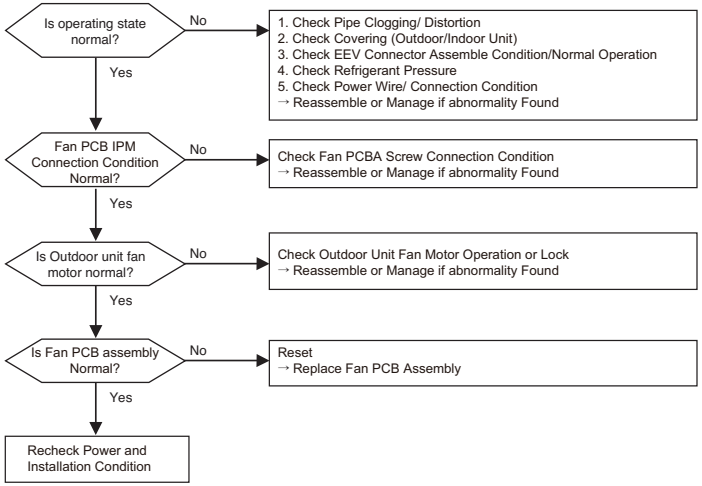
Error No.	Error Type	Error Point	Main Reasons
182*	Communication Error Between Main and Sub Micom of External PCB	Failure Receiving Signal Between Main and Sub Micom	Failure Receiving Signal Between Main and Sub Micom

■ Error diagnosis and countermeasure flow chart

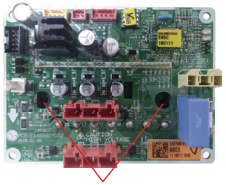


Error No.	Error Type	Error Point	Main Reasons
193*	Fan PCB Heatsink Temperature High	Heatsink temperature is over standard value(about 85°C)	1. Fan PCBA IPM Connection Condition Abnormal 2. Outdoor Unit Fan Motor Operation Abnormal 3. Outdoor Unit Fan PCB Assembly Defect 4. Overload Operation (Pipe Clogging/ Covering/ EEV Defect/Ref. Overcharge)

■ Error diagnosis and countermeasure flow chart



Check Fan PCB Screw Connection Condition



Check Screw Connection Condition

If connection condition is abnormal, reassemble or manage

Error No.	Error Type	Error Point	Main Reasons
194*	Outdoor unit Fan PCB heatsink temperature sensor error	Outdoor unit Fan PCB heatsink temperature sensor error	Defective outdoor unit PCB

■ Error diagnosis and countermeasure flow chart

Change Inverter PCB

Error No.	Error Type	Error Point	Main Reasons
51 #HR	Excessive connection of indoor unit to HR unit	Indoor unit capacity exceed HR unit capacity specification	1. Wrong connection of communication line or pipe 2. Incorrect operation of HR unit PCB Dip Switch 3. Indoor unit connection each HR unit connection port exceeding the capacity

HR : Heat Recovery
#: No. Of HR Unit

1) Check if the communication line and pipe between HR unit and indoor unit are correctly connected
2) Check whether DIP switch is set for each connection conditions between HR unit and indoor unit
3) If the indoor unit connected to HR unit is in group control, check if the corresponding capacity is 100 kBtu/h or less.
4) If the indoor unit connected to HR unit is not in group control, check if the corresponding capacity is 56 kBtu/h or less (including zoning control)
5) Even after performing the above process, if the same error code occurs, replace the corresponding HR unit PCB
6) After checking and taking action for No.1~5 processes, carry out auto addressing, and carry out pipe search

Error No.	Error Type	Error Point	Main Reasons
2001 or 200#HR	Pipe detection error	After finishing auto pipe detection, if the number of the indoor units detected is different from the number communicating indoor units	1. HR unit's power cable or communication cable connection defect 2. After auto-addressing, wrong address setting of the indoor unit (Defective indoor power / transmission error and PCB defect) 3. Wrong setting of the HR unit's rotary switch or dip switch 4. HR unit PCB defect: CH200 error has been happened during auto pipe detection. “200 #h” will be displayed 5. ODU unit PCB defect: CH200 error has been happened after finishing auto pipe detection. “200 1” will be displayed.

HR : Heat Recovery
#: No. Of HR Unit

1) Check the periodic blinking of the HR unit’s green LED (transmission LED)
2) When green LED (communication LED) of HR unit blinks regularly,
   2.1) Check input power of HR unit. (220V±10%)
   2.2) After reset of power of outdoor, wait for more than 30 minutes, temperature of pipes will be cool down then, do auto-addressing
   2.2) While power of HR unit is on, check total indoors display ‘CH05’ or not.(Refer to CH05)
3) When green LED (communication LED) of HR unit blinks regularly, Check setting of rotary switch and DIP switch, After reset of power of outdoor and HR unit, wait for more than 30 minutes, temperature of pipes will be cool dow then, do auto-addressing *
4) If indoor unit quantity is different between installed quantity and quantity which check thru piping searching, check pipe installation condition Outdoor unit ↔ HR unit ↔ Indoor unit
5) If indoor unit has not been connected to #1 valve of HR unit, set pipes of HR unit manually**
6) If it is not applied as above, set pipes of HR unit as manual.
   [NB] How to check display method of outdoor main PCB 7-segment ?
   '88' → Indoor q'ty which check thru 'Auto-Addressing' → '88' → Indoor q'ty which check thru 'piping checking'

Error No.	Error Type	Error Point	Main Reasons
201 #HR	HR unit liquid pipe temperature sensor error	Abnormal value of sensor measurement (Open / Short)	1. Defective temperature sensor connection 2. Defective temperature sensor (Open/Short) 3. Defective outdoor unit PCB

Error No.	Error Type	Error Point	Main Reasons
202 #HR	HR unit Sub-cooling inlet pipe temperature sensor error	Abnormal value of sensor measurement (Open / Short)	1. Defective temperature sensor connection 2. Defective temperature sensor (Open/Short) 3. Defective outdoor unit PCB

Error No.	Error Type	Error Point	Main Reasons
203 #HR	HR unit Sub-cooling discharge pipe temperature sensor error	Abnormal value of sensor measurement (Open / Short)	1. Defective temperature sensor connection 2. Defective temperature sensor (Open/Short) 3. Defective outdoor unit PCB

■ Error diagnosis and countermeasure flow chart

1) Check connection condition of temperature sensor and lead cable

2) Is value of temperature sensor normal? If not replace sensor
   - Piping temperature sensor : 10°C = 10kΩ : 25°C= 5kΩ : 50°C= 1.8kΩ

3) If connection of sensor and value is correct, replace outdoor unit PCB

■ HR unit error display No.

HR Unit	HR #1	HR #2	HR #3	HR #4	HR #5	HR #6	HR #7	HR #8	HR #9	HR #10	HR #11	HR #12	HR #13	HR #14	HR #15	HR #16
Error display	1h	2h	3h	4h	5h	6h	7h	8h	9h	10h	11h	12h	13h	14h	15h	16h

■ Example of HR unit error display.

#16 HR unit Sub-cooling inlet pipe temperature sensor error 202 → 16h (Repeat)

h : HR unit

: HR unit Number

Error No.	Error Type	Error Point	Main Reasons
204 #HR	Transmission error between the HR unit and outdoor unit	Transmission error between the HR unit and outdoor unit	1. Defective connection in HR unit power supply and communication connection 2. Wrong setting of the HR unit rotary switch and dip switch 3. Defective HR unit PCB

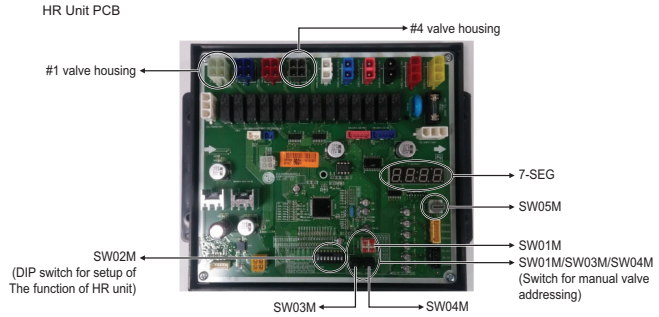
■ Error diagnosis and countermeasure flow chart

1) Check connection between power cables and communication cables, check communication green LED blink of HR unit PCB

2) If communication green LED blink of HR unit PCB is normal, check setting of rotary switch of HR unit and dip switch(Refer to CH200), Reset power of outdoor and HR unit
   (If communication error of HR unit occurs, it can't be released until reset of outdoor power)

3) If communication green LED blink of HR unit PCB is abnormal(not blinking,just on), check communication condition of total indoor units(Refer to CH05)
   If communication green LED blink of HR unit PCB is abnormal(not blinking, just on) even if communication condition is normal, replace HR unit PCB.

[NB] If Indoor units/communication cables of HR unit and cables of power 220V has been changed each other, communication parts and indoor will be burnt.



Error No.	Error Type	Error Point	Main Reasons
205 #HR	Communication error between HR unit and the upgraded 485 modem	4 series upgraded 485 communication error between HR unit and HR unit modem	1. Wiring defect between HR unit and upgraded 485 modem 2. Defect of the upgraded 485 PCB modem 3. Defect of the HR unit PCB

■ Error diagnosis and countermeasure flow chart

1) Check the communication connection between HR unit and the upgraded 485 modem, and check for the red LED on
2) Reset the outdoor unit and the power of HR unit if the red LED of the upgraded 485 modem is on
3) Replace the upgraded 485 modem if the red LED is flashing at the upgraded 485 modem
4) Replace the HR unit PCB if the red LED of the upgraded 485 modem is flashing even after replacing the upgraded 485 modem.

Error No.	Error Type	Error Point	Main Reasons
206 #HR	Duplicate address error of HR unit	When the HR unit address is set duplicated at the 4 series upgraded 485 communication	1. Defect of power cable of HR unit or communication line connection 2. Error of address allocation rotary switch setting of HR unit 3. Defect of the HR unit PCB

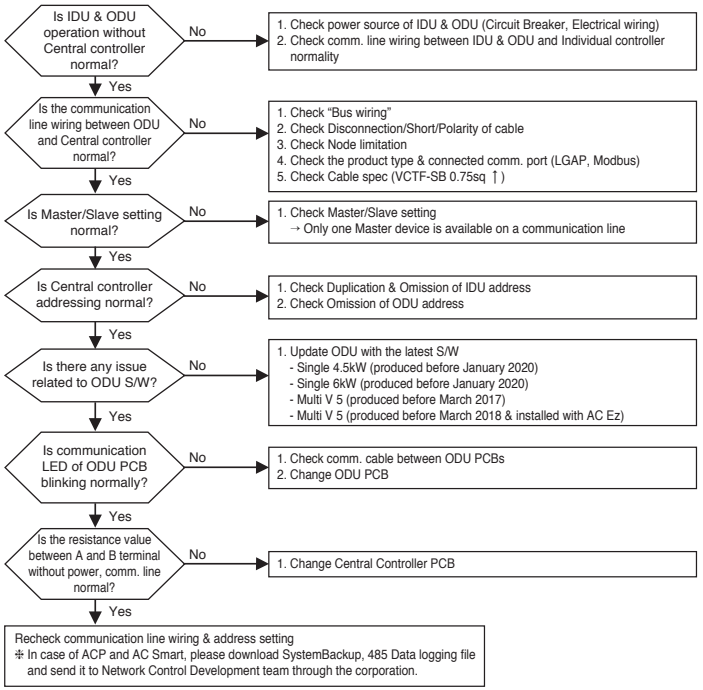
■ Error diagnosis and countermeasure flow chart

1) Check whether the rotary switch setting of HR unit PCB is set differently for HR units
2) Reset the outdoor unit and the power of HR unit by setting the rotary switch of HR unit PCB differently for HR units
3) Perform the auto addressing again after performing the number 2 process
4) Replace the corresponding HR unit PCB if the same error code is occurred even after performing the number 3 process
   - The above error code is only occurred at the upgraded 485 communication (9600bps communication)
   - Refer to the installation manual of the outdoor unit for the address setting to HR unit rotary switch for HR units

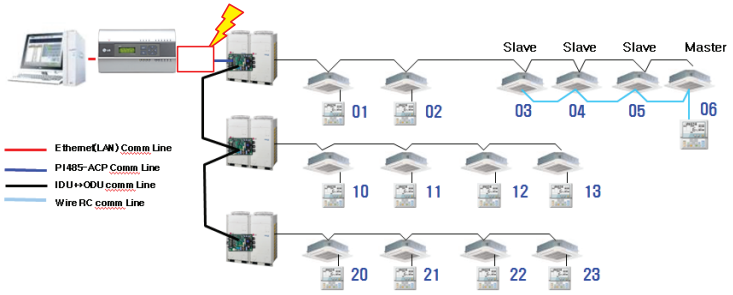
Upgraded 485 Modem

Error No.	Error Type	Error Point	Main Reasons
242*	Data Receive Error	RS-485 Communication system check (IDU & ODU operation / Comm. line wiring / Master, Slave setting / Central controller address setting / Product type)	1. IDU & ODU operation is abnormal. (power, comm. line, etc) 2. Communication line wiring is abnormal. (Wiring, Disconnection, Short, Polarity, Node limitation, Cable spec, Product type) 3. Master, Slave setting is abnormal. (1 Master on 1 comm. Line) 4. Central controller address setting is abnormal. (Duplication, Omission) 5. Product type is abnormal. (LGAP port, Modbus port) 6. ODU PCB or Central Controller PCB is abnormal.

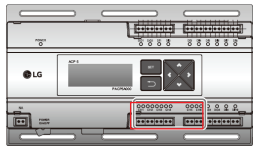
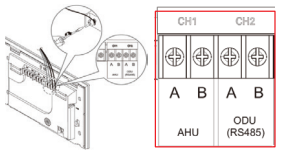
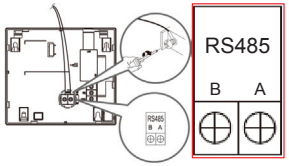
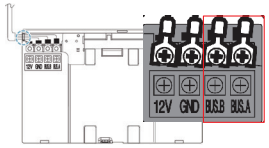
■ Error Diagnosis and Countermeasure Flow Chart



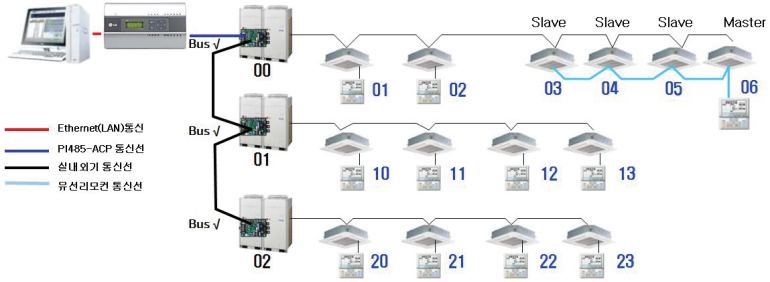
Check comm. line wiring between IDU and ODU & Individual controller normality.



Disconnect comm. line on central controller and test IDU, ODU, individual controller operation.
If the operation is normal, connect comm. line on central controller.

ACP	AC Smart
	
AC Ez Touch	**AC Ez**
	

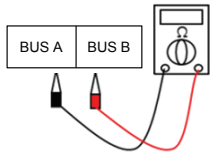
Check “Bus wiring”, Disconnection/Short/Polarity of cable



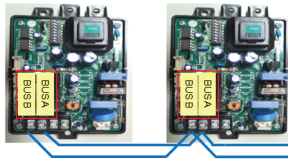
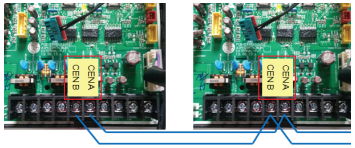
1. Check “Bus wiring”: Check each node whether the cable is connected with 1 or 2.
2. Check Disconnection/Short/Polarity of cable

Disconnection: Check the suspicious cable based on IDU searching status.
Ex) In above wiring diagram, Central controller Auto Searching
- 20, 21, 22, 23 IDUs are not found.
- You need to check comm. line. between 01 ODU and 02 ODU (or between 02 ODU and 20 IDU).

Short
Check central controller comm. port.



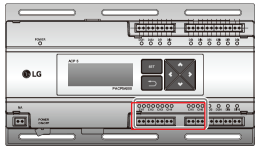
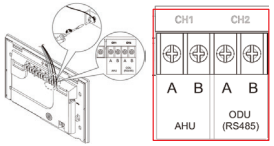
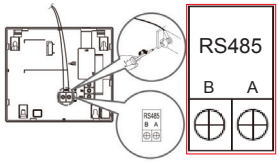
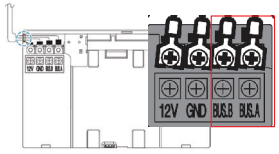
Polarity

Single/Vent/etc	Multi V super IV
	

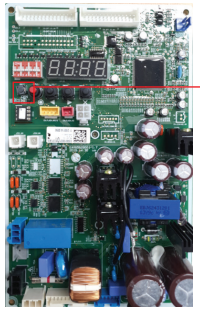
Check Node limitation, the product type & connected comm. port

1. Check Node limitation
   → Check Maximum Number of (PI485, ACS Product, ODU) on comm. line.
   Central Controller(Slave) ×1 + (Multi V ODU) ×2 + (PI 485 G/W) ×1 ≤ 32
   Ex) AC Ez(slave) 2 ea + Multi V 6ea = 2 + (6 X 2) = 14 ≤ 32 → OK

2. Check the product type & connected comm. port (LGAP, Modbus)

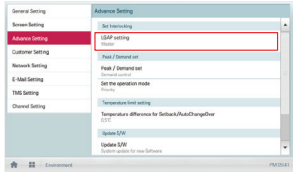
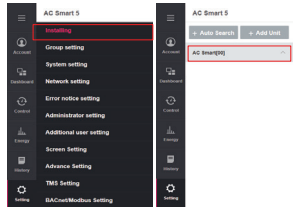
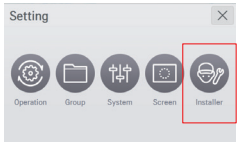
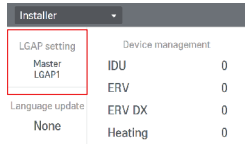
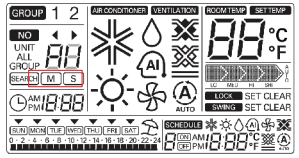
ACP	AC Smart
CH1~CH4: LGAP (ODU) CH5, CH6: Modbus (AHU, Chiller, ACS I/O module) 	CH1: Modbus (AHU, Chiller, ACS I/O module) AC Smart 5: Selectable in GUI (Modbus or LGAP) CH2: LGAP (ODU) 
AC Ez Touch	**AC Ez**
Only LGAP (ODU) 	Only LGAP (ODU) 

Check ODU PCB: Multi V 5

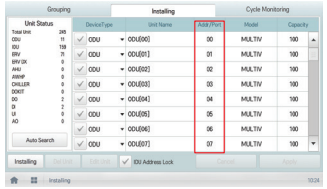
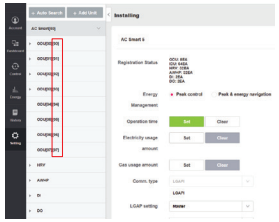
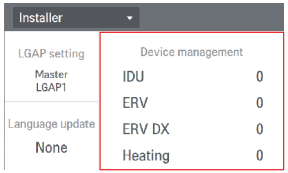
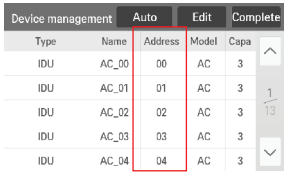
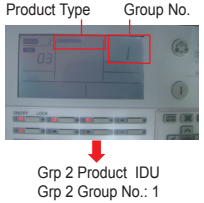


• Communication LED(Orange) Between ODU and Central controller
• Change Main PCB if communication LED(Orange) doesn't blink

Check Master/Slave setting
Only one Master device is available on a communication line.
※ ACP : Only Master device

AC Smart IV	AC Smart 5
Environment > Advance Setting > LGAP setting 	1. Setting > Installing & Select AC Smart  2. LGAP setting 
AC Ez Touch	**AC Ez**
1. Setting > Installer  2. LGAP setting 	M : Master S : Slave 

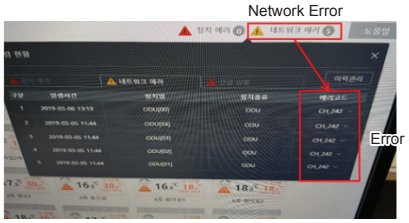
Check Duplication & Omission of IDU address

ACP IV, AC Smart IV	ACP 5, AC Smart 5
1. Installing > Installing 2. Check Addr/Port column. 	1. Setting > Installing 2. Select Device and check Address. 
AC Ez Touch	**AC Ez**
1. Setting > Installer > Device management  2. Check Address column. 	1. Check “Group No.” is set properly. Ex) IDU address **10~18** Group No of AC Ez : **1** ① Press ⚙ button 5 seconds. ② Press 2 or 3. And check product type, Group No.  Grp 2 Product IDU Grp 2 Group No.: 1 2. Check unfound IDU with operation. 3. Set IDU address with Remote controller.

Check Duplication & Omission of ODU address

ACP 5, AC Smart 5

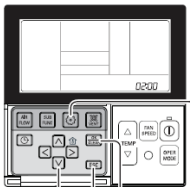
1. For TMS site, set address of ODU and make auto-searching.
2. For the site unusing ODU address, check Version.
   If ODU activate device control function is not applied, update with latest S/W.
   (Setting > System setting > Version)
   - ACP 5 : ~Ver.1.41.0 → Need to be updated with latest S/W
     Ver.1.60.4~ → OK
   - AC Smart 5 : ~Ver.1.51.0 → Need to be updated with latest S/W
     Ver.1.90.1~ → OK



3. Clear ODU activate device control function.
   (Setting > Installing > Click ODU > Activate device control)

Set IDU address with Remote controller.

Standard II



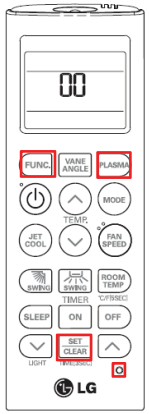
Press ⚙ button(3sec)

→ Repeat Pressing ⚙ button (Function code 02 : XX)
→ Set address with Up/Down
→ Press ok/Clear (saved)
→ Press ESC

Standard III

Select setting category and Press [∧(up)] for 3 seconds.
→ Input the password and press [OK].
→ Select [Centeral Control Address] and set address.

Wireless



✳ For Setting Address
Press FUNC + Reset

→ Set address with Up/Down
→ Run/Stop Button (Saved)
→ Press Reset (Exit)

✳ For Checking Address Press
Plasma+Reset (Toward the IDU)

→ Press Start/Stop button (count the number of blinking)
→ Press Reset (Exit)

Upgrade guide

1. ACP 5

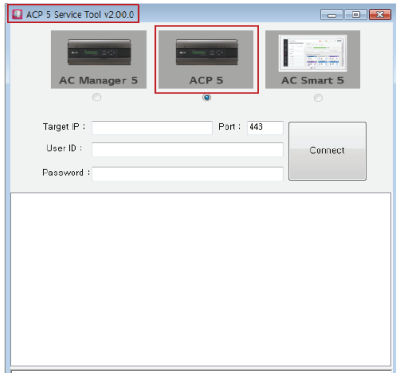
Program is available to download on the partner portal.
(Partner.lge.com > Global > Doc. Library > Doc. Type > Technical Data > Technical Bulletin > Network Solution & S/W)

1) Unzip service tool on PC that is possible to connect ACP.

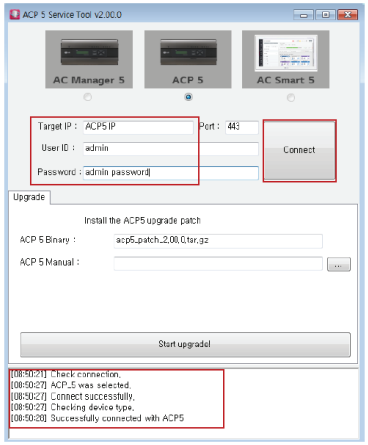
ACS5_SVC_Tool v2.00.0.exe

※ Distributed service tool and update file always use together. It might have problem using different version of service tool and update file.

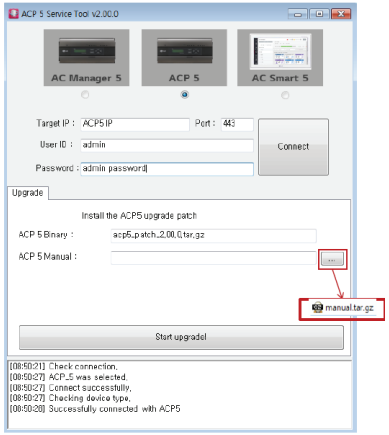
2) Execute Service Tool.



3) Connect to device.
- Target IP : ACP 5 IP address.
- User ID : admin (fixed administrator ID)
- Password : admin password.

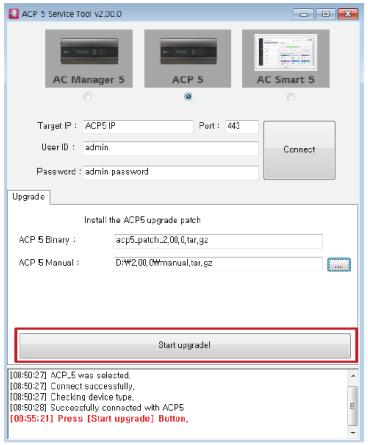


4) Click […] button to select manual file.

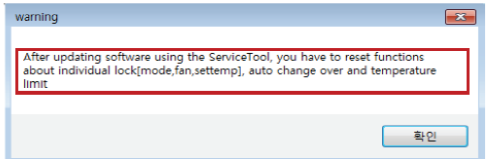


※ Selecting manual file is recommended

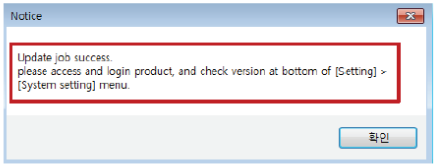
5) Click [Start upgrade] button to upgrade S/W.



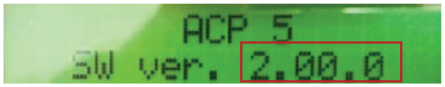
※ You can see below popup message before the update.
After upgrading, some control contents will be initialized.
So you will need to check the settings for these features after the upgrade.



※ You can see below popup message after the update.



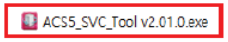
5) Check ACP 5 Version on LCD Display.



2. AC Smart 5

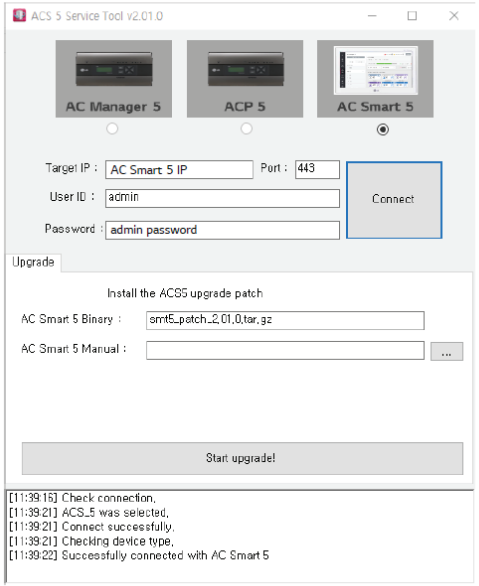
Program is available to download on the partner portal.
(partner.lge.com > Global > Doc. Library > Doc. Type > Technical Data > Technical Bulletin > Network Solution & S/W)

1) Unzip service tool on PC that is possible to connect AC Smart 5.



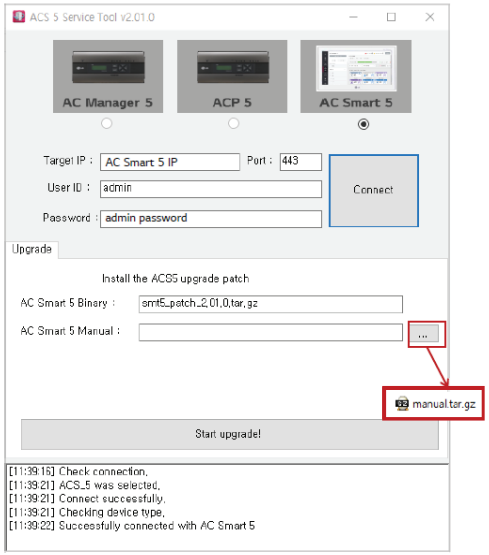
2) Execute Service Tool.

3) Connect to device.
- Target IP : AC Smart 5 IP address.
- User ID : admin (fixed administrator ID)
- Password : admin password.



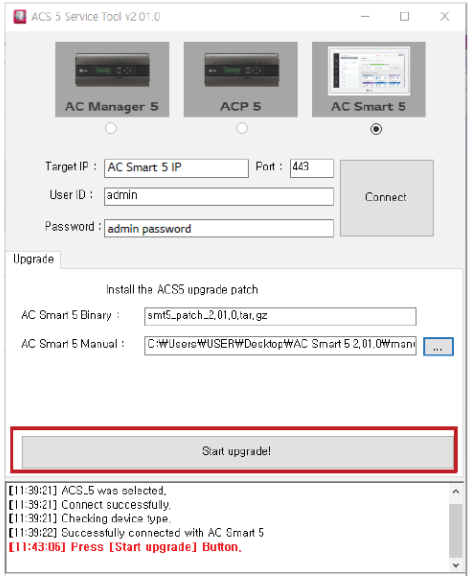
- Port : you can check its status on the network setting of WEB's setting (Default : 443)

4) Click […] button to select manual file.

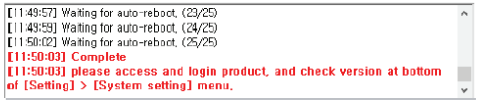


※ Selecting manual file is recommended.

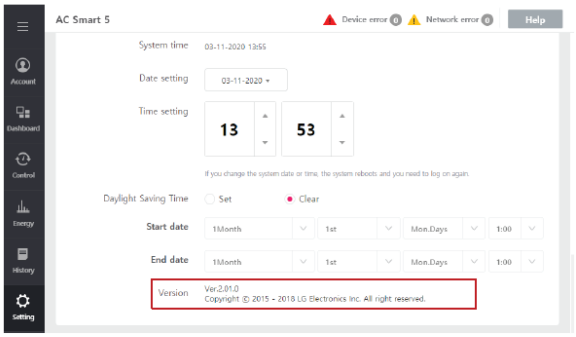
5) Click [Start upgrade] button to upgrade S/W.



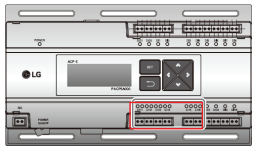
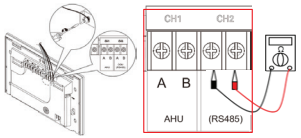
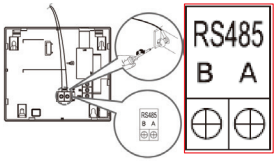
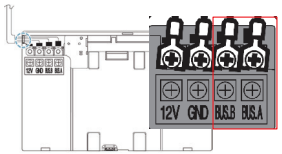
※ You can see below message after the update is complete.



6) Check AC Smart 5 Version
- Login AC Smart 5 and go to [Setting] > [System Setting].



Check the resistance between A and B terminal

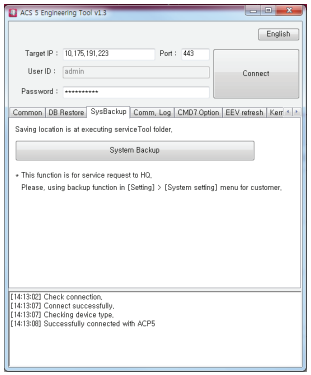
ACP	AC Smart
	
AC Ez Touch	**AC Ez**
	

A, B terminal Resistance value	Normal sample	Defect sample
	Over 1kΩ	1kΩ or less

System Backup

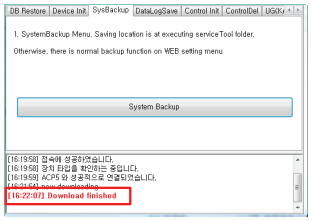
Program is available to download on the partner portal.
Please refer to the latest S/W release of central controller. (partner.lge.com > Global > Doc. Library > Doc. Type > Technical Data > Technical Bulletin > Network Solution & S/W)

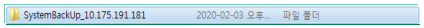
① Enter IP, P/W and click “Connect” button.
② Move to System Backup tap : Click “SysBackup” tap



③ Click “System Backup” button :

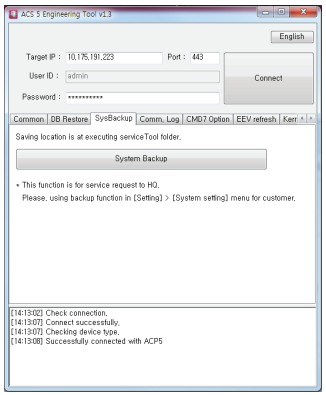
④ Check system backup complete message and check saved file on ENG Tool folder.





Data logging
Program is available to download on the partner portal.
Please refer to the latest S/W release of central controller. (partner.lge.com > Global > Doc. Library > Doc. Type > Technical Data > Technical Bulletin > Network Solution & S/W)

① Enter IP, P/W and click “Connect” button.
② Move to Data Logging tap : Click “Comm. Log” tap



③ Click below buttons sequentially:

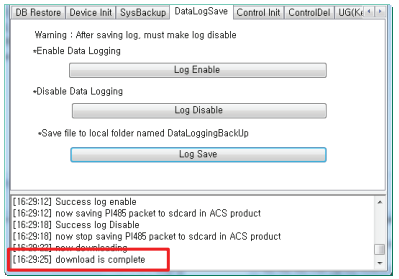
Start Data Logging

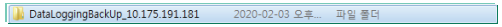
Phenomenon Reproduction

End Data Logging

Save file on local PC

④ Check data logging complete message and check saved file on ENG Tool folder.





MULTI V 5

Ⅲ. Trouble Shooting Guide

Checking Method for Key Components

1. The Phenomena from Main Component Failure

Component	Phenomenon	Cause	Check method and Trouble shooting
Compressor	Not operating	Motor insulation broken	Check resistance between terminals and chassis
		Strainer clogged	Change strainer
		Oil leakage	Check Oil level after opening oil port
	Stop during running	Motor insulation failure	Check resistance between terminals and chassis
	Abnormal noise during running	R-S-T misconnection	Check compressor U-V-W connection
Outdoor fan	High pressure error in cooling mode operation	Motor failure, bad ventilation around outdoor heat exchanger	Check the fan operation to confirm proper motor functioning. Switch OFF the outdoor unit and remove obstacles, if any, around the HEX. Check connector * In case of 2 motor model, you should use SE17 function to inspect motor fault.
Outdoor EEV	Heating failure, frequent defrosting	Bad connector contact	Check resistance between terminals
	No operation sound after switching ON the power supply	Coil failure	Service necessary
	Heating failure, frozen outdoor heat exchanger part	EEV clogged	Service necessary
	Low pressure error or discharge temperature error	EEV clogged	

When system fault occurs, the error code is displayed on the indoor unit display or remote control display. The trouble shooting guide is available in the service manual.

• When CH05/53/11 ERROR occurs, check if auto-addressing has done and communication wiring is ok.

2. Compressor

2.1 Failure Judge Method

1. Error display (CH21, CH22, CH26, CH29)
- Failure to restart after power reset
- Main power supply failure from inverter board to compressor
- Compressor input current is normal but compressor fails to start with electric noise from inverter board
- CH29 in normal operation and cycle

2. Phase current , input current hunting
- The phase current, input current value is hunting more than 5A in stable state of high / low pressure and compressor Hz

3. Coil resistance (U-V, V-W, W-U) and insulation resistance measurement
- Insulation resistance : 50MΩ or more
- Coil resistance : refer to below

JQC068MA*

Temp.	25 ℃	75 ℃
U-V	0.216 ± 7 % Ω	0.258 ± 7 % Ω
V-W	0.216 ± 7 % Ω	0.258 ± 7 % Ω
W-U	0.216 ± 7 % Ω	0.258 ± 7 % Ω

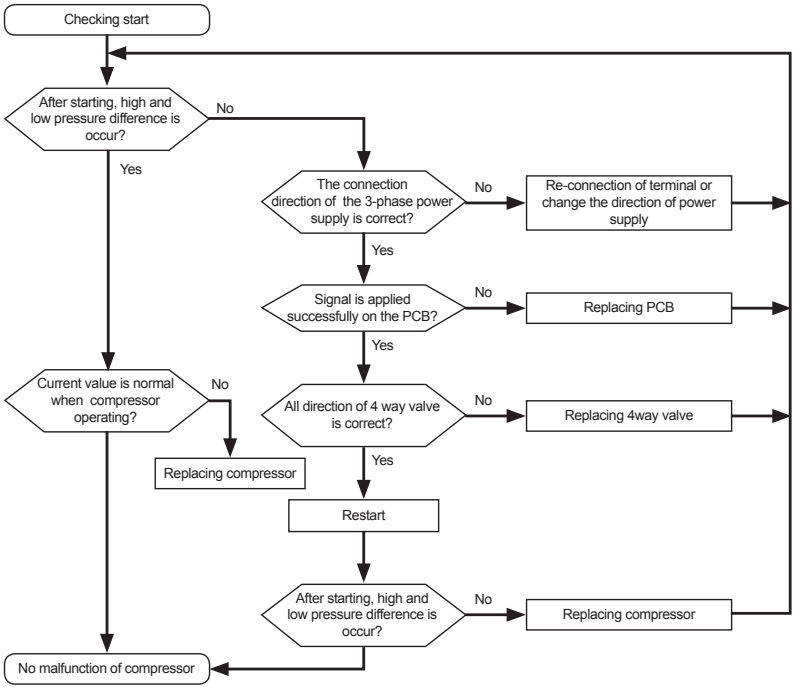
JQC048MA*

Temp.	25 ℃	75 ℃
U-V	0.302 ± 7 % Ω	0.360 ± 7 % Ω
V-W	0.302 ± 7 % Ω	0.360 ± 7 % Ω
W-U	0.302 ± 7 % Ω	0.360 ± 7 % Ω

2.2 Failure Cause

· Failure to obtain discharge superheat (refrigerant overcharging)
· High discharge temperature (refrigerant shortage)
· Failure to obtain high and low pressure difference
· Defective compressor
· Foreign substance inflow
· Overload operation
· Nitrogen / Vapor inflow and poor vacuum
· Defective oil return valve
· Oil return piping blocked
· Defective VI EEV
· Defective oil balancing valve
· Oil shortage due to oil leakage
· Lack of oil due to frequent Thermo On / Off
· Defective Suction VI valve

2.3 Checking Method (Flow Chart)



* In case of 4way valve fault, we should give a impact on 4way valve body first. If 4way valve is not switched completely, the suction temp. is high like discharge temp.

2.4 Process of Replacing the Compressor

Please follow the below process when you replace the compressor.

- Before replacing the compressor, check whether the failure of the compressor.
- Change the oil for compressor after replacing the compressor for 2~3 times.

1. check the turn off sign of the main power supply.
2. Remove the refrigerant with manifold gauge connecting to service valve.

⚠ CAUTION

Please release gradually the refrigerant, because there may be released oil mixed with the refrigerant.

3. Remove the terminal cover of compressor and power supply cable.
4. Please remove the crank case heater and discharge temperature sensor of the compressor.
5. Please remove the mounting nut of the compressor.
6. Please be separated by heating the welded portion of the pipe connected to the compressor.
7. Replace the compressor.
8. Please reconnect the pipe that had been separated by #7 to compressor by welding.
9. After closing the service valve of liquid pipe & gas pipe, check whether there is a site of the leak by injecting nitrogen gas(38 kgf/cm²g) through the check joint of the high-pressure side and low pressure side.
10. Remove the nitrogen gas.
11. Open the service valve (liquid pipe and gas pipe) of the outdoor unit and make a vacuum.
12. Please install the insulation material and the discharge temperature sensor of compressor.
13. Connect power supply cable to terminal of compressor.

⚠ CAUTION

Please be aware that not occur the reverse phase & loss of phase when connecting the phase.

14. After complete of vacuum processing, please charge the refrigerant by calculating the additional amount of refrigerant according refrigerant basic amount of the enclosed, outdoor unit charging factor, the pipe length.
15. After confirming once again of the power supply line connection is correct to the terminals of the compressor, please check the insulation resistance. Please make sure that you cover the compressor terminal cover, turn on the power, and check the current flows through the crankcase heater.
16. Make sure that the service valve of liquid pipe side and gas pipe side has been opened.
17. Please check the operation status after operating all IDU.

2.5 Precautions of Replacement

1. Be sure to use the compressor suitable for the model
2. Be careful not to damage the pipe
3. Do not enter foreign substances into the compressor
4. Check U, V, W Color of the compressor terminals
5. Use screw only for the compressor
6. When replacing the compressor, add oil if the oil has flowed too much
7. Use only regulated oil specified in this guide
8. Vacuum over 4 ~ 5 hours
9. Perform pipe cleaning with nitrogen
10. Charging with regulated refrigerant specified in this guide

2.6 Checklist after Replacement

1. Check whether there is any abnormality when the cycle is stabilized at cooling or heating mode.
   (Suction / Discharge superheat degree, Input current, Phase current, Pressure ratio, Oil sensor, etc.)
2. Check current Hz control according to target Hz
3. Check that the target high / low pressure
4. Check the amount of refrigerant
5. Check the abnormal noise during running

2.7 Compressor Specification

The specification of compressor being adapted to Multi V is below.
When the compressor is not working, please check the compressor referring to the below specification.

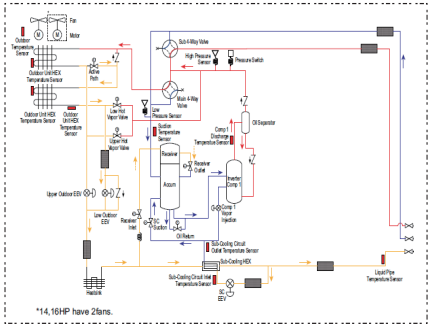
	Heat Pump & Heat Recovery	
Model	JQC048MAA	JQC068MAA
Manufacturer	LG	LG
Type	BLDC inverter Scroll	BLDC inverter Scroll
Compression Volume (cm^3/rev)	43.8	62.1
Refrigerating machine oil	FVC68D	FVC68D
Weight (kg)	31	31.8
Internal diameter of inlet (mm)	ID22.6 ±0.2	ID22.6 ±0.2
Internal diameter of outlet (mm)	ID16.05 ±0.2	ID16.05 ±0.2

3. EEV

3.1 Failure Judge Method

■ Cooling

1. Main EEV (In case of 2 EEV model)
   1) Basic control
      - Variable path mode : Upper EEV Full Close / Lower EEV Full Open
      - Low temperature cooling mode : Upper EEV Full Open / Lower EEV Close
   2) Failure phenomenon
      ① Upper EEV leakage
      All the refrigerant flows into the upper EEV and decrease the capacity of the lower heat exchanger.
      → SC EEV Open to ensure SC degree
      ② Lower EEV clogging
      Flow rate is concentrated in check valve → Excessive pressure loss → Indoor refrigerant noise occurs
2. SC EEV
   1) Basic control : SC / SH control
   2) Failure phenomenon
      ① SC EEV open failure : Outdoor SC can not be controlled
      → Indoor refrigerant noise occurs due to insufficient SC
      → Temperature is not lowered even if EEV is opened when discharge temperature emergency control
      ② SC EEV close failure : Outdoor SC leakage (EEV leakage or SC HEX inner leakage)
      → Discharge temperature is very low. In some case, CH150 occur.
      → We can inspect by closing VI suction valve. If the cycle become normal, we can be sure of SC leakage.
      → If no operation sound after switching ON the power supply, inspect EEV coil
      → If there is no problem at EEV, change SC EEV Assembly
3. VI EEV
   1) Basic control : Inverter start control, Vapor Injection control
   2) Failure phenomenon
      ① VI EEV open failure : CH21 error display, Compressor failure
      → Failure to reduce compressor different pressure during start-up
      ② VI EEV Close failure : Failure to obtain the degree of discharge superheat, CH21, Compressor failure
      → Liquid compression



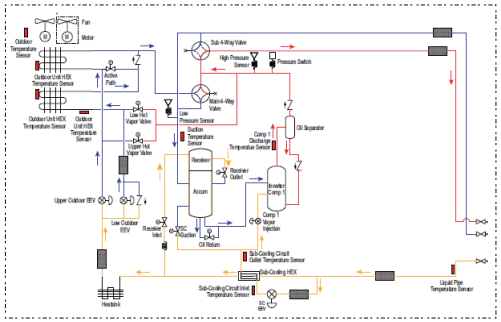
* SC : Sub Cooling, SH : Super Heating

■ Heating

1. Main EEV
   1) Basic control : Suction the degree of superheat control
   2) Failure phenomenon
      ① Upper EEV open failure
      Excessive drop of low pressure, Upper and lower heat exchanger temperature difference 10 ℃ or more
      → The refrigerant does not flow through the upper heat exchanger and the evaporation amount is insufficient.
      ② Lower EEV open failure
      Excessive drop of low pressure, Upper and lower heat exchanger temperature difference 10 °C or more
      → The refrigerant does not flow through the lower heat exchanger and the evaporation amount is insufficient.

2. SC EEV
   1) Basic control : Inverter emergency control
   2) Failure phenomenon
      ① SC EEV Open failure : EEV is open but discharge temperature is not lower
      → Open when compressor discharge temperature rises
      ② SC EEV close failure : Outdoor SC leakage (EEV le akage or SC HEX inner leakage)
      → Discharge temperature is very low. This can make compressor failure.
      → We can inspect by closing VI suction valve. If the cycle become normal, we can be sure of SC leakage.
      → If no operation sound after switching ON the power supply, inspect EEV coil
      → If there is no problem at EEV, change SC EEV Assembly

3. VI EEV
   1) Basic control : Inverter start control, Vapor Injection control
   2) Failure phenomenon
      ① VI EEV Open failure : CH21, Compressor failure
      → Failure to reduce compressor different pressure during start-up
      ② VI EEV Close failure : Failure to obtain the degree of discharge superheat, CH21, Compressor failure
      → Liquid compression



* SC : Sub Cooling, SH : Super Heating

■ Physical Failure Judge Method

1. Main PCB reset to initialize EEV : Full Open (1,950 pls) → Full Close (1,950 pls + 200 pls) → Open (32 pls - 4Way valve on) or Open (1 950 pls - 4Way valve off)
   → EEV operation sound and vibration are larger than the normal operation state when close signal is entered in full close state
   → When the operation signal (close and open) is transmitted while the EEV mechanism is in the constrained state, the operation sound and the vibration are larger than the normal operation state
   * If EEV is normal and reset several times, it is reset to full close state

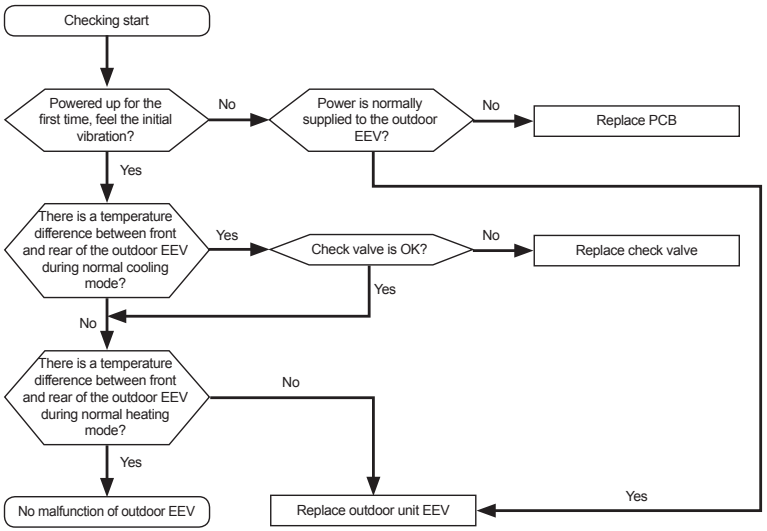
2. Check the resistance between coil terminal
* EEV Resistance Spec

Coil terminal color		Resistance
Red	White	150Ω ± 15
Red	Orange	150Ω ± 15
Brown	Yellow	150Ω ± 15
Brown	Blue	150Ω ± 15
White	Orange	300Ω ± 15
Yellow	Blue	300Ω ± 15

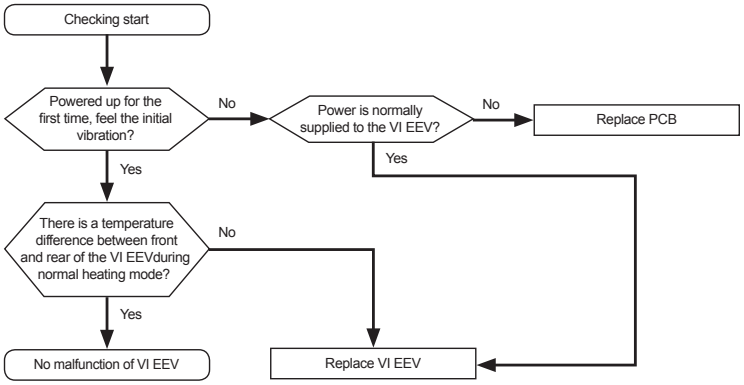
3. Use the EEV failure judgment kit

3.2 Checking Method (Flow Chart)

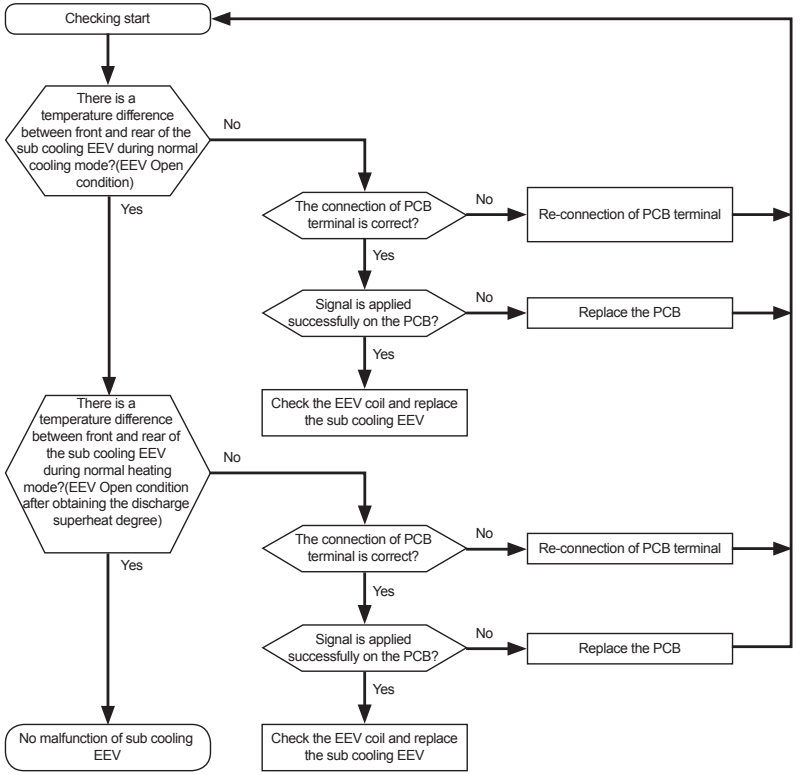
■ Outdoor Unit EEV



■ VI EEV



■ Sub Cooling EEV



3.3 Precautions of Replacement

1. EEV should be judged correctly and replaced
2. Replaced EEV should be returned for cause analysis
3. Do not transfer heat to EEV body when welding
4. In case use the refrigerant after welding, be careful welding crack and the body damage
5. Be careful not to damage terminals when PCB is fastened
   (Contact failure prevent)
6. PCB reset after replacement and check operation sound is normal
7. Vacuum at least 4 ~ 5 hours after welding.
8. After vacuum processing, please charge the refrigerant by calculating the additional amount of refrigerant according refrigerant basic amount of the enclosed, outdoor unit charging factor, the pipe length.

4. Solenoid Valve

Check that the output signal of the control board matches the operation of the solenoid valve.

4.1 Variable Path Valve

1. Basic control
   - Base : Off
   - Cooling mode : Open
   - Low temperature cooling mode : Close
   - Heating mode : Close

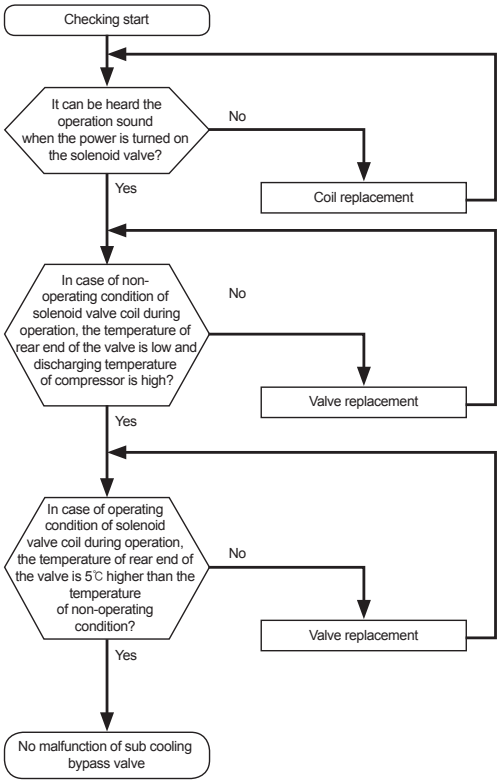
2. Failure Phenomenon
   1) Open Failure
      : The upper EEV is closed and the refrigerant flow is blocked. So, the high pressure rises sharply
      → CH34, High-pressure switch ON, Main PCB Off

   2) Close Failure
      : The refrigerant passing through the upper EEV does not go to the heat exchanger but enters accumulator through the variable path valve
      → Heat capacity decrease, Excessive temperature difference between upper / lower heat exchanger (more than 15 degrees)

4.2 Sub Cooling Bypass Valve

1. When the compressor starts, the sub cooling bypass valve is ON for minute. At this time, check whether the noise or pipe vibration occurs In solenoid valve
2. Turn on the valve 5 seconds after stopping the compressor to quickly remove the difference of high / low pressure
3. If the compressor suction pipe temperature drops below target temperature, turn on the sub cooling bypass valve.
4. Depending on the cycle status, the sub cooling bypass valve may remain ON. This is not a malfunction.
5. The change of operation status by the solenoid valve operation can be confirmed by the temperature before and after the bypass pipe and the refrigerant sound.
6. Insulation resistance in the state of connecting the valve to coil should be over 100mΩ when measure it with DC mega tester(DC 500V)

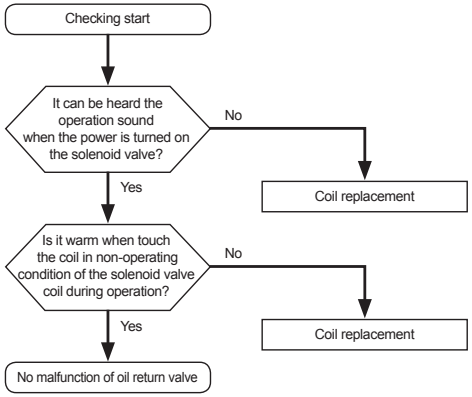
■ Checking Method (Flow Chart)



4.3 Oil Return Valve

1. It is located at the bottom of the accumulator and operates after the compressor running to supply oil to the compressor.
2. When the compressor starts operating, oil solenoid valve will be ON for minutes. check if there is operation noise on the solenoid valve or pipe vibration
3. It turns ON right after the compressor stop
4. Solenoid valve can turn ON and OFF repeatedly by the condition of cycle operation. this is not a malfunction.
5. Insulation resistance in the state of connecting the valve to coil should be over 100mΩ when measure it with DC mega tester(DC 500V)

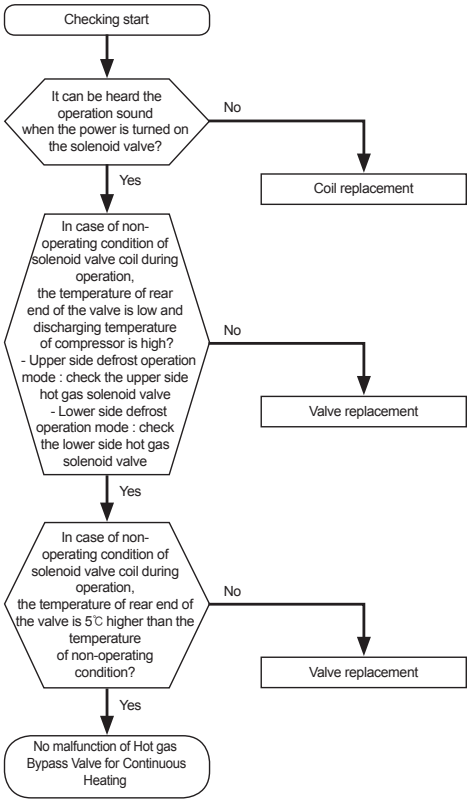
■ Checking Method (Flow Chart)



4.4 Hot gas Bypass Valve for Continuous Heating

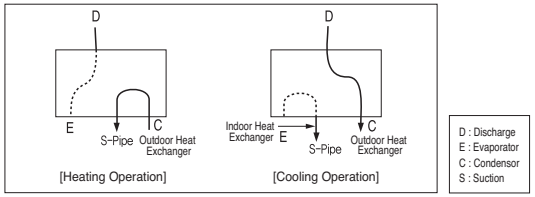
1. Defrost operation eliminates ice attached on heat exchanger, recovering performance of heat exchanger.
2. Two solenoid valves will be on by turns in the extent of 6 minutes when separated defrosting is on.
3. It will be turned of right after the end of separated defrosting.
4. The change of the operation condition by the operation of solenoid valve can be checked by the before and behind temperature of bypass piping and the sound of refrigerant.
5. Insulation resistance in the state of connecting the valve to coil should be over 100mΩ when measure it with DC mega tester(DC 500V).

■ Checking Method (Flow Chart)



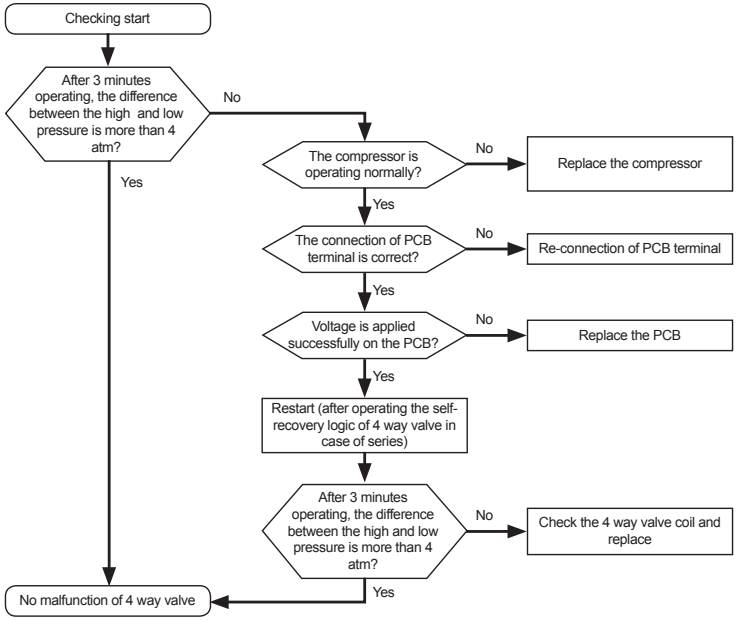
5. 4Way Valve

1. Keep it off before the outdoor unit is powered on and the indoor unit is turned on.
2. Cooling, defrosting, oil recovery : OFF, heating : ON
3. When alternating cooling to heating, transform 4 way valve during re-starting for 3 minutes.
4. To check the mode of cooling/heating operation of 4 way valve, touch the piping surface of low pressure service valve.
5. Refrigerant flowchart of 4 way valve

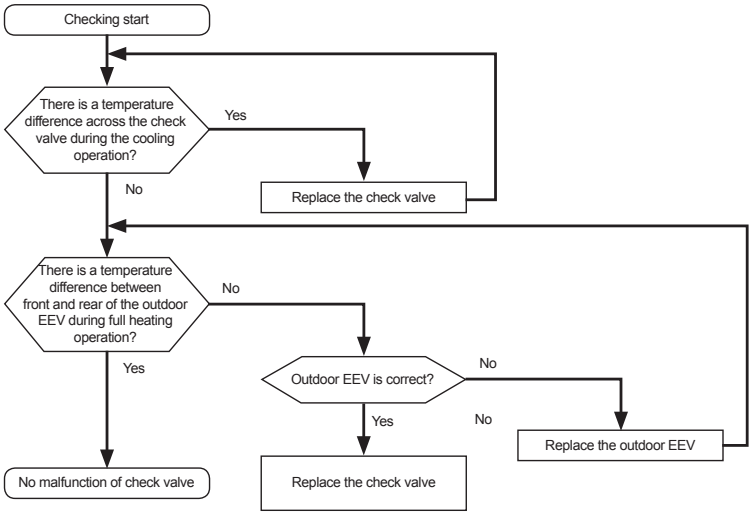


6. Insulation resistance in the state of connecting the valve to coil should be over 100mΩ when measure it with DC mega tester(DC 500V).

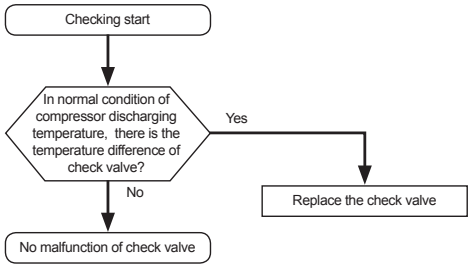
■ Checking Method (Flow Chart)



6. Check Valve (Outdoor EEV Check Valve)



7. Check Valve (Oil Separator)



8. Outdoor Fan & Fan Motor

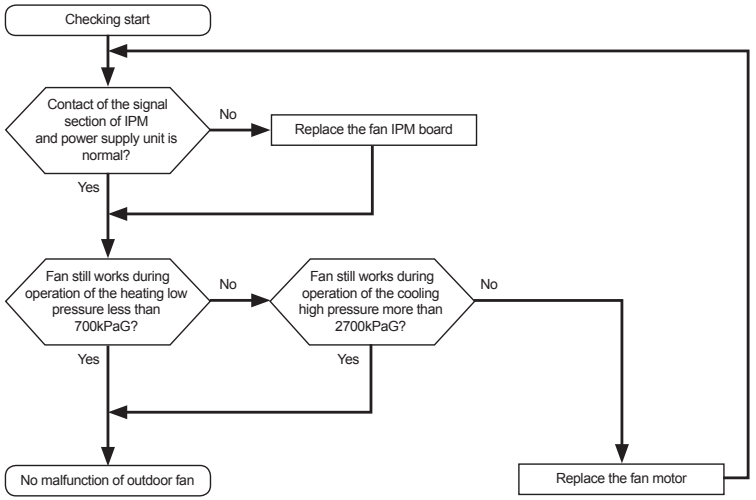
8.1 Outdoor Fan

1. The outdoor fan is controlled by the inverter motor which can control the number of rotations.
2. The outdoor fan is controlled by the high/low pressure of the outdoor unit after the operation of compressor.
3. There is possibility that the outdoor fan does not operate due to low capacity operation or low outdoor temperature even if the compressor is operating. This does not mean breakdown of the unit, the fan will start operating if it reaches the set point.

8.2 Fan Motor

Checking Item	Symptom	Countermeasure
1. The fan motor does not operate. 2. Vibration of the fan motor is large	1) When power supply is abnormal	* Modify connection status in front of or at the rear of the breaker, or if the power terminal console is at frosting condition.
		* Modify the power supply voltage is beyond specified scope.
	2) For wrong wiring	* For following wiring. 1. Check connection status. 2. Check contact of the connector. 3. Check that parts are firmly secured by tightening screws. 4. Check connection of polarity. 5. Check short circuit and grounding.
	3) For failure of motor	* Measure winding resistance of the motor coils. - UX3 : 19Ω ±7 %(@25°C) - UX2 : 14.2Ω ±7 %(@25°C)
	4) For failure of circuit board	* Replace the circuit board in following procedures if problems occur again when powering on and if there are no matters equivalent to items as specified in above 1) through 3).(Carefully check both connector and grounding wires when replacing the circuit board) 1. Replace only fan control boards.If starting is done, it means that the fan control board has defect. 2. Replace both fan control board and the main board. if starting is done, it means that the main board has defect. 3. If problems continue to occur even after countermeasure of No.1 and No.2, it means that both boards has defect.

8.3 Checking Method (Flow Chart)



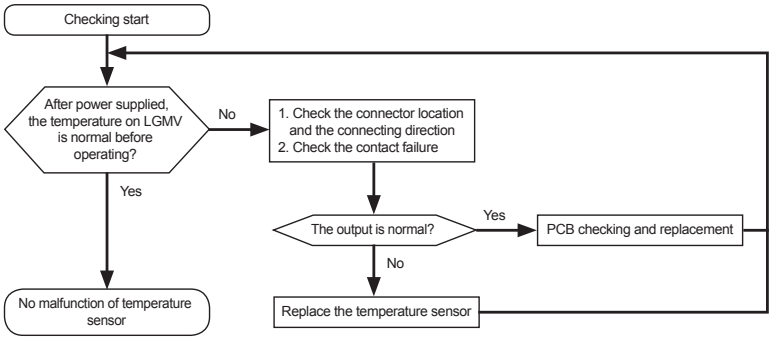
9. Temperature Sensor

1. Check the condition of installation and the contact of temperature sensor.
2. Check whether the connector contact of temperature sensor is normal.
3. Measure the resistance of temperature sensor.

	TH1	TH2	TH3
Resistance	10KΩ±1%(25℃)	5KΩ±1%(25℃)	200KΩ±1%(25℃)
	1.07KΩ±3.3%(85℃)	535KΩ±3.3%(85℃)	28KΩ±7.7%(85℃)

* TH1 : Outdoor temperature sensor
* TH2 : Pipe temperature sensor
* TH3 : Discharge pipe(D-pipe) temperature sensor

■ Checking Method (Flow Chart)

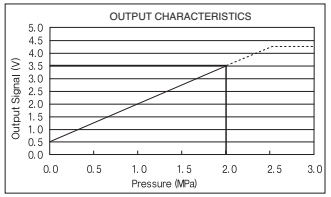


10. Pressure(High/Low) Sensor

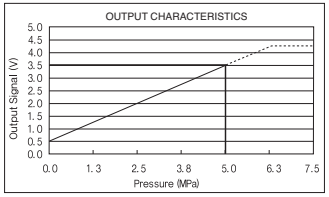
Connect manifold gauge to the service valve of outdoor unit, and compare the output of high pressure sensor to the output of low pressure sensor to detect the defect.

Below)
Compare the output of pressure sensor to the output of manifold gauge pressure using the table below.
Read the pressure clearly between black and white as the composition of pressure sensor.

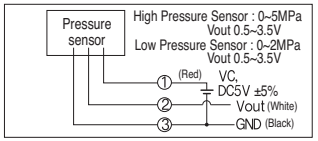
<Low Pressure Sensor>



<High Pressure Sensor>

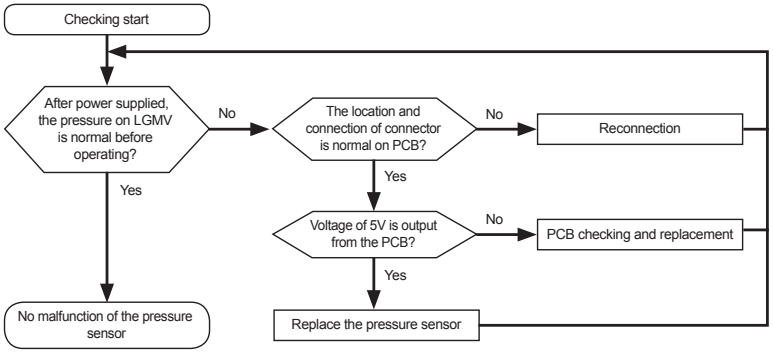


1) If the pressure of manifold gauge is 0~1kg/cm^2, it indicates the pressure got lower due to the leakage of refrigerant. Find the place of leakage and fix it.
2) If the difference of the outputs of high and low pressure is in the range of 1kg/cm^2, the pressure sensor is normal.
3) If the difference of the outputs of high and low pressure is over 1kg/cm^2, the pressure sensor is out of order, it need to be replaced.
4) The composition of pressure sensor



The pressure sensor is composed like the circuit picture shown above. If DC 5V voltage flows on red and black wire, voltage would be made between the white and black wire. The pressure which is equivalent to the pressure output is shown in the table above.

■ Checking Method (Flow Chart)

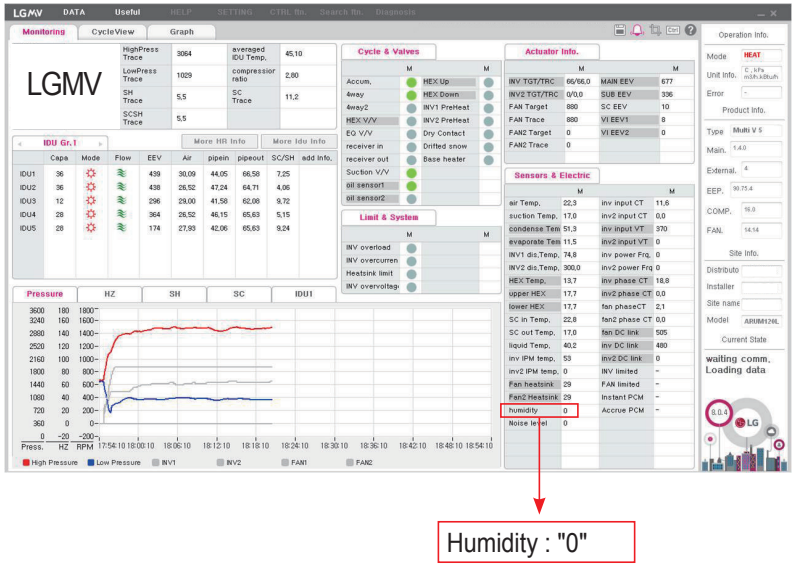


11. Humidity Sensor

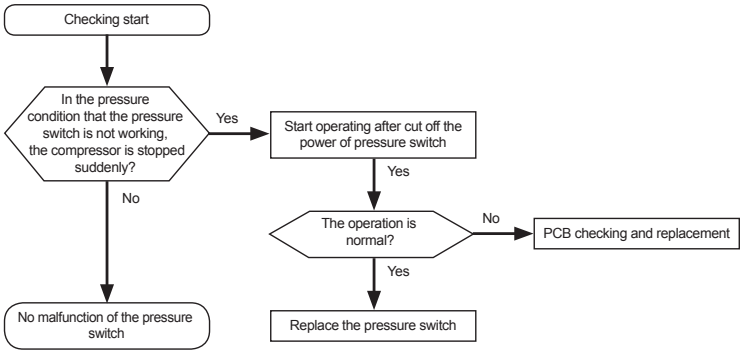
If the humidity sensor has problem such as sensor open or short, no error display is shown at outdoor unit.

Normally LGMV shows humidity ratio such as below display box of LGMV.
However, if the humidity sensor open/short occurred, it displays as "0".
In case of the sensor fault occurred, the system is operated not as the dual sensing SLC (Temperature + Humidity) but as the SLC (Only Temperature)

This means that system is normally operated without humidity function even if humidity sensor has problem.



12. Pressure Switch



⚠ CAUTION

When the long-term operation to turn off the power of the pressure switch, you can receive a fatal damage to the components and piping systems.

13. Main PCB

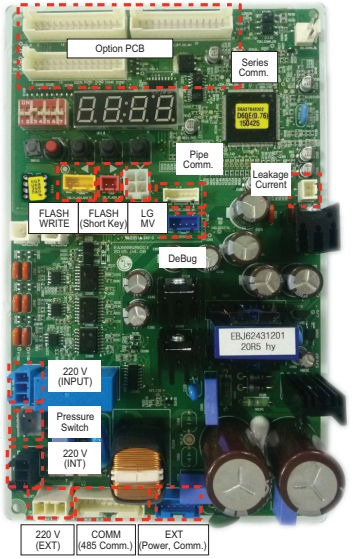
13.1 Failure Judge Method

1. Error code check

Error Code	Error diagnosis
-	• Check restart after power reset • Check main PCB power supply. 1)
CH50	• Check N-phase wrong connection of power supply.
CH53	• Check communication PCB (Indoor/Outdoor) connection harness (24pin), Main - External PCB communication harness(6pin, Blue) connection condition
CH86	• Check the EEPROM inserting (direction, pin break, etc.) condition
CH52, CH57, CH105	• Check Main - Inverter PCB communication harness(2pin, Blue) wrong connection condition
CH145	• Check Main - External PCB communication harness(6pin, Blue) wrong connection condition

2. Main PCB check

Check the power line connection status because it is not displayed in 7 segment



13.2 Failure Cause

1. High voltage (T-N more than 484V, N phase wiring fault) → CH50
2. Rainwater inflow by Control box / Front Panel / Service port open, Control box screw loosening
3. Part short by foreign substance
4. Defective PCB / Diode / Resistance / Capacitor / Regulator

13.3 Precautions of Replacement

1. Be sure to use the main PCB suitable for the model (Check P/No)
2. Be sure to turn off the power and wear insulated gloves before touching the PCB.
3. Use box or bag only for PCB.
4. If on-boarding is required after replacement, check the program and EEPROM C/Sum (especially when using an alternate Main PCB)

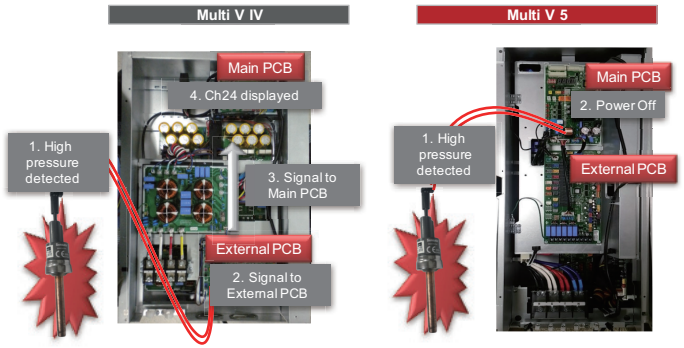
13.4 Check Point after Replacement

1. Check whether there is any abnormality when the cycle is stabilized at cooling or heating mode.
2. Check current Hz control according to target Hz
3. Check that the target high / low pressure is reached

---

1) Check high pressure switch or operation cycle if Main PCB has no power. If high pressure switch is ON, the system will shut off power supply to Main PCB. Generally in this case, check pressure switch fault or outdoor unit service valve open. (Pressure switch will be ON when the high pressure is over 39~42kgf/cm^2)

• Difference of Main PCB



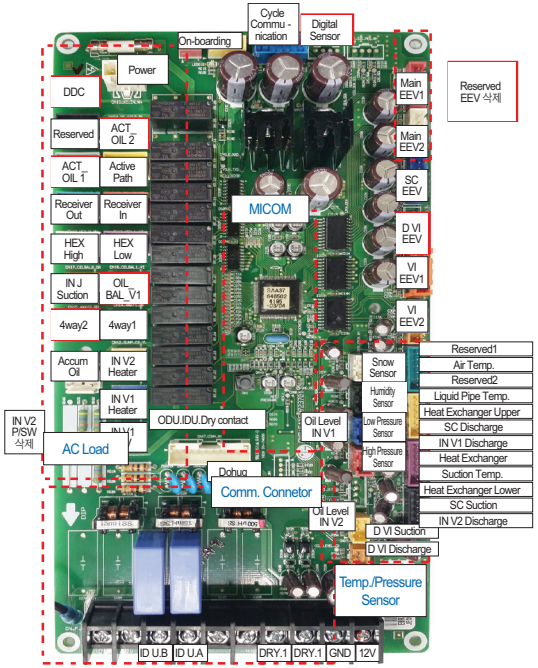
14. External PCB

14.1 Failure Judge Method

1. Error code check

Error Code	Error diagnosis
CH05, CH53, CH104, CH237, CH238	• Even after checking the connection condition of indoor and outdoor communication lines (shield wire, unshield wire)
CH32, CH33, CH34, CH35, CH36, CH41, CH42, CH43, CH44, CH45, CH46, CH47, CH113, CH114, CH115, CH116, CH151, CH153, CH154	• Even after replace each temperature sensor, pressure sensor, and valve replacement.
CH145	• Even after checking Main - External PCB communication harness(6pin, Blue) connection condition

2. External PCB check



14.2 Failure Cause

1. High voltage (T-N more than 484V, N phase wiring fault) → CH50
2. Rainwater inflow by Control box / Front Panel / Service port open, Control box screw loosening
3. Part short by foreign substance
4. Defective PCB / Diode / Resistance / Capacitor / Regulator

14.3 Precautions of Replacement

1. Be sure to use the main PCB suitable for the model (Check P/No)
2. Be sure to turn off the power and wear insulated gloves before touching the PCB.
3. Use box or bag only for PCB.
4. If on-boarding is required after replacement, check the program and EEPROM C/Sum (especially when using an alternate Main PCB)

14.4 Check Point after Replacement

1. Check whether there is any abnormality when the cycle is stabilized at cooling or heating mode.
2. Check current Hz control according to target Hz
3. Check that the target high / low pressure is reached

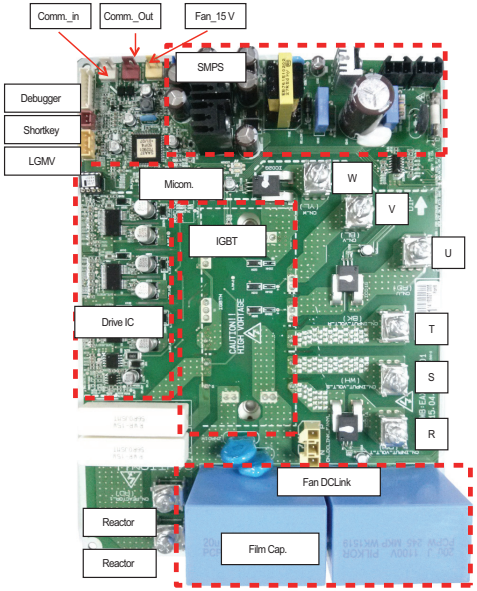
15. Inverter PCB

15.1 Failure Judge Method

1. Error code check

Error Code	Error diagnosis
-	• Checking restart after power reset
CH52, CH57	• Even after checking 220V connection condition for Inverter SMPS power supply
CH52, CH57, CH105	• Even after checking Main - Inverter PCB communication harness(2pin, White) connection condition
CH23, CH50	• Even after checking R, S, T connection harness condition (Open, Wrong connection) and connection sequence.
CH21	• Even after replacing compressor
CH21, CH26	• Even after checking U, V, W connection condition
CH60	• Even after checking EEPROM inserting (direction, pin break, etc.) condition.

2. Inverter PCB check



15.2 Failure Cause

1. High voltage (T-N more than 484V, N phase wiring fault) → CH50
2. Rainwater inflow by Control box / Front Panel / Service port open, Control box screw loosening
3. Part short by foreign substance
4. Defective Fan motor / PCB / Diode / Resistance / Capacitor / Regulator

15.3 Precautions of Replacement

1. Be sure to use the main PCB suitable for the model (Check P/No)
2. Be sure to turn off the power and wear insulated gloves before touching the PCB.
3. Use box or bag only for PCB.
4. Be sure to apply thermal grease.
5. When IGBT screw is fastened, it should be fastened two times.
6. If on-boarding is required after replacement, check the program and EEPROM C/Sum
   (especially when using an alternate Main PCB)

15.4 Check Point after Replacement

1. Check whether there is any abnormality when the cycle is stabilized at cooling or heating mode.
2. Check current Hz control according to target Hz
3. Over current error check (CH29)
4. Check that compressor 1 and 2 are properly connected.
5. Check that the target high / low pressure is reached.

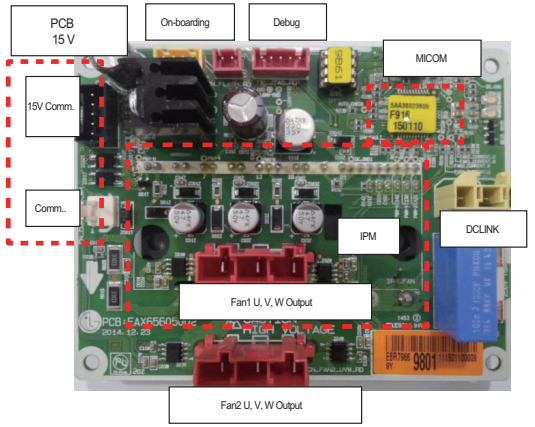
16. Fan PCB

16.1 Failure Judge Method

1. Error code check

Error Code	Error diagnosis
-	• Checking restart after power reset
CH105	• Even after checking 220V connection condition for Inverter SMPS power supply
CH76, CH107	• Even after checking DC_Link P, N connection harness assembly condition (Open, Wrong connection)
CH77, CH106	• Even after replacing fan motor • Even after fan motor connector misconnection(U, W, V output)

2. Inverter PCB check



16.2 Failure Cause

1. High voltage (T-N more than 484V, N phase wiring fault) → CH50
2. Rainwater inflow by Control box / Front Panel / Service port open, Control box screw loosening
3. Part short by foreign substance
4. Defective Fan motor / PCB / Diode / Resistance / Capacitor / Regulator

16.3 Precautions of Replacement

1. Be sure to use the main PCB suitable for the model (Check P/No)
2. Be sure to turn off the power and wear insulated gloves before touching the PCB.
3. Use box or bag only for PCB.
4. Be sure to apply thermal grease.
5. When IGBT screw is fastened, it should be fastened two times.
6. If on-boarding is required after replacement, check the program and EEPROM C/Sum (especially when using an alternate Main PCB)

16.4 Check Point after Replacement

1. Check whether there is any abnormality when the cycle is stabilized at cooling or heating mode.
2. Check current Hz control according to target Hz
3. Over current error check (CH29)
4. Check that fan 1 and 2 are properly connected.
5. Check that the target high / low pressure is reached.

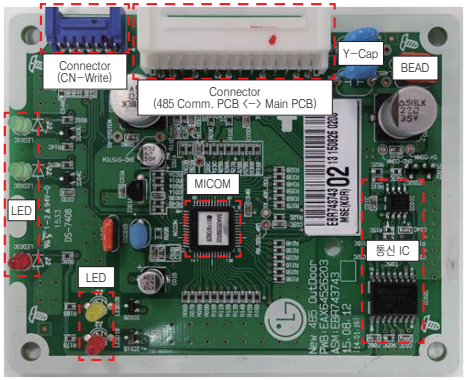
17. Communication PCB

17.1 Failure Judge Method

1. Error code check

Error Code	Error diagnosis
-	• Checking restart after power reset
CH05, CH53	• Even after checking 220V connection condition for main SMPS power supply
CH76, CH107	• Indoor/Outdoor communication PCB connection harness(24pin), Main - External PCB communication harness(10pin) connection condition
CH05, CH53, CH104, CH237, CH238	• Even after checking the connection condition of indoor and outdoor communication lines (shield wire, unshield wire)

2. Communication PCB check



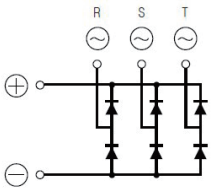
17.2 Failure Causes

1. Part short (by foreign substance, moisture)
2. Resistance / Capacitor / Micom / Comm. IC defect
3. Connector & Housing Pin wrong connection
4. PCB Fault

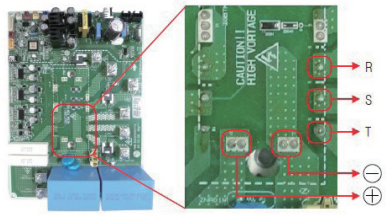
18. Phase Bridge Diode

18.1 Phase Bridge Diode Checking Method

Internal circuit diagram



Appearance



1. Wait until Comp PCB DC voltage gets discharged, after the main power switch off.
2. Pull out DC_Link connector, CN COIL 1, 2 connector connected with Converter PCB.
3. Set multi tester in diode mode.
4. Measured value should be 0.4~0.7V measuring as below table.
5. In case the measured value is different from the table, set multi tester to resistance mode and measure. If the value is small (0 Ω) or high (hundreds M Ω), PCB needs to be replaced.
6. In case that bridge diode is damaged, check if Comp, Converter PCB assembly(IPM) is needed to be replaced.

Diode terminal / Tester terminal	+ terminal : black(-)	- terminal : red(+)
R(~) : red(+)	0.4 V ~ 0.7 V	-
S(~) : red(+)	0.4 V ~ 0.7 V	-
T(~) : red(+)	0.4 V ~ 0.7 V	-
R(~) : black(-)	-	0.4 V ~ 0.7 V
S(~) : black(-)	-	0.4 V ~ 0.7 V
T(~) : black(-)	-	0.4 V ~ 0.7 V

※ Red(+) and black(-) are the measuring terminals of multi tester.

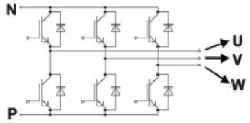
⚠ CAUTION

1. Check the electric parts of c/box, 10 minutes after switching off the main supply and checking DC voltage is discharged. Otherwise, there is chance of getting electric shock.
2. There is chance of electric shock by charged voltage.

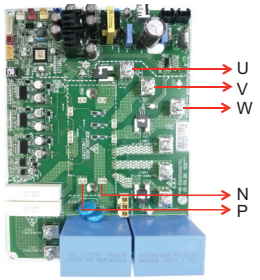
19. Inverter IGBT

19.1 Inverter IGBT Checking Method

Internal circuit diagram



Appearance

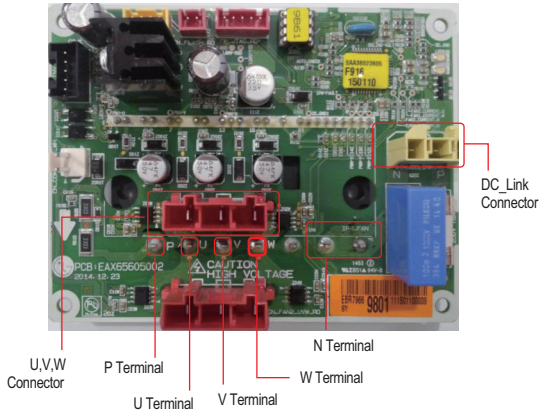


1. Wait until Inverter PCB DC voltage gets discharged, after the main power switch off (approximately 5~10 minutes)
2. Pull out all the connector connected with Inverter PCB
3. Set multi tester in diode mode
4. Measured value should be 0.2~0.6V measuring as below table.
5. In case the measured value is different from the table, set multi tester to resistance mode and measure. If the value is small (0 Ω) or high (hundreds M Ω), PCB needs to be replaced

Diode terminal / Tester terminal	P terminal : black(-)	N terminal : red(-)
U terminal : red(+)	0.2 V ~ 0.6 V	-
V terminal : red(+)	0.2 V ~ 0.6 V	-
W terminal : red(+)	0.2 V ~ 0.6 V	-
	P terminal : red(+)	N terminal : red(+)
U terminal : black(-)	-	0.2 V ~ 0.6 V
V terminal : black(-)	-	0.2 V ~ 0.6 V
W terminal : black(-)	-	0.2 V ~ 0.6 V

20. Fan IPM

20.1 Fan IPM Checking Method



1. Wait until Fan PCB DC voltage gets discharged after the main power switch off
2. Pull out DC Link connector and U, V, W fan motor connector connected with fan PCB
3. Set multi tester in resistance mode
4. If the value between P and N terminal of IPM is short (0Ω), PCB needs to be replaced (IPM damaged)
5. If the measured value is different from the value given in the table, PCB is needs to be replaced

Diode terminal / Tester terminal	P terminal : black(-)	N terminal : red(-)
U terminal : red(+)	4.98 MΩ ± 10 % (25℃)	5.85 MΩ ± 10 % (25℃)
V terminal : red(+)	4.98 MΩ ± 10 % (25℃)	5.85 MΩ ± 10 % (25℃)
W terminal : red(+)	4.98 MΩ ± 10 % (25℃)	5.85 MΩ ± 10 % (25℃)
	P terminal : red(+)	N terminal : red(+)
U terminal : black(-)	4.49 MΩ ± 10 % (25℃)	0.72 MΩ ± 10 % (25℃)
V terminal : black(-)	4.49 MΩ ± 10 % (25℃)	0.72 MΩ ± 10 % (25℃)
W terminal : black(-)	4.49 MΩ ± 10 % (25℃)	0.72 MΩ ± 10 % (25℃)

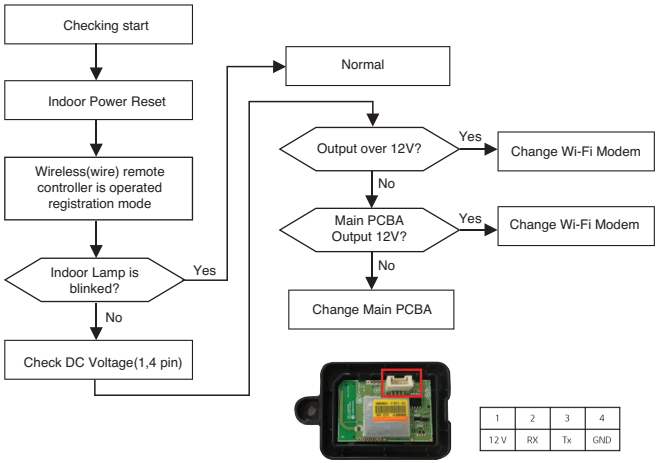
21. ThinQ Wi-Fi Modem

ThinQ Wi-Fi Modem

Symptom	Cause	Check method and Trouble shooting
During product registration, Wifi LED is not blinked*	Wireless remote controller is defected or indoor is not received signal.	Check air conditioner is operated by wireless remote controller.
	The product is not supported by ThinQ	Check ThinQ logo Check to install Wi-Fi Modem
	Wi-Fi wire is not connected	Check your Wi-Fi Modem is connected with indoor unit
After completing product registration, "Product Registration Failed" message pops up	Router configuration Problem	Check router 1) 2.4GHz 2) Minimum: over -60db - Recommendation : over -40db 3) Security method (WPA2) 4) Check password(English, number)
After completing product registration, "Product Registration to other country" message pops up	Product registration problem	Customer has ID, deleted Product Restart registration
Disconnect often occurs	Wi-Fi Signal low	Install rourer near the product (Minimum : over -60db)
	Internet is slow	Connect at least products to the rotuer Check Internet speed

* HW defect occurs only for the phenomenon, so check the flow chart and replace it.
If you have any questions about the ThinQ app, please send email to smart.thinq@lge.com.

Symptom	Primary Check Point
During product registration, Wi-Fi LED is not blinked	Check air conditioner is operated by wire remote controller.
	Doesn't operate registration mode, execute Flow Chart



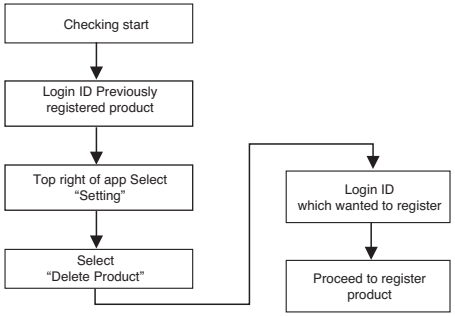
Symptom	Primary Check Point
After completing product registration, "Product Registration Failed" message pops up	Check the router's settings

• After the product registration is completed, "Product registration failure" is output when the server cannot communicate with the product for 1 minute and 30 seconds after registering the product.
- The router and the Wi-Fi modem communicate normally but if the router communicates later
- If the router's name (SSID) or password includes unsupported characters
- If the router's security method setting is WEP
- If you enter the wrong password for the router
- If the signal strength of the router is weak
- If the connection of www.smartthinq.com is blocked due to the security of the network

Action	Primary Check Point
Action 1	The router and the Wi-Fi modem communicate normally but if the router communicates later - After deleting the product, proceed with product registration again.
Action 2	If the router's name (SSID) or password includes unsupported characters - Modify the name of the router (SSID) and the password to supported characters. - After deleting the product, proceed with product registration again.
Action 3	If the router's security method setting is WEP - It is recommended to change the security method to WPA2. If you want to use WEP, set key to 1. - After deleting the product, proceed with product registration again.
Action 4	If you enter the wrong password for the router After deleting the product, proceed with product registration again. - Enter the correct router password when proceeding.

Symptom	Primary Check Point
After completing product registration, “Product Registration to other country“	Customer has ID, deleted Product

• After completing product registration, “Product Registration to other country“ is ThinQ Server has Wi-Fi Modem device information(device ID using MAC) already.
- Customer registered to other country.
- During A process of manufacture, it was registered.(OQC)



※ If you don’t know registration ID or history, you send mail to smart.thinq@lge.com

Symptom	Primary Check Point
After Using product, "disconnected" message pops up	Check network environment of the place.

• After the product is using, "disconnected" is output when the server cannot communicate with the product for 1 minute and 30 seconds after registering the product.
- The router and the Wi-Fi modem communicate normally but if the router communicates later
- If the router is Power Off or Break Down
- If you change password for the router
- If the signal strength of the router is weak

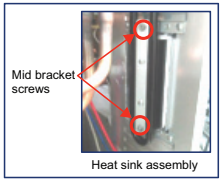
Action	Primary Check Point
Action 1	Registered the product using smart Phone’s hotspot function - After deleting the product at app, proceed with product registration again. - Hot spot function On, password is configured simply. - If registration is completed, router is problem. Check router’s password and other configuration.
Action 2	If the signal strength of the router is weak(under -60 db) - Move the router closer to the product. - After deleting the product, proceed with product registration again.

Service & Replace Method of Control Box, Inverter PCB

■ Control box / Inverter PCB Servicing / Dismantling Procedure.

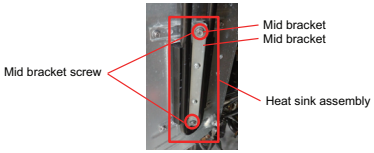
⚠ WARNING

- Do not pull out the heat sink assembly before removing the middle bracket screws.
- Do not apply heavy force on tube parts while detaching the heat sink assembly.
  It may damage and leads to failure of device. Gently detach total heat sink assembly.



■ Control Box assembly Servicing / Dismantling Procedure

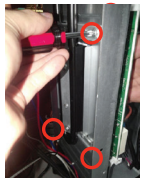
1. Remove the control box cover.
2. Remove the middle bracket screws as shown in the figure.
3. Gently detach the Heat sink assembly from the control box
4. Detach Fan lead wire from the control box and compressor lead wires from the compressors.
5. Now the control box assembly can be removed from the outdoor unit after removing the outer screws.
6. Inversely follow above procedure (1~5) to reassemble the control box.



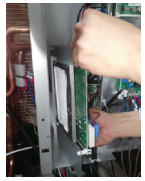
Note.
Apply thermal grease at the heat sink if necessary.

■ Inverter PCB Servicing / Dismantling Procedure

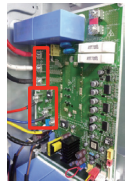
1. Remove the Thermal Pad mounting screws at the left side of the control box (4EA)



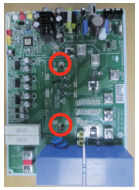
2. Carefully pull out the Inverter PCB from control box assembly.



3. Detach the Compressor (U/V/W) and the power input (R/S/T) lead wires.



4. Unscrew the middle IGBT mounting screws (2EA)



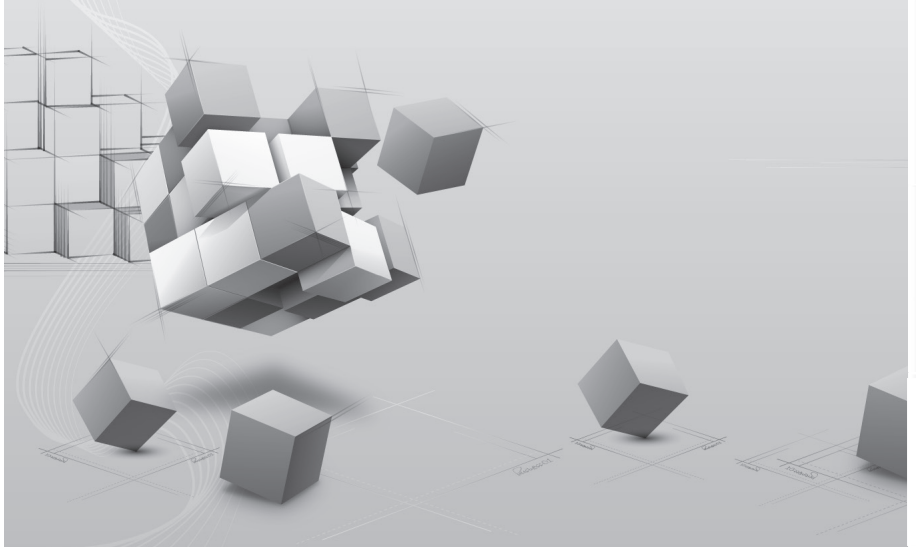
5. Finally take out the PCB from the corner supporters.

6. Follow the same procedure (1~5) inversely to reassembly the inverter PCB.

Note.
1. Apply thermal grease at heat sink if needed.
2. Carefully reconnect the wires with out interchanging the locations.

MULTI V 5

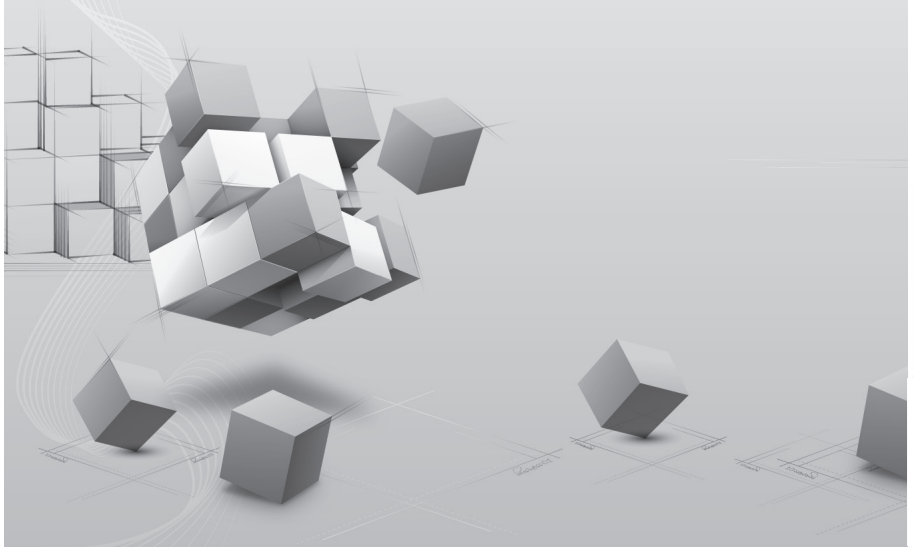
Ⅳ. Control Logic



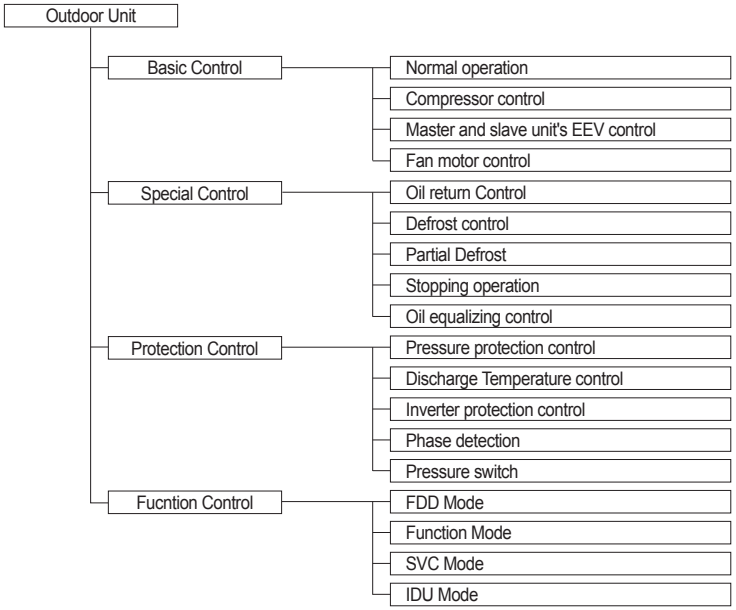
MULTI V 5

Ⅳ. Control Logic

Outdoor Unit Control



1. Outdoor Unit Control Classification



2. Basic Control

2.1 Normal operation

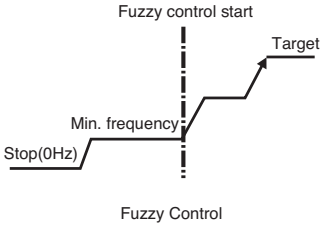
Actuator	Cooling operation	Heating operation	Stop state
Compressor	Fuzzy control	Fuzzy control	stop
Fan	Fuzzy control	Fuzzy control	stop
Main EEV	Upper : Min. pulse Low : Full open	Fuzzy control	Min. pulse
Subcooling EEV	Fuzzy control	• Normal : Vapor injection Control • Avoiding control of high discharge temperature	Min. pulse
Indoor Unit EEV	Superheating fuzzy control	Subcooling fuzzy control	Min. pulse

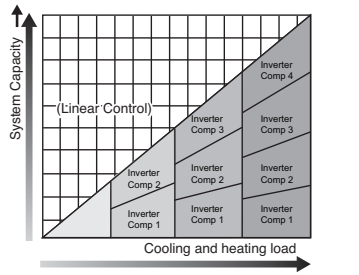
Note : Heating operation is not functional at an outdoor air temperature of 27°C or more.
Cooling operation is not functional at an outdoor air temperature of 2°C or less with indoor unit combination of 10% or less

2.2 Compressor control

Fuzzy control : Maintain evaporating temperature(Te) to be constant on cooling mode and condensing temperature(Tc) on heating mode by Fuzzy control to ensure the stable system performance.
(Tc: 47~51°C [116.6~123.8°F], Te: 2~5°C [35.6~41°F])
(1) Cooling mode
Te can be set various step at installation mode.
(2) Heating mode
Tc can be set various step at installation mode.

Note: By setting dip switch, Te and Tc are decided simultaneously.





Inverter linear control as cooling and heating load increasing

2.3 Master and slave Unit's EEV control

(1) Main EEV control
Main EEV operates with fuzzy control rules to keep the degree of super Heat(Superheat) (about 3°C [37.4°F])at the evaporator outlet stable during heating mode
The degree of Superheat = Tsuction - Tevaporation
Tsuction : temperature at suction pipe sensor(°C [°F])
Tevaporation : evaporation temperature equivalent to low pressure(°C [°F])

(2) Subcooling EEV control(about 15°C [59°F]))
Subcooling EEV works with fuzzy rules to keep the degree of Subcool at the outlet of subcooler during cooling mode
The degree of Subcool = Tcondensation - Tliquid
Tliquid : temperature at outlet of subcooler(°C [°F])
Tcondensation : condensation temperature equivalent to high pressure(°C [°F])

(3) Avoiding excessive high discharge temperature : when discharge super heat degree is above (25°C [145°F]) in heating operation.

(4) Vapor injection flow-rate control at heating mode
The degree of Superheat (VI_SH) = Subcooler out(°C [°F]) – Subcooler in(°C [°F])
VI_SH can be controled according to current discharage super heat degree value. If discharge super heat value is increased, then targe superheat value will be decreased to reduce refrigerant flow to compressor.

2.4 Fan motor control

Fan motor operates with Fuzzy control rules.

3. Special Control

3.1 Oil return control

3.1.1 Oil return control on cooling mode

Oil return operation recovers Oil level in compressor by collecting oil accumulated in pipe.
Each cycle component operates as shown on the below table during oil return operation.

Outdoor Unit

Component	Starting	Running	Ending
Inv Compressor	30Hz	Setting Value	30Hz
FAN	Normal control	Normal control	Normal control
Main EEV	Upper : Min. pulse Low : Max. pulse	Upper : Min. pulse Low : Max. pulse	Upper : Normal control Low : Normal control
Subcooling EEV	Min. pulse	20 pulse	20 pulse
4way valve 1	OFF	OFF	OFF
4way valve 2	OFF	OFF	OFF

Indoor Unit

Component	Starting	Running	Ending
Fan	Normal control	OFF	Normal control
Thermo on unit EEV	Normal control	Normal control	Normal control
Thermo off unit EEV	40 pulse	400 pulse	40 pulse
Oil return signal	OFF	ON	OFF

- Oil return operation time : 3 min for running step
- Starting condition : When low oil level which is measured by oil level sensor is kept continuously then oil return operation will be started.
- Oil return process ends if compressor protection control starts

3.1.2 Oil return control on heating mode

Outdoor Unit

Component	Starting	Running	Ending
Inv Compressor	30Hz	Setting Value	25~40Hz
FAN	Normal control	Normal control	Normal control
Main EEV	Upper : Min. pulse Low : Max. pulse	Upper : Min. pulse Low : Max. pulse	Upper : Normal control Low : Normal control
Subcooling EEV	Min. pulse	20 pulse	20 pulse
4way valve 1	ON	OFF	ON
4way valve 2	Heat Recovery : OFF Heat pump : OFF	OFF	OFF

Indoor Unit

Component	Starting	Running	Ending
Fan	Normal control	OFF	Normal control
Thermo on unit EEV	Normal control	400~800 pulse	Normal control
Thermo off unit EEV	80~130 pulse	400~800 pulse	80~130 pulse

- Oil return operation time : 3 min for running step
- Starting condition:same as cooling mode
- Oil return process ends if compressor protection control starts

3.2 Defrost control

Defrost operation eliminates ice accumulated on heat exchanger, recovering performance of heat exchanger.
Each cycle component operates as following table during defrost operation.

Outdoor Unit

Component	Starting	Running	Ending
Inv Compressor	30Hz	Setting Value	25~40Hz
FAN	Stop	High pressure control	Normal control
Main EEV	Normal control	Max. pulse	Normal control
Subcooling EEV	Normal control	Min. pulse	Normal control
4way valve 1	ON → OFF	OFF	ON
4way valve 2	OFF	OFF	OFF
Upper Heat Exchanger	OFF	OFF	OFF
Lower Heat Exchanger	ON → OFF	OFF	OFF

Indoor Unit

Component	Starting	Running	Ending
Fan	OFF	OFF	OFF
Thermo on unit EEV	Normal control	400~800 pulse	Normal control

- Ending condition
  1) All heat exchanger pipe temperature are above setting temperature for 30 sec.
  2) The running time of defrost operation is over 30% of the total heating time (Maximum 20 min.)
  3) If compressor protection control starts by high discharge temperature of compressor.

3.3 Partial Defrost

Partial defrost operation divides heat exchanger with upper and parts that gives a chance to make the defrost separately in order to proceed the heating performance continuously. Each cycle component operates as following table during partial defrost operation.

Outdoor Unit

Component	Starting	Running	Ending
Inv Compressor	Normal control	Setting Value	Normal control
FAN	Normal control	Low pressure control	Normal control
Main EEV	Normal control	Normal control	Normal control
Subcooling EEV	Normal control	Normal control	Normal control
4way valve 1	ON	ON	ON
4way valve 2	OFF	OFF	OFF
Upper Heat Exchanger	OFF	OFF → ON → ON	OFF
Lower Heat Exchanger	OFF	ON → OFF→ ON	OFF

Indoor Unit

Component	Starting	Running	Ending
Fan	ON(Setting)	ON(Low)	ON(Setting)
Thermo on unit EEV	Normal control	Normal control	Normal control

■ Ending condition

1) Upper defrost ending condition over setting temperature.
2) Low defrost ending condition over setting temperature.
3) Max. 12 minutes

3.4 Stopping operation

3.4.1 Stopping operation on cooling mode

Component	Operation	Note
Inv Compressor	OFF	-
FAN	Stop	-
Main EEV	32 pulse	-
Subcooling EEV	16 pulse	Stop(Min. pulse)
4way valve 1	OFF	-
4way valve 2	Heat Recovery : OFF	-
	Heat Pump : ON	-

3.4.2 Stopping operation on heating mode

Component	Operation	Note
Inv Compressor	OFF	-
FAN	Stop	-
Main EEV	32 pulse	-
Subcooling EEV	16 pulse	Stop(Min. pulse)
4way valve 1	ON	OFF over 30°C air temperature
4way valve 2	OFF	-

3.5 Oil equalizing control

This function prevents oil unbalance between inverter compressors.

When oil level which is measured by oil level sensor is kept differently between each compressor then oil equalizing EEV will be open during 5 minutes.

※ Except for 1 compressor model

4. Protection Control

4.1 Pressure Protection Control

4.1.1 Pressure control on cooling mode

■ **High pressure control**

Pressure Range	Compressor	Fan
$P_d \geq 4003$ kPa	Stop	Stop
$P_d > 3775$ kPa	-15Hz/10sec.	+100RPM/10sec.
$P_d \geq 3650$ kPa	Frequency holding	+100RPM/10sec.
$P_d \geq 3480$ kPa	+2 Hz or less/10sec.	+100RPM/10sec.
$P_d < 3480$ kPa	Normal control	

■ **Low pressure control**

Pressure Range	Compressor	Fan
Ps ≤ 110kPa	Stop (1 min. later)	Stop
Ps ≤ 150kPa	-10Hz / 10sec.	-100RPM/10sec.
Ps > 150kPa	Frequency holding	-100RPM/10sec.
Ps > 185kPa	+2Hz or less/20sec.	-100RPM/10sec.
Ps > 220kPa	+2Hz or less/20sec.	-100RPM/10sec.
Ps > 260kPa	Normal Control	

❉ Frequency holding : frequency (or RPM) is not increasing (can decrease)

4.1.2 Pressure control on heating mode

■ **High pressure control**

Pressure Range	Compressor	Fan
$P_d \geq 4003$ kPa	Stop	Stop
$P_d > 3415$ kPa	-15Hz/10sec.	-50RPM/10sec.

■ **Low pressure control**

Pressure Range	Compressor	Fan
Ps ≤ 110 kPa	Stop	Stop
Ps ≤ 150 kPa	-10Hz/10sec.	+100RPM/10s
Ps ≤ 185 kPa	Frequency holding	+100RPM/10s
Ps ≤ 220 kPa	+2 Hz or less/10sec.	+100RPM/10s
$P_s \leq 260$ kPa	Normal control	Normal control

❉ Frequency holding : frequency (or RPM) is not increasing (can decrease).

4.2 Discharge Temperature Control

■ **Outdoor unit control**

Temperature range	Compressor	Sub cooling EEV	IDU EEV
T_{dis} >113°C (235.4°F)	-5Hz/10sec.	SC,SH decrease control	SH decrease control
T_{dis} >110°C (230°F)	-5Hz/30sec.	SC,SH decrease control	SH decrease control
$T_{dis} \geq 105$°C (221°F)	Frequency holding	SC,SH decrease control	SH decrease control
$T_{dis} \leq 100$°C (212°F)	+3Hz or less	SC,SH decrease control	SH decrease control
T_{dis} >100°C (212°F)	Normal control	SC,SH decrease control	SH decrease control

SC : Sub Cooling, SH : Super Heating

4.3 Inverter protection control

	Chassis	Compressor (kW)	HP	Cooling & Heating or Cooling(Heating)					
				Normal Operation		Frequency Down		System Stop	
				Compressor1	Compressor2	Compressor1	Compressor2	Compressor1	Compressor2
AC Input Current	UXA	12	8	16(18)A or less	-	16(18)A or more	-	20A or more	-
	UXA	17	10	24(26)A or less	-	24(26)A or more	-	28A or more	-
	UXA	17	12	24(26)A or less	-	24(26)A or more	-	28A or more	-
	UXB	17	14	26(28)A or less	-	26(28)A or more	-	30A or more	-
	UXB	17	16	26(28)A or less	-	26(28)A or more	-	30A or more	-
	UXB	17/12	18	24(26)A or less	18(20)A or less	24(26)A or more	18(20)A or more	28A or more	22A or more
	UXB	17/12	20	24(26)A or less	20(22)A or less	24(26)A or more	20(22)A or more	28A or more	24A or more
	UXB	17/12	22	25(27)A or less	21(23)A or less	25(27)A or more	21(23)A or more	29A or more	25A or more
	UXB	17/17	24	26(28)A or less	26(28)A or less	26(28)A or more	26(28)A or more	30A or more	30A or more
	UXB	17/17	26	26(28)A or less	26(28)A or less	26(28)A or more	26(28)A or more	30A or more	30A or more
Compressor Current	UXA	12	8	20A or less	-	20A or more	-	30A or more	-
	UXA	17	10	28A or less	-	28A or more	-	41A or more	-
	UXA	17	12	28A or less	-	28A or more	-	41A or more	-
	UXB	17	14	28A or less	-	28A or more	-	41A or more	-
	UXB	17	16	28A or less	-	28A or more	-	41A or more	-
	UXB	17/12	18	28A or less	20A or less	28A or more	20A or more	41A or more	30A or more
	UXB	17/12	20	28A or less	20A or less	28A or more	20A or more	41A or more	30A or more
	UXB	17/12	22	28A or less	20A or less	28A or more	20A or more	41A or more	30A or more
	UXB	17/17	24	28A or less	28A or less	28A or more	28A or more	41A or more	41A or more
	UXB	17/17	26	28A or less	28A or less	28A or more	28A or more	41A or more	41A or more

❉ AC input current is input current of inverter compressor except constant current (current pass through noise filter)

4.4 Phase detection

■ If the power lines are connected incorrectly the product will not work and displays error like below.
Case1) 1 or more phase lines are missing (disconnected)
Case 2) Neutral (N) line connected wrongly to any phase line

Case	Operation				
Missed Phase	R, S, T	Single Unit	M	-	-
			Error No. 501	-	-
		Series Units	M	S1	S2
			Error No. 501	Error No. 502	Error No. 503
			M + S1 (At the same time)	M + S2 (At the same time)	M + S3 (At the same time)
			Error No. 501	Error No. 502	Error No. 503
			M + S1 + S2 (At the same time)	-	-
			Error No. 501	-	-
	N	No error			
Reversed Phase	R, S, T	Single Unit	Normal operation		
		Single Unit	Normal operation		
		If Neutral (N) line wrongly connects to any phase line (R or S or T) The Error No. 25 or 50 will be appeared.			

❉ M : Master Unit,
S1 : Slave Unit 1
S2 : Slave Unit 2
S3 : Slave Unit 3

4.5 Pressure switch

- Main has pressure sensing switch in series between compressor and power relay.
- The state of pressure sensing switch is normally on. It has small electric current from 220V AC. Never touch the connecting terminal with hand nor two short wires directly.

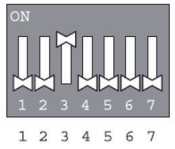
5. Function control

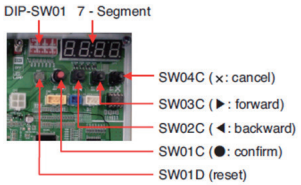
5.1 Generation 4 Features

Generation 4 Features (Gen. 4)
- Two (2) set point control between zone and central / gateway controllers.
- Improved cooling / heating thermal on / off range setting.
- Improved communication rate / auto addressing time.
- Fan off during cooling thermal off setting.
- New Premium controller / upgraded programmable controller.
- Improved group control airflow features.
- Indoor unit power consumption display.
- Added heating test mode / commissioning operation setting.
- Filter status notification.
- System product check feature using wall controller.

The latest versions of LG's indoor units are Generation 4 (Gen 4).
For Gen 4 indoor units to operate with Gen 4 indoor unit features, the air conditioning system must meet the following requirements:
- All indoor units, heat recovery units, and outdoor units must be Gen 4 or higher.
- All Outdoor units must have Gen 4 or higher software installed.
- Outdoor units DIP switch 3 must be set to ON (factory default setting is OFF).
- All controllers must support Gen 4 indoor unit features.

Select the mode/function/option/value using '▶', '◀' Button and confirm that using the '●' button after dip switch No.5 is turned on.





Outdoor Units*	Indoor Units**	Heat recovery boxes	Outdoor Unit Dipswitch No.3	Operation Status
Gen 4 or Higher	Gen 4 ONLY	Model 2A ONLY	Must be ON	System will operate with Gen. 4 indoor unit features.
			OFF	System will operate but without Gen. 4 indoor unit features.
		Any combination of Models 1A, 2A	Must be OFF (factory default)	Does NOT include Gen. 4 features. System will not operate if DIP Switch No. 3 is ON, and an error code CH200 will be generated to ODU and CH242 on Gen 2 IDU.
	Any combi-nation of Gen 2 and Gen 4	Model 2A ONLY	Must be OFF (factory default)	
		Any combination of Models 1A, 2A		
		Any combination of Models 0A****1A, 2A	N/A***	Does not include Gen. 4 features.

* Gen 4 or Higher outdoor units : Multi V 5, Multi V IV or Multi V Water IV with Gen 4 or Higher software (see table below for Gen 4 or higher serial numbers) or Multi V S.

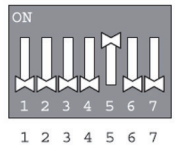
** Gen 4 Indoor Units model numbers end in “4”; Gen 2 Indoor Units model numbers end in “2” or an “A”, including Hydro Kit.

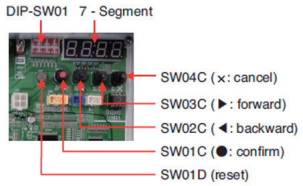
*** DIP Switch No. 3 on Gen 2 outdoor units is not related to Gen 4 features as it is with Gen 4 outdoor units.

**** 0A Model Heat Recovery boxes are not for use with Multi V 5, Multi V IV, Multi V Water IV, or Multi V III heat recovery systems.

5.2 Function Control Setting

Select the mode/function/option/value using '▶', '◀' Button and confirm that using the '●' button after dip switch No.5 is turned on.





■ The Function Table

FD - Function codes designated as "FDD" are used by the Multi V commissioning agent to assist with system startup. No "FD" function code should be left in the "on" position without an authorized LG commissioning agent approving the use.

FN - Function codes designated by "Installation" are used to modify the behavior of one or more components of the VRF system. A change in the value of an "FN" function code typically impacts the behavior of the refrigeration system control universally.

SE - Function codes designated as "Service" should only be used by a qualified Multi V VRF Service Engineer. The "SE" codes are designed to provide the qualified service technician with manual control of the VRF system component(s) as an aide in isolating an operational problem during initial commissioning and startup or to assist the service technician with diagnosing an operational problem. No "SE" function code should be left in the "on" position without a qualified Multi V service technician on site.

ID - Function codes designated by "IDU" are used to modify the behavior of one or more of the indoor units. A modification to an ID function code value typically is used to fix a localized issue with a single or group of indoor units.

Mode	Display	Function Selection Content	Model Type		Page
			Heat Recovery	Heat Pump	
Fdd	Fd 1	Automatic Refrigerant Charging (Cooling)	●	●	202
	Fd 2	Automatic Refrigerant Charging (Heating)	●	●	202
	Fd 3	Refrigerant Amount Check (Cooling)	●	●	-
	Fd 4	Refrigerant Amount Check (Heating)	●	●	-
	Fd 7	Automatic ITR (Cooling / Heating)	●	●	205
	Fd 8	All IDU operation (Cooling)	●	●	209
	Fd 9	All IDU operation (Heating)	●	●	209

Mode	Display	Function Selection Content	Model Type		Page
			Heat Recovery	Heat Pump	
Func	FN 1	Cool & Heat Selector	-	●	210
	FN 2	High Static Pressure Compensation	●	●	212
	FN 3	Night Low Noise	●	●	214
	FN 4	Overall Defrost	●	●	216
	FN 5	ODU Addressing	●	●	218
	FN 6	Snow Removal & Rapid Defrost	●	●	219
	FN 7	Airflow Adjusting for IDU	●	●	220
	FN 8	Target Pressure Adjusting	●	●	221
	FN 9	Low Ambient Kit	●	●	222
	FN 10	High Efficiency Mode (Cooling Operation)	●	●	223
	FN 11	Auto Dust Removal Mode	●	●	224
	FN 12	Compressor Max. Frequency Limit	●	●	225
	FN 13	ODU Fan Max. RPM Limit	●	●	226
	FN 14	Smart Load Control	●	●	227
	FN 16	Humidity Reference	●	●	231
	FN 17	Active Oil Control	●	●	-
	FN 19	The Connecting of Central Control at IDU Terminals	●	●	232
	FN 20	Compressor Input Current	●	●	233
	FN 21	The Smart Plug	●	●	234
	FN 22	Overall Defrost Entrance for Low temperature	●	●	235
	FN 23	Optional Base Panel Heater	●	●	236
	FN 24	Change Defrost Control for Noise Reduction	●	●	000
	FN 25	Priority Cooling	●	●	000
	FN 26	Refrigerant gas leak detection system mode	●	●	000
SVC	SE 1	Pump Down	●	●	237
	SE 2	Pump Out	●	●	239
	SE 3	Vaccum	●	●	243
	SE 4	Back Up	●	●	244
	SE 5	Forced Oil Return	●	●	246
	SE 6	Forced Defrost	●	●	246
	SE 8	Display Cycle Information	●	●	247
	SE 9	Noise Reduction	●	●	248
	SE 10	Entry Heating Oil Return	●	●	249
	SE 11	Heating Fan Low Noise	●	●	250

Mode	Display	Function Selection Content	Model Type		Page
			Heat Recovery	Heat Pump	
SVC	SE 12	Number of Partial Defrost	●	●	251
	SE 14	Level Changes of CH200	●	-	252
	SE 15	Level Changes of CH53	●	●	252
	SE 17	Fan Motor Service mode	●	●	000
Idu	Id 1	EEV Pulse of Non-Operating IDU in Heating	●	●	253
	Id 2	Set IDU Superheat	●	●	254
	Id 3	Set IDU Subcool	●	●	254
	Id 5	Set Auto Pipe Detection	●	-	255
	Id 6	Start Auto Pipe Detection	●	-	255
	Id 7	Set Zone Master	●	-	257
	Id 8	Operating IDU Low Noise	●	-	258
	Id 9	In Cooling IDU EEV Max. Pulse	●	●	259
	Id 10	Comfort Cooling	●	●	260
	Id 11	Non-Operating IDU Subcool	●	●	262
	Id 12	Set IDU Superheat for Fan	●	●	263
	Id 13	IDU Fan RPM Direct Control	●	●	-

* Functions save in EEPROM will be maintained continuously, though the system power was reset.

5.3 FDD Mode

5.3.1 FDD Check List

■ Please check the following.

1. Automatic address setting has been preceded by a test drive will proceed on the premise.
   After installation, auto address must be checked because it is related the number of Installation

2. 3 minutes after the initial power on test drive at one point.
   After the power on, MICOM data reset and communication with indoor unit time is 3minute

3. Indoor units must be manufactured after Feb. 2009.

4. In FDD test drive, state of the test drive and error are displayed using 7 segment.
   The process of the test drive and state of error are displayed using only the master outdoor unit.

5. If the error is occurred during the test drive, it will be operated the last step after turn off the test drive.
   After the dipswitch off, pressing the black button for 2 seconds in order to reset all data and return to operation standby state

6. SW04C (X: Cancel) button and SW01C (●: execute) button is pressed for more than 5 seconds at the same time when the test drive must be turned of the reason of abrupt trouble during test drive.

7. All indoor units are turned off or the results are displayed after 90 seconds when the test drive is over.

8. First, please pressing the main PCB reset button for 3 minutes when you want to use all FDD functions.

9. Normal test run is operated when you use more than LGMV 7.1.1 version.

⚠CAUTION
- If the product is used for the first time after installation, the ITR (Fd7) must be completed before normal use.
- The indoor unit can not be operated during FDD operation (indicated by 'HL' on the wired remote control).
- When replacing the main PCB, please use it as the old EEPROM. (Test run information is stored in EEPROM)

5.3.2 FDD Code Display

Code	Display	Display contents	Display contents
E01	E01	Excessive or less capacity of indoor units	1. Excessive connection of indoor units compared to capacity of Outdoor Unit. (Over 160% or less than 50% ratio) 2. Check communication status between outdoor and indoor unit.(Check the number of indoor units)
E02	E02	System unstable Error	1. In case emergency control of system occurs during determining cycle stability (Re-check the amount of system refrigerant, installed environment.)
E03	E03	Temperature Range Error	1. In case outdoor and indoor unit are outside the range of operable temperature.
E04	E04	Defrost Operation Error	1. Unstable Test Run when the frost condition is met. 2. Check the temperature value of the ambient, hex temperature included upper/lower.
E05	E05	In case error occurs during sense checking process. (system error, emergency status)	1. Re-execute Test Run after the error is generated. (Errors and emergency controls can be checked through LGMV Display)
E06	E06	Occurs when the indoor unit number is one or non operational indoor unit is installed.	1. Check communication status between outdoor and indoor unit.(Execute address settings as needed)
E08	E08	Test Run forced termination	1. Re-execute Test Run after reset of outdoor unit (E08 does not mean termination)
E12	E12	Auto addressing error	1. In case auto addressing is not operated or the number of addressed indoor unit is zero. (Check communication status between outdoor and indoor unit.(Execute address settings as needed)
E13	E13	SVC V/V Closed error	1. Check Pipe in/out temperature before and after operation of indoor unit. 2. Check svc valve is closed or not.

* Emergency control: Low / High pressure limit, compression ratio limit, excessive increase of discharge or IPM temperature of Compressor, etc.
* Non Operational Indoor unit:
AHU Model, Hydro Kit (LRD-L1600A, LRD-L3200A, LRD-L5200A, LRD-L1600B, LRD-L2500B)
ERV DX (LZ-H500NX, LZ-H800NX, LZ-H1000NX, LZ-H500HX, LZ-800HX, LZ-1000HX)

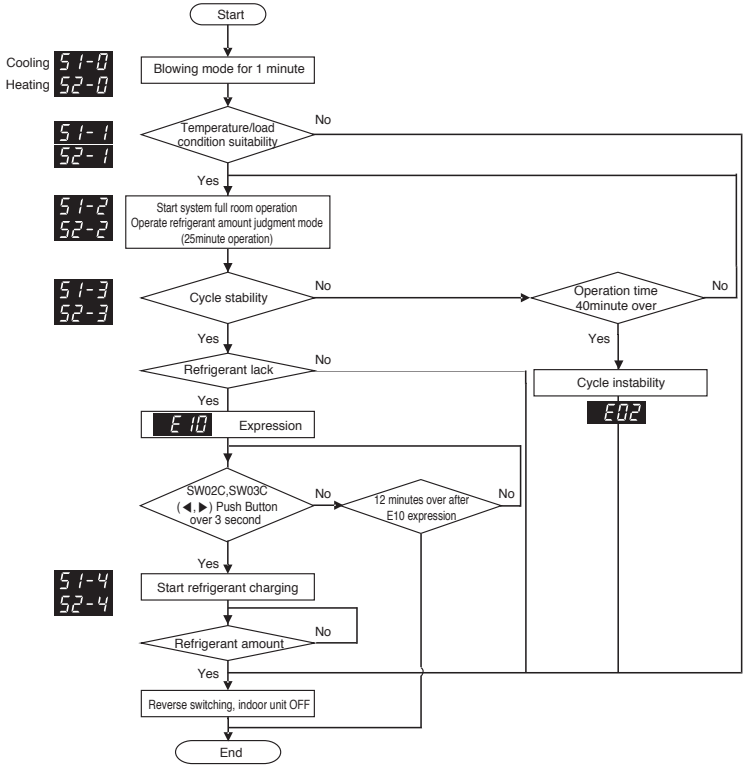
5.3.3 Refrigerant Auto Charging (Cooling / Heating)

This function charge suitable refrigerant amount in system through cycle operation automatically. If the refrigerant amount is inaccurate by service, pipe leakage, etc, can use this function.

■ Setting the function

Function	
Refrigerant Auto Charging	Fd 1 (Cooling) / Fd 2 (Heating)

■ Flow Chart



■ Detailed information

• Install refrigerant charging device like this page.

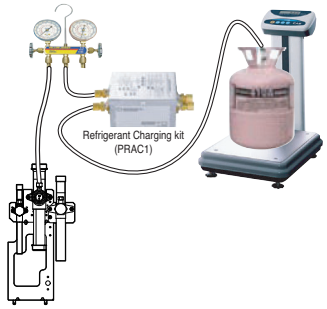
• If it is out of the guarantee temperature range, can end by not operating refrigerant charging.
- Outdoor guarantee temperature range
  cooling : 0~43°C [32~109.4 °F] / heating : -10~24°C [14~75.2°F]
- Indoor guarantee temperature range
  cooling : 0~32°C [32~64.4°F] / heating : 10~27°C [50~80.6°F]

• If the system are turned off continuously by low pressure decrease excessively due to refrigerant lack before E10 expression, try again after add about 15% refrigerant of regular refrigerant amount.

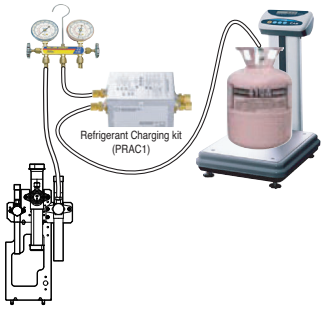
• Press SW04C(X: Cancel) button and down dip switch after function end.

■ Refrigerant Charging Method

Heat recovery system



Heat pump system



• Procedure
1. Prepare Manifold, refrigerant and scale. (sold separately)
2. Connect Manifold to refrigerant charging port As shown in the figure above.
3. Connect Manifold and refrigerant.
4. Perform the air purge between Manifold hose.
5. When PrES / PUtn is appeared, push '▶' or '◀' button.
6. When S1-4 or S2-4 is appeared, open the valve and fill the system with the refrigerant.
7. When S1-5 or S2-5 is appeared, close the valve and remove connected charging port.

⚠ WARNING
- When perform the leakage test and air purge, please use a vacuum pump or an inert gas. (nitrogen)
- If you use Oxygen, compressed air and flammable gas, there are fire and danger of explosion. There are risk of death, personal injury, fire, explosion.

⚠ CAUTION
- When you put refrigerant, using the specified equipment.
- Please the wired remote control to set the main unit.
- During Indoor unit operating, be careful not to be thermo off.
- Use refrigerant charging, if service only.
- Put the refrigerant by calculating the refrigerant amount surely, if install.
- Refrigerant charging time can be different following the charging refrigerant amount. (charging time : about 3 kg / min)
- If The outdoor unit occurred frost when Heating automatic refrigerant filling, Please restart corresponding function after forced defrost.

5.3.4 Automatic ITR (Cooling / Heating)

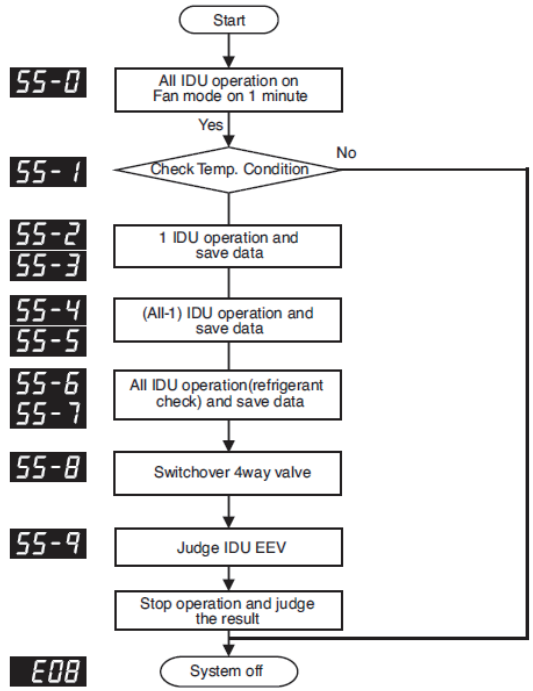
It is a function to get information about amount of refrigerant and EEV status in IDU, ODU if normal or not.

■ Setting the function

Function	
Automatic ITR (Cooling / Heating)	Fd 7

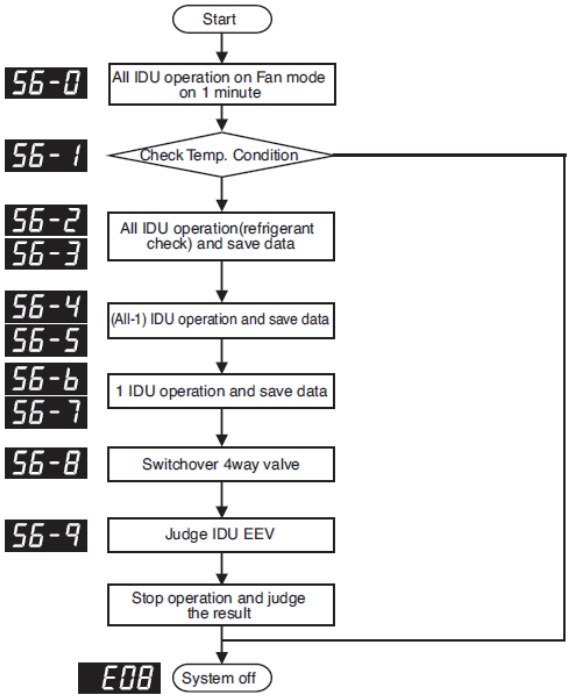
■ Flow Chart

1. Cooling
   - If the system is in operation before entering the cooling test operation, "IDU / STOP" is displayed, then the indoor unit is turned off and the FDD operation is entered. please enter the total amount of refrigerant accurately before entering mode.



2. Heating

• If the system is in operation before entering the heating test operation, "IDU / STOP" is displayed, then the indoor unit is turned off and the FDD operation is entered. please enter the total amount of refrigerant accurately before entering mode.



■ The Display of Results

		Judgment	Code	Display
ITR(Cooling)	IDU EEV	OK	5-Cn	5-cn
		NG	5-C1	5-c1
		Impossible to Judge	5-CF	5-cF
	Refrigerant	More than standard	ex) 20%	20
		Less than standard	ex) -15%	-15
		Don't Adjustment required	00	00
		Impossible to Judge	3-CF	3-cF
ITR(Heating)	IDU EEV	OK	6-Cn	6-cn
		NG	6-C1	6-c1
		Impossible to Judge	6-CF	6-cF
	Outdoor Main EEV	OK	7-Cn	7-cn
		NG	7-C1	7-c1
		Impossible to Judge	7-CF	7-cF
	Refrigerant	More than standard	ex) 20%	20
		Less than standard	ex) -15%	-15
		Don't Adjustment required	00	00
		Impossible to Judge	3-CF	4-cF

⚠CAUTION

· Ask an authorized technician to setting a function.
· Guaranteed temperature range.
  - IDU : 18~32°C [64.4~89.6°F] / ODU : 0~43°C [32~109.4°F]
· In case the function is not used, set the dip S/W oFF and reset the power.
· If the indoor unit error occurs, indoor unit operate in fan mode. the indoor unit number that occurred an error is not displayed.
· Fd3 and Fd4 (refrigerant amount check) is function to judge the system's refrigerant automatically through the system operation. For details, refer to the service manual.

■ The Display of Results

Follow the process.

Multi V Start up Confirmation(example)

Installation Information

	Name	Company / Address	product composition	
Installer			Outdoor unit	1
CIQ			Indoor unit	4
Supervisor			HR unit	0
Site			Total refrigerant quantity	10.3 Kg

* Please make sure that the product configuration information matches the actual installation.

Trial run Condition

	Air temperature	Standard value	Status of trial run	
Indoor	26.9 ℃	Cooling: 10℃ ≤ Indoor temperature ≤ 35℃ Heating: 15℃ ≤ Indoor temperature ≤ 35℃	Operation mode	Cooling trial run
Outdoor	25.1 ℃	Cooling: 0℃ ≤ Outdoor temperature ≤ 45℃ Heating: -10℃ ≤ Outdoor temperature ≤ 35℃	Trial run error information	Normal shutdown

Trial run report

Amount of refrigerant	Outdoor uint EEV	Indoor unit EEV
Normal Amount of refrigerant : 10.2kg	-	Normal

Cycle summary

Item	ODU 1				ODU 2				ODU 3				ODU 4				Criteria
	Minimum	Maximum	Average	pass/fail	Minimum	Maximum	Average	pass/fail	Minimum	Maximum	Average	pass/fail	Minimum	Maximum	Average	pass/fail	
High pressure (kPa)	2112	2643	3372		0	0	0		0	0	0		0	0	0		2000~3500kPa (Cool/Heat)
Low pressure (kPa)	677	726	1124		0	0	0		0	0	0		0	0	0		650~1200kPa(Cool) 200~1000kPa(Heat)
ODU EEV pulse	30	65	130		0	0	0		0	0	0		0	0	0		-
Discharge superheating (℃)	-	-	22		-	-	0		-	-	0		-	-	0		10 ~ 50℃
Suction superheat (℃)	-	-	13.8		-	-	0		-	-	0		-	-	0		0.5 ~ 30℃
Subcooling (℃)	-	-	19.2		-	-	0		-	-	0		-	-	0		0.5 ~ 20℃
INV1 Discharge temperature (℃)	-	-	84		-	-	0		-	-	0		-	-	0		50 ~ 100℃
INV2 Discharge temperature (℃)	-	-	82		-	-	0		-	-	0		-	-	0		50 ~ 100℃
Input voltage (V)	380	380	380		0	0	0		0	0	0		0	0	0		345~456V
Phase current (A)	10	10	10		0	0	0		0	0	0		0	0	0		20A ↓
INV1 CT current (A)	-	-	15		-	-	0		-	-	0		-	-	0		24A ↓
INV2 CT current (A)	-	-	15		-	-	0		-	-	0		-	-	0		24A ↓

5.3.5 All IDU operation (Cooling / Heating)

It is a function to continuously operate in cooling / heating for one hour.

■ Setting the function

Function	
All IDU operation (Cooling)	Fd 8
All IDU operation (Heating)	Fd 9

■ Detailed information

- This function is used with heat pump and heat recovery.
- It is used for the purpose of checking the drain or heating cycle (EEV etc. parts inspection) when cooling / heating continuous operation is not possible due to themo off.

⚠CAUTION

· Ask an authorized technician to setting a function.
· This function enables additional charging of the refrigerant and installation inspection before ITR.

5.4 Function Mode

5.4.1 Cool & Heat selector

It is a function to control the cooling / heating limit through the switch of cool & heat selector and ODU
This is used to prevent heterogeneous operation and unnecessary energy wastage.

■ Setting the function

Function		Option
Cool & Heat selector	Fn 1	oFF, op1~op2

■ Option Selection

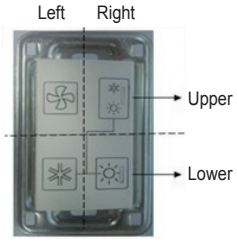
Switch Control		Function		
Switch (Up)	Switch (Down)	oFF	op1	op2
Right side (On)	Left side (Left)	Not operate	Cooling	Cooling
Right side (On)	Right side (On)	Not operate	Heating	Heating
Left side (On)	-	Not operate	Fan mode	Off

• If "On" & "op1" is selected, the following three operating scenarios are possible:

1) Cooling mode
The right side of the upper switch + The right side of the lower switch.

2) Heating mode
The right side of the upper switch + The left side of the lower switch.

2) Fan mode
The left side of the upper switch (The position of the lower switch is irrelevant)
Mechanical refrigeration is locked out and the IDU fans are allowed to operate.



■ Detailed information

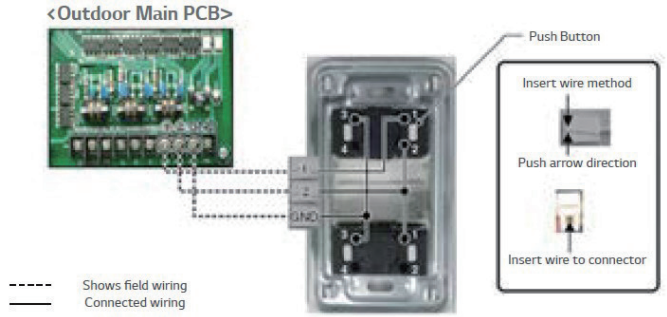
• This function is used with heat pump only.

• Heating, Cooling, Fan Only, Dry modes are a change in the setting impact.

• Cool & Heat selector information

- IDU control without central controller.
- Select operation mode : Cooling, Heating, Fan mode.
- Mode lock for cooling & heating mixing error-proof during the change of season.
- The Cool & Heat selector switch consists of two toggle switches mounted over/under. The upper switch is two-position and manually locks out heating and cooling operation allowing Fan only or allows heating or cooling operation depending on the position of the lower switch. The bottom switch is two-position and manually sets the position of the outdoor unit's reversing valve. If the left side is depressed, the valve is in the cool position. If the right side is depressed, the valve is in the heat position.

• Wiring Diagram



⚠CAUTION
· Ask an authorized technician to setting a function.
· If do not use a function, set an off-mode.
· If use a function, first install a Cool & Heat selector.
· Simultaneous model can not be used.
· Communication line length can be maximum 300m, use Communication line as thick as 1.25mm.
· This function is disabled during central controller connection.
(Central control mode lock function is prior to this function)

5.4.2 High Static Pressure Compensation

This function secures the air flow rate of ODU, in case the static pressure has been applied like using duct at fan discharge of ODU.
When the static pressure is added to the air flow rate of ODU, the air flow rate is reduced. This function compensates the reduced air flow rate by increasing the RPM of fan according to the static pressure.

■ Setting the function

Function		Option
High Static Pressure Compensation	Fn 2	oFF, op1~op3

■ Option Selection

Setting	UXA (8~12HP)			
	RPM	Pa	CMM at 0Pa	CMM at 80Pa
Standard (Default)	880	0~20	240	175
op1	910	21~40	255	190
op2	930	41~60	265	200
op3	950	61~80	270	205

Setting	UXB (14~26HP)			
	RPM	Pa	CMM at 0Pa	CMM at 80Pa
Standard (Default)	1000	0~20	320	190
op1	1040	21~40	335	230
op2	1070	41~60	350	260
op3	1100	61~80	360	280

※ Based on connecting duct

■ Detailed information

- This function is used with heat pump and heat recovery.
- All modes of operation involving compressor operation are a change in the setting impact.
- The operating symptoms that might be corrected using this function During normal operation in cooling mode, the system head pressure is consistently high relative to target pressure. In heating mode during normal operation, the system suction pressure is too low relative to the target pressure.
- If the air flow rate of ODU is decrease according to the static pressure, the efficiency of the system decreases. generally, when the air flow is less than 80% of the rated air flow, the cycle changes abnormally. (ex. high pressure over-pressure, low pressure over-pressure)
- Each option increases the max RPM to ensure air flow rate at least 80% of the rated air flow rate, depending on the static pressure.

⚠CAUTION
- Ask an authorized technician to setting a function.
- If the indoor unit combination is more than 100%, a higher level option setting should be considered.
- The air flow increases when the option is set at a higher level than the static pressure. This causes increase in noise and power consumption.
- It is recommended to check the correct static pressure when setting the option step.

5.4.3 Night Low Noise

The night low noise function is used to reduce the operating speed of the outdoor unit fans under normal operating conditions in the evening while the outdoor unit is operating in the cooling mode.

■ Setting the function

Function		Option
Night Low Noise	Fn 3	oFF, op1~op12

■ Option Selection

Setting	Judgment Time (Hr)	Operation Time (Hr)	Noise	
			UXA	UXB
op1	8	9	55	59
op2	6.5	10.5	55	59
op3	5	12	55	59
op4	8	9	52	56
op5	6.5	10.5	52	56
op6	5	12	52	56
op7	8	9	49	53
op8	6.5	10.5	49	53
op9	5	12	49	53
op10	Continuous Operation		55	59
op11	Continuous Operation		52	56
op12	Continuous Operation		49	53

• Judgment Time : The time that the outdoor temperature is highest - Function starts time

• Operation time : The time that the low noise operation function is maintained after the function is turned on

• Option : Determine the target noise level (limited Max FAN RPM by option step)

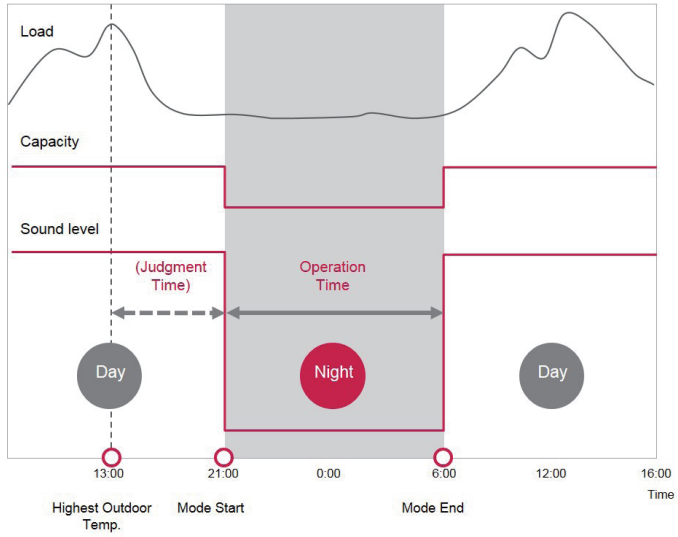
■ Detailed information

• This function is used with heat pump and heat recovery.

• Cooling mode is a change in the setting impact.

• Multi V 5 continuously monitors the building's cooling demand. On a rolling 24 hour basis, the peak cooling demand is maintained and an internal timer begins counting hours since the peak demand was set. Depending on which setting value is selected, Multi V 5's Night Low Noise function will delay the beginning time of the restricted fan speed operation. Also, depending on which setting value is selected, the restricted fan speed period time varies.

• Night Silent Operation



⚠CAUTION
- Ask an authorized technician to setting a function.
- In case of setting the target noise level, cooling capacity can be decreased.
- In most applications, since the cooling load decreases during the night, setting this function has no detrimental impact on cooling capacity.
- You can set the low noise mode control main agent by using wired remote controller (for details, refer to the new standard remote controller's manual.

5.4.4 Overall Defrost

It is a function to select the overall or partial defrost when the defrost is in operation.

■ Setting the function

Function		Option
Overall Defrost	Fn 4	on, oFF

■ Option Selection

Setting	Detail of function
on	Overall defrost
oFF	Partial defrost (Default)

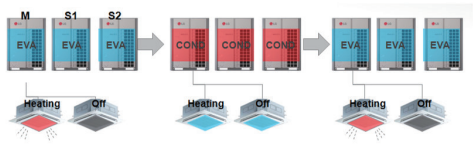
- Overall Defrost - Return to heating after quick defrosting operation
- Partial Defrost - Operate defrosting while heating

■ Detailed information

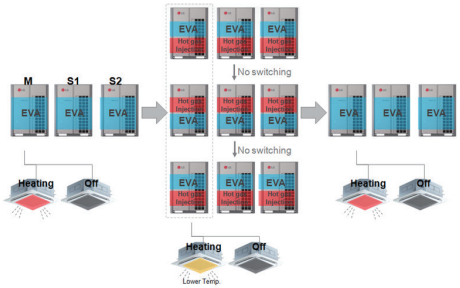
- In locations where the relative humidity remains high during the heating season or where experience has shown that defrosting all the outdoor units at the same time saves energy and/or shortens the time it takes to defrost the outdoor unit coil without impacting the comfort level in the building.
- This function is used with heat pump and heat recovery.
- Heating mode is a change in the setting impact.
- The operating symptoms that might be corrected using this function When the outside ambient air temperature is above 0°C(32°F), visual inspection shows that all frost (or ice) is not cleared from the outdoor unit's coil following a defrost cycle.
- Overall defrost mode recommended environment When the temperature of continuous heating is kept for a long time in a low temperature and high humidity environment in winter.
  (outdoor temperature : -5℃ or less / humidity : 70% or more)

- Schematic Diagram

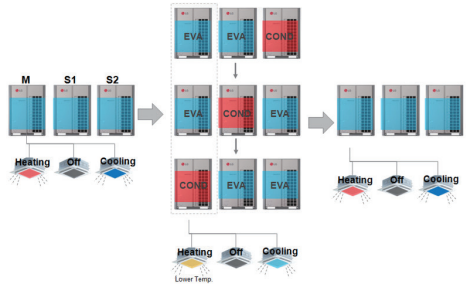
1) Overall Defrost



2) Partial Defrost (Heat Pump)



3) Partial Defrost (Heat Recovery)



⚠CAUTION
- Ask an authorized technician to setting a function.
- Although the discharge temperature is lowered, the heating operation rate increases while partial defrost.
- If you use continuous heating mode, please select partial defrost mode.

5.4.5 ODU Addressing

It is the outdoor unit address setting function for outdoor unit when central controller is installed.

■ Setting the function

Function		Option
ODU Addressing	Fn 5	0 ~ 254

■ Option Selection

Setting	Detail of function
0	Default (Not Install a central controller)
1 ~ 254	Number of outdoor unit

■ Detailed information

• This function is used with heat pump and heat recovery.

⚠CAUTION
· Ask an authorized technician to setting a function.
· If use a function, first install a central controller.

5.4.6 Snow Removal & Rapid Defrost

It is a function to prevent accumulation of snow in the snowy area or to judgment the fast defrost in the humid area.

■ Setting the function

Function		Option
Snow Removal & Rapid Defrost	Fn 6	oFF, op1~op3

■ Option Selection

Setting	Mode	Fan speed during snow removal (RPM)	
		UXA	UXB
oFF	Not setting	-	-
op1	Snow removal	670	850
op2	Rapid defrost	-	-
op3	Snow removal & Rapid defrost	670	850

■ Detailed information

1. Snow Removal
   • A function to prevent the snow from accumulating and blocking the flow path during the outdoor unit non-operation.
   (set in areas of the country where snow may accumulates on the top of the unit)
   • Outside temperature 3 degrees or less, 2 minutes every 30 minutes outdoor fan operation while non-operation.

2. Rapid Defrost
   • This is optional logic that limits the severity of frost accumulation on the outdoor unit coil between defrost cycles. it calls for more frequent defrost cycles.
   • Rapid defrost start condition.

Conditions		
Tout 〈 0°C	ΔTt 〉 9°C	Tt 〈 -15&&operating time 〉 90min
0°C 〈 Tout 〈 -15°C	ΔTt 〉 10°C	T indoor, pipe in(avg) 〈 40°C
Tout ≤ -15°C	-	operating time 〉 120min
Tout 〈 5°C	RH 〉 85%	operating time 〉 180min

* ΔTt : Outdoor Temp. - Heat Exchanger Temp.

⚠CAUTION
· Ask an authorized technician to setting a function.
· If do not use a function, set an off-mode.

5.4.7 Airflow Adjusting for IDU

It is the function to cope with the overload by changing air flow in the room to the low air flow when the compressor Hz is the maximum but the high pressure is low.

■ Setting the function

Function		Option
Airflow Adjusting for IDU	Fn 7	on, oFF

■ Option Selection

Setting	Detail of function
on	Low capacity mode (discharge temperature up)
oFF	Not setting

■ Detailed information

- Use when it is known the outdoor unit is operating at full capacity during the heating season and the indoor unit air temperature in all zones is low, or feels drafty in nearly all the conditioned spaces served by the system.
- This function is used with heat pump and heat recovery.
- Heating modes is a change in the setting impact.
- The operating symptoms that might be corrected using this function
  This function should only be used on a temporary basis. It is typically used when the outdoor unit is undersized. Symptoms occur most often when the design combination ratio (i.e. [nominal cooling capacity of all IDUs] / [nominal cooling capacity of the outdoor unit]x100) is greater than 130%.

  Symptoms include one or more of the following:
  1) One or more IDU fans will not start because the temperature of the indoor unit coil does not reach 85°F (i.e. perpetual "hot start" mode)
  2) Indoor unit fans run, but the leaving are temperature is low.

⚠CAUTION
- Ask an authorized technician to setting a function.
- Always verify the refrigerant charge is correct before considering the use of this function. This function is not a fix for a poorly designed piping system or a system that is not properly operating.

5.4.8 Target Pressure Adjusting

It is a function to change the target pressure of ODU according to field installation conditions (ex. pressure loss according to piping length) and customer characteristics (ex, cooling or heating capability).

■ Setting the function

Function		Option
Target Pressure Adjusting	Fn 8	oFF, op1~op6

■ Option Selection

Setting	Cooling (Low Pressure, kPa)	Heating (High Pressure, kPa)
oFF	804	2990
op1	725	3121
op2	765	3056
op3	869	2827
op4	935	2663
op5	1000	2500
op6	1065	2337
op7	804	2990

■ Detailed information

- This function is used with heat pump and heat recovery.
- Heating, Cooling and Dry modes is a change in the setting impact.
- The operating symptoms that might be corrected using this function
  Low compressor operating speed on peak design days (or low compressor operating hours) during the heating or cooling seasons or both (in the case of an oversized outdoor unit).

⚠CAUTION
- Ask an authorized technician to setting a function.
- If do not use a function, set an off-mode.
- Option values of UXA / UXB Chassis are the same.
- A power consumption or capacity can be changed.
- This function can not be set with the remote control.

5.4.9 Low Ambient Kit

It is a function to Informs the Multi V microprocessor controller the low ambient kit is installed.

■ Setting the function

Function		Option
Low Ambient Kit	Fn 9	on, oFF

■ Option Selection

Setting	Detail of function
on	Low ambient kit installation
oFF	Not setting (Default)

■ Detailed information

- This function is used with heat pump and heat recovery.
  (However, the kit does not extend the range of cooling below -15°C(5ºF) unless all indoor units are operating in cooling when heat recovery is used)
- Low ambient cooling modes is a change in the setting impact.
- The operating symptoms that might be corrected using this function
  This option assist the Multi V core logic maintain compressor suction pressure at low ambient temperatures.
- In buildings where the zones served by the Multi V system will all need cooling when outdoor ambient temperatures fall below 5°F.
- Operation range after installation of low ambient kit
  Before : -15~48°C / After : -25~48°C (detailed refer to the manual)

⚠CAUTION
· Ask an authorized technician to setting a function.
· If do not use a function, set an off-mode.
· If low ambient kit is installed, this function must be enabled.
· Refer to the accessory manual or PDB for how to set up and use the guide.

5.4.10 High Efficiency Mode

High efficiency mode refers to increasing the compressor capability to cool at high ambient temperatures. This function automatically lowers the target low pressure as the outdoor ambient temperature rises while the outdoor unit operates in cooling mode (i.e. reversing valve in cooling position).

■ Setting the function

Function		Option
High Efficiency Mode	Fn 10	on, oFF

■ Option Selection

Setting	Detail of function
on	High efficiency mode
oFF	Default

■ Detailed information

- This function is used with heat pump and heat recovery.
- Cooling and Dry modes is a change in the setting impact.
- The operating symptoms that might be corrected using this function
  On extremely hot days when cooling demand is the highest, depending on the capacity of the outdoor unit relative to the actual load, if the VRF system is struggling to keep the space temperature, invoking this option may be the solution to provide a little more capacity to meet the need.
- High efficiency mode can be used for all cooling dominant installations. Using this option will provide additional cooling capacity, but will do so by increasing the amount of work (i.e. raises lift) the compressor will perform. Net energy consumed may increase if this option is invoked.

⚠CAUTION
· Ask an authorized technician to setting a function.
· If do not use a function, set an off-mode.
· Always verify the refrigerant charge is correct before using this function. If the refrigerant charge is low, the use of this function will not provide any benefit.

5.4.11 Auto Dust Removal Mode

This function is able to improve the heat exchange efficiency to maintain clean state on heat exchanger of ODU. Dust is removed on heat exchanger of outdoor unit by reverse rotation of fan.

■ Setting the function

Function		Option
Auto Dust Removal Mode	Fn 11	oFF, op1~op5

■ Option Selection

Setting	Reverse cycle fan runtime (min)	Time delay between cycles	Number of cycles
oFF	-	-	-
op1	5	2 hours	No limit
op2	5	2 hours	2
op3	3	5 minutes (following compressor shutdown)	1
op4	1	-	1
op5	1	1	2

■ Detailed information

- This function is used with heat pump and heat recovery.
- Cooling and Dry modes is a change in the setting impact.
- The operating symptoms that might be corrected using this function
  When the outdoor unit is installed in arid climates, where moisture levels are very low, this option can be selected to assist with keeping outdoor unit coil heat transfer optimized.
- The op3 selection requires the Multi V demand limit I/O PCB board be installed. If the demand limit controller is installed in the master outdoor unit and a binary signal is sent to the outdoor unit via a third party source, VRF system normal operation can be interrupted and an auto dust removal cycle can be performed.

⚠CAUTION
- Ask an authorized technician to setting a function.
- If do not use a function, set an off-mode.
- This option is not a substitute for coil cleaning and does not completely clear the coil of all debris. A coil cleaning procedure should be included when performing regular preventative maintenance.

5.4.12 Compressor Max. Frequency Limit

It is a function to limit the maximum speed (frequency) of inverter compressor.

■ Setting the function

Function		Option
Compressor Max. Frequency Limit	Fn 12	oFF, op1~op9

■ Option Selection

Setting	Inverter (Hz)	Setting	Inverter (Hz)
oFF	-	op5	113
op1	143	op6	105
op2	135	op7	98
op3	128	op8	90
op4	120	op9	83

■ Detailed information

- This function is used with heat pump and heat recovery.
- All modes is a change in the setting impact.
- The operating symptoms that might be corrected using this function
  Setting the maximum compressor speed can be a method to artificially downsize an outdoor unit either temporarily until all indoor units are installed on a core and shell project or permanently on projects where the outdoor unit installed has excess capacity on both heating and cooling design days.

*Note : If interested in this option, please note there is no concern a selection will inhibit proper defrost or oil return operation. The oil return requires algorithm operates the compressor at speeds that are lower than the available minimum speed selectable.

⚠CAUTION
- Ask an authorized technician to setting a function.
- If use a function, first install a central controller. (refer to the Installation manual)
- Do not depend on this option to lower the maximum current draw of the outdoor unit. The maximum speed selected is ignored by the Multi V microprocessor during defrost.

5.4.13 ODU Fan Max. RPM Limit

It is a function to limit the maximum RPM of ODU.

■ Setting the function

Function		Option
ODU Fan Max. RPM Limit	Fn 13	oFF, op1~op7

■ Option Selection

Setting	Max ODU Fan Speed Normal Operation / Low Ambient or Overheat Operation (RPM)	
	UXA	UXB
oFF	880 / 1000	1000 / 1150
op1	860 / 980	950 / 1100
op2	840 / 960	900 / 1050
op3	820 / 940	850 / 1000
op4	800 / 920	800 / 950
op5	780 / 900	750 / 900
op6	760 / 880	700 / 850
op7	740 / 860	650 / 800

■ Detailed information

- This function is used to limit the maximum speed of the outdoor unit fans in applications where the building owner desires to reduce the noise generated by the fans. The maximum fan speed limit set by this function is ignored for defrost operation.
- This function is used with heat pump and heat recovery.
- Heating, Cooling and Dry modes is a change in the setting impact.
- The operating symptoms that might be corrected using this function
  No adverse operating conditions are solved using this function. The function is for convenience to provide a method to address any possible noise complaints.

⚠CAUTION
- Ask an authorized technician to setting a function.
- This option does not limit the speed of the fans during defrost operation.
- The 'ODU Fan Max. RPM Limit' and 'Night Low Noise Function' functions can be set simultaneously. MAX RPM is set to a smaller value among the set values.
- Efficiency or capacity can be changed according to option.

5.4.14 Smart Load Control

Smart Load Control function enables comprehensive understanding of environmental conditions in order to optimize energy efficiency. This technology allows active control of discharge refrigerant temperature which eventually increases the efficiency for average outdoor unit in comparison to the previous models.

■ Setting the function

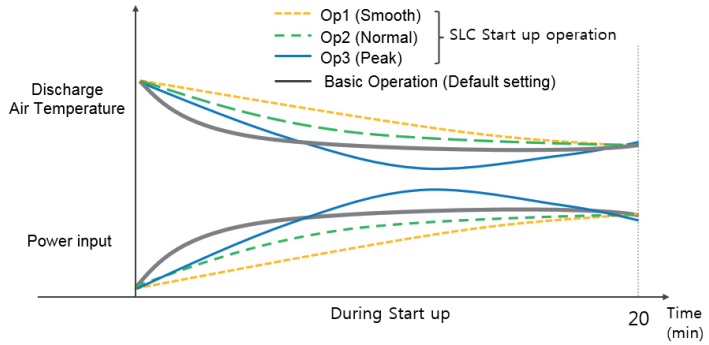
Function		Option
Smart Load Control	Fn 14	oFF, op1~op3

■ Option Selection

Setting	Start-up	Detail of function
oFF	Basic operation	SLC not selected
op1	Smooth	Slowly controlled to become target pressure
op2	Normal	Normally controlled to become target pressure
op3	Peak	Quickly controlled to become target pressure

※ Outdoor temperature Range : (Cooling) 35 ~ 20°C / (Heating) -10 ~ 5°C

- Smooth Mode (Op1) : Maximize energy savings, rate of temperature change less important.
- Normal Mode (Op2) : Balance the rate of temperature change with energy consumed.
- Peak Mode (Op3) : Quickly cool/heat the building, energy consumption less important



※ Outdoor temperature Range : (Cooling) 35 ~ 20°C / (Heating) -10 ~ 5°C

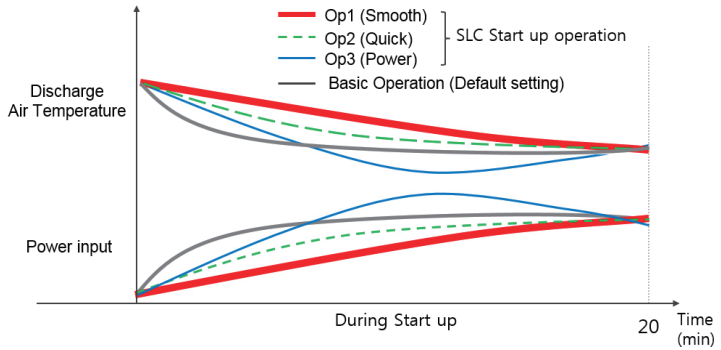
■ Detailed information

• This function is used with heat pump and heat recovery.

• Heating, Cooling and Dry modes are a change in the setting impact.

• The operating symptoms that might be corrected using this function
This feature does not correct adverse operating conditions. It is an energy enhancement feature.

ex) If outdoor setting is Op1(red line),
outdoor unit start operation slowly compared than basic operation but save energy during start-up and after start up, discharge air temperature is automatically changed according to outdoor and indoor temperature.



⚠CAUTION
· Ask an authorized technician to setting a function.

5.4.15 Humidity Reference

It is the function to set whether to use the humidity sensor. The outdoor unit considers the current outdoor ambient humidity condition when making adjustments to the control values of the refrigeration cycle.

■ Setting the function

Function		Option
Humidity Reference	Fn 16	on, oFF

■ Option Selection

Setting	Detail of function
on	Humidity sensor use
oFF	Not setting (Default)

■ Detailed information

• The humidity sensor's real time reporting of the outdoor ambient humidity level is used in the Advanced Smart Load Control (FN14), Comfort Cooling (ID10), and Intelligent Defrost - Smart Heating (core logic) to prepare the system for changes in the building load.

• This function is used with heat pump and heat recovery.

• Heating, Cooling and Dry modes is a change in the setting impact.

• Cooling / Heating operation by using humidity sensor
- When used cooling operation of SLC function, it will improve energy efficiency because evaporation temperature will be decreased
- When used heating operation in case of high humidity condition, deforest will be delayed because target high/low pressure will be changed.

• Activation function by using humidity sensor.

		Multi V IV	Multi V IV	Multi V 5	Multi V 5	Multi V 5
		SLC	Comfort Cooling	Dual Sensing SLC	Dual Sensing Comfort Cooling	Increased heating time(Frost delay)
Operation	cooling	O	O	O	O	X
	Heating	O	X	X	X	O
Consider-ation	Temperature	O	O	O	O	O
	Humidity	X	X	O	O	O

⚠CAUTION
· Ask an authorized technician to setting a function.

5.4.16 The Connecting of Central Control at IDU Terminals

This function allows the field connection of the AC-EZ central controller to the indoor unit communications buss on Multi V 5.

■ Setting the function

Function		Option
The Connecting of Central Control at IDU Terminals	Fn 19	on, oFF

■ Option Selection

Setting	Detail of function
on	AC EZ connection
oFF	Not setting (Default)

■ Detailed information

• This function is used with heat pump and heat recovery.

⚠CAUTION

· Ask an authorized technician to setting a function.

5.4.17 Compressor Input Current

This function is used when the current management is required by proportionally reducing the maximum MFA specification of the product.

■ Setting the function

Function		Option
Compressor Input Current	Fn 20	oFF, op1~op10

■ Option Selection

Setting	Compressor input current limit (%)	Setting	Compressor input current limit (%)
oFF	-	op6	70
op1	95	op7	65
op2	90	op8	60
op3	85	op9	55
op4	80	op10	50
op5	75		

■ Detailed information

• This function is used with heat pump and heat recovery.

• All modes are a change in the setting impact.

• Since the MFA value is different for each HP and the value is limited proportionally, it does not mean that the option value differs for each chassis.
(Maximum current value for each model is stored in EEPROM in main PC)

⚠CAUTION

· Ask an authorized technician to setting a function.
· If do not use a function, set an off-mode.
· If use a function, capacity may go down.

5.4.18 The Smart Plug

It is a function that displays the power consumption on the wired remote control when the outdoor unit is operating.

■ Setting the function

Function		Option
The Smart Plug	Fn 21	SPL0, SPL1, Pd10, Pd11

■ Option Selection

Setting		Detail of function
SPL0	oFF	Smart Plug Logic OFF (Default)
SPL1	Pd10	PDI non-installation
	Pd11	PDI installation

- Pd10 - Monitor the value from the watt hour meter.
- Pd11 - Monitor the calculated value in the outdoor unit. (error ± 5%)

■ Detailed information

- This function is used with heat pump and heat recovery.
- All modes is a change in the setting impact.
- When the optional PDI is installed, the PDI monitors outdoor unit power consumption as well as indoor unit power consumption. PDI allocates outdoor unit power consumed to indoor units based on the volume of refrigerant flow through each indoor unit during the billing period. For VRF systems without the PDI, outdoor unit power consumption is reported, however indoor unit power consumption is ignored.
- If the Smart Plug function is turned on, the power consumption data may be viewed using one of LG's central control/monitoring devices such as ACP, AC Smart, or the multi site communications manager. For installations where a third party BMS system Is present, consumption data is also made available for viewing at the BMS front end using LG's BACnet gateway.

⚠CAUTION
- Ask an authorized technician to setting a function.
- When PDI is installed, be sure to set the outdoor unit option to PDI ('PDI1').
  (If the setting is not set to PDI1, the value displayed on the remote control may differ from the actual value.)
- It is possible to check the power consumption during operation while setting the function, but it can differ value compared to actual power consumption.

5.4.19 Overall Defrost Entrance for Low temperature

It is a function to operate overall defrost.

■ Setting the function

Function		Option
Overall Defrost Entrance for Low temperature	Fn 22	on, oFF

■ Option Selection

Setting	Detail of function
on	Overall defrost
oFF	Default

■ Detailed information

- This function is used with heat pump and heat recovery.
- Heating modes is a change in the setting impact.
- Overall defrost operates every 3 hours whenever the outdoor air temperature is below 10°C. (If defrosting is not possible for 3 hours)
- This function may be used in any location. It is most likely used in climates where moisture levels are high the outdoor unit's heating capacity is slightly undersized, the condenser coil is partially restricted, or other local factors dictate that no frost must be allowed to build on the coil.

⚠CAUTION
- Ask an authorized technician to setting a function.
- If do not use a function, set an off-mode.

5.4.20 Optional Base Panel Heater

It is a function to prevent freezing of ODU base pan in a cold area.

■ Setting the function

Function		Option
Optional Base Panel Heater	Fn 23	on, oFF

■ Option Selection

Setting	Detail of function
on	Base pan heater kit installation
oFF	Base pan heater kit non-installation (Default)

■ Detailed information

- This function is used with heat pump and heat recovery.
- Heating mode is a change in the setting impact.
- The operating symptoms that might be corrected using this function
  Reduces ice-build up in the bottom of the unit that may occur in some installation scenarios where drainage holes in the bottom pan of the unit are obstructed or where the surface temperature of the bottom pan is below freezing.
- The optional base pan heater maintains the bottom surface of the outdoor unit at a temperature above 0°C to keep condensate water in a liquid state while in the base pan. When the surface temperature of the base pan is above 0°C, the condensate flows into channels formed in the pan that guide the flow of water to one-inch diameter holes in the base pan along the bottom of the channels in which water flows out the bottom of the unit. If the base pan surface temperature is below 0°C, the condensate that contacts the surface of the pan will freeze preventing it from flowing in the channels to the holes. As a result ice may build up in the bottom of the unit.
- Using this setting, it allows a third party heater to be energized to keep the bottom surface of the unit at a temperature above 0°C.

⚠CAUTION
· Ask an authorized technician to setting a function.
· If do not use a function, set an off-mode.
· Heater is accessory.(sold separately)

5.4.21 Change Defrost Control for Noise Reduction

This is a optional function to change defrost control algorithm for reducing noise.

■ Setting the function

Function		Option
Change Defrost Control for Noise Reduction	Fn 24	on, oFF

■ Option Selection

Setting	Detail of function
on	Setting the noise reduction option for defrost cycle
oFF	Default

■ Detailed information

- This function is used with heat pump and heat recovery.
- Inverter frequency will be down from 30Hz to 25Hz at Step1 of defrosting cycle to reduce noise.
- Control fan rpm directly and make speed down at Step3 and Step6 of defrosting cycle to reduce noise in the Indoor. Make sure that IDU rpm can be controlled by ODU only for Generation 4 communication system.

⚠CAUTION
· Ask an authorized technician before set the function.

5.4.22 Priority Cooling

This is a function to make cooling mode is more important than heating mode for outdoor operating mode.

■ Setting the function

Function		Option
Priority Cooling	Fn 25	on, oFF

■ Option Selection

Setting	Detail of function
on	Set cooling priority mode
oFF	Default

■ Detailed information

- This function is only used to Heat Pump System. You can not use for Heat Recovery System.
- This function can be operated properly under only Gen4 communication feature state.
- If priority cooling option is enable state, then you can turn on the indoor unit as heating mode even though outdoor unit is operating as cooling mode.

⚠CAUTION
· Ask an authorized technician before set the function.
· This function is a specialized feature only for North America Area, especially CANADA.

5.4.23 Refrigerant gas leak detection

This is a function to make cooling mode is more important than heating mode for outdoor operating mode.

■ Setting the function

Function			Option
Refrigerant gas leak detection system mode	Fn 26	Mode	oFF, oP1, oP2, oP3
		set	on, oFF

■ Option Selection

Setting		Detail of function
Mode	oFF	Default, Ignore CH230 Error
	oP1	System is Off when CH230 error has occurred
	oP2	Pump Down and Close main pipe line of outdoor unit when CH230 error has occurred.
	oP3	Close pipe line of refrigerant gas leak indoor unit when CH230 error has occurred
Set	oFF	Default, Clear CH230 Error
	on	Maintain CH230 error state.

■ Detailed information

- This function can be operated properly under only Gen4 communication feature state.
- After system detect refrigerant gas leak, system can operate differently according to option.

(1) In case of oP1
- System is shutdown
- CH230 error is displayed on 7 segment of ODU.

(2) In case of oP2
- System is shutdown and CH230 error is displayed on 7 segment of ODU.
- ODU sends a close signal to I/O module to close liquid and high pressure gas pipe line.
- After do that, 2 minute later, pump down operation is started automatically.
- During the pump down operation, if low pressure is drop down to 307kPaG limit or operating time has passed over 12 minute, then ODU sends a close signal to I/O module to close low pressure side pipe line.

(3) In case of oP3
- ODU can be operated without shutdown but CH230 error is displayed on 7 segment of ODU.
- Only indoor unit which has a gas leak is shutdown and try to close its pipe. This operation process is down without any ODU direction signal.

⚠CAUTION
· Ask an authorized technician before set the function.
· Pipe line can be closed by external actuator which should be installed. LGE do not supply an external actuator.
· LG VRF system is send a digital signal to I/O module and installer must connect signal line between I/O Module and external actuator which can close pipe line to prevent gas leak.

5.5 SVC Mode

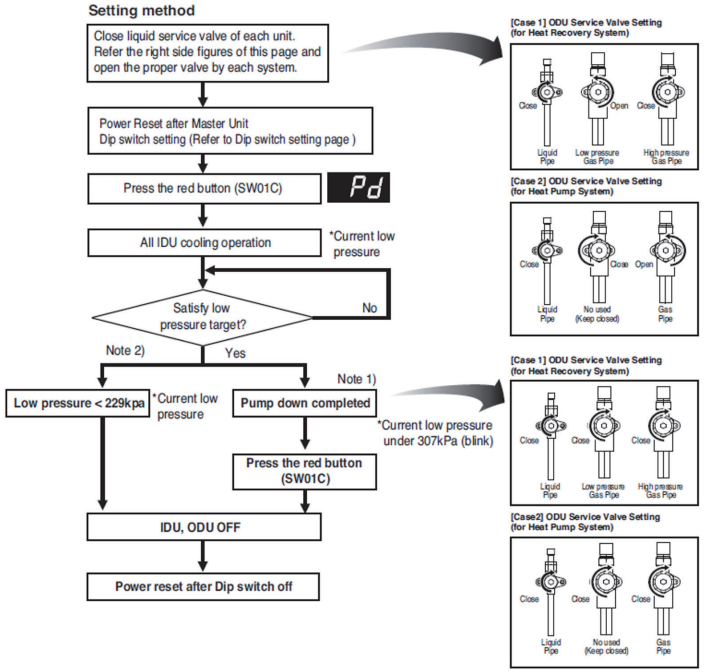
5.5.1 Pump Down

This function gathers the refrigerant present in the system to ODU.
Use this function to store refrigerant of system in ODU for leakage or IDU replacement.

■ Setting the function

Function		Option
Pump Down	SE 1	Pd (display "Low Pressure"), oFF

■ Flow Chart



Note 1) If low pressure become under 307kPa,close the gas service valve of all ODU immediately.
Note 2) If low pressure descends below 229kPa, the system turns off automatically. Close the gas service valve immediately.

■ Detailed information

• This function is used with heat pump and heat recovery.

Note : The amount of refrigerant that can be pumped out is limited by the amount of refrigerant that can be stored in the outdoor unit and additional refrigerant storage containers may need to be used. The maximum amount of refrigerant for Multi V 5 is size dependent and varies between 14.3 and 37.5 lbs / frame. If the system charge is greater than the volume that can be stored, a supplemental storage device will be required to totally evacuate the system.

⚠CAUTION
· Use pump down function within guaranteed temperature range.
- IDU : 20~32°C [68~89.6°F] / ODU : 5~40°C [41~104°F]
· Make certain that IDU doesn't run with thermo off mode during operation.
· Maximum operation time of pump down function is 30 min. (in case low pressure doesn't go down)

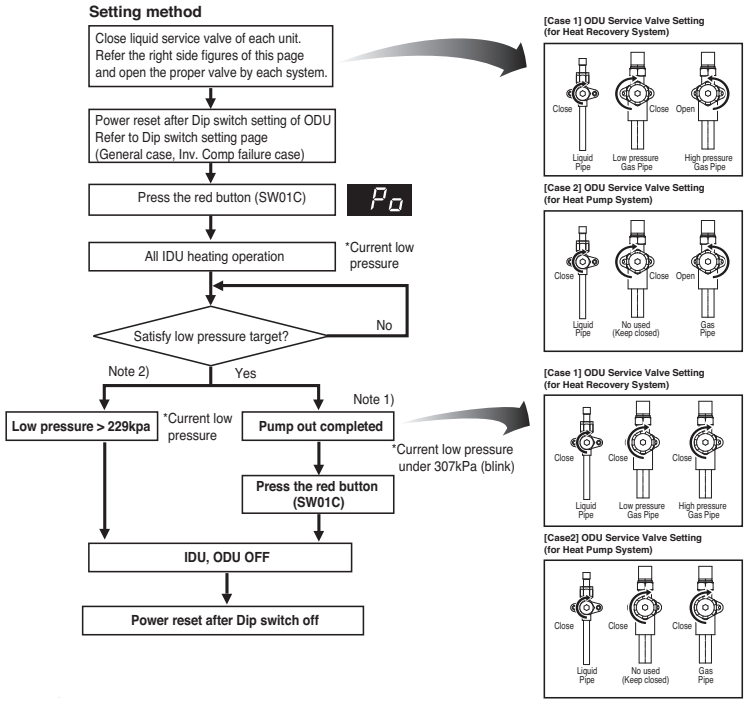
5.5.2 Pump Out

This function gathers the refrigerant to other ODU and IDU.
Use this function in case of compressor failure, ODU parts defect, leakage.

■ Setting the function

Function		Option
Pump Out	SE 2	Po (display "Low Pressure"), oFF

■ Flow Chart



Note 1) If low pressure become under 307kPa, close the gas service valve of all ODU immediately.
Note 2) If low pressure descends below 229 kPa, the system turns off automatically. Close gas service valve immediately. This function is operating only Heat Pump model.

■ Detailed information

• This function is used with heat pump and heat recovery.

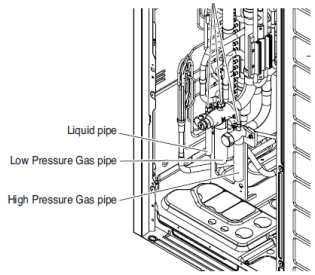
Note : In systems with short piping systems, the amount of refrigerant that can be pumped from the outdoor unit may be limited and additional refrigerant storage containers may need to be used.

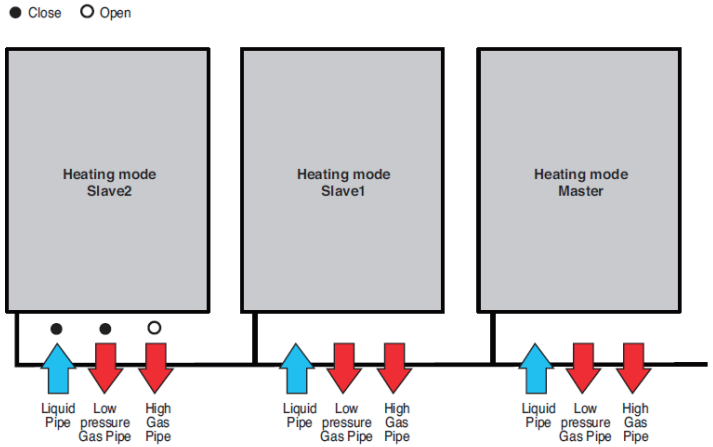
⚠CAUTION

- Use pump out function within guaranteed temperature range.
  - IDU : 10~32°C [50~89.6°F] / ODU : 5~40°C [41~104°F]
- Make certain that IDU doesn't run with thermo off mode during operation.
- Pump out function takes 2~5 min. after compressor start.
  Make certain that IDU doesn't run with thermo off mode during operation.
  (in case low pressure doesn't go down)

■ Example (Slave2 ODU inverter compressor failure)

• For Heat Recovery System

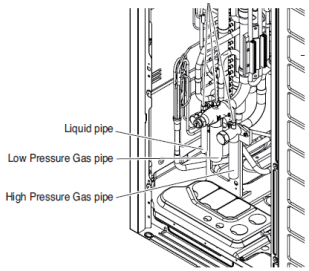


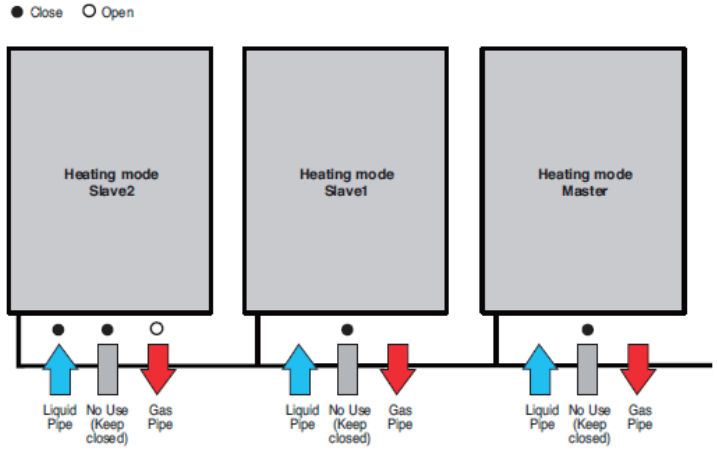


1. Close liquid pipe and low pressure gas pipe of the unit for pump out operation.
2. Operate pump out.
3. Close high pressure gas pipe of unit after completion.
4. End pump out.
5. After replacing the compressor, eliminate remaining refrigerant of corresponding ODU and perform vacuum work. (with vacuum mode)
6. Add the refrigerant with auto charging function.

■ Example (Slave2 ODU inverter compressor failure)

• For Heat Pump System





1. Close liquid pipe of the unit for pump out operation.
2. Operate pump out.
3. Close gas pipe of unit after completion.
4. End pump out.
5. After replacing the compressor, eliminate remaining refrigerant of corresponding ODU and perform vacuum work. (with vacuum mode)
6. Add the refrigerant with auto charging function.

5.5.3 Vacuum

This function is used for creating vacuum in the system after compressor replacement, ODU parts replacement or IDU addition/replacement.

■ Setting the function

Function		Option
Vacuum	SE 3	Vacc, oFF

■ Detailed Information

• This function is used with heat pump and heat recovery.

• If the vacuum mode start, ODU valve / ODU & IDU EEV open with "Vacc" display.

• Vacuum mode cancellation method
: Push the reset button on master unit PCB after setting all dip s/w oFF.

* *Note* : Isolation valves, manual shutoff valves, or 3rd party electronically operated valves, and non-operating or malfunctioning electronic valves must be opened manually prior to initiating service setting SE3.

⚠CAUTION
· ODU operation stops during vacuum mode. compressor can't operate.

5.5.4 Back Up

This function is used when backing up outdoor units or compressors.

■ Setting the function

Function	
Back Up	SE 4

■ Manual Back Up

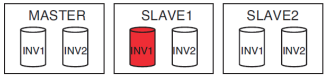
This function allows the system to operate in case of inverter compressor failure by backing up compressor manually.
Service can be asked by displaying error to the customer every 6 hours.

• Option Setting

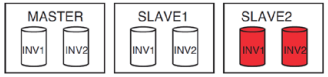
Option	Detail of function
Unit	Outdoor unit back up
Inv1	Inverter compressor No.1 back up
Inv2	Inverter compressor No.2 back up

• Operation Method
1) Check which compressor is broken. (refer to "Trouble Shooting Guide")
2) Turn off the power.
3) Set the dip S/W of defective outdoor unit.
4) Turn on the power.

ex1) Inverter SLAVE1 compressor fail of Slave1 → option "Inv1" selection



ex2) Unit fail of Slave2 → option "Unit" selection

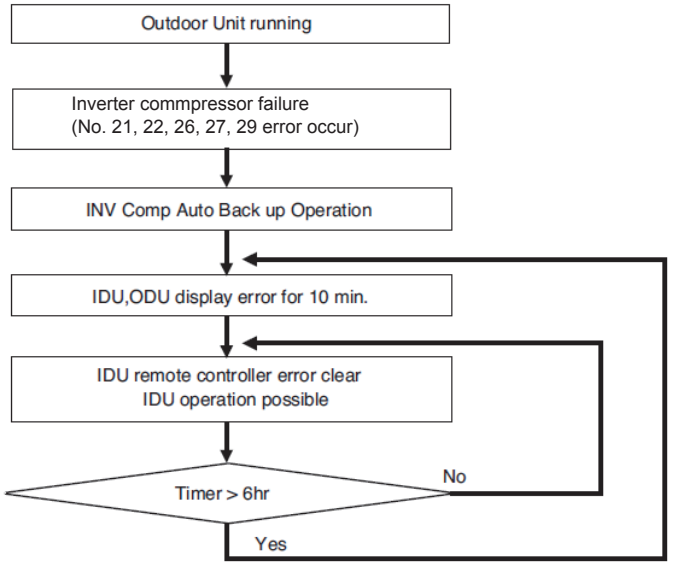


* In 1comp model, setting the 'inv2' can not be used.
* If you make a backup of compressor in 1comp model, the outdoor unit is automatically backed up.

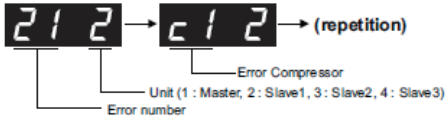
⚠CAUTION
· Manual back up function mode is applied after push the main PCB reset button.
· You must set the function of the outdoor unit to be backed up.
· If you want to disable the backup, please set the 'off'.
· This function is a temporary. do not forget to turn this function off after replacing compressor. Long term use of this function will lead to multiple compressor failures on the system.

■ Auto Back Up

This function allows the system to operate in case of inverter compressor failure by backing up compressor automatically.
Service can be asked by displaying error to the customer every 6 hours.



ex) Slave1 unit Inverter compressor 1 start failure error No. 21 occur



⚠CAUTION
- Request service immediately if error occurs.
- Auto back up is set up to 1 inverter compressor.
- If Inverter compressor auto back up starts, error displays for 10 min. every 6 hours.
- Error displays continuously at the corresponding ODU.

5.5.5 Forced Oil Return

This function is used in recovering the oil level of the compressor through recollecting the accumulated oil in the pipe.

■ Setting the function

Function		Option
Forced Oil Return	SE 5	01, oFF

■ Option Selection

Setting	Detail of function
oFF	Off (Default)
01	Oil return on

■ Detailed information
- This function is used with heat pump and heat recovery.
- Automatically disabled the forced oil return function after finishing oil return function.

⚠CAUTION
·If a compressor is lost and it is unknown if oil is trapped in the pipeline, ask an authorized technician.

5.5.6 Forced Defrost

This function is used in defrosting of heat exchanger.

■ Setting the function

Function		Option
Forced Defrost	SE 6	Def, oFF

■ Option Selection

Setting	Detail of function
oFF	Off (Default)
Def	Defrost on

■ Detailed information
- This function is used with heat pump and heat recovery.
- Automatically disabled the forced defrost function after finishing manual defrost.

5.5.7 Display Cycle Information

This function is to display the main parameter value displayed by LGMV in real time through the 7-segment of the master outdoor unit for smooth operation when the LGMV cable is faulty or missing. The 7 segment is display 26 different cycle data.

■ Setting the function

Function		Option
Display Cycle Information	SE 8	op1~op26

■ Option Selection

step	Title	7-seg	example	seg_1	seg_2	seg_3	seg_4
op1	Current High Pressure	P1	4321kPa	4	3	2	1
op2	Current low Pressure	P2	1234kPa	1	2	3	4
op3	Inv 1 Freq.	h1	120Hz		1	2	0
op4	Inv 2 Freq.	h2	30Hz			3	0
op5	fan rpm	h3	110RPM		1	1	0
op6	Subcooling degree	T1	53°C			5	3
op7	Superheating degree	T2	-4.5°C		-	4	5
op8	ODU Air Temp.	T3	10°C		1	0	0
op9	Suction Temp.	T4	43.4°C		4	3	4
op10	Comp1 discharge temp.	T5	150°C		1	5	0
op11	Comp2 discharge temp.	T6	124°C		1	2	4
op12	Liquid pipe temp.	T7	10°C		1	0	0
op13	Sc_in	T8	10°C		1	0	0
op14	Sc_out	T9	10°C		1	0	0
op15	hex_total	T10	10°C		1	0	0
op16	hex_hi	T11	10°C		1	0	0
op17	hex_low	T12	10°C		1	0	0
op18	Inlet pipe temp of IDU	T13	-10°C	-	1	0	0
op19	main1 eev	PLS1	1950pls	1	9	4	0
op20	main2 eev	PLS2	32pls			3	2
op21	sc eev	PLS3	16pls			1	6
op22	oil eev	PLS4	50pls			5	0
op23	vi eev1	PLS5	1350pls	1	3	5	0
op24	vi eev2	PLS6	50pls			5	0
op25	IDU running capacity	IDU1	24kBtu/h			2	4
op26	Total number of IDU	IDU2	10EA			1	0

■ Detailed information

• This function is used with heat pump and heat recovery.

5.5.8 Noise Reduction

It is a function to reduce the noise of the entire system.

■ Setting the function

Function		Option
Noise Reduction	SE 9	oFF, op1~op2

■ Option Selection

Option	Detail of function
oFF	Normal operation (Fast cooling & Fast heating)
op1	Powerful Refrigerant noise reduction
op2	Mild Refrigerant noise reduction Mode

• oFF : Performance priority
• op1 : Refrigerant noise reduction priority
(Initial indoor EEV 120 pls / compressor Hz slow up, Europe model default)
• op2 : Mid mode between OFF and OP1
(Initial indoor EEV 150 pls)

■ Detailed information

• This function is used with heat pump and heat recovery.

• In case of SE9, it is an option to set control based on an outdoor unit. It is a function to control (reduce) the noise of the entire system, not to control noise in individual indoor units.
That is, it is all indoor unit control, not individual indoor unit control. Individual indoor unit control is possible through indoor unit setting option.

• Differences between SE9 and SE11
- SE9 (Noise Reduction): outdoor unit noise control + indoor unit noise control
- SE11 (Heating fan Low noise): outdoor unit fan noise control
(control factor : the outdoor temperature, heat exchanger temperature, indoor unit operation rate, not always controlled)

⚠CAUTION
·Ask an authorized technician to setting a function.
·Change a power consumption or efficiency.

5.5.9 Entry Heating Oil Return

This function is for performing oil recovery operation while heating operation.
The refrigerant noise claim occurs due to repetition of oil recovery operation, this function will be checked and applied.

■ Setting the function

Function		Option
Entry Heating Oil Return	SE 10	oFF, on

■ Option Selection

Option	Detail of function
oFF	Default
on	Operate entry heating oil return

■ Detailed information

- This function is used with heat pump and heat recovery.
- If the oil level is not recovered and cycle issue such as high pressure rise / low-pressure drop after the oil recovery in the heating mode, the oil recovery is performed in the cooling mode.
- It is effective if the heating operation rate is high and the possibility of occurrence of cycle issue is low due to installation / operation conditions. however, if a cycle issue occurs, it may be ineffective by re-entering the cooling mode.

⚠CAUTION
·Ask an authorized technician to setting a function.
·If a cycle issue occurs, check the cycle by performing forced oil recovery operation (SE5).

5.5.10 Heating Fan Low Noise

It is a function to reduce outdoor fan max rpm by adjusting low target pressure while heating mode.

■ Setting the function

Function		Option
Heating Fan Low Noise	SE 11	oFF, on

■ Option Selection

Option	Detail of function
oFF	Off (Default)
on	Function enabled

■ Detailed information

- This function is used with heat pump and heat recovery.
- The fan rpm is reduced by about 50 to 70% and may vary depending on environment and logic.
- Differences between SE9 and SE11
  - SE9 (Noise Reduction): outdoor unit noise control + indoor unit noise control
  - SE11 (Heating fan Low noise): outdoor unit fan noise control
    (control factor : the outdoor temperature, heat exchanger temperature, indoor unit operation rate, not always controlled)

ex) In case of SE11, optimize fan noise by adjusting the target low pressure when the outdoor temperature is more than 5°C, the indoor unit operation rate is less than 30%, and the heat exchanger temperature is more than 3°C

⚠CAUTION
·Ask an authorized technician to setting a function.
·Change a power consumption or efficiency.

5.5.11 Number of Partial Defrosts

This function is used for continuous heating control by option setting split defrost (heating cycle, upper / lower valve control)

■ Setting the function

Function		Option
Number of Partial Defrosts	SE 12	oFF, op1~op11

■ Option Selection

Option	Maximum Partial Defrost Cycles	Option	Maximum Partial Defrost Cycles
oFF	None (Default)	op6	6
op1	1	op7	7
op2	2	op8	8
op3	3	op9	9
op4	4	op10	10
op5	5	op11	11

■ Detailed information

• This function is used with heat pump and heat recovery.

* *Note* : In order to prevent the accumulation of ice on the side of the outdoor unit, it is considered that the number of partial defrost is minimized and that overall defrost is effective on the outdoor unit side. however, on the indoor unit side, frequent overall defrost can cause the lack of heating (according conversion to cooling cycle).

⚠CAUTION
·Ask an authorized technician to setting a function.
·Change a power consumption or efficiency.

5.5.12 Level Changes of CH200

It is a function to change CH200 error level.

■ Setting the function

Function		Option
Level Changes of CH200	SE 14	oFF, on

■ Option Selection

Option	Detail of function
oFF	level 3 (CH200 display, system off, default)
on	level 4 (CH200 display, system on)

■ Detailed information

• This function is used with heat recovery.

• In case CH200 occurs because of communication error or individual breaker,
- Option is 'ON' → Changes to level4 and system on with CH200 display
- Option is 'OFF' → Changes to level3 and system off with CH200 display.

5.5.13 Level Changes of CH53

It is a function to change error level in the state of CH53.

■ Setting the function

Function		Option
Level Changes of CH53	SE 15	oFF, on

■ Option Selection

Option	Detail of function
oFF	level 4 (CH53 display, system on, default)
on	level 4 (CH53 display, system on)

■ Detailed information

• This function is used with heat pump and heat recovery.

• In case CH200 occurs because of communication error or individual breaker,
- System operation is possible with level4 regardless of option setting.
- But after setting the option 'on', if CH21, 26, 29, or 116 occurs in the state of CH53, the system will not operate because it is switched to level 1.

5.5.14 Fan Motor Service mode

This is a function that can check each motor defect in a model with 2 fan (UXB/UXC chassis)

■ Setting the function

Function		Option
Fan Motor Service mode	SE 17	oFF, on

■ Option Selection

Option	Detail of function
oFF	Default
on	Fan Motor Service mode

■ Detailed information

• After completion of the inspection, 2 motor wires must be connected again. There is no distinction between upper and lower connectors)

⚠CAUTION

·Use this service mode for inspection of motor defect with 2 fan model because in case of 2 fan model like UXB/UXC chassis, only 1 inverter operate 2 fan motor. If you disconnect 1 wire of motor without this service mode, the system will display error.
·This function is available at system off without any error.
·Reset the system after inspection.
·In case of outdoor unit combination, this function will be operated at each unit.

5.6. IDU Mode

5.6.1 EEV Pulse of Non-operating IDU in Heating

It is the function to adjust EEV pulse of no IDU in heating.

■ Setting the function

Function		Option
EEV Pulse of Non-operating IDU in Heating	Id 1	seg1, seg2 : IDU No. seg3, seg4 : EEV * 10pls

■ Option Selection

seg1, seg2	seg3, seg4
1 ~ 64	40 ~ 120 * 10pls

• EEV pulse can be set in units of 10pls from 150 to 300pls. ('0': No setting)

■ Detailed information

• This function is used with heat pump and heat recovery.

• It is a function to take action in case of unusual issue in the field.

ex) EEV pulse of indoor unit is typically 80pls. (different by model)
① Claims due to refrigerant noise in non-operating IDU → EEV pulse ▼
② Refrigerant shortage cycle non-operating IDU during low load operation → EEV pulse ▲

⚠CAUTION

·Ask an authorized technician to setting a function.
·If the EEV pulse is large, the risk of noise generation may increase and if the EEV pulse is small, the risk of liquid accumulation may increase.

5.6.2 Set IDU Superheat / Set IDU Subcool

This function is used to set additional superheat and subcool in the indoor unit.

■ Setting the function

Function		Option
Set IDU Superheat	Id 2	seg1, seg2 : IDU No. seg3, seg4 : IDU Superheat
Set IDU subcool	Id 3	seg1, seg2 : IDU No. seg3, seg4 : IDU Subcool

■ Option Selection

seg1, seg2	seg3, seg4	
	IDU Superheat	IDU subcool
1 ~ 64	-9 ~ +9	-5 ~ +9

- Set EACH IDU : Select "Idu" → "Id2 or 3" → EACH → Select Indoor Unit No. → Set Value
- Set All IDU : Select "Idu" → "Id2 or 3" → ALL → Set Value

■ Detailed information

- This function is used with heat pump and heat recovery.

- In cooling mode,
  1) IDU Superheat ▲ → refrigerant flow ▼ → refrigerant noise ▼ & performance ▼
  2) IDU Superheat ▼ → refrigerant flow ▲ → performance ▲
     (Caution to the performance down of other indoor units and liquid compression)

- In heating mode,
  1) IDU Superheat ▲ → refrigerant flow ▼ → refrigerant noise ▼ & performance ▼
  2) IDU Superheat ▼ → refrigerant flow ▲ → performance ▲
     (Caution to the performance down of other indoor units)

⚠CAUTION
·Ask an authorized technician to setting a function.

5.6.3 Set Auto Pipe Detection / Start Auto Pipe Detection

The function that sets connection relationship automatically between the indoor unit and heat recovery unit.

■ Setting the function

Function		Option
Set Auto Pipe Search	Id 5	oFF, Ath, Atc, Nor
Start Auto Pipe Search	Id 6	oFF, StA

■ Option Selection

Set Auto Pipe Detection		Start Auto Pipe Detection	
Option	Detail of function	Option	Detail of function
oFF	None (Default)	oFF	None (Default)
Ath	Mode1	StA	Start Pipe Search
Atc	Mode2	-	-
Nor	Manual Pipe Search	-	-

- "Ath" Setting : Outdoor temperature is over 15°C(59°F) (If it fail, use "Atc")
- "Atc" Setting : Outdoor temperature is below 15°C(59°F) (If it fail, use "Ath")

■ Detailed information

1. Auto Pipe Detection
   - 5~30 minutes are required depending on the number of the indoor units and outdoor temperature.
   - The number of the indoor units connected is displayed on7-Segment of the outdoor unit main PCB for about 1 minute.
   - In case of auto pipe detecting error, '200' is displayed .
   - Auto pipe detection process is completed after '88' is disappeared.

⚠CAUTION
·Execute auto pipe detection again whenever the indoor PCB and HR unit PCB is replaced.
- Operation error occurs unless power is supplied to the indoor and HR units.
·Error No.200 occurs if the number of connected indoor units and that of scanned indoor units are different.
·If auto pipe detection process fails, complete it with manual pipe detection (see Manual pipe detection part).
·If auto pipe detection process is completed normally, manual pipe detection is not required.
·If you want to do auto pipe detection again after auto pipe detection fails, do after reset of outdoor unit by all means.
·During 5 minutes after pipe detection is completed, do not turn off the main unit PCB to save the result of pipe detection automatically.

2. Manual Pipe Detection
• Procedure
1) Enter the central control address into each indoor unit using its wired remote controller.
2) Turn No.1 of DIP s/w SW02M of HR unit PCB on.
3) Reset the power of HR unit PCB.
4) On the HR unit PCB, manually set address of each valve of the HR unit to the central control address of the indoor unit connected to the valve.
5) Reset the power of outdoor unit PCB.
6) The number of the indoor unit installed is displayed after about 5 minutes.
ex) HR → The number of the indoor
7) Reset the power of outdoor unit PCB, HR unit.
8) Manual pipe detection is completed

⚠CAUTION
·In case that central controller is not installed, firstly set up central controller's setting to make address setting of indoor units.
·In case that central controller is installed, please set central control address in wired remote control of indoor unit.
·HR unit's manual pipe address is set by the central control adress of indoor units.
·Address of valve which is not connected with indoor unit should be set differently with the address of a valve which is indoor unit connected (If address is overlapped valve will not work preperly).
·If there occurs some error during pipe detection process, it means pipe detection process is not properly finished.
·If an error occurred, it means that manual pipe setting is not completed.
·During 5 minutes after pipe detection process is completed, do not turn off the main outdoor unit's PCB to save the result of pipe detection automatically.

5.6.4 Set Zone Master

It is a function to operate according to the mode of the master indoor unit when several indoor units are connected to one of the branch of the heat recovery model.

■ Setting the function

Function		Step	Option
Set Zone Master	Id 7	1	seg1 : Branch No. seg2 : Pipe No.
		2	seg3, seg4 : IDU No.

■ Option Selection

seg1	seg2	seg3, seg4
1 ~ G	1 ~ 4	1 ~ 64

■ Detailed information
• This function is used with heat recovery.

• Operation
Step 1 : Branch No. (using '◀' button) & Pipe No. setting (using '▶' button)
Step 2 : Indoor Unit No.(using '◀" ▶' button)
(The number of the indoor unit to be displayed is the number of the indoor unit connected to the zone selected in step 1)
* To proceed to next stpe, press SW01C (●: execute) button.

⚠CAUTION
·Ask an authorized technician to setting a function.

5.6.5 Operating IDU Low Noise

This function is used to reduce refrigerant noise when the indoor unit starts to run for heat recovery system.

■ Setting the function

Function		Step	Option
Operating IDU Low Noise	Id 8	1	seg1, seg2 : - seg3, seg 4 : IDU No.
		2	seg1 : 1, 2 seg2, seg3, seg4 : -
		3	seg,1, seg 2 : - seg 3,4 : EEV pulse

■ Option Selection

Step		seg1	seg2	seg3, seg4
1		-	-	1 ~ 64
2		1 (Cooling) / 2 (Heating)	-	-
3	Cooling ('1' in step 2)	-	-	0, 13 ~ 17 (13 0 ~ 170pls)
	Heating ('2' in step 2)	-	-	0, 1 (140pls)

• Impossible to set all indoor unit at once Only possible to set each indoor unit

■ Detailed information

• This function is used with heat recovery.

⚠CAUTION
·Ask an authorized technician to setting a function.
·Maintain setting EEV pulse when the indoor unit starts to run for about 3min.

5.6.6 In Cooling IDU EEV Max. Pulse

It is the function to prevent excessive opening by setting EEV maximum pulse of indoor unit in cooling.

■ Setting the function

Function		Option
In Cooling IDU EEV Max. Pulse	Id 9	seg1, seg2 : IDU No. seg3, seg4 : Max. EEV * 10pls

■ Option Selection

seg1, seg2	seg3, seg4
1 ~ 64	150 ~300 * 10pls

• Maximum EEV pulse can be set in units of 10pls from 150 to 300pls. ('0': No setting)
• Set EACH IDU : Select "Idu" → "Id9" → EACH → Select Indoor Unit No. → Set Value
• Set All IDU : Select "Idu" → "Id9" → ALL → Set Value

■ Detailed information

• This function is used with heat pump and heat recovery.

• In cooling mode, the typical normal maximum pulse is 600. If superheat is too low, you can restrict IDU max pulse to reduce noise in cooling caused by valve hunting.

• Adjust operating range to stop hunting and stop noise
EEV valve normal range 0 ~ 1350 pulse
EEV in cooling typically open < 600 pulse, never greater than 1000 pulse
EEV in heating typically 8 ~ 1350 pulse
Maximum open can be adjusted down to 300 pulse

⚠CAUTION
·Ask an authorized technician to setting a function.

5.6.7 Comfort Cooling

It is function to reduce the ODU energy consumption by the continuous operation without thermo off.

■ Setting the function

Function		Option
Comfort Cooling	Id 10	seg1, seg2 : IDU No. seg3, seg4 : 0, 1~3

■ Option Selection

seg1, seg2	seg3, seg4	seg3, seg4
1 ~ 64	0	No setting
	1	Cooling capacity low, Power consumption low
	2	Cooling capacity mid, Power consumption mid
	3	Cooling capacity high, Power consumption high

- Set EACH IDU : Select "Idu" → "Id10" → EACH → Select IDU No. → Set Value
- Set All IDU : Select "Idu" → "Id10" → ALL → Set Value

■ Detailed information

- This function is used with heat pump and heat recovery.

- Possible setting condition
  Indoor setting temperature - Indoor temperature < -2℃

- Operation
  - Exist Indoor unit humid sensor : Use Indoor unit humid Value
  - Non Exist Indoor unit humid sensor : Use Default Value
  - Accurate superheat control using calculated values

⚠CAUTION
·For detailed logic, please refer to the next appendix page.

5.6.8 Non-operating IDU Subcool

It is function to reduce refrigerant noise that might be heard when non-operating IDU EEV is opened to recover liquid accumulated inside IDU.

■ Setting the function

Function		Option
Non-operating IDU Subcool	Id 11	seg1, seg2 : IDU No. seg3, seg4 : IDU Subcool

■ Option Selection

seg1, seg2	seg3, seg4	
1 ~ 64	0	Default
	1	Add 1°C of IDU subcool
	⋮	⋮
	7	Add 7°C of IDU subcool

- Set EACH IDU : Select "Idu" → "Id11" → EACH → Select Indoor Unit No. → Set Value
- Set All IDU : Select "Idu" → "Id11" → ALL → Set Value

■ Detailed information

- This function is used with heat pump and heat recovery.

⚠CAUTION
·Ask an authorized technician to setting a function.

5.6.9 Set IDU Superheat For Fan

It is a function to alleviate dew condensation on indoor unit panel by setting additional superheat according to the indoor air volume when moisture is continuously generated or input into the room.

■ Setting the function

Function		Option
Set IDU Superheat for Fan	Id 12	seg1, seg2 : IDU No.. seg3, seg4 : IDU Superheat

■ Option Selection

seg1, seg2	seg3, seg4			
	Option	Step 1	Step 2	Step 3
1 ~ 64	0	0	0	0
	1	0	+1	+2
	2	+1	+2	+3
	3	+2	+3	+4

• Set EACH IDU : Select "Idu" → "Id12" → EACH → Select Indoor Unit No. → Set Value
• Set All IDU : Select "Idu" → "Id12" → ALL → Set Value

■ Detailed information

• This function is used with heat pump and heat recovery.

• In high humidity region, this option can be applied to prevent dew condensation

• Set step1 ~ step 3 to each or all IDU according to field condition (high humidity)

⚠CAUTION
·This function reduces IDU capacity when fan speed reduces by raising superheat as fan speed lowers
·When setting this function, the temperature of the indoor unit may rise by about 1 ℃ ~ 4 ℃.
·When used with the target pressure adjusting function (Fn8), the temperature of the indoor unit connected to the same outdoor unit may rise as well.

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Ⅳ. Control Logic

HR Unit Control

1. Basic Control

1.1 Normal Operation

Actuator	Power on	Cooling operation	Heating operation	Stop state
High pressure gas valve	Close	Close	Open	Keep
Low pressure gas valve	After 30 sec. Open	Open	Close	Keep
Liquid valve	Close	Open	Close	Close

1.2 Starting Control(Heating Mode Only)

If the system is operated in the heating mode, all high pressure gas valves are opened

1.3 Valve Control

Mode change timer is calculated as Table 1, and valves are controlled by Mode change timer according to Table 2.

Table 1. Mode change timer calculation

Previous mode	Changing mode	Mode change timer
Stop or ventilation	Cooling or heating	120 sec
Cooling mode	Heating	180 sec
Heating mode	Cooling	120 sec
Cooling or heating	Stop or ventilation	During heating : 60 sec During cooling : 0 sec

Table 2. Valve control by mode change timer

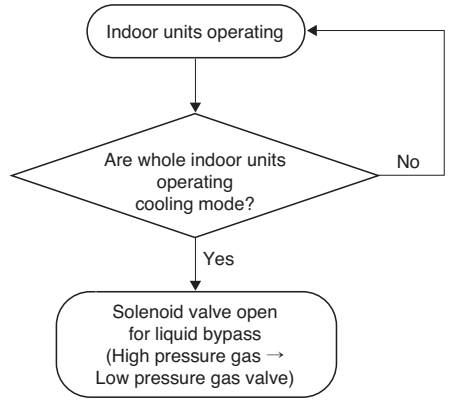
Operating mode	Mode change timer	H/P gas valve	L/P gas valve	Balancing valve
Cooling	120 ≤ timer	Keep	Keep	Close
	0 < timer < 120	Close	Close	Open
	timer = 0	Close	Open	Close
Heating	180 ≤ timer	Keep	Keep	Close
	0 < timer < 180	Close	Close	Close
	timer = 0	Open	Close	Close
Stop or ventilation	0 < timer 5	Cooling mode : Close	Keep	Close
	Timer = 0	Heating mode : Low pressure gas valve → Close	Keep	Close

2. Special Control

2.1 Oil Return/Defrost Control

Component	Starting	Running	Ending
Inverter compressor	Stop	60 Hz	40 Hz
High pressure gas valve	Keep	Close	Open or Close
Low pressure gas valve	Keep	Open	Open or Close
Balancing valve	Open for 30s	Close	Close

2.2 Liquid Bypass Control

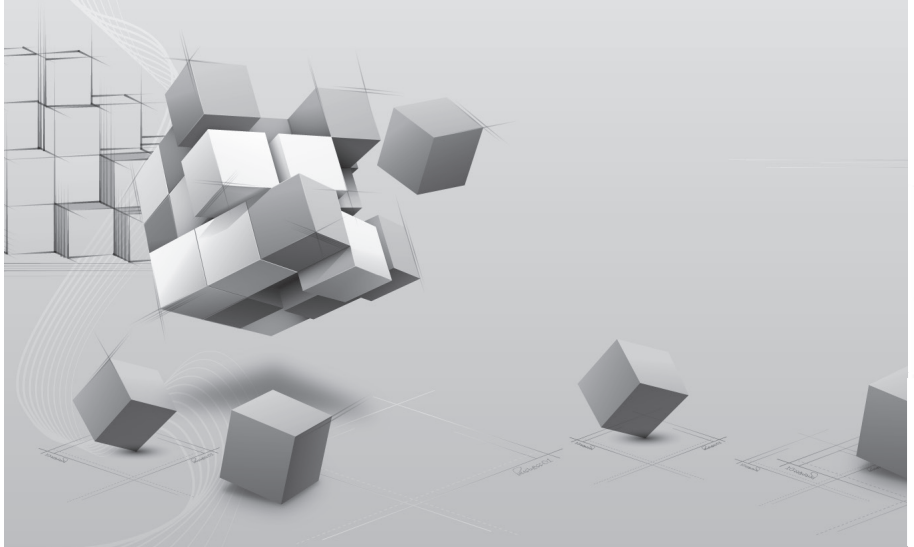


2.3 Subcooling EEV Control

Target : about 25°C(77°F)
Subcooling EEV works with Fuzzy rules to keep the degree of subcooling at the outlet of subcooler during simultaneous operation
The degree of subcooler = T outlet of subcooler – T inlet of subcooler

MULTI V 5

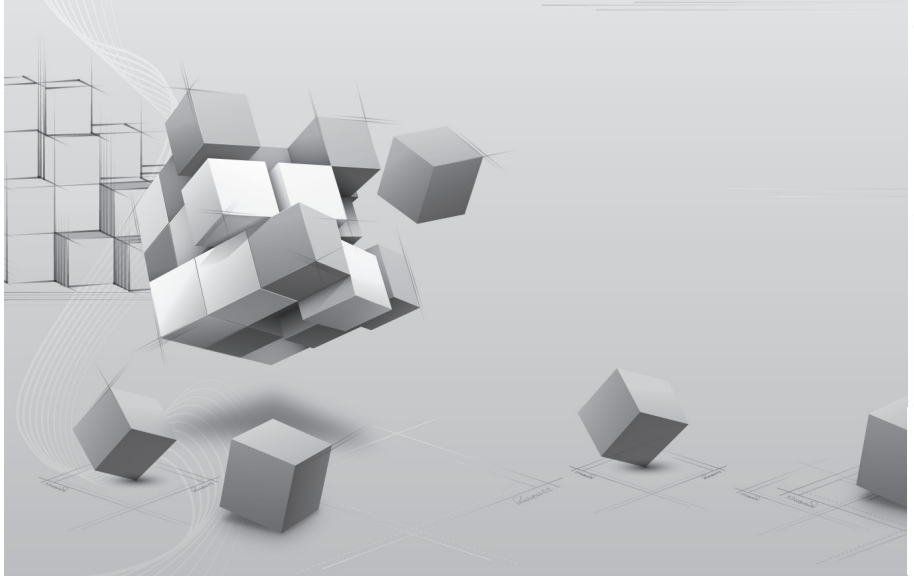
Ⅴ. Central Control



MULTI V 5

Ⅴ. Central Control

Introduction of LG HVAC Controller



1. Introduction of LG HVAC Controller

Central Controller	AC Ez	PQCSZ250S0 • Max. 32 IDUs	PACEZA000 • 5 inch Touch LCD • Max. 64 IDUs
	AC Smart	Premium PQCSW421E0A • 10.2-inch Touch LCD • Max. 128 IDUs (discontinued)	IV PACS4B000 • 10.2-inch Touch LCD • Max. 128 IDUs • Exp I/O allowed (discontinued) AC Smart 5 PACS5A000 • 10 inch type Touch LCD • Max. 128 IDUs • Exp I/O allowed
	ACP	Standard/premium PQCPC22A0/PQCPC22N0 • Web Controller • Max. 256 IDUs (discontinued)	IV PACP4B000 • Web Controller • Max. 256 IDUs • Exp I/O allowed (discontinued) ACP 5 PACP5A000 • Web Controller • Max. 256 IDUs • Exp I/O allowed
	BMS Gateway	ACP BACnet PQNFB17C0 • ACP included • Max. 256 IDUs (discontinued) AC Smart BACnet PBCANA000 • AC Smart included • Max. 128 IDUs (discontinued)	ACP LonWorks PLNWKB000 • ACP included • Max. 64 IDUs
	AC Manager	AC Manager IV PACM4B000 • PC SW • Multi ACP, AC smart (Max. 32) • Max. 8,192 IDUs	AC Manager 5 PACM5B000 • Web Controller • Multi ACP, AC smart (Max. 32) • Max. 8,192 IDUs

Note :
- A wide range of central controllers can be adopted depending on the size of the building.
- BMS G/W functions as a central controller as well as a G/W.
- ACM IV is the S/W for integrating other hardware controllers.
- ACM 5 is possible to connect PC, Tablet, Smart Phone.

Etc	PDI	Premium (8port) PQNUD1S40 Standard (2port) PPWRDB000	PI485GW	PMNFP14A1 ODU type • Multi • SCAC • Therma V PHNFP14A0 IDU type • IDU, ERV
	Dry Contact	1 input PDRYCB000 2 inputs PDRYCB400 for thermostat PDRYCB300 for thermostat(analog input) PDRYCB320 Modbus PDRYCB500 for Multi V III PQDSBCDVM0 for Multi V IV PVDSMN000		
	DO Kit	PQNFP00T0 •Switch On/Off	ACS I/O module	PEXPMB000 • DI 3 • DO 3 • UI 4 • AO 4 (0~10V)

*( ) Name used before BECON HVAC.

Note :
- PDI : Power Distribution Indicator. Displays the power usage rate of the VRF system's indoor unit
- 485 G/W : Installed for communication with central controllers in certain products (indoor, outdoor equipment)
- Dry Contact : Product for controlling the SAC of external equipment via contact or modus communication.
- Do-kit : Assigns an address to the air conditioner central controller for controlling the on/off of externally connected equipment through the central controller.
- ACS IO Module : Expansion module connected to the central controller for enabling the control of external equipment.

		 AC Ez	 AC Ez Touch	 AC Smart	 ACP	 (S/W) AC Manager IV	 AC Manager 5
Model Code		PQCSZ250S0	PACEZA000	IV : PACS4B000 5 : PACS5A000	IV : PACP4B000 5 : PACP5A000	PACM4B000****	PACM5A000****
Max. IDUs		32	64	128	256	8,192	8,192
Size (mm, W x H x D)		190 x 120 x 17	137 x 121 x 25	253.2 x 167.7 x 27	270 x 155 x 65	-	270 x 155 x 65
ERV/ERV DX Control		●	●	●	●	●	●
Hydro kit Control			●	●	●	●	●
LG AHU Control				●	●	●	●
LG Chiller Control				●*	●*	●	●
Total On/Off (All IDUs)			●	●	●	●	●
Individual / Group Control		●	●	●	●	●	●
Visual Navigation				●	●	●	●
Schedule		●	●	●	●	●	●
Error code display		●	●	●	●	●	●
History			● (error)	●	●	●	●
Lock	Total	●	●	●	●	●	●
	Partial		●	●	●	●	●
Auto Control	Peak Control		●	●	●	●	●
	Time limit Control			●	●	●	●
	Auto changeover		●	●	●	●	●
	Setback		●	●	●	●	●
Energy Report	Electricity Use		●**	●**	●**	●	●
	Gas Use			●**	●**	●	●
Interlocking	Emergency Pattern			●	●	●	●
	Virtual Group Control			●	●	●	●
	ACS I/O Module			●	●	●	●
2 Setpoint			●***	●***	●***	●	●
Energy Navigation				●**	●**		●
Remote Access			By PC S/W	IV : Web (flash) 5 : Web (HTML5)	IV : Web (flash) 5 : Web (HTML5)	By PC S/W	Web (HTML5)
I/O Port (including)			DI : 1	DI : 2 / DO : 2	DI : 10 / DO : 4		

* Need Chiller Option S/W(PCHLLN000)
** Need PDI Standard / Premium
*** Available with 4 generation Indoor unit
**** Integrator products(AC Manager IV or 5) require AC Smart IV or ACP IV for physical connection of HVAC system

■ Compatibility between Controllers

Master (A) \ Slave (B)	AC Ez	AC Ez Touch	AC Smart IV/5	ACP IV/5	ACP BACnet	ACP Lonworks	PDI
AC Ez	O	X	X	X	X	X	X
AC Ez Touch	O	O	X	X	X	X	O
AC Smart IV/5	O	O	O	X	X	X	O
ACP IV/5	O	O	O	X	X	X	O
ACP BACnet	O	O	O	X	X	X	O
ACP Lonworks	O	O	O	X	X	X	O
PDI	X	X	X	X	X	X	X

■ Compatibility with Integrator

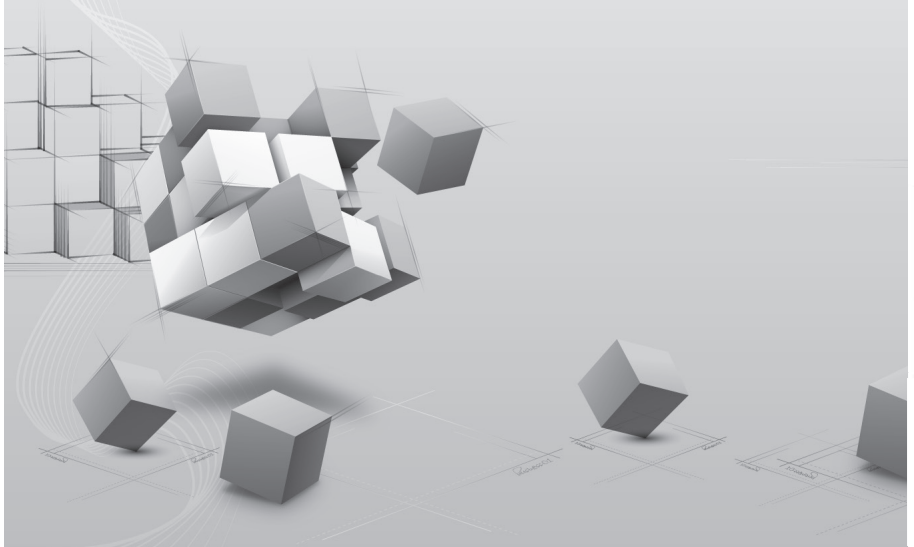
Master (A) \ Slave (B)	AC Ez	AC Ez Touch	AC Smart IV/5	ACP IV/5	ACP BACnet	ACP Lonworks	PDI
AC Manager IV	X	X	O	O	O	O	X
AC Manager 5	X	X	O	O	O	O	X

Note : Only one master can be selected for one 485 node.
Products can be divided into ones that only operate as master and ones with the master/slave selection option.

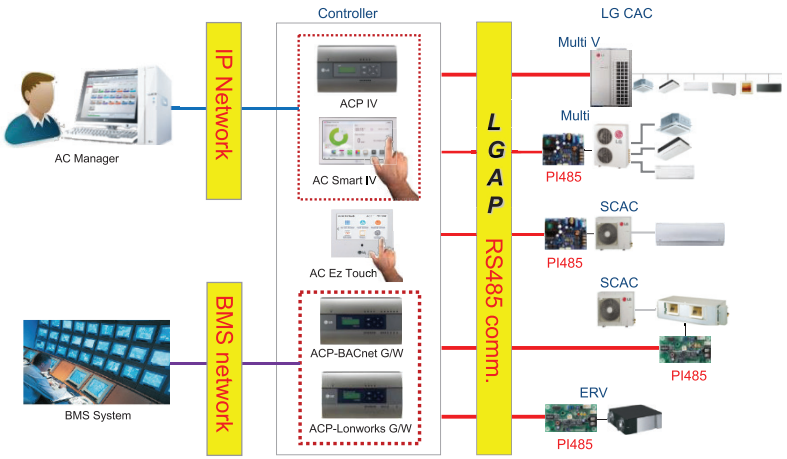
MULTI V 5

Ⅴ. Central Control

Common Part



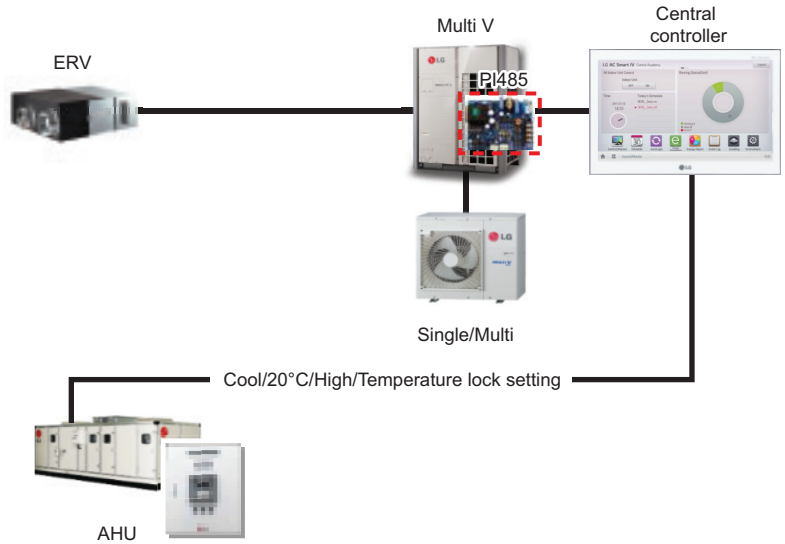
1. Communication Hierarchy



Note : The LG SAC central controller communicates with the product through the LGAP central control protocol. The BMS and AC Manager are based on Ethernet communication but has different protocol.

2. PI 485 Gateway

■ In some circumstances, the 485 G/W can be omitted when installing the central controller.

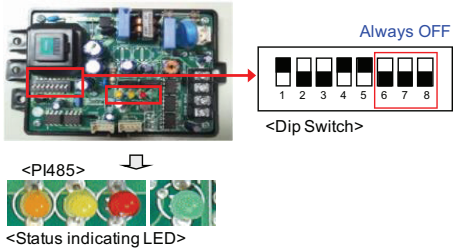


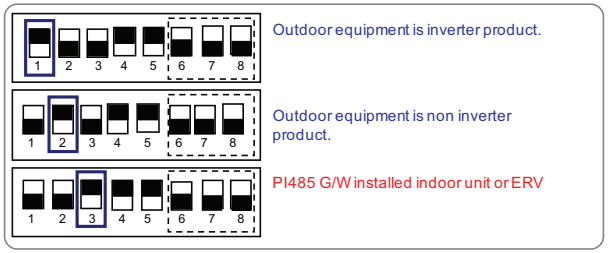
■ 485 G/W installation is unnecessary if the conditions listed below are met.

Outdoor unit	Multi V Plus2, Sync2 or later model (Multi V III, IV)
	For Multi V S model, please refer to PDB
Indoor unit	2 series or later(4 series)
Remote Controller	Below new type or later model

Note : Please refer to the manual or product PDB for information on what PI485 G/W is compatible with each product.

■ Inspection of PI485GW





• Check for normal communications

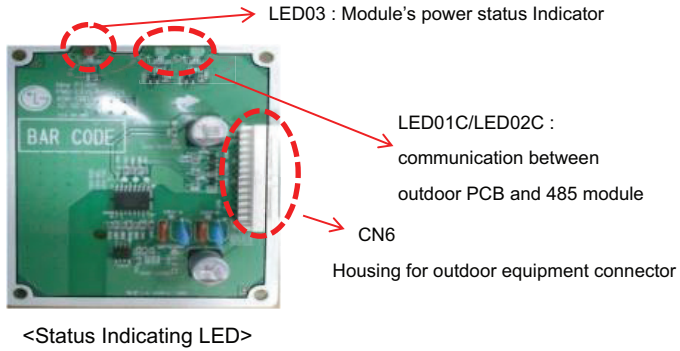
- LED1(Green)
  Blinks when the PI485 and central controller (AC-Ez/ACP/AC Smart/…) are communicating.
- LED01G(Red)
  Blinks when receiving information from outdoor on the number of indoor unit with addresses (once in 3 minutes).
  (for multi and multi v, number of blinks is equal to the number of indoor unit)
- LED02G (Yellow)
  When data is received by the PI485 from outdoor
- LED03G (Orange)
  When data is transmitted from PI485 → Outdoor.

• PI 485 Dip s/w setting procedure

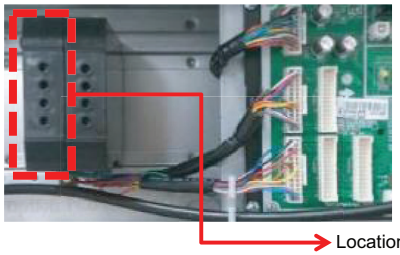
<PI485 Dip S/W>

s/w #1 on – Multi V, Multi MPS inverter
s/w #2 on – MPS fixed speed multi
s/w #3 on – Ventilator, Duct, Single
s/w #4 on – LGAP implemented product
s/w #5 on – (up to Multi V 7 series),
off(subsequent models)

■ Inspection of 485 module (for MV IV)

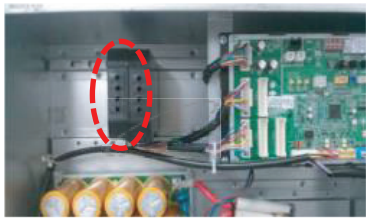


Installation and connecting to outdoor equipment



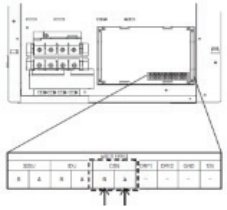
- Install the central controller module board in the location for optional modules in the outdoor equipment control box.
  (Hang the upper part and fix the lower part with screws)

• Check for normal communications



[Normal operations]
- LED01C(green, Rx), LED02C(green, Tx) : Blinking once every 2s ~ 10s
→ If the above sequence is not observed, check the connections to main board.
- LED03C(red) : Power on status (Always On)
→ If the above sequence is not observed, check the connection between A and B terminal of the central controller communications line

• Connect to central controller



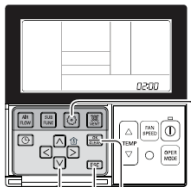
- Connect the communication line of the central controller to the central controller terminal (CEN_A, CEN_B) on the external board.

<*Pay attention to wire polarities when connecting>

※ PI485 for Multi V Super doesn't require separate dip switch setting.

3. Centeral Control Address

※ Do not set the same address to different IDUs connected to the same Central Controller.

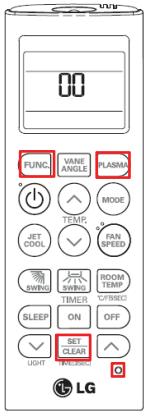


Standard II

Press ⚙ button(3sec)
→ Repeat Pressing ⚙ button (Function code 02 : XX)
→ Set address with Up/Down
→ Press ok/Clear (saved)
→ Press ESC

Standard III

Select setting category and Press [∧(up)] for 3 seconds.
→ Input the password and press [OK].
→ Select [Centeral Control Address] and set address.



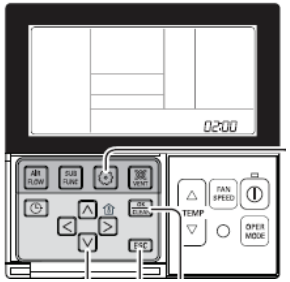
Wireless

※ For Setting Address
Press FUNC + Reset
→ Set address with Up/Down
→ Run/Stop Button (Saved)
→ Press Reset (Exit)

※ For Checking Address Press
Plasma+Reset (Toward the IDU)
→ Press Start/Stop button (count the number of blinking)
→ Press Reset (Exit)

※ It's different on wireless remote controller model. Refer to each manual.

Hydro kit

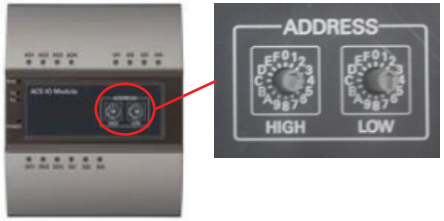


Press ⚙ button(3sec)
→ Repeat Pressing ⚙ button
(Function code 07 : XX)
→ Set address with Up/Down
→ Press ok/Clear (saved)
→ Press ESC

AHU control kit

Press ⚙ button(3sec)
→ Repeat Pressing ⚙ button
(Function code 11 : XX)
→ Set address with Up/Down
→ Press ok/Clear (saved)
→ Press ESC

ACS IO module (PEXPMB000)



Address range
: 01~F7

Recommend
: 20~2F

■ Basic Check Point

Products Normality

➢ Check Products(IDU, ODU) normality
: without Central controller

- ODU Auto Addressing
- Error state check
  : after removing control system
- The other factor checking
  - Pump, Sensor and so on

Central Control Addressing

➢ IDU's address checking
(Duplication & Omission of IDU address)

- Address checking of All IDU's address
  - All IDUs should have unique central control address
    → If address is duplicated, those IDUs cannot communicate with central controller
- Address checking When using Group Control

Communication Cable wiring

➢ "BUS Wiring" is mandatory
➢ Checking Disconnection/Short of cable

- Comm. cable checking
  (disconnection / short / polarity)
- Node limitation checking
  (checking the number of ODU/PI485)
- Cable spec check (VCTF-SB 0.75sq)

Master/Slave & PI485 setting

➢ Central Controller Master/Slave setting
➢ PI485 G/W checking by products

- There should be only one Master device on a communication line
  - ACP, ACP_BACnet is Master device only
  - The other controllers are selective device
    : AC Smart, AC Ez, PDI
- PI485 G/W Setting for Single & Ventilation

MULTI V 5

V . Central Control

Product Part

<Note>
1. The session of "Install" in product part is not include 'Unit Registration' on ACP, AC Smart, ACP BACnet etc . Refer to prouduct manal.
2. The session of "Install" in product part has explaination of some function that much times asked to HQ.
3. Some proudcts which have same GUI & functions do not explain in duplicate.
4. "AC Manager IV is discontinued. We have oinly 'Flow Chart' category.

1. AC-Ez

AC Ez

Features

Standard Features

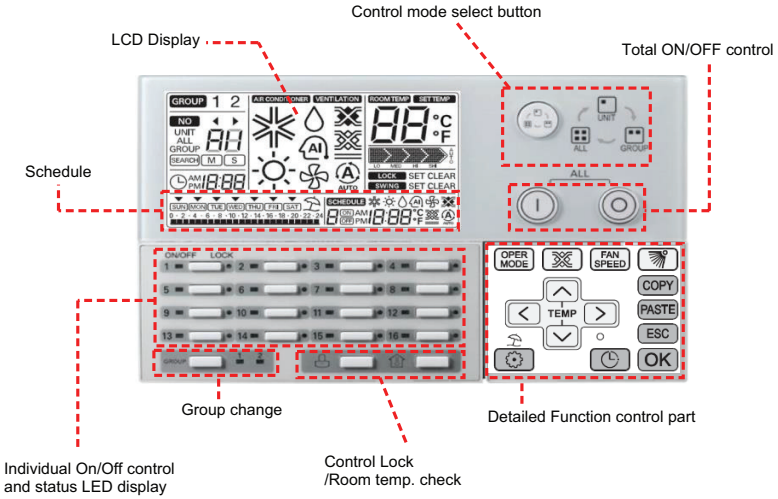
- Indoor Unit Control/Monitoring by Groups/Indoor Units
- Control & Monitor : On/Off
  - Operation mode
  - Set temperature
  - Room temperature
  - Fan speed
  - Auto swing

Advanced Function

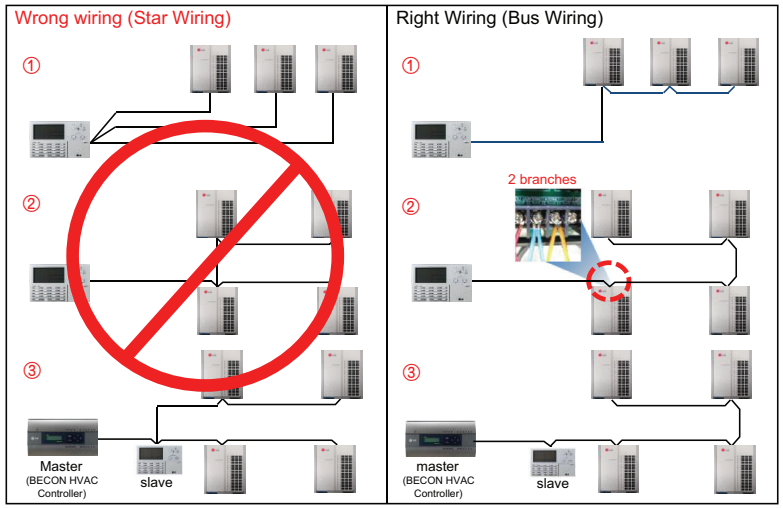
- It is available to select each Individual, Group, All unit
- Unit status check by intuitive LED light
- Connectable with upper level controller
- Weekly Schedule Events (8 schedules per 1 day)
- Exception day setting for Schedule function

Model no.	PQCSZ250S0
Dimension (WxHxD)	190mm x 120mm x 17mm
Max. number of unit	32
	- One unit type : 32 IDU or 32 Vent
	- Mixed unit type : 16 IDU & 16 Vent
Applicable unit type	Air conditioner, ERV, DX ERV
Display	LED, LCD Display
Power	12VDC, 600mA (Not Included)
Surrounding Conditions	Operating Temperature : 0~40°C
	Storage Temperature : -20~60°C
	Humidity : 0~98% (non-condensing)
LG Comm. type	1 Channel RS485
	*Channel 1 : Outdoor unit, PI485GW

■ Components



■ ODU Wiring

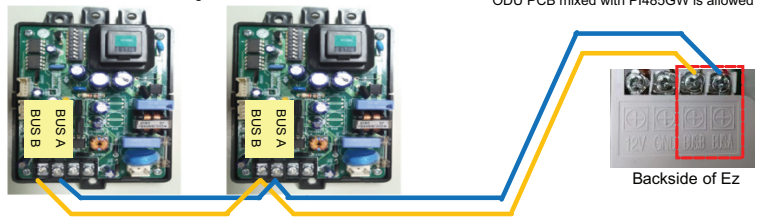


■ ODU Wiring

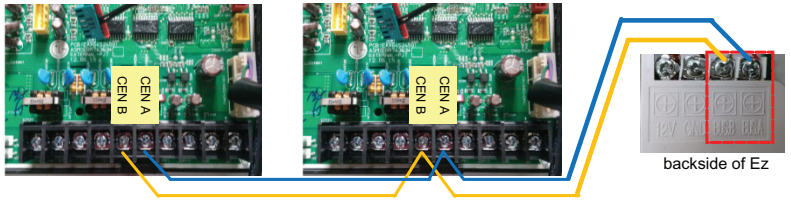
*Communication line has polarity : Bus A / B

< Single/Vent/etc >

*ODU PCB mixed with PI485GW is allowed

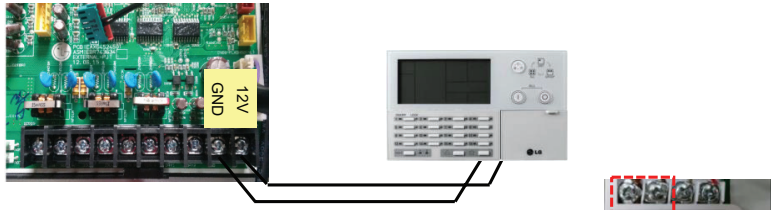


< After Multi V II >

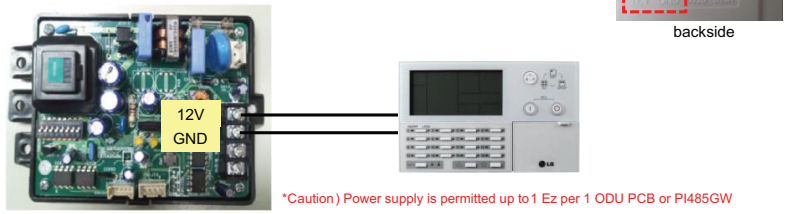


■ Power Supply

1) From ODU PCB (after Multi V II)

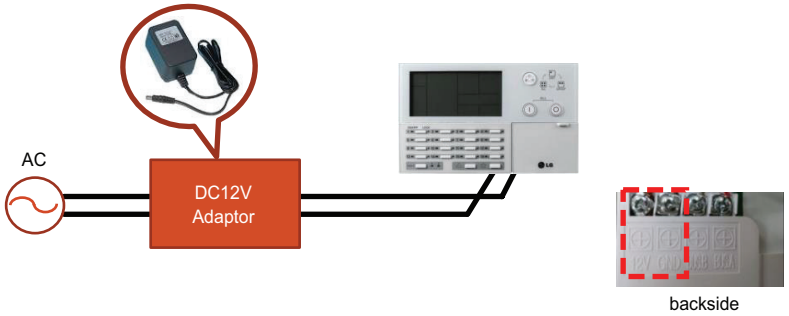


2) From PI485GW (Single/Vent/etc)



*Caution) Power supply is permitted up to 1 Ez per 1 ODU PCB or PI485GW

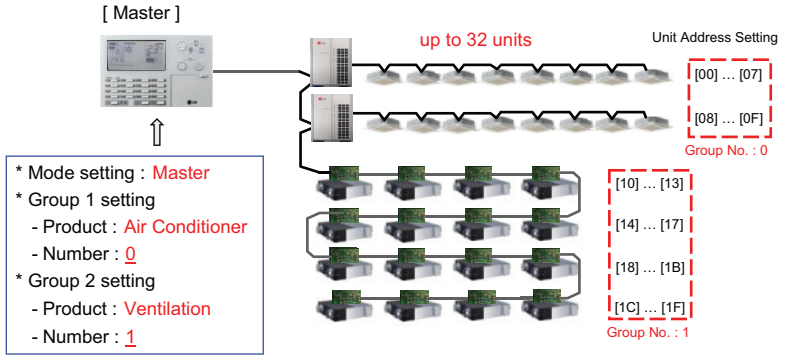
3) From external source.



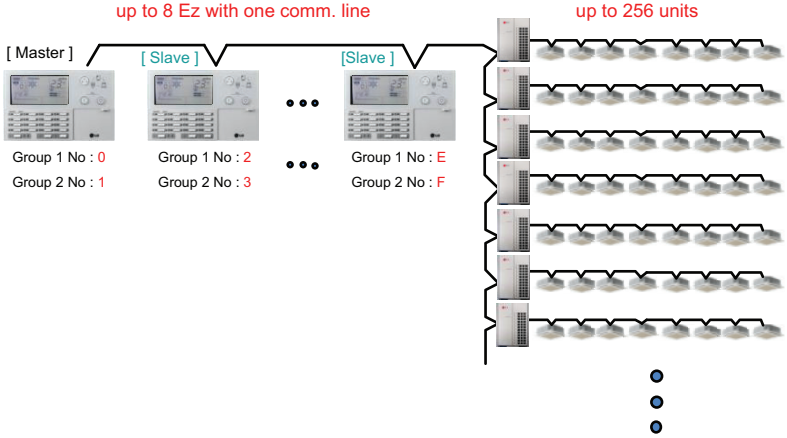
➡ Use an appropriate Power Adaptor : DC12V and more than 600mA

■ Combination

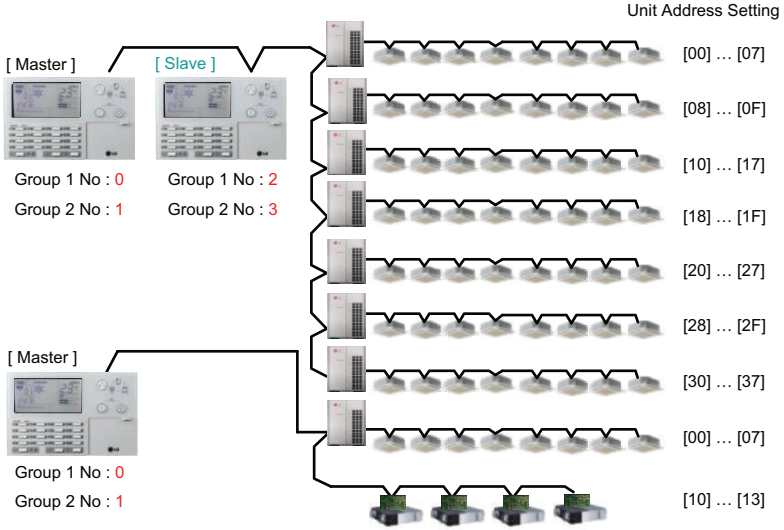
1) 1 AC Ez with one line



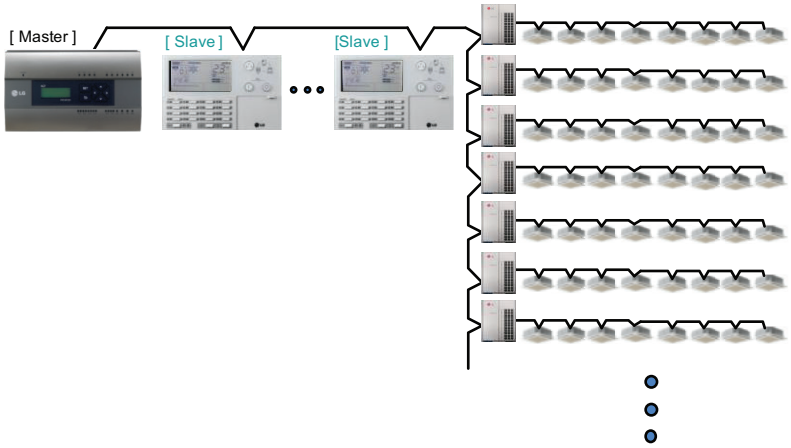
2) A number of AC Ez with one line.



3) A number of AC Ez with two lines.



4) Upper level controller is maser, and others are slave mode.



■ Installer Setting Code Table

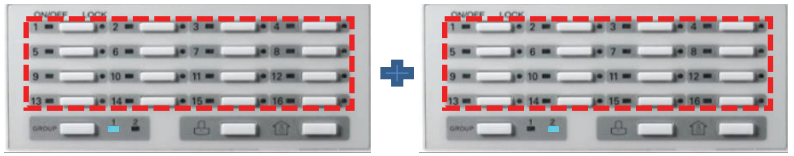
No.	Function	Code	Value
1	Master/Slave Setting	1	(M) : Master (S) : Slave
2	Group 1 product Select	2	Air conditioner / Ventilator
	Group Number Setting		0~F : Group Address - : No use of this group
3	Group 2 product Select	3	Air conditioner / Ventilator
	Group No. Setting		0~F : Group Address - : No use of this group
4	Indoor units searching (Master controller only)	4	Indoor unit searching
5	°C / °F setting	5	°C : Celsius
			°F : Fahrenheit

If you need more detail, please refer to product manual
(http://partner.lge.com/global : Home > Download > Manuals)

■ Group Type

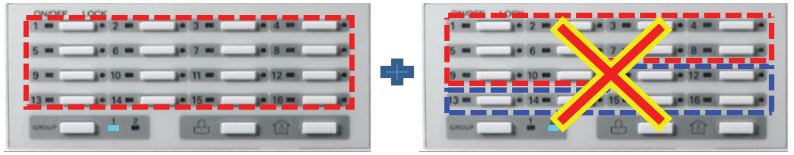
Unit type of each Group can be set as Air conditioner type or Ventilation(including DX model).
One Group can have only one unit type(it cannot be divided by different unit type), so only following combinations are allowed.

: max 32 IDU / max 32 Vent. / max 16 IDU + max 16 Vent.



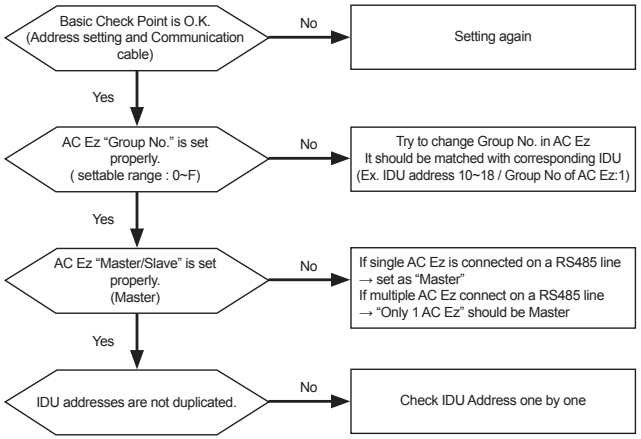
Group 1: 16 IDU or 16 ERV　　Group 2: 16 IDU or 16 ERV

< Example of wrong case >

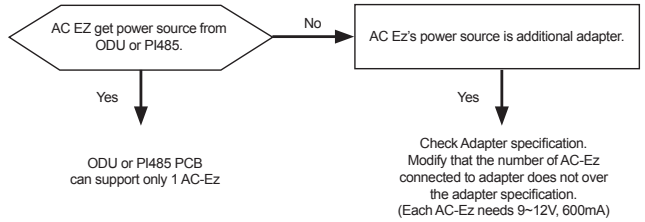


Group 1: 16 IDU　　Group 2: 10 IDU or 6 ERV

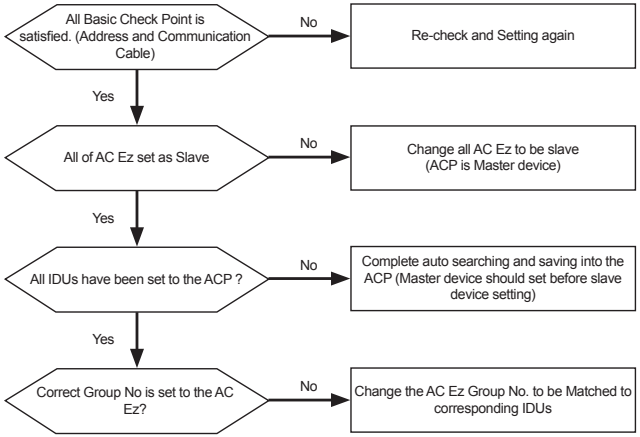
Symptom	Primary Check Point
Auto searching failure of all or some units	- Basic Check Point - Check AC Ez Group No. to be matched with corresponding IDU - Check AC Ez Master / Slave Setting (Only one master device is allowed on a RS485 line)



Symptom	Primary Check Point
In case of more than one AC Ez, Intermittently unexpected shutdown of AC Ez	- Power Supply Source of AC Ez should be checked



Symptom	Primary Check Point
In case of AC Ez with ACP, AC Ez does not recognize all or some units	- Basic check Point - ACP's IDU device setting should be completed before setting of AC Ez



2. AC-Ez Touch

AC Ez Touch

Features

Standard Features
- Indoor Unit Control/Monitoring by Groups/Indoor Units
- Web Access with Graphical User Access Control
- Total 200 Schedule Events
  : Weekly, Monthly, Exception day setting
- 1 Digital Input
- Multiple Language Selections
  (Eng, Ita, Spa, Por, Rus, Fra, Ger, Tur, Pol, Chi, Kor)
- Max.5,000 error history (1 year)
- Max.5,000 alarm history (1 year)

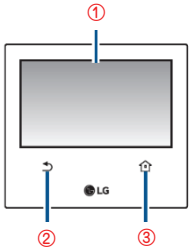
Advanced Function
- Two Set point Auto-changeover / Setback
- Temperature Set point Range Limit
- Remote Controller Lock (All, Temp, Mode, Fan Speed)
- Energy save mode
- Change alarm: Oil change / Filter change
- Energy Management with PDI (prediction, saving)
  : today / week / month (max. 4month)

Optional Accessories
- PDI(Power Distribution Indicator) - PQNUD1S40
  PPWRDB000

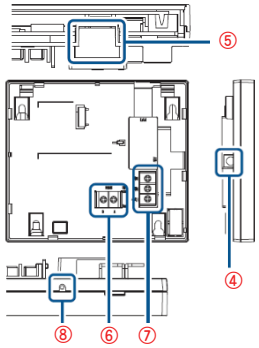
* This file is base on v1.10.4 of AC Ez Touch.

Model no.	PACEZA000
Dimension (WxHxD)	137mm x 121mm x 25mm
Weight (kg)	0.66 kg (Gross:1.618kg)
Max. number of unit	64
Applicable unit type	Air conditioner, ERV, DX ERV, Hydro kit (Heating)
Display	5 inch color LCD Screen (800*480)
Power	12VDC (3.33A)
Surrounding Conditions	Operating Temperature : 0~40°C Storage Temperature : -20~60°C Humidity : 0~98% (non-condensing)
LG Comm. type	1 Channel RS485 *Channel 1 : Outdoor unit, PI485GW
Ethernet	100Mbps
External Interface	1 Digital Input, 1 Analog Input

■ Components

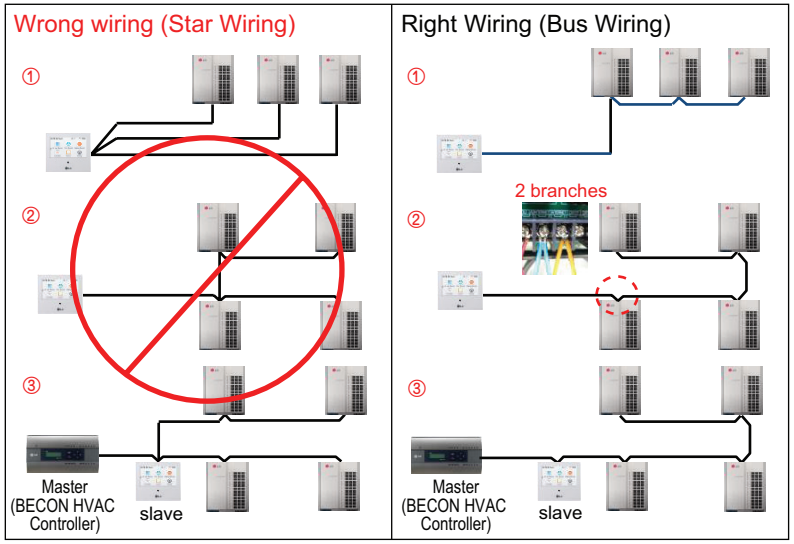


<Front>



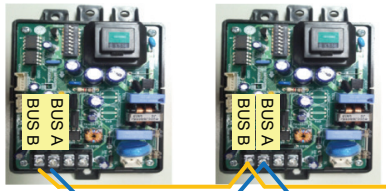
① LCD display window
② Back button
: move to the previous screen
③ Home screen button
④ Power input part
⑤ LAN communication part
⑥ RS-485 communication part
⑦ AI / DI input part
AI+: Reserved
DI+: Contact point input (dry contact input)
COM: Common GND
⑧ Reset Button

■ ODU Wiring



■ ODU Wiring

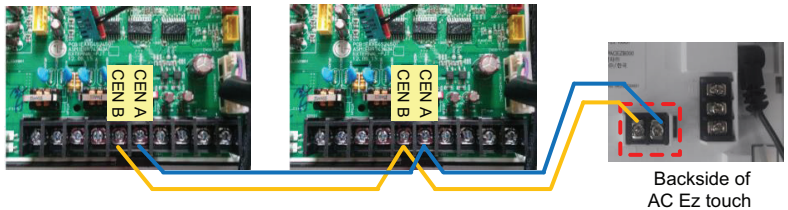
< Single/Vent/etc >



* Communication line has polarity : Bus A / B

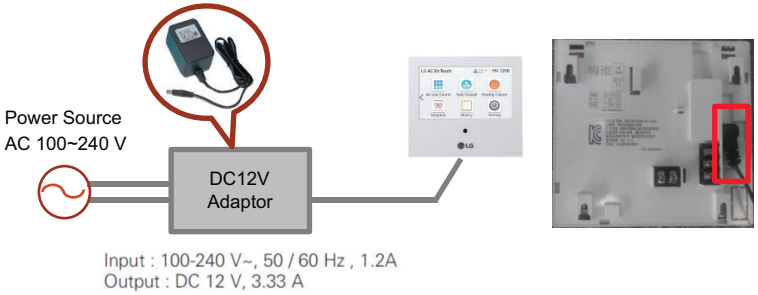
Backside of
AC Ez touch

< Multi V Series (After Multi V II) >



Backside of
AC Ez touch

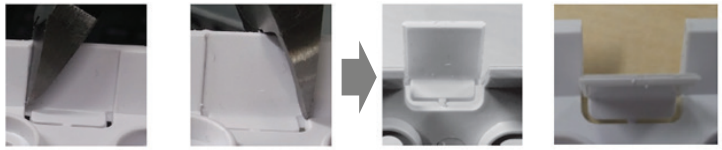
■ Power Supply



Input : 100-240 V~, 50 / 60 Hz , 1.2A
Output : DC 12 V, 3.33 A

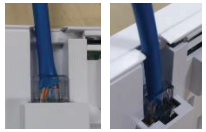
■ RJ45 Connection

Need to remove knockout structure before connection

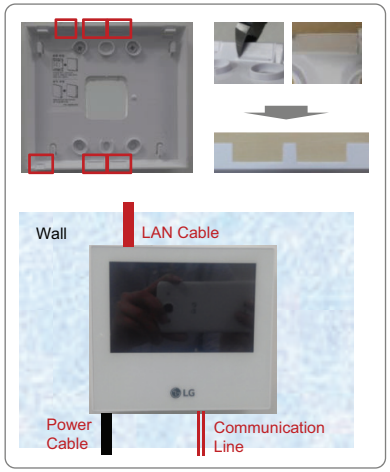


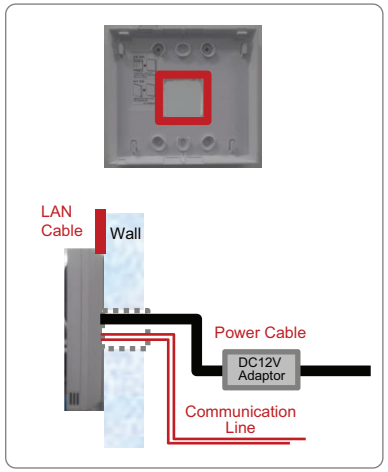
① Cut the rim of the groove part on the both sides of the knockout structure using a nipper.

② After cutting, bend the knockout structure to the inward direction & Outward director for 2 times, respectively. And tear the knockout structure.

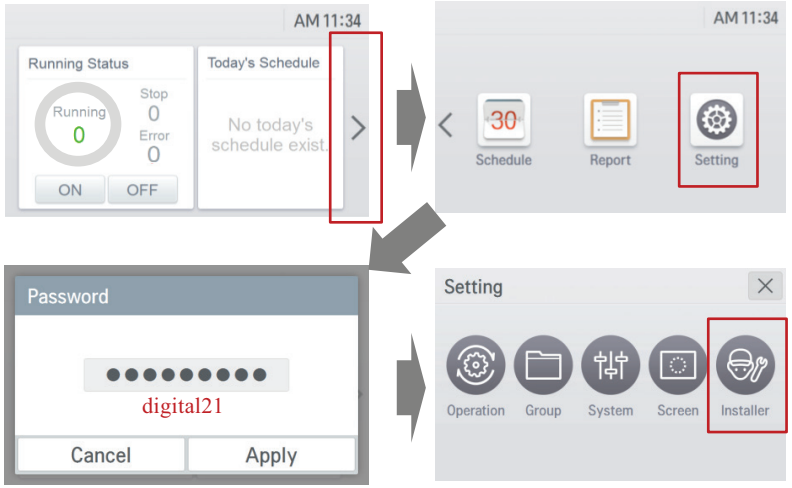
	Case 1	Case 2	Case 3
Type	No cover 	Same sized cover with RJ45 	Bigger cover than RJ45 
Connection Guide	OK 	OK 	OK after remove cover  If the cover can not be remove, Please change RJ45 connector.

■ Decide the space for install the AC Ez

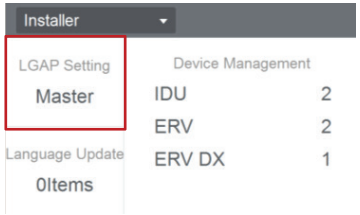




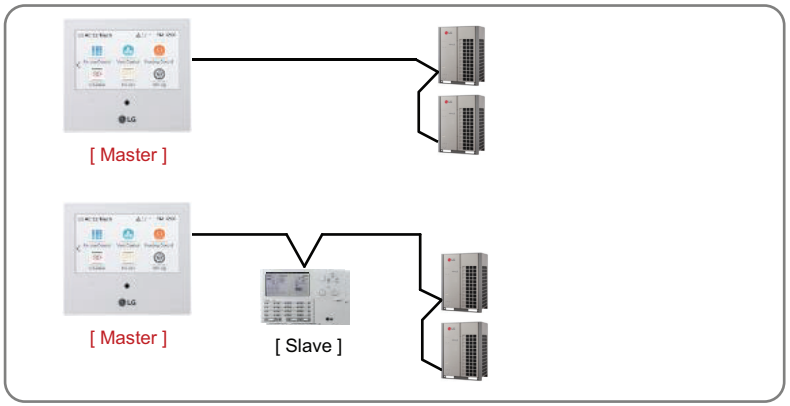
■ How to access “Installer Mode”

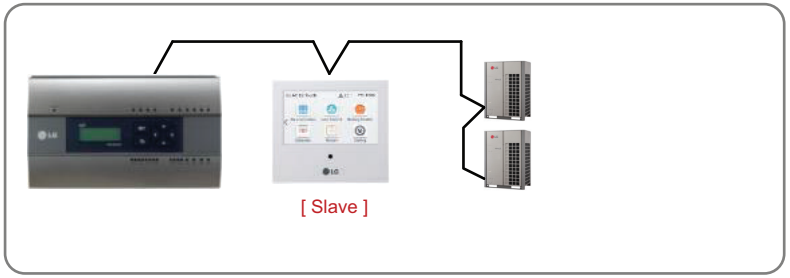


■ Set Master/Slave



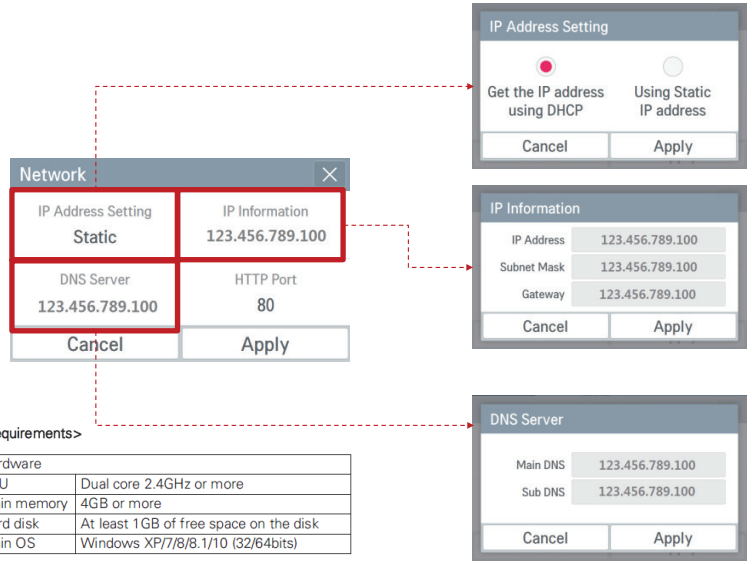
	Master	Slave
Each equipment lock setting	O	X
Set temp range	O	X
2 set point	O	X
IDU 2 set	O	X
Auto search device	O	X
Energy report	O	X
Energy save mode	O	X





If you need more detail, please refer to product manual.
(http://partner.lge.com/global : Home > Download > Manuals)

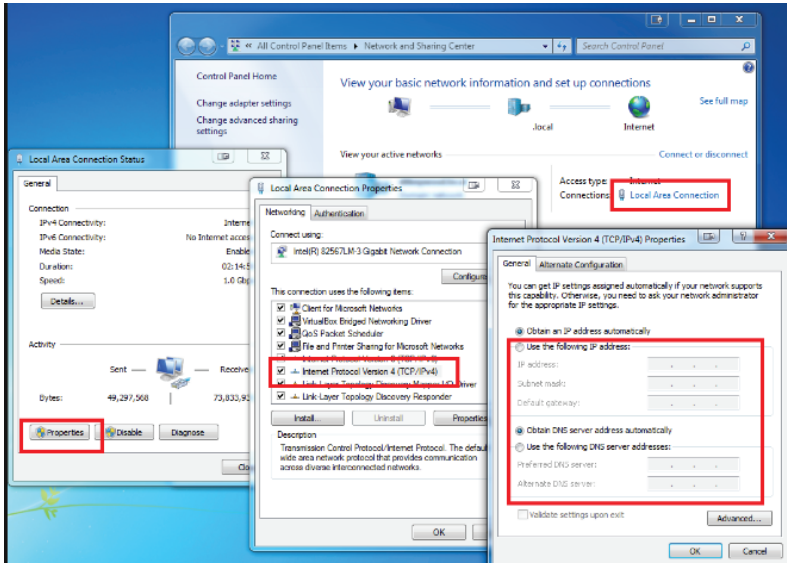
■ Network Setting(AC Ez Touch)



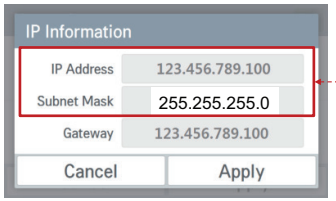
<Requirements>

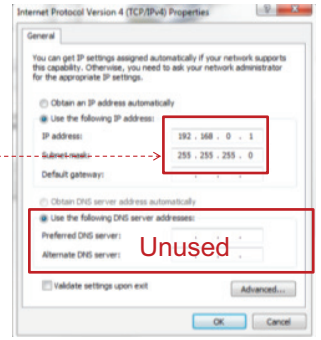
Hardware	
CPU	Dual core 2.4GHz or more
Main memory	4GB or more
Hard disk	At least 1GB of free space on the disk
Main OS	Windows XP/7/8/8.1/10 (32/64bits)

■ Network Setting(PC)



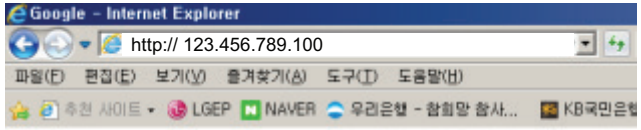
1) Connection directly between AC Ez touch and PC.
   - IP Address
     1) AC Ez touch : 123.456.729.100
     2) PC : 123.456.729.101
   - Subnet Mask : 255.255.255.0



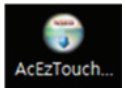


2) Using Building Network → Need to discuss with IT Administrator.

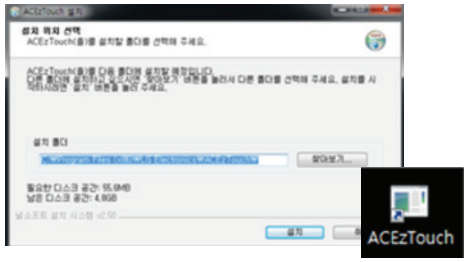
■ Connecting



① Insert IP & Installation file download

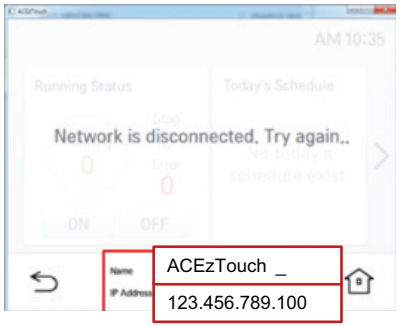


② Installation file

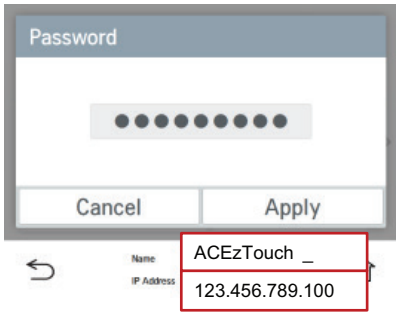


③ Installation process

④ Execution file on main screen



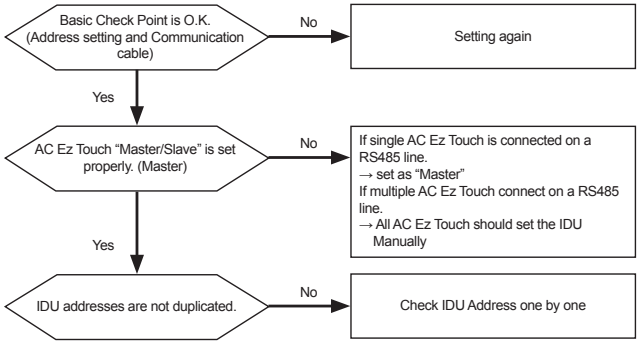
⑤ Run PC Program and Name/IP Address 'Set up'



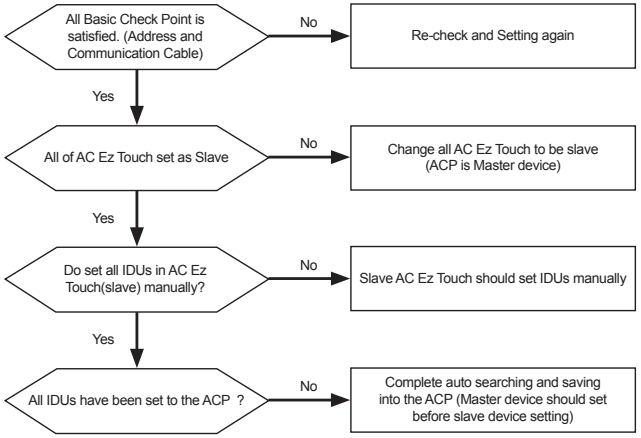
⑥ Access & Login

* If AC Ez Touch will be updated on new version, below step should be repeated same as first web access process.

Symptom	Primary Check Point
Auto searching failure of all or some units	- Basic Check Point - Check AC Ez Touch Master / Slave Setting (Only one master device is allowed on a RS485 line)



Symptom	Primary Check Point
In case of AC Ez Touch with ACP AC Ez Touch does not recognize all or some units	- Basic check Point - ACP's IDU device setting should be completed before setting of AC Ez



3. AC Smart 5

Features

New Features
- BMS Integration (BACnet IP and Modbus TCP)
- HTML5
- IPv 6 Support
- Advanced functions for ODU / IDU
- Enhanced Interlocking function

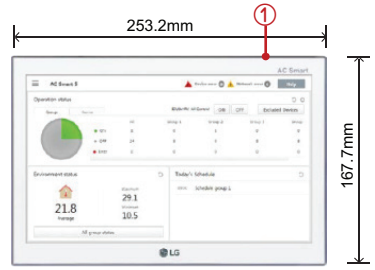
Standard Features for control
- Two Set point Auto-changeover / Setback
- Interlocking, Energy Report, Error, Event Log by Email
- Energy Report, Event Log Save to PC
- Accumulated Power monitoring with PDI
- Compatible with ACS I/O

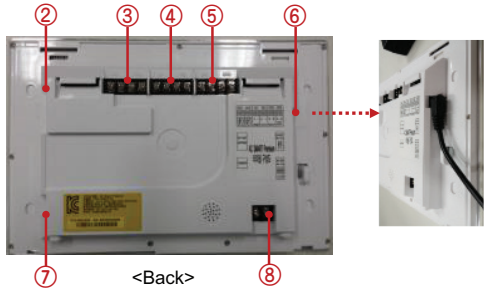
Standard Features (BACnet IP/Modbus TCP)
- Interface between BACnet/IP BMS and LG HVAC unit
- Modbus TCP support
- BTL Certified (B-ACS)
- Product list offering BMS Points

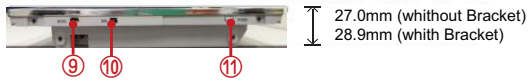
Unit type	BACnet IP	Modbus TCP
IDU	○	○
ERV, DX ERV	○	○
ODU	Monitoring Only	X
Hydro kit	○	○
AHU	○	○

Model no.	PACS5A000
Dimension (WxHxD)	253.2mm x 167.7mm x 27mm
Weight (kg)	0.914 kg (including power adaptor)
Max. number of unit	128
Applicable unit type	Air conditioner, ERV, DX ERV, Hydro kit, AHU control/comm. kit, LG Chiller(option kit required)
Display	10 inch type WSVGA TFT LCD Touch Screen (1024*600)
Power	12VDC (3.33A), 24VAC
Surrounding Conditions	Operating Temperature : 0~40°C Storage Temperature : -20~60°C Humidity : 0~98% (non-condensing)
LG Comm. type	2 Channel RS485 *Channel 1 : AHU Control kit, Chiller *Channel 2 : Outdoor unit, PI485GW
Ethernet	100/10Mbps
External Interface	2 Digital Inputs, 2 Digital Outputs, 1 micro USB

■ Components

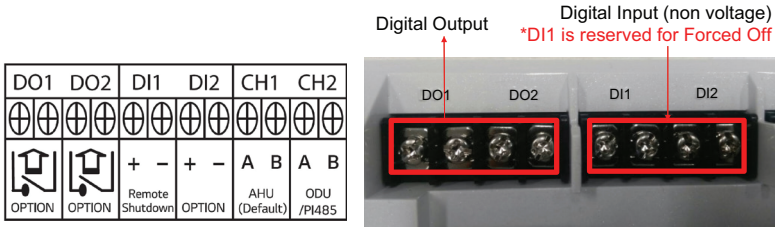


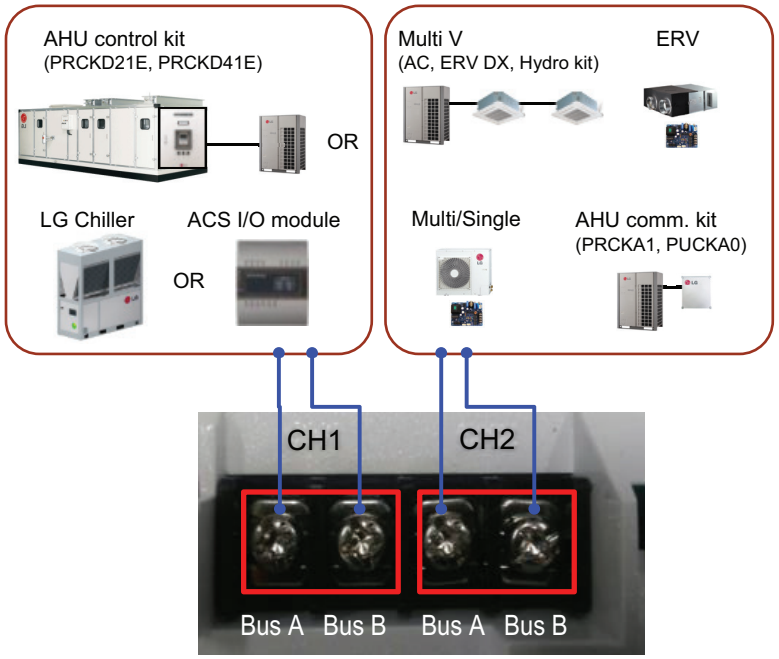




① Touch Screen (LCD)
② SD memory slot (reserved)
③ 2 Digital Output signal (≤ 1.5A, 30V)
④ 2 Digital Input signal (non voltage input only)
: DI #1 is reserved for forced off
⑤ RS485 port (CH1, CH2)
⑥ DC 12V Adaptor input
⑦ Ethernet port
⑧ AC 24V power input
⑨ Micro USB port
: for data backup/restore, floor plan upload
⑩ Mini USB
: for software debugging (serial port)
⑪ Power On/Off switch
: Push less than 10 seconds to control LCD backlight.
Push 10 seconds or more to reset AC Smart 5

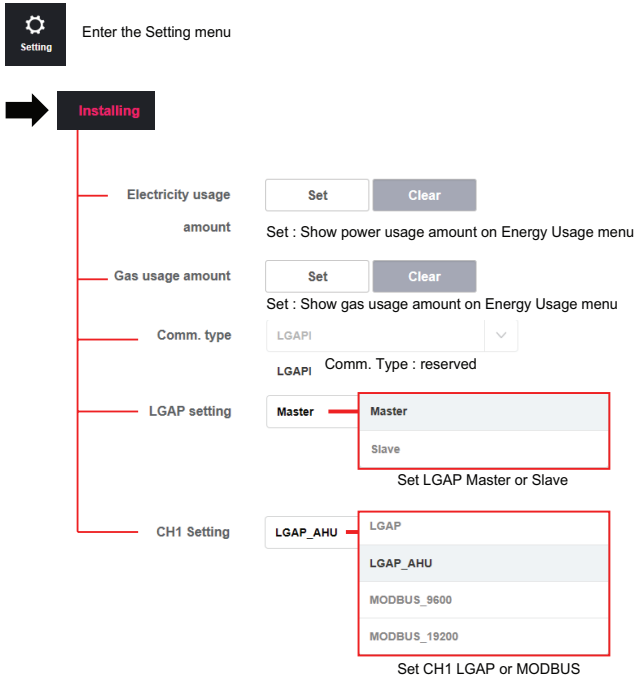
■ Terminal Port of Backside





*CH1 can be set as LGAP.
Then you can connect Multi V, ERV, Multi/Single, AHU comm. Kit.
(Setting > Installing → Select AC Smart → CH1 Setting)

■ Components



■ Components

Setting

Enter the Setting menu

Advance Setting

This setting allows central controller to proceed each particular communication.

Set connected device

Cycle monitor ● Set ○ Clear

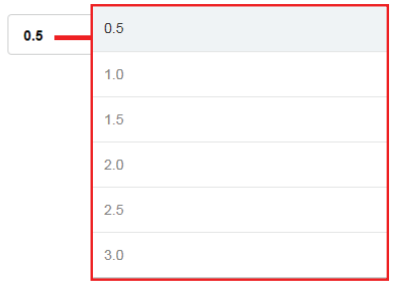
Cycle control ● Set ○ Clear
(Peak control, Energy navigation)

Slave controller ● Set ○ Clear
Set : allows Slave controller to control

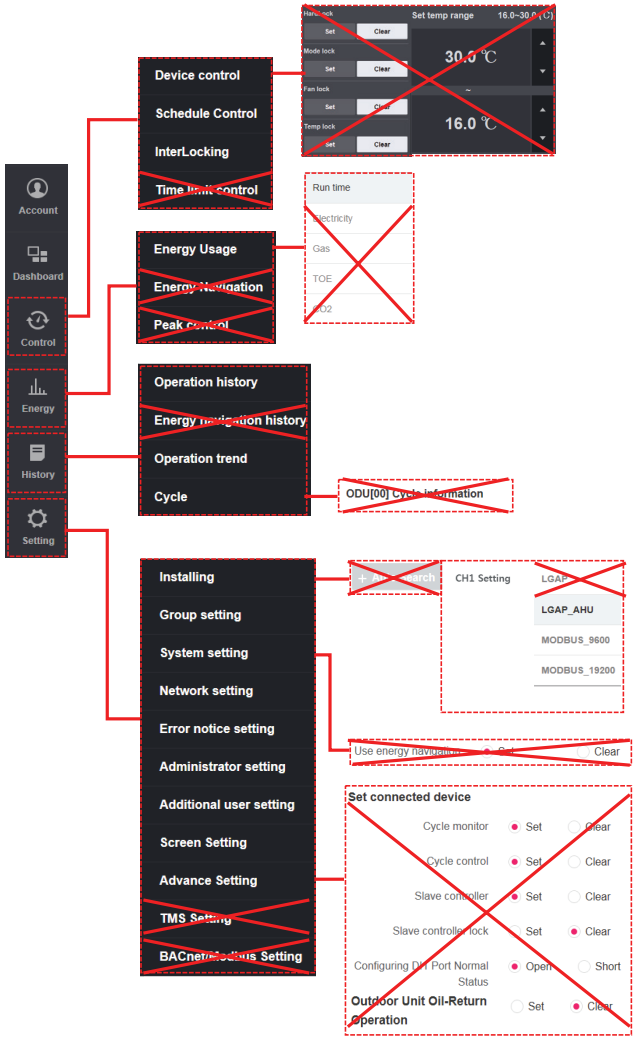
Slave controller lock ○ Set ● Clear
Clear : allows Slave controller to control the 'Hard locked' IDU

Differential

Set the temp. difference for autochangeover and Setback operation of 2 Setpoint function.

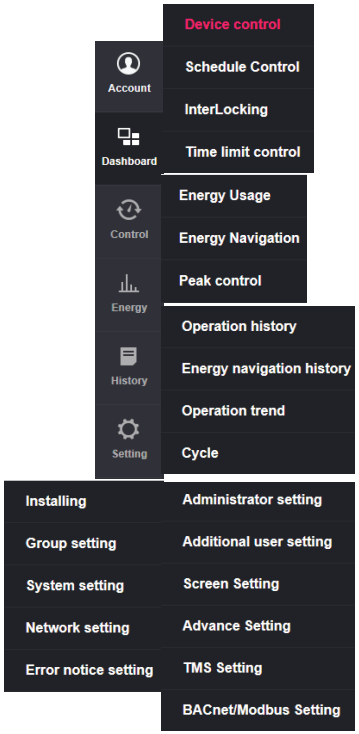


■ Disable Function in Slave mode

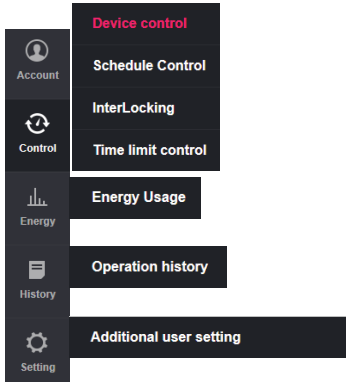


■ Menu Activation by Account Level

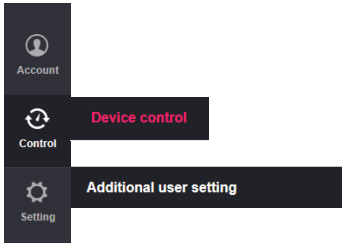
Installer level
- ID : admin (fixed)
- Control for all group
- [Setting] allowed



Administrator level
- Control for selective group
- [Additional user setting] allowed only



Normal User level
- Control for selective group
- Limited function



■ Type of Energy Measurement

Electricity for ODU

- Unit : kW Ex) 122.3kW
- Required equipment

PDI

WHM

- Applicable unit :
  IDU, ERV DX, AWHP

Gas & Electricity for GHP

- Unit : kL Ex) 122.34kL
- Required equipment

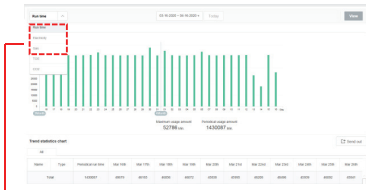
PDI

Gas meter/ WHM

- Applicable unit :
  IDU, ERV DX, AWHP

IDU Run time

- Unit : Hour ex) 12.15 → 12h 9m
- Required equipment : nothing
- Applicable unit :
  IDU only
- Running time : IDU is turning on status regardless of operation mode



⚠ To use Energy Report, Unit address must be unique among different unit type.

- Run time : Operating time for indoor unit
- Electricity : Power consumption for EHP
- Gas : Gas consumption for GHP

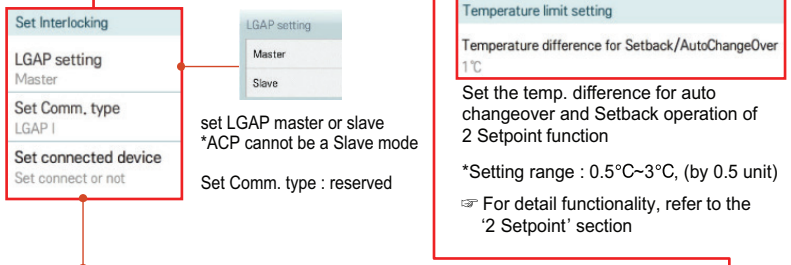
☞ For detail PDI setting and wiring, please refer to the PDI product manual.

4. AC Smart IV

Basic Info | Wiring | Installation | Flow chart | Case study

■ Components

Enter the Environment menu → Advance Setting



set LGAP master or slave
*ACP cannot be a Slave mode

Set Comm. type : reserved

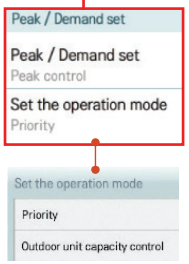
Set the temp. difference for auto changeover and Setback operation of 2 Setpoint function

*Setting range : 0.5°C~3°C, (by 0.5 unit)

☞ For detail functionality, refer to the '2 Setpoint' section

This setting allows central controller to process each particular communication
: Cycle monitor
: Cycle control (Peak control, Energy navigation)
: PDI power usage
: PDI gas usage
: In Enable, allows Slave controller to control
: In Disable, allows Slave controller to control the 'Hard locked' IDU

☞ For Hard lock, refer to the 'Lock Function' in Control/Monitor section



Set the Peak control operation mode

☞ For the detail functionality, refer to the 'Peak Control' section

5. ACP 5

Basic Info | Wiring | Installation | Flow chart | Case study

Features

New Features
- BMS Integration (BACnet IP and Modbus TCP)
- HTML5
- IPv 6 Support
- Advanced functions for ODU / IDU
- Enhanced Interlocking function

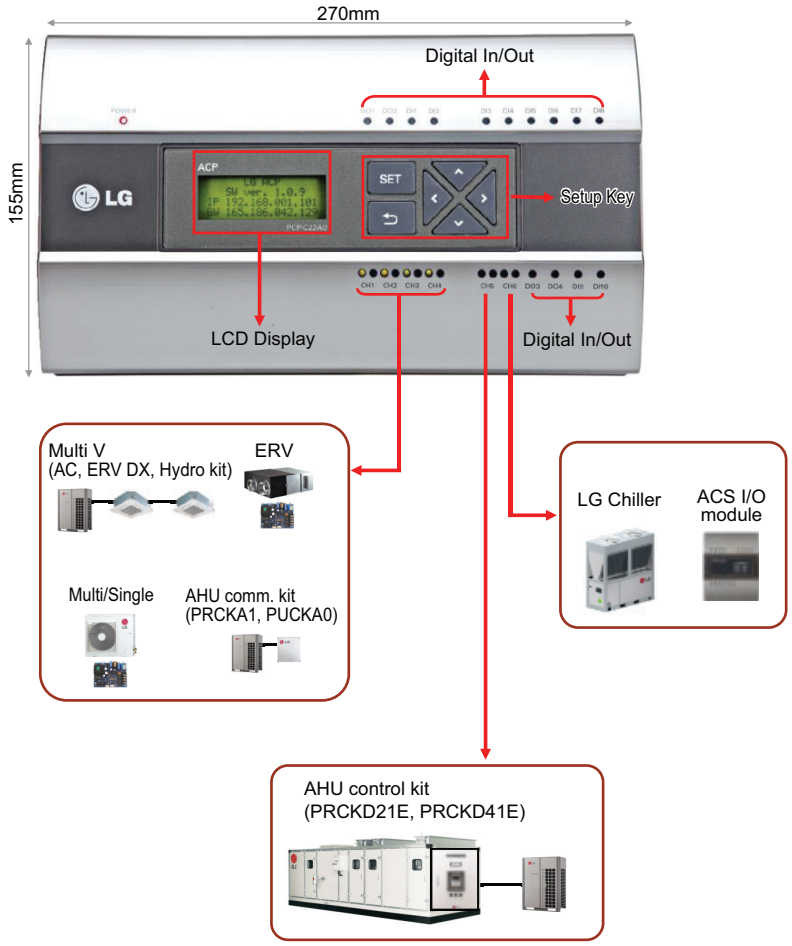
Standard Features for control
- Basic Control & Monitor functions for applicable units
- Two Set point Auto-changeover / Setback
- Visual Navigation (Floor map view)
- Error Alarm by Email
- Energy Monitoring / Report Save to PC
- Energy Navigation
- Emergency Stop (using digital input port)
- Compatible with ACS I/O module

Standard Features (BACnet IP/Modbus TCP)
- BTL Certified (B-ACS)
- Product list offering BMS Points

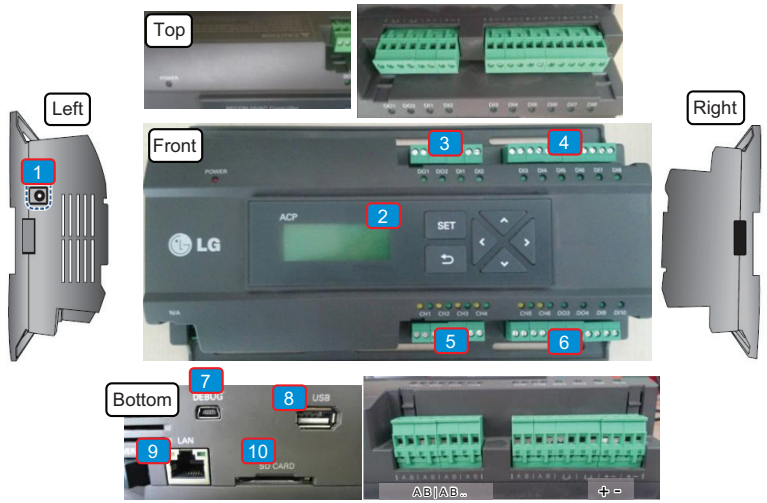
Unit type	BACnet IP	Modbus TCP
IDU	○	○
ERV, DX ERV	○	○
ODU	Monitoring Only	X
Hydro kit	○	○
AHU	○	○

Model no.	PACP5A000
Dimension (WxHxD)	270mm x 155mm x 65mm
Weight (kg)	1.3 kg (including power adaptor)
Max. number of unit	256
Applicable unit type	Air conditioner, ERV, DX ERV, Hydro kit, AHU control/comm. kit, LG Chiller(option kit required)
Display	20x4 Character LCD
Power	12VDC, max 2.3A
Surrounding Conditions	Operating Temperature : 0~40°C Storage Temperature : -20~80°C Humidity : 0~95%
Comm. Port(Channel)	Ch.1~4 : LG AP1)(ODU, ERV, DX ERV, Hydro kit) Ch.5 : LG AP(AHU Control kit) or Modbus(AHU, Chiller, ACS I/O module) Ch.6 : Modbus(AHU, Chiller, ACS I/O module)
Ethernet	100/10Mbps
External Interface	10 Digital Inputs (DI1 : Forced stop only) 4 Digital Outputs, 1 USB (Software update, Data backup) 1 SD card (Data backup, Data logging)

■ Components



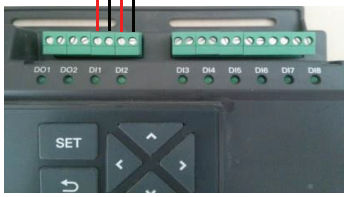
■ Part description



1) Power socket
2) LCD & Button key
3,4) Digital I/O
5) RS485 port
6) RS485 port for AHU control kit, ACS I/O module, Digital I/O
7) Debugging port (mini USB type)
8) USB
9) LAN
10) SD card

■ ACP Digital Input

Type of signal input must be dry contact relay (No voltage)



<Example of Input devices>

▶ Simple On/Off Switch

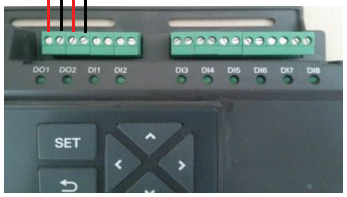
▶ Input signal from the other system

I/O Controller

Emergency stop

■ ACP Digital Ouput

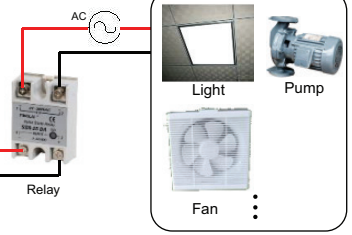
Acceptable Electric spec.
: ≤ 30V, 1.5A



Input External Device

<Example of Output devices>

▶ Control On/Off device



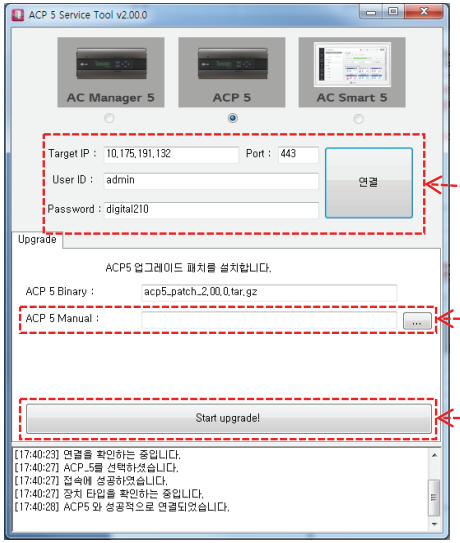
▶ Output signal to the other system

I/O Controller

Error Monitoring

■ S/W Update

1. Execute Service Tool
(you can download latest service tool from LG global website)



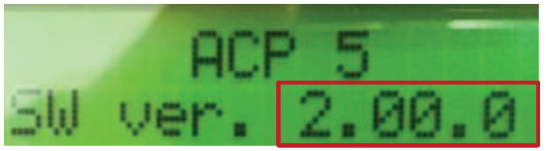
① Enter IP address, User ID (admin), Password and click Connect button.

② Select S/W manual file attached in technical bulletin

③ Click “Start upgrade!” button.

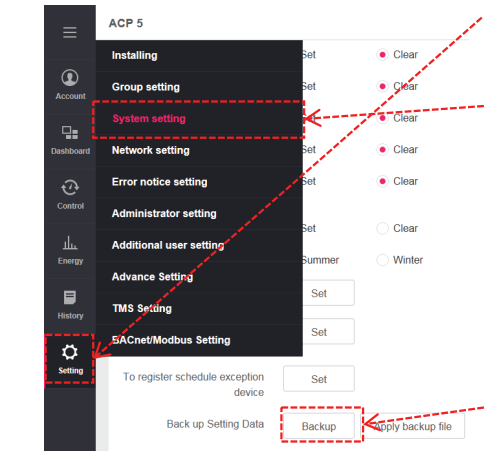
④ Check auto rebooting message.

2. Check version information on ACP’s display after rebooting.



■ DB management

<DB Backup>



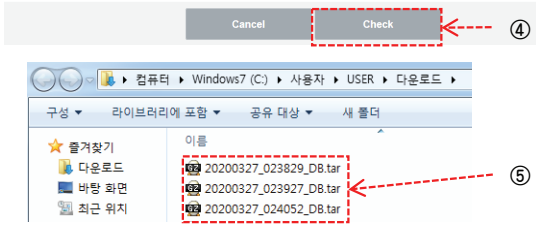
① Click “Setting”.

② Click “System setting”.

③ Click “Backup” button.

Data backup

Do you wish to backup DB?

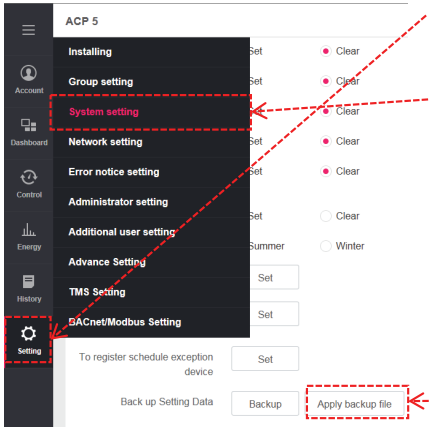


④ Click “Check” button.

⑤ Check backup data.

■ DB management

<DB Restore>



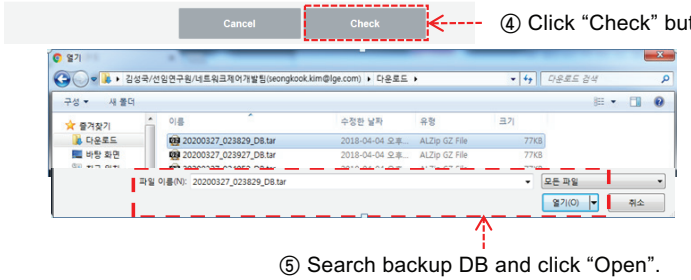
① Click “Setting”.

② Click “System setting”.

③ Click “Apply backup file” button.

Alerts

Do you wish to restore DB?

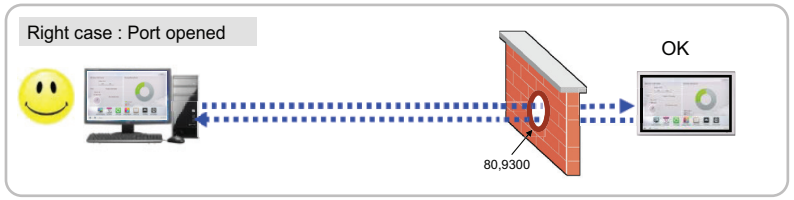


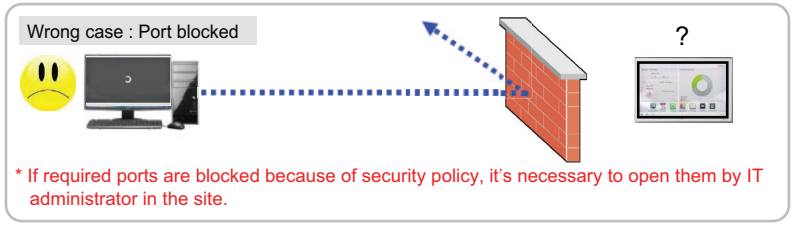
④ Click “Check” button.

⑤ Search backup DB and click “Open”.

■ Reauired TCP Port

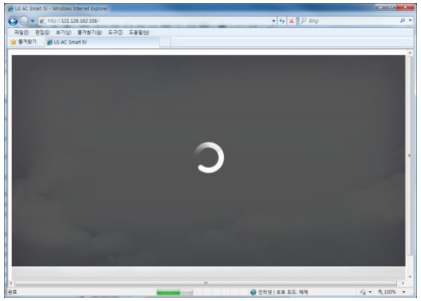
TCP Port Used to access AC Smart/ACP : 80(can be modified), 9300





* If required ports are blocked because of security policy, it's necessary to open them by IT administrator in the site.

Q) How to deal with Web access error?



Case)
- Web access using internet browser
- Internal access using private IP

Problem)
It looks connected but cannot enter the log-in page

Measurement)
#1. Refresh the page & wait until ready to type
#2. Delete Temporary files in browser & try again
#3. Try login with another web browser
#4. Reboot AC Smart IV & try again
#5. S/W update as latest version & try again

* Regarding external access using public IP, you need to make sure that the network connectivity has no problem through required TCP ports.
* In case that internet speed is extremely slow, this can happen.

6. ACP IV

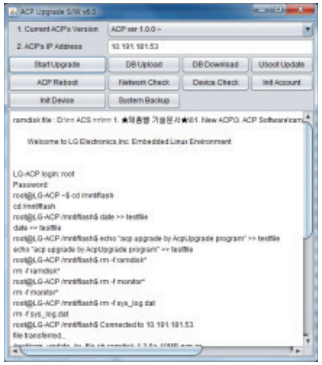
■ S/W Update & DB management

There are three ways to handle S/W update and DB management.

1. Using Front menu and USB.

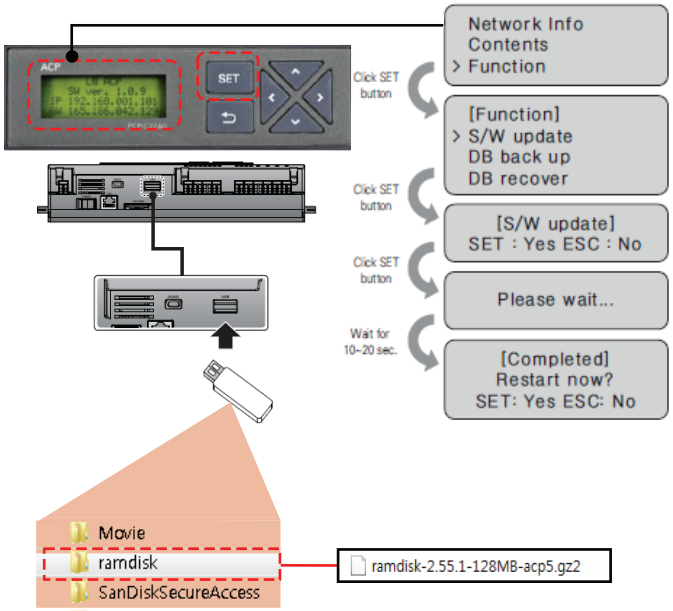
2. Using GUI and USB.

3. Using Service tool and PC.



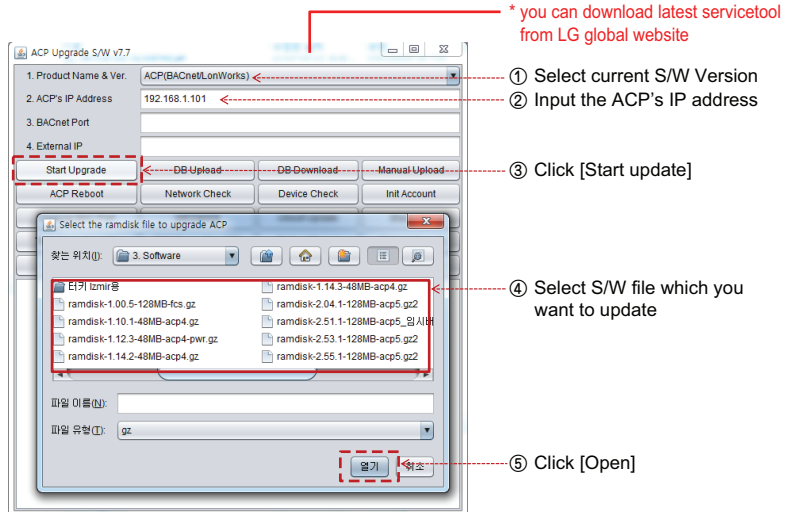
■ S/W Update & DB management - S/W update by USB

1. Create “ramdisk” folder in root USB memory.
2. Copy the ramdisk S/W file within 'ramdisk' folder. At this time, only one S/W file must be put in there.
3. Run update by using ‘S/W update’ menu.

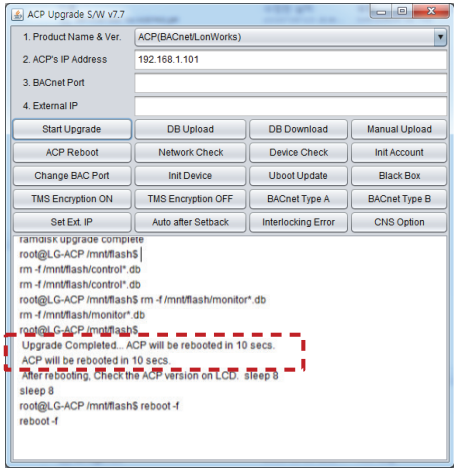


■ S/W Update & DB management - S/W update by Laptop

1. Run update Tool (Java Application (*.jar))



2. Confirm the success message and Check version information on ACP's display after rebooting.

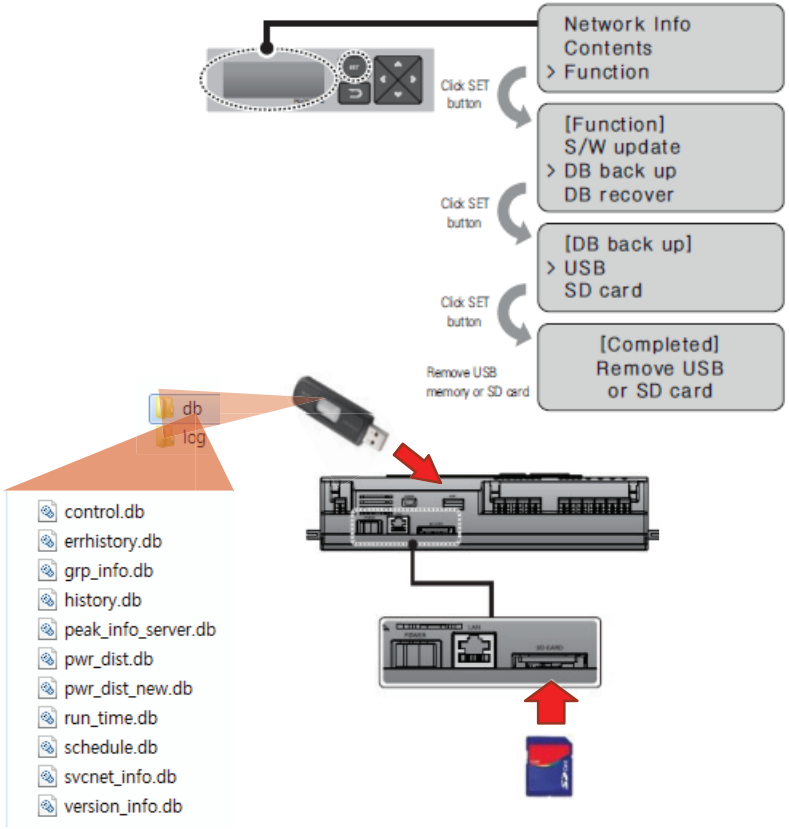


*Checking ACP version on LCD

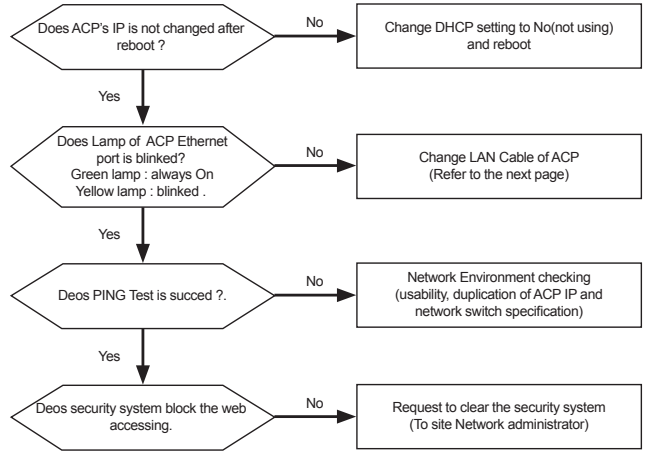
■ S/W Update & DB management - DB Management

<DB Backup>
1. Insert USB memory or SD card into the ACP
2. SET >[Function] >SET >[DB back up] >SET >[USB] or [SD card]>SET
3. After completing backup, DB files is saved in 'db' folder

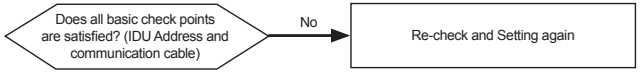
<DB Recover>
1. copy the DB files in "db" folder
2. SET >[Function] >SET >[DB recover] >SET >[USB] or [SD card] >SET
3. ACP is automatically restarted for data recovery



Symptom	Primary Check Point
Can not access to ACP from PC	- Check Network setting - Check LAN Cable - Check Status of DHCP Setting



Symptom	Primary Check Point
Auto searching failure from ACP (CH 242 error)	- Basic check point - Check Product type (EHP, AHU, AWHP)

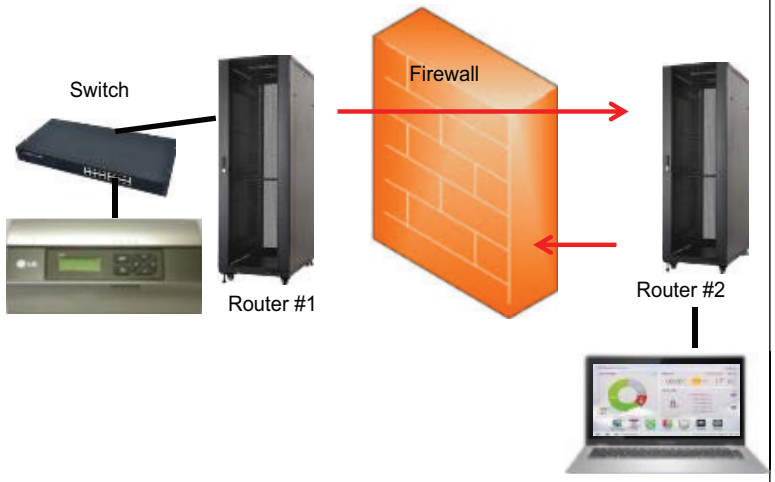


• Some devices such as M-AHU, Chiller, ACS IO Module does not displayed on auto serching result.
• ACP IV CH5,6 can set either LGAP or Modbus on ACP IV GUI.

Summary

• Site Name : Site OO, Korea
• Issue : Can not access in ACP.

Inspection

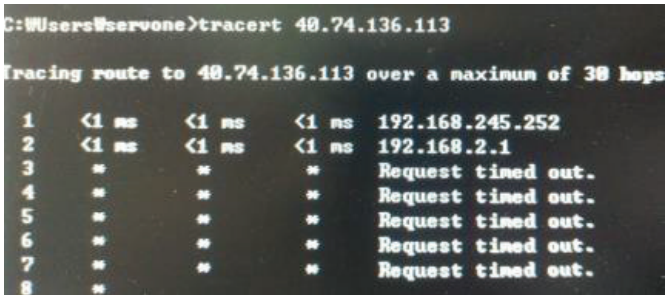


ACP placed on network #1 and do accessed by using PC located in network #2

Cause

- Network firewall do block the packet that came from other networks

Solution

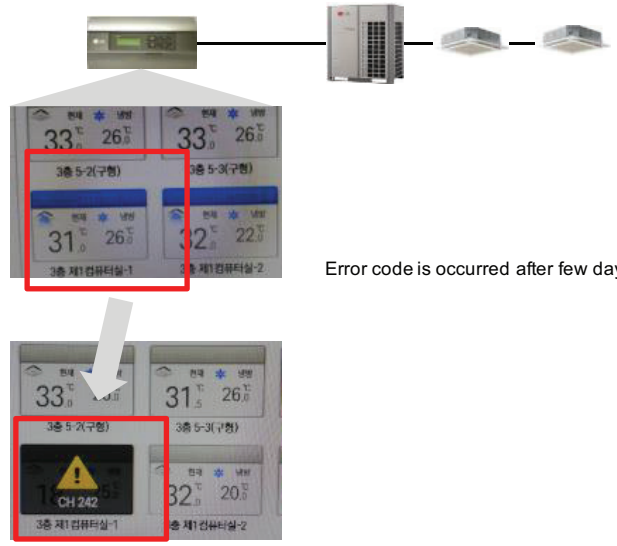


The packet of ACP can communicate in between ACP and Router #1.
But can not communicate with Router #2 because of firewall.
In that case we need to request the adjust in security level of ACP by network administrator.

Summary

- Site Name : Site OO, Korea
- Product Involved : ACPI
- Issue : Occur the error code “CH 242” on ACP

Inspection

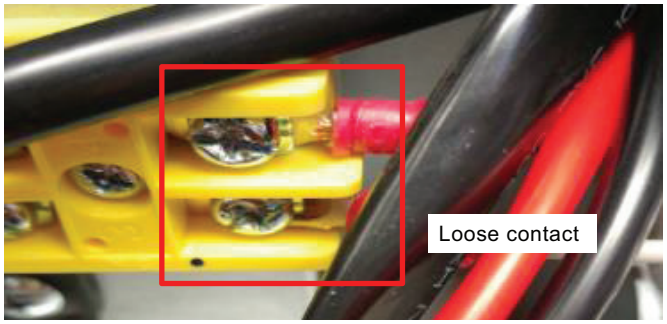


Error code is occurred after few days

Cause

• Loose contact of communication line between IDU and ODU

Solution



After re-wiring works, it operate normallly

7. AC Manager 5

Model name : PACM5A000

Description

The product is specially designed for large buildings. It can control Max. 32 ACP and AC Smart.
It can easily control large number of indoor unit in the PC, Mobile, Tablet screen.

Specification

Components :

Standalone

Max. No. of Controllable units : 8,192

Structure

■ Feature

User Friendly Interface
- Flexible design

Convenient Automation
- Operation Trending Report
- Automatic E-mail Sending

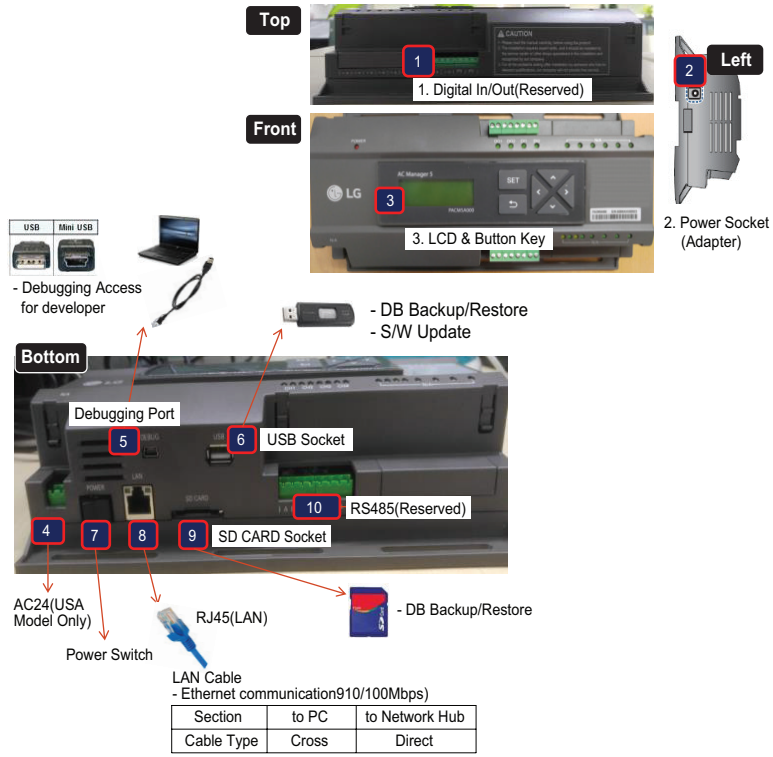
Integrates Easily
- Schedule Function

Other External equipment Controls

Efficient Power Control
- Energy Management

List		AC Manager IV	AC Manager 5
			 Standalone
Model Code		PACM4B000	PACM5A000
Max. IDUs		8,192	
Remote Access		Software Access	PC,Mobile,Tablet
Group Composition		1 depth	Multi-Level
Control		IDU, Ventilation, LG AHU, Systemboiler, Chiller, ACS I/O	
Energy Report	Electricity/Gas	•	
	Energy Navigation	-	•
Operation Trend		-	•
Simple On/Off (All IDUs)		•	
Visual Navigation		•	
Schedule		•	
Lock	Full	•	
	Partial	•	
Error code		•	
Auto Control	Peak Control	•	
	Time limit Control	•	
	Auto change over	•	
History		•	
Inter locking	Emergency Pattern	•	
	Virtual Group Control	•	
	Expansion I/O	•	
I/O Port (including)		-	

■ Feature



Section	to PC	to Network Hub
Cable Type	Cross	Direct

Structure

Devices that can be interfaced
- The devices of AC Manager 5 that can be interfaced are as follows.

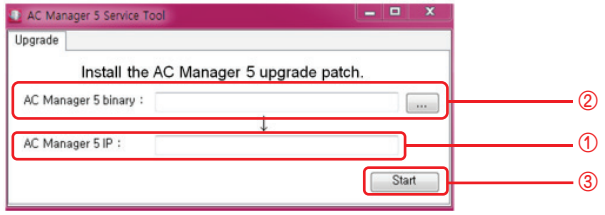
Product type	Interfacing product	Remark
Central controller	ACP Standard	It shall be connected to AC Manager 5 through TCP/IP
	ACP Premium	It shall be connected to AC Manager 5 through TCP/IP
	ACP IV	It shall be connected to AC Manager 5 through TCP/IP
	AC Smart Premium	It shall be connected to AC Manager 5 through TCP/IP
	AC Smart IV	It shall be connected to AC Manager 5 through TCP/IP
	ACP Lonworks	It shall be connected to AC Manager 5 through TCP/IP
	ACP BACnet	It shall be connected to AC Manager 5 through TCP/IP
Remote control	PC	Needs web browser supporting HTML5(Safari v5.1.7 or higher, Internet Explorer 10 or higher, Crome v55.0 or higher)
	Tablet PC	
	Smart Phone	

■ S/W Update & DB management

There are two ways to handle S/W update and DB management

1. Using Front menu and USB

2. Using Service tool and PC



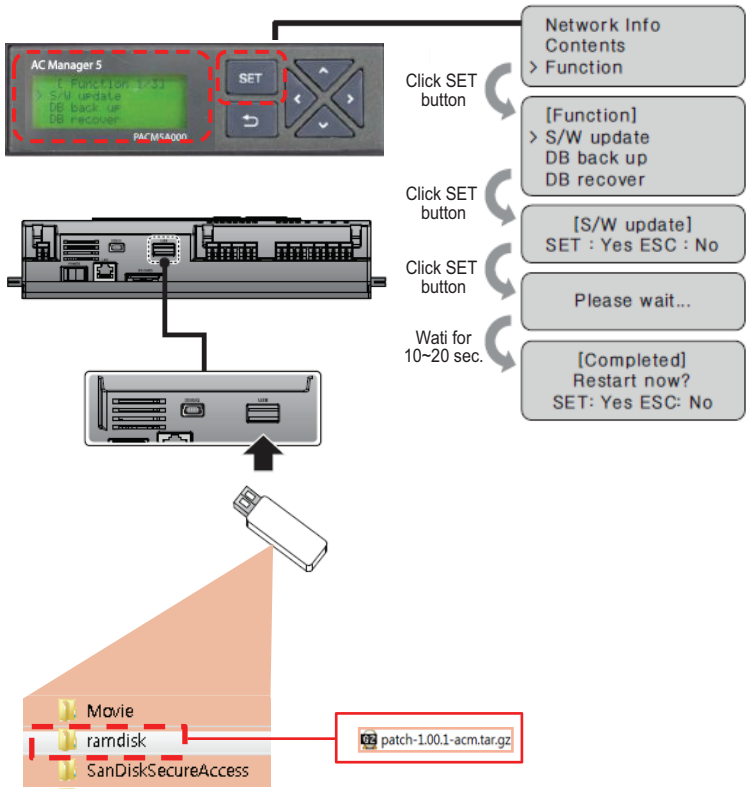
① Input IP address of AC Manager5 that installed in the input field

② Click the […] button ➔ Select SW file

③ Click the Start button Start

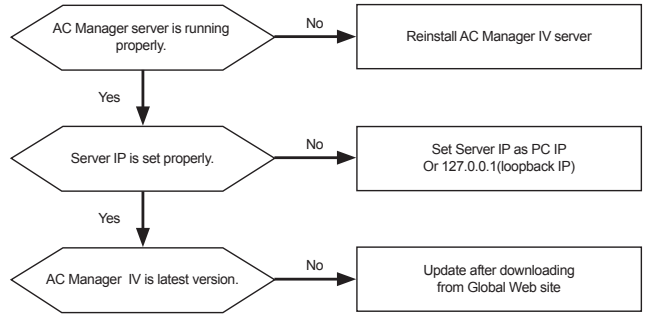
■ S/W update by USB

1. Create “ramdisk” folder in root USB memory
2. Copy the ramdisk S/W file within 'ramdisk' folder. At this time, only one S/W file must be put in there
3. Run update by using ‘S/W update’ menu
   (New version software file can be downloaded from LG Electronics System Air Conditioner homepage.)



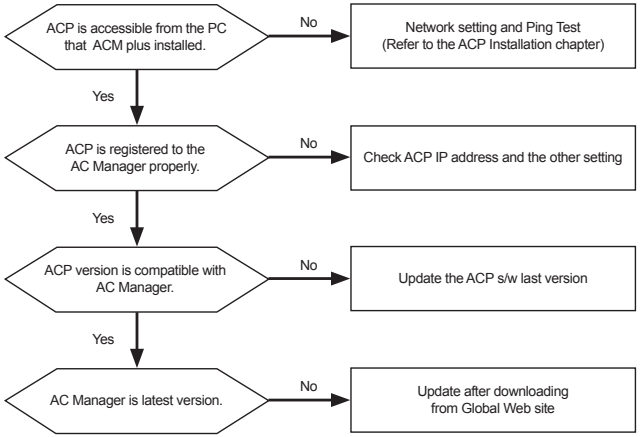
8. AC Manager IV

Symptom	Primary Check Point
AC Manager IV execution failure	- Check If Program is installed cpmpletely - Check AC Manager plus / IV server IP setting



• AC Manager 5 do not need any installation. Because it is connected by web server function.

Symptom	Primary Check Point
AC Manager display CH246 error	- ACP accesability from the PC ACM plus installed - ACP Version Check - AC Manager version check



9. PDI (Standard/Premium)

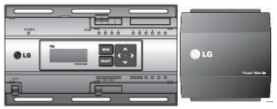
Features

Standard Features
- Maximum Displayed IDU
  - 128 IDUs(EHP)
- Maximum Displayed ODU system
  - 2 ODU system(PPWRDB000)
  - 8 ODU system(PQNUD1S40)
- WHM Pulse output connection
- Indoor unit accumulate Power Consumption Monitor
- Outdoor unit accumulate Power Consumption Monitor
- Instant Power monitor
- Operation Display
  - Pulse signal
  - RS485 communication
- Error Display
  - Error – 01 : RS485 Communication error
  - Error – 02 : Wattmeter no signal error

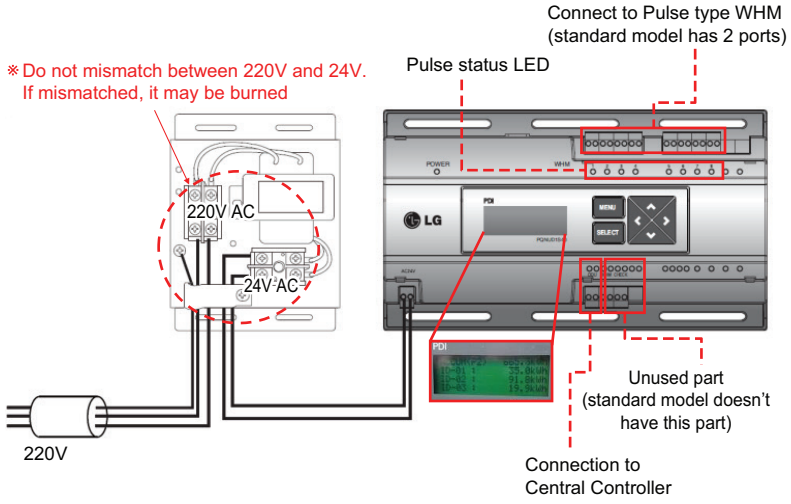
Advanced Function
- Data backup during power outage(50h)
- Interlock with Central Controller
  - ACP , AC smart , AC Ez touch

Model no.	PQNUD1S40(Premium), PPWRDB000(Standard)
Dimension (WxHxD)	270mm x 155mm x 64.8mm
Max. number of unit	128
Applicable unit type	Air conditioner, DX ERV
Display	77mm x 32 mm
Power	AC 220V 60Hz , AC 24V 60Hz
Surrounding Conditions	Operating Temperature : -20~50 °C Storage Temperature : -20~80 °C Humidity : Under 90% RH
LG Comm. type	1 Channel RS485

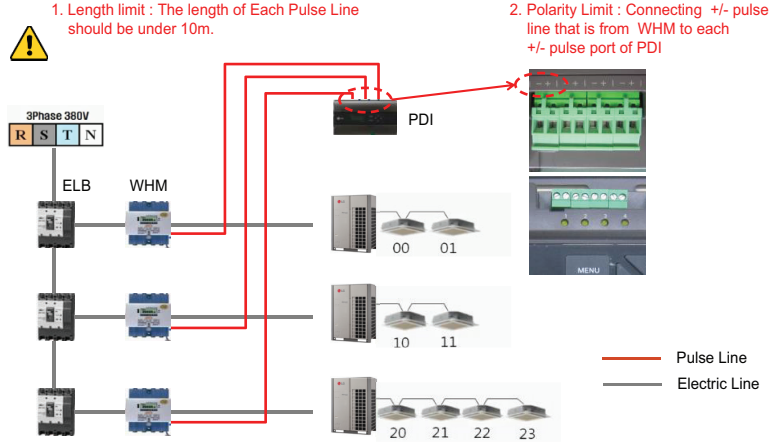
■ Specification

	Standard (PPWRDB000)	Premium (PQNUD1S40)
Outline		
Number of Max IDUs	128	128
Type of ODU	Air Conditioner(EHP, GHP) ERV DX, Hydro kit	Air Conditioner(EHP, GHP) ERV DX, Hydro kit
Number of Max WHMs	2	8
LCD Display	4 Lines	4 Lines
LED Display	Power/Comm./Pulse status	Power/Comm./Pulse status

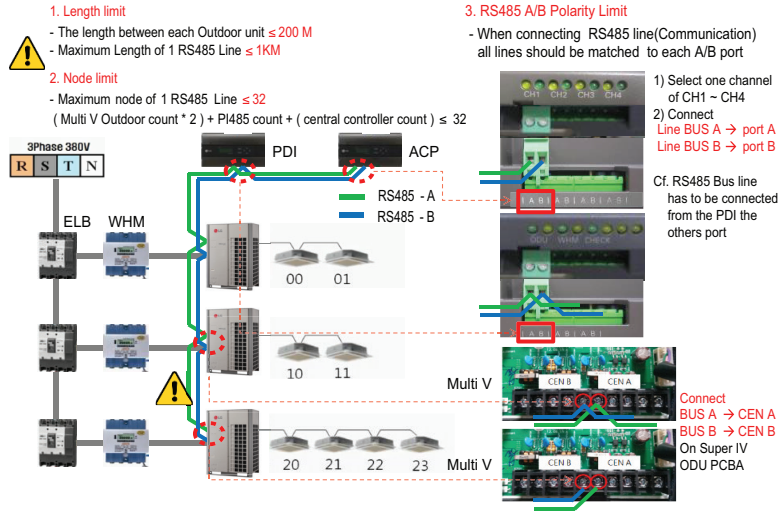
■ Component



■ Pulse Line



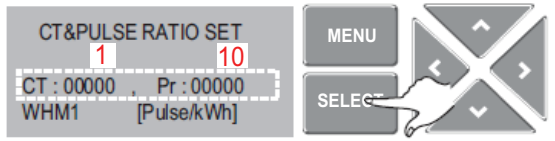
■ Communication Line

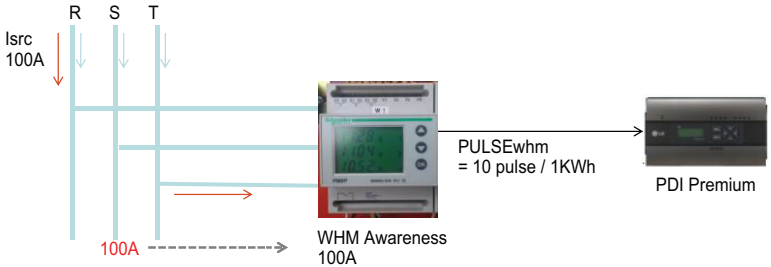


1. Put CT Ratio to WHM
   - ① Putting CT Set value
     = pri : sec = 1 : 1

2. Set & Put the Pulse Ratio to WHM
   - ② Setting the Pulse Ratio
   → You can set this value within the WHM Spec
   . ex WHM Spec = 1~99999 impulses
   if you choice 10 pulse/1KWh
   → ③ Putting Pulse Ratio : 10

3. PDI Setting
   - ④ Putting CT ratio =1
   & Pulse value





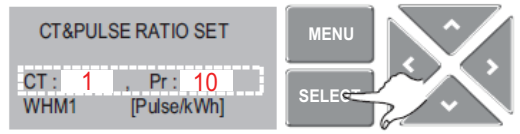
Set Pulse Rate
10 pulse/1kwh

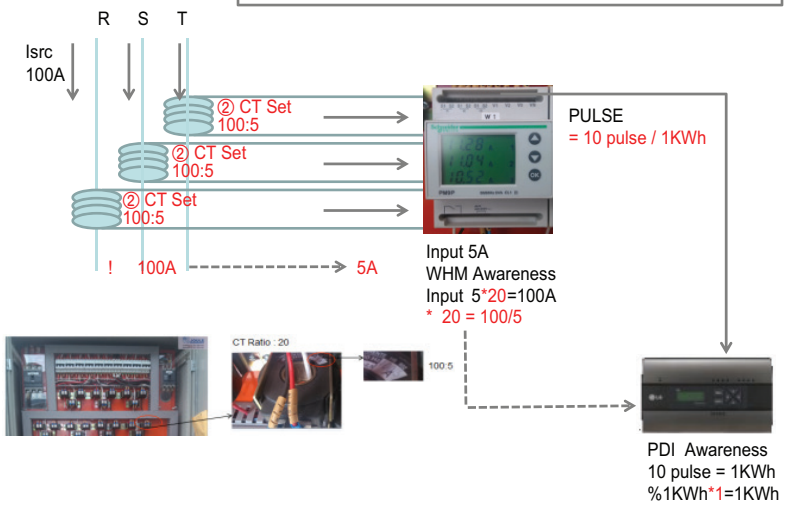
1. Set CT Ratio
   ① Set Actual CT Ratio
   * Cover WHM capacity (ex. 5A)
   (EX. 5A= Isrc/CT ratio =100A/20=5A)
   → Set Actual CT : pri / sec =100 / 5

2. WHM Setting
   - ② Putting CT Set value
   = pri / sec = 100 / 5
   - ③ Setting & Putting
   Pulse value : 10
   (if you set 10 pulse/1KWh)

※ Set "1" in CT : [ ]
Because CT Ratio was already reflected
In Programmable WHM (100:5)
If you set the CT Ration(CT=20) in PDI,
Consumption data is x 20

3. PDI Setting
   - ④ Putting CT ratio & Pulse value





■ Standby Power Consumption Logic

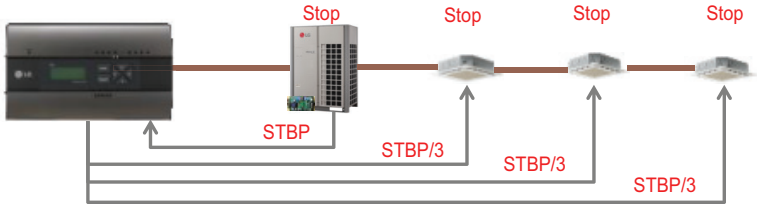
When All IDU (connected to a ODU) stop, STBP(Standby Power Consumption) mode start
And there is a different according to the PDI mode Set.

1) Set as AUTO : In this mode, PDI distributes the STBP to the each IDU unit.

① Mode setting

* In 20 minutes after turning on

② STBP operating



③ Result checking

INSTANT P(1)	1080 W	ACCUM P(1)	1.2KW
ID-01 :	360 W	ID-01 :	0.4KW
ID-02 :	360 W	ID-02 :	0.4KW
ID-03 :	360 W	ID-03 :	0.4KW

■ Standby Power Consumption Logic

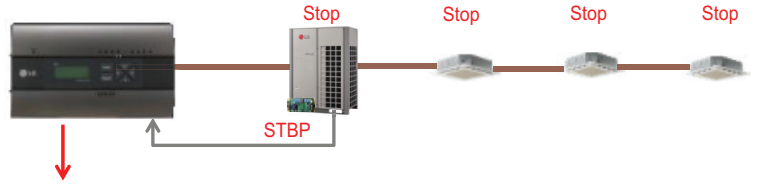
When All IDU (connected to a ODU) stop, STBP(Standby Power Consumption) mode start
And there is a different according to the PDI mode Set.

2) Set as Manual : In this mode, PDI saves the STBP in PDI STBP's page , do not distribute to each IDU.

① Mode setting

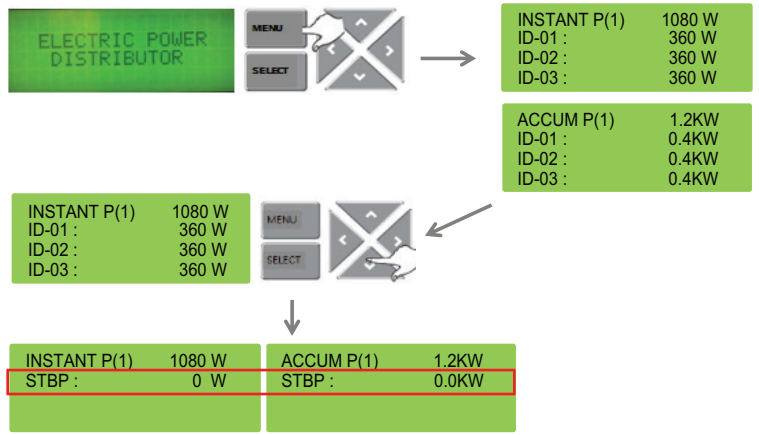
* In 20 minutes after turning on

② STBP operating



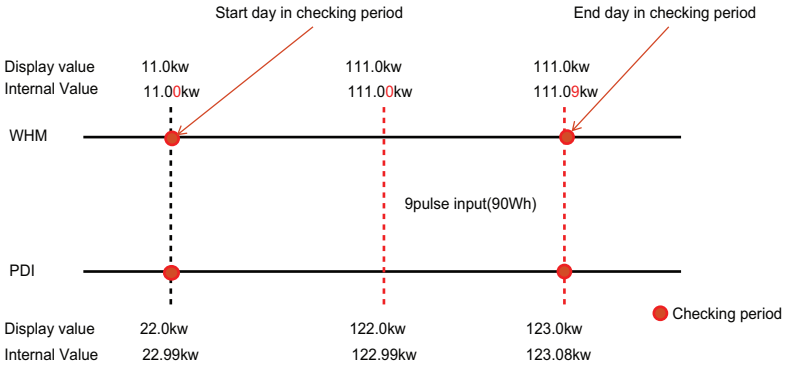
You can check the STBP data in the PDI
as following ③

③ Result checking



■ Difference due to WHM displaying Logic

WHM's minimum displayable value is 0.1kw(100w)
In case of 100pulse/1kwh(10W/P) setting , last digit(marked with red color) is not be shown on WHM LCD panel.
It can cause maximum 1kwh difference in checking period.
The actual value is counted and memorized internally. (the checking period is extended , it doesn't increase)



Internal Count Value
= Power of End day – Power of start day

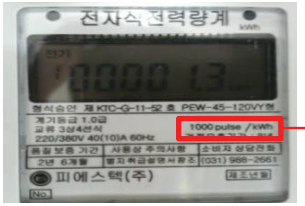
WHM = 111.09-11.00=100.09
PDI = 123.08-22.99=100.09
➔ Same value!

LCD Display
= Power of End day – Power of start day

WHM = 111.0-11.0=100
PDI = 123.0-22.0=101
➔ 1kw Difference.

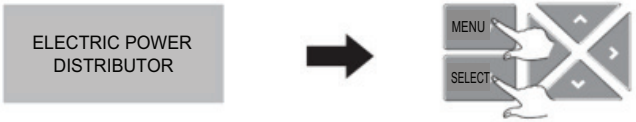
■ WHM Verification Steps

1) Check the WHM's Spec Value



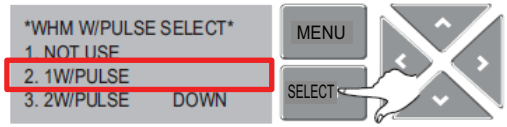
① : WHM Pulse Spec = 1000pulse/kwh ➔ 1W/P

2) Check PDI's Pulse Setting value



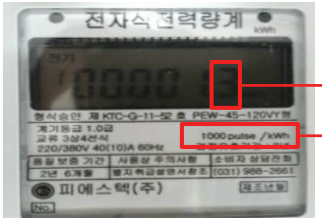
Press Menu & Select key at the same time

② : Check PDI 's Pulse setting Should be = 1W/P



➔ ③ : WHM Pulse Spec = ② PDI 's Pulse setting

3) Confirm what WHM Value increase means.



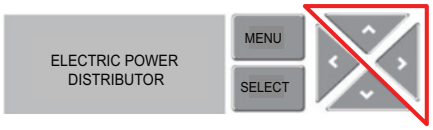
③ WHM Pulse Spec = 1000pulse/kwh = 1W/P,
WHM Value increase 0.1 = 0.1kW = 100W

Increased 0.1 means that pulses of 100 times went out from WHM

➔ So, PDI 's pulse count value should increase 100 count than before

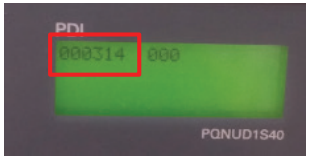
4) Check the PDI's increased value the WHM's increased value = the PDI's increased value.

* Before Starting a check,
you first change the mode of PDI to test mode



① Press Up arrow key & Right arrow key at the same time

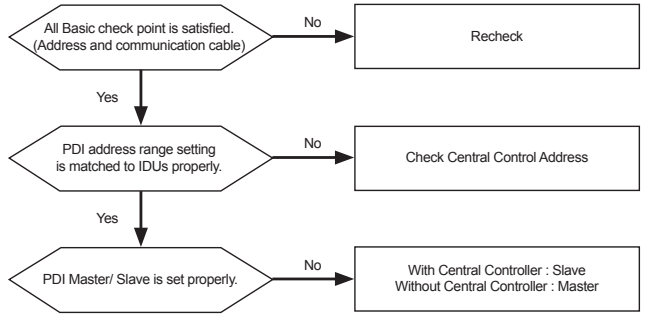
② Select key 4 times until you see like right side display
* you press the "MENU" key so that you could get back the operating mode



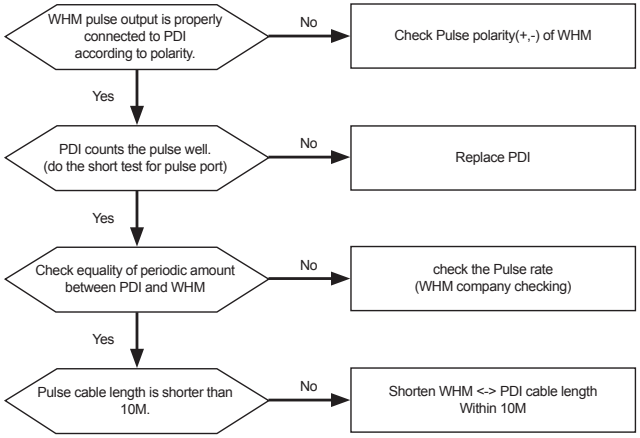
➔ Count Number should increase 100 count than before.

➔ If the outdoor unit is in operation,
but the number displayed does not increase or < 100
➞ Check wiring between WHM # PDI
➞ Replace the PDI with one that works correctly to test it for defects

Symptom	Primary Check Point
PDI display ER-01 Power consumption is not distributed to IDUs properly.	- Check Central Control Address of IDUs - PDI Master/Slave Setting - Central Controller Communication satus Checking



Symptom	Primary Check Point
PDI display ER-02. Increasing data between WHM and PDI is different.	- Check Polarity of WHM Pulse output - Check inferiority of WHM - Check Length between WHM and PDI (<10m)



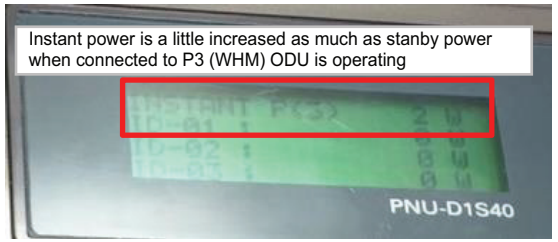
• Do not try short test too many.
The Power consumption data of Short test will be added to the PDI.

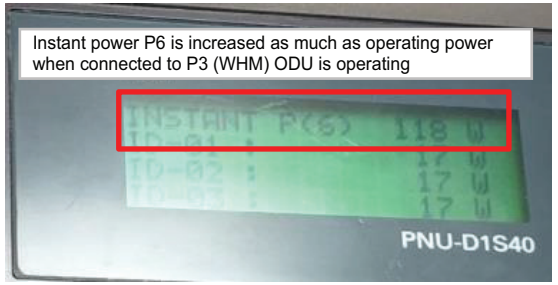
Summary

• Field name : Site OO, Korea
• Product involved : PDI, wired remote control
• Issue: Power consumption of PDI is not matched with WHM

Inspection

-> PDI pulse port matching TEST





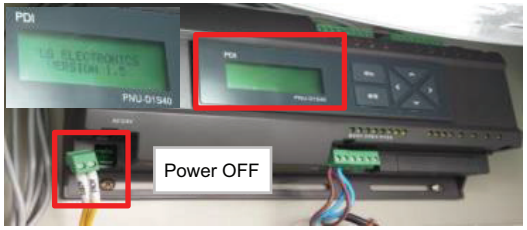
- Instant power react in the opposite way
▸ PDI port and WHM matching was wrong
*Address of IDUs connected to ODU

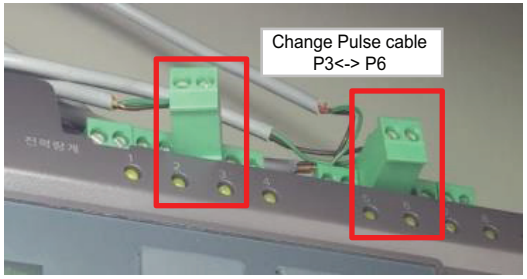
Cause

• WHM is incorrectly connected to PDI port.

Solution

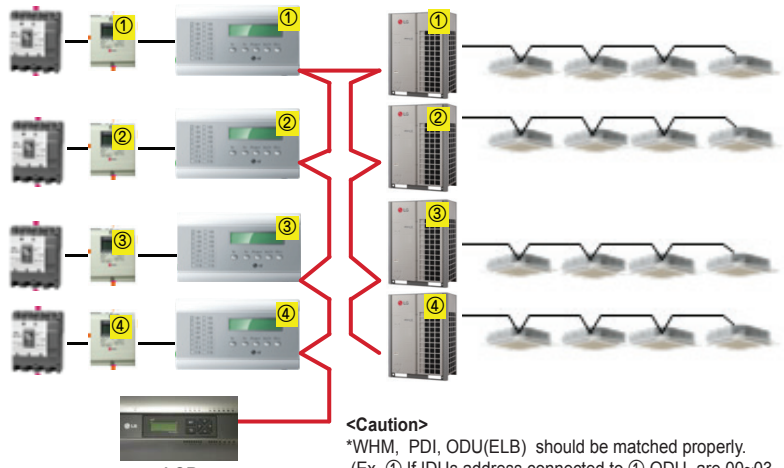
-> Change Pulse cable.





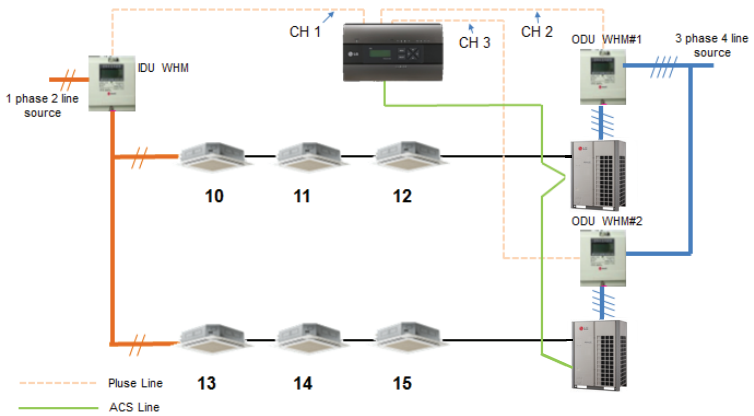
⇒ From the date modified, power distribution returned to normal.

■ App. PDI(Old) + WHM + ODU



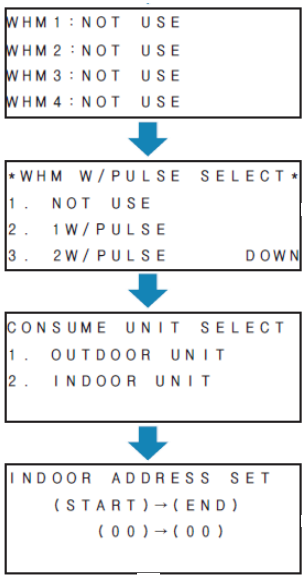
<Caution>
*WHM, PDI, ODU(ELB) should be matched properly.
(Ex. ① If IDUs address connected to ① ODU are 00~03
① PDI address range should be set as 00~03)

■ App. PDI(Premium) + WHM + ODU



Example

1. CH1 Port setting
   -> WHM1 pulse rate -> Select Indoor Unit ->
   IDU addr range setting(10 – 15)
2. CH2 Port setting
   -> WHM2 pulse rate -> Select Outdoor Unit ->
   IDU addr range (10 – 12)
3. CH3 Port setting
   -> WHM3 pulse rate -> Select Outdoor Unit ->
   IDU addr range(13 – 15)

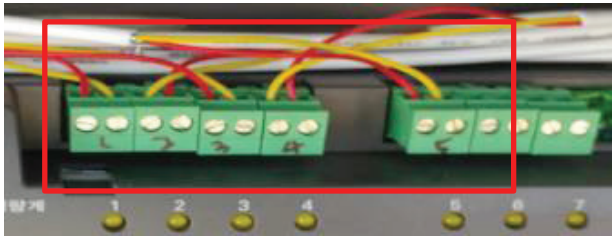


Summary

- Site Name : Site OO, Turkey
- Product Involved : ACP, PDI
- Issue : Mismatch between the power used by PDI and the power measured by the power meter.

Inspection

No pulse error is occured

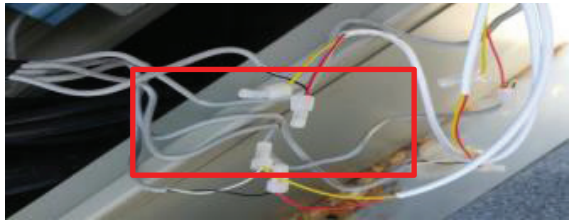


The line (from WHM) polarity does not checked

Cause

• W/pulse signal line wrong wiring(Polarity mismatch).

Solution

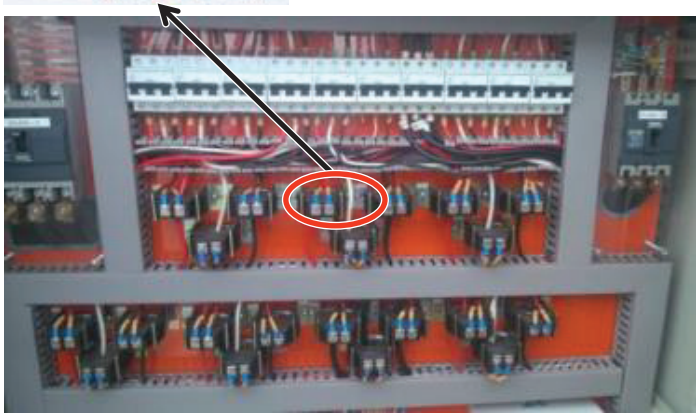


After changing the polarity of extended line, it operates nomally.

Summary

• Site Name : Site OO
• Product Involved : ACP, PDI
• Issue : Mismatch between the power used by PDI and the power measured by the power meter.

Inspection



Check the electric panel CT → CT Ratio 20

Cause

- False setting of the W/P resulted in the difference in the power usage data.

Solution

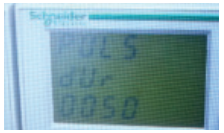
Reexamine the settings on the power meter and PDI

Pulse Type

CT Ratio = 20

0.1KWh/pulse -> 10pulse / 1KWh
So, PRwhm = 10

PT = 1.0



Pulse duration = 50msec

<PDI Setting>

CT00001 / Pr:00010

■ App. Global WHM Notification

*Refer to technical bulletin.

No	Maker / Model	Spec: Type	Spec: A (Max Current)	Spec: Pulse Output: Width	Spec: Pulse Output: W/Pulse	Image	Reference Site
1	Schneider / Power Logic PM200P	3P4W	6A	10, 50,100, 300, 500, or 1000ms	0.1, 1, 10, 100, 1000, 10000, or 100000kWh/P		May, 2012 Brazil
2	Schneider / PM9P	3P4W	6A	50. 100, 200, 300ms	0.1, 1, 10, 100kWh/P		May, 2012 Brazil
3	ABB (Sweden) / OD4165	3P4W	65A	100ms	100P/kWh (10W/P)		Oct, 2010 Czech
4	XIZI / DTS 601	3P4W	40A	-	200P/kWh (5W/P)		June.2013 China (singapore tech)
5	Kohler / AEL.TF.10	3P4W	100A	-	1000P/kWH (1W/P)		April, 2013 Turkey
6	Saia-burgess / AAE3D5F10 PR3A00, ALE3D5F10	3P4W	65A	50ms	1W/P, 10W/P		Jun, 2013 Swiss
7	Ziegler / 3430	3P4W	5A	60ms, 100ms or 200ms	Programmable		May, 2015 Iran
8	ABB / B24	3P4W	6A	Programmable: 10~990ms	Programmable		May, 2015 Kenya
9	ABB / A43	3P4W	80A	Programmable: 10~990ms	Programmable		Feb, 2014 Singapore

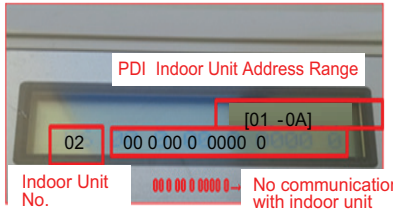
Summary

- Site Name : Apartment, Philadelphia, USA
- Product Involved : ACP, PDI
- Issue : Power is not distributed to the indoor unit

Inspection

ODU 1	Normal Case	ROOM02 CC address missing case
ROOM01	5KWh	7.5KWh
ROOM02	5KWh	0
ROOM03	5KWh	7.5KWh
TOTAL(ODU1)	15KWh	15KWh

The power usage of 1 indoor unit is not displayed

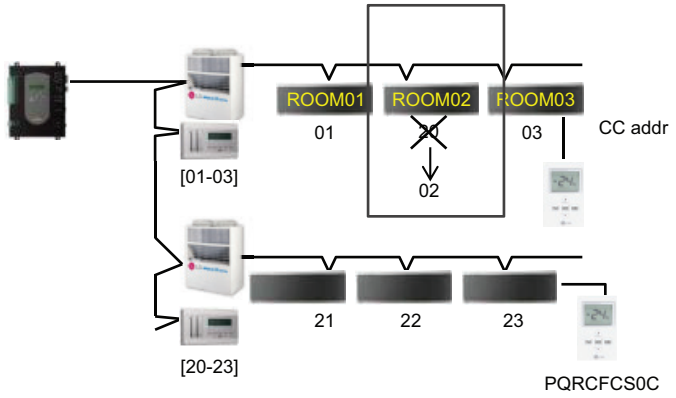


PDI Diagnostic Mode → Check the communication status with the indoor unit.

Cause

- The IDU address is set wrong.

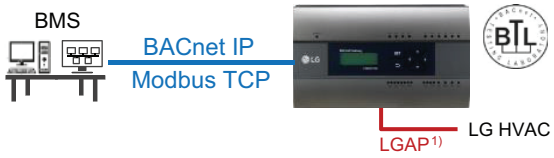
Solution



The problematic indoor unit was found and after correcting the address, the power was supplied properly.

10. BMS Gateway

10.1 ACP-BACnet



Model no.	PQNFB17C0
Dimension (WxHxD)	270mm x 155mm x 65mm
Weight (kg)	1.3 kg (including power adaptor)
Max. number of unit	256
Applicable unit type	Air conditioner, ERV, DX ERV, Hydro kit, AHU control/comm. kit
Display	20x4 Character LCD
Power	12VDC, max 2.3A
Surrounding Conditions	Operating Temperature : 0~40°C Storage Temperature : -20~80°C Humidity : 0~95%
Comm. Port(Channel)	Ch.1~4 : LGAP1)(ODU, ERV, DX ERV, Hydro kit) Ch.5 : LGAP(AHU Control kit) or Modbus(ACS I/O module) Ch.6 : Modbus(ACS I/O module)
Ethernet	100/10Mbps
External Interface	10 Digital Inputs (DI1 : Forced stop only) 4 Digital Outputs, 1 USB (Software update, Data backup) 1 SD card (Data backup, Data logging)

Features

Standard Features
- Interface between BACnet/IP BMS and LG HVAC unit
- Modbus TCP support (No setting)
- ACP IV functions
- BTL Certified (B-ACS)
- Product list offering BMS Points

Unit type	BACnet IP	Modbus TCP
IDU	○	○
ERV, DX ERV	○	○
ODU	Monitoring Only	X
Hydro kit	○	○
AHU	○	○

Based on v5.08.1

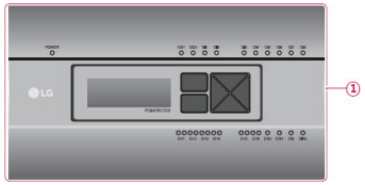
Advanced Function
- Two Setpoint Auto / changeover / Setback
- Interlocking, Energy Report, Error, Event Log by Email
- Energy Report, Event Log Save to PC
- Accumulated Power monitoring with PDI2)
- Compatible with ACS I/O (No BMS points)

Optional Accessories
- PDI2) - PQNUD1S40, PPWRDB000
- ACS I/O - PEXPMB000

1) LG Air-conditioner Protocol

2) Power Distribution Indicator

■ Components



<Front Case>

Power Supply Adaptor
Input: 100-240 V~
50/60 Hz, 1.2 A
Output: DC 12 V
3.33 A, 40 W MAX

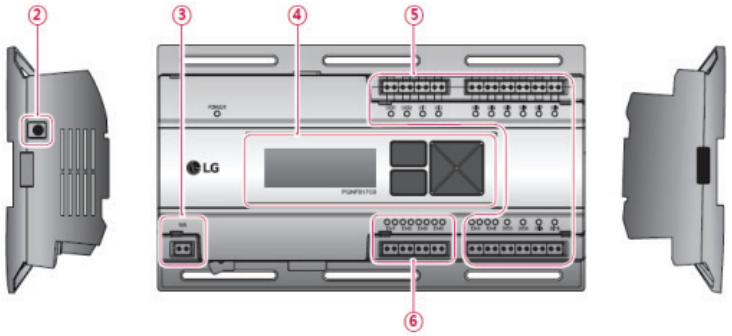
Power Cord
250 V~, 3 A

Quick Guide

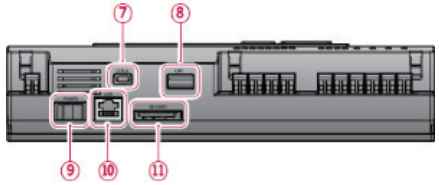
ACP BACnet Installation/User Manual CD

① Front cover
② Adaptor connection jack for DC 12V
③ Power port (for 24V~, PQNFB17C2 Only)
④ Buttons and LCD

Set Network environment (IP, Net mask, Gateway)
Select Peak(Default) or Demand(Not used)
SW upgrade, Data backup, Data recovery
RS-485 communication logging
Set Fahrenheit/Celsius
Set Device ID for BACnet
Set Vnet number for Modbus
Foreign Device register



<Front, Side>

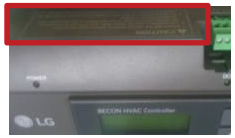
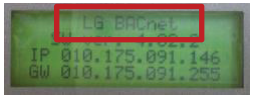


<Bottom>

⑤ 4 Digital Output signal (≤ 1.5A, 30V), 10 Digital Input signal (non voltage input only)
DI #1 is reserved for forced off.
⑥ Comm. port
CH1~4 : LG AP (ODU, ERV, DX ERV, Hydro kit)
CH5 : LG AP(AHU Control kit) or Modbus(ACS I/O)
CH6 : Modbus(ACS I/O)
⑦ Mini USB port
USB to Serial port for software debugging.
⑧ USB port
For software update and data backup/recover.
⑨ Power switch
⑩ Ethernet port
To connect with BMS or AC Manager.
For software update/data backup/recover.
⑪ SD card slot
For data backup/recover, RS485 data logging.

■ What are the differences as hardware?

CPU & Memory Upgraded

Items	Old (~ Nov. 2015)	New[1] (Dec. 2015 ~)
CPU	ARM Cortex A8 800Mhz	ARM Cortex A9 1Gh
RAM	DDR2 128MB x 2	DDR2 256MB x 2
Top case	9-Pin Serial Port 	Caution Label 
LCD Display	LG BACnet 	LG BACnet-G 

1) New Product : After 21st Dec.2015

■ What are the differences as software?

Upgraded to ACP IV

Items	Old (~ Nov. 2015)	New1) (Dec. 2015 ~)
S/W Version	~v3.1.5	v5.08.1~
Embedded ACP Func.	ACP Premium	ACP IV
Email[2] / Save to PC In Energy Report 	X 	O 
Email[2] / Save to PC In Event Log 	X 	O 
Update S/W, DB Backup / Recovery DB 	X 	O 

1) New Product : After 21st Dec.2015
2) Email setting added in environment menu

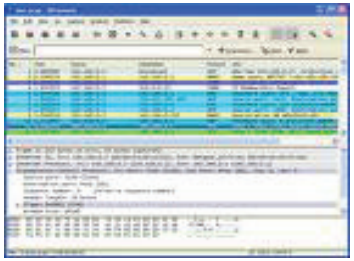
■ Steps

1. Install and connect BACnet Gateway
2. Verify and Check for ACS System
3. Offer BACnet points to BMS
4. Integrating BACnet points with BMS (BMS Job)
4. JMT PASS?
NO
YES
END

1) Check the rules and cautions
2) Set the central control address
3) Set PI485 and connect
4) Install BACnet G/W and connect
5) Set BACnet G/W network address
6) Set BACnet G/W function

Trouble shoot

- Check setting
  - Device Instance no.
  - IP address
- Get the advice from HQ



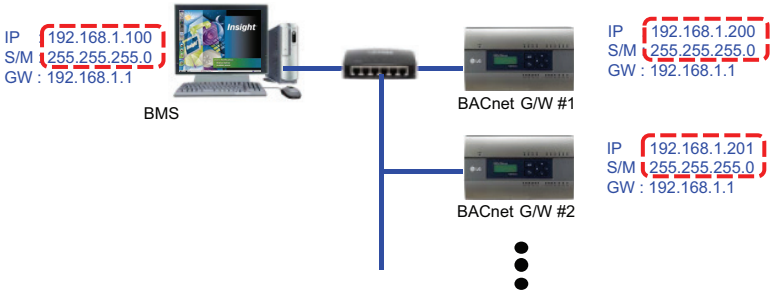
1. Install and connect BACnet Gateway.

1) Check the rules and cautions
2) Set the central control address
3) Set PI485 and connect
4) Install BACnet G/W and connect
5) Set BACnet G/W network address
6) Set BACnet G/W function

Assigning the network address (by LG).

Network Info.	Setting Value	Remarks
IP Address	ex) 192.168.1.101	IP Address should be communicable with BMS. IT administrator of the building should provide IP address to LG. Confirm the required network information with the BMS integrator and IT manager of the job site
GW Address	ex) 192.168.1.1	
Net Mask	ex) 255.255.255.0	

BACnet G/W need to be located at the same network domain with BMS.



Normally First 3 digits are the same with BMS IP address and Gateway, and Subnet Mask is like “255.255.255.0” (C class). If not like this, contact LG HQ and get the advice.

1. Install and connect BACnet Gateway.

1) Check the rules and cautions
2) Set the central control address
3) Set PI485 and connect
4) Install BACnet G/W and connect
5) Set BACnet G/W network address
6) Set BACnet G/W function

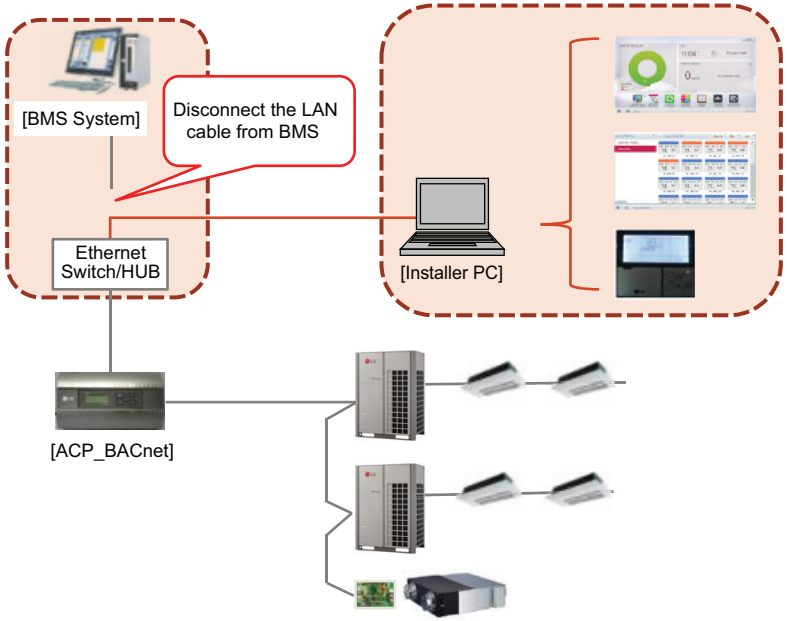
Device Setup (by LG)

Contents	Setting Value	Remarks
Temperature	0, Celsius 1, Fahrenheit	Default 0
Device ID (Device Instance No,)	ex) 9000 Device ID / Unit: 9000 Indoor unit 9001 ERV 9002 AHU 9003 Outdoor unit 9004 Hydro kit 9005 General	Default : 9000 Confirm the Device Instance number of ACP BACnet G/W with the BMS integrator. Change Device ID to be unique if necessary. Note) Unique Numbers are required for BACnet Device Object Instance Numbers across the entire network but in practice you can use duplicates as long as they are separated by a router. - Indoor unit : Device ID - ERV : Device ID + 1 - AHU : Device ID + 2 - Outdoor unit : Device ID + 3 (Monitoring Only) - Hydro Kit : Device ID + 4 - General : Device ID + 5 (applied sw : after v5.04.1)
Vnet No.	ex) 10	The slave address of Modbus TCP (There is no need to set the Vnet No. for BACnet)

Reset the power of ACP BACnetG/W after changing any setting.

2. Verify and Check for ACS System
   - First of all, it is necessary to check the ACS System prior to connecting the BMS.
   - This needs to be carried out by LG field engineer using Web Interface GUI and Thermostat.

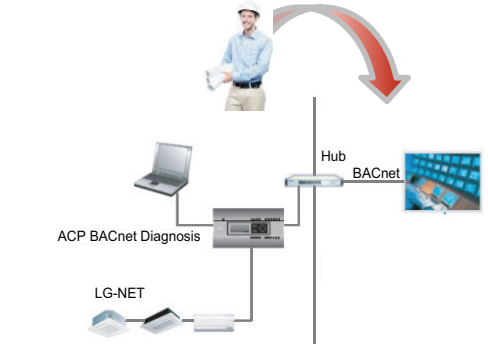
   1) Web Connection check : OK
   2) No Error IDU
   3) Control / Monitor by Web
   4) Control / Monitor by Thermostat



3. Offer BACnet points to BMS.

	Name	Object Name (XX : Unit Address Number)	Object Type	Unit Inactive TEXT-0	Active 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	Filter Sign	ac_FilterSign_XX	BI	Off(0)	On(1)				
6	Filter Sign reset	ac_FilterSignReset_XX	BV	-	Reset(1)				
7	Operation Mode (Setting)	ac_AirConModeCommand_XX	MO		Cool(1)	Dry(2)	Fan(3)	Auto(4)	Heat(5)
8	Operation Mode (Status)	ac_AirConModeStatus_XX	MI		Cool(1)	Dry(2)	Fan(3)	Auto(4)	Heat(5)
9	Swing (Setting)	ac_SwingCommand_XX	BO	Stop(0)	Run(1)				
10	Swing (Status)	ac_SwingStatus_XX	BI	Stop(0)	Run(1)				
11	Fan Speed (Setting)	ac_FanSpeedCommand_XX	MO		Low(1)	Middle(2)	High(3)	Auto(4)	
12	Fan Speed (Status)	ac_FanSpeedStatus_XX	MI		Low(1)	Middle(2)	High(3)	Auto(4)	
13	Set Room Temperature	ac_SetRoomTemp_XX	AV	℃					
14	Room Temperature	ac_RoomTemp_XX	AI	℃					
15	Alarm	ac_Alarm_XX	BI	Normal(0)	Abnormal(1)				
16	Error Code	ac_MalfunctionCode_XX	AI	Refer to the LG Error code list					
17	-	-	-						
18	-	-	-						
19	Set Temperature (Status)	ac_SetTempStatus_XX							
	Accumulated Power Distribution (Status)	ac_AccumulatedPower							

BACnet Points Information



LG Engineering Side

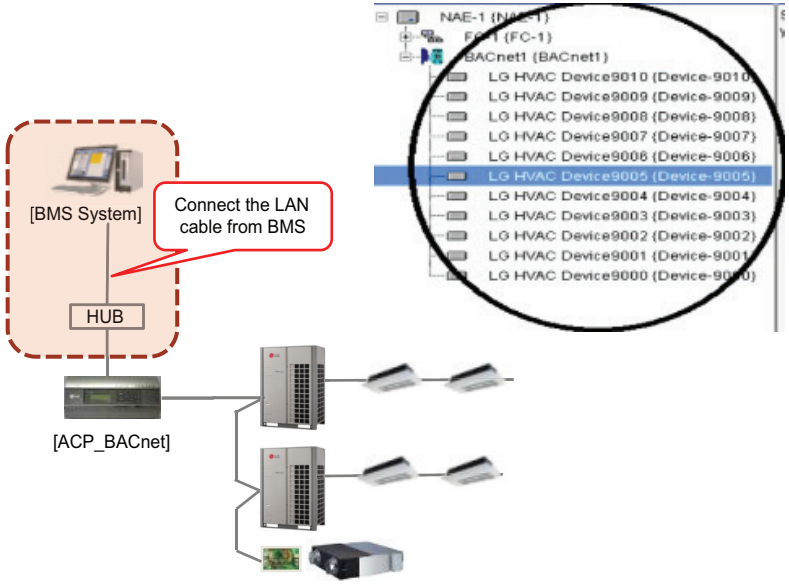
1. Install and connect BACnetGateway
2. Verify and Check for ACS System
3. Offer BACnetpoints to BMS

BMS Engineering Side

4. Integrating BACnetpoints with BMS
   1) Discover the Device
   2) Discover the Objects
   3) Read/Write the Present Value of each object point

4. Integrating BACnet points with BMS (BMS Job)
   • This is NOT to be done by LG since it is directly related to the BMS side.
   • The BMS engineer is to carry out the engineering of the Point, however LG is responsible for providing the method of how the points are calculated and the information of each the Points.

1) Discover the Device
After connecting with BMS, the BMS engineer should discover the Device(s) within LG BACnet Controller.
BMS engineer can add the Device & associated points manually if desired. It is a different method depending on BMS system.



When BMS can't discover the device :
- Please verify the network configuration again.
- Be sure you can network ping each device from your laptop and BMS.

4. Integrating BACnet points with BMS (BMS Job)

2) Discover the Objects
BMS engineer can discover the Object List or add it manually. Refer to the Instance Number file.

- binary_output: 1 (ac_StartStopCommand_0)
- binary_input: 2 (ac_StartStopStatus_0)
- binary_output: 3 (ac_LockCommand_0)
- binary_input: 4 (ac_LockStatus_0)
- binary_input: 5 (ac_FilterSign_0)
- binary_value: 6 (ac_FilterSignReset_0)
- multi_state_output: 7 (ac_AirConModeCommand_0)
- multi_state_input: 8 (ac_AirConModeStatus_0)
- binary_output: 9 (ac_SwingCommand_0)
- binary_input: 10 (ac_SwingStatus_0)
- multi_state_output: 11 (ac_FanSpeedCommand_0)
- multi_state_input: 12 (ac_FanSpeedStatus_0)
- analog_value: 13 (ac_SetRoomTemp_0)
- analog_input: 14 (ac_RoomTemp_0)
- binary_input: 15 (ac_Alarm_0)
- analog_input: 16 (ac_MalfunctionCode_0)
- multi_state_output: 17 (ac_UserModeCommand_0)
- multi_state_input: 18 (ac_UserModeStatus_0)
- analog_input: 19 (ac_SetTempStatus_0)
- analog_input: 20 (ac_Accumulated power(100 Watt)_0)
- multi_state_output: 21 (ac_UserModeAcCommand_0)
- multi_state_input: 22 (ac_UserModeAcStatus_0)
- binary_output: 23 (ac_UserModeAcOperCommand_0)
- binary_input: 24 (ac_UserModeAcOperStatus_0)

When BMS can't discover the object-list. Even if the device itself was discovered. :
- If you can't see any indoor unit points like mode, room temp etc.
  → Usually, a BACnet BMS has three distinct ways to discover the object-list.

A. BMS requests all objects at one time by using the Read Property Multiple.
B. BMS requests a object at a time by using the Read Property.
   This way requires more time for discovery but can be more thorough regarding all point attributes.
C. Manually add each required point by referring to the Object instance number file.

3) Read/Write the Present Value of each object point
After Discovery of all Objects List,
LG and BMS engineer can verify the controlling and monitoring IDU unis.

■ Type A or B

ACP BACnet G/W differently responds to each “Device ID” depending on the systems.
ACP BACnet G/W can set the “Type A” or “Type B” depending on the response way of MAC address.
- Type A : response the Same MAC address regardless of “Device ID”
- Type B : response the Different MAC address depending on “Device ID”

Example>

Type A (Default)

• Different Device ID, Same MAC address.

Device ID :
Indoor 9000
ERV 9001
AHU 9002
Outdoor 9003
AWHP 9004
(General 9005)

MAC Address :
Indoor 0xc7d1a2c2a1d6
ERV 0xc7d1a2c2a1d6
AHU 0xc7d1a2c2a1d6
Outdoor 0xc7d1a2c2a1d6
AWHP 0xc7d1a2c2a1d6
(General 0xc7d1a2c2a1d6)

Type B

• Different Device ID, Different MAC address.

Device ID :
Indoor 9000
ERV 9001
AHU 9002
Outdoor 9003
AWHP 9004
(General 9005)

MAC Address :
Indoor 10
ERV 11
AHU 12
Outdoor 13
AWHP 14
(General 15)

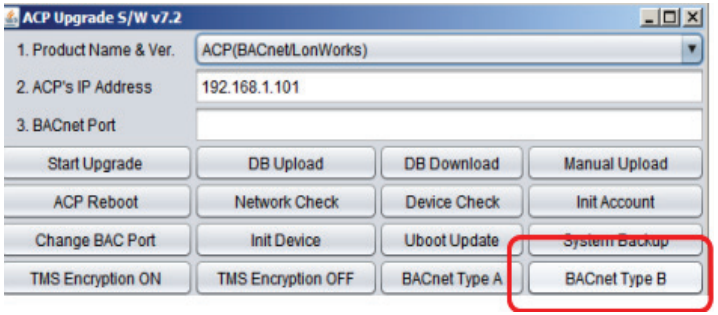
❖ When should you set it to “Type B”?

- Case 1) When only one system was connected to one ACP BACnetG/W : No setting
- ✓ Case 2) When multiple systems was connected to one ACP BACnetG/W and BMS had a following problem : Set to “Type B” after onboarding the latest S/W

If the Device ID is different but the MAC address is the same, some BMS will recognize it as the same system.
Especially Schneider or Honeywell BMS.

■ How to set to “Type B”

1) Run the Service tool
2) Select the Model: ACP BACNET
3) Fill the right IP of the Gatwey
4) Press the Button “BACnet Type B”
5) Wait until the device reboot



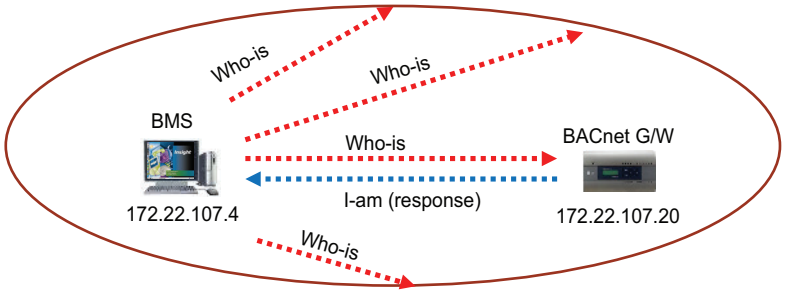
It can be possible to change a type of BACnet on LG GUI after software ver.5.10.1

■ List Changed to BACnet Type B

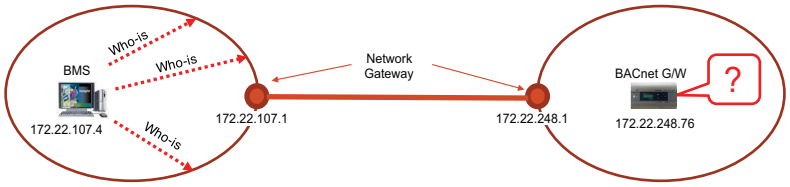
Model	S/W ver.	BMS	Type B	Site
PQNFB17C2 (After Dec.21, 2015)	v5.04.2	Delta ORCAview	Changed	Canada
PNF-B17C0	v3.1.2	Honeywell EBI(v6.2e) IPC controller	Changed	Korea
PQNFB17C1	v3.1.2	Tridium	Changed	Mexico
PQNFB17C1	v3.1.2	Schneider	Changed	Poland

■ Register Foreign DeviceB

◆ Who-is message in the same domain.



◆ Who-is message in the different domain without BBMD*

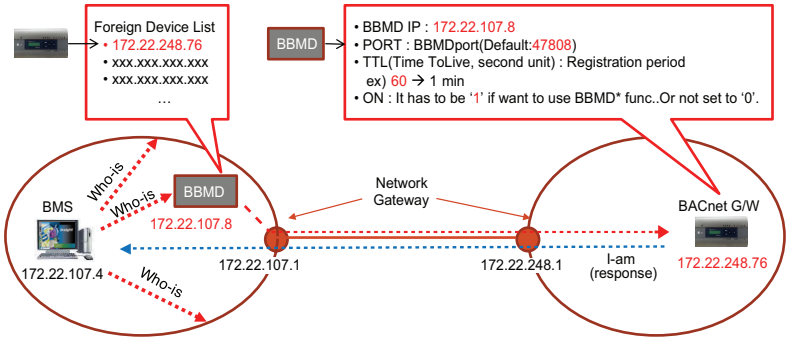


*BBMD : BACnet/IP Broadcast Management Device

◆ The BBMD* receiving the “Register FD(Foreign Device)” command :

1) If FD registration is possible, BBMD responds.
→ BBMD automatically retransmits “Register FD” command after the set TTL value.

2) If FD registration is not possible or there is no registration function in BMS, BBMD doesn’t response
→ BACnet G/W’s “ON” will be change to “0” after the set TTL value
(If “ON” will be re-set to “1”, it is possible to register again.)



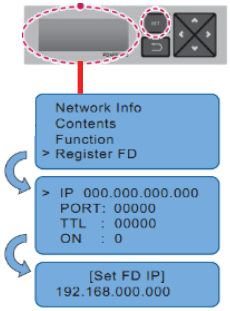
*BBMD : BACnet/IP Broadcast Management Device

◆ IP, PORT, TTL, and FD activate setting

1.

IP setting

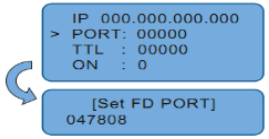
: Input the BBMD IP



2.

PORT setting

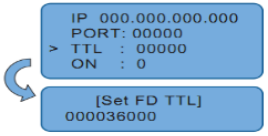
: Input the BBMD Port
(Default 47808)



3.

TTL setting

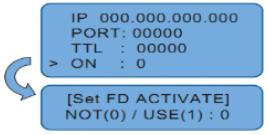
: Input the TTL second
(Time to Live)
ex> 60 → 1min



4.

FD Activate setting

: Set to “1”, activation
Set to “0”, not used



◆ Tip!

. . .
TTL : 60
ON : 1

Example>
If the “ON” value remains unchanged after 60 seconds, you can confirm that the FD(foreign device) is registered normally in BBMD.

• For more information, please consult with the experts of BMS.
*BBMD : BACnet/IP Broadcast Management Device

◆ Site Information
• Site : USA OO school
• Date : May, 17, 2016
• BMS : Honeywell WEB-600E (Niagara Platform)
• BACnet GW / Q'ty / Ver. : PQNFB17C1 / 2ea / v3.1.5 → v3.1.5c (Onboarding)
• Outdoor Unit 9ea
• Indoor Unit 124ea

◆ Problem
• When the ACP periodically reboots(every monday 2AM), the BMS can not communicate intermittently with one BACnet G/W. (other BACnet G/Ws is Ok)

◆ Cause
• Reappearance testing after changing the system clock to 2 am on Monday → Problem found
• After rebooting, BACnet G/W creates and initializes the object. By the way, the problem occurs when the BACnet G/W receives a data request from the BMS during object creation and initialization.

◆ Solution
• Solution : Onboarding v3.1.5c. (Added initialization recovery logic)

◆ Site Information

- Site : USA OO
- Date : May, 18, 2016
- BMS : Automated Logic BMS, LGR25 Controller
- BACnet GW / Q'ty / Ver. : PQNFB17C1 / 1ea / v3.1.5
- Outdoor Unit 4ea
- Indoor Unit 56ea

◆ Problem

1. Auto Discover Failure : When joint matching test, BMS can not find the object.
2. Manual Discover Failure : Manually Added some objects but can not find all the objects we added.

◆ Cause & Solution

1. Auto Discover Failure : When Auto Discovery, BMS get the object list using "WHO-has". By the way, BMS requests incorrect object name to BACnet G/W.

ex) incorrect request object : Startstopcommand_01
→ correct request object : ac_StartStopCommand_01

→ Need the setting of BMS, But the contractor does not fully understand Automated Logic BMS,
→ Select Manual Discovery method.

2. Manual Discover Success :
1) Change to correct Device ID

ex) incorrect Device ID :1002
→ correct Device ID : 9000

2) We have entered the object type and instance number one by one. → Success

10.2 ACP-Lonworks

Model no.	PLNWKB000
Dimension (WxHxD)	270mm x 155mm x 65mm
Weight (kg)	1.3 kg (Include power adaptor)
Max. number of unit	64 (ACP only : 256)
Applicable unit type	Air conditioner, ERV, DX ERV, Hydro kit, AHU control/comm. Kit (AHU and other unis are not connected simultaneously)
Display	20x4 Character LCD (network environment setting & Information display)
Power	12VDC, max 2.3A
Surrounding Conditions	Operating Temperature : 0~40°C Storage Temperature : -20~80°C Humidity : 0~95%
Comm. Port(Channel)	Ch.1~4 : LG AP1)(ODU, ERV, DX ERV, Hydro kit) Ch.5 : LG AP(AHU Control kit)
Lon Port	TP/FT-10
External Interface	2 Digital Inputs (DI1 : Emergency stop only) 2 Digital Outputs, 1 Ethernet Port 100/10Mbps 1 USB (Software update, Data backup) 1 SD card (Data backup)

Features

Standard Features

- Interface between LonWorks BMS and LG HVAC unit
- Web Access with Graphical User Access Control
- ACP Premium functions
- Forced off digital input
- Interfacing with AC Manager
- Flash ver.'s the latest s/w version : v2.1.2
- Java ver.'s the latest s/w version : v2.0.2c
- Digital I/O (Inherent) : No points for Lon-Works
- For LonWorks G/W, only 64 units are allowed
  - Addr. Range : 00~FF, don't need to be continuous number

Advanced Function

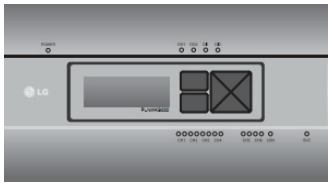
- Two Setpoint Auto-changeover / Setback
- Time Limit Control, Interlocking
- Energy Report, Error, Event Log by Email
- Energy Report, Event Log Save to PC
- Accumulated Power monitoring with PDI[2)]

Optional Accessories

- PDI - PQNUD1S40, PPWRDB000

1) LG Air-conditioner Protocol
2) Power Distribution Indicator

■ Components



<Front Case>

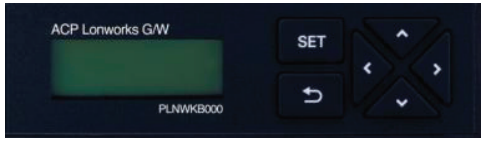
Power Supply Adaptor
Input: 100-240 V~
50/60 Hz, 1.2 A
Output: DC 12 V
3.33 A, 40 W MAX

Power Cord
250 V~, 3 A

Quick Guide

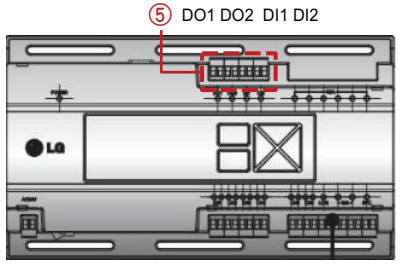
ACP Lonworks
User's Guide

① Front cover
② Adaptor connection jack for DC 12V
③ Power port (for 24V~, PLNWKB100 Only)
④ Buttons and LCD

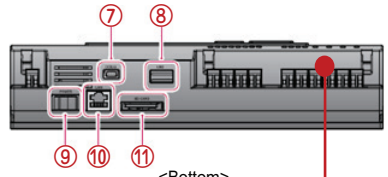


Set Network environment (IP, Net mask, Gateway)
Select Peak(Default) or Demand(Not used)
SW upgrade, Data backup, Data recovery
RS-485 communication logging
Set Language (Korean/English)
Set whether to use Schedule function
Set whether to use PDI/Fire alarm function
Set whether to display error history/cycle info,
Set whether to use 0.5°C control

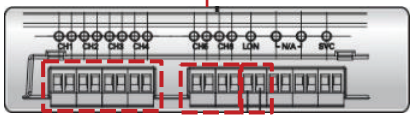
■ Components



<Front, Side>



<Bottom>



CH1 CH2 CH3 CH4 CH5 CH6 LON

⑤ 2 Digital Output signal (≤ 1.5A, 30V), 2 Digital Input signal (non voltage input only)
DI #1 is reserved for forced off

⑥ Comm. port
CH1~4 : LG AP (ODU, ERV, DX ERV, Hydro kit)
CH5 : LG AP(AHU Control kit)
CH6 : Not used
LON : To connect with BMS

⑦ Mini USB port
USB to Serial port for software debugging

⑧ USB port
For software update and data backup/recover

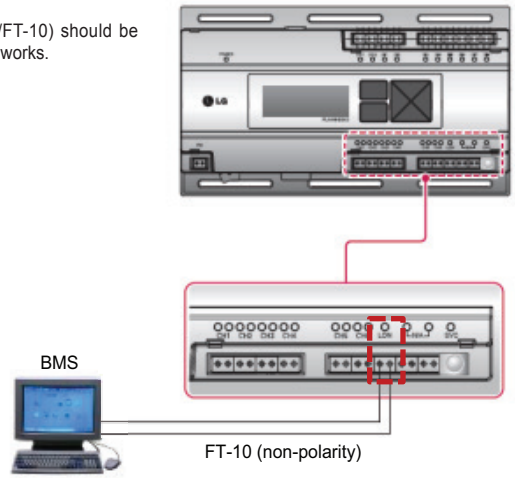
⑨ Power switch

⑩ Ethernet port
To connect with AC Manager
For software update/data backup/recover

⑪ SD card slot
For data backup/recover, RS485 data logging

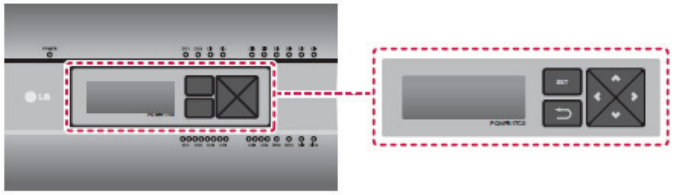
◆ Wiring

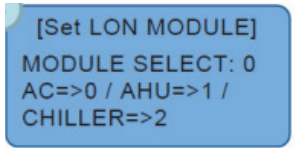
LON communication cable(TP/FT-10) should be connected LON port of ACP Lonworks.



◆ Set Lonworks type

- 0 : AC, ERV, DX ERV, AWHP
- 1 : DX AHU
- 2 : LG Chiller (applicable model is limited)

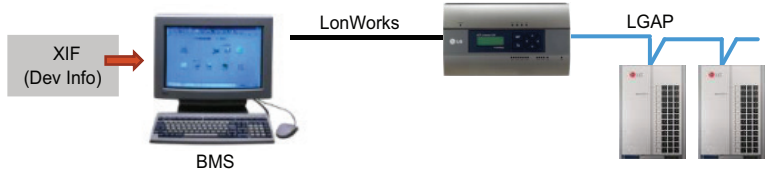




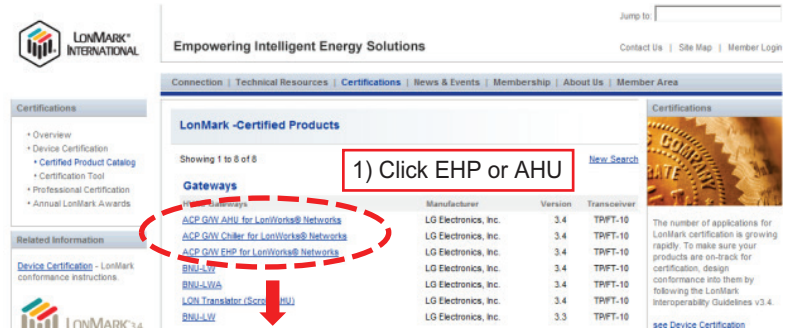
■ Commissioning

1) Using “Upload from device”

2) Using “XIF File” for pre-engineering



■ XIF file Download



LonMark-Certified Product Catalog

Link : http://www.lonmark.org/certifications/device_certification/product_catalog/search?categoryID=-1&deviceClassID=-1&Submit=Search&manID=825

ACP G/W EHP for LonWorks® Networks New Search

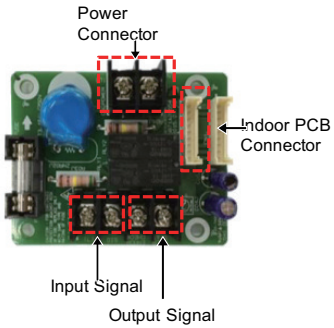
Company Name:	LG Electronics, Inc.
Standard Program ID:	8 000CC 4850 04 04 02
LonMark Version:	3.4
Category:	Gateways
LonMark Format:	8
Manufacturer ID:	000CC - LG Electronics
Device Class:	4850 - HVAC Gateways
Usage Class:	04 - Industrial-Commercial
Media Channel:	04 - TP/FT-10
SPID Model Number:	02
Datasheet:	LG_ACP_GW.pdf
XIF/DRFs Download:	8000CC4850040402.zip
XIF available:	Yes, included in the above ZIP file
DRFs available:	Yes, included in the above ZIP file
LonMark Profiles	0000 - Node Object (1)

2) Click *.zip file

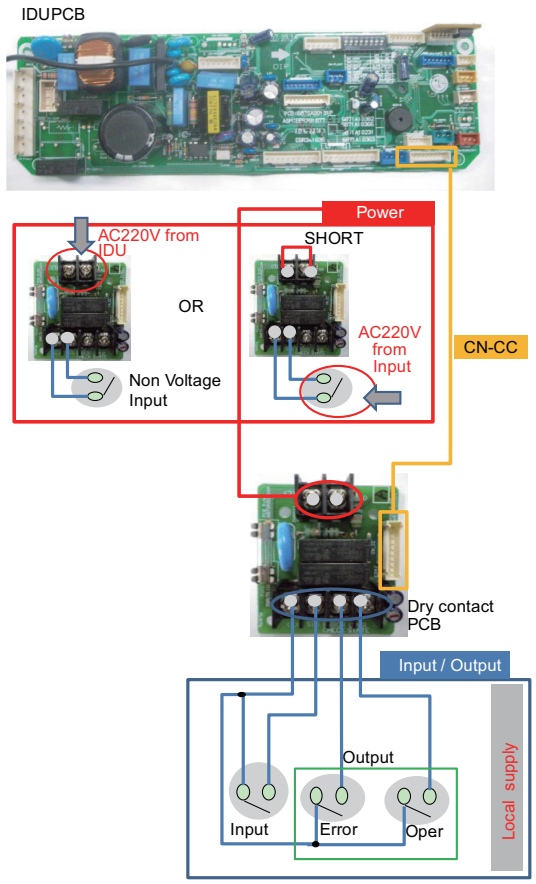
Each Unit type (EHP, AHU, Chiller) has different .XIF
- LGAC.XIF, LGAHU.XIF, LGChil.XIF

11. Dry Contact

11.1 Simple Dry Contact

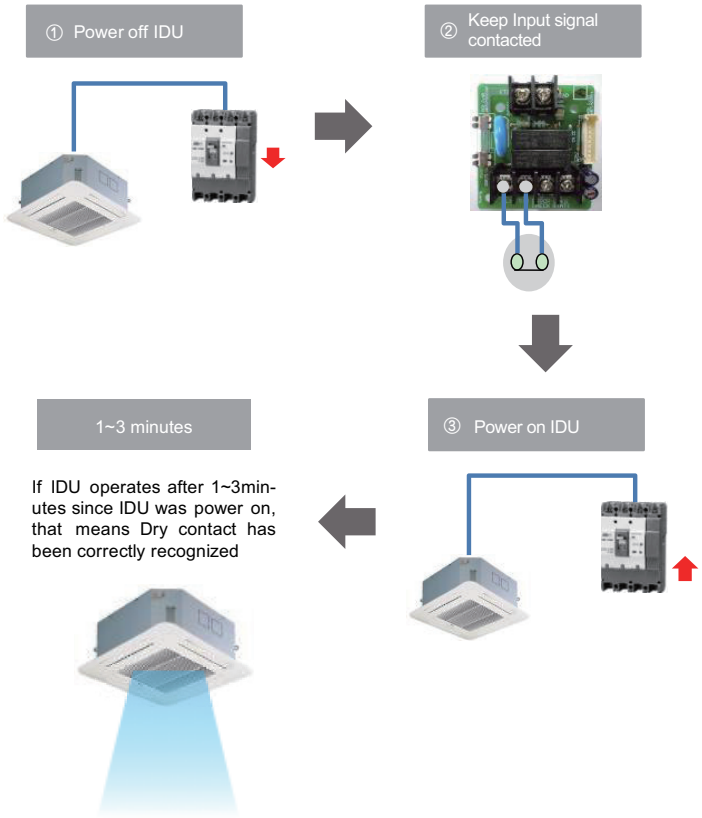
Model Code		PDRYCB000	Features
Shape		 For IDU	
Case		O	
Quantity of point		1	
Comm.		-	
Power		AC 220V	
Control	On / Off	●	
	Mode	-	
	Set Temp.	-	
	Fan Speed	-	
	Thermo-Off	-	
	Energy saving		
	Lock/Unlock	-	
	ODU low noise	-	
	Demand control	-	
Output	Operation Status	●	
	Error	●	
	Room temp.	-	
Previous model		PQDSB	

■ Wiring (Example)



■ Dry contact recognition in Indoor unit

- Initially, switching off and on Indoor unit is required for recognizing Dry Contact.
- During this recognition time, input signal must be on

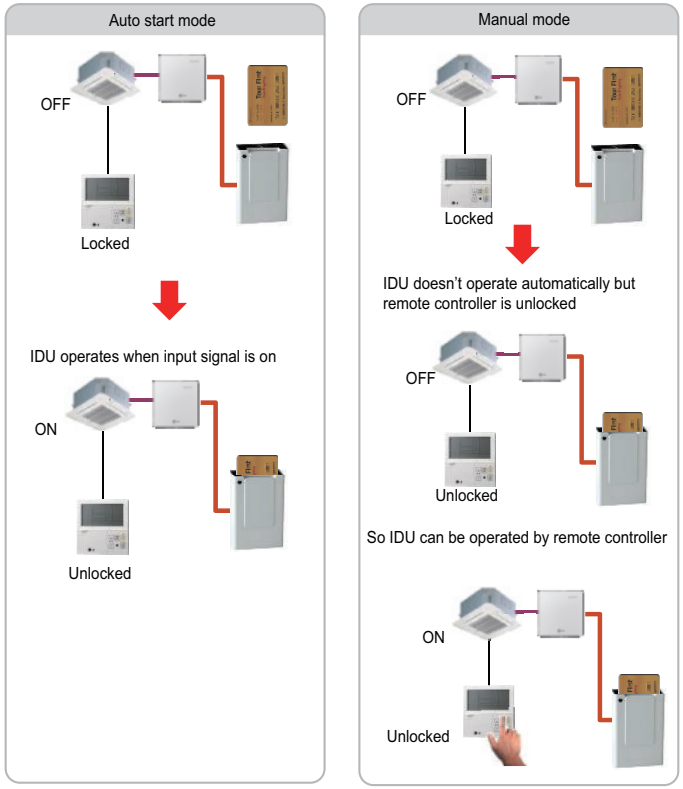


■ Auto start mode / Manual mode

There are two different operation scenario depending on the mode setting

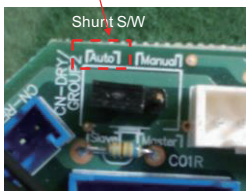
Case \ Mode	Auto start mode	Manual mode
Input On	IDU operates, Unlocked*	Unlocked
Input Off	IDU stops, Locked**	IDU stops, Locked

* Remote controller is allowed to control IDU
**Remote controller is prohibited to control IDU



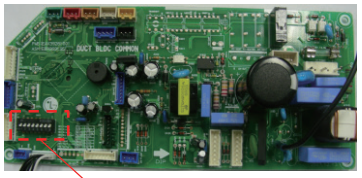
■ Auto start mode / Manual mode Setting – IDU PCB

▸ Case #1 : IDU PCB without Dip switch



- Auto : Auto-Start
- Manual : Depends on how it is set by Remote Controller

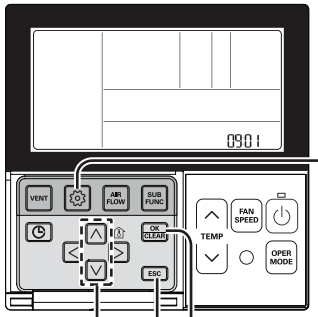
▸ Case #2 : IDU PCB with Dip switch



- On(Auto) : Auto-Start
- Off(Manual) : Depends on how it is set by Remote Controller

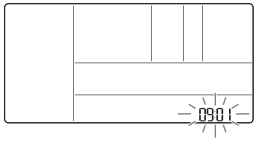
■ Auto start mode / Manual mode Setting – Wired Remote Controller

► Standard Wired R/C



1 Press and hold ⚙ Bbutton for more than 3 seconds to enter the installer settings mode.
- If pressing only once briefly, it will enter the user settings mode. Make sure to press and hold for more than 3 seconds.

2 Move to the Dry Contact Mode Settings in the menu using ⚙ button and then it displays as below.



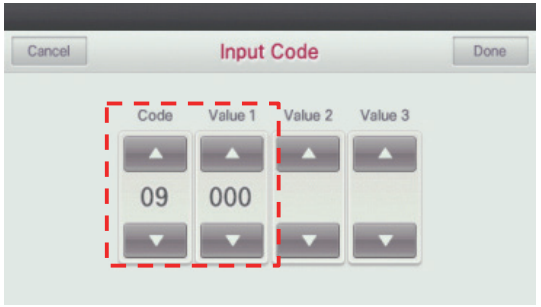
3 Select the Dry Contact Mode using ∧ ∨ button.

4 Press OK CLEAR button to save the setting.

5 Press ESC button to exit.
❉ If no button is selected for about 25 seconds after setup, it exits the setup mode automatically.
❉ If the Kbutton is not selected before you exit, the changes will not apply.

► Premium Wired R/C

- Press and hold 'wireless remote controller signal receiver part' of the remote controller for 3 seconds or longer to enter the installer function.
- Select dry contact mode setting code value '09'.
- At the Value 1 field, press the '▲', '▼' button to select dry contact setting value, and press 'Done' button to apply the dry contact mode setting.
  - If you do not press 'Done' button, your settings will not be applied.

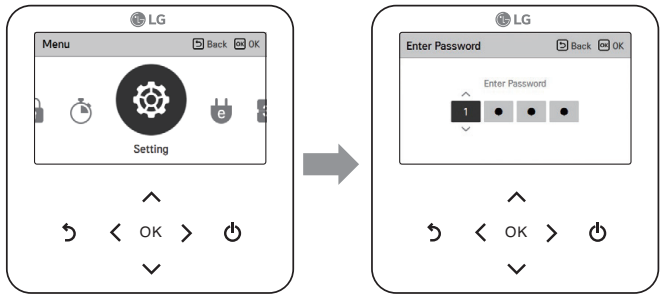


※ Dry contact setting value
- 00: manual
- 01: automatic

*Caution : When you set the Dry contact mode, you should make sure that Dry Contact input is On(For example, Cardkey is injected)

▶ Standard III Wired R/C

- In the menu screen, press [<,>(left/right)] button to select the setting category, and press [∧(up)] button for 3 seconds to enter the password input screen for the installer setting.
- Input the password and press [OK] button to move to the installer setting list.

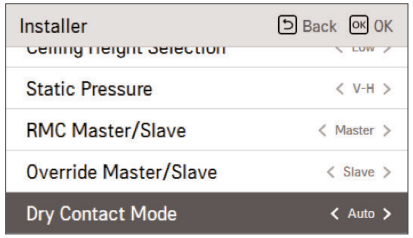


※Installer setting password
Main screen → menu → setting → service → RMC version information → SW Version
Example) SW version : 1.00.1 a
In the above case, the password is 1001.

▶ Dry contact mode setting (air conditioner / DX ventilator)

Dry contact function is the function that can be used only when the dry contact devices is separately purchased and installed.

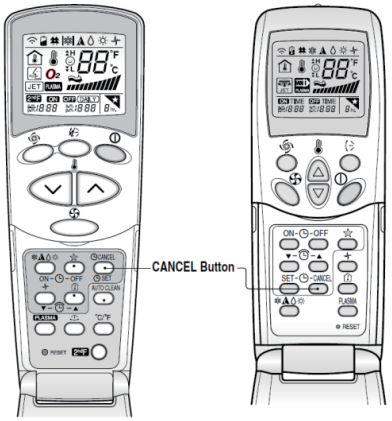
- Change setting values using [<,>(left/right)] button.



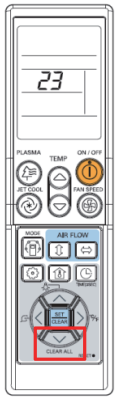
Value
Auto
manual

▶ Auto start mode / Manual mode Setting – Wireless Remote Controller

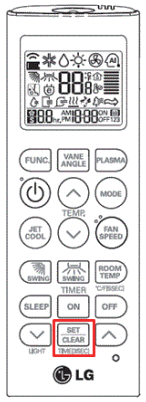
It Gives selection whether to turn ON the unit directly of not from the external source.
The selection can be made bu passing CANCEL button of the wireless remote controller 3 times within 3 minutes of resetting the unit with facing it towards the unit.
(This function availability depends on indoor unit model)



▶ Auto start mode / Manual mode Setting – Wireless Remote Controller

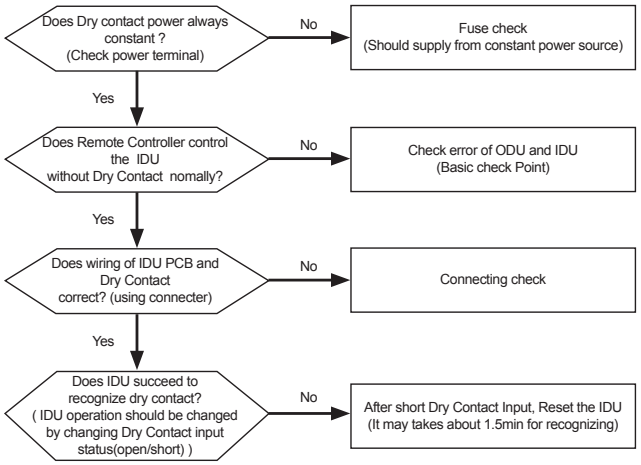


1m 30s after supplying power to IDU,
press the Clear All button on R/C three times



1m 30s after supplying power to IDU,
press the Set/Clear button on R/C three times

Symptom	Primary Check Point
Not work as desired	- Dry Contact Wiring check



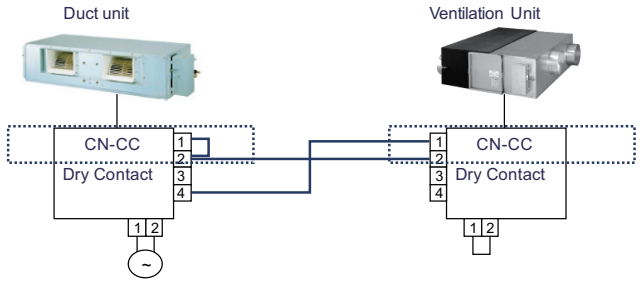
Request

☞ In a conference room of an hotel, It is necessary to synchronize the operation of the AC with the Eco V

Solution

☞ Indoor unit dry contact PCB is connected with Eco V forced operation contact.

<Conference Room>



In this case when IDU is on, Eco V starts(auto mode). And when IDU fan is Off, Eco V is off
→ Check!! dip switch No.5 in Eco V PCB
dip switch No.5 is ON then EcoV will be auto start
dip switch No.5 is Off then EcoV will be manual start(Remote controller enable)

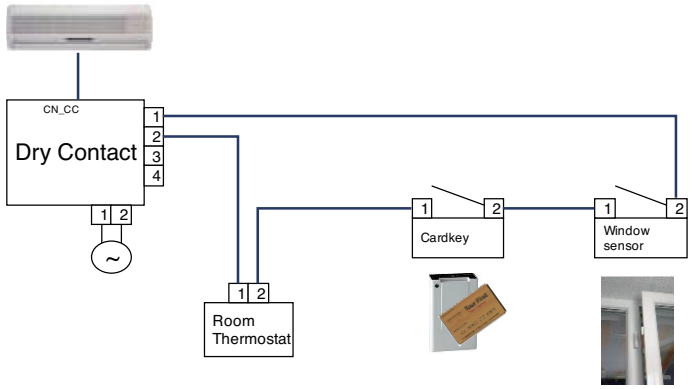
Request

☞ The indoor unit should be controlled by external switches, and it needs to be off while window is opened.

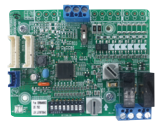
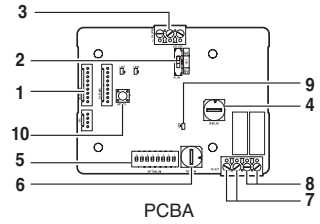
Solution

☞ Indoor unit is connected with a series of contacts

<Hotel Room>



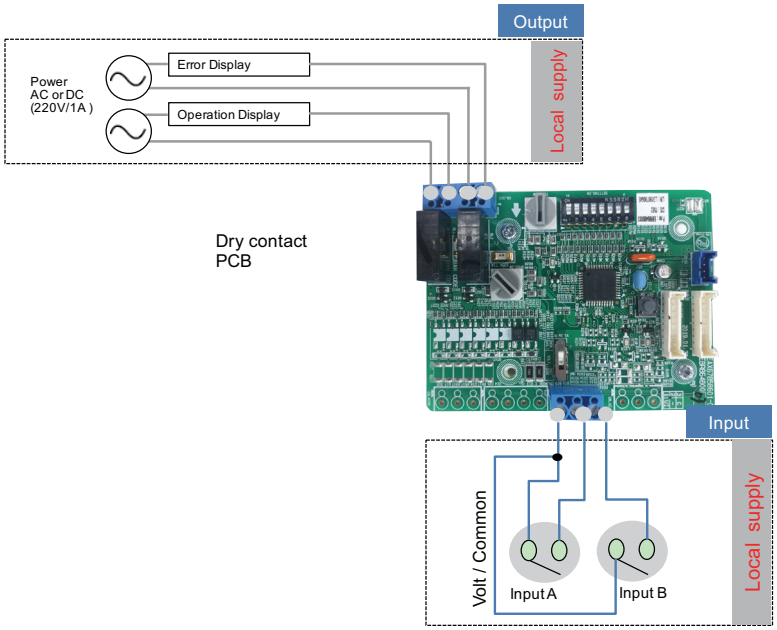
11.2 Dry Contact for 2 Inputs

Model Code		PDRYCB400	Features
Shape			 PCBA
		For IDU	
Case		O	
Quantity of point		2	
Comm.		-	
Power		from IDU	
Control	On / Off	●	
	Mode	●	
	Set Temp.	(Select & Fix)	
	Fan Speed	-	
	Thermo-Off	(Select & Fix)	
	Energy saving	(Select & Fix)	
	Lock/Unlock	(Select & Fix)	
	ODU low noise	-	
	Demand control	-	
Output	Operation Status	●	
	Error	●	
	Room temp.	-	
Previous model		PQDSBC	

Dry Contact For Setback

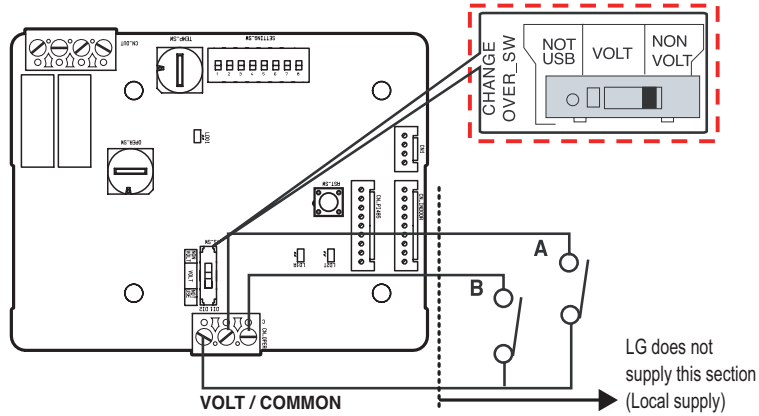
1. CN_INDOOR: Connect communication wire between indoor unit and Dry Contact For Setback and supply power to Dry Contact For Setback
2. VS_SW: Switch to select voltage (5 V-12 V) of contact point
3. CN_OPER: Contact point signal input
4. OPER_SW: Switch to select the control mode
5. SETTING_SW: Switch to select whether to use set function of Dry contact for setback
6. TEMP_SW: Switch to set the desired temperature of the indoor unit
7. CN_OUT (O1, O2): Connector to show whether the indoor unit is operating
8. CN_OUT (E3, E4): Connector to show whether there is an error with the indoor unit
9. LD01: LED to display the status of the Dry Contact For Setback
10. RST_SW: Reset switch

■ Wiring

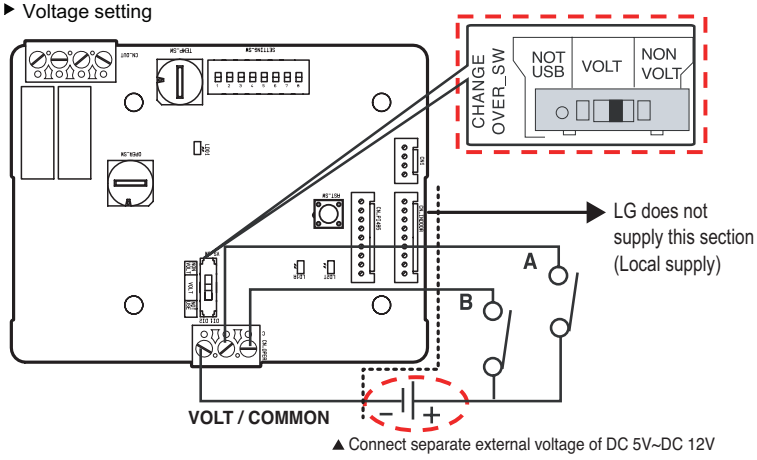


■ Voltage / Non Voltage setting for Input signal

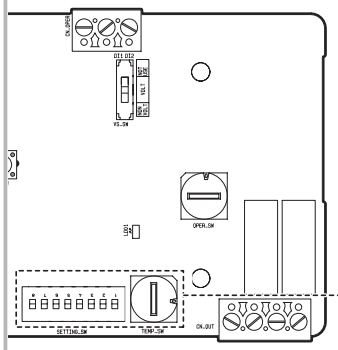
▶ Non Voltage setting



▶ Voltage setting



■ Desired Temperature setting

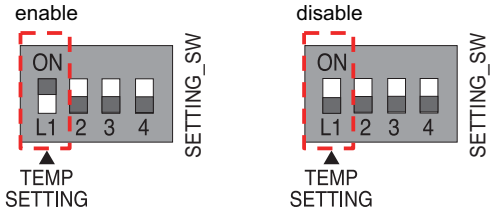


Desired temperature setting table

TEMP SW setting	0	1	2	3	4	5	6	7
Temperature setting(°C)	18	19	20	21	22	23	24	25

TEMP SW setting	8	9	A	B	C	D	E	F
Temperature setting(°C)	26	27	28	29	30	30	30	30

*Enable/Disable the Temp. setting



■ Control Mode setting

• General mode

OPER_SW	Input A	Input B	Operating mode
1	OFF	OFF	Indoor unit stopped, locked
	ON	OFF	Indoor unit prior operating condition maintained, unlocked
	OFF	ON	Indoor unit stopped, locked
	ON	ON	Indoor unit stopped, locked
2	OFF	OFF	Indoor unit stopped, locked
	ON	OFF	Indoor unit operating, unlocked
	OFF	ON	Indoor unit stopped, locked
	ON	ON	Indoor unit stopped, locked
3	OFF	OFF	Indoor unit stopped, locked
	ON	OFF	Indoor unit stopped, locked
	OFF	ON	Indoor unit prior operating condition maintained, unlocked
	ON	ON	Indoor unit operating, unlocked
4	OFF	OFF	Indoor unit stopped, locked
	ON	OFF	Indoor unit stopped, locked
	OFF	ON	Indoor unit prior operating condition maintained, unlocked
	ON	ON	Indoor unit prior operating condition maintained, unlocked
5	OFF	OFF	Indoor unit prior operating condition maintained, locked
	ON	OFF	Indoor unit prior operating condition maintained, locked
	OFF	ON	Indoor unit prior operating condition maintained, locked
	ON	ON	Indoor unit prior operating condition maintained, unlocked
6	OFF	OFF	Indoor unit prior operating condition maintained, locked
	ON	OFF	Indoor unit prior operating condition maintained, locked
	OFF	ON	Indoor unit prior operating condition maintained, locked
	ON	ON	Indoor unit operating, unlocked

• Particular mode

OPER_SW	Input A	Input B	Operating mode	
7	OFF	OFF	Indoor unit operating at low level, locked	Fan level Setting Mode
	ON	OFF	Indoor unit operating at low level, unlocked	
	OFF	ON	Indoor unit stopped, locked	
	ON	ON	Indoor unit stopped, locked	
8	OFF	OFF	Indoor unit operating at low level, locked	
	ON	OFF	Indoor unit operating at low level, unlocked	
	OFF	ON	Indoor unit stopped, locked	
	ON	ON	Indoor unit prior operating condition maintained, unlocked	
9	OFF	OFF	Indoor unit operating in power save mode, locked	Power Save Mode
	ON	OFF	Indoor unit operating in power save mode, unlocked	
	OFF	ON	Indoor unit stopped, locked	
	ON	ON	Indoor unit operating, unlocked	
A	OFF	OFF	Indoor unit operating in power save mode, locked	
	ON	OFF	Indoor unit operating in power save mode, unlocked	
	OFF	ON	Indoor unit stopped, locked	
	ON	ON	Indoor unit stopped, locked	
B	OFF	OFF	Indoor unit operating (Compressor in stop mode), locked	Comp. Stop Mode
	ON	OFF	Indoor unit prior operating condition maintained (Compressor not in stop mode), unlocked	
	OFF	ON	Indoor unit stopped, locked	
	ON	ON	Indoor unit stopped, locked	
C	OFF	OFF	Indoor unit stopped, unlocked	Operating Mode select
	ON	OFF	Indoor unit in cool/high operation, unlocked	
	OFF	ON	Indoor unit in heat/high operation, unlocked	
	ON	ON	Indoor unit in fan/high operation, unlocked	
D	OFF	OFF	Indoor unit stopped, locked	
	ON	OFF	Indoor unit in cool/high operation, locked	
	OFF	ON	Indoor unit in heat/high operation, locked	
	ON	ON	Indoor unit in fan/high operation, locked	

■ Control Mode setting

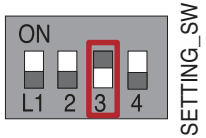
• Particular mode

OPER_SW	Input A	Input B	Operating mode	
E	OFF	OFF	Indoor unit prior operating condition maintained (Compressor not in stop mode), unlocked	Comp. Stop whit Economize
	ON	OFF	Indoor unit prior operating condition maintained (Compressor in stop mode), unlocked	
	OFF	ON	Indoor unit prior operating condition maintained (Compressor not in stop mode), unlocked	
	ON	ON	Indoor unit prior operating condition maintained (Compressor in stop mode), unlocked	

※ When interlocking with Economizer, turn on 2nd switch of SETTING_SW.

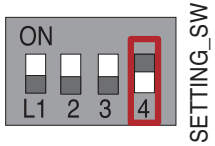
OPER_SW	Input A	Input B	Operating mode	
F	OFF	OFF	Occupied, unlocked	Occupancy Sensor
	ON	OFF	Unoccupied, unlocked	
	OFF	ON	Occupied, locked	
	ON	ON	Unoccupied, locked	

※ When using the Occupancy sensor interlock mode, the setting switch must be set as shown below.

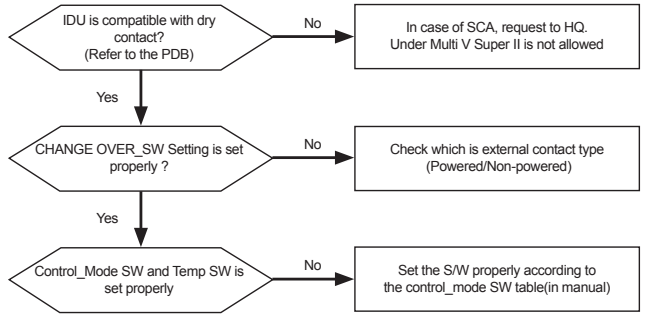


OPER_SW	Input A	Input B	Operating mode
0	OFF	OFF	Indoor unit stopped, locked
	ON	OFF	Indoor unit stopped, locked
	OFF	ON	Indoor unit stopped, locked
	ON	ON	Indoor unit prior operating condition maintained, unlocked
1	OFF	OFF	Indoor unit stopped, unlocked
	ON	OFF	Indoor unit stopped, unlocked
	OFF	ON	Indoor unit stopped, unlocked
	ON	ON	Indoor unit prior operating condition maintained, unlocked
2	OFF	OFF	Indoor unit stopped, locked
	ON	OFF	Indoor unit prior operating condition maintained, unlocked
	OFF	ON	Indoor unit operating, unlocked
	ON	ON	Indoor unit prior operating condition maintained, unlocked
3	OFF	OFF	Operation (in cooling mode), locked
	ON	OFF	Restore previous operation status, unlocked
	OFF	ON	Unlocked
	ON	ON	Unlocked

※ When using the extended mode, the switch must be set as shown below.

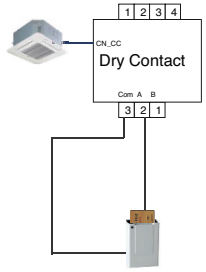


Symptom	Primary Check Point
IDU is not controllable by 3rd part controller	- Check external Contact type (Powered/Non-voltage) Check - Check IDU's operation according to the control_mode SW (refer to the table) - Check Compatibility between IDU and Dry Contact



■ Usage example

• Pre-Cooling



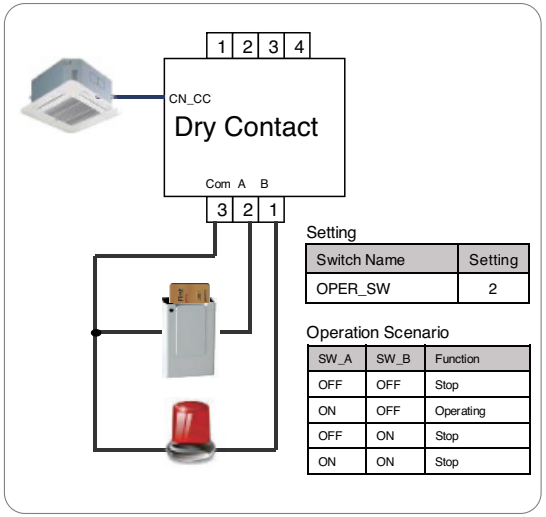
Setting

Switch Name	Setting
OPER_SW	7
TEMP_SW	A (28°C)

Operation Scenario

SW_A	SW_B	Function
OFF	OFF	Operating with 28°C & low level, Locked (Remote controller is now allowed to control IDU)
ON	OFF	Operating with 28°C & low level, Unlocked, (User can step down desired temp. by Remote controller)
OFF	ON	Stop
ON	ON	Stop

• Emergency stop



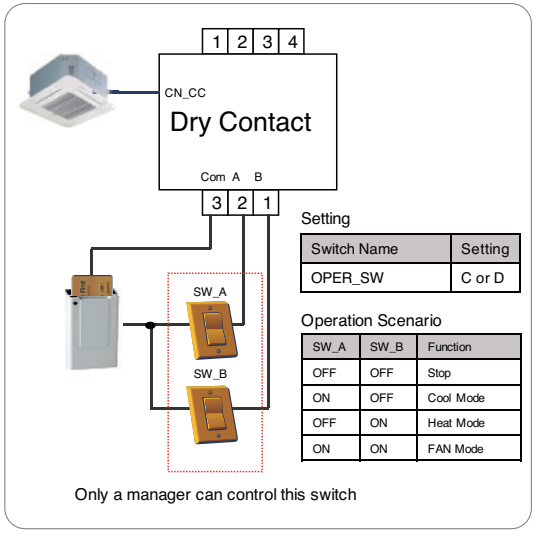
Setting

Switch Name	Setting
OPER_SW	2

Operation Scenario

SW_A	SW_B	Function
OFF	OFF	Stop
ON	OFF	Operating
OFF	ON	Stop
ON	ON	Stop

• Mode Selector



Setting

Switch Name	Setting
OPER_SW	C or D

Operation Scenario

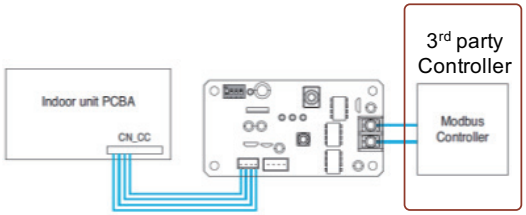
SW_A	SW_B	Function
OFF	OFF	Stop
ON	OFF	Cool Mode
OFF	ON	Heat Mode
ON	ON	FAN Mode

Only a manager can control this switch

11.3 Modbus Dry Contact

Model Code		PDRYCB500	Features
Shape			• Max no. for one room controller : 16 units • Modbus configuration - Modbus RTU slave / 2 wire RS485 - Baud : 9600 / Parity : None / Stop bits : 1
		For IDU	
Case		O	
Quantity of point		-	
Comm.		Modbus	
Power		from IDU	
Control	On / Off	●	
	Mode	●	
	Set Temp.	●	
	Fan Speed	●	
	Thermo-Off	-	
	Energy saving	-	
	Lock/Unlock	-	
	ODU low noise	-	
	Demand control	-	
Output	Operation Status	●	
	Error	●	
	Room temp.	●	
Previous model		PQDSBCGCD0	

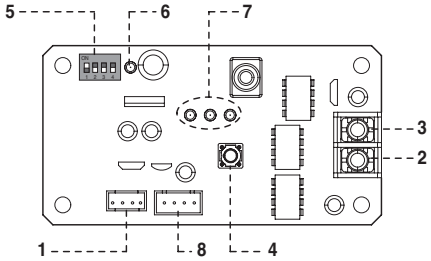
• Connecting Dry contact with IDU and Modbus Controller



Type : Modbus RTU Slave (2 wire RS485)

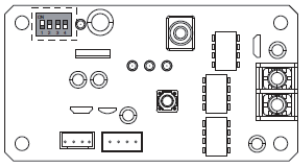
Baud : 9600

TX	01	01	00	00	00	01	FP	CA
	Device Addr.	Function Code	Modbus address		Start	Byte count	CRC	
RX	01	04	02	00	FA	90	48	
	Device Addr.	Function Code	Byte count	Data		CRC		



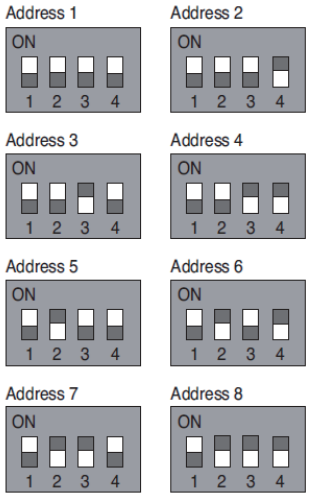
1. CN-OUT : Indoor Unit Connector
2. BUS-A : RS-485(+) Terminal
3. BUS-B : RS-485(-) Terminal
4. SW1 : Reset Switch
5. SWDIP : Setting Address Switch
6. LED1 : RS-485 Status LED
7. LED(01~03)G : Communication Status LED
8. CN-JIG : Connector for expanding the address range

• Setting Address



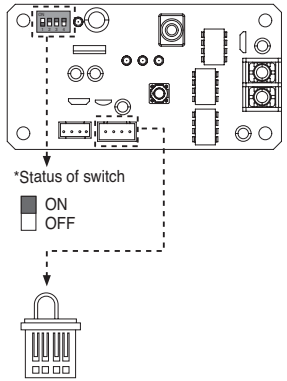
*Status of switch

ON
OFF



* In case, connect a Modbus controller with several product, Address have to be set different from others.

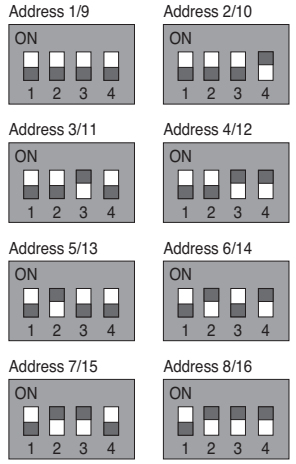
• Setting Address



*Status of switch

ON
OFF

- Not attached(default): 1~8
- Attached(expanding address range): 9~16



* Number: Address when connector is attached

* In case, connect a Modbus controller with several product, Address have to be set different from others.
* If the connector is attached to 'CN-JIG', the address range is expanded. (Please attach the connector before turning on the product.)

After change any Dry contact setting, then you must press RESET switch to reflect the setting.

Trouble Shooting Guide Book

MULTI V™ 5

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