

**Multi Split / Single**

# **Trouble Shooting Guide Book**



# Contents

## Trouble Shooting Guide Book

Multi Split / Single

### I . Basic Part

1. Unit Conversion	006
2. Temperature vs. pressure of ref.	007
3. p-h Diagram_R410a	010

### II . Multi & Single Overview

1. Nomenclature	014
2. Model Line up	020
3. Piping Diagram	028
4. Wiring diagrams & Outdoor PCB	038
5. Indoor Unit PCB	053
6. Exploded View	066
7. LGMV Guideline	081

### III . Self-diagnosis Function

1. DC Inverter System	084
2. Error Code Check	092
3. Measures for Main Error Codes	096

### IV . Outdoor Units Control

1. Outdoor Unit Control Classification	176
2. Basic Control	177
3. Special Control	179
4. Protection Control	180
5. Function Control	182

### V . Indoor Units Control

1. Air Flow	188
2. Air purifying	190
3. Installation Functions	191
4. Reliability	197
5. Convenience Functions & Controls	198
6. Special Function & Kit	206

### VI . Test Run Check

1. Check Before Test Run	210
2. Test Run Flow Chart	211
3. Test Running	214

### VII . Trouble Shooting Guide

1. The phenomena from main component failure	220
2. Outdoor Unit EEV	221
3. Pressure Sensor	224
4. Reverse Valve	225
5. Temperature Sensor	225
6. Compressor	226
7. Outdoor Fan & Fan Motor	227
8. Compressor Specification	228
9. Phase Bridge Diode Checking Method	229
10. Inverter IPM Checking Method	230

### VIII . Checking Method for Key Components

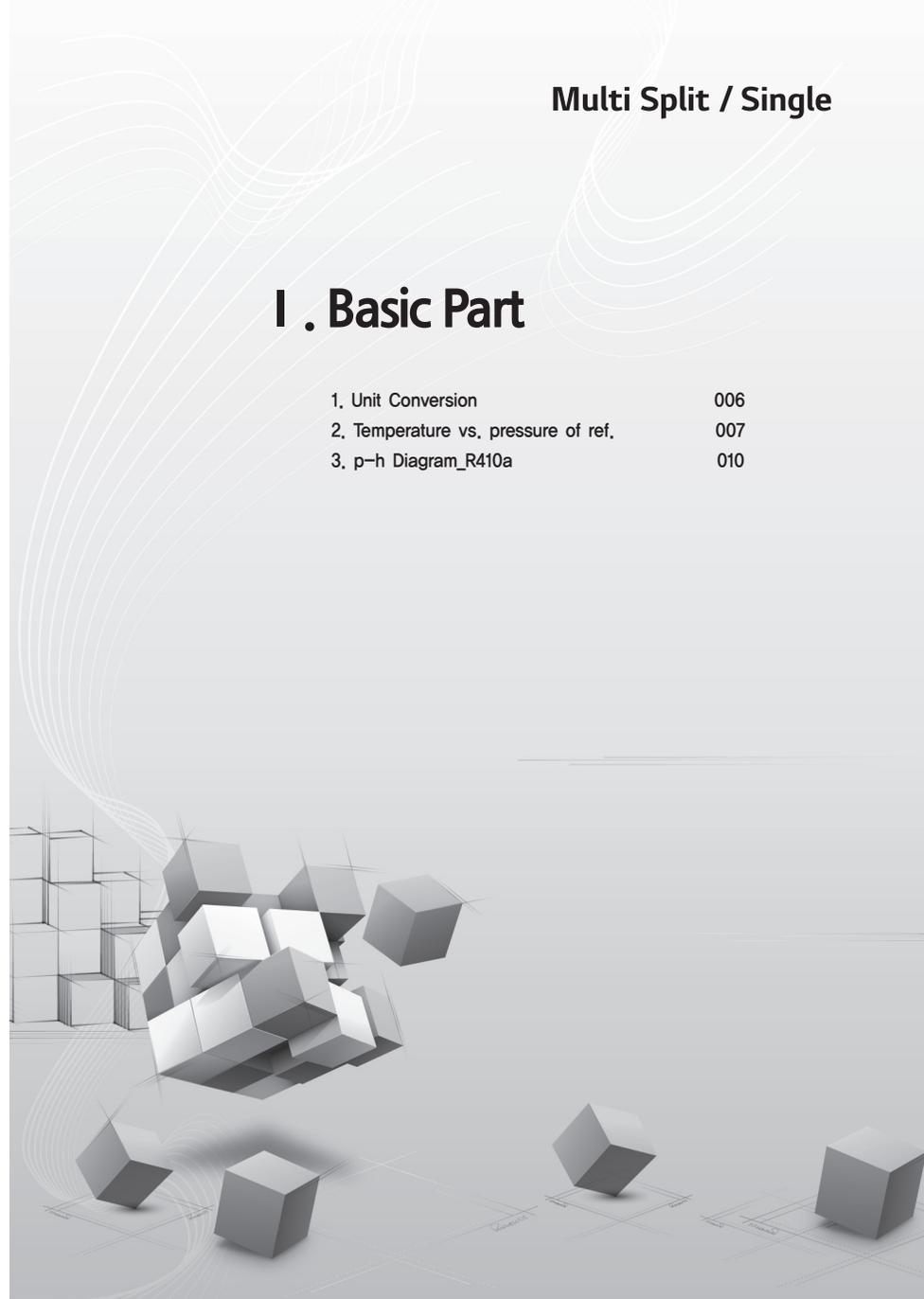
1. Process of replacing the compressor	232
2. Compressor	233
3. EEV	234
4. Reverse Valve	235
5. Temperature Sensor	236
6. Pressure Sensor	236

### IX . PCB On-boarding

1. How to On-boarding for 7kW	238
-------------------------------	-----

# I . Basic Part

1. Unit Conversion	006
2. Temperature vs. pressure of ref.	007
3. p-h Diagram_R410a	010



## 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 <sup>2</sup>	bar	Pa	atm	lbf/in <sup>2</sup> (psi)
kgf/cm <sup>2</sup>	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 <sup>2</sup> (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 = Gauge pressure(kPa) + 101,325(kPa)

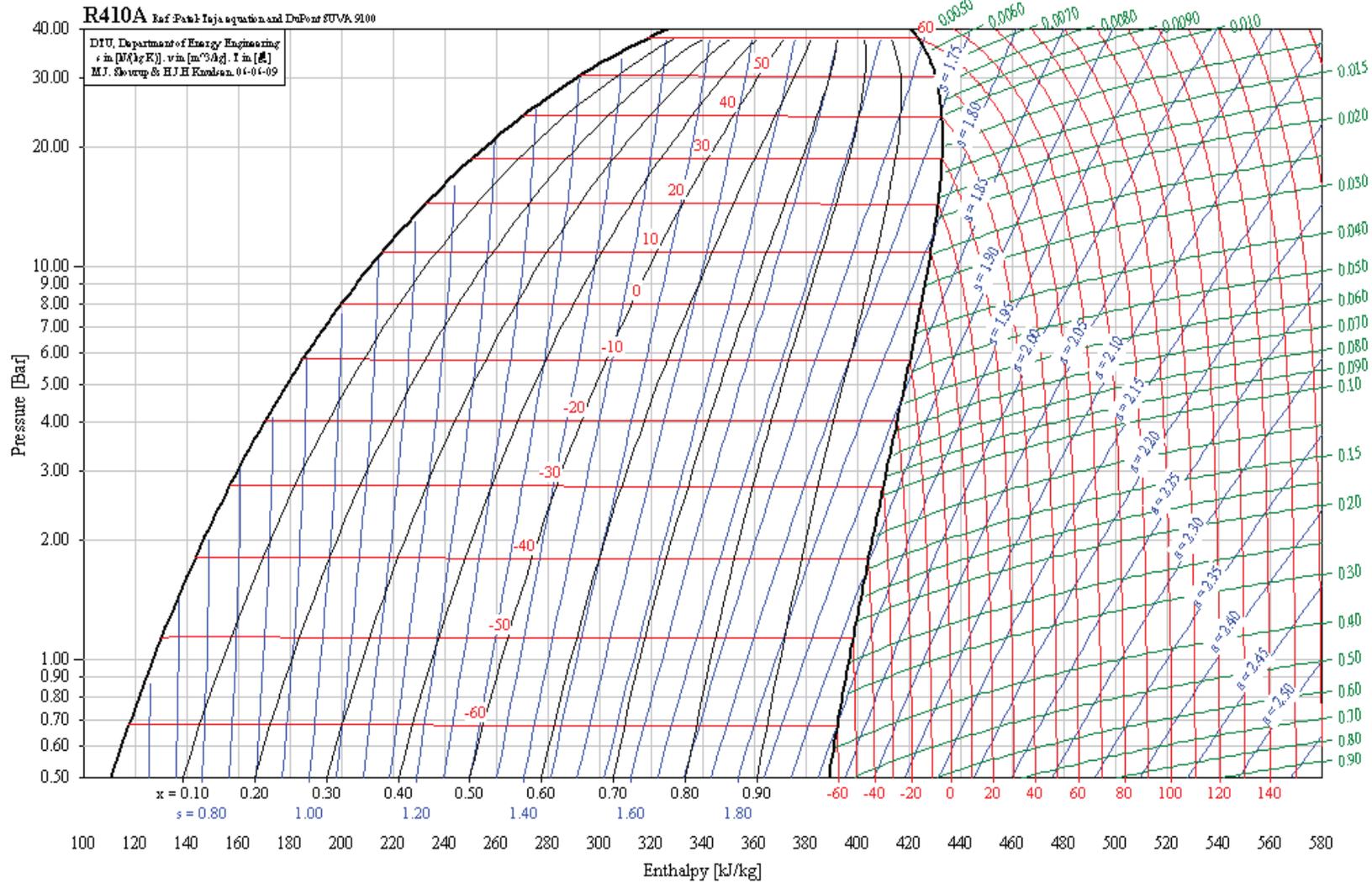
kPa : kgf/cm<sup>2</sup> x 101,97

R-410A					
Temp.	Relative pressure(kPaG)		Relative pressure kPaG	Temp.(°C)	
	Saturated Liquid	Saturated Gas		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

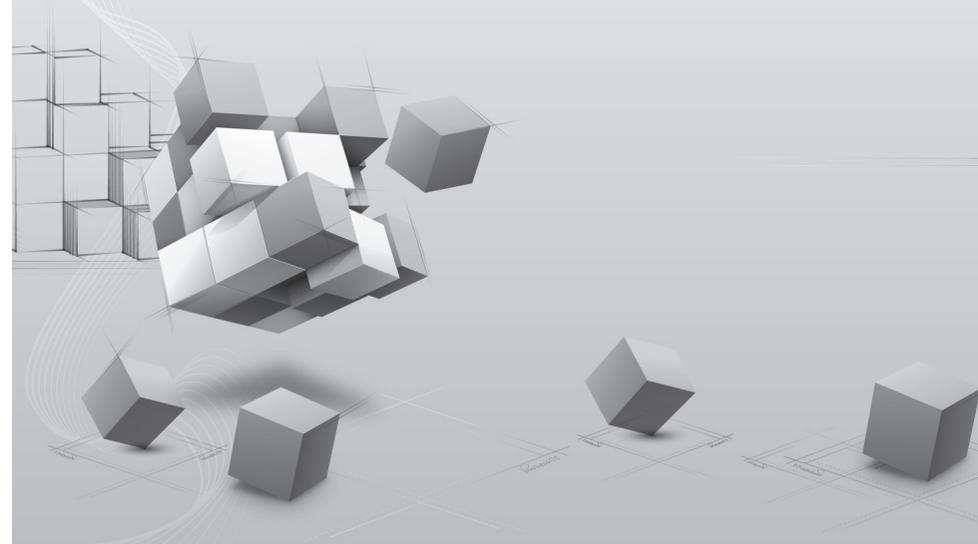
R-134A		
Temp.	Pressure	
°C	kPa	kgf/cm <sup>2</sup>
-25	5,58	0,06
-20	31,92	0,33
-15	63,12	0,64
-10	99,79	1,02
-5	142,54	1,45
0	192,00	1,96
5	248,85	2,54
10	313,79	3,20
15	387,53	3,95
20	470,81	4,80
25	564,42	5,76
30	669,11	6,82
35	785,74	8,01
40	915,13	9,33
50	1261,00	12,40
60	1579,24	16,10
70	2013,87	20,54

### 3. p-h Diagram R-410a



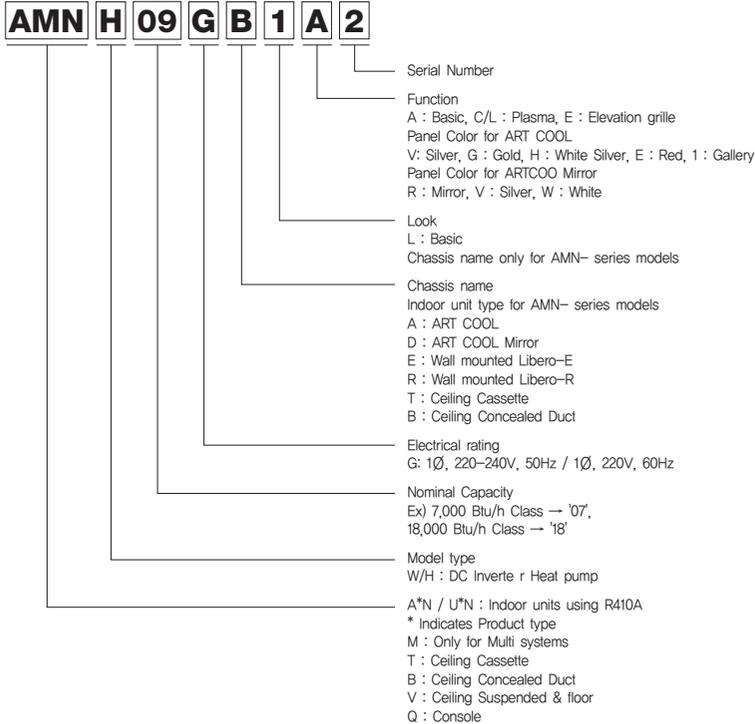
## II . Multi & Single Overview

1. Nomenclature	014
2. Model Line up	020
3. Piping Diagram	028
4. Wiring diagrams & Outdoor PCB	038
5. Indoor Unit PCB	053
6. Exploded View	066
7. LGMV Guideline	081

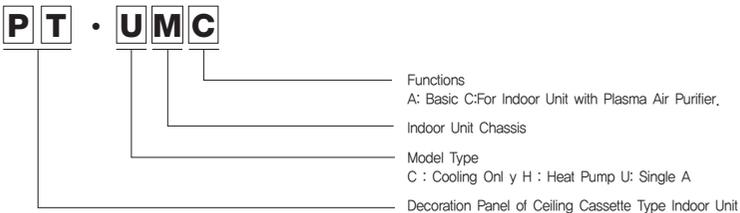


# 1. Nomenclature

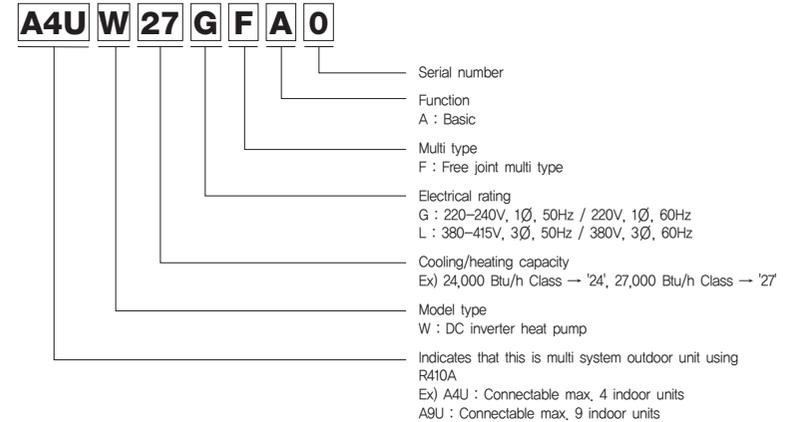
## 1.1 Indoor Units (Global)



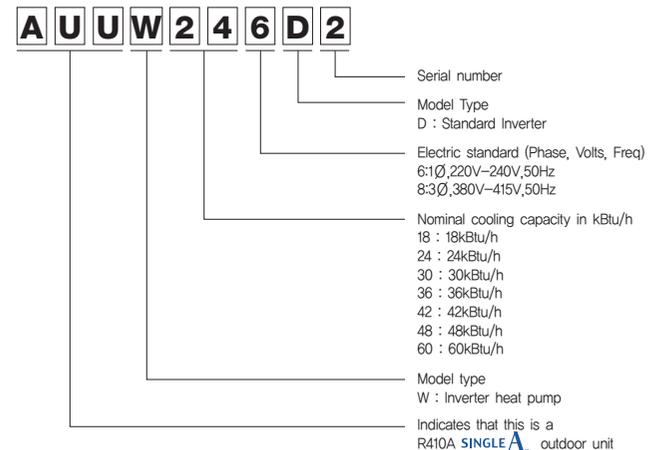
## 1.2 Decoration panel (For ceiling cassette models)



## 1.3 Outdoor Units\_Multi (Global)

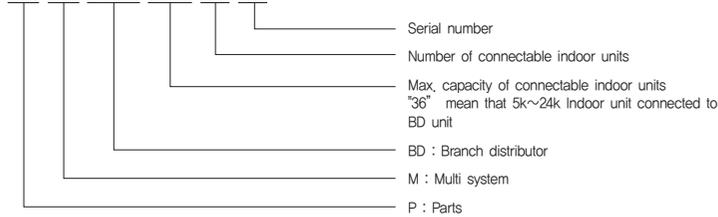


## 1.4 Outdoor Units\_single (Global)



## 1.5 BD Units (Global)

**P M BD 36 2 0**

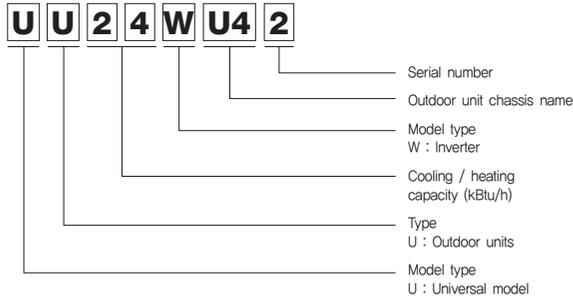


## 1.6 Indoor Units (Europe)

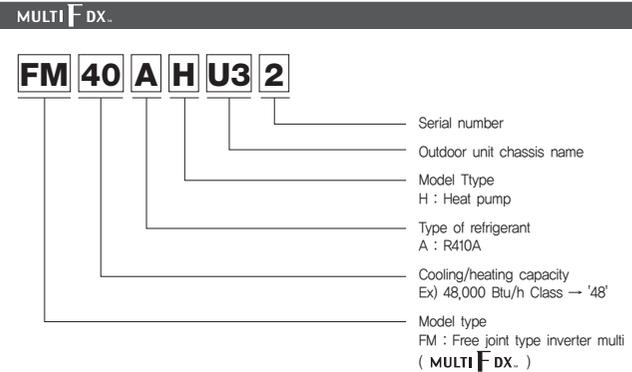
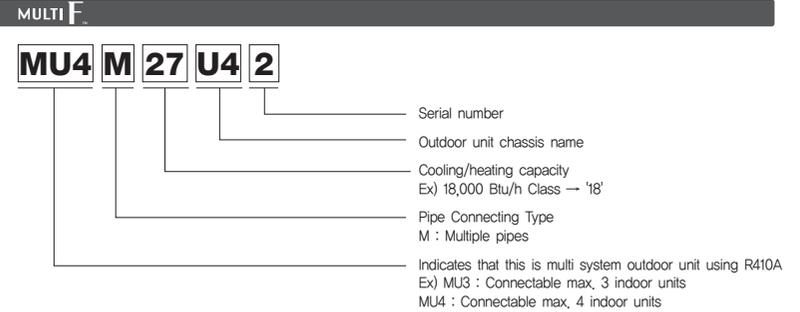
**M B 09 AHL N 2 1**



## 1.7 Outdoor Units\_single (Europe)



## 1.8 Outdoor Units\_Multi (Europe)

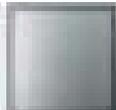


## 2. Model Line up

### 2.1 Indoor Units

Category	Chassis Name	Capacity(Btu/h/kW)										
		1,5 (5)	2,1 (7)	2,5 (9)	3,5 (12)	5,0 (18)	7,1 (24)	8,0 (30)	10,0 (36)	12,5 (42)	14,0 (48)	15,0 (60)
Wall mounted	Libero-R	SB	AMNW07GRBLO [MS07AQ NBO] [MS07AQ NBO]	AMNW09GRBLO [MS09AQ NBO] [MS09AQ NBO]	AMNW12GRBLO [MS12AQ NBO] [MS12AQ NBO]		AMNW18GRBLO [MS18AQ NBO] [MS18AQ NBO]	AMNW24GRBLO [MS24AQ NCO] [MS24AQ NCO]				
		SC				AMNW18GRBLO [MS18AQ NCO] [MS18AQ NCO]	AMNW24GRBLO [MS24AQ NCO] [MS24AQ NCO]					
	Libero-E	SW	AMNW05GEVAD [MS05SQ NVO] [MS05SQ NVO]	AMNW07GEVAD [MS07SQ NVO] [MS07SQ NVO]								
		SB			AMNW09GEBAD [MS09SQ NBO] [MS09SQ NBO]	AMNW12GEBAD [MS12SQ NBO] [MS12SQ NBO]						
ART COOL	SF			AMNH09GAF* [MA09AH* NF1] [MA09AH* NF1]	AMNH12GAF* [MA12AH* NF1] [MA12AH* NF1]							
ART COOL Mirror	SB	AMNW07GDB*0 [MS07AW* NCO] [MS07AW* NCO]	AMNW09GDB*0 [MS09AW* NCO] [MS09AW* NCO]	AMNW12GDB*0 [MS12AW* NCO] [MS12AW* NCO]								
	SC				AMNW18GDB*0 [MS18AW* NCO] [MS18AW* NCO]	AMNW24GDB*0 [MS24AW* NCO] [MS24AW* NCO]						
Ceiling Cassette	1-Way	TU	AMNH09GTU [MT09AH NU1] [MT09AH NU1]	AMNH12GTU [MT12AH NU1] [MT12AH NU1]								
		TR	AMNH09GTR [MT09AH NR0] [MT09AH NR0]	AMNH12GTR [MT12AH NR0] [MT12AH NR0]	ATNH09GLE2 [CT09 NR2] [CT09 NR2]	ATNH12GLE2 [CT12 NR2] [CT12 NR2]						
	4-Way	TQ					ATNH09GLE2 [CT09 NR2] [CT09 NR2]	ATNH12GLE2 [CT12 NR2] [CT12 NR2]				
		TP						ATNH09GLE2 [CT09 NR2] [CT09 NR2]	ATNH12GLE2 [CT12 NR2] [CT12 NR2]			
		TN							ATNH09GLE2 [CT09 NR2] [CT09 NR2]			
		TM								ATNH09GLE2 [CT09 NR2] [CT09 NR2]		
Ceiling Con-cealed Duct	High Static Pressure	BH				ABNH09GLA2 [CB18 NH2] [CB18 NH2]	ABNH12GLA2 [CB24 NH2] [CB24 NH2]					
		BG					ABNH09GLA2 [CB18 NH2] [CB18 NH2]	ABNH12GLA2 [CB24 NH2] [CB24 NH2]				
	Low Static Pressure (Slim)	BR						ABNH09GLA2 [CB18 NH2] [CB18 NH2]	ABNH12GLA2 [CB24 NH2] [CB24 NH2]	ABNH18GLA2 [CB36 NH2] [CB36 NH2]	ABNH24GLA2 [CB48 NH2] [CB48 NH2]	
		B1	AMNH09GBA2 [MB09AH N3] [MB09AH N3]	AMNH12GBA2 [MB12AH N3] [MB12AH N3]								
		B2	AMNH09GBA2 [MB09AH N3] [MB09AH N3]	AMNH12GBA2 [MB12AH N3] [MB12AH N3]								
		L1		ABNH09GLA2 [CB18 NH2] [CB18 NH2]	ABNH12GLA2 [CB24 NH2] [CB24 NH2]	ABNH18GLA2 [CB36 NH2] [CB36 NH2]	ABNH24GLA2 [CB48 NH2] [CB48 NH2]					
L2			ABNH09GLA2 [CB18 NH2] [CB18 NH2]	ABNH12GLA2 [CB24 NH2] [CB24 NH2]	ABNH18GLA2 [CB36 NH2] [CB36 NH2]	ABNH24GLA2 [CB48 NH2] [CB48 NH2]						
L3				ABNH09GLA2 [CB18 NH2] [CB18 NH2]	ABNH12GLA2 [CB24 NH2] [CB24 NH2]	ABNH18GLA2 [CB36 NH2] [CB36 NH2]	ABNH24GLA2 [CB48 NH2] [CB48 NH2]					
Ceiling & Floor	VE	AMNH09GELA2 [CV09 NE2] [CV12 NE2]	AMNH12GELA2 [CV12 NE2] [CV12 NE2]									
Ceiling Suspended	VJ			UMNH09GLA2 [CV18 NL2] [CV18 NL2]	UMNH12GLA2 [CV24 NL2] [CV24 NL2]	UMNH18GLA2 [CV36 NL2] [CV36 NL2]	UMNH24GLA2 [CV48 NL2] [CV48 NL2]					
	VK					UMNH09GLA2 [CV18 NL2] [CV18 NL2]	UMNH12GLA2 [CV24 NL2] [CV24 NL2]	UMNH18GLA2 [CV36 NL2] [CV36 NL2]	UMNH24GLA2 [CV48 NL2] [CV48 NL2]			
	VL							UMNH09GLA2 [CV18 NL2] [CV18 NL2]	UMNH12GLA2 [CV24 NL2] [CV24 NL2]	UMNH18GLA2 [CV36 NL2] [CV36 NL2]		
Console	QA	AQNH09GALAO [CQ09 NA0] [CQ12 NA0]	AQNH12GALAO [CQ12 NA0] [CQ12 NA0]	AQNH18GALAO [CQ18 NA0] [CQ18 NA0]								
Floor Standing	PT2								APNH09GLAO [UP18 NT2] [UP18 NT2]			

- \* Notes :
- Refer the Combination Table of Product Data Book for Outdoor Units.
    - : connectable with Multi type outdoor units.
    - : connectable with Single CAC outdoor units..
  - \* indicates color of panel.
    - ART COOL : Silver(V), Gold(G), White Silver(H), Red(E), Gallery(1)
    - ART COOL Mirror : Mirror(R), Silver(V), White(W)

<p>• Wall Mounted(LIBERO-R)</p> <p>AMNW07GRBLO [MS07AQ NBO] AMNW09GRBLO [MS09AQ NBO] AMNW12GRBLO [MS12AQ NBO] AMNW18GRBLO [MS18AQ NCO] AMNW24GRBLO [MS24AQ NCO]</p> 	<p>• Ceiling Concealed Duct – High static pressure</p> <p>ABNH18GLA2 [CB18 NH2] ABNH24GLA2 [CB24 NH2] ABNH36GLA2 [CB36 NH2] ABNH42GLA2 [CB42 NR2] ABNH48GLA2 [CB48 NR2] ABNH60GLA2 [CB60 NR2]</p> 
<p>• Wall Mounted(LIBERO-E)</p> <p>AMNW05GEVAD [MS05SQ NVO] AMNW07GEVAD [MS07SQ NVO] AMNW09GEBAD [MS09SQ NBO] AMNW12GEBAD [MS12SQ NBO] AMNW18GEBAD [MS18SQ NCO] AMNW24GEBAD [MS24SQ NCO]</p> 	<p>• Ceiling Concealed Duct – Low static pressure</p> <p>AMNH09GBA2 [MB09AH N13] AMNH12GBA2 [MB12AH N13] AMNH18GBA2 [MB18AH N23] AMNH24GBA2 [MB24AH N23]</p>  <p>ABNH09GLA2 [CB09L N12] ABNH12GLA2 [CB12L N22] ABNH18GLA2 [CB18L N22] ABNH24GLA2 [CB24L N32]</p> 
<p>• ART COOL</p> <p>AMNH09GAF*1 [MA09AH* NF1] AMNH12GAF*1 [MA12AH* NF1]</p> 	<p>• Ceiling &amp; Floor</p> <p>AVNH09GELA2 [CV09 NE2] AVNH12GELA2 [CV12 NE2]</p> 
<p>• Ceiling Cassette 1-way</p> <p>AMNH09GTUCO [MT09AH NU1] AMNH12GTUCO [MT12AH NU1]</p> 	<p>• Ceiling Suspended</p> <p>UVNH18GLA2 [CV18 NL2] UVNH24GLA2 [CV24 NL2] UVNH30GLA2 [UV30 NL2] UVNH36GLA2 [UV36 NK2] UVNH42GLA2 [UV42 NL2] UVNH48GLA2 [UV48 NL2] UVNH60GLA2 [UV60 NL2]</p> 
<p>• Ceiling Cassette 4-way</p> <p>AMNH09GTU [MT09AH NR0] AMNH12GTU [MT12AH NR0] ATNH09GLE2 [CT09 NR2] ATNH12GLE2 [CT12 NR2] ATNH18GLE2 [CT18 NR2] ATNH24GLE2 [CT24 NR2] ATNH30GLE2 [CT30 NR2] ATNH36GLE2 [CT36 NN2] ATNH42GLE2 [CT42 NR2] ATNH48GLE2 [CT48 NR2] ATNH60GLE2 [CT60 NN2]</p> 	<p>• Console</p> <p>AQNH09GALAO [CQ09 NA0] AQNH12GALAO [CQ12 NA0] AQNH18GALAO [CQ18 NA0]</p> 
<p>• ART COOL Mirror</p> <p>AMNW07GDB*0 [MS07AW* NBO] AMNW09GDB*0 [MS09AW* NBO] AMNW12GDB*0 [MS12AW* NBO] AMNW18GDB*0 [MS18AW* NCO] AMNW24GDB*0 [MS24AW* NCO]</p> 	<p>• Floor Standing</p> <p>APNH48GTLAO [UP48 NT2]</p> 

## 2.2 Outdoor Units

### DC Inverter SINGLE A (1Ø)

DC Inverter	AUW096D [UU09W ULD]	AUW126D [UU12W ULD]	AUW186D2 [UU18W UE2]
No. of connectable indoor units	1		
Total capacity index of connectable indoor units(kW)	2.5	3.5	5.0
Power supply	10, 220 - 240V, 50Hz		



DC Inverter	AUW246D2 [UU24W U42]	AUW306D2 [UU30W U42]	AUW366D2 [UU36W UO2]
No. of connectable indoor units	1		
Total capacity index of connectable indoor units(kW)	7.1	8.0	10.0
Power supply	10, 220 - 240V, 50Hz		



DC Inverter Synchro	AUW426D2 [UU42W U32]	AUW486D2 [UU48W U32]	AUW606D2 [UU60W U32]
No. of connectable indoor units	1 ~ 4		
Total capacity index of connectable indoor units(kW)	12.5	14.0	15.0
Power supply	10, 220 - 240V, 50Hz		



### DC Inverter SINGLE A (3Ø)

DC Inverter	AUW368D2 [UU37W UO2]
No. of connectable indoor units	1
Total capacity index of connectable indoor units(kW)	10.0
Power supply	3Ø, 380 - 415V, 50Hz



DC Inverter	AUW428D2 [UU43W U32]	AUW488D2 [UU49W U32]	AUW608D2 [UU61W U32]
No. of connectable indoor units	1 ~ 4		
Total capacity index of connectable indoor units(kW)	12.5	14.0	15.0
Power supply	3Ø, 380 - 415V, 50Hz		



### MULTI F (1 phase)

Nominal Capacity(kW)	4.1	4.7
Model Name	A2UW14GFA0 [MU2M15 UL2]	A2UW16GFA0 [MU2M17 UL2]
No. of connectable indoor units	Max.2	
Total capacity index of connectable indoor units	kBtu/h	21
		24
Power supply	220-240V, 1Ø, 50Hz	
Chassis		

Nominal Capacity(kW)	5.3	6.2
Model Name	A3UW18GFA0 [MU3M19 UE2]	A3UW21GFA0 [MU3M21 UE2]
No. of connectable indoor units	Max.3	
Total capacity index of connectable indoor units	kBtu/h	30
		33
Power supply	220-240V, 1Ø, 50Hz	
Chassis		

Nominal Capacity(kW)	7.0	7.9	8.8
Model Name	A4UW24GFA0 [MU4M25 U42]	A4UW27GFA0 [MU4M27 U42]	A5UW30GFA0 [MU5M30 U42]
No. of connectable indoor units	Max.4		
Total capacity index of connectable indoor units	kBtu/h	39	41
		48	
Power supply	220-240V, 1Ø, 50Hz		
Chassis			

### MULTI F (1 phase)

Nominal Capacity(kW)	11.7	
Model Name	A5UW40GFA0 [MU5M40 UO2]	
No. of connectable indoor units	Max.5	
Total capacity index of connectable indoor units	kBtu/h	52
Power supply	220-240V, 1Ø, 50Hz	
Chassis		

### MULTI F DX. (1 phase)

Nominal Capacity(kW)	11.7	14.1	16.7
Model Name	A7UW40GFA0 [FM40AH UO2]	A8UW48GFA0 [FM48AH U32]	A9UW56GFA0 [FM56AH U32]
No. of connectable indoor units	Max.7	Max.8	Max.9
Total capacity index of connectable indoor units	kBtu/h	52	63
		73	
Power supply	220-240V, 1Ø, 50Hz		
Chassis			

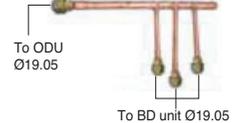
### MULTI F DX. (3 phase)

Nominal Capacity(kW)	13.5	14.1	16.7
Model Name	A7UW42LFA0 [FM41AH U32]	A8UW48LFA0 [FM49AH U32]	A9UW56LFA0 [FM57AH U32]
No. of connectable indoor units	Max.7	Max.8	Max.9
Total capacity index of connectable indoor units	kBtu/h	54	63
		73	
Power supply	380-415V, 3Ø, 50Hz		
Chassis			

## 2.3 BD (Branch distributor) units

No. of connectable indoor units	Max. 2	Max. 3	Max. 4
Model name	PMBD3620	PMBD3630	PMBD3640
Connectable indoor unit capacity   kBTuh	5-24	5-24	5-24
BD unit			

## 2.4 Branches

Branch Type	No. of BD Units	Accessory Model Name	Applicable Model	Specifications	
				Gas	Liquid
Y-Branch	2	PMBL5620	1Ø, 3Ø	 <p>To ODU Ø19.05</p> <p>To BD unit Ø19.05</p> <p>Ø19.05</p>	 <p>To ODU Ø9.52</p> <p>To BD unit Ø9.52</p> <p>Ø9.52</p>
Branch Kit	3	PMBL1203F0	1Ø, 3Ø	 <p>To ODU Ø19.05</p> <p>To BD unit Ø19.05</p>	 <p>To ODU Ø9.52</p> <p>To BD unit Ø9.52</p>

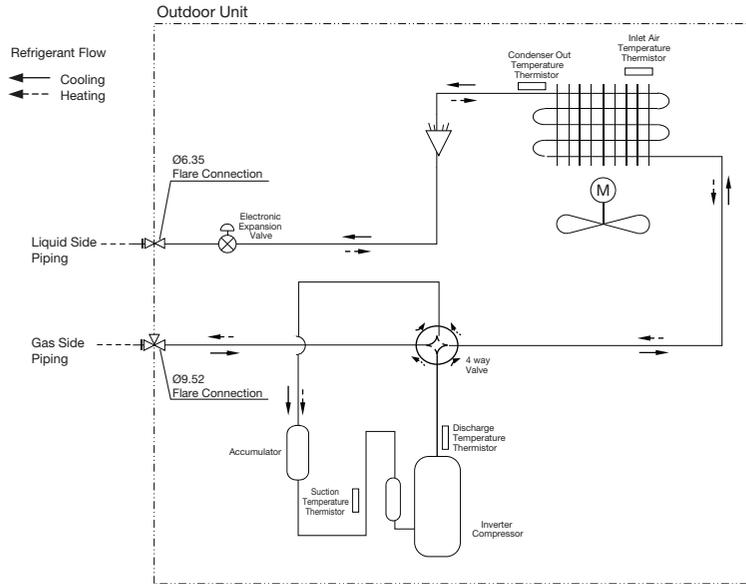
## 2.5 Control systems (standard)

These controllers will be provided with the respective indoor units.

Type	Individual controller	Applicable model
Wired remote controller		Ceiling cassette Ceiling concealed duct
Wireless remote controller		ARTCOOL Ceiling & floor Ceiling Suspended Console Wall Mounted ARTCOOL Mirror
		Floor Standing

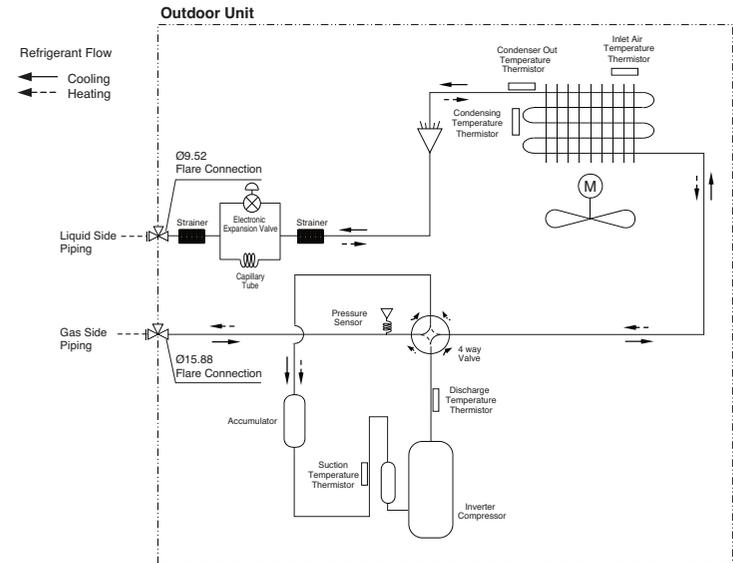
### 3. Piping diagrams

#### 3.1 UU09W / UU12W



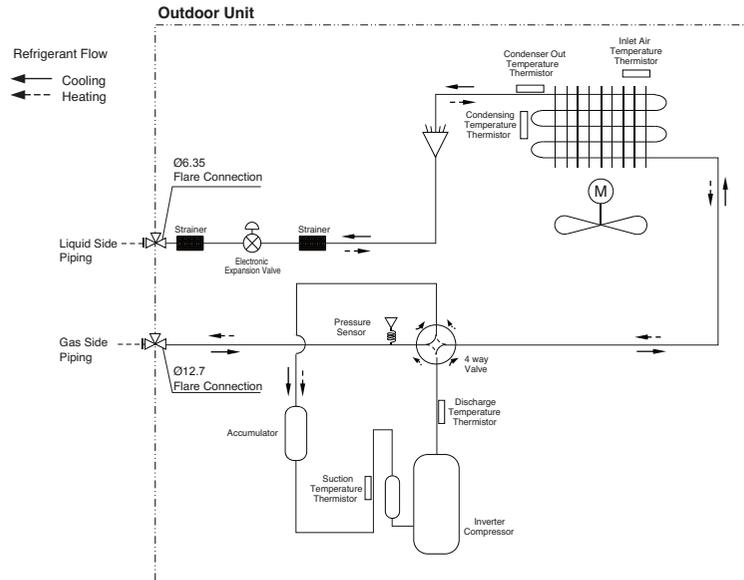
Remarks	Pressure Sensor	Temperature Sensor	Check valve	Solenoid valve
	Pressure Switch	SVC Valve	EEV	Strainer

#### 3.2 UU36W / UU37W



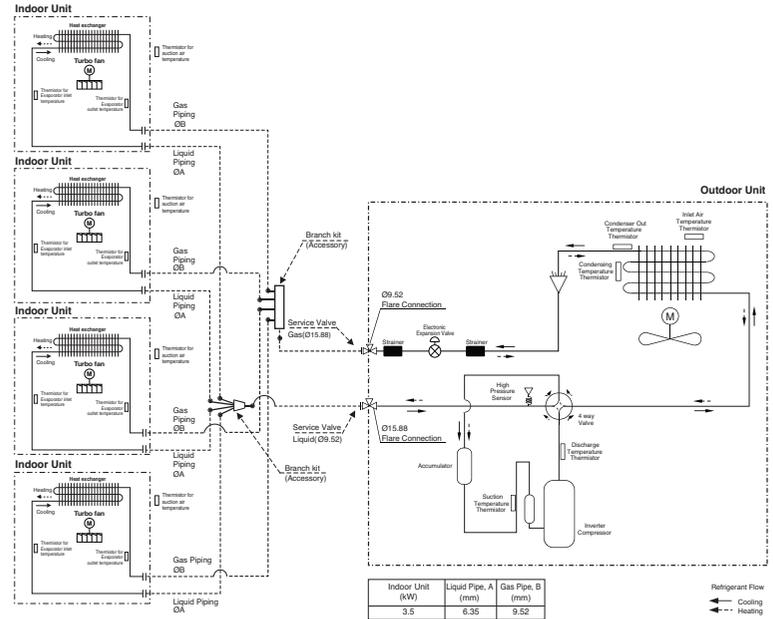
Remarks	Pressure Sensor	Temperature Sensor	Check valve	Solenoid valve
	Pressure Switch	SVC Valve	EEV	Strainer

3.3 UU18W / UU24W / UU30W / UU42W / UU43W / UU48W / UU49W / UU60W / UU61W



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

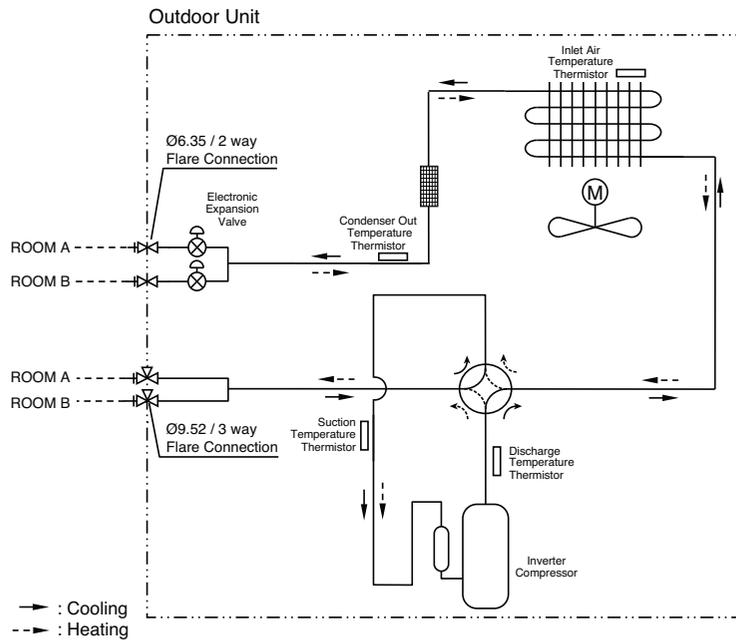
3.4 UU42W / UU43W / UU48W / UU49W / UU60W / UU61W



Note:  
1. The pipes between the indoor units and the branch kits must have same dimensions as indoor unit connections.

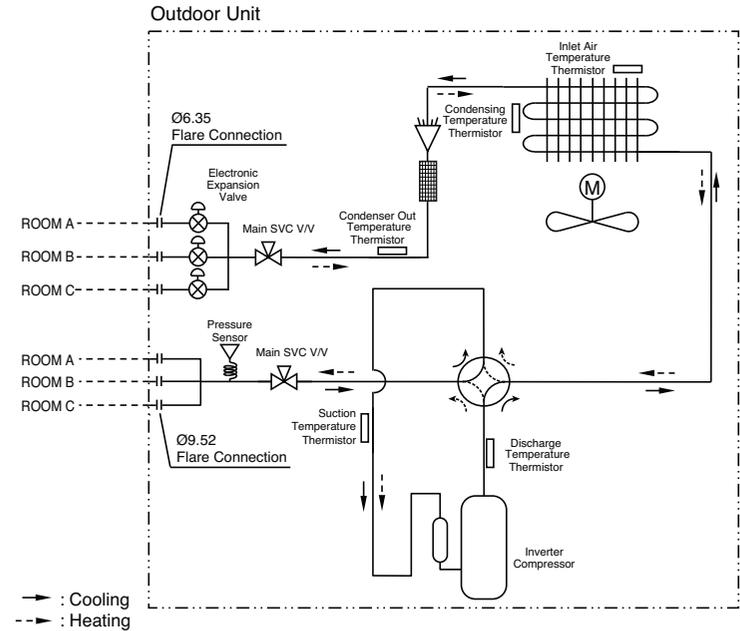
Remarks	Pressure Sensor	Temperature Sensor	Check valve	Solenoid valve
	Pressure Switch	SVC Valve	EEV	Strainer

### 3.5 MU2M15 / MU2M17



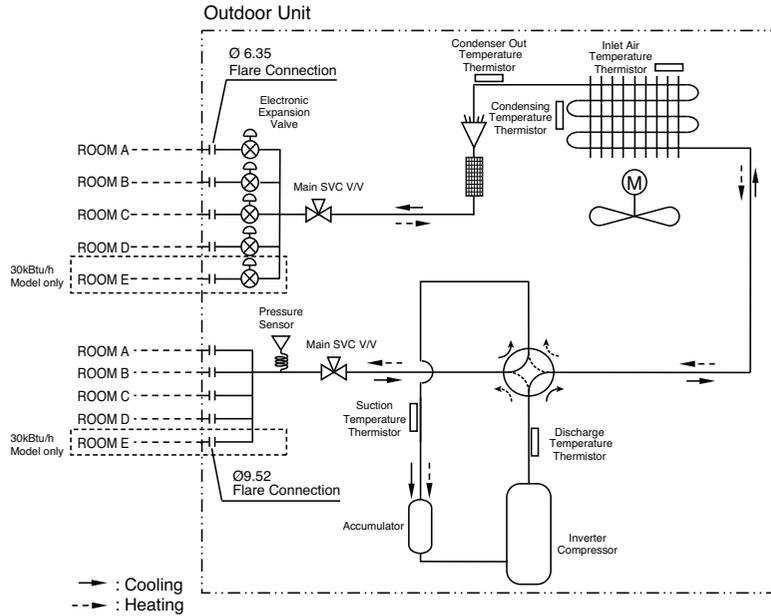
Remarks	Pressure Sensor	Temperature Sensor	Check valve	Solenoid valve
	Pressure Switch	SVC Valve	EEV	Strainer

### 3.6 MU3M19 / MU3M21



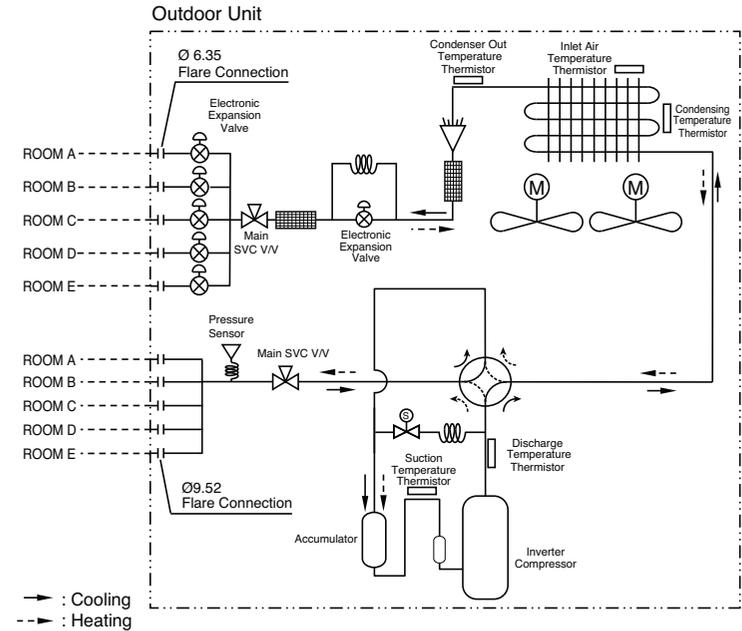
Remarks	Pressure Sensor	Temperature Sensor	Check valve	Solenoid valve
	Pressure Switch	SVC Valve	EEV	Strainer

### 3.7 MU4M25 / MU4M27 / MU5M30



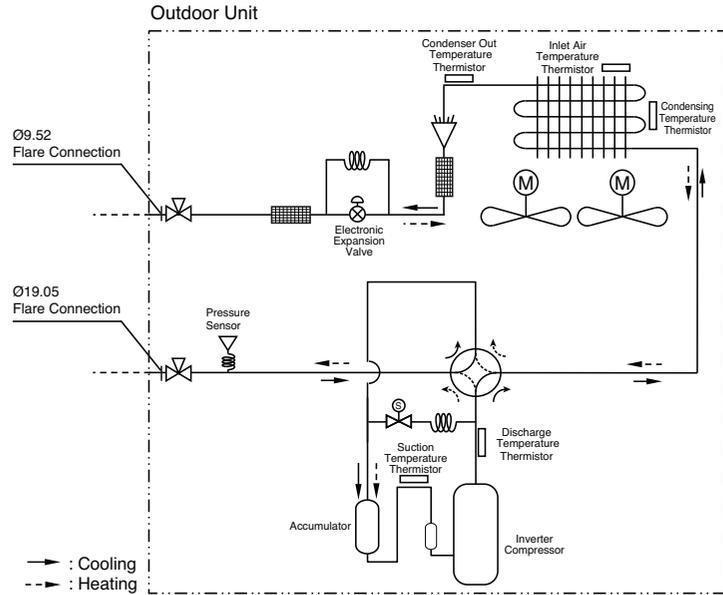
Remarks	Pressure Sensor	Temperature Sensor	Check valve	Solenoid valve
	Pressure Switch	SVC Valve	EEV	Strainer

### 3.8 MU5M40



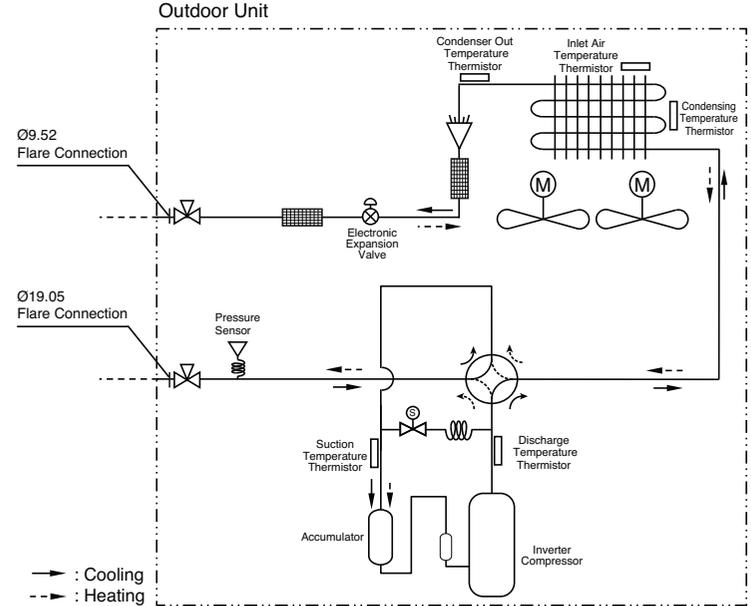
Remarks	Pressure Sensor	Temperature Sensor	Check valve	Solenoid valve
	Pressure Switch	SVC Valve	EEV	Strainer

### 3.9 FM40AH / FM41AH



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

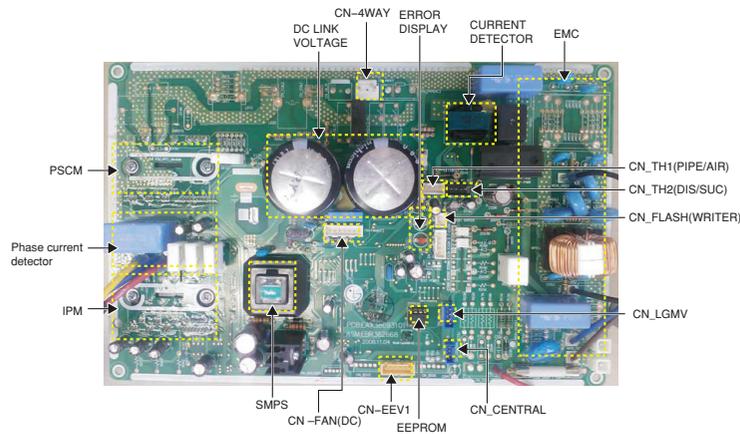
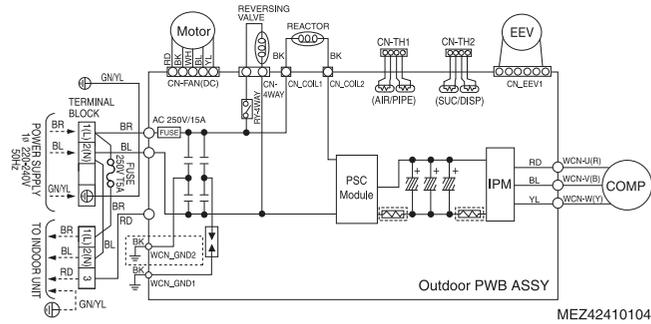
### 3.10 FM48AH / FM49AH / FM56AH / FM57AH



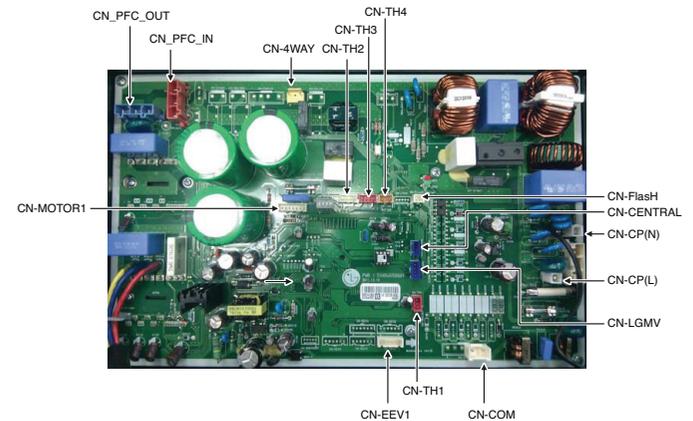
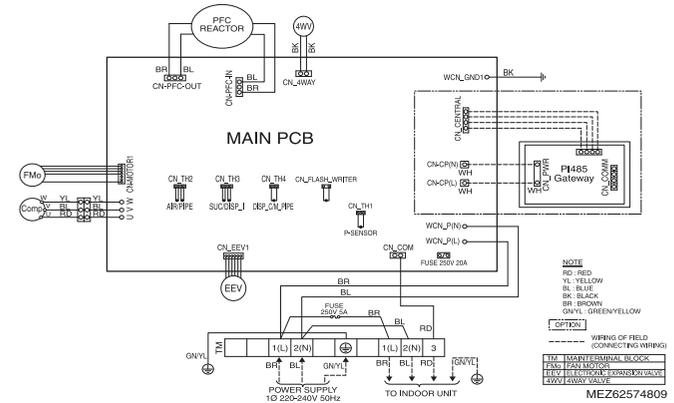
Remarks	Pressure Sensor	Temperature Sensor	Check valve	Solenoid valve
	Pressure Switch	SVC Valve	EEV	Strainer

## 4. Wiring diagrams & Outdoor PCB

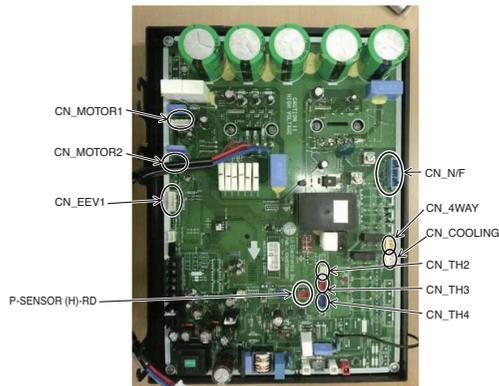
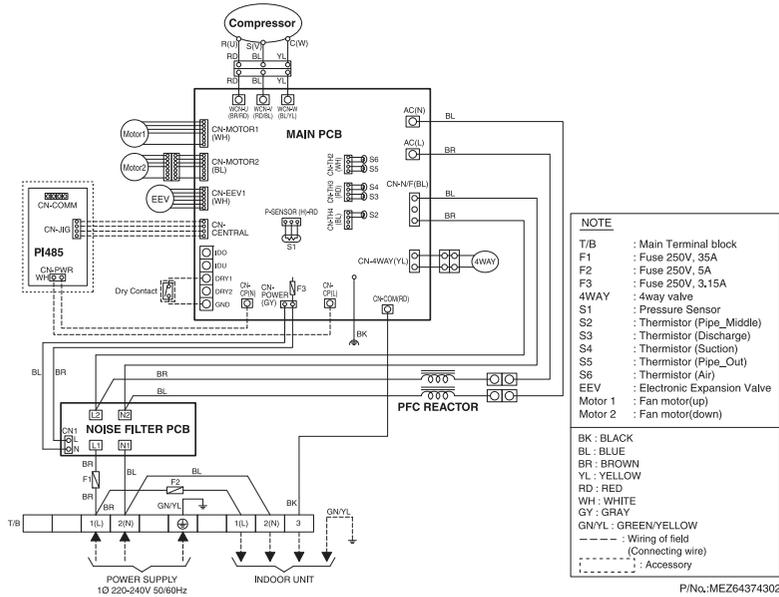
### 4.1 UU09W / UU12W



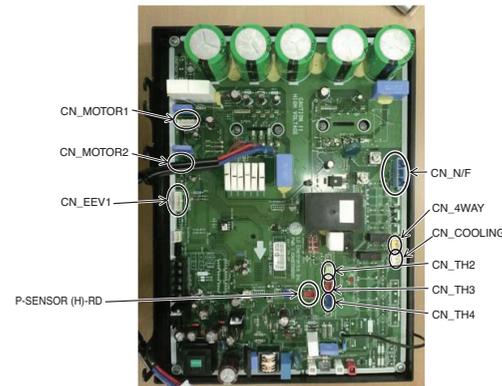
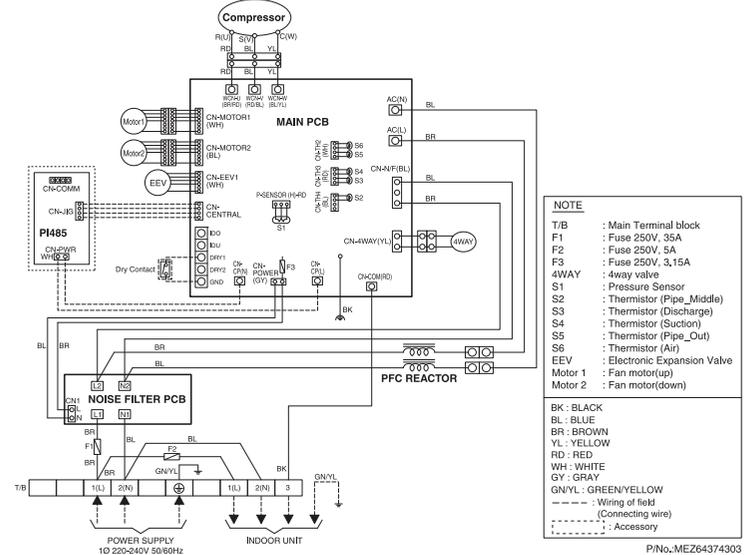
### 4.2 UU18W / UU24W / UU30W



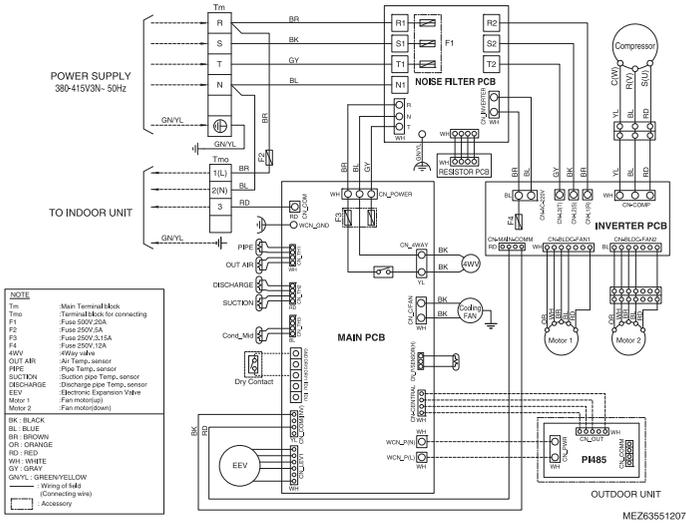
### 4.3 UU36W



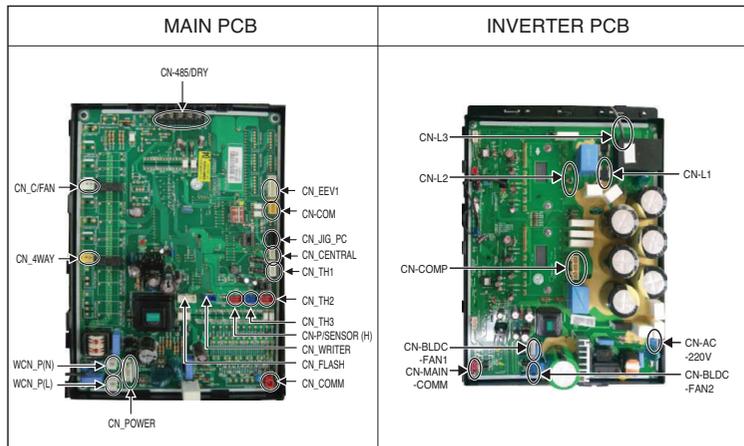
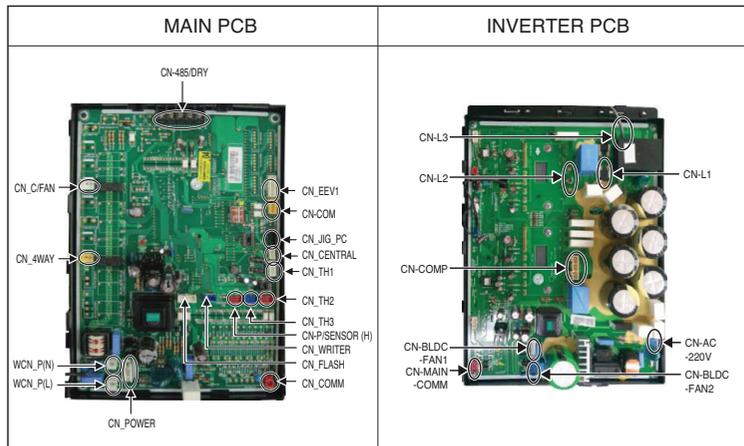
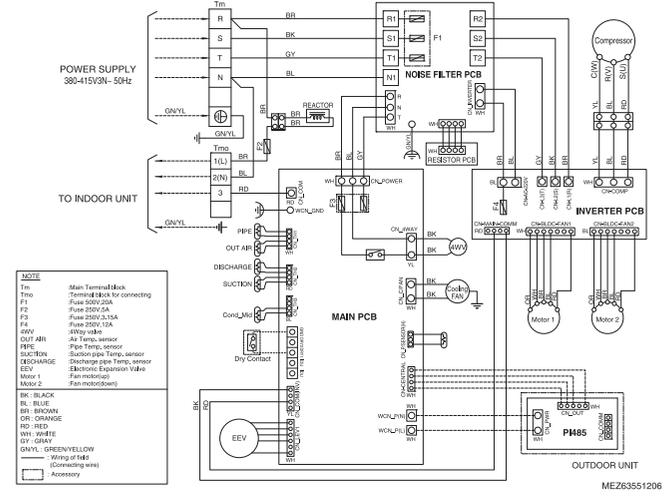
### 4.4 UU42W / UU48W / UU60W



4.5 UU37W

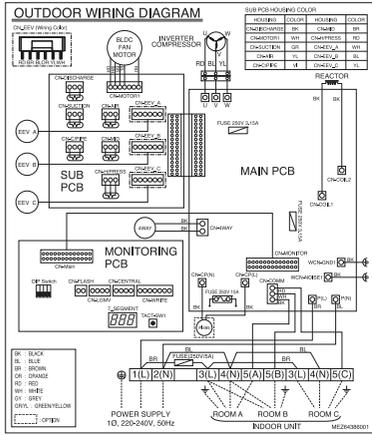


4.6 UU43W / UU49W / UU61W

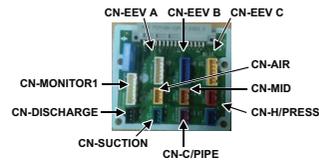




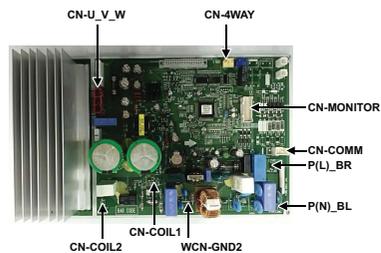
## 4.9 MU3M21



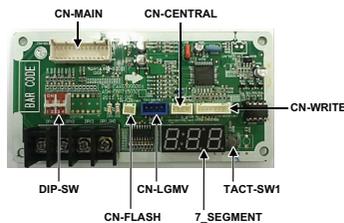
### ► Sub PCB



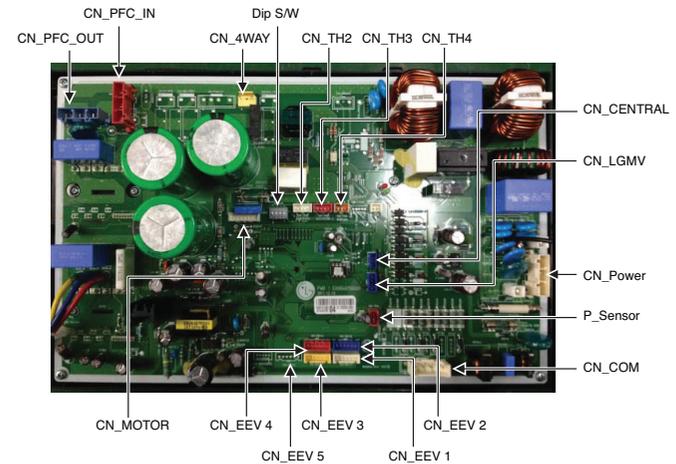
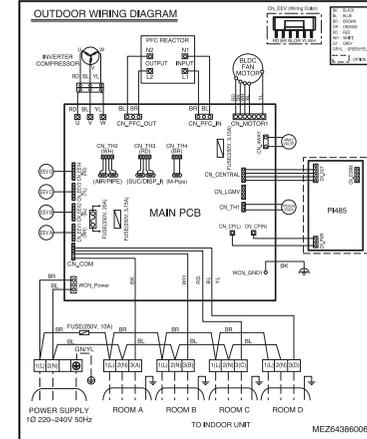
### ► Main PCB



### ► Monitoring PCB



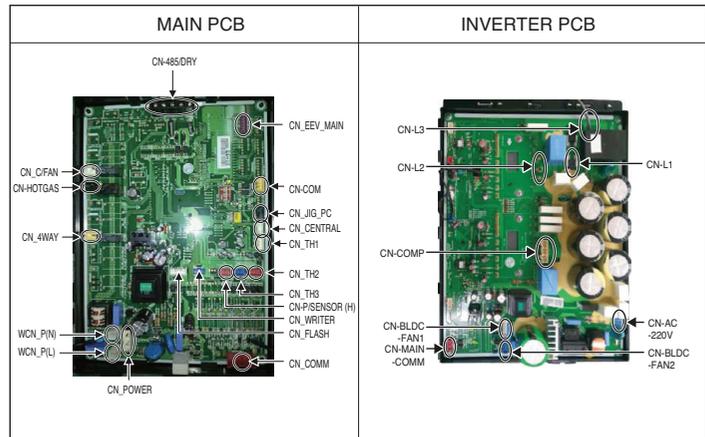
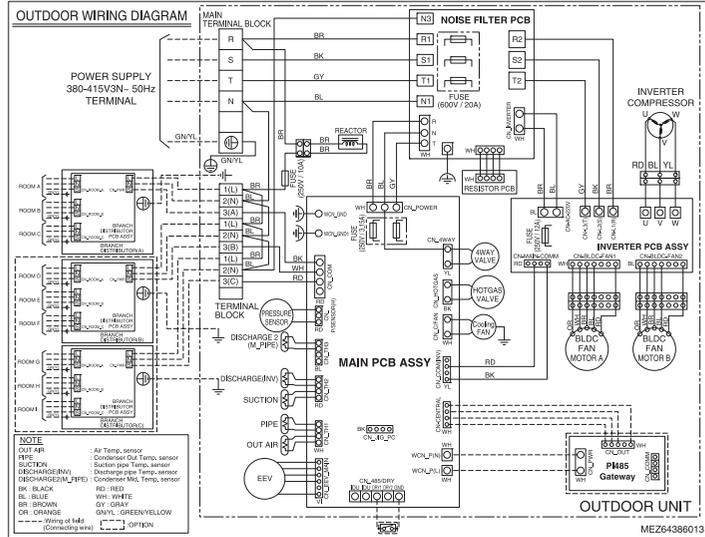
## 4.10 MU4M25 / MU4M27







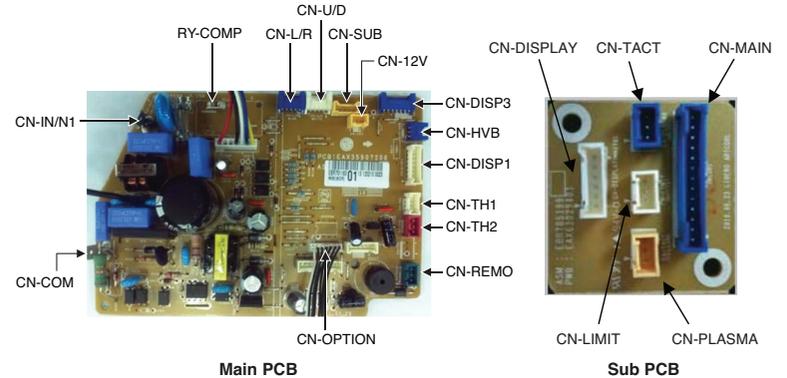
## 4.15 FM41AH / FM49AH / FM56AH



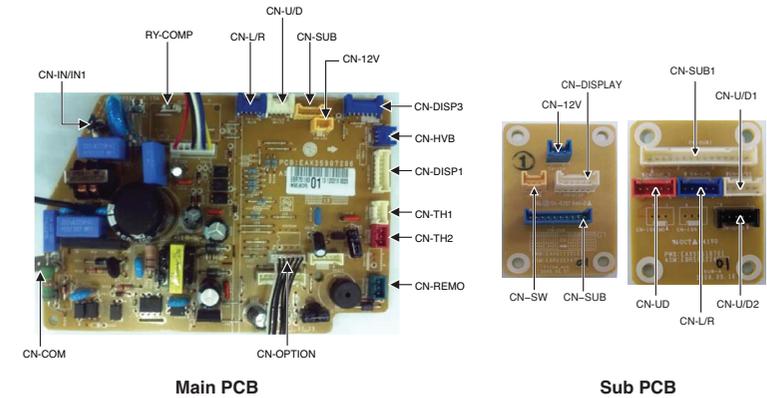
## 5. Indoor PCB

### 5.1 Wall mounted

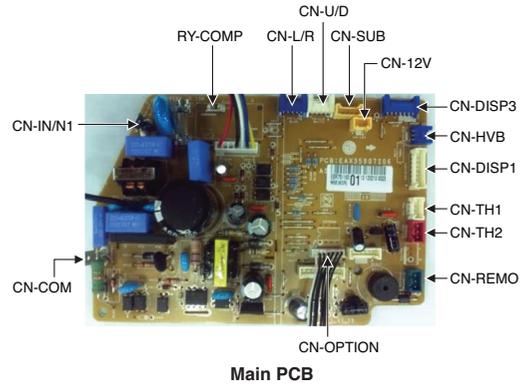
#### 5.1.1 Libero-R (MS07AQ, MS09AQ, MS12AQ)



#### 5.1.2 Libero-R (MS18AQ, MS24AQ)

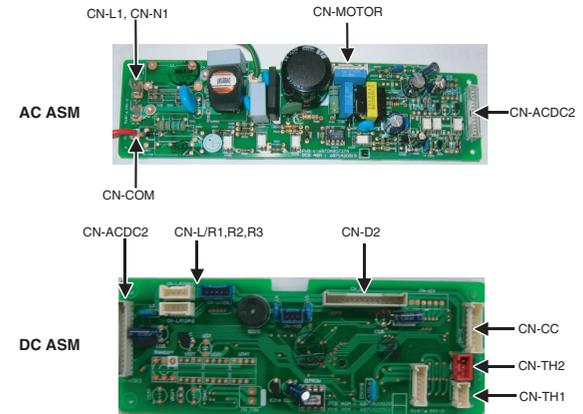


### 5.1.3 Libero-E (MS05SQ, MS07SQ, MS09SQ, MS12SQ, MS18SQ, MS24SQ)



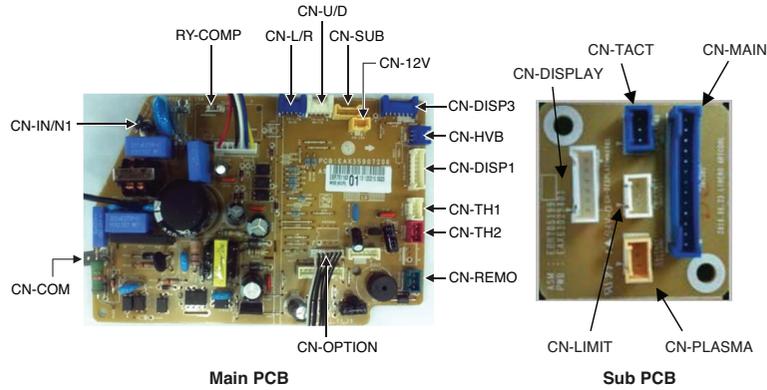
## 5.2 Artcool

### 5.2.1 MA09AH, MA12AH



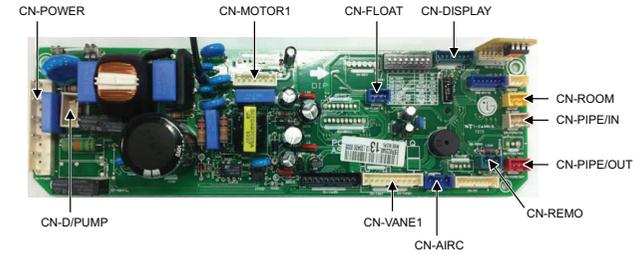
### 5.3 Artcool Mirror

#### 5.3.1 MS07AW, MS07AW, MS12AW, MS18AW, MS24AW

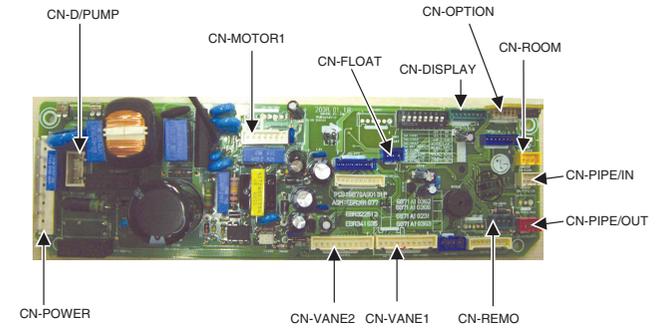


### 5.4 Ceiling Cassette

#### 5.4.1 1-way (MT09AH, MT12AH)

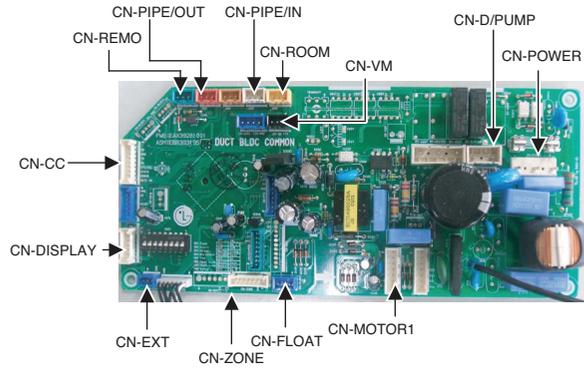


#### 5.4.2 4-way (MT06AH, MT08AH, CT09, CT12, CT18, CT24, UT30, UT36, UT42, UT48, UT60)

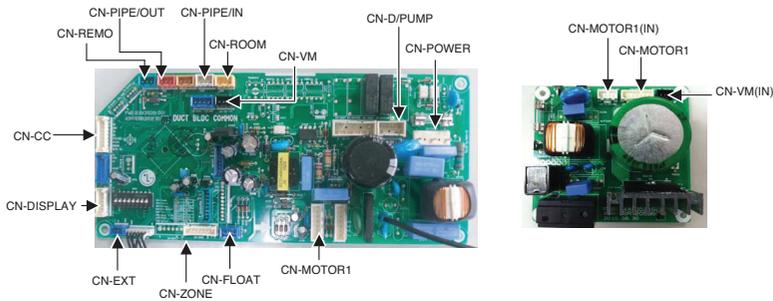


## 5.5 Ceiling Concealed duct

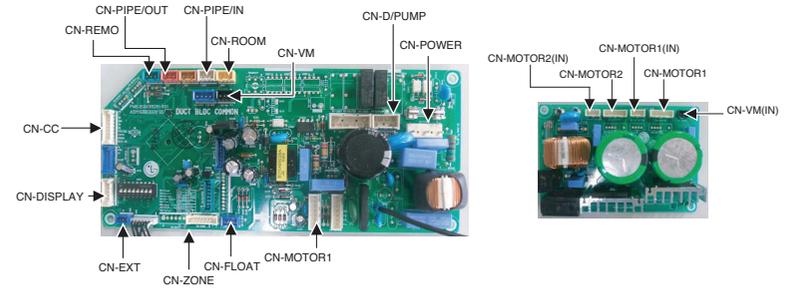
### 5.5.1 High static pressure (CB18, CB24, UB30)



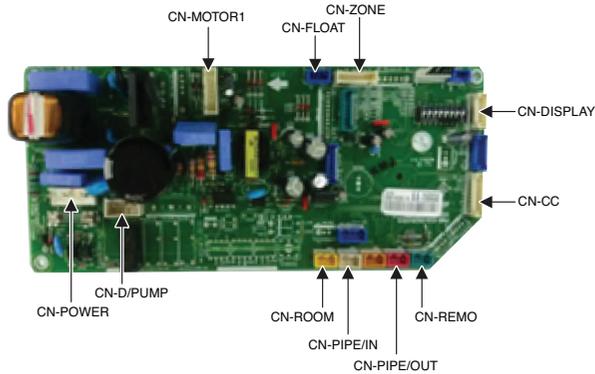
### 5.5.2 High static pressure (UB36)



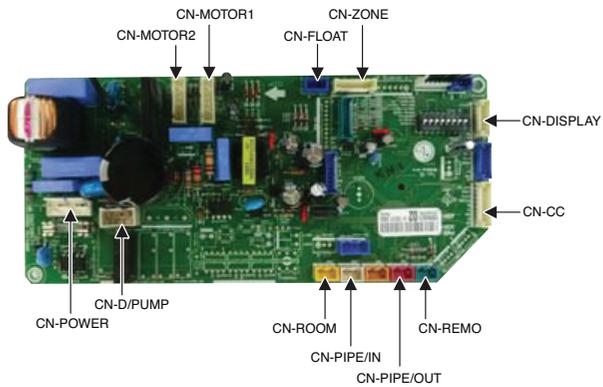
### 5.5.3 High static pressure (UB42, UB48, UB60)



### 5.5.4 Low static pressure (CB09L, CB12L)

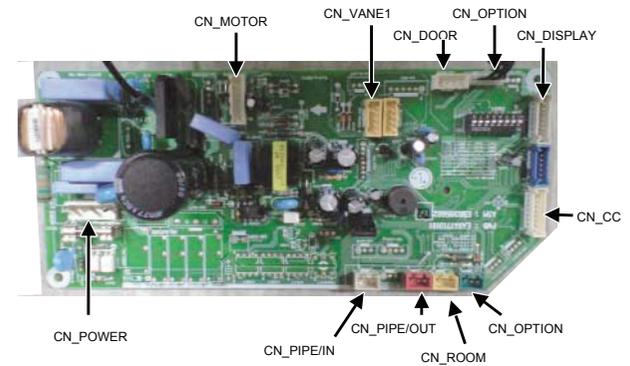


### 5.5.5 Low static pressure (CB18L, CB24L)



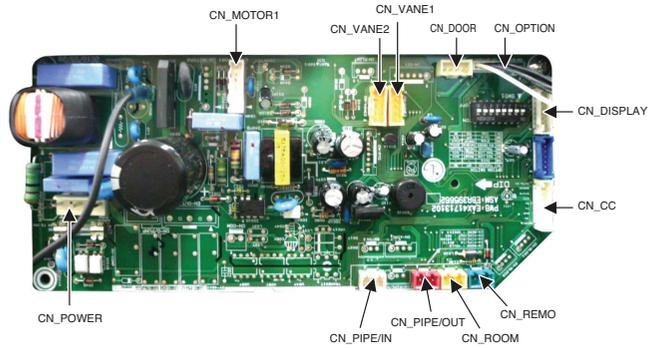
### 5.6 Ceiling & Floor

#### 5.6.1 CV09, CV12

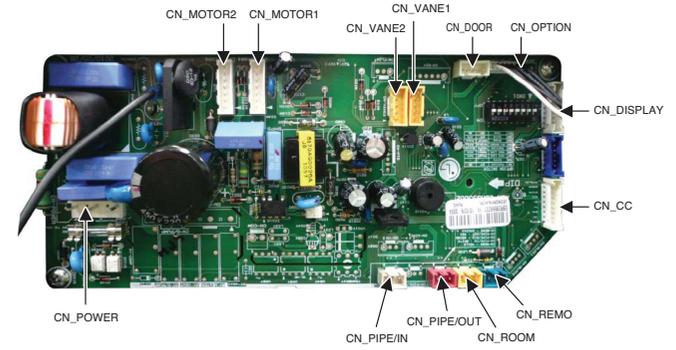


## 5.7 Ceiling Suspended

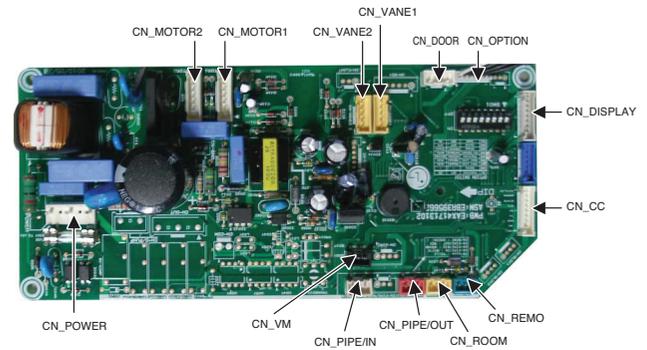
### 5.7.1 CV18, CV24, UV30



### 5.7.2 UV36

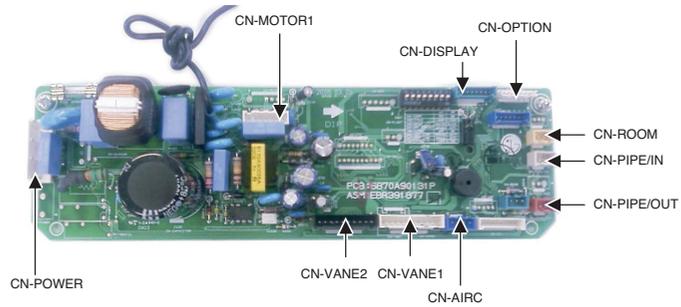


### 5.7.3 UV42, UV48, UV60



## 5.8 Console

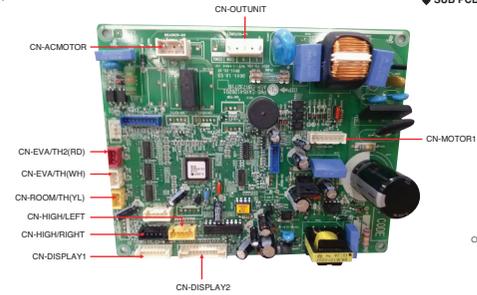
### 5.8.1 CQ09, CQ12, CQ18



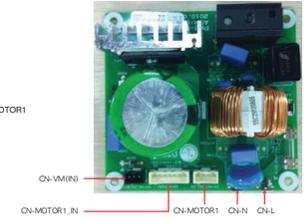
## 5.9 Floor standing

### 5.9.1 UP48

#### ◆ AC PCB



#### ◆ SUB PCB

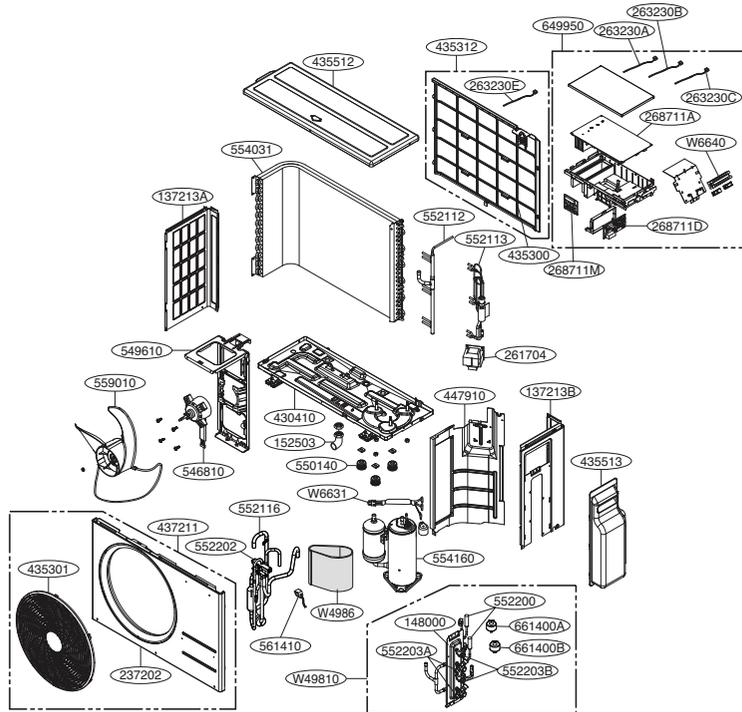


#### ◆ DISPLAY PCB



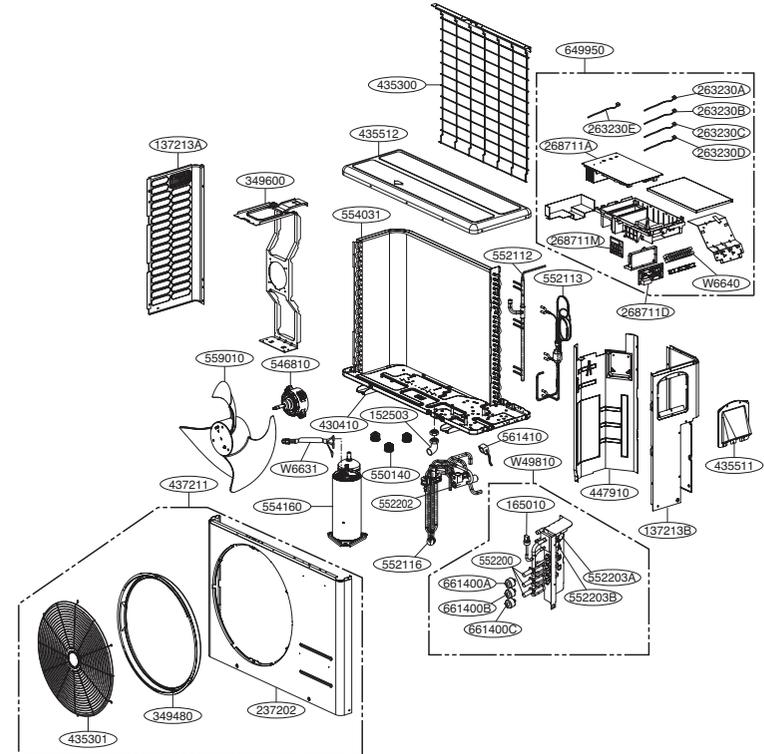
## 6. Exploded View

### 6.1 MU2M15 / MU2M17



Location No.	Description	Sensor Information	Housing Color
263230A	Thermistor1 (CN-DISCHARGE)	Discharge Pipe	Black
263230B	Thermistor2 (CN-SUCTION)	Suction Pipe	Green
263230C	Thermistor3 (CN-C/PIPE)	Cond-Out Pipe	Violet
263230E	Thermistor4 (CN-AIR)	Air	Yellow

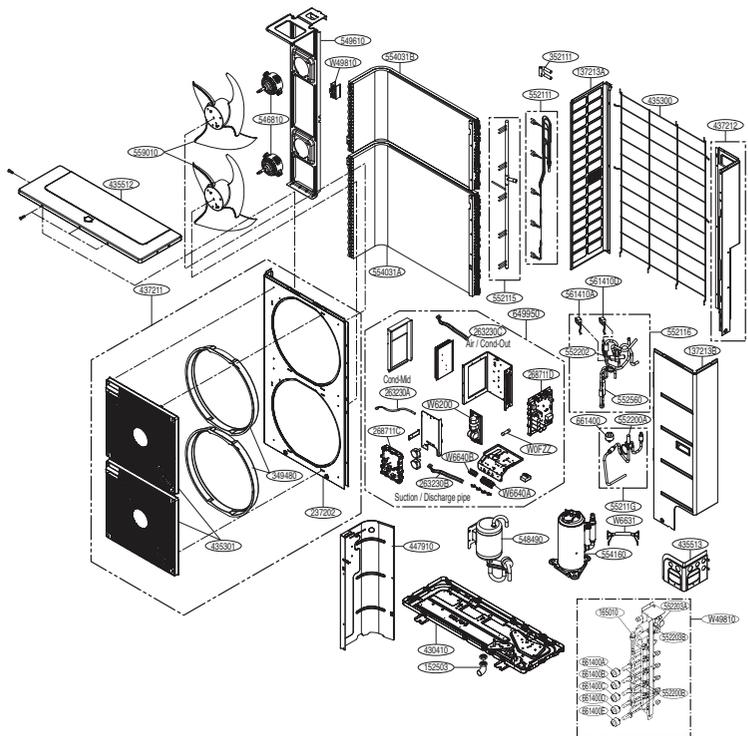
### 6.2 MU3M19 / MU3M21



Location No.	Description	Sensor Information	Housing Color
263230A	Thermistor1 (CN-DISCHARGE)	Discharge Pipe	Black
263230B	Thermistor2 (CN-SUCTION)	Suction Pipe	Green
263230C	Thermistor3 (CN-C/PIPE)	Cond Out Pipe	Violet
263230D	Thermistor4 (CN-MID)	Cond Middle Pipe	Brown
263230E	Thermistor5 (CN-Air)	Air	Yellow
165010	CN-H/PRESS	Pressure sensor	Red

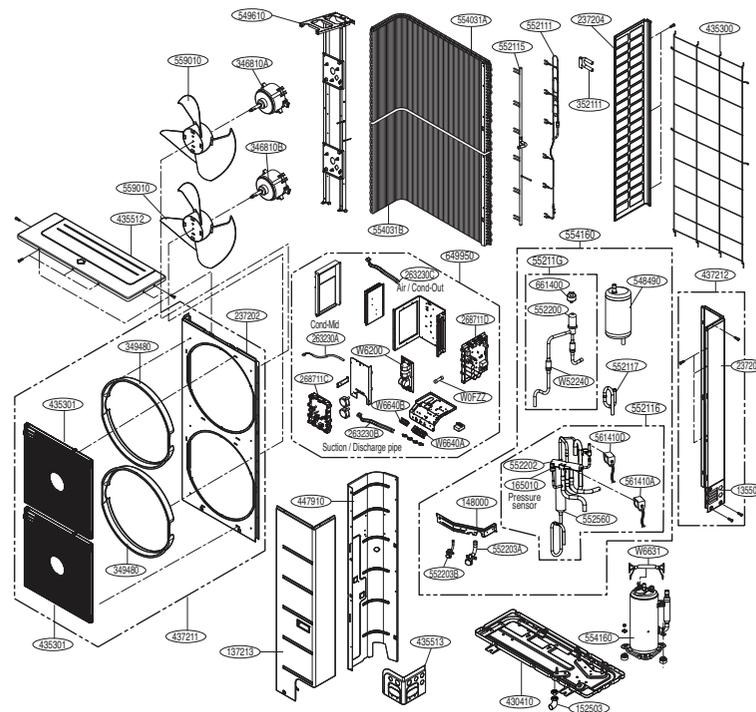


## 6.5 MU5M40



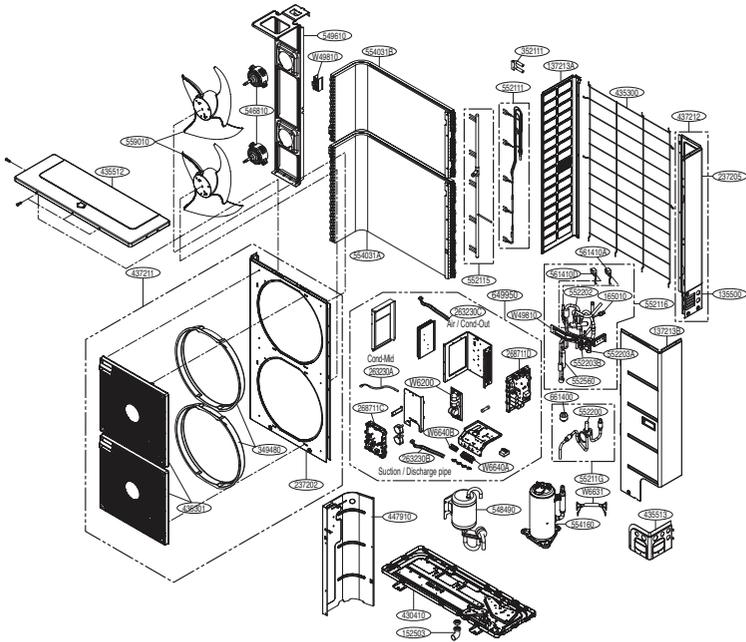
Location No.	PCB Connector	Description	Housing Color
263230C	CN-TH1	Air / Cond Out	White
263230B	CN-TH2	Suction / Discharge	Red
263230A	CN-TH3	Cond Mid	Blue
165010	CN-P/SENSOR(H)	Pressure Sensor	Red

## 6.6 FM48AH / FM56AH



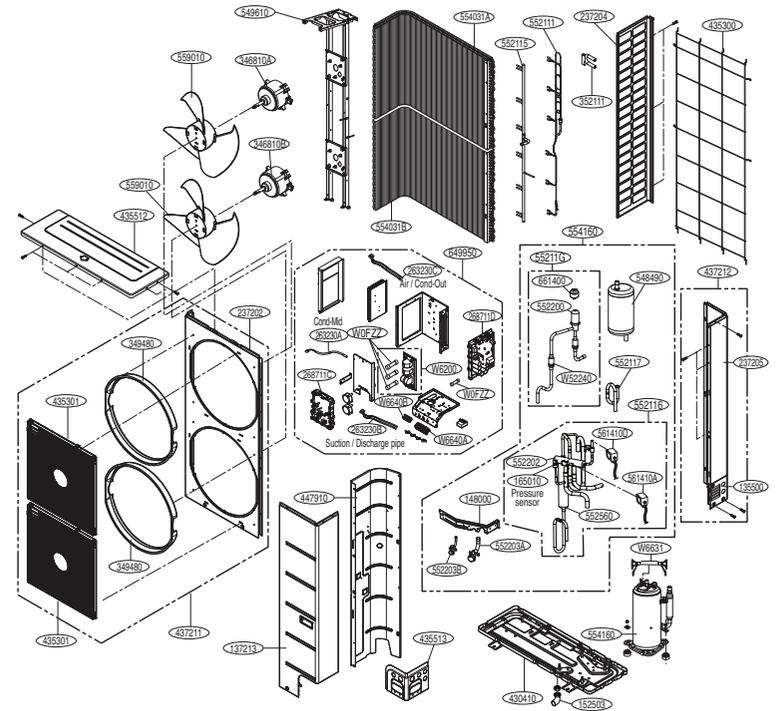
Location No.	PCB Connector	Description	Housing Color
263230C	CN-TH1	Air / Cond Out	White
263230B	CN-TH2	Suction / Discharge	Red
263230A	CN-TH3	Cond Mid	Blue
165010	CN-P/SENSOR(H)	Pressure Sensor	Red

## 6.7 FM40AH



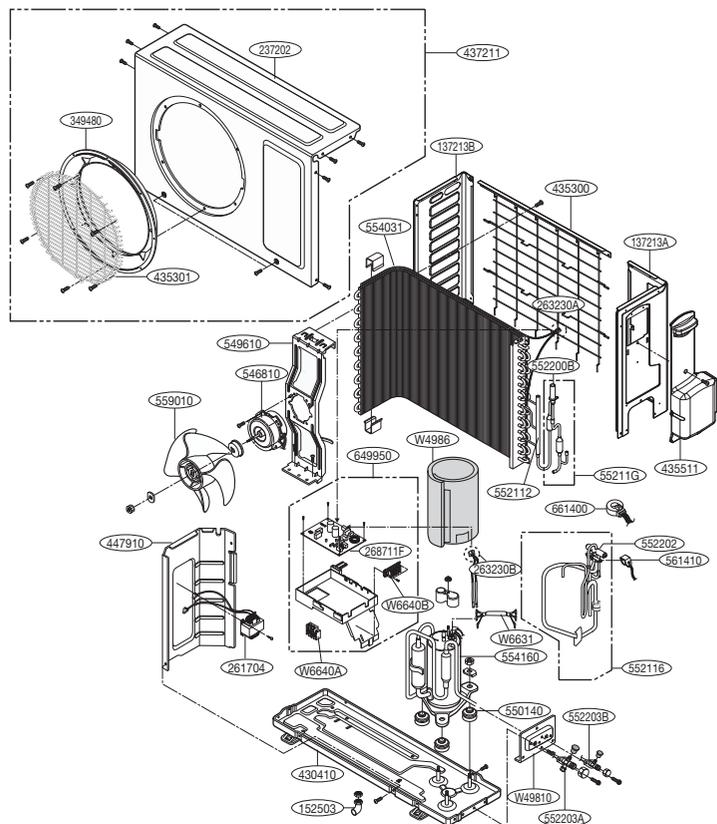
Location No.	PCB Connector	Description	Housing Color
263230C	CN-TH1	Air / Cond Out	White
263230B	CN-TH2	Suction / Discharge	Red
263230A	CN-TH3	Cond Mid	Blue
165010	CN-P/SENSOR(H)	Pressure Sensor	Red

## 6.8 FM41AH / FM49AH / FM57AH



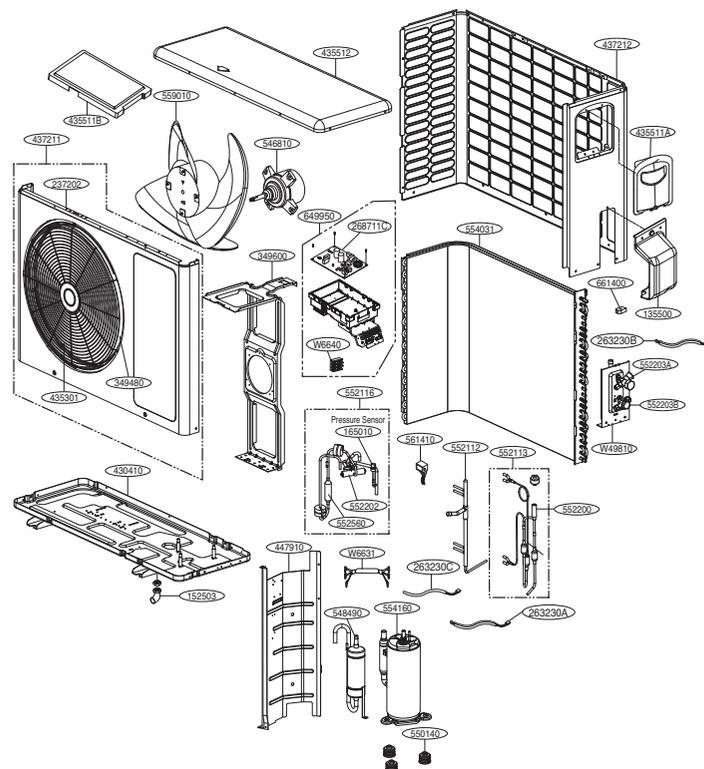
Location No.	PCB Connector	Description	Housing Color
263230C	CN-TH1	Air / Cond Out	White
263230B	CN-TH2	Suction / Discharge	Red
263230A	CN-TH3	Cond Mid	Blue
165010	CN-P/SENSOR(H)	Pressure Sensor	Red

## 6.9 UU09W / UU12W



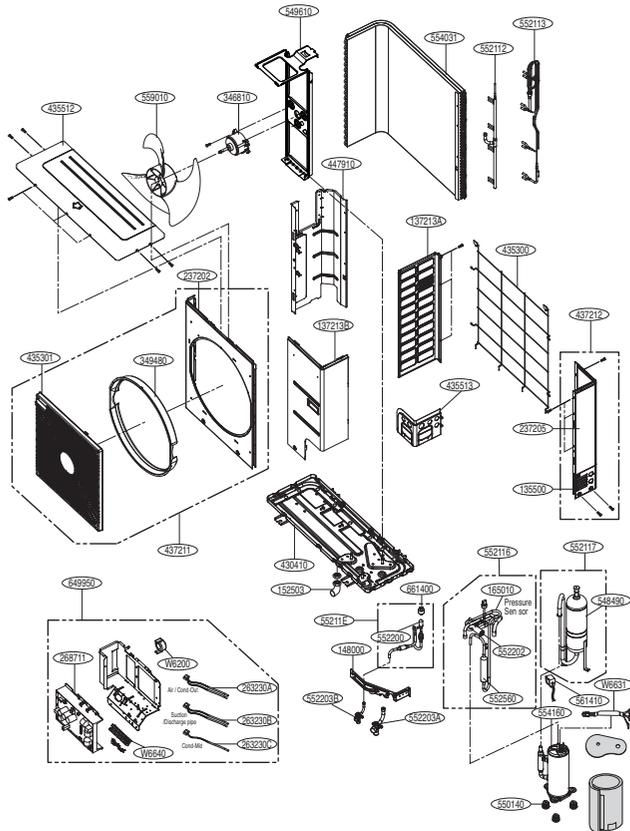
Model	Classification	Description	Part Number	Location Number	Remark
AUJW096D	Inverter Heating	Compressor	5416A90029C	554160	-
AUJW126D		Harness,Multi	6631A30099D	W6631	

## 6.10 UU18W



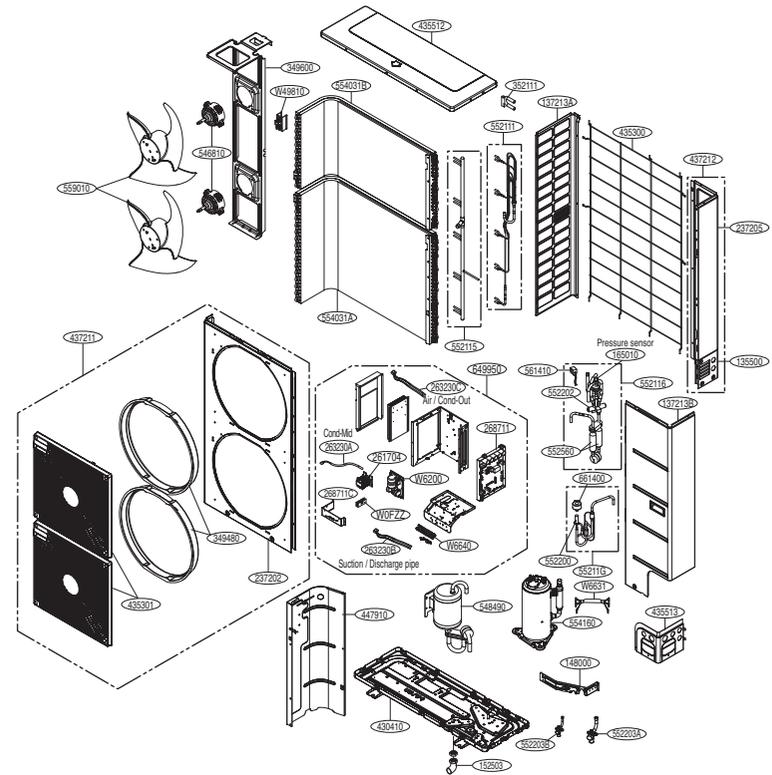
Location No.	Description	Sensor Information	Housing Color
263230A	Thermister1(CN-TH3)	Suction /Discharge pipe	Red
263230B	Thermister2(CN-TH2)	Air / Cond-Out	White
263230C	Thermister3(CN-TH4)	Cond-Mid	Orange
165010	Pressure sensor(CN-TH1)	Pressure Sensor	Red

## 6.11 UU24W / UU30W



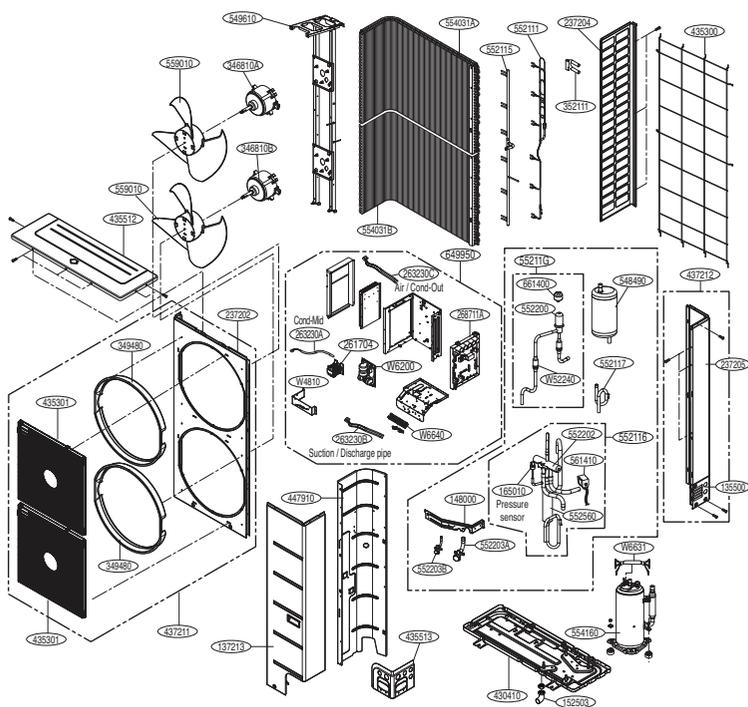
Location No.	Description	Sensor Information	Housing Color
263230A	Thermister1(CN-TH2)	Air / Cond-Out	White
263230B	Thermister2(CN-TH3)	Suction /Discharge pipe	Red
263230C	Thermister3(CN-TH4)	Cond-Mid	Orange
165010	Pressure sensor(CN-TH1)	Pressure Sensor	Red

## 6.12 UU36W



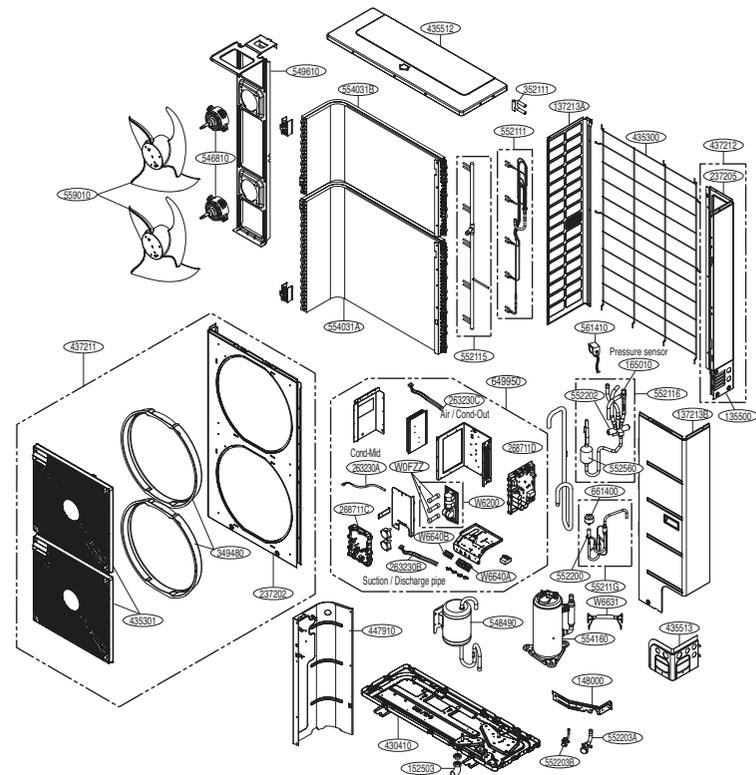
Location No.	Description	Sensor Information	Housing Color
263230A	Thermistor S2(CN-TH4)	Cond-Mid	Blue
263230B	Thermistor S4/S3(CN-TH3)	Suction /Discharge pipe	Red
263230C	Thermistor S6/S5(CN-TH2)	Air / Cond-Out	White
165010	Pressure sensor(P-SENSOR (H)-RD)	Pressure Sensor	Red

## 6.13 UU42W / UU48W / UU60W



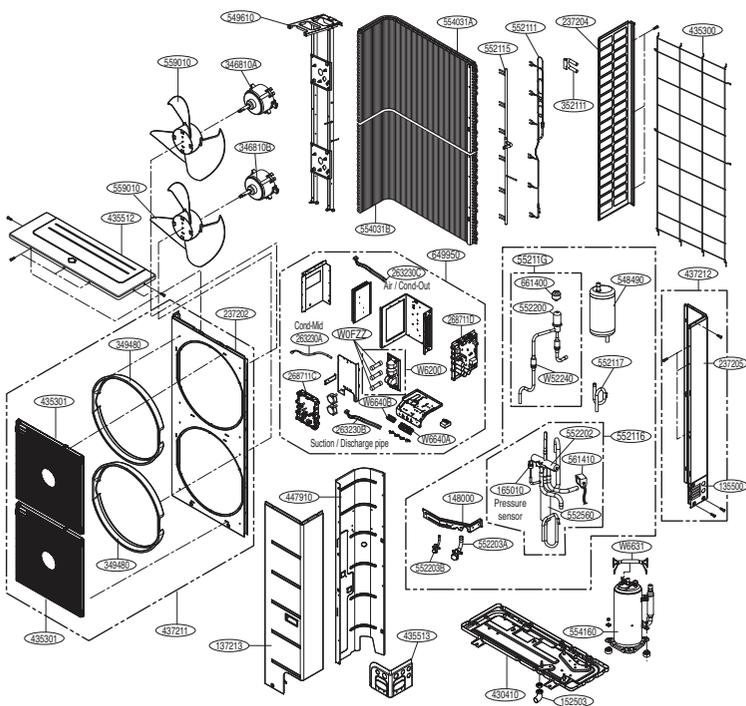
Location No.	Description	Sensor Information	Housing Color
263230A	Thermistor S2(CN-TH4)	Cond-Mid	Blue
263230B	Thermistor S4/S3(CN-TH3)	Suction /Discharge pipe	Red
263230C	Thermistor S6/S5(CN-TH2)	Air / Cond-Out	White
165010	Pressure sensor(P-SENSOR (H)-RD)	Pressure Sensor	Red

## 6.14 UU37W



Location No.	Description	Sensor Information	Housing Color
263230A	Thermistor1 (CN-TH3)	Cond-Mid	Blue
263230B	Thermistor2(CN-TH2)	Suction /Discharge pipe	Red
263230C	Thermistor3(CN-TH1)	Air / Cond-Out	White
165010	Presure sensor(CN-P/SENSOR (H))	Pressure Sensor	Red

## 6.15 UU43W / UU49W / UU61W



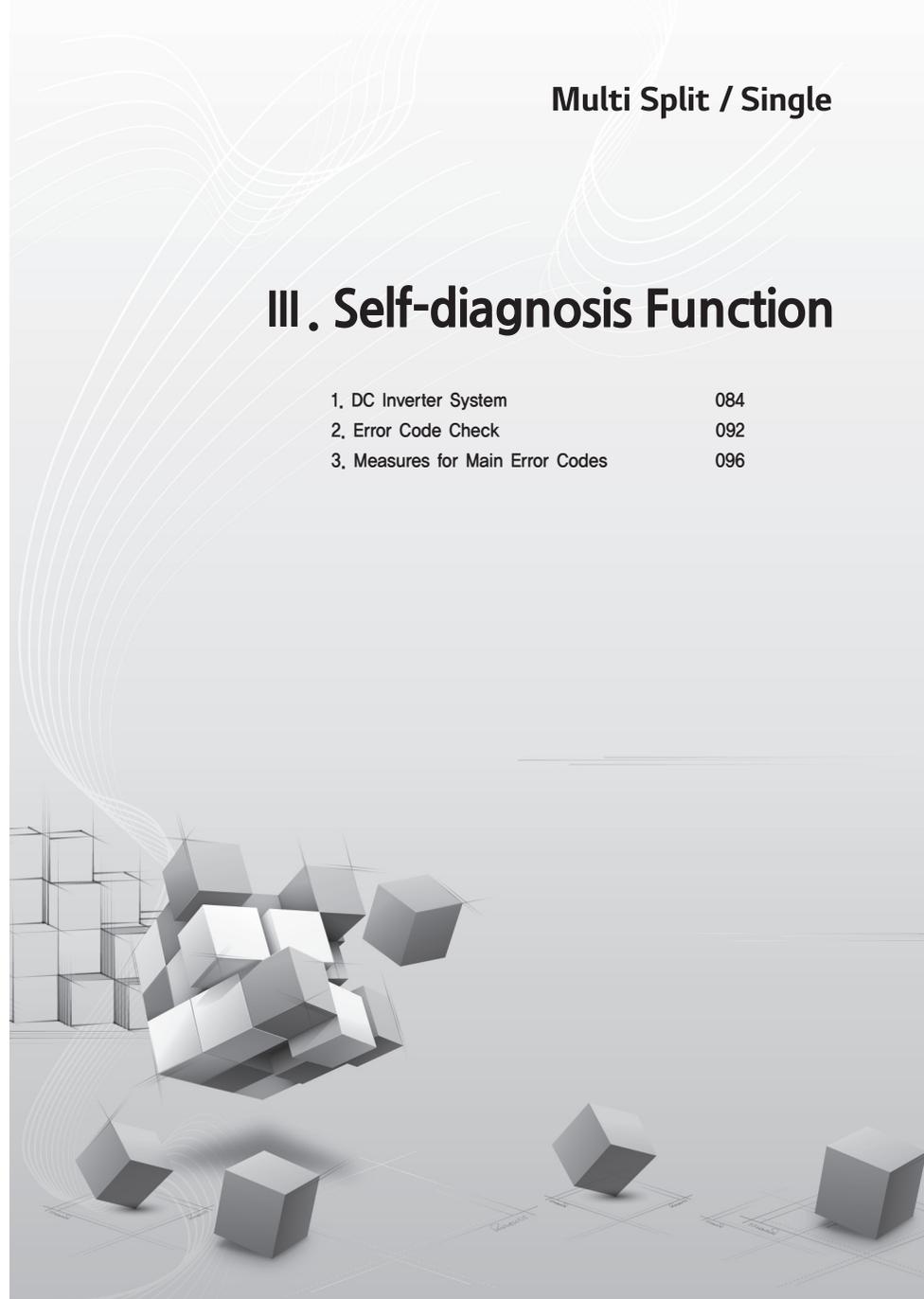
Location No.	Description	Sensor Information	Housing Color
263230A	Thermistor 1(CN-TH3)	Cond-Mid	Blue
263230B	Thermistor 2(CN-TH2)	Suction /Discharge pipe	Red
263230C	Thermistor 3(CN-TH1)	Air / Cond-Out	White
165010	Pressure sensor(CN-P-SENSOR (H))	Pressure Sensor	Red

## 7. LGMV Guideline

Mode	No.	Item	Unit	Normal condition	Abnormal condition	Cause & Check Point
Cooling	1	High Pressure	kPa	1600~3800	Above 3900	Overcharging, Outdoor Fan lock, Condenser block
				Below 1600	Ref. Leakage or Ref. Shortage	
	2	Low Pressure	kPa	600~1200	Above 1500	Overcharging
Heating	3	Indoor pipe Inlet, Outlet	℃	0~5	Below 500	Ref. Leakage or Ref. Shortage, ESP setting error (Duct)
				Above 5	Ref. Leakage or Ref. Shortage	
	4	High Pressure	kPa	2200~3300	Above 3500	EEV Fault, Thermistor Defect
Common	5	Low Pressure	kPa	300~1100	Below 200	Overcharging
				60~100	Above 105	Indoor Fan Lock, ESP setting error (Duct)
	6	Comp. Discharge T. (Tdis-Tc)	℃	Above 15	Ref. Leakage or Ref. Shortage, Outdoor Fan Lock	
7	Discharge Superheat	℃	Below 500	EEV Fault, Overcharging		

## III. Self-diagnosis Function

1. DC Inverter System	084
2. Error Code Check	092
3. Measures for Main Error Codes	096



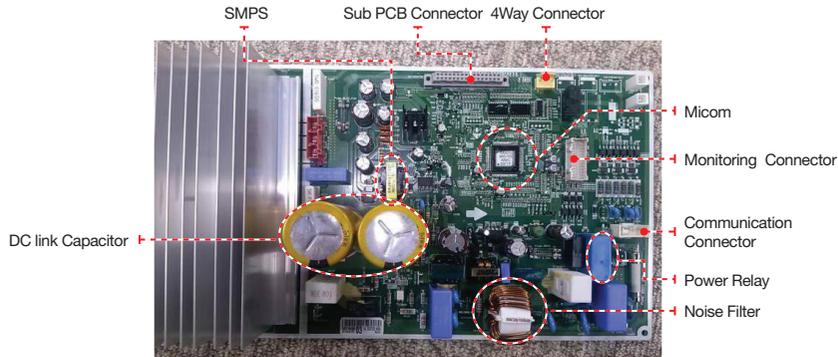
# 1. DC Inverter System

## Structure of the DC inverter controller

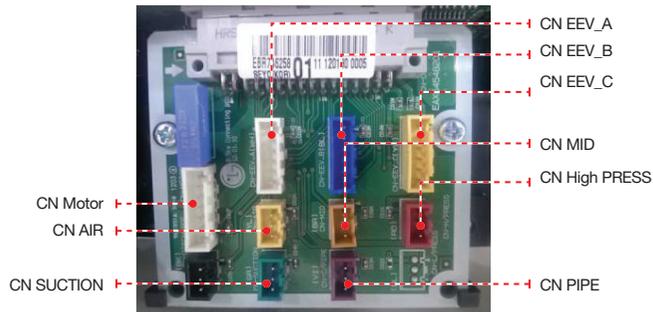
PCBA	모델명
2/2.5kW	MU3M19
	MU3M21

\* As of July, 2013

### Main PCBA



### Sub PCBA : Sensor, EEV, Motor

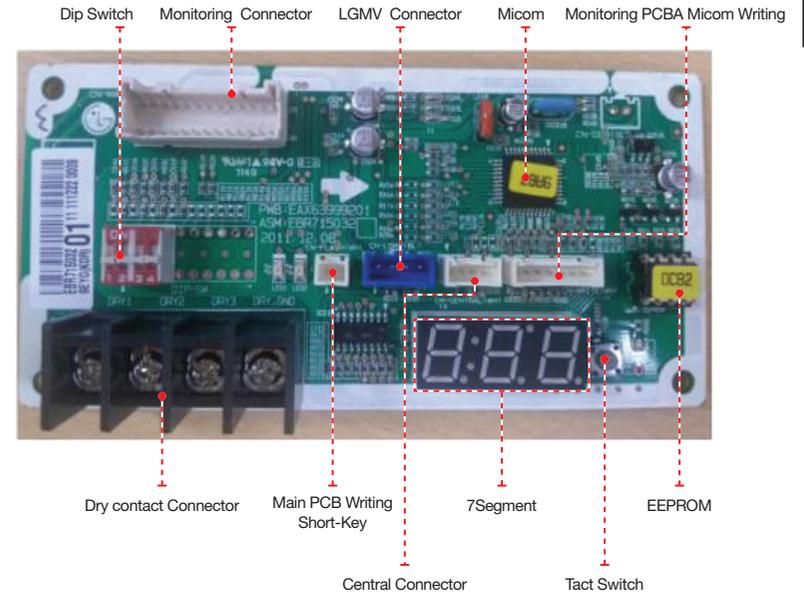


## Structure of the DC inverter controller

PCBA	모델명
2/2.5kW	MU3M19
	MU3M21

\* As of July, 2013

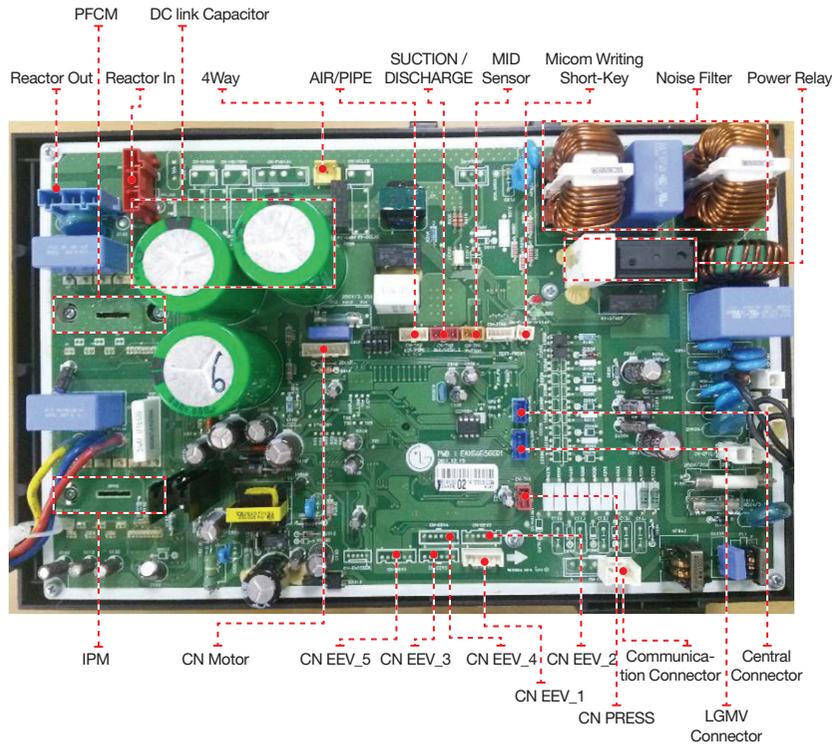
### Monitoring PCBA



## Structure of the DC inverter controller

PCBA	모델명
4kW	UU18W
	UU24W
	UU30W
	MU4M25
	MU4M27
	MU5M30

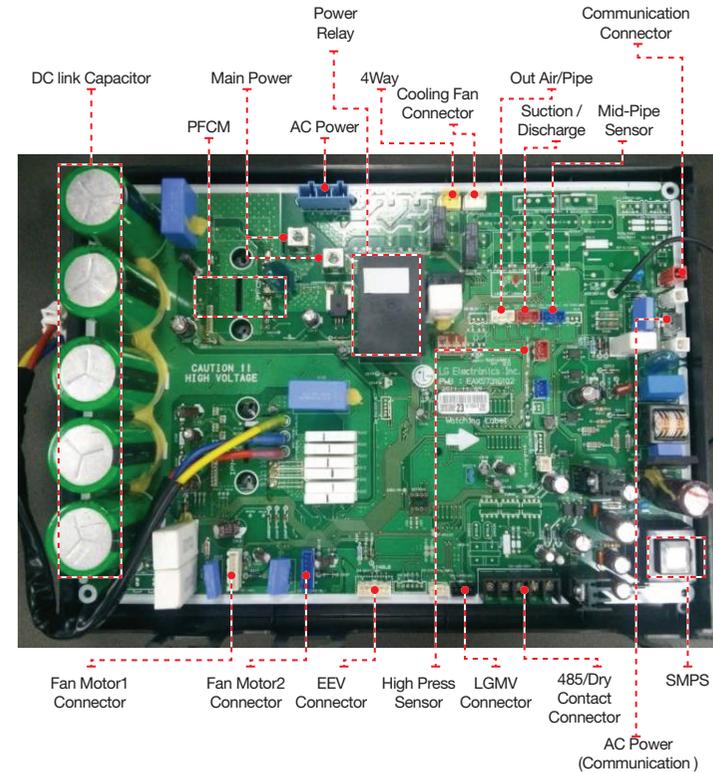
\* As of July, 2013



## Structure of the DC inverter controller

PCBA	모델명
5kW	UU36W
	UU42W
	UU48W
	UU60W

\* As of July, 2013



## Structure of the DC inverter controller

PCBA	모델명
6kW	MU5M40
	FM40AH
	FM48AH
	FM56AH

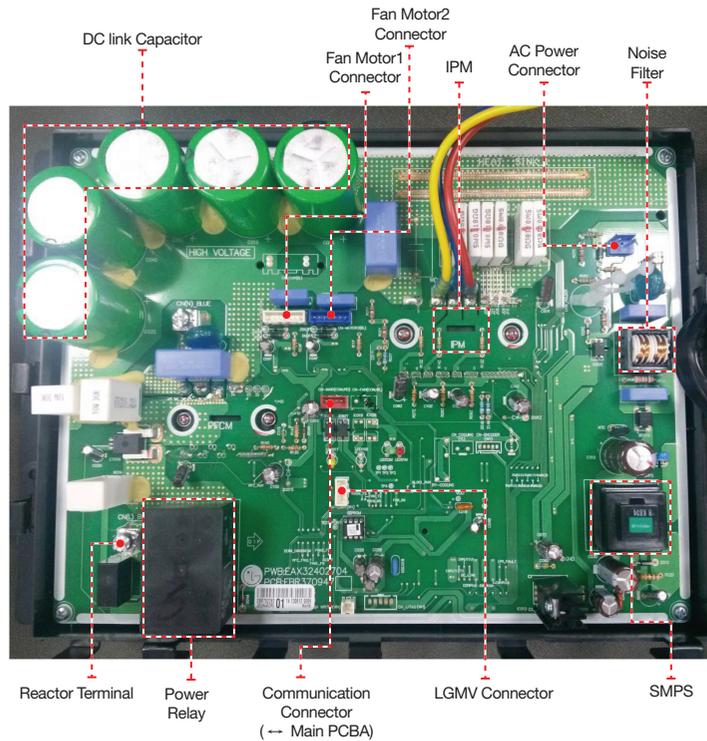
\* As of July, 2013

## Structure of the DC inverter controller

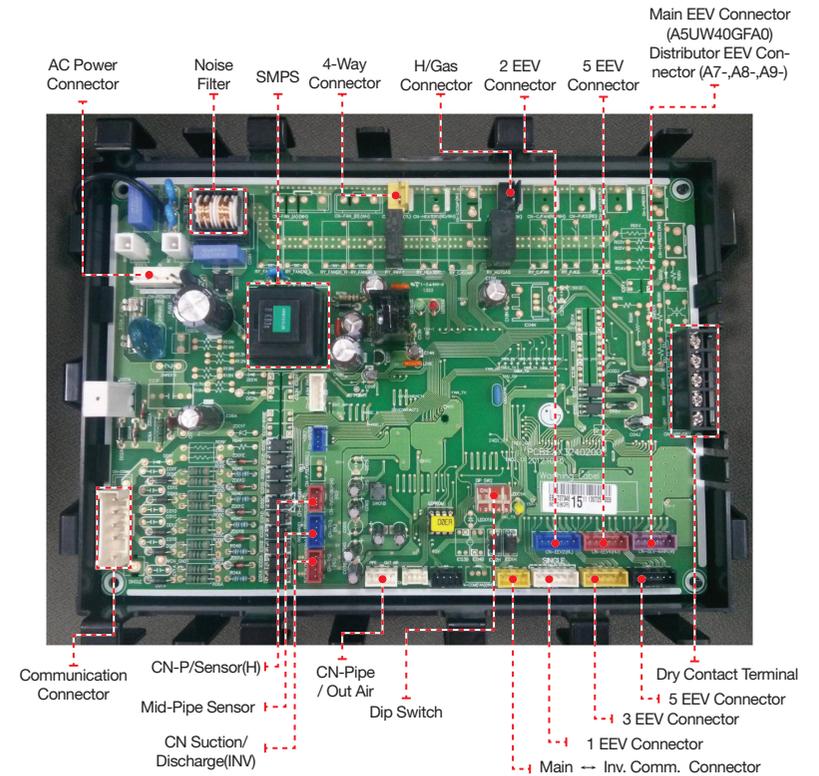
PCBA	모델명
6kW	MU5M40
	FM40AH
	FM48AH
	FM56AH

\* As of July, 2013

### 6kW Inverter PCBA



### 6kW Main PCBA

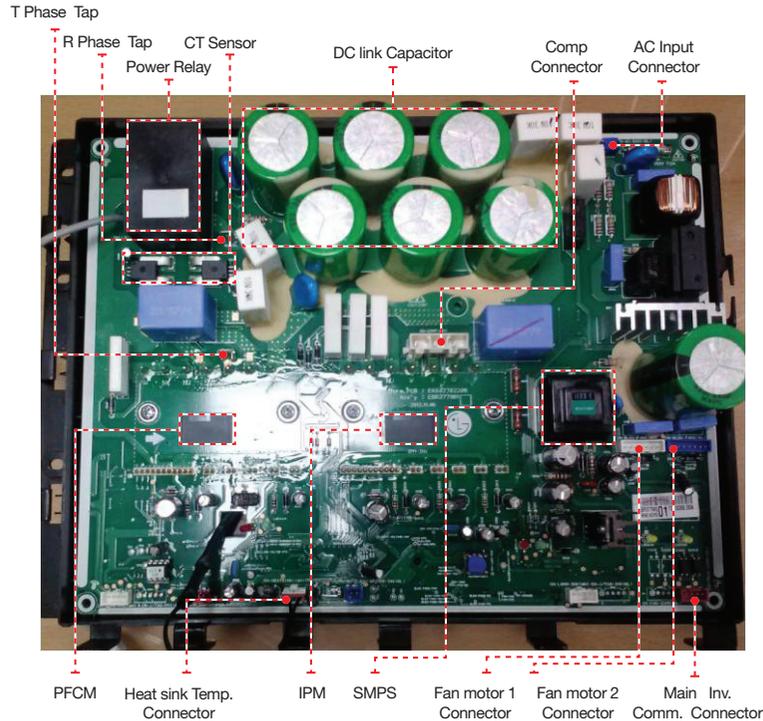


## Structure of the DC inverter controller

PCBA	모델명
7kW	UU37W
	UU43W
	UU49W
	UU61W
	FM41AH
	FM49AH
	FM57AH

\* As of July, 2013

### 7kW Inverter PCBA

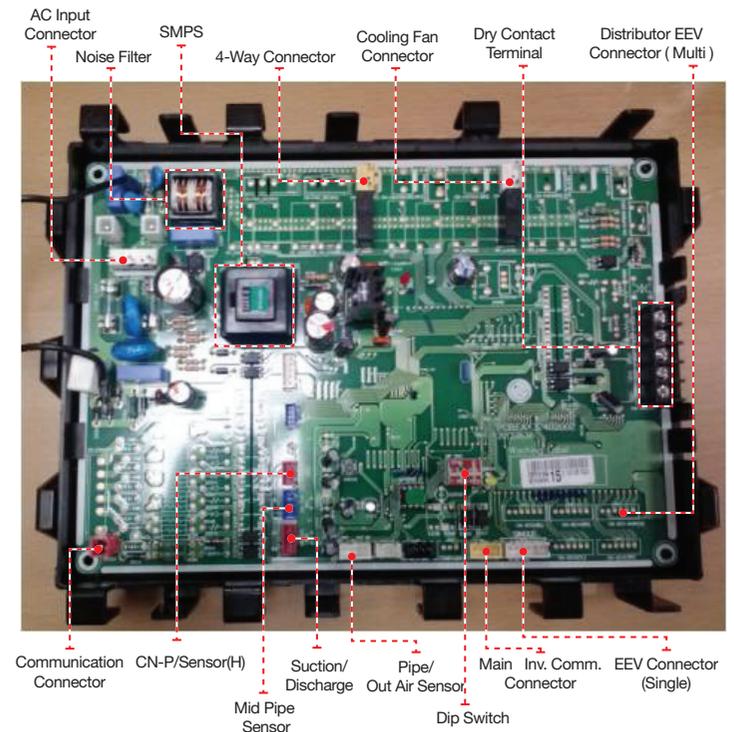


## Structure of the DC inverter controller

PCBA	모델명
7kW	UU37W
	UU43W
	UU49W
	UU61W
	FM41AH
	FM49AH
	FM57AH

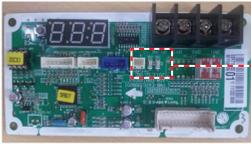
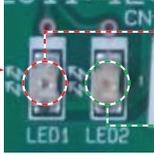
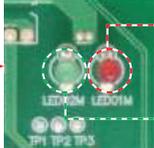
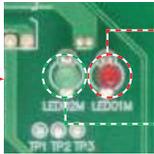
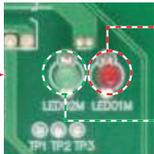
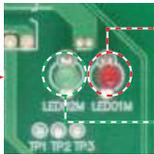
\* As of July, 2013

### 7kW Main PCBA



## 2. Error Code Check

### 2.1 Error Code Check \_ Outdoor Device

구분	IPM Check Point	
2/2.5kW		 <p>10-Figure position in red</p> <p>1--figure position in green</p>
4kW		 <p>10-Figure position in red</p> <p>1--figure position in green</p>
5kW		 <p>10-Figure position in red</p> <p>1--figure position in green</p>
6kW		 <p>10-Figure position in red</p> <p>1--figure position in green</p>
7kW		 <p>10-Figure position in red</p> <p>1--figure position in green</p>

### 2.2 Error Code\_Single & Multi\_Indoor Device Error Codes

※ Error checking : The errors may be checked on display parts of wired remote controller and the display of Indoor unit (depends on the indoor unit type)

Code	Title	Cause of Error
1	Air temperature sensor of Indoor unit	Air temperature sensor of indoor unit is open or short
2	Inlet pipe temperature Sensor of indoor unit	Inlet pipe temperature sensor of indoor unit is open or short
3	Communication error : wired remote controller ↔ indoor unit	Failing to receive wired remote controller signal in indoor unit PCB
4	Drain pump	Malfunction of drain pump
5	Communication error : outdoor unit ↔ indoor unit	Failing to receive outdoor unit signal in indoor unit PCB
6	Outlet pipe temperature sensor of indoor unit	Outlet pipe temperature sensor of indoor unit is open or short
9	Indoor EEPROM Error	In case when the serial number marked on EEPROM of Indoor unit is 0 or FFFFFFFF
10	Abnormal fan motor operation	Disconnecting the fan motor connector/ Failure of indoor fan motor lock

## 2.3 Error Code\_Single & Multi\_Outdoor Device Error Codes

※ Error checking : The errors may be checked on LED of the display parts of wired remote controller and the LED of the controller of outdoor device .

Code	Contents	Operation State	Error Display			Count
			Cable Remote Controller	Outdoor Device		
				Red LED	Green LED	
21	IPM Fault Error	Stop	CH21	Flashing 2 times	Flashing 1 time	10 time Within 1h
22	CT 2 Error (Input of Over-Current)	Stop	CH22	Flashing 2 times	Flashing 2 times	Infinite restart
23	DC Link Error (High/Low DC Voltage)	Stop	CH23	Flashing 2 times	Flashing 3 times	Infinite restart
24	Pressure Switch High/Low Pressure Fault	Stop	CH24	Flashing 2 times	Flashing 4 times	Infinite restart
25	Input Frequency Detection Failure	Stop	CH25	Flashing 2 times	Flashing 5 times	1 time Within 1h
26	DC Comp Position Detection Error	Stop	CH26	Flashing 2 times	Flashing 6 times	1 time Within 1h
27	PSC/PFC Over-Current Error (HW)	Stop	CH27	Flashing 2 times	Flashing 7 times	10 time Within 1h
29	Comp Phase Over-Current Error	Stop	CH29	Flashing 2 times	Flashing 9 times	10 time Within 1h
32	D-Pipe Overheating Error (INV Comp)	Stop	CH32	Flashing 2 times	Flashing 2 times	Infinite restart
33	D-Pipe Overheating Error (Constant-rate Comp)	Stop	CH33	Flashing 3 times	Flashing 3 times	Infinite restart
41	D-Pipe Sensor Error (INV Comp)	Stop	CH41	Flashing 4 times	Flashing 1 time	1 time Within 1h
43	High pressure Sensor Error	Stop	CH43	Flashing 4 times	Flashing 3 time	1 time Within 1h
44	Outdoor Inlet Sensor Error	Stop	CH44	Flashing 4 times	Flashing 4 times	1 time Within 1h

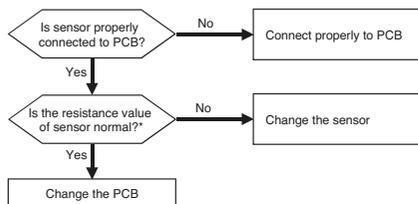
Code	Contents	Operation State	Error Display			Count
			Cable Remote Controller	Outdoor Device		
				Red LED	Green LED	
45	Cond. Pipe Sensor Error	Stop	CH45	Flashing 4 times	Flashing 5 times	1 time Within 1h
46	Suction Pipe Sensor Error	Stop	CH46	Flashing 4 times	Flashing 6 times	1 time Within 1h
47	D-Pipe Sensor Error (Constant-rate Comp)	Stop	CH47	Flashing 4 times	Flashing 7 times	1 time Within 1h
51	Over-Capacity Connection Error	Stop	CH51	Flashing 5 times	Flashing 1 time	1 time Within 1h
53	Communication Error between Outdoor Device Indoor Device	Stop	CH53	Flashing 5 times	Flashing 3 times	1 time Within 1h
54	Open and Reverse Phase Error	Stop	CH54	Flashing 5 times	Flashing 4 times	10 time Within 1h
60	EEPROM Check Sum Error	Stop	CH60	Flashing 6 times	-	1 time Within 1h
61	Outdoor Device Pipe Overheating Error	Stop	CH61	Flashing 6 times	Flashing 1 time	Infinite restart
62	Heat-sink Overheating Error	Stop	CH62	Flashing 6 times	Flashing 2 times	Infinite restart
65	Heat-sink Sensor Error	Stop	CH65	Flashing 6 times	Flashing 5 times	1 time Within 1h
67	Outdoor BLDC Fan Lock Error	Stop	CH67	Flashing 6 times	Flashing 7 times	10 time Within 1h
73	PSC/PFC Over-Current Error (SW)	Stop	CH73	Flashing 7 times	Flashing 3 times	10 time Within 1h

### 3. Measures for Main Error Codes

#### 3.1 CH01 (Indoor unit air sensor error) CH02 (Indoor unit pipe inlet sensor error) CH06 (Indoor unit pipe outlet sensor error)

Error No.	Error Type	Error Point	Main Reasons
01	Indoor unit air sensor error	Indoor unit sensor is open/short	1, Indoor unit PCB wrong connection 2, Indoor unit PCB failure 3, Sensor problem (main reason)
02	Indoor unit pipe inlet sensor error		
06	Indoor unit pipe outlet sensor error		

##### ■ Error diagnosis and countermeasure flow chart



\*\* In case the value is more than 100kΩ (open) or less than 100Ω (short), Error occurs  
Refer: Resistance value maybe change according to temperature of temp sensor,  
It shows according to criteria of current temperature(±5% margin) → Normal  
Air temp sensor: 10°C = 20.7kΩ : 25°C= 10kΩ : 50°C= 3.4kΩ  
Pipe temp sensor: 10°C = 10kΩ : 25°C= 5kΩ : 50°C= 1.8kΩ



→ CN-ROOM : Indoor air temp sensor  
→ CN-PIPE IN : Pipe inlet temp sensor  
→ CN-PIPE OUT : Pipe outlet temp sensor

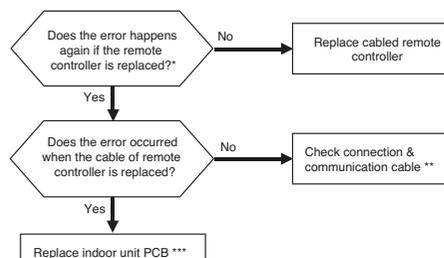


→ Measure the resistance of outlet pipe temp sensor.

#### 3.2 CH03 (No communication between cabled remote controller & indoor unit)

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

\*\* 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

\*\*\* 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)



→ CN-REMO : Remote controller connection

※ The PCB can differ from model to model.  
Check from the right source.

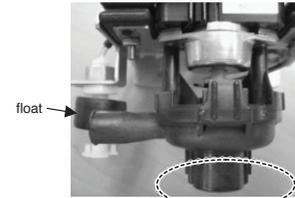
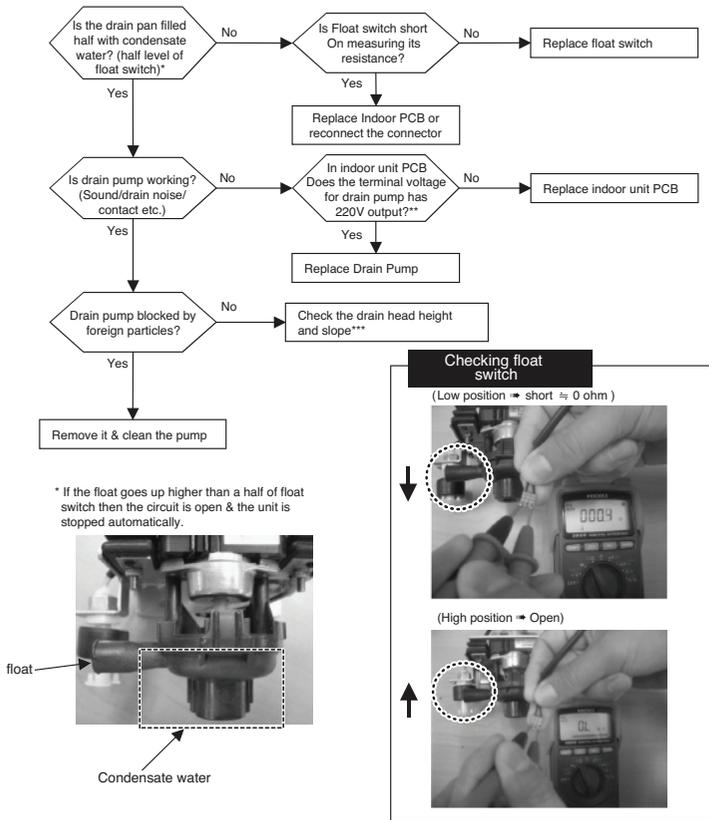


→ Checking communication cable connection status

### 3.3 CH04 (Drain pump error)

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	<ol style="list-style-type: none"> <li>1, Drain pump/float switch fault</li> <li>2, Improper drain pipe location, clogging of drain pipe</li> <li>3, Indoor unit PCB fault</li> </ol>

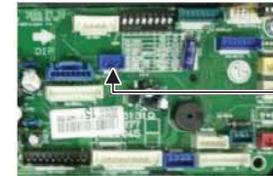
#### ■ Error diagnosis and countermeasure flow chart



A:Point to check rotating

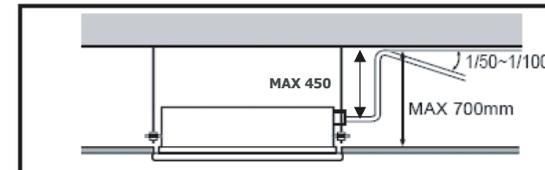


\*\*\* Indoor PCB drain pump connector  
(Check input of 220V)  
(Marked as CN-DPUMP)



Float switch Housing (CN-FLOAT)

[\*\*] Standard of drain pipe head height / slope



### 3.4 CH09 (Indoor unit EEPROM error)

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

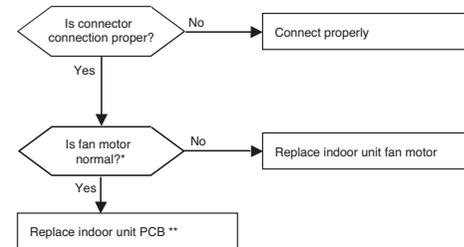
#### ■ Error diagnosis and countermeasure flow chart

- Replace the indoor unit PCB, and then make sure to perform Auto addressing and input the address of central control

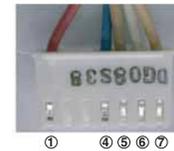
### 3.5 CH10 (Indoor unit BLDC fan motor failure)

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, Motor fault

#### ■ Error diagnosis and countermeasure flow chart



\* It is normal when check hall sensor of indoor fan motor as shown below



Each terminal with the tester

Tester	Normal resistance(±10%)	TH chassis	TD chassis
+	-	∞	∞
①	④	∞	∞
⑤	④	hundreds kΩ	hundreds kΩ
⑥	④	∞	∞
⑦	④	hundreds kΩ	hundreds kΩ

<Checking connection state of fan motor connector>

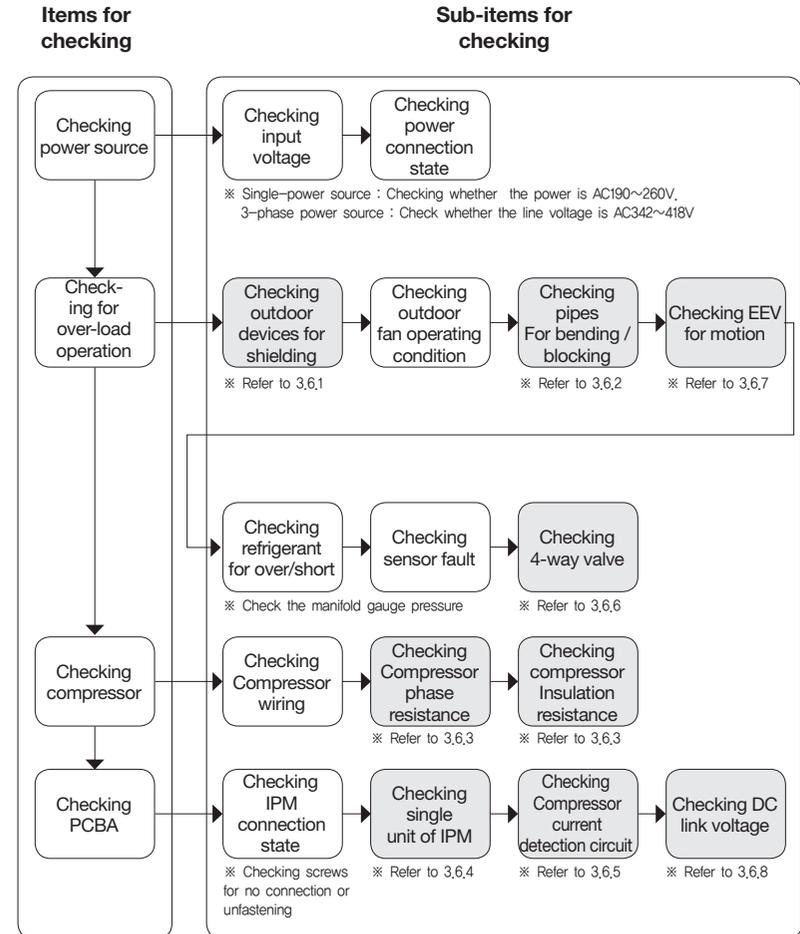


\*\* Replace the indoor unit PCB, and then make sure to do Auto addressing and input the address of central control  
(Notice: The connection of motor connector to PCB should be done under no power supplying to PCB)

### 3.6 CH21 (DC Peak / Comp IPM Fault)

Items	Contents	
Purpose	Protection of the IPM parts and compressor in the PCB assembly from over-current.	
Condition for Generation	Generation when over-current is detected in IPM.	
Expected Causes	Installation & Overload	Outdoor device shielding, closing of a SVC valve, under/over charging of refrigerant, infiltration of water into refrigerant, outdoor fan fault, EEV (Electric Expansion Valve) fault, fault of a temperature sensor or its connection, blocking of an indoor device filter, and bending/blocking of a pipe.
	Compressor	Open/Short of the coil in the compressor, insulation breaking between the coil in the compressor and the pipe or panel, damage of compressor with abrasion, and compressor connection fault.
	PCB Assembly	IPM part fault, fault-signal detection circuit fault, compressor current detection circuit fault, and DC link detection circuit fault.
	Others	Improper power input, IPM connection fault, and insufficient distance between heat sink and control panel.

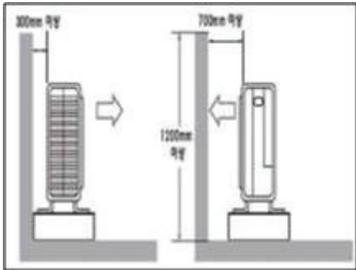
### Flow of trouble diagnosis



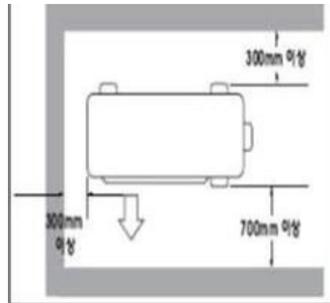
## 3.6.1 Checking outdoor devices for shielding

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

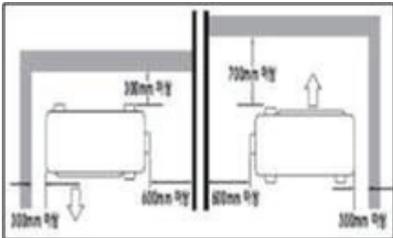
## ■ When the front/back has a wall (1 side)



## ■ When the front/back/left/right have walls (3 sides)



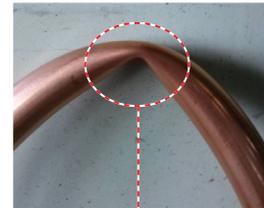
## ■ When the front/back/left/right have walls (2 sides)



## 3.6.2 Generation of refrigerant flow disturbance

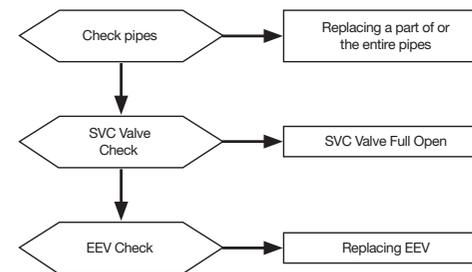
Cause of Trouble	Condition	Mechanism of Fault Generation
Generation of refrigerant flow disturbance	Bending/Blocking of a pipe EEV fault Closing of SVC Valve	Freezing of indoor device → Reduced evaporation temperature due to excessive expansion of refrigerant. Weak heating and cooling → Insufficient flow of refrigerant
		Frequent turning on/off of the compressor by the high/low pressure protection logic → Accumulated refrigerant elevates the temperature and reduces the pressure. Wrong oil collection elevates the outlet temperature of the compressor and damages the compressor.

## ■ Bending/Blocking of a pipe



Bending of a pipe

## ■ Checking SVC Valve

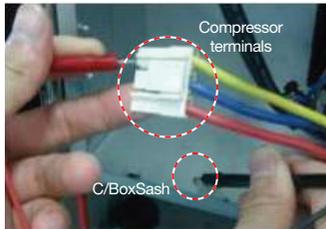


※ EEV Checking Method :  
Check the opening/closing sound of EEV when the power is applied for the first time.

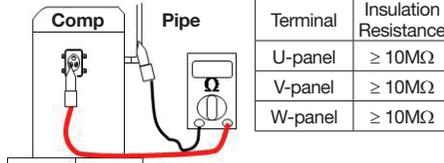
### 3.6.3 Checking compressor phase resistance

Purpose	Judgment of the fault of the compressor,	Items for checking	1, Measurement of insulation resistance between the compressor and panel, 2, Measurement of phase resistance, 3, Wiring Check,
---------	--	--------------------	--

#### ■ How to check the insulation resistance between the compressor and panel



Measure the resistance between a compressor terminal and panel.

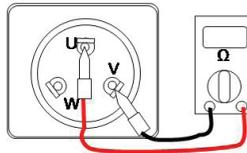


1. Turn the switch of the tester to "Resistance" mode and check the resistance
2. Measure the resistance between the terminals,
3. "0Ω" means the short of compressor phase. (Replace the compressor)
4. Refer to the compressor resistance standards,
5. If any disorder is found, measure the line resistance between the terminals of the compressor as shown below,
6. If the compressor is found to be normal, any compressor connection wire may have a fault,

#### ■ How to check the U, V, and W phase resistance



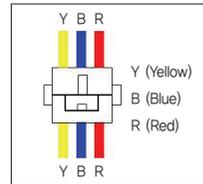
Measure the line resistance between the compressor terminals.



Model	GKT141MAC	GKT176MAB	GJT240MAA	GPT442MBA	GPT442MAA	
Windings	U-V	1.040 ±7% Ω	1.125±7% Ω	0.628 ±7% Ω	0.438 ±7% Ω	0.845 ±7% Ω
Resistance (at 25°C)	V-W	1.040 ±7% Ω	1.125±7% Ω	0.628 ±7% Ω	0.438 ±7% Ω	0.859 ±7% Ω
	W-U	1.040 ±7% Ω	1.125±7% Ω	0.628 ±7% Ω	0.438 ±7% Ω	0.864 ±7% Ω

Purpose	Judgment of the fault of the compressor,	Items for checking	1, Measurement of insulation resistance between the compressor and panel, 2, Measurement of phase resistance, 3, Wiring Check,
---------	--	--------------------	--

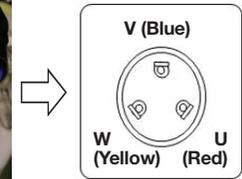
#### ■ How to check the compressor wiring error



Check whether the PCB wires and compressor wires are connected in the same colors.



Check whether the compressor wires are properly connected with U, V, and W.



※ The wiring direction is CCW, (counter clock wise)



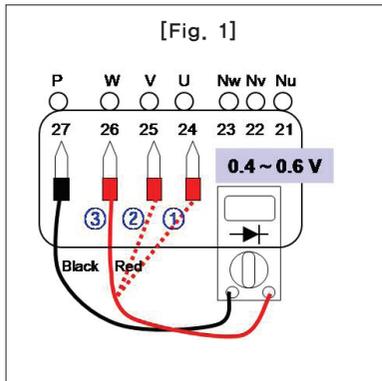
[Picture of normal compressor wiring]

### 3.6.4 IPM Check

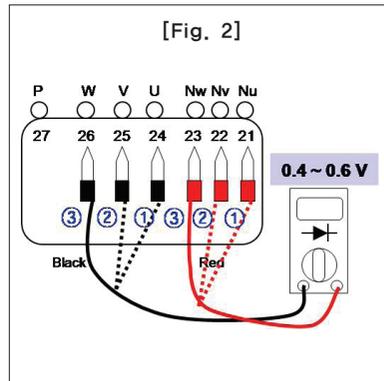
Purpose	Judgment of the IPM part fault of PCB assembly,	Items for checking	1. Judgment of damage of IGBT 2. Checking the soldering state
---------	---	--------------------	--

#### ■ How to check IPM IGBT (Diode Mode)

1. Remove the connector from PCB,
2. Set the Multi-Tester as Diode Voltage Measurement Mode, (  $\rightarrow$  )
3. Measure the voltages of P~U / P~V / P~W as shown in Fig. 1,
4. Measure the voltages of U~Nu / V~Nv / W~Nw as shown in Fig. 2,
5. If the measurements are significantly different from the levels shown in the figures, the IPM is deemed to be damaged.



Sequence of Measurement	Measurement	Normal Standards
1	P-U	0.4V~0.6V
2	P-V	0.4V~0.6V
3	P-W	0.4V~0.6V



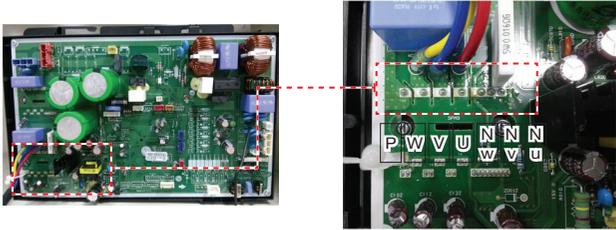
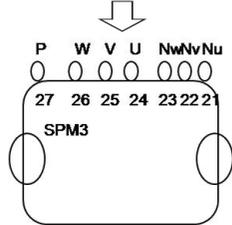
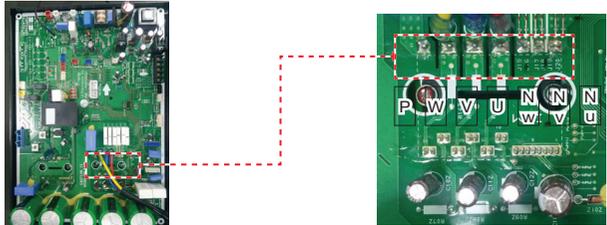
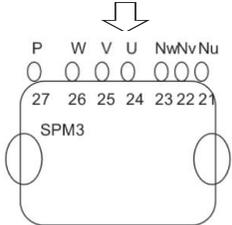
Sequence of Measurement	Measurement	Normal Standards
1	U-Nu	0.4V~0.6V
2	V-Nv	0.4V~0.6V
3	W-Nw	0.4V~0.6V

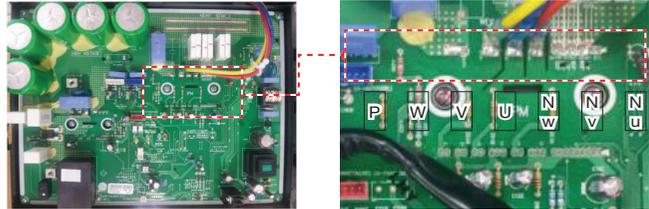
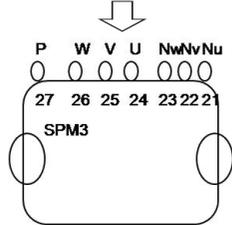
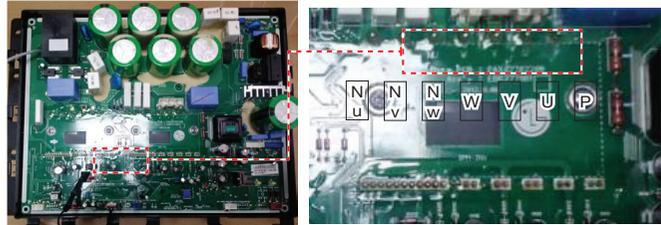
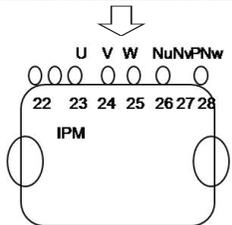
Purpose	Judgment of the IPM part fault of PCB assembly,	Items for checking	1. Judgment of damage of IGBT 2. Checking the soldering state
---------	---	--------------------	--

Step	Flow of Inspection
1	Turn the power off (wait until the outdoor device LED is turned off)
2	Remove compressor wires.
3	Measure the voltage as shown in the figure.
4	Check the voltage for being in the range of 0.4~0.6V.
5	Judge IPM Pins for short.

#### ■ IPM Check Point

구분	IPM Check Point
2/2.5kW	<div style="text-align: center;"> <p>[ IPM Pin Arrangement and Pin Numbers ]</p> </div>

구분	IPM Check Point
4kW	  <p>[ IPM Pin Arrangement and Pin Numbers]</p>
5kW	  <p>[ IPM Pin Arrangement and Pin Numbers]</p>

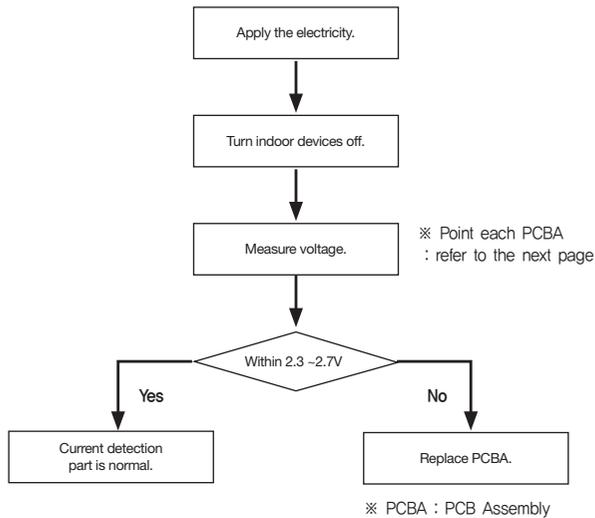
구분	IPM Check Point
6kW	  <p>[ IPM Pin Arrangement and Pin Numbers]</p>
7kW	  <p>[ IPM Pin Arrangement and Pin Numbers]</p>

### 3.6.5 Compressor Phase Current Detection Circuit

Purpose	Judgment of the IPM part fault of PCB assembly,	Items for checking	1. Checking for current detection error,
---------	---	--------------------	--

1. Set the tester in DC Voltage Mode and check the Voltage,
2. Measure the voltage in the order of "U-GND/V-GND/W-GND,"
3. The standard of normal voltage measurement is  $2.5V \pm 0.2V$ ,
4. If the measurement is different from the standard, replace PCBA,

#### Checking method



**! Caution :** When the measurement is made in the state that the electricity is applied, check the tester for being in the measurement mode and be careful to avoid possible short of the parts other than the measuring part.

#### ■ Current Detection Circuit Check Point

구분	Compressor Phase Current Detection
2/2.5kW	
4kW	

구분	Compressor Phase Current Detection
5kW	
6kW	

구분	Compressor Phase Current Detection
7kW	

### 3.6.6 4-Way Valve Check

Purpose	Judge whether the 4-way valve part has any fault.	Items for checking	1. Check the working voltage of the 4-way valve. 2. Check the 4-way valve coil resistance.
---------	---	--------------------	---

#### ■ Checking the output voltage of CN-4way (refer to next page)

1. Set the tester in AC Voltage Mode and check the current.
2. Check the output voltage between both ends of CN-4Way Connector.
3. The standard of normal voltage is  $220V \pm 10\%$ .
4. If the measurement is different from the standard, replace PCBA.

※ The measurement should be made at the time to start heating mode operation and at the time of standby after operation.

#### ■ Check the 4-way.valve coil resistance.

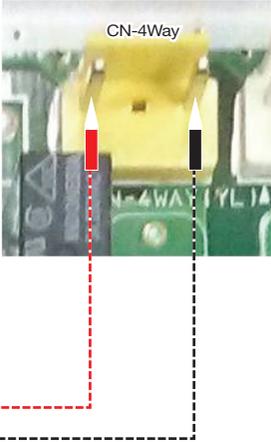
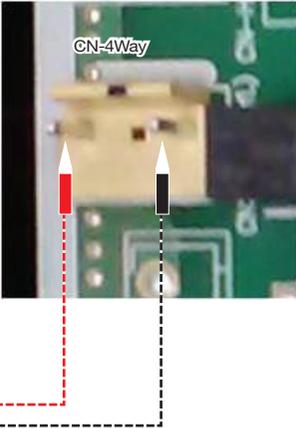
1. Set the tester in Resistance Mode and check the current.
2. Measure the resistance between the both ends of a single unit of 4-Way valve coil.
3. The standard of normal resistance is  $14k\Omega \pm 10\%$ .
4. If the measurement is different from the standard, replace 4-Way valve coil.

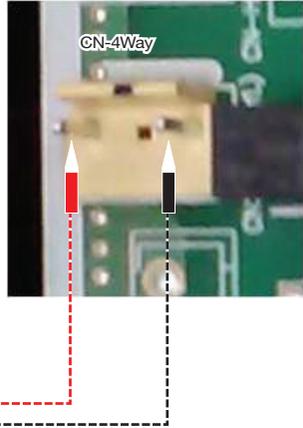


**! Caution :** When the measurement is made in the state that the electricity is applied, check the tester for being in the measurement mode and be careful to avoid possible short of the parts other than the measuring part.

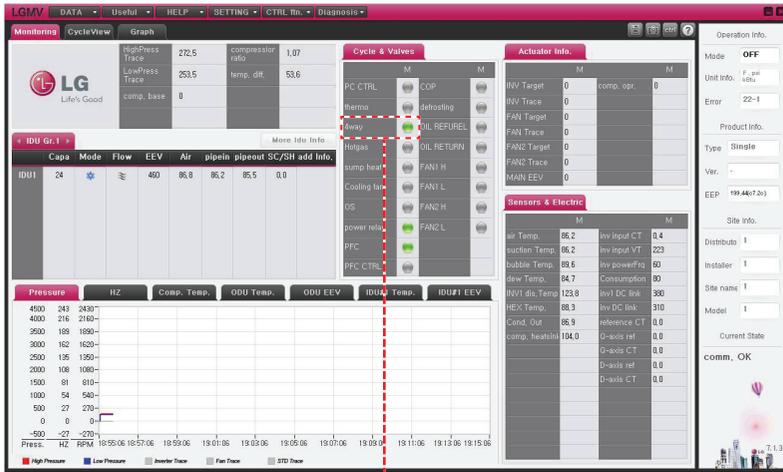
### ■ 4-Way Check Point

구분	4Way Check	
2/2.5kW		
4kW		

구분	Compressor Phase Current Detection	
5kW		
6kW		

구분	Compressor Phase Current Detection	
7kW	 <p data-bbox="1193 514 1284 535">Main PCB</p>	

## ■ LGMV Display

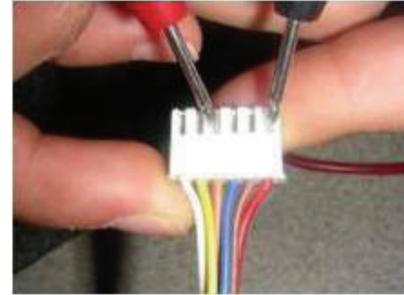


When Heating, LED turn on  
When Cooling, LED turn off

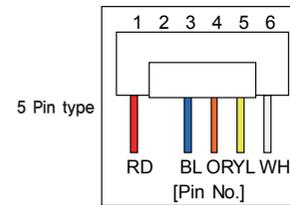
## 3.6.7 EEV Check

Purpose	Judging EEV part fault,	Items for checking	1. Measure EEV resistance,
---------	-------------------------	--------------------	----------------------------

### ■ Checking EEV resistance

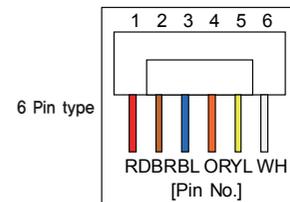


1. Set the tester in Resistance Mode and check the current,
2. Measure the resistance between eth Pins of EEV Connector,
3. For the measurement method and normal standard, refer to the Table,



[Table]

Measurement Pin	Normal Standard
1-3	45Ω±5Ω
1-4	45Ω±5Ω
1-5	45Ω±5Ω
1-6	45Ω±5Ω



[Table]

Measurement Pin	Normal Standard
1-4	45Ω±5Ω
1-6	45Ω±5Ω
2-3	45Ω±5Ω
2-5	45Ω±5Ω

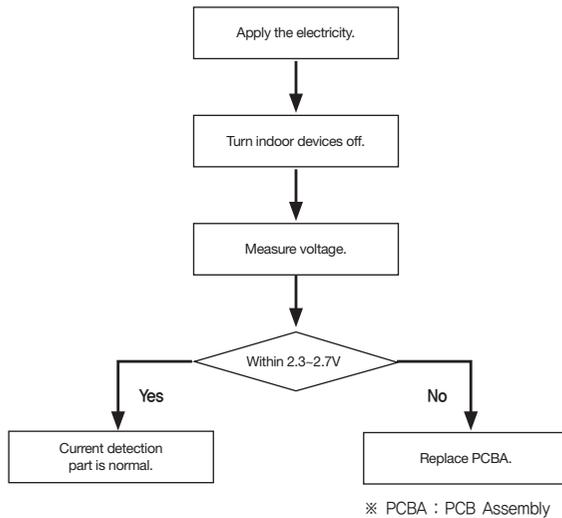
※ There may be the difference in the resistance depending upon the EEV Specifications,

### 3.6.8 DC Link Detection Circuit

<b>Purpose</b>	Generation of an error caused by DC link voltage detection error.	<b>Items for checking</b>	1. Checking DC link voltage detection error
----------------	---	---------------------------	---

1. Set the tester in DC Voltage Mode and check the current.
2. Checking the voltage between DC/L and Micom\_GND.
3. The standard of normal voltage measurement is 2.4~2.8V.
4. If the measurement is different from the standard, replace PCBA.

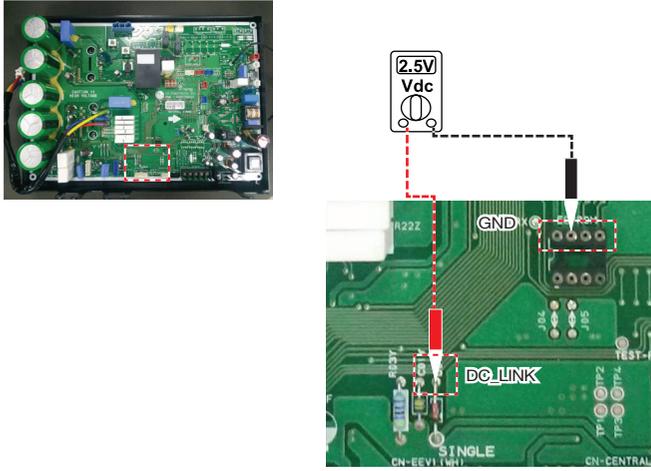
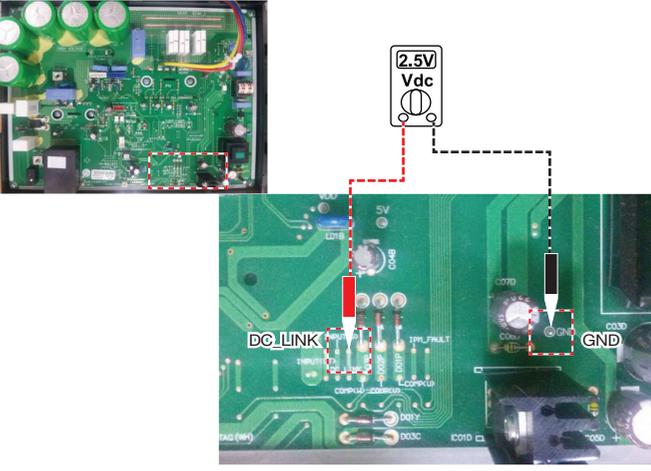
#### Checking method

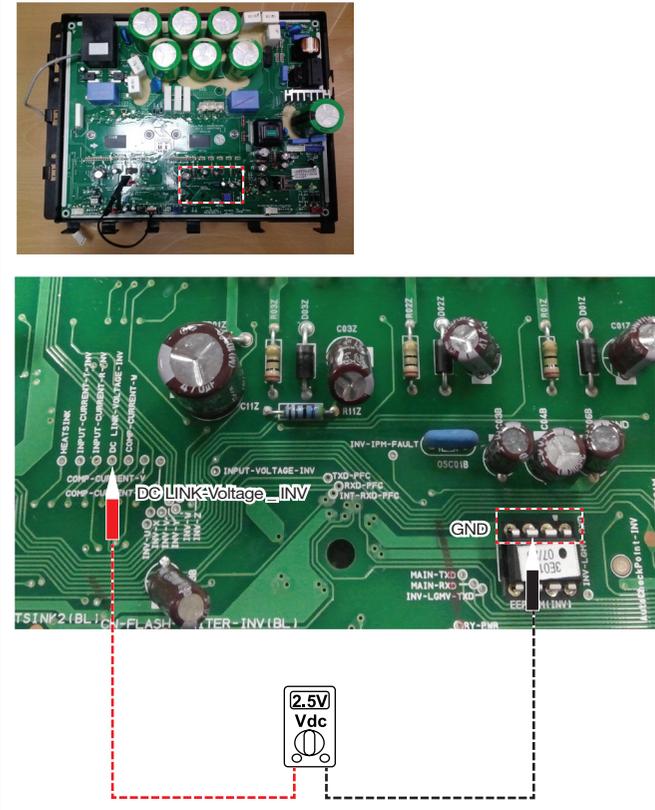


**! Caution :** When the measurement is made in the state that the electricity is applied, check the tester for being in the measurement mode and be careful to avoid possible short of the parts other than the measuring part.

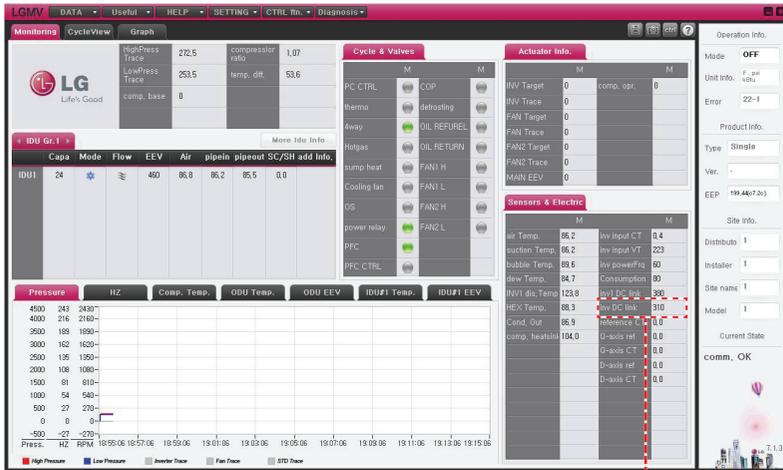
### ■ DC Link Detection Circuit Check Point

구분	DC Link Detection Circuit Check Point
2/2.5kW	
4kW	

구분	DC Link Detection Circuit Check Point
5kW	 <p>The image shows the DC link detection circuit for a 5kW unit. It includes a top-down view of the PCB and a close-up of the DC_LINK area. A 2.5V Vdc probe is connected to the DC_LINK node and a GND point. The DC_LINK node is labeled 'DC_LINK' and is connected to a 'SINGLE' terminal. The GND point is labeled 'GND'.</p>
6kW	 <p>The image shows the DC link detection circuit for a 6kW unit. It includes a top-down view of the PCB and a close-up of the DC_LINK area. A 2.5V Vdc probe is connected to the DC_LINK node and a GND point. The DC_LINK node is labeled 'DC_LINK' and is connected to a 'SINGLE' terminal. The GND point is labeled 'GND'.</p>

구분	DC Link Detection Circuit Check Point
7kW	 <p>The image shows the DC link detection circuit for a 7kW unit. It includes a top-down view of the PCB and a close-up of the DC_LINK area. A 2.5V Vdc probe is connected to the DC_LINK node and a GND point. The DC_LINK node is labeled 'DC LINK Voltage_INV' and is connected to a 'SINGLE' terminal. The GND point is labeled 'GND'.</p>

## ■ LGMV Check Point



Inv DC link 310

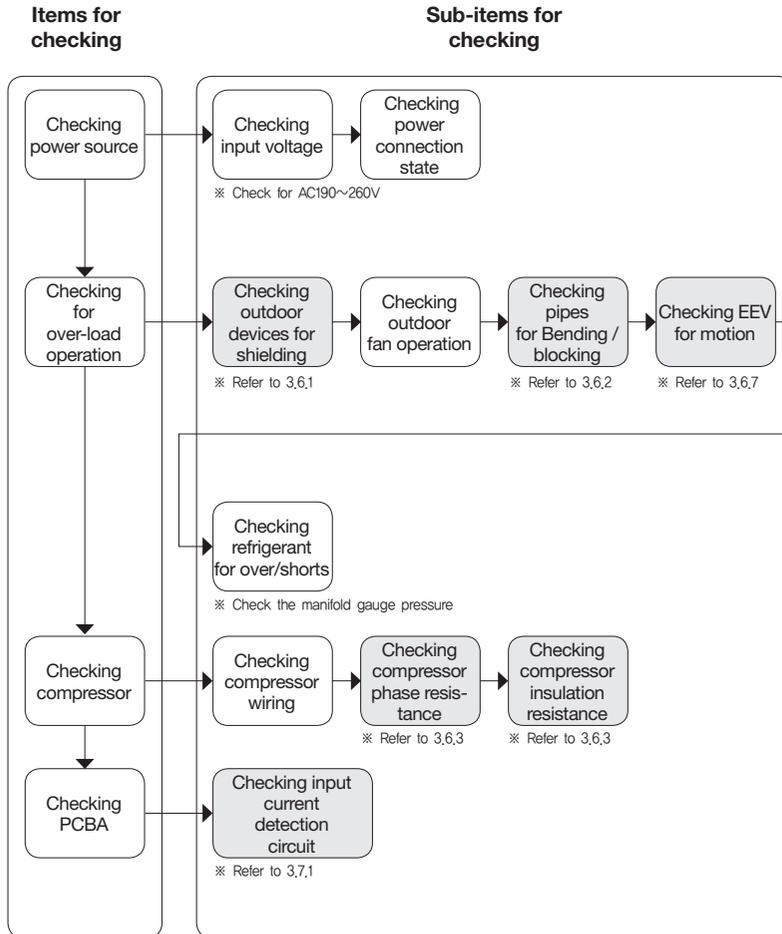
### DC Link NG Voltage level

Controller	Voltage
2~6kW	140V
7kW	380V

## 3.7 CH22 (Input of Over Current)

Items	Contents	
Purpose	Prevention of the damage of PCBA, wire, and connector caused by over-current	
Condition for Generation	The detected current exceeds the standard.	
Expected Causes	Installation & Overload	Installation fault, closing of SVC valve, under/over charging with refrigerant, infiltration of water into refrigerant, outdoor device shielding, outdoor fan fault, EEV valve fault, and sensor fault or assembling error.
	Compressor	Short between compressor coil and sash, abrasion of compressor, and short/opening of compressor coil.
	PCB Assembly	Input current detection circuit fault.
	Others	Input of low-voltage.

## Flow of trouble diagnosis

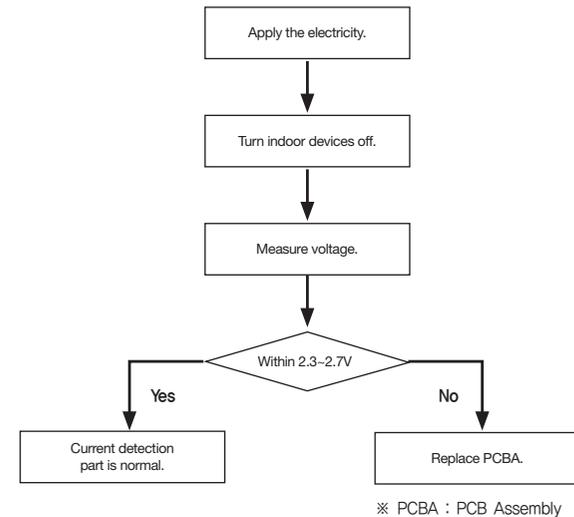


## 3.7.1 Input Current Detection Circuit

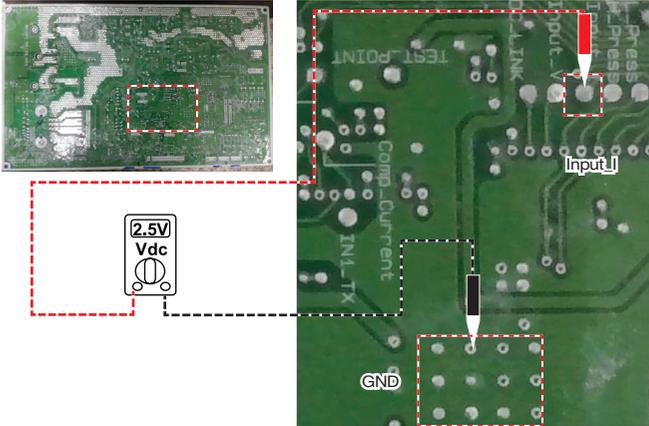
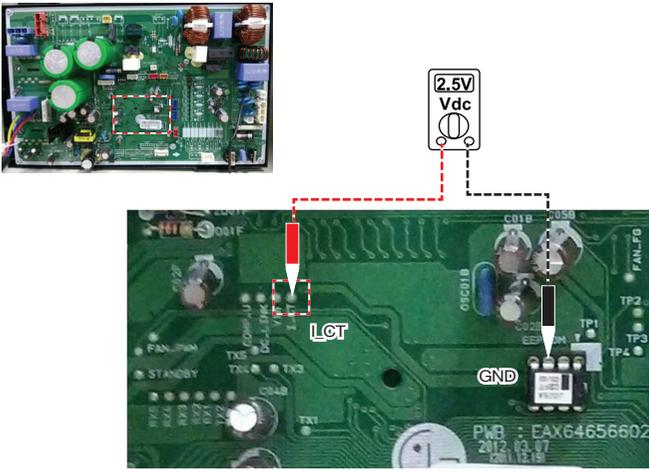
Purpose	Generation of over-current caused by input current detection error.
Items for checking	1. Checking for current detection error

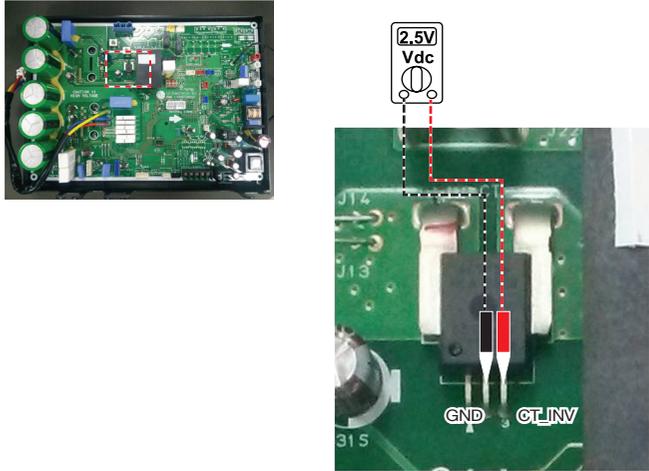
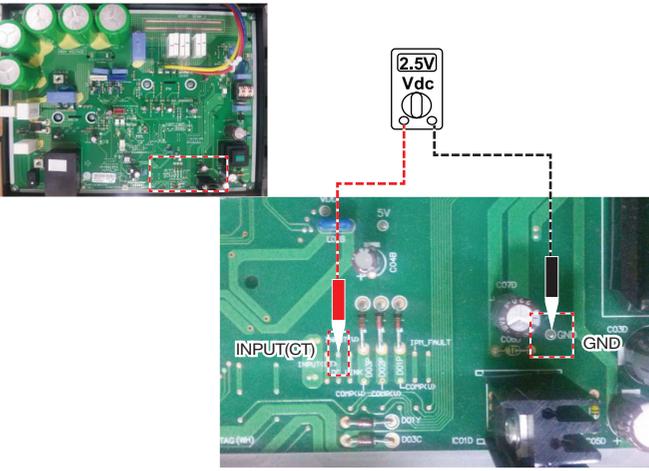
1. Set the tester in DC Voltage Mode and check the current.
2. Check the current between IN/I and Micom\_GND.
3. The standard of normal voltage measurement is  $2.5V \pm 0.2V$ .
4. If the measurement is different from the standard, replace PCBA.

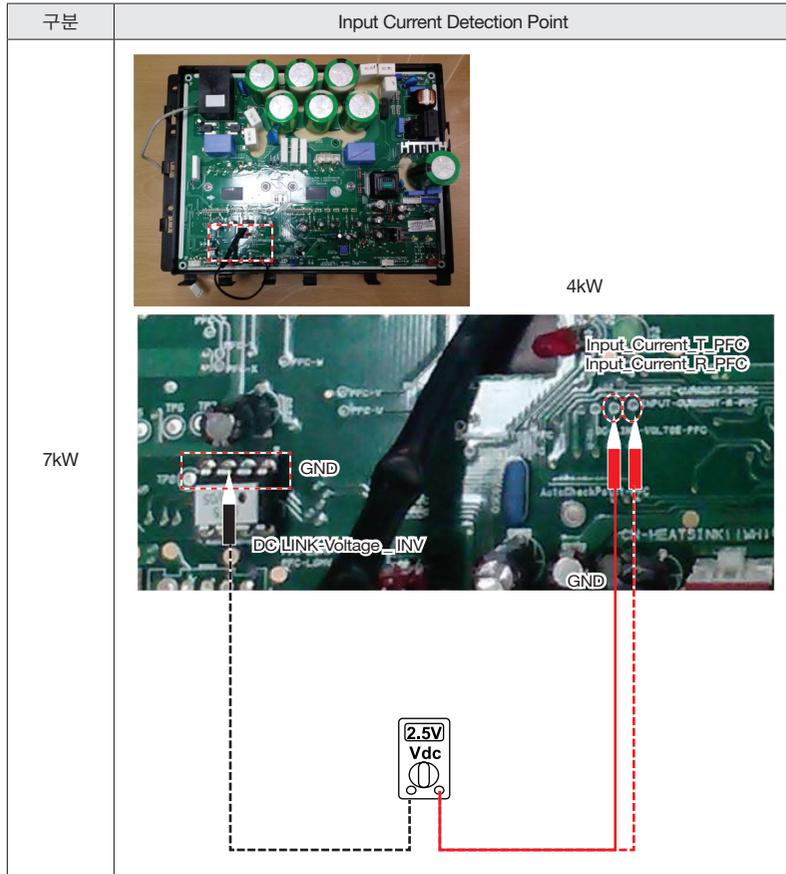
## Checking method



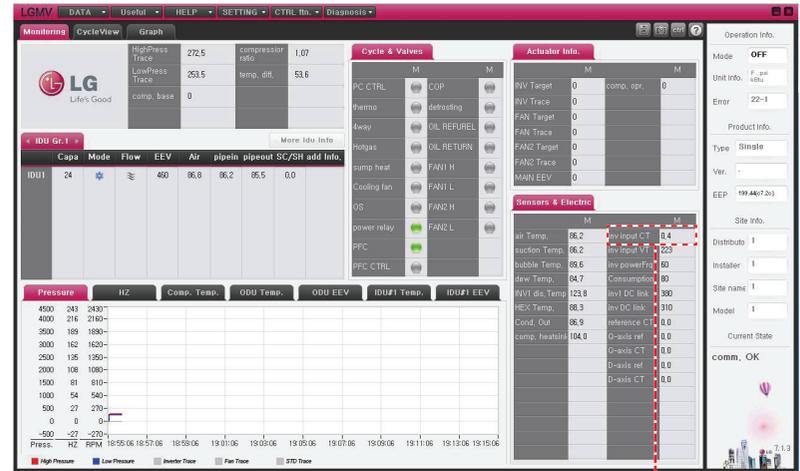
**! Caution :** When the measurement is made in the state that the electricity is applied, check the tester for being in the measurement mode and be careful to avoid possible short of the parts other than the measuring part.

구분	Input Current Detection Point
2/2.5kW	
4kW	

구분	Input Current Detection Point
5kW	
6kW	



## ■ LGMV Display



inv input CT 0.4

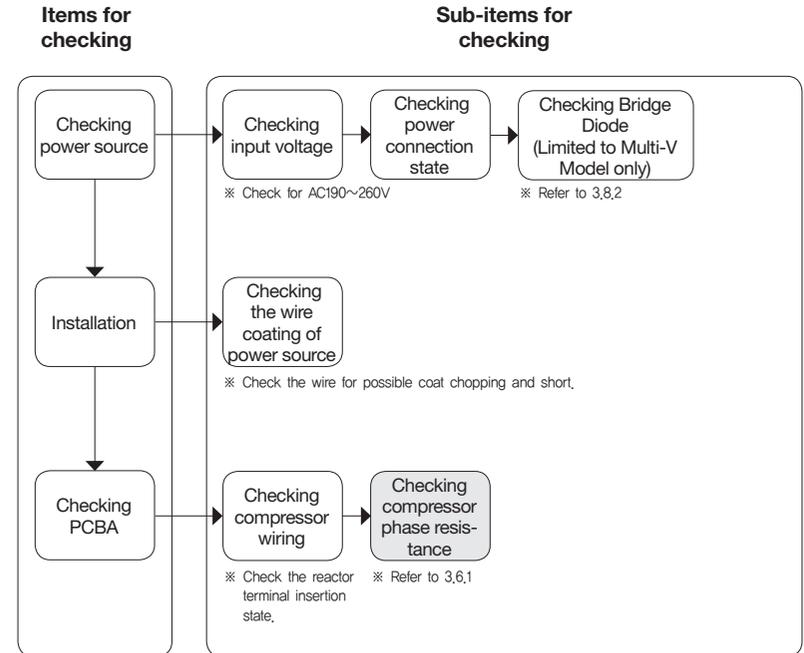
### CH22 error condition

Controller	Current Level
2kW	9A ↑
2.5kW	11A ↑
4kW	19A ↑
5kW	29A ↑
6kW	29A ↑
7kW	13A ↑

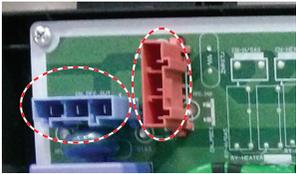
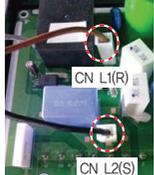
### 3.8 CH23 (DC Link Voltage Low)

Items		Contents
Purpose		Securing the credibility of the compressor lifetime against the generation of over-current at the compressor part in the DC Link Low Voltage condition.
Condition for Generation		Detected DC Link Voltage is less than the standard.
Expected Causes	Installation	Installation fault and input of low-voltage power
	PCB Assembly	Damage of DC link voltage detection circuit and reactor terminal connection error

### Flow of trouble diagnosis



### 3.8.1 Checking Reactor Connection

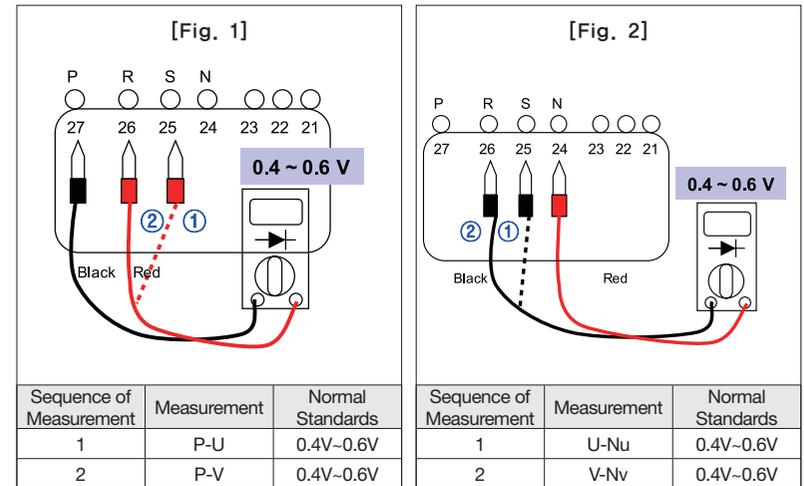
구분	Reactor Connector Point	
2/2.5kW		
4kW		
5kW		 Brown Wire is connected AC(L) Terminal, Blue Wire is connected AC(N) Terminal.
6kW		 Brown Wire is connected CN(L) Terminal, Blue Wire is connected CN(N) Terminal.
7kW		 Brown Wire is connected CN L1(R) Terminal, Black Wire is connected CN L2(S) Terminal.

### 3.8.2 Checking PFCM (PCBA : 4,5,6kW)

Purpose	Items for checking
Checking Bridge Diode parts for fault,	1. Checking PFCM for damage

#### ■ How to check PFCM IGBT (Diode Mode)

1. Remove the connector from PCB,
2. Set the Multi-Tester as Diode Voltage Measurement Mode, ( → )
3. Measure the voltage as shown in Fig. 1,
4. Measure the voltage as shown in Fig. 2,
5. If the measurements are significantly different from the levels shown in the figures, the PFCM is deemed to be damaged.

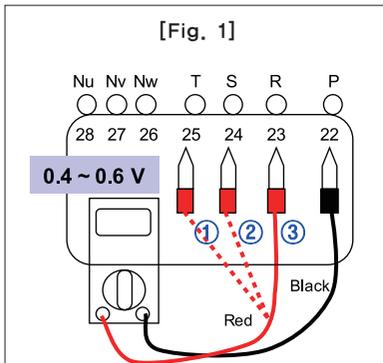


### 3.8.2 Checking PFCM (PCBA : 7kW)

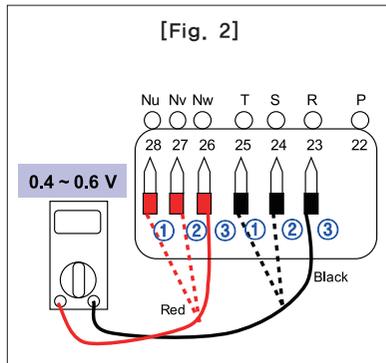
Purpose	Checking Bridge Diode parts for fault,	Items for checking	1. Checking PFCM for damage
---------	--	--------------------	-----------------------------

#### ■ How to check PFCM IGBT (Diode Mode)

1. Remove the connector from PCB,
2. Set the Multi-Tester as Diode Voltage Measurement Mode, (  $\rightarrow$  )
3. Measure the voltages of P~R / P~S / P~T as shown in Fig. 1,
4. Measure the voltages of T~Nu / S~Nv / R~Nw as shown in Fig. 2,
5. If the measurements are significantly different from the levels shown in the figures, the IPM is deemed to be damaged.



Sequence of Measurement	Measurement	Normal Standards
1	P-U	0.4V~0.6V
2	P-V	0.4V~0.6V
3	P-W	0.4V~0.6V

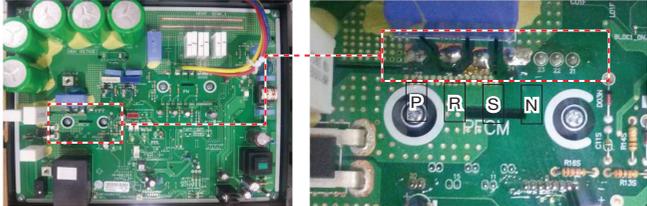
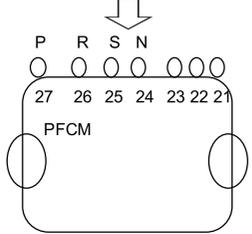
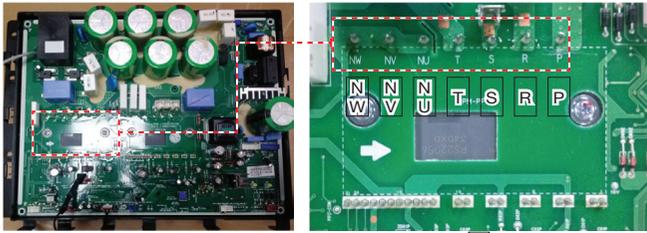
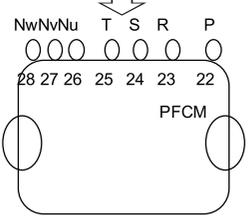


Sequence of Measurement	Measurement	Normal Standards
1	U~Nu	0.4V~0.6V
2	V~Nv	0.4V~0.6V
3	W~Nw	0.4V~0.6V

#### ■ PFCM Point

구분	PFCM Point
4kW	<p>[PFCM Pin Arrangement and Pin Numbers]</p>
5kW	<p>[PFCM Pin Arrangement and Pin Numbers]</p>

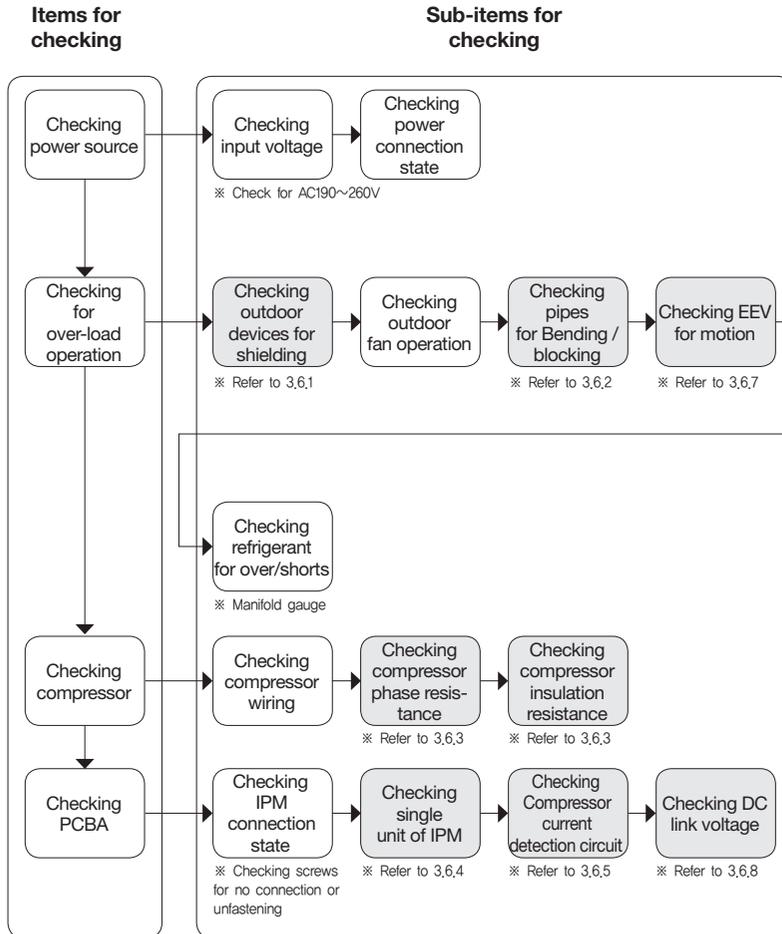
## ■ PFCM Point

구분	IPM Check Point
6kW	  <p>[PFCM Pin Arrangement and Pin Numbers]</p>
7kW	  <p>[PFCM Pin Arrangement and Pin Numbers]</p>

## 3.9 CH26 (Compressor Starting Failure)

Items	Contents	
Purpose	Restarting of the compressor when it does not properly work.	
Condition for Generation	① The compressor current exceeds the standard at initial starting. ② The compressor current does not reach the standard at initial starting. ③ The compressor frequency does not reach the standard at initial starting.	
Expected Causes	Installation & Overload	Closing of SVC valve, under/over charging with refrigerant, infiltration of water into refrigerant, outdoor device shielding, outdoor fan fault, EEV valve fault, and sensor fault or assembling error
	Compressor	Open/Short of the coil in the compressor, insulation breaking between the coil in the compressor and the sash, damage of compressor with abrasion, and compressor connection fault
	PCB Assembly	IPM parts fault, compressor current detection circuit fault, and DC link detection circuit fault
	Others	Input of abnormal power, IPM connection fault, and power connection fault

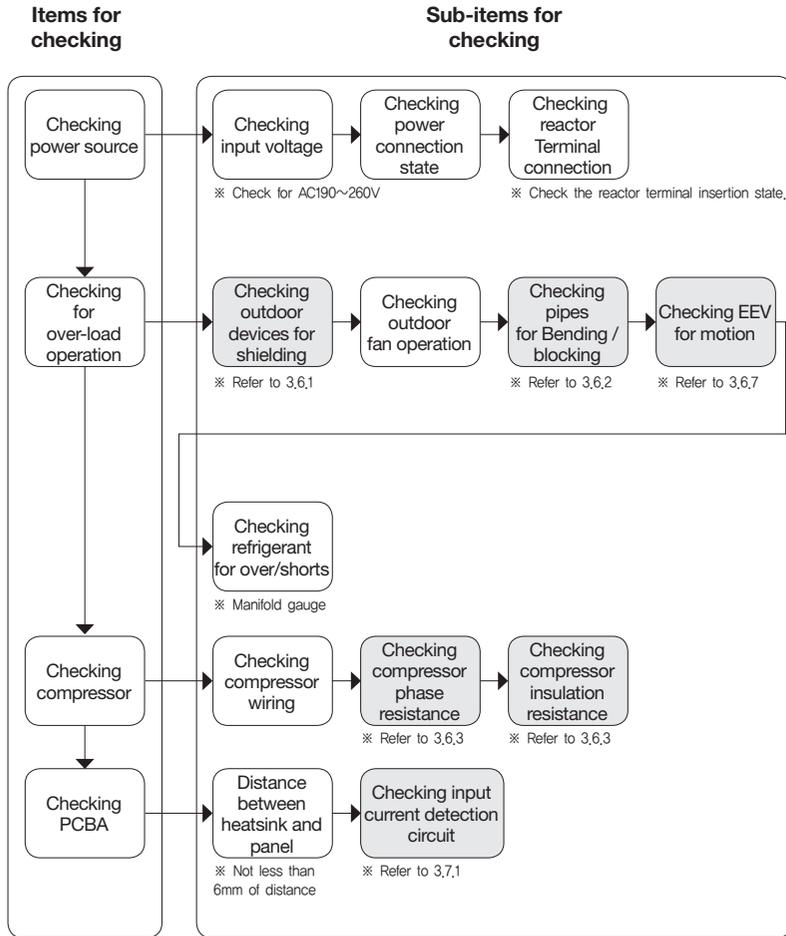
## Flow of trouble diagnosis



## 3.10 CH27/73 (PSC/PFC Fault Error)

Items	Contents	
Purpose	Prevention of the damage of PCBA, wire, and connector caused by over-current	
Condition for Generation	Transfer of signals with detection of the flow of over-current in PSC/PFC	
Expected Causes	Installation & Overload	Transfer of signals with detection of the flow of over-current in PSC/PFC, Outdoor device shielding
	Compressor	Open/Short of the coil in the compressor, insulation breaking between the coil in the compressor and the sash, damage of compressor with abrasion, and compressor connection fault
	PCB Assembly	Damage of PSCM/PFCM and input current detection circuit fault
	Others	Input of abnormal power, power connection fault, reactor terminal connection fault, and faulty distance between heatsink and sash

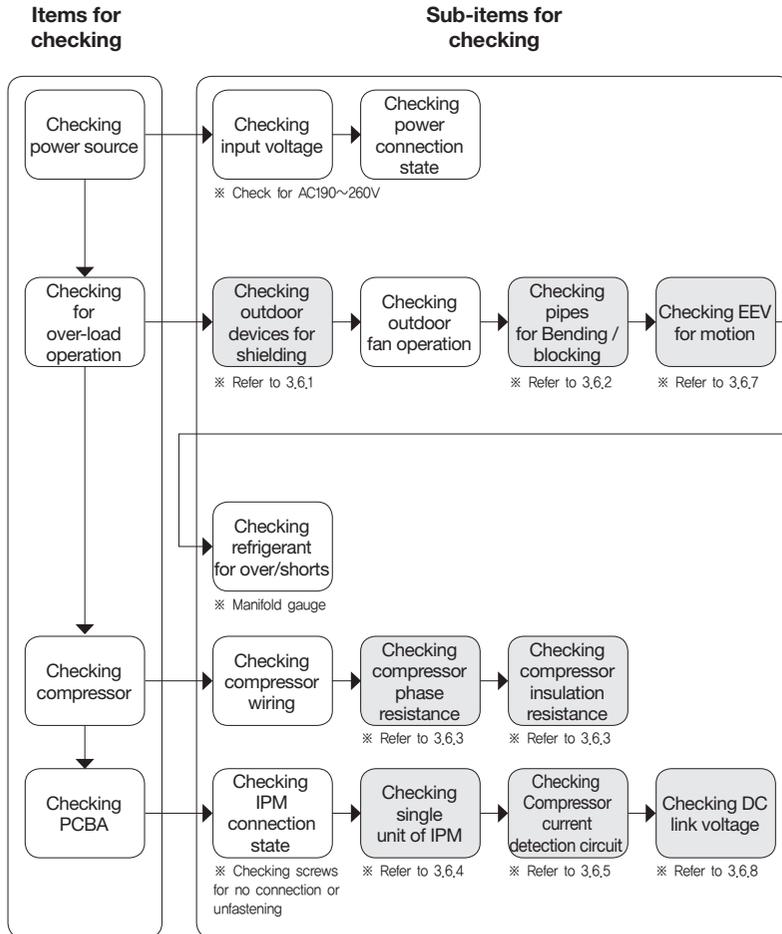
## Flow of trouble diagnosis



## 3.11 CH29 (Compressor Over Current)

Items	Contents	
Purpose	Protection of IPM and compressor in the PCB assembly from over-current.	
Condition for Generation	Increased compressor current exceeding the standard.	
Expected Causes	Installation & Overload	Transfer of signals with detection of the flow of over-current in PSC/PFC, blocking of a outdoor unit.
	Compressor	Open/Short of the coil in the compressor, insulation breaking between the coil in the compressor and the sash, damage of compressor with abrasion, and compressor connection fault
	PCB Assembly	Compressor current detection circuit fault, DC link detection circuit fault, and fault of single unit of IPM
	Others	Input of abnormal power and power connection fault

## Flow of trouble diagnosis

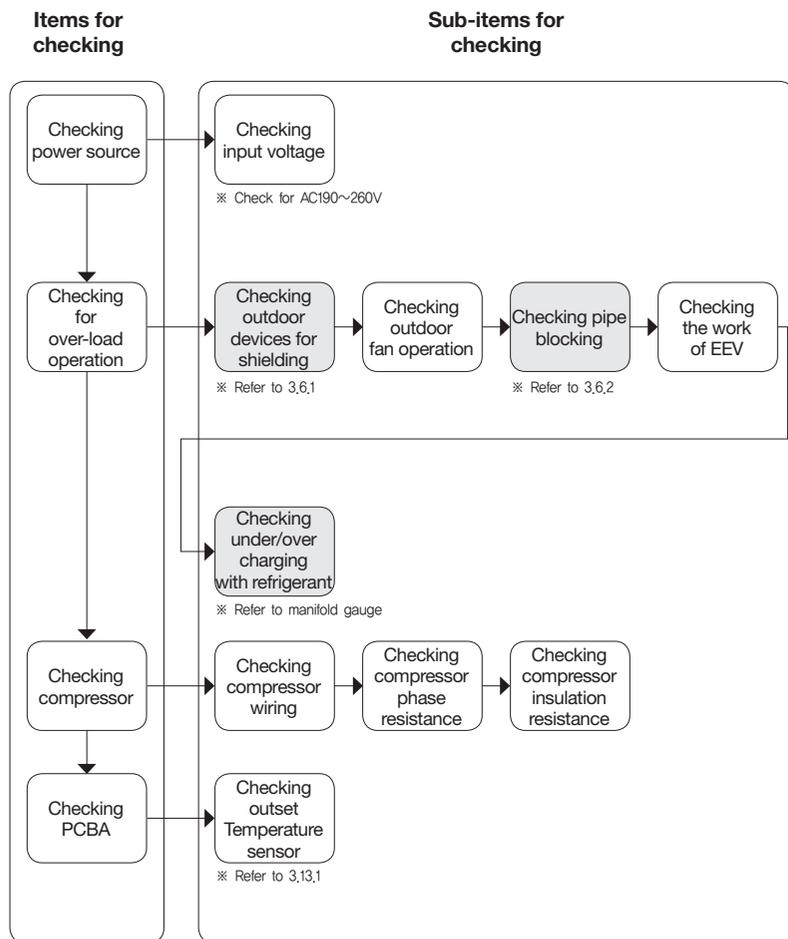


## 3.12 CH32(Discharge pipe overheating error of Inverter)

Items	Contents	
Purpose	Possible damage of compressor and piping due to high discharge temperature	
Condition for Generation	The discharge temperature is elevated exceeding the standard.	
Expected Causes	Installation	Installation fault, closing of SVC valve, under/over charging with refrigerant, and infiltration of moisture into refrigerant
	Overload	Outdoor device shielding, outdoor fan fault, and EEV valve fault
	Compressor	Short between compressor coil and sash, abrasion of compressor, and short/opening of compressor coil
	PCB Assembly	Compressor current and DC link voltage detection circuit fault
	Sensor	Discharge temperature sensor fault

※ IPM (Intelligent Power Module) : The part to control the inverter compressor

## Flow of trouble diagnosis



## 3.13 Checking Temperature Sensor Open/Short

Items	Contents
Purpose	Prevention of reception of wrong temperature value from the temperature sensor
Condition for Generation	Damage of temperature sensor (Short / Open)

### ■ Cause of Temperature Sensor Error

Classification	Causes in Detail
PCB Assembly	Connector open, damaged insulation of sash, damage of the wire coating of temperature sensors

Code No.	Details of Errors
41	Inverter Discharge temperature sensor Open/Short
43	High pressure Sensor Error
44	Outdoor air temperature sensor Open/Short
45	Outdoor piping temperature sensor Open/Short
46	Outdoor suction temperature sensor Open/Short
47	Constant rate outlet temperature sensor Open/Short

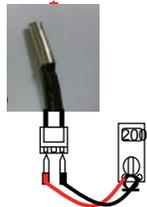
- Uses of sensors  
: Control of compressor and cycle
- Kinds of Sensors (See corresponding pages)  
Outlet :  $200K\Omega \pm 10\%$   
Piping :  $5K\Omega \pm 10\%$   
Air :  $10K\Omega \pm 10\%$   
(Based on  $25^{\circ}\text{C}$  of surrounding temperature)
- Sensor insulation resistance  
: The resistance between the sash and sensor terminal should be not less than  $1M\Omega$ .
- Pressure sensor : Refer to the page 230

### 3.13.1 Sensor Checking Methods

Purpose	Checking single units of sensors for fault	Items for checking	Measurement of the unique resistance by sensor temperature.
---------	--	--------------------	---

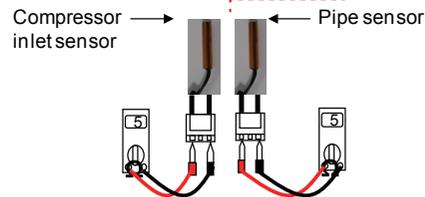
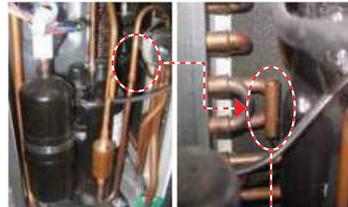
#### ① Compressor discharge sensor

- Position : Outlet of compressor
- Sensor value :  $200k\Omega \pm 10\%$   
(Based on 25°C)



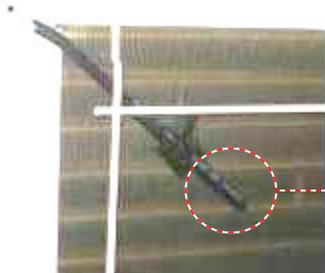
#### ② Pipe sensor

- Position : Compressor inlet and pipe
- Sensor value :  $5k\Omega \pm 10\%$   
(Based on 25°C)



#### ③ Outdoor temperature sensor

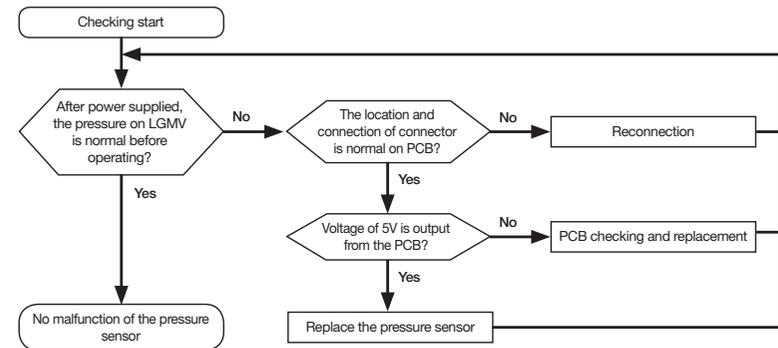
- Position : Rear part of outdoor device
- Sensor value :  $10k\Omega \pm 10\%$   
(Based on 25°C)



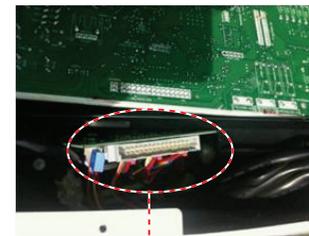
Purpose	Checking single units of sensors for fault	Items for checking	Measurement of the unique resistance by sensor temperature.
---------	--	--------------------	---

#### ④ Pressure sensor

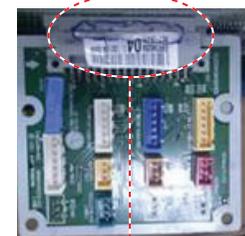
- Position : Outlet of 4-way valve (based on cooling mode)
- Sensor value : [Refer to the page 224](#)



- In case of Multi models (A3UW18GFA0, A3UW21GFA0), check the ejection of Sub PCB.



Ejection of sub PCB



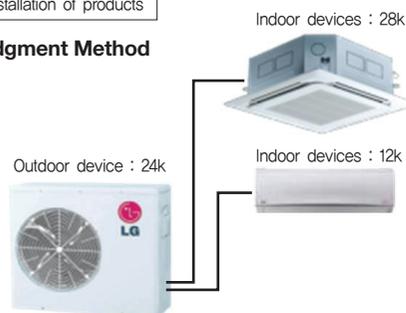
Insert the sub PCB to the Main PCB

### 3.14 CH51 (Indoor Device Connection Error)

Items	Contents
Purpose	Prevention of installation of indoor devices exceeding the capacity of outdoor device
Condition for Generation	Connection of indoor devices exceeding the guaranteed capacity of outdoor device

Re-installation of products

#### ■ Judgment Method



Product guarantee : 150%  
(Percentage is different from each model)

Model Name	"Maximum total capacity"
MU2M15	21
MU2M17	24
MU3M19	30
MU3M21	33
MU4M25	39
MU4M27	41
MU5M30	48
MU5M40	52
FM40AH	52
FM48AH	63
FM56AH	73
FM41AH	54
FM49AH	63
FM57AH	73

- 1) Selection of the possible capacity to be combined with the outdoor device

$$= \frac{24k}{(\text{Outdoor device capacity})} * \frac{1.5}{(\text{Product guarantee})} = 36k$$

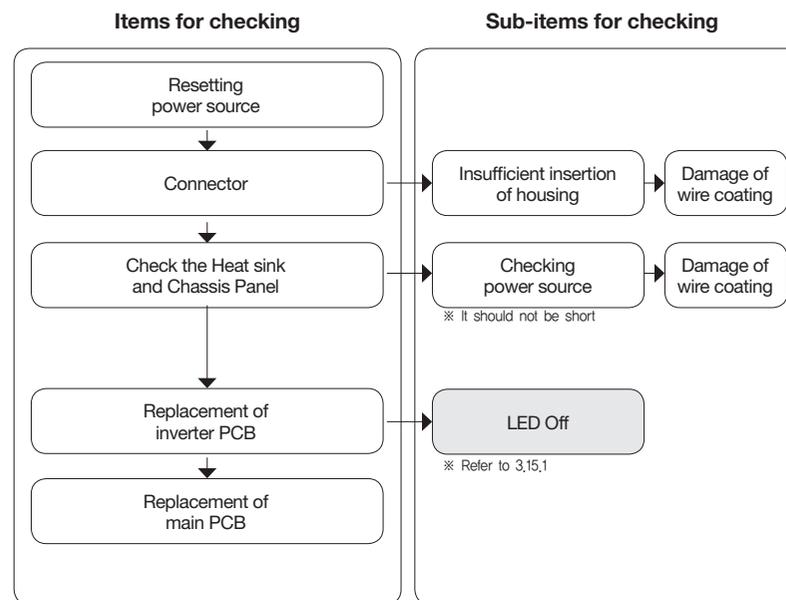
- 2) Indoor device capacity  
= 28k + 12k = 40k

➔ Total capacity of indoor devices (40k) exceeds the maximum combination capacity of the outdoor device (36k).  
→ CH51(Indoor Device Over-Connection Error)

### 3.15 CH52(PCB Communication Error)

Items	Contents
Purpose	Checking the communication state between Main PCB and Inverter PCB
Condition for Generation	Generation of noise source interfering with communication

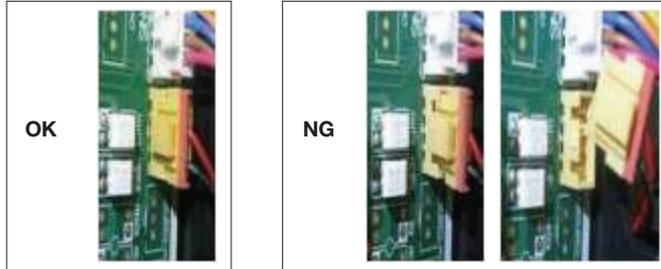
Resetting power source: Wait for 3 minutes after turning the power of the product off.



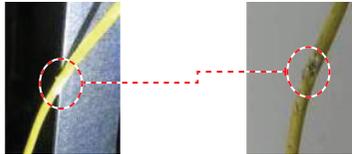
### 3.15.1 Environment interfering PCB communication

Purpose	Installation environment interfering the communication	Items for checking	Checking method of faulty points
---------	--	--------------------	----------------------------------

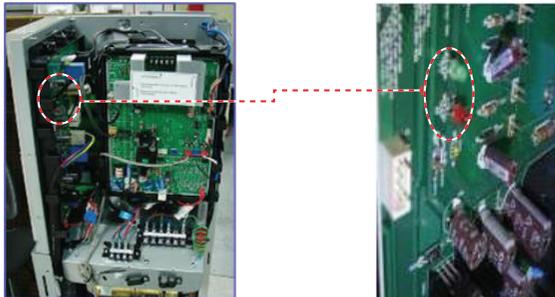
#### ① Insufficient insertion of wires



#### ② Damage of wire coating : Interference with wires or wire coating damage with chopping



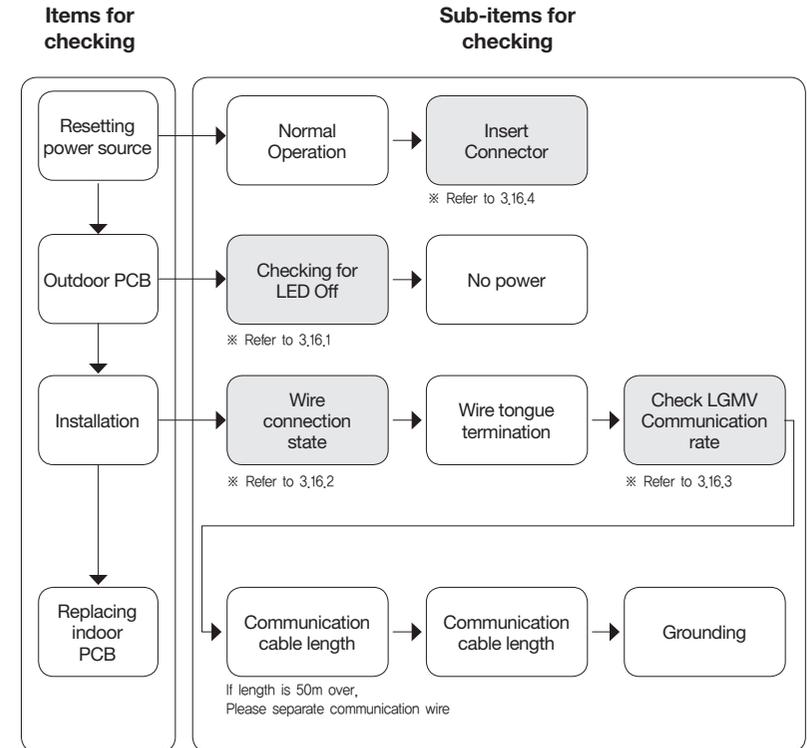
#### ③ Inverter PCB LED : Replacement of inverter PCB during LED Off after resetting



### 3.1.6 CH05/53(Indoor/Outdoor Device Communication Error) ⇒ Detection by indoor devices

Items	Contents
Purpose	Checking for smooth data sending/receiving between indoor/outdoor devices
Condition for Generation	Damage and installation of outdoor device PCB

Resetting power source: Wait for 3 minutes after turning the power of the product off.



### 3.16.1 Checking Method of Outdoor PCB

Purpose	Checking whether outdoor PCB is normal	Items for checking	Lighting of LED, fuse damage, and reactor connection error
---------	--	--------------------	--

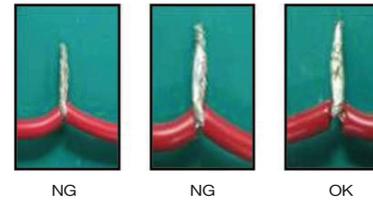
- ① Check reactor connection state,
- ② Check fuse state
- ③ Check whether outdoor PCB LED is lighted,

구분	Fuse Point	
2/2.5kW		
4kW		
5kW		C/Box Fuse 
6kW		
7kW		C/Box Fuse 

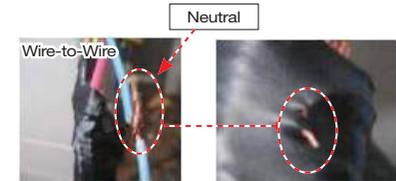
### 3.16.2 Installation environment interfering with the communication of indoor/outdoor devices

Purpose	Installation environment interfering the communication	Items for checking	Check installation error points
---------	--	--------------------	---------------------------------

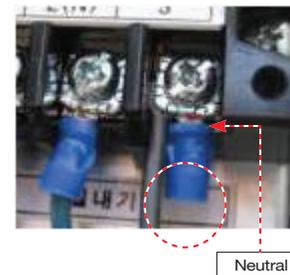
- ① The communication lines of the indoor /outdoor devices are installed by wire-to-wire method.  
: In case of additional connection, connect the wires with soldering as shown below.



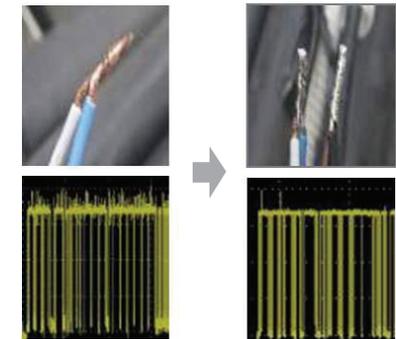
- ③ The cut section of the wire passes the insulation tape and causes a short with another wire.



- ② Wire tongue-termination fault.



- ④ Communication noise by oxidized wire arrangement : Soldering is required.

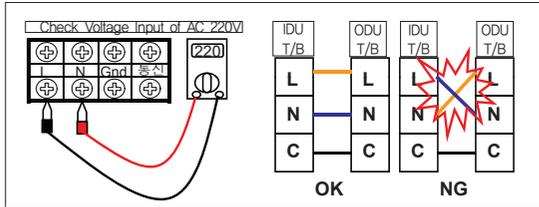


1) Check Voltage Input of AC 220V, Indoor & Outdoor Communication  
When Input AC 220V,

Equipment : Multi-Meter  
Test Mode : AC Voltage  
Indoor & Outdoor Terminal block



- Check AC 220V Live ↔ Neutral, Indoor & Outdoor
- Otherwise, arrange the Communication Wire, Check AC 220V

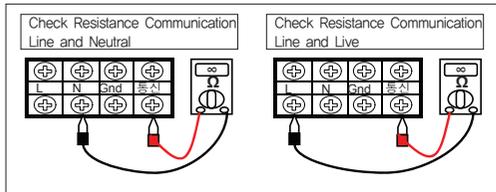


Equipment: Multi-Meter  
Test Mode : Resistance

2) Check electric short Communication Line and Power Line

After Removing Power Line Wire and Communication Line Wire, Check the voltages

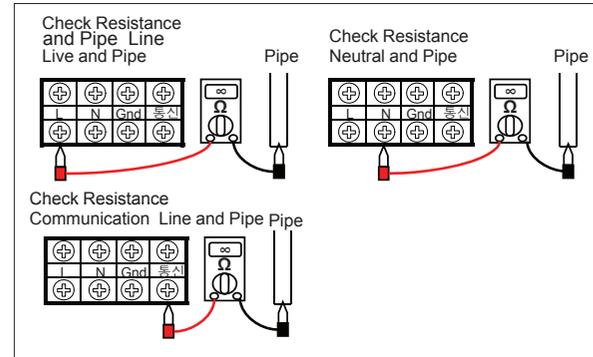
- Check resistance Communication ↔ Live should be infinite
- Check resistance Communication ↔ Neutral should be infinite
- Check resistance Communication ↔ Gnd should be infinite



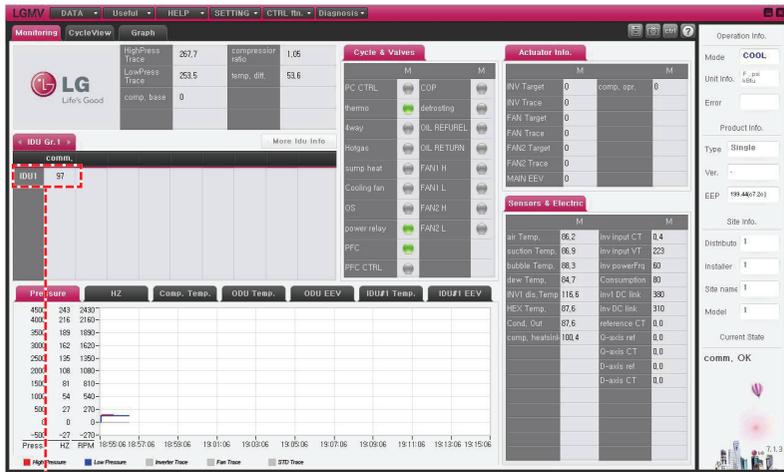
3) Check electric leakage Communication Line and Pipe

After Removing Power Line Wire and Communication Line Wire, Check the voltages

- Check Infinite Resistance between Power /Communication Line and Pipe Line



### 3.16.3 Check LGMV Communication rate



Communication rate (Normally 90% ↑)

IDU1	97
------	----

### 3.16.4 How to measure for Environment Noise

- Applied Model : Multi/Single Outdoor PCBA (Refer to PCB P/no of attached file)
- Applied S/No : ~ 301xxxxxx (~ Jan, 2013)

#### 1. Symptom

- Outdoor unit cannot communicate with Indoor unit,
- Outdoor reset then work normal,  
: It happens intermittently
- LEDs for showing power-on and communication status are not on or not blinking in outdoor inverter PCBA

#### 2. Causes

- Noise disturb the outdoor unit communication with indoor unit

#### 3. Improvement

- Inserting small connector with capacitor in Inverter PCBA of Outdoor Unit  
1)Connector can be applied to the list(PCBA P/No) on the next page  
2)Guide where you put it on the next page
- It helps outdoor unit communicate with indoor unit better than before and reduce the noise level



[Connector with capacitor in CN\_Flash\_Writer or CN\_Flash]

[Phenomenon]



- 1) Red LED off
- 2) Red LED turn on but not blinking

[ PCBA P/NO]

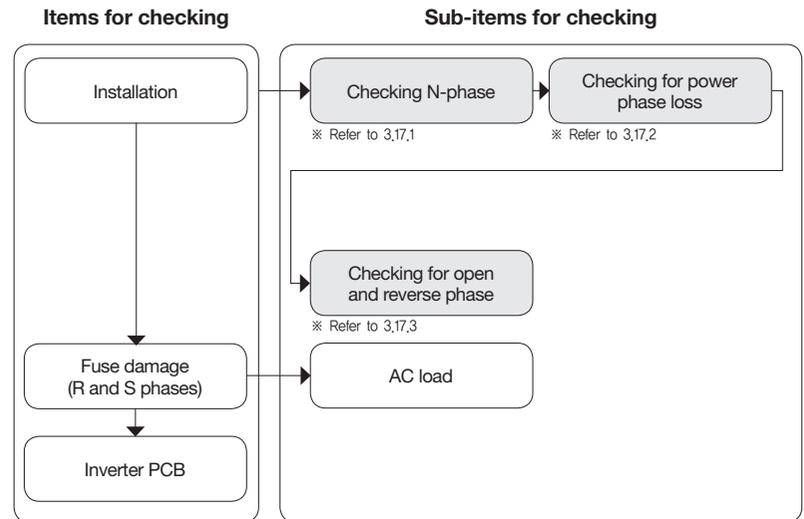
PCBA P/NO
EBR362668**
EBR356522** EBR481682** EBR610154** EBR614818** EBR633722** EBR652505** EBR683491** EBR723989**
EBR753611**
EBR741383**



### 3.17 CH54(Open and Reverse Phase Error)

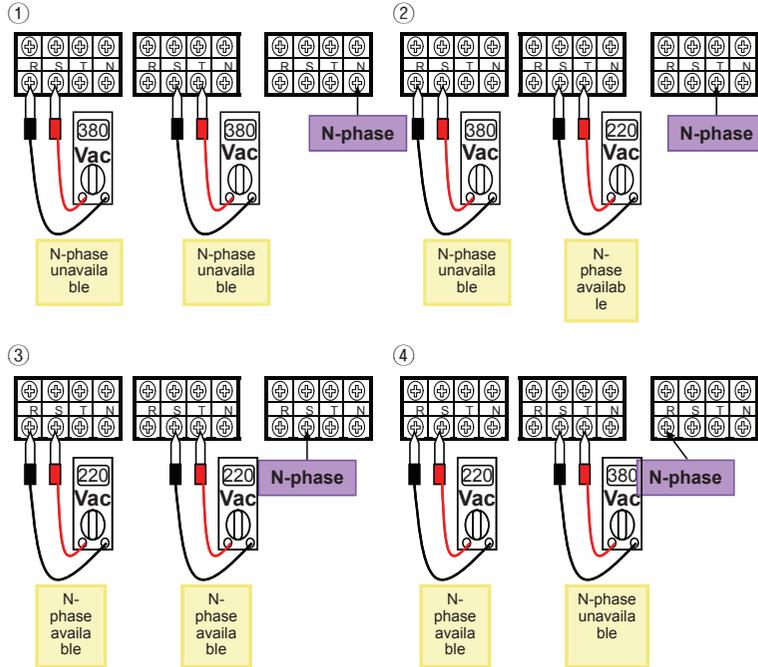
Items	Contents
Purpose	Prevention of phase unbalance and prevention of reverse rotation of constant-rate compressor
Condition for Generation	Main power wiring fault

Resetting power source: Wait for 3 minutes after turning the power of the product off.



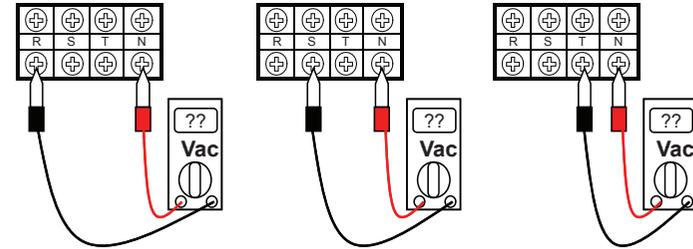
### 3.17.1 Judgment method of N-phase wiring error

Set the tester in AC voltage measurement mode (The part having wave pattern)



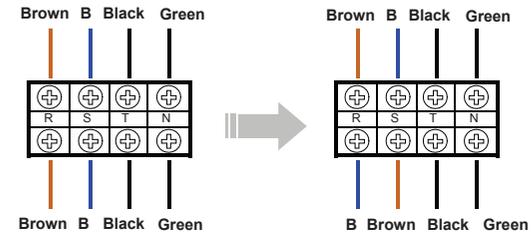
### 3.17.2 Judgment Method of R,S,T phase loss

- Set the tester in AC voltage measurement mode (The part having wave pattern)
- The part that does not generate voltage was upgraded,
- Power module requires checking..



### 3.17.3 Judgment method of open and reverse phase of R,S,T

- Operation with replacement of R and S phases only

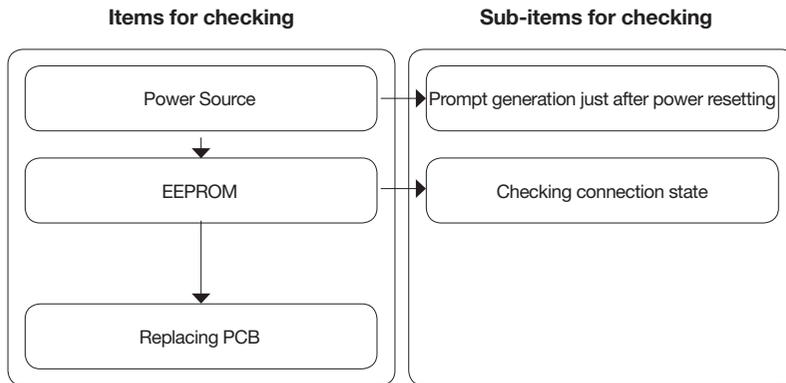


### 3.18 CH60(EEPROM Fault)

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

Items	Contents
Purpose	Prevention of application of wrong cycle data
Condition for Generation	Judgment of the error caused by noise and the fault of EEPROM connection

Resetting power source: Wait for 3 minutes after turning the power of the product off.



#### ■ How to check the EEPROM assembling state of outdoor devices

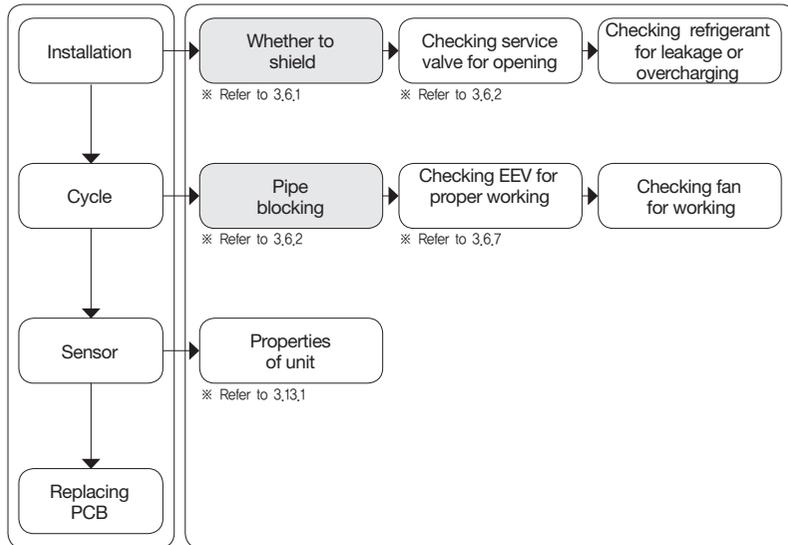
- ① Check the direction of EEPROM  
(Shape of marking line and direction of EEPROM)
- ② Check whether EEPROM is perfectly adhered.
- ③ Check whether EEPROM lead is put out of the outlet.

구분	EEPROM Position	
2/2.5kW		
4kW		
5kW		
6kW		
7kW		

### 3.19 CH61 (Condensor High Error)

Items	Contents
Purpose	Protection of compressor from elevated pressure and judgment whether to start defrosting
Condition for Generation	Shielding environment, cycle disorder, and sensor unit fault

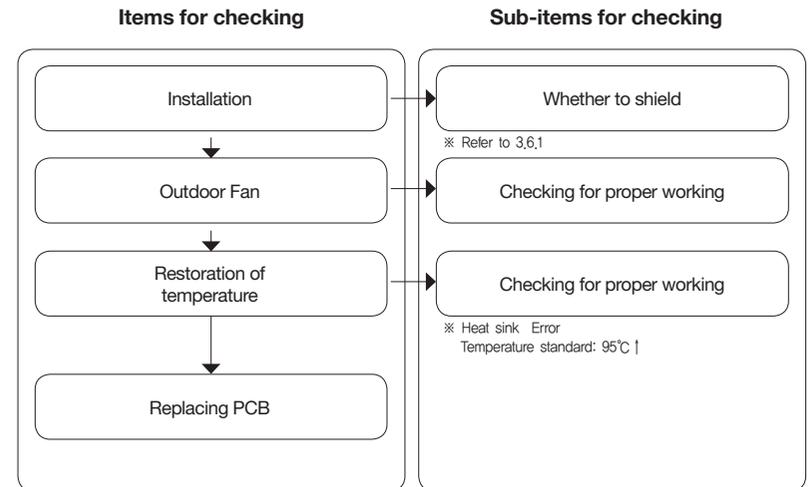
Resetting power source: Wait for 3 minutes after turning the power of the product off.



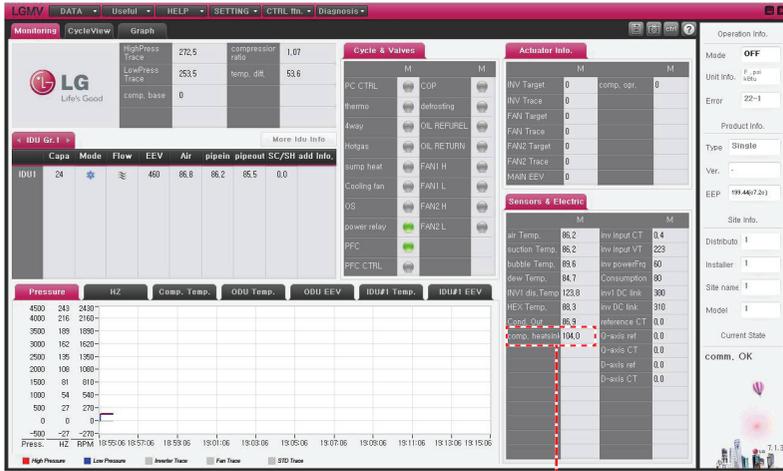
### 3.20 CH62 (Heatsink High Error)

Items	Contents
Purpose	Prevention of damage of IPM and PSCM/PFCM
Condition for Generation	Heat sink temperature reaches the limit level.

Resetting power source: Wait for 3 minutes after turning the power of the product off.



### 3.3.20.1 Check LGMV for CH 62



comp. heatsink 104.0

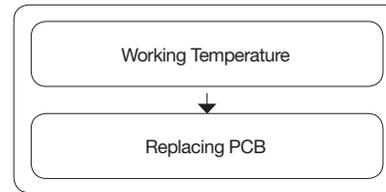
#### DC Link NG Voltage level

Controller	Current Level
All PCBA	95°C ↑
7kW	85°C ↑

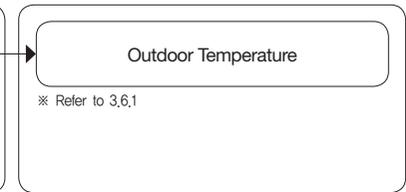
### 3.3.21 CH65 (Heat sink Temperature Sensor Open/Short)

Items	Contents
Purpose	Prevention of damage or wrong control of PCBA (PSCM/PFCM,IPM) caused by heat sink temperature detection error
Condition for Generation	Detected temperature is $\leq -40^{\circ}\text{C}$ or $\geq 200^{\circ}\text{C}$ .

#### Items for checking



#### Sub-items for checking



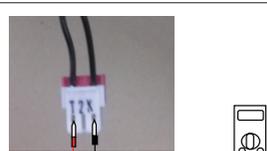
#### Environmental factor checking method

- 1) The products works when outdoor temperature is  $\leq -20^{\circ}\text{C}$ .
- 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.

#### Sensor checking method

1. Power Off
2. Measure the resistance using a tester.
3. Measure the resistance Heat sink Temp point (Refer to the next page) (based on  $25^{\circ}\text{C}$ ,  $7\text{k}\Omega \pm 10\%$ )

구분	Heat sink Tempe Sensor Point	
2/2.5kW		
4kW		
5kW		
6kW		
7kW		

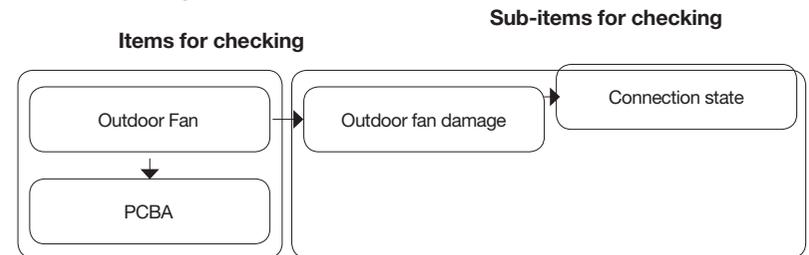
### 3.3.21 CH65 (Heat sink Temperature Sensor Open/Short)

Items	Contents
Purpose	Detection of no proper operation of the fan.
Condition for Generation	The fan is not operated at the rpm exceeding the standard.

#### CH67 Cause of Generation

Classification	Causes in Detail
Fan	Fan motor damage and fan connection fault
PCB Assembly	Damage of fan motor driving circuit

#### Trouble Checking Flow



#### Cautions

- 1) Both the fan and PCB may be damaged when the fan connector is mounted or removed in the state that the power is supplied.
- 2) Both the fan and PCB may be damaged when the fan connector is inserted in reverse direction.
- 3) If fan motor fault is identified, PCB should be also replaced in consideration of possible damage of PCB.

### 3.13 Checking Temperature Sensor Open/Short

1. Check alien substance in the Fan,
2. Check the imprisonment of fan → Please turn Fan, if fan is turn, ok,
3. Check the terminal,



4. Check the Motor. Refer to the below,

#### ■ How to check the outdoor fan motor of BLDC



– Checking wire terminals for possible short



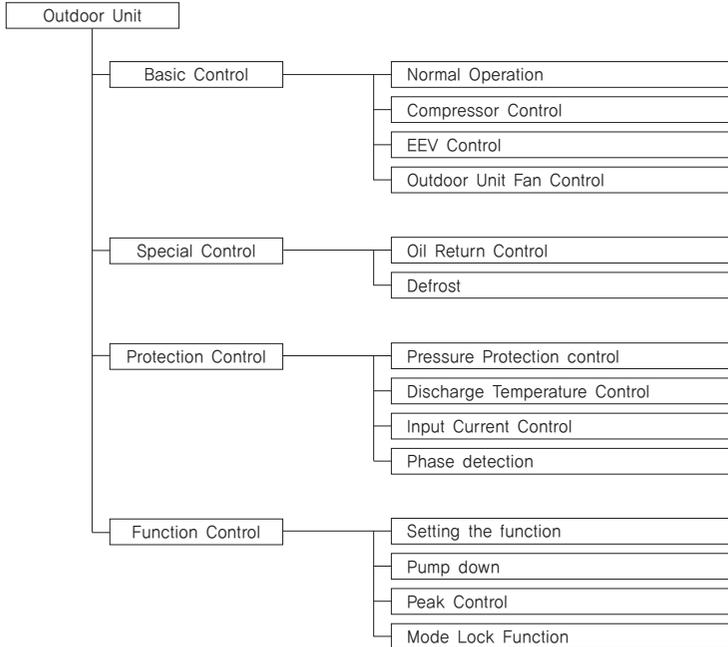
① ④⑤⑥⑦

Tester		정상저항(±10%)	
①	④	∞	∞
⑤	④	Dozens kΩ ~hundreds kΩ	Dozens kΩ ~hundreds kΩ
⑥	④	∞	∞
⑦	④	Dozens kΩ ~hundreds kΩ	Dozens kΩ ~hundreds kΩ

## IV. Outdoor Units Control

1. Outdoor Unit Control Classification	176
2. Basic Control	177
3. Special Control	179
4. Protection Control	180
5. Function Control	182

# 1. Outdoor Unit Control Classification



# 2. Basic Control

## 2.1 Normal Operation

Basic principle is to control the rpm of the motor by changing the working frequency of the compressor. Three phase voltage is supplied to the motor and the time for which the voltage will be supplied is controlled by IPM (intelligent power module). Switching speed of IPM defines the variable frequency input to the motor.

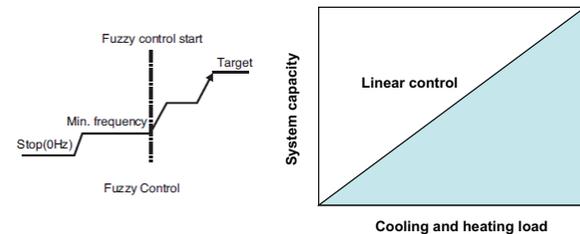
Actuator	Cooling operation	Heating operation	Stop state
Compressor	Fuzzy control	Fuzzy control	Stop
Fan	Fuzzy control	Fuzzy control	Stop
EEV	Super heating fuzzy control	Super heating & Sub cooling fuzzy control	Min. Pulse

※ UU09W, UU12W, MU2M15, MU2M17

Frequency that corresponds to each room's capacity will be determined according to the difference in the temperature of each room and the temperature set by the remote controller. There are various factors determining the frequency.

## 2.2 Compressor control

Fuzzy control : Maintain evaporating temperature (Te) to be constant on cooling mode and constant condensing temperature (Tc) on heating mode by fuzzy control to ensure the stable system performance.



Inverter linear control as cooling and heating load increasing

※ UU09W, UU12W, MU2M15, MU2M17

Capacity steps of compressor are decided by summation of capacity code, outdoor temp., indoor temp., step compensation of temperature difference indoor temp. and setting temp.

## 2.3 EEV( Electronic Expansion Valve) control

EEV operates with fuzzy control rules to keep the degree of superheat (about 2~3°C) at the evaporator outlet status.  
The degree of superheat = Tsuction – T evaporation  
Tsuction : temperature at suction pipe sensor(°C)  
T evaporation : evaporation temperature (°C)

※ UU09W, UU12W, MU2M15, MU2M17

EEV operates with PI control rules to keep the degree of superheat at the evaporator inlet and outlet status.

## 3. Special Control

### 3.1 Oil Return Control

Oil return operation recovers oil amount 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
Compressor	Normal control	Setting value	Normal control
Fan	Normal control	Off	Normal control
EEV (Thermo on)	Normal control	Setting value	Normal control
EEV (Thermo off)	Min. Pulse	Setting value	Min. Pulse
4 way valve	On	Off	On

#### Indoor unit

Component	Starting	Running	Ending
Fan	Normal control	Off	Normal control
Defrost signal	Off	On	Off

### 3.2 Defrost

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

#### Outdoor unit

Component	Starting	Running	Ending
Compressor	Normal control	Setting value	Normal control
Fan	Normal control	Off	Normal control
EEV (Thermo on)	Normal control	Setting value	Normal control
EEV (Thermo off)	Min. Pulse	Setting value	Min. Pulse
4 way valve	On	Off	On

#### Indoor unit

Component	Starting	Running	Ending
Fan	Normal control	Off	Normal control
Oil return signal	Off	On	Off

## 4. Protection Control

### 4.1 Pressure Protection Control

#### 4.1.1 High Pressure Protection Control

Pressure range	Compressor
$P_d \geq 4069 \text{ kPa}$	Off
$3938 \text{ kPa} \leq P_d < 4069 \text{ kPa}$	3Hz down
$3840 \text{ kPa} \leq P_d < 3938 \text{ kPa}$	3Hz down
$3709 \text{ kPa} \leq P_d < 3840 \text{ kPa}$	Frequency holding
$3611 \text{ kPa} \leq P_d < 3709 \text{ kPa}$	3 Hz up
$P_d < 3611 \text{ kPa}$	Normal control

\* UU09W, UU12W, MU2M15, MU2M17 are not applied.

#### 4.1.2 Low Pressure Protection Control

##### ■ Cooling Mode

Pressure range	Compressor
$P_e > 310 \text{ kPa}$	Normal control
$278 \text{ kPa} < P_e \leq 310 \text{ kPa}$	3Hz down
$245 \text{ kPa} < P_e \leq 278 \text{ kPa}$	3Hz down
$212 \text{ kPa} < P_e \leq 245 \text{ kPa}$	3Hz down
$P_e \leq 212 \text{ kPa}$	Off

\* UU09W, UU12W, MU2M15, MU2M17 are not applied.

##### ■ Heating mode

Pressure range	Compressor
$P_e > 294 \text{ kPa}$	Normal control
$255 \text{ kPa} < P_e \leq 294 \text{ kPa}$	3Hz down
$229 \text{ kPa} < P_e \leq 255 \text{ kPa}$	3Hz down
$203 \text{ kPa} < P_e \leq 229 \text{ kPa}$	3Hz down
$P_e \leq 203 \text{ kPa}$	Off

\* UU09W, UU12W, MU2M15, MU2M17 are not applied.

### 4.2 Discharge Temperature Control

Temperature range	Compressor
$T_d \geq 105 \text{ }^\circ\text{C}$	Off
$100\text{ }^\circ\text{C} \leq T_d < 105\text{ }^\circ\text{C}$	5Hz down
$95\text{ }^\circ\text{C} \leq T_d < 100\text{ }^\circ\text{C}$	5Hz down
$93\text{ }^\circ\text{C} \leq T_d < 95\text{ }^\circ\text{C}$	Frequency holding
$90\text{ }^\circ\text{C} \leq T_d < 93\text{ }^\circ\text{C}$	3 Hz up
$T_d < 90\text{ }^\circ\text{C}$	Normal control

### 4.3 Input Current Control

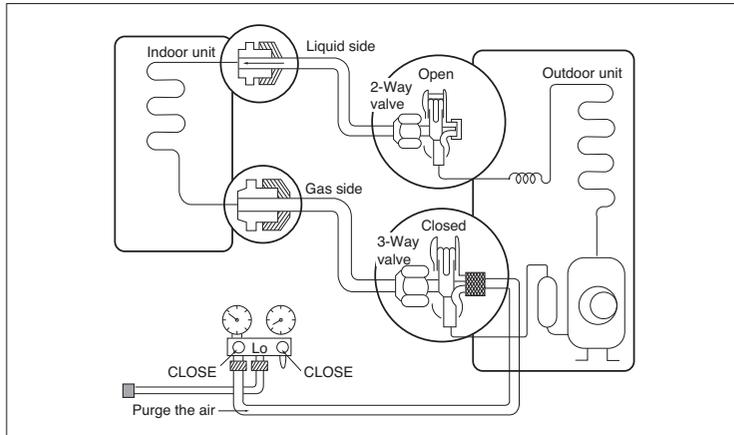
	Normal control	Frequency down	Comp off
Input current	Less than 10A	14A or less	Over than 14A

※ Remarks: The data of pressure and frequency are different model by model.

## 5. Function Control

### 5.1 Pump Down

#### 5.1.1 UU09W, UU12W, MU2M15, MU2M17



#### • Procedure

- (1) **Confirm that both the 2-way and 3-way valves are set to the open position.**
  - Remove the valve stem caps and confirm that the valve stems are in the raised position.
  - Be sure to use a hexagonal wrench to operate the valve stems.
- (2) **Operate the unit for 10 to 15 minutes.**
- (3) **Stop operation and wait for 3 minutes, then connect the charge set to the service port of the 3-way valve.**
  - Connect the charge hose with the push pin to the service port.
- (4) **Air purging of the charge hose.**
  - Open the low-pressure valve on the charge set slightly to air purge from the charge hose.
- (5) **Set the 2-way valve to the closed position.**
- (6) **Operate the air conditioner at the cooling cycle and stop it when the gauge indicates 1kg/cm<sup>2</sup>g.**
- (7) **Immediately set the 3-way valve to the closed position.**
  - Do this quickly so that the gauge ends up indicating 3 to 5kg/cm<sup>2</sup>g.
- (8) **Disconnect the charge set, and mount the 2-way and 3-way valve's stem nuts and the service port nut.**
  - Use torque wrench to tighten the service port nut to a torque of 1.8 kg.m.
  - Be sure to check for gas leakage.

#### 5.1.2 Other Models

##### Setting Procedure

- 1) Set the Dip Switch as follow after shutting the power source down.



UU18W  
UU24W  
UU30W



UU36W  
UU42W  
UU48W  
UU60W



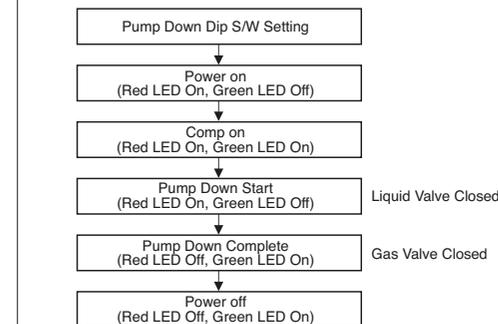
UU37W  
UU43W  
UU49W  
UU61W

- 2) Reset the power.
- 3) Red LED and Green LED of PCB lights during work.  
(The indoor unit is operated by force.)
- 4) If operation is done, Red LED will be turned off.  
If operation is not done normally, Red LED will blink.
- 5) Close the Liquid valve only after green LED turned off (7 minutes from the start of the machine).  
Then close the gas valve after Green LED on.



#### WARNING:

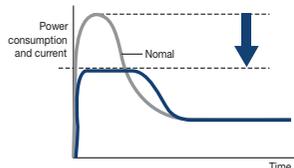
- When the green LED of PCB is on, compressor is going to be off because of low pressure.
- You should return the Dip Switch to operate normally after finishing the operation.
- Improper Pump down will lead to product turn off along with LED (green & red) off with in 20 minutes from the initial start.



## 5.2 Peak Control (Multi Models only)

### Saving Power Consumption

Saving Power Consumption operation is the function which enables efficient operation by lowering the maximum power consumption value.



#### Setting Procedure

- Set the Dip Switch as follow after shutting the power source down.



Step 1



Step 2

- Reset the power.

Phase	1c								3c								
Model	14k	16k	18k	21k	24k	27k	30k	40k	48k	56k	42k	48k	56k				
Step1(A)	8	8	9	9	12	13	15	22	24	26	7	8	9				
Step2(A)	7	7	8	8	10	11	13	18	20	22	6	7	8				

#### Saving Power Consumption with Mode Lock.



Saving Power Consumption (step 1)  
+ Mode Lock (Cooling)



Saving Power Consumption (step 2)  
+ Mode Lock (Cooling)



Saving Power Consumption (step 1)  
+ Mode Lock (Heating)



Saving Power Consumption (step 2)  
+ Mode Lock (Heating)

### Night Quiet Mode

Night Quiet Mode operation lowers the noise level of the outdoor unit by changing the comp frequency and fan speed. This function is operated all night long.

#### Setting Procedure

- Set the Dip Switch as follow after shutting the power source down.



Step 1



Step 2

※ Noise level :Step 1 > Step 2

- Reset the power.

#### Night Quiet Mode with Mode Lock.



Mode Lock (Cooling)  
+ Night Quiet Mode (step 1)



Mode Lock (Cooling)  
+ Night Quiet Mode (step 2)

#### CAUTION

- If comp frequency and fan speed are down, the cooling capacity may decrease accordingly.
- This function is only available for Cooling Mode.
- If you want to stop the Night Quiet Mode, Change the Dip Switch.
- If operating indoor unit is set by the fan speed "Power", Night Quiet Mode will be stopped until fan speed "Power" is changed.

## 5.3 Mode Lock Function (Multi Models only)

#### Setting Procedure

- Set the Dip Switch as follow after shutting the power source down.



Only Cooling Mode



Only Heating Mode

- Reset the power.

#### Mode Lock with Night Quiet Mode



Mode Lock (Cooling)  
+ Night Quiet Mode (step 1)



Mode Lock (Cooling)  
+ Night Quiet Mode (step 2)

#### Saving Power Consumption with Mode Lock.



Mode Lock (Cooling)  
+ Saving Power Consumption (step 1)



Mode Lock (Heating)  
+ Saving Power Consumption (step 1)



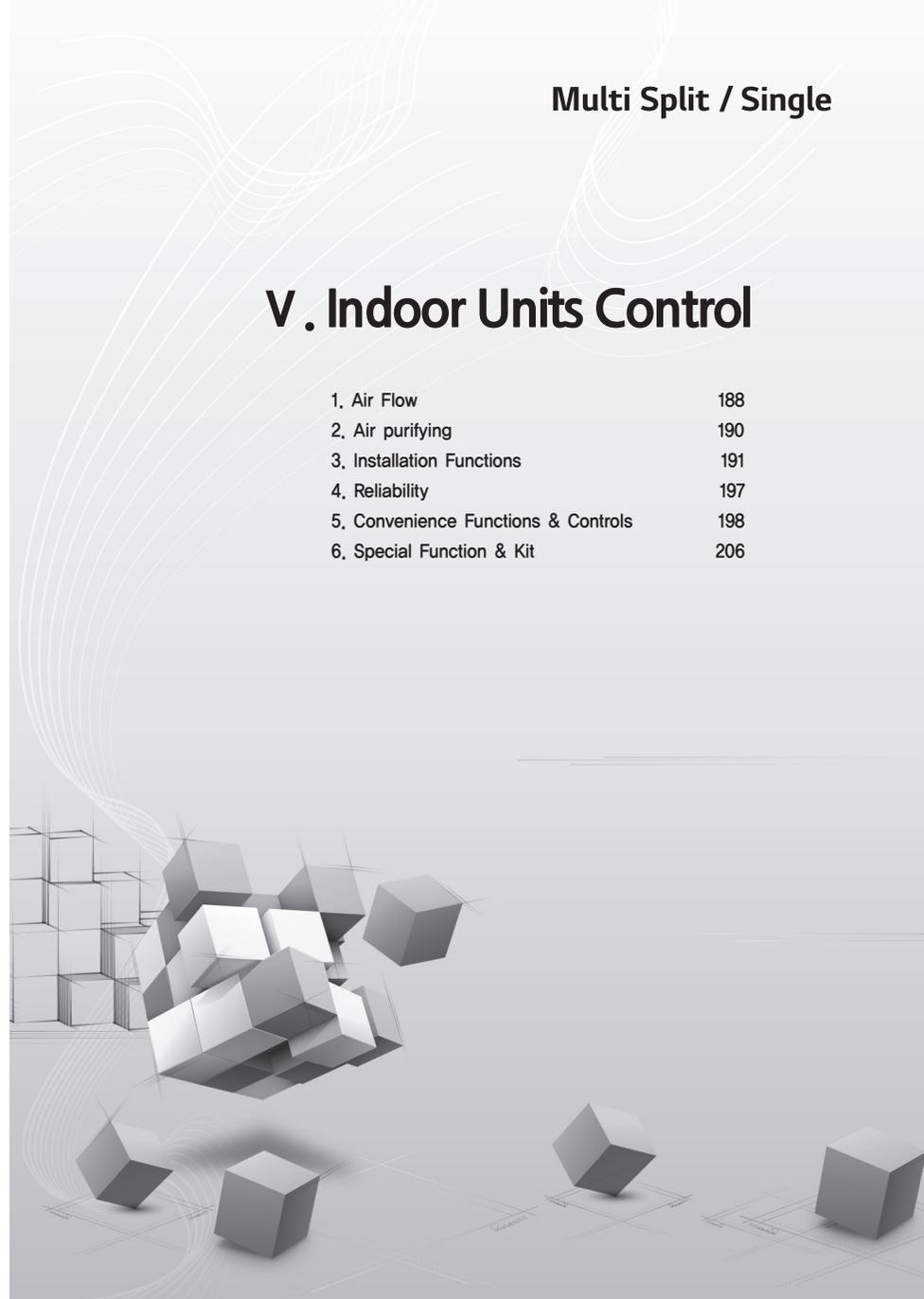
Mode Lock (Cooling)  
+ Saving Power Consumption (step 2)



Mode Lock (Heating)  
+ Saving Power Consumption (step 2)

## V. Indoor Units Control

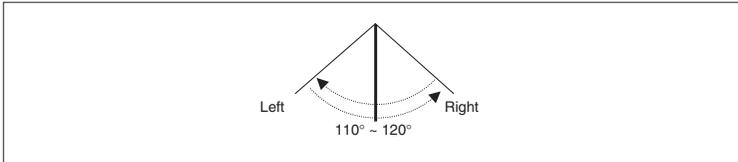
1. Air Flow	188
2. Air purifying	190
3. Installation Functions	191
4. Reliability	197
5. Convenience Functions & Controls	198
6. Special Function & Kit	206



# 1. Air Flow

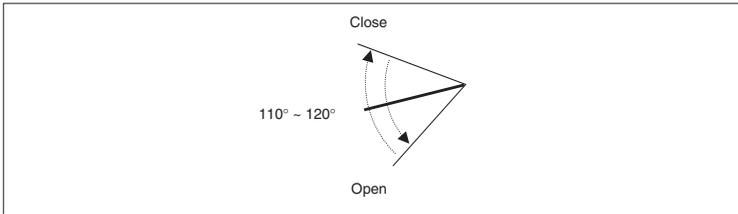
## 1.1 Auto swing (left & right)

- By the horizontal airflow direction control key input, the left/right louver automatically operates with the auto swing or it is fixed to the desired direction,



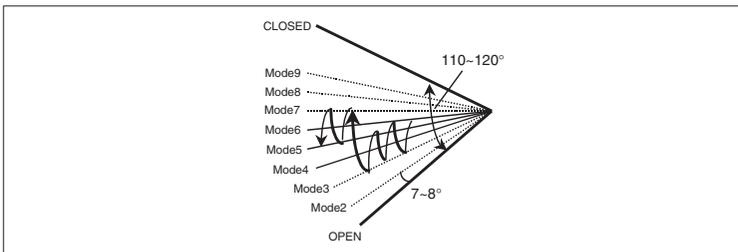
## 1.2 Auto swing (up & down)

- By the auto swing key input, the upper/lower vane automatically operates with the auto swing or it is fixed to the desired direction,



## 1.3 Chaos swing (up/down)

- By the Chaos swing key input, the upper/lower vane automatically operates with the chaos swing or it is fixed to the desired direction,



NOTE: Some Models are different by swing width and swing pattern.

## 1.4 Air flow step

- Indoor fan motor control have 6 steps,
- Air volume is controlled "SH", "H", "Med", "Low" by remote controller,
- "LL" step is selected automatically in Hot start operation,

Step	Discription
LL	Very low, In heating mode
L	Low
M	Med
H	High
SH	Super high
Auto	Chaos wind

## 1.5 Chaos wind (auto wind)

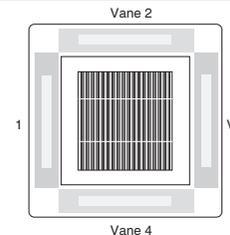
- When "Auto" step selected and then operated, the high, medium, or low speed of the airflow mode is operated for 2~15 sec, randomly by the Chaos Simulation

## 1.6 Jet Cool Mode Operation

- While in heating mode or Fuzzy operation, the Jet Cool key cannot be input, When it is input while in the other mode operation (cooling, dehumidification, ventilation), the Jet Cool mode is operated,
- In the Jet Cool mode, the indoor fan is operated at super-high speed for 30 min, at cooling mode operation,
- In the Jet Cool mode operation, the room temperature is controlled to the setting temperature, 18° C,
- When the sleep timer mode is input while in the Jet Cool mode operation, the Jet Cool mode has the priority,
- When the Jet Cool key is input, the upper/lower vanes are reset to those of the initial cooling mode and then operated in order that the air outflow could reach further,

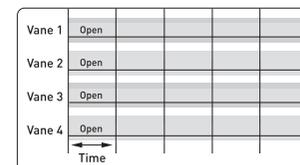
## 1.7 Swirl wind Swing

- It is the function for comfort cooling/heating operation,
- The diagonal two louvers are opened the more larger than the other louvers, After one minute, it is opposite

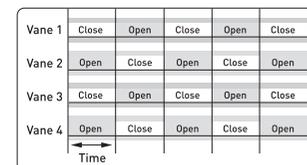


- Comparison of Air Flow Types

4-Open (conventional)



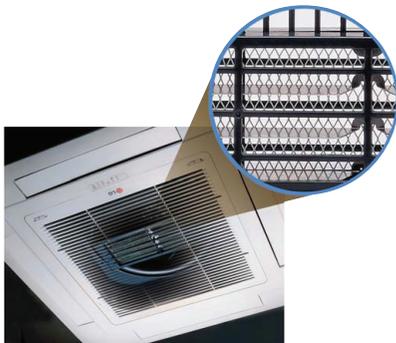
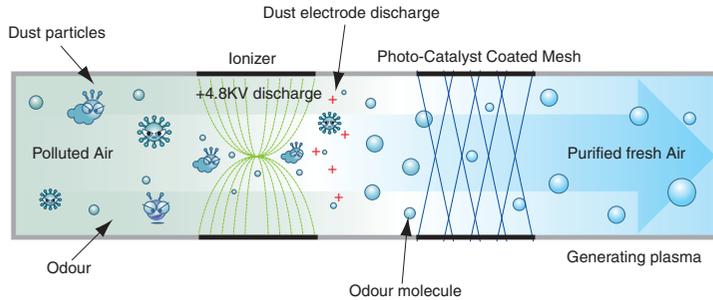
Swirl Swing (New)



## 2. Air purifying

### 2.1 PLASMA Air Purifying System

The PLASMA Air Purifying System not only removes microscopic contaminants and dust, but also removes house mites, pollen, and pet fur to help prevent allergic diseases like asthma. This filter that can be used over and over again by simply washing with water.



## 3. Installation Functions

### 3.1 E.S.P. (External Static Pressure) Setting

This function is applied to only duct type. Setting this in other cases will cause malfunction.

- Press **[SET]** button for 4 seconds to enter the installer setting mode until timer segment displays "01.01".
- If pressing **[SET]** button repeatedly, it moves to static pressure selection menu as picture below.
- Select static pressure by pressing **[UP]**/**[DOWN]** button. (01:V-H, 02:F-H, 03:V-L, 04:F-L)
- Press **[SET]** button to save.
- Pressing **[ESC]** button will exit settings mode.
  - \* After setup, it automatically gets out of setup mode if there is no button input for 25 seconds.
  - \* When exiting without pressing set button, the manipulated value is not reflected.

<Static Pressure Setting Table>

Pressure selection		Function	
		Zone state	ESP standard value
01	V-H	Variable	High
02	F-H	Fixed	High
03	V-L	Variable	Low
04	F-L	Fixed	Low

This is the function that decides the strength of the wind for each wind level and because this function is to make the installation easier.

- If you set ESP incorrectly, the air conditioner may malfunction.
- This setting must be carried out by a certified-technician.

- 1 If pressing **[SET]** button long for 3 seconds, it enters into remote controller setter setup mode.  
- If pressing once shortly, it enters into user setup mode.  
Please press more than 3 seconds for sure.
- 2 If entering into ESP setup mode by using **[SET]** button, it indicates as the picture below.
- 3 Select ESP fan step by pressing **[▲]** **[▼]** button. (01: very low, 02: low, 03: medium, 04: high, 05: very high)
- 4 Move to ESP value setting by pressing **[>]** button.  
(It is 000 when delivering from the warehouse.)
- 5 Press **[▲]** **[▼]** button to setup ESP value.  
(It is possible to setup ESP value from 1 to 255, and 1 is the smallest and 255 is the biggest.)

• When setting ESP value on the product without very weak wind or power wind function, it may not work.

- 6 Select ESP fan step again by using **[SET]** **[SET]** button and setup ESP value, as No. 4 and 5, that corresponds each wind flow
- 7 Press **[SET]** button to save.
- 8 Press **[OFF]** button to exit.  
✦ After setup, it automatically gets out of setup mode if there is no button input for 25 seconds.  
✦ When exiting without pressing set button, the manipulated value is not reflected.

- Please be careful not to change the ESP value for each fan step.
- It does not work to setup ESP value for very low/power step for some products.
- ESP value is available for specific range belongs to the product.

### CB18

(Unit: CMM)

Setting Value	Static Pressure[mmAq(Pa)]				
	2,5(25)	4(39)	6(59)	8(78)	10(98)
100	12,8	—	—	—	—
105	13,9	—	—	—	—
110	15,2	12,7	—	—	—
115	16,5	14,0	—	—	—
120	17,8	15,3	12,7	—	—
125	—	16,5	14,0	—	—
130	—	17,8	15,3	12,6	—
135	—	—	16,5	13,5	—
140	—	—	17,5	14,5	12,3
145	—	—	—	16,5	13,5

### CB24

(Unit: CMM)

Setting Value	Static Pressure[mm Aq(Pa)]				
	2,5(25)	4(39)	6(59)	8(78)	10(98)
105	13,9	—	—	—	—
110	15,2	12,7	—	—	—
115	16,5	14,0	—	—	—
120	17,8	15,3	12,7	—	—
125	—	16,5	14,0	—	—
130	—	17,8	15,3	12,6	—
135	—	—	16,5	13,5	—
140	—	—	17,6	14,5	12,3
145	—	—	—	16,5	13,5
150	—	—	—	18,0	15,2

### UB30

(Unit: CMM)

Setting Value	Static Pressure[mmAq(Pa)]				
	4(49)	6(59)	8(78)	10(98)	12(118)
100	20,8	—	—	—	—
105	23,2	19,5	—	—	—
110	26,0	21,5	—	—	—
115	—	23,5	19,1	—	—
120	—	26,3	21,6	—	—
125	—	—	24,0	19,9	—
130	—	—	27,0	22,7	—
135	—	—	—	25,9	21,3
140	—	—	—	—	24,5

## UB36

(Unit: CMM)

Setting Value	Static Pressure[mmAq(Pa)]				
	4(49)	6(59)	8(78)	10(98)	12(118)
115	25,9	—	—	—	—
120	27,9	—	—	—	—
125	29,9	26,4	—	—	—
130	32,0	28,5	25,0	—	—
135	—	30,7	27,5	—	—
140	—	32,9	29,9	26,0	—
145	—	—	32,3	28,5	24,7
150	—	—	—	31,0	27,3
155	—	—	—	—	29,9

## UB42

(Unit: CMM)

Setting Value	Static Pressure[mmAq(Pa)]				
	6(59)	8(78)	10(98)	12(118)	14(137)
85	31,5	—	—	—	—
90	36,3	29,8	—	—	—
95	41,3	34,5	28,4	—	—
100	45,4	39,7	33,5	27,3	—
105	—	44,1	38,6	33,1	27,6
110	—	—	44,2	38,9	33,6
115	—	—	—	44,7	39,6

## UB48

(Unit: CMM)

Setting Value	Static Pressure[mmAq(Pa)]				
	6(59)	8(78)	10(98)	12(118)	14(137)
85	31,5	—	—	—	—
90	36,3	29,8	—	—	—
95	41,3	34,5	28,4	—	—
100	45,4	39,7	33,5	27,3	—
105	—	44,1	38,6	33,1	27,6
110	—	—	44,2	38,9	33,6
115	—	—	—	44,7	39,6

## UB60

(Unit: CMM)

Setting Value	Static Pressure[mmAq(Pa)]				
	6(59)	8(78)	10(98)	12(118)	14(137)
95	41,3	—	—	—	—
100	45,4	39,7	—	—	—
105	49,5	44,1	38,6	—	—
110	—	48,5	44,2	38,9	—
115	—	—	49,8	44,7	42,2
120	—	—	—	50,5	48,1

## CB09L

(Unit: CMM)

Setting Value	Static Pressure[mmAq(Pa)]					
	0 (0)	1 (10)	2 (20)	3 (30)	4 (40)	5 (50)
60	—	—	—	—	—	—
65	5,03	—	—	—	—	—
70	5,60	4,85	—	—	—	—
75	6,19	5,44	4,57	—	—	—
80	6,79	6,05	5,17	—	—	—
85	7,41	6,67	5,80	4,80	—	—
90	8,05	7,31	6,43	5,44	—	—
95	8,71	7,96	7,09	6,09	4,97	—
100	9,38	8,63	7,76	6,76	5,64	—
105	10,07	9,32	8,45	7,45	6,33	5,08
110	—	10,03	9,16	8,16	7,04	5,79
115	—	—	9,88	8,88	7,76	6,51
120	—	—	—	9,62	8,50	7,25
125	—	—	—	10,38	9,26	8,01
130	—	—	—	—	10,03	8,78

## CB12L, CB18L

(Unit: CMM)

Setting Value	Static Pressure[mmAq(Pa)]					
	0 (0)	1 (10)	2 (20)	3 (30)	4 (40)	5 (50)
75	6,50	—	—	—	—	—
80	7,34	6,70	—	—	—	—
85	8,20	7,55	6,69	—	—	—
90	9,07	8,43	7,56	6,47	—	—
95	9,96	9,32	8,45	7,36	—	—
100	10,87	10,22	9,36	8,27	6,96	—
105	11,79	11,15	10,28	9,19	7,89	6,35
110	12,73	12,09	11,22	10,14	8,83	7,30
115	13,69	13,05	12,18	11,09	9,78	8,25
120	14,67	14,02	13,16	12,07	10,76	9,23
125	15,66	15,01	14,15	13,06	11,75	10,22
130	16,67	16,02	15,16	14,07	12,76	11,23
135	—	—	16,18	15,10	13,79	12,26
140	—	—	—	16,14	14,83	13,30
145	—	—	—	—	15,89	14,36

## CB24L

(Unit: CMM)

Setting Value	Static Pressure[mmAq(Pa)]					
	0 (0)	1 (10)	2 (20)	3 (30)	4 (40)	5 (50)
85	10,19	—	—	—	—	—
90	12,18	10,71	11,09	—	—	—
95	13,81	12,34	12,19	—	—	—
100	15,16	13,69	13,38	10,71	—	—
105	16,30	14,83	14,36	11,85	—	—
110	17,31	15,85	15,23	12,86	10,97	—
115	18,27	16,80	16,07	13,82	11,93	—
120	19,26	17,79	16,93	14,80	12,91	10,49
125	20,34	18,87	17,89	15,88	13,99	11,57
130	21,60	20,13	19,01	17,14	15,25	12,83
135	—	21,64	20,36	18,66	16,76	14,35
140	—	—	22,01	20,50	18,61	16,19
145	—	—	—	22,75	20,86	18,44

Note : 1. The above table shows the correlation between the air rates and E,S,P.

## 4. Reliability

### 4.1 Hot start

- When heating is started, the indoor fan is stopped or very slow to prevent the cold air carry out
- When the temp. of heat exchanger reach 30° C(model by model), indoor fan is started,

### 4.2 Self-diagnosis Function

- The air conditioner installed can self-diagnosed its error status and then transmits the result to the central control. Therefore, a rapid countermeasure against failure of the air conditioner allows easy management and increases the usage life of air conditioner.
- Refer to trouble shooting guide.

### 4.3 Soft dry operation

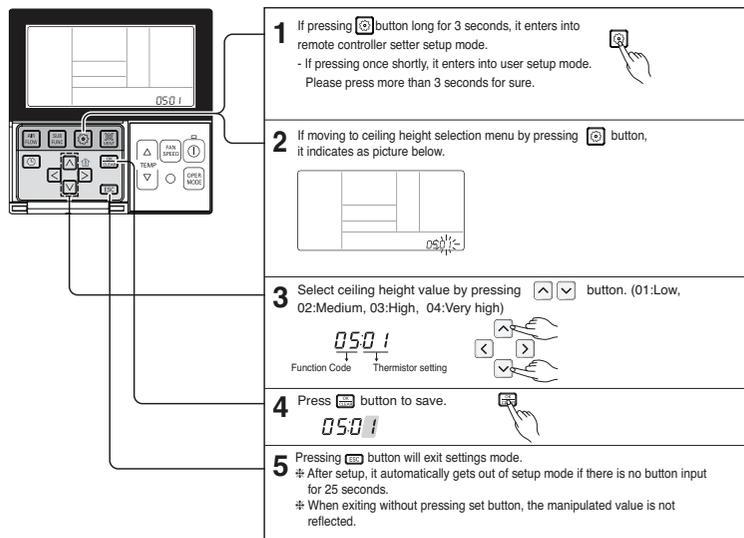
- When the dehumidification operation input by the remote control is received, the intake air temperature is detected and the setting temp is automatically set according to the intake air temperature.

Intake air Temp.	Setting Temp.
$26^{\circ}\text{C} \leq \text{intake air temp.}$	25°C
$24^{\circ}\text{C} \leq \text{intake air temp.} < 26^{\circ}\text{C}$	intake air temp. -1°C
$22^{\circ}\text{C} \leq \text{intake air temp.} < 24^{\circ}\text{C}$	intake air temp. -0.5°C
$18^{\circ}\text{C} \leq \text{intake air temp.} < 22^{\circ}\text{C}$	intake air temp.
intake air temp. < 18°C	18°C

- While compressor off, the indoor fan repeats low airflow speed and stop.
- While the intake air temp is between compressor on temp. and compressor off temp., 10-min dehumidification operation and 4-min compressor off repeat.  
Compressor ON Temp. → ' Setting Temp+0.5°C  
Compressor OFF Temp. → ' Setting Temp-0.5°C
- In 10-min dehumidification operation, the indoor fan operates with the low airflow speed.

## 3.2 High Ceiling operation

This function is to adjust FAN Airflow rate according to ceiling height (For ceiling type product)



- 1 If pressing **SET** button long for 3 seconds, it enters into remote controller setter setup mode.  
- If pressing once shortly, it enters into user setup mode.  
Please press more than 3 seconds for sure.
- 2 If moving to ceiling height selection menu by pressing **CEILING** button, it indicates as picture below.
- 3 Select ceiling height value by pressing **UP**/**DOWN** button. (01:Low, 02:Medium, 03:High, 04:Very high)
- 4 Press **SET** button to save.
- 5 Pressing **SET** button will exit settings mode.  
\* After setup, it automatically gets out of setup mode if there is no button input for 25 seconds.  
\* When exiting without pressing set button, the manipulated value is not reflected.

<Ceiling Height Selection Table>

Ceiling Height Level		Description
01	Low	Decrease the indoor airflow rate 1 step from standard level
02	Medium	Set the indoor airflow rate as standard level
03	High	Increase indoor airflow rate 1 step from standard level
04	Very high	Increase indoor airflow rate 2 steps from standard level

- Ceiling height setting is available only for some products.
- Ceiling height of 'Very high' function may not exist depending on the indoor unit.
- Refer to the product manual for more details.

## 5. Convenience Functions & Controls

### 5.1 Cooling & heating Operations

#### 5.1.1 Cooling Mode

- Operating frequency of compressor depends on the load condition, like the difference between the room temp. and the set temp., frequency restrictions.
- If the compressor operates at some frequency, the operating frequency of compressor cannot be changed within 30 seconds. ( not emergency conditions)
- Compressor turned off when
  - intake air temperature is in between  $\pm 0.5^{\circ}\text{C}$  of the setting temp. limit for three minutes continuously.
  - intake air temperature reaches below  $1.0^{\circ}\text{C}$  of the temperature of setting temp.,
- Compressors three minutes time delay.
  - After compressor off, the compressor can restart minimum 3 minutes later.

#### 5.1.2 Heating Mode

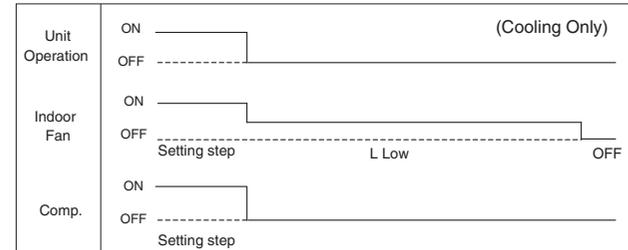
- Operating frequency of compressor depend on the load condition, The difference between the room temp. and set temp., frequency restrictions.
- If compressor operates at some frequency, the operating frequency of compressor cannot be changed within 30 seconds.
- Condition of compressor turned off
  - When intake air temperature reaches  $+4^{\circ}\text{C}$  above the setting temperature.
- Condition of compressor turned on
  - When intake air temperature reaches  $+2^{\circ}\text{C}$  above the setting temperature.
- Condition of indoor fan turned off
  - While in compressor on : indoor pipe temp.  $< 20^{\circ}\text{C}$
  - While in compressor off : indoor pipe temp.  $< 30^{\circ}\text{C}$
- While in defrost control, between the indoor and outdoor fans are turned off.
- Compressor 2minutes delay
  - After compressor off, the compressor can restart minimum 2 minutes later.

**NOTE:** Some Models are different by temperature of thermo ON/OFF.

CST/Duct/CVT type indoor unit matched with Universal Outdoor unit	CST/ Duct/CVT type indoor unit matched with Single Outdoor unit/Multi Outdoor unit/Multi V Outdoor unit
Thermo ON : $+2^{\circ}\text{C}$ above setting temp. Thermo OFF : $+4^{\circ}\text{C}$ above setting temp.	Thermo ON : Setting temp. Thermo OFF : $+3^{\circ}\text{C}$ above setting temp.

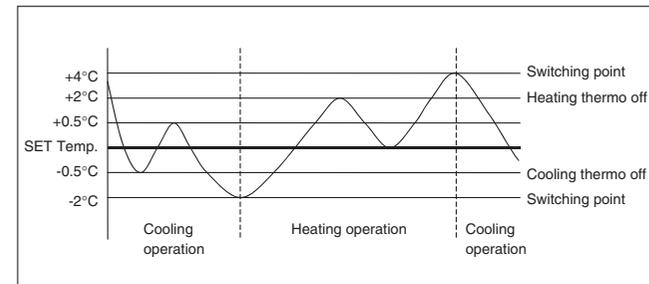
### 5.2 Auto cleaning operation

- Function used to perform Self Cleaning to prevent the Unit from Fungus and bad odor.
- Used after the Cooling Operation before turning the unit off, clean the Evaporator and keep it dry for the next operation.
- The function is easy to operate as it is accessed through the Remote controller.



### 5.3 Auto changeover operation

- The air conditioner changes the operation mode automatically to keep indoor temperature.
- When room temperature vary over  $\pm 2^{\circ}\text{C}$  with respect to setting temperature, air conditioner keeps the room temperature in  $\pm 2^{\circ}\text{C}$  with respect to setting temperature by auto change mode.

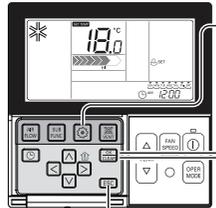


### 5.4 Auto restart Operation

- Whenever there is electricity failure to the unit, and after resumption of the power, unit will start in the same mode prior to the power failure. Memorized condition are on / off condition, operating mode (cooling/ heating), set temperature and fan speed. The unit will memorize the above conditions and start with same memorized condition.

## 5.5 Child Lock Function

It is the function to use preventing children or others from careless using.



- 1 Press button repeatedly until the is flashing.
- 2 If moving to 'setup' icon area by using , 'setup' icon blinks, and child lock function is setup if pressing button at that time.
- 3 When cancelling lock function, if moving to 'cancel' icon by pressing , then, pressing button, child lock function is cancelled.
- 4 Press button to exit.  
 \* After setup, it automatically gets out of setup mode if there is no button input for 25 seconds.  
 \* When exiting without pressing set button, the manipulated value is not reflected.

## 5.6 Forced operation

- To operate the appliance by force in case when the remote control is lost, the forced operation selection switch is on the main unit of the appliance, and operate the appliance in the standard conditions.
- The operating condition is set according to the outdoor temp. and intake air temperature as follows.

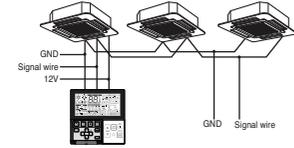
Indoor temp.	Operating Mode	Setting temp.	Setting speed of indoor fan
over 24°C	Cooling	22°C	High speed
21~24°C	Healthy Dehumidification	23°C	
below 21°C	Heating	24°C	

- The unit select the last operation mode in 3 hours.
- Operating procedures when the remote control can't be used is as follows :
  - The operation will be started if the ON/OFF button is pressed.
  - If you want to stop operation, re-press the button.

## 5.7 Group Control

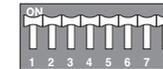
### 1. When installing more than 2 units of air conditioner to one wired remote controller, please connect as the right figure.

- If it is not event communication indoor unit, set the unit as slave.
- Check for event communication through the product manual.



When controlling multiple indoor units with event communication function with one remote controller, you must change the master/slave setting from the indoor unit.

- Indoor units, the master/slave configuration of the product after completion of indoor unit power 'OFF' and then 'ON' the power after 1 minutes elapsed sign up.
- For ceiling type cassette and duct product group, change the switch setting of the indoor PCB.



#3 switch OFF: Master (Factory default setting)

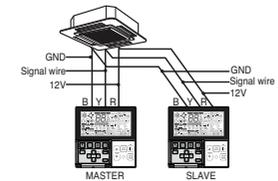


#3 switch ON: Slave

- For wall-mount type and stand type product, change the master/slave setting with the wireless remote controller. (Refer to wireless remote controller manual for detail)
- When installing 2 remote controllers to one indoor unit with event communication function, set the master/slave of the remote controller. (Refer to remote controller master/slave selection)
- When controlling the group, some functions excluding basic operation setting, fan level Min/Mid/Max, remote controller lock setting and time setting may be limited.

### 2. When installing more than 2 wired remote controllers to one air conditioner, please connect as the right picture.

- When installing more than 2 units of wired remote controller to one air conditioner, set one wired remote controller as master and the others all as slaves, as shown in the right picture.
- You cannot control the group as shown in the right for some products.
- Refer to the product manual for more detail.



<When simultaneously connecting 2 sets of wired remote controller>

- When controlling in groups, set the master/slaver of the remote controller. Refer to Installer setting section on how to set master/slave for more detail.

## 5.8 Sleep Timer Operation

- When the sleep time is reached after (1,2,3,4,5,6,7,0(cancel) hr) is input by the remote control while in appliance operation, the operation of the appliance stops.
- While the appliance is on pause, the sleep timer mode cannot be input.
- While in cooling mode operation, 30 min later since the start of the sleep timer, the setting temperature increases by 1°C. After another 30 min elapse, it increases by 1°C again.
- When the sleep timer mode is input while in cooling cycle mode, the airflow speed of the indoor fan is set to the low.
- When the sleep timer mode is input while in heating cycle mode, the airflow speed of the indoor fan is set to the medium.

## 5.9 Timer(On/Off)

### 5.9.1 On-Timer Operation

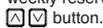
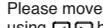
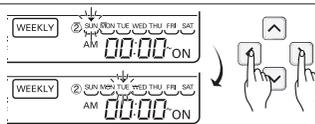
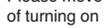
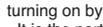
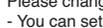
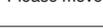
- When the set time is reached after the time is input by the remote control, the appliance starts to operate.
- The timer LED is on when the on-timer is input, it is off when the time set by the timer is reached.
- If the appliance is operating at the time set by the timer, the operation continues. While in Fuzzy operation, the airflow speed of the indoor fan is automatically selected according to the temperature.

### 5.9.2 Off-Timer Operation

- When the set time is reached after the time is input by the remote control, the appliance stops operating.
- The timer LED is on when the off-timer is input, it is off when the time set by the timer is reached.
- If the appliance is on pause at the time set by the timer, the pause continues.

## 5.10 Weekly Program

You can set the daily reservation in weekly unit.  
Weekly reservation keeps operating until before you cancel it once you setup

<b>1</b>	Please move to reservation setup mode by pressing reservation button. * You can setup two weekly reservations for one day, and up to fourteen reservations for a week. For example, to setup (Tuesday morning 11:30 turned on ~ afternoon 12:30 turned off), you setup in order below.	
<b>2</b>	Please move to 'weekly' by repeatedly pressing reservation button. 'Weekly' blinks at this time.	
<b>3</b>	Please select weekly reservation or weekly reservation i by using  button. * You can setup two reservations, weekly reservation 1 and weekly reservation 2, for a day.	
<b>4</b>	Please move to 'date' setup part by using  button. If 'date' indication blinks, please setup date. You can setup date from Monday to Sunday.	
<b>5</b>	Please move to 'AM/PM' setup part of turning on by using  button.	
<b>6</b>	Please move to 'hour' setup part of turning on by using  button. - It is the part to setup the time at which air-conditioner is turned on.	
<b>7</b>	Please change time by using  button. - You can setup hour 0~12.	
<b>8</b>	Please move to 'minute' setup part of turning on by using  button.	
<b>9</b>	If 'minute' indication blinks, please setup 'minute' by using  button	

**10** Please move to 'AM/PM' setup part of turning off by using button.  
- AM/PM setup is identical with turning on time setup.

**11** Please move to 'hour' setup part of turning off by using Right button.  
- It is the part to reserve the time at which air-conditioner is turned off.  
- If 'hour' indication blinks, please setup 'hour'.  
\* Please setup 'hour' and 'minute' identically with the method to setup turning on time.

**12** If finishing weekly reservation setup, please press setup/cancellation button. Weekly reservation setup for the day that you set is finished.

**13** If you setup with the method identical with above by selecting the day that you'd like to setup, it operates weekly reservation.  
If you setup both turning on reservation time and turning off reservation time identically, it doesn't operate reservation drive.

**Weekly reservation explanation**

Reservation number      Turning on time      Turning off time

SUN MON TUE WED THU FRI SAT  
Under bar: the indication that there is weekly reservation for corresponding day

\* Indoor unit is turned on to desired temperature if it is configured using up/down button during preset of weekly operation time.  
(Temperature selection range : 18°C-30°C)  
- When desired temperature is not set, it is turned on automatically with desired temperature of previous operation.

## 5.11 Two Thermistor Control

This is the function to select the temperature sensor to judge the room temperature.

- If pressing button long for 3 seconds, it enters into remote controller setter setup mode.  
- If pressing once shortly, it enters into user setup mode.  
Please press more than 3 seconds for sure.
- If moving to room temperature perception sensor selection menu by pressing button, it indicates as picture below.
- Set Thermistor value by pressing button. (01: Remote Controller, 02: Indoor, 03: 2TH)
- Press button to save.
- Pressing button will exit settings mode.  
\* After setup, it automatically gets out of setup mode if there is no button input for 25 seconds.  
\* When exiting without pressing set button, the manipulated value is not reflected.

<Thermistor Table>

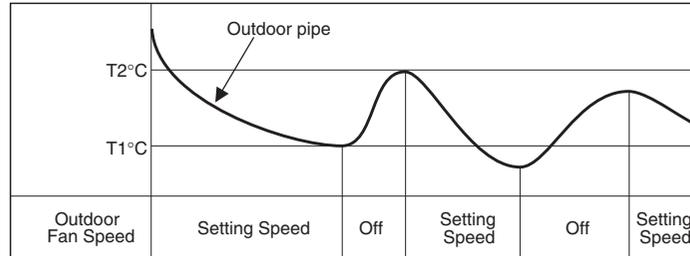
Temperature sensor selection		Function
01	Remote controller	Operation in remote controller temperature sensor
02	Indoor unit	Operation in indoor unit temperature sensor
03	2TH	Operation of higher temperature by comparing indoor unit's and wired remote controller's temperature. (There are products that operate at a lower temperature.)
		Operation of lower temperature by comparing indoor unit's and wired remote controller's temperature.

\* The function of 2TH has different operation characteristics according to the product.

## 6. Special Function & Kit

### 6.1 Low Ambient control

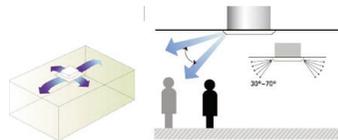
- This Function is for cooling operating in outdoor low temperature .
- If outdoor temperature drops below certain temperature, liquid back is prevented by reducing outdoor fan speed.
- It can prevent frosting of evaporator and keep cooling operation



### 6.2 Space control

Vanes angle can be controlled by pair, considering its installation environment.

- For example direct drafts can be annoying, leading to discomfort and reduced productivity vane control helps to eliminate this problem.
- Easily controlled by wired remote control.
- Air Flow can be controlled easily regarding any space environment.

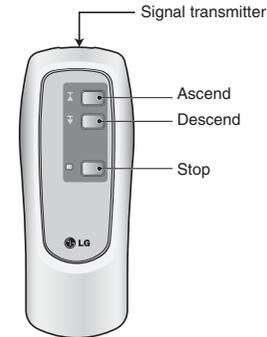


### 6.3 Auto Elevation Grille

- Auto Elevation Grille is automatically down to height of max. 3,1 m. So it enables to install the Indoor unit at high ceiling space. And Auto Elevation Grille makes you cleaning the filter easily.



### ■ ELEVATION GRILL (REMOTE CONTROLLER\_Accessory)



#### • Main Components of Lift Grill

- ① Lift grill front panel assembly
- ② Bolts for installation (4 EA, P/No. 3A00255K)
- ③ Instruction manual
- ④ Remote Controller for lift grill

#### • How to Use Remote Controller

As for operation of Remote Controller, use it by directing the transmitter part of Remote Controller to the receiver part of front panel directly under front panel.

- Do not drop it down or into water. Or else there is worry about trouble failure.
- Do not press hard the Remote Controller button with nail (ball-point pen or other sharp substance). Or else there is worry about trouble failure.
- In case when obstacle such as curtain hides the signal reception part of receiver in between the space interval, Remote Controller operation is infeasible.

• How to Operate the Lift Grill

**CAUTION**

- Always stop the air conditioner operation for safety before operating lift grill.
- Take heed \_ there is worry about dust fall etc. when suction grill descends.
- In case when the set automatic stop distance goes wrong, check the set value of operation panel and confirm if there is neither obstacle nor mankind.
- When you are not to remove obstacle, stop the operation before touching the obstacle.

1. Stop the Air Conditioner Operation

Automatic Stop Distance of Grill

2. Descend the Suction Grill

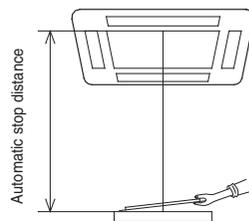
- Depress the down button(▼).
- Then suction grill descends and stops automatically at a certain distance.
- You may stop it at wanted distance point by depressing the stop button (■) when descending.

3. Raise the Suction Grill

- Depress the up button(▲).
- Then suction grill goes up and enters into the front panel.

4. Stop the Suction Grill during Rising

- Depress the stop button(■).
- Make use of this when you want to stop it at your wished position.



Ceiling height	Low	Medium (Height: 3-4 m)	High
Automatic stop distance	1.5±0.5 m	2.5±0.5 m	3.5±0.5 m

\* If you want to change automatic distance setting, consult with your sale agency.

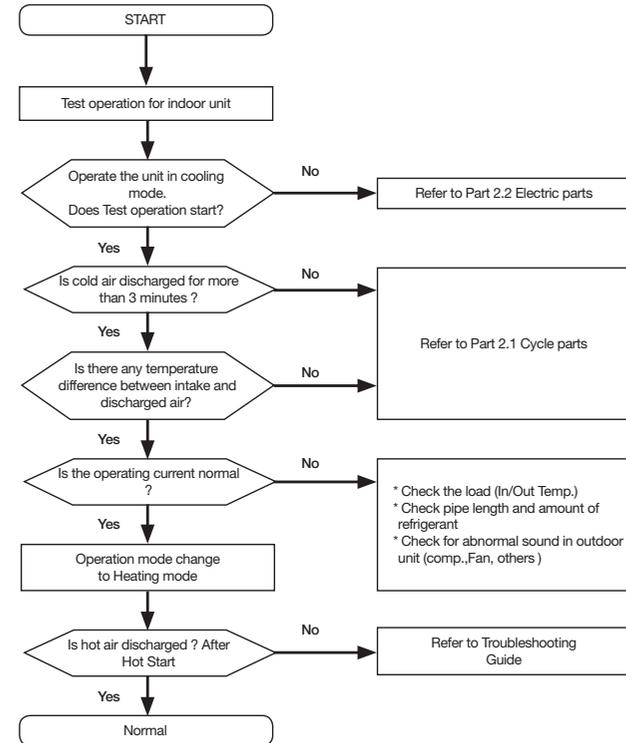
## VI. Test Run check

1. Check Before Test Run	210
2. Test Run Flow Chart	211
3. Test Running	214

## 1. Check Before Test Run

1	Check to see whether there is any refrigerant leakage, and check whether the power or transmission cable is connected properly.
2	Check liquid pipe and gas pipe valves are fully opened. NOTE: Be sure to tighten caps.
3	Confirm that 500 V megger shows 2,0 M $\Omega$ or more between power supply terminal block and ground. Do not operate in the case of 2,0 M $\Omega$ or less. <b>NOTE</b> : Never carry out mega ohm check over terminal control board. Otherwise the control board may break. Immediately after mounting the unit or after leaving it turned off for an extended length of time, the resistance of the insulation between the power supply terminal board and the ground may decrease to approx. 2,0 M $\Omega$ as a result of refrigerant accumulation in the internal compressor. If the insulation resistance is less than 2,0 M $\Omega$ , turn on the main power supply.

## 2. Test Run Flow Chart



## 2.1 Cycle parts

### Trouble analysis

1. Check temperature difference between intake and discharge air, and check for the operating current too.

Case	Symptom	Supposed Caused
Case 1	Temp. difference : approx. 0°C Current : less than 80% of rated current	All amount of refrigerant leaked out, Check refrigeration cycle,
Case 2	Temp. difference : approx. 8°C Current : less than 80% of rated current	Refrigerant leakage Clog of refrigeration cycle Defective Compressor.
Case 3	Temp. difference : less than 8°C Current : over the rated current	Excessive amount of refrigerant
Case 4	Temp. difference : over 8°C	Normal

### NOTICE

Temperature difference between intake and discharge air depends on room air humidity. When the room air humidity is relatively higher, temperature difference is smaller. When the room air humidity is relatively lower temperature difference is larger.

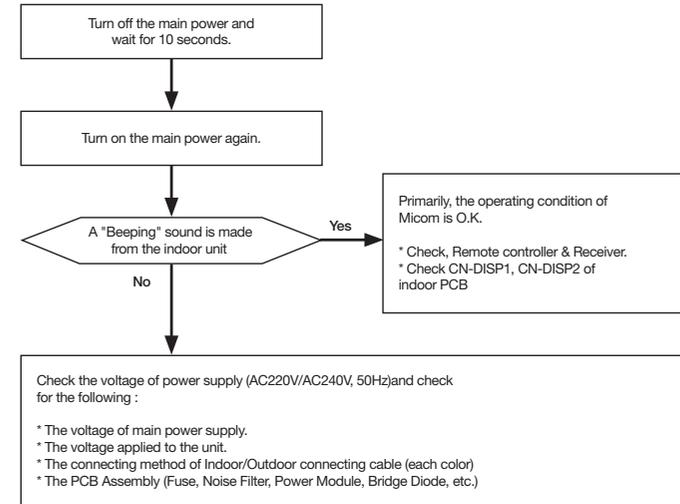
2. Check temperature and pressure of refrigeration cycle in cooling mode.

Suction pressure (Compared with the normal value)	Temperature of Discharge Air (Compared with the normal valve)	Cause of Trouble	Description
Higher	High	Defective compressor Defective 4-way reverse valve	Current is low.
	Normal	Excessive amount of refrigerant	High pressure does not quickly rise at the beginning of operation.
Lower	Higher	Insufficient amount of refrigerant (Leakage) Clogging	Current is low.

### NOTICE

- The suction pressure is usually 8.5~9.5kg/cm<sup>2</sup>G(Cooling) at normal condition,(R410)
- The temperature can be measured by attaching the thermometer to the low pressure tubing and wrap it with putty.

## 2.2 Electric parts



The operation check of the Indoor PCB Assembly		
Procedure	Specification	Remedy
1) The input voltage of power module.	1) AC230V±30V	1) Check the power outlet.
2) The output voltage of power module.	2) 12V±3V	2) Replace PCB Assembly
3) IC04D(7805)	3) DC5V	3) Replace PCB Assembly
4) IC01A(KIA7036)	4) The voltage of micom pin 19 : DC4.5V ↑	4) Replace PCB Assembly

## 3. Test Running

### 3.1 SPLIT, ART cool, ART cool deluxe Type

#### 3.1 SPLIT, ART cool, ART cool deluxe Type

- Check that all tubing and wiring have been properly connected.
- Check that the gas and liquid side service valves are fully open.

##### 3.1.1 Prepare remote controller

- 1 Remove the battery cover by pulling it according to the arrow direction.
- 2 Insert new batteries making sure that the (+) and (-) of battery are installed correctly.
- 3 Reattach the cover by pushing it back into position.



#### NOTE:

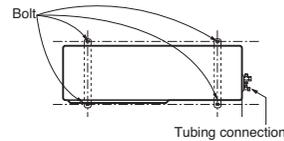
- Use 2 AAA(1.5volt) batteries. Do not use rechargeable batteries.
- Remove the batteries from the remote controller if the system is not going to be used for a long time.

##### 3.1.2 Precautions in test run

- The initial power supply must provide at least 90% of the rated voltage. Otherwise, the air conditioner should not be operated.
- For test run, carry out the cooling operation firstly even during heating season. If heating operation is carried out firstly, it leads to the trouble of compressor. Then attention must be paid.
- Carry out the test run more than 5 minutes without fail. (Test run will be cancelled 18 minutes later automatically)
- The forced operation is started by pressing button for 2 seconds. The test run is started by pressing button for 3-6 seconds.
- To cancel the test run, press any button.

##### 3.1.3 Settlement of outdoor unit

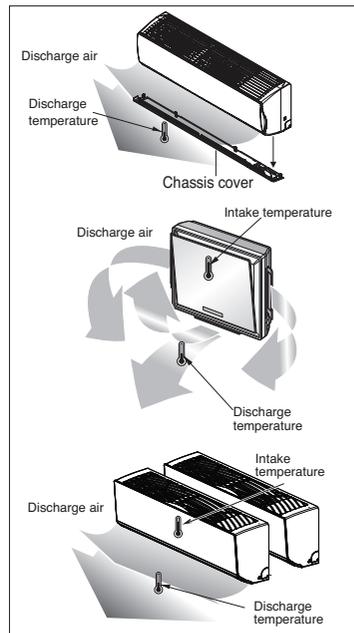
- Anchor the outdoor unit with a bolt and nut( $\phi 10\text{mm}$ ) tightly and horizontally on a concrete or rigid mount.
- When installing on the wall, roof or rooftop, anchor the mounting base securely with a nail or wire assuming the influence of wind and earthquake.
- In the case when the vibration of the unit is conveyed to the hose, secure the unit with an anti-vibration rubber.



##### 3.1.4 Evaluation of the performance

Operate unit for 15-20 minutes, then check the system refrigerant charge:

1. Measure the pressure of the gas side service valve.
2. Measure the temperature of the intake and discharge of air.
3. Ensure the difference between the intake temperature and the discharge is more than 8°C (Cooling) or reversely (Heating).



### 3.2 Ceiling Cassette

#### PRECAUTIONS IN TEST RUN

- The initial power supply must provide at least 90% of the rated voltage. Otherwise, the air conditioner should not be operated.

#### CAUTION

- For test run, carry out the cooling operation firstly even during heating season. If heating operation is carried out firstly, it leads to the trouble of compressor. Then attention must be paid.
- Carry out the test run more than 5 minutes without fail. (Test run will be cancelled 18 minutes later automatically)

- To cancel the test run, press any button.

#### CHECK THE FOLLOWING ITEMS WHEN INSTALLATION IS COMPLETED

- After completing work, be sure to measure and record trial run properties, and store measured data, etc.
- Measuring items are room temperature, outside temperature, suction temperature, blow out temperature, wind velocity, wind volume, voltage, current, presence of abnormal vibration and noise, operating pressure, piping temperature, compressive pressure.
- As to the structure and appearance, check following items.
  - \* Is the circulation of air adequate?
  - \* Is the draining smooth?
  - \* Is the heat insulation complete (refrigerant and drain piping)?
  - \* Is there any leakage of refrigerant?
  - \* Is the remote controller switch operated?
  - \* Is there any faulty wiring?
  - \* Are not terminal screws loosened?

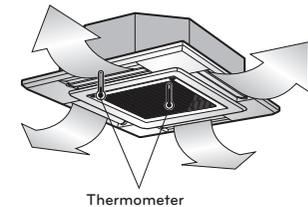
M4.....118N.cm(12kgf.cm)  
 M5.....196N.cm(20kgf.cm)  
 M6.....245N.cm(25kgf.cm)  
 M8.....588N.cm(60kgf.cm)

#### Connection of power supply

- Connect the power supply cord to the independent power supply. Circuit breaker is required.
- Operate the unit for 15 minutes or more.

#### Evaluation of the performance

- Measure the temperature of the intake and discharge air.
- Ensure the difference between the intake temperature and the discharge one is more than 8°C (Cooling) or reversely (Heating).

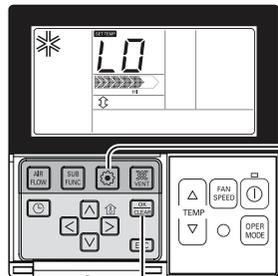


Thermometer

### 3.3 Ceiling Concealed Duct

After installing the product, you must run a Test Run mode.

For details related to this operation, refer to the product manual.

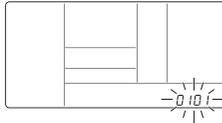


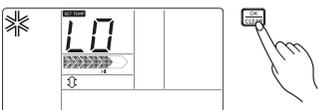
- 1** If pressing  button long for 3 seconds, it enters into remote controller setter setup mode.

  - If pressing once shortly, it enters into user setup mode. Please press more than 3 seconds for sure.
  - Please cancel the right and left of wind direction for RAC product.



Function Code    Set
- 2** Setup figure '01' blinks at the lower part of indication window.


- 3** Press  button to start.


- 4** During the test run, pressing the below button will exit the test run.

  - Select operation, temperature up/down, wind flow control, wind direction, start/stop button.

### 3.4 Ceiling Suspended

#### PRECAUTIONS IN TEST RUNNING

- The initial power supply must provide at least 90% of the rated voltage. Otherwise, the air conditioner should not be operated.

M4.....118N.cm(12kgf.cm)  
 M5.....196N.cm(20kgf.cm)  
 M6.....245N.cm(25kgf.cm)  
 M8.....588N.cm(60kgf.cm)

#### CAUTION

- For test run, carry out the cooling operation firstly even during heating season. If heating operation is carried out firstly, it leads to the trouble of compressor. Then attention must be paid.
- Carry out the test run more than 5 minutes without fail. (Test run will be cancelled 18 minutes later automatically)

- To cancel the test run, press any button.

#### Check the following items when installation is complete

After completing work, be sure to measure and record trial run properties, and store measured data, etc.

Measuring items are room temperature, outside temperature, suction temperature, blow out temperature, wind velocity, wind volume, voltage, current, presence of abnormal vibration and noise, operating pressure, piping temperature, compressive pressure.

As to the structure and appearance, check following items.

- Is the circulation of air adequate?
- Is the draining smooth?
- Is the heat insulation complete (refrigerant and drain piping)?
- Is there any leakage of refrigerant?
- Is the remote controller switch operated?
- Is there any faulty wiring?
- Are not terminal screws loosened?

#### Connection of power supply

Connect the power supply cord to the independent power supply.

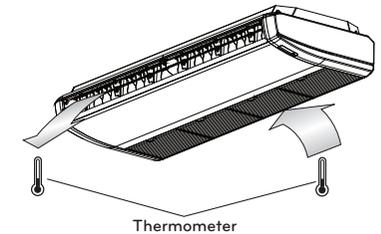
- Circuit breaker is required.

Operate the unit for fifteen minutes or more.

#### Evaluation of the performance

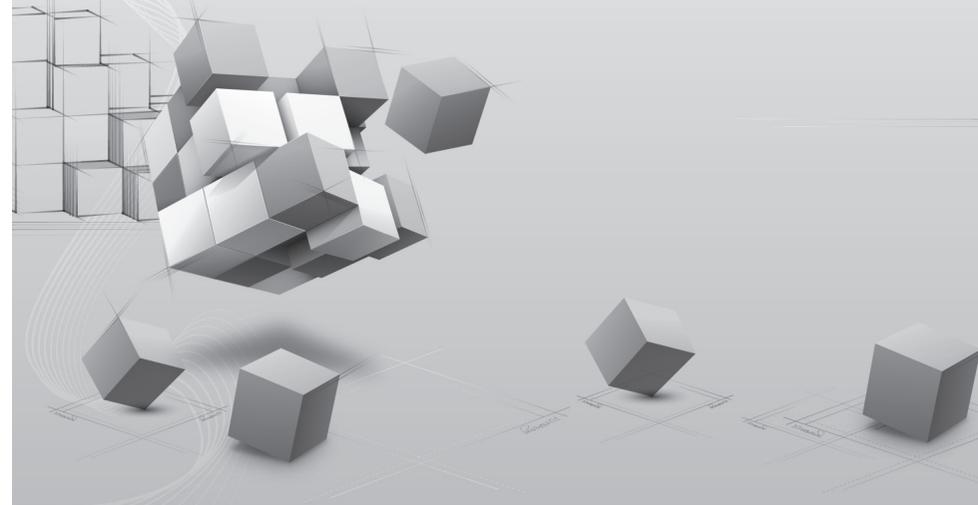
Measure the temperature of the intake and discharge air.

Ensure the difference between the intake temperature and the discharge one is more than 8°C (Cooling) or reversely (Heating).



## VII. Trouble Shooting Guide

1. The phenomena from main component failure	220
2. Outdoor Unit EEV	221
3. Pressure Sensor	224
4. Reverse Valve	225
5. Temperature Sensor	225
6. Compressor	226
7. Outdoor Fan & Fan Motor	227
8. Compressor Specification	228
9. Phase Bridge Diode Checking Method	229
10. Inverter IPM Checking Method	230



# 1. The phenomena from main component failure

## The phenomena from main component failure

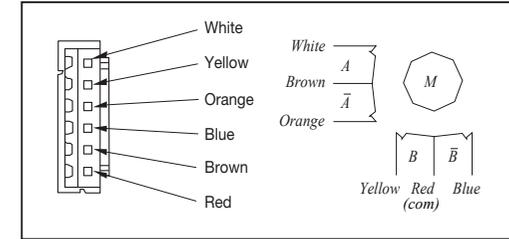
Component	Phenomenon	Cause	Check method and Trouble shooting
Compressor	Not operating	Motor insulation broken	Check resistance between terminals and chassis
		Strainer clogged	Change strainer
		Oil leakage	Check oil amount after opening oil port
	Stop during running	Motor insulation failure	Check resistance between terminals and chassis
	Abnormal noise during running	R-S-T misconnection	Check compressor R-S-T 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
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 ERROR occurs, check if auto-addressing has done and communication wiring is ok.

# 2. Outdoor Unit EEV

## 2.1 Electronic Expansion Valve



### Pulse signal output value and valve operation

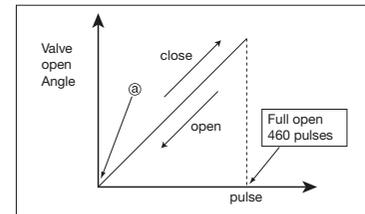
Output(φ) No.	Output state			
	1	2	3	4
φ1	ON	ON	OFF	ON
φ2	ON	ON	ON	OFF
φ3	OFF	OFF	ON	OFF
φ4	OFF	OFF	OFF	ON

### Output pulse sequence

- In valve close state: 4 → 3 → 2 → 1 → 4
- In valve open state: 1 → 2 → 3 → 4 → 1

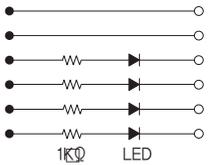
- \* 1. If EEV open angle does not change, all of output phase will be OFF
- 2. If output phase is different or continuously in the ON state, motor will not operate smoothly and start vibrating.

### EEV valve operation

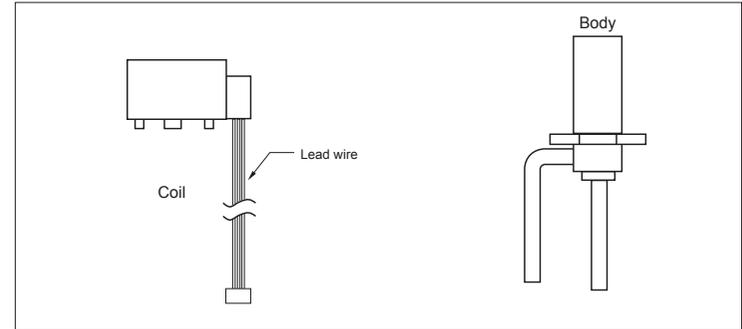


- At power ON, open angle signal of 700 pulses output and valve position is set to ①. If valve operates smoothly, no noise and vibration occurs and if valve is closed, noise occurs.
- Noise from EEV can be confirmed by touching the EEV surface with a screw driver and listening the EEV noise.
- If liquid refrigerant is in EEV, the noise is lower.

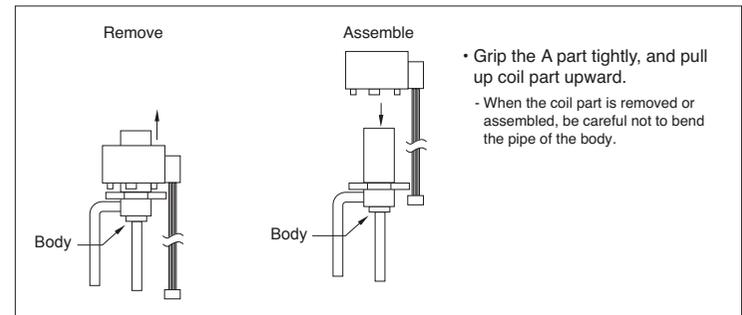
• EEV failure check method

Failure mode	Diagnosis	Repair process	Unit
Microcomputer Driving circuit failure	<p>1. Disconnect the EEV connector form control board and connect testing LED</p>  <p>2. Main power ON, pulse signal is out from EEV for 17 sec. If LEDs do not turn on, or are in on state continuously, then driving circuit is abnormal</p>	Check and replace Indoor unit control board	Indoor unit
EEV locking	1. If EEV is locked, in no load state, the driving motor rotate, and clicking sound always occurs	Replace EEV	Indoor/ Outdoor unit
EEV Motor coil short or misconnection	<p>1. Check the resistance between coil terminal (Brown-white, brown-orange, red-yellow, red-blue)</p> <p>2. If the estimated resistance value is in <math>46 \pm 3.7 \Omega</math> then the EEV is normal</p>	Replace EEV	Outdoor unit
Full closing (valve leakage)	<p>1. Operate indoor unit with FAN mode and operate another indoor unit with COOLING mode</p> <p>2. Check indoor unit(FAN mode) liquid pipe temperature (from operation monitor of outdoor unit control board)</p> <p>3. When fan rotate and EEV is fully closed, if there is any leakage, then the temperature is down</p> <p>If estimated temperature is very low in comparison with suction temperature which is displayed at remote controller then the valve is not fully closed</p>		Indoor unit

• EEV Coil and body(Outdoor unit)



• Remove and assemble the coil



### 3. Pressure Sensor

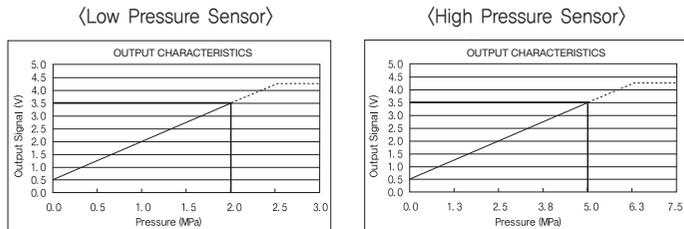
Connect manifold gauge to the service valve of outdoor unit, and compare the output of High pressure sensor to the manifold gauge value.

In case of cooling mode, pressure sensor value will be low pressure side (liquid side gauge value)

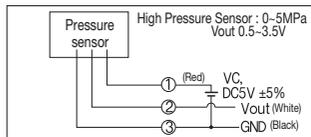
In case of heating mode, pressure sensor value will be high pressure side value (gas side gauge value)

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.



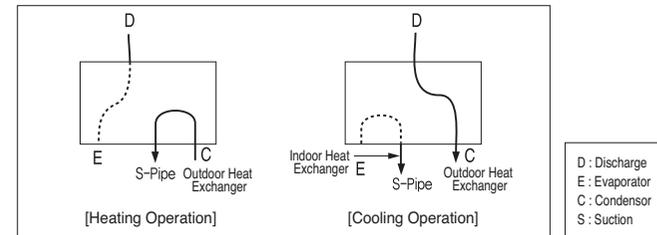
- 1) If the pressure of manifold gauge is 0~1kg/cm<sup>2</sup>, it indicates the pressure got lower due to the leakage of refrigerant. Find the place of leakage and fix it.
- 2) If the difference of the outputs of high pressure is in the range of 1kg/cm<sup>2</sup>, the pressure sensor is normal.
- 3) If the difference of the outputs of high pressure is over 1kg/cm<sup>2</sup>, 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.

### 4. Reverse 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 100m $\Omega$  when measure it with DC mega tester(DC 500V).

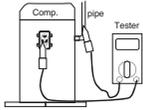
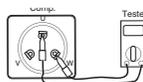
### 5. Temperature Sensor

- 1) outdoor temperature sensor : TH1
- 2) Pipe temperature sensor : TH2
- 3) Discharge pipe (D-pipe) temperature sensor : TH3
- 4) Suction pipe (S-pipe) temperature sensor : TH4
- 5) Mid sensor : TH5
  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, TH4, TH5	TH3
10K $\Omega$ ±1%(25°C)	5K $\Omega$ ±1%(25°C)	200K $\Omega$ ±1%(25°C)

## 6. Compressor

Check and ensure in following order when error related with the compressor or error related with power occurs during operation:

No.	Checking Item	Symptom	Countermeasure
1	Is how long power on during operation?	1) Power on for 12 hours or more	* Go to No.2.
		2) Power on for 12 hours or less	* Go to No.2 after applying power for designated time (12hours).
2	Does failure appears again when starting operation?  Method to measure insulation resistance  Figure 1.  Method to measure coil resistance  Figure 2.	1) The compressor stops and same error appears again.	* Check IPM may fail.
		2) If output voltage of the inverter is stably output, *1	* Check coil resistor and insulation resistor. If normal, restart the unit. If same symptom occurs, replace the compressor. * Insulation resistor: 2MW or more Coil resistor:
		3) If output voltage of the inverter is unstable or it is 0V. (When incapable of using a digital tester)	* Check the IPM. If the IPM is normal, replace the inverter board. * Check coil resistor and insulation resistor.

### [Cautions when measuring voltage and current of inverter power circuit]

Measuring values may differ depending on measuring tools and measuring circuits since voltage, current in the power supply or output side of the inverter has no sine wave form. Especially, output voltage changes when output voltage of the inverter has a pattern of pulse wave. In addition, measuring values appear largely differently depending on measuring tools.

- 1) If using a movable tester when checking that output voltage of the inverter is constant (when comparing relative voltage between lines), always use an analog tester. Especially exercise particular caution if the output frequency of the inverter is low, when using a movable tester, where change of measured voltage values is large between other lines, when virtually same values appear actually or where there is danger to determine that failure of the inverter occurred.
- 2) You can use rectification voltmeter (  ) if using commercial frequency tester when measuring output values of the inverter (when measuring absolute values). Accurate measuring values cannot be obtained with a general movable tester (For analog and digital mode).

## 7. Outdoor Fan & Fan motor

### 7.1 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.

### 7.2 Fan motor

Checking Item	Symptom	Countermeasure
(1) The fan motor does not operate. Does failure appears again when starting operation?	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.
(2) Vibration of the fan motor is large.	3) For defective fuse	* Replace the fuse if there is defect.
	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 4). (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. Compressor Specification

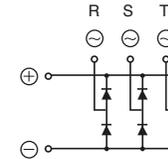
The specification of compressor being adapted to Single / Multi is below.  
When the compressor is not working, please check the compressor referring to the below specification.

Model	GKT141MAC	GKT176MAB	GJT240MAA	
Manufacturer	LG	LG	LG	
Type	Twin Rotary	Twin Rotary	Twin Rotary	
Compression Volume	14,1 cm <sup>3</sup> / rev	17,6 cm <sup>3</sup> / rev	24,0 cm <sup>3</sup> / rev	
Refrigerating machine oil	FVC68D / 570 cc	FVC68D / 670 cc	FVC68D / 900 cc	
Weight	11,8 kg	12,0kg	13,8kg	
Internal diameter of inlet	Φ 12,8 mm	Φ 12,8 mm	Φ 16,0 mm	
Internal diameter of outlet	Φ 9,7 mm	Φ 9,7 mm	Φ 9,7 mm	
Motor	No. of pole	6	6	
	Grade of insulation	E	E	
Performance	Cooling Capacity	14,500 Btu/h	18,800 Btu/h	25,300 Btu/h
	Power Input	1,291 W	1,649 W	2,280 W
	Running current	5 A	6 A	7,4 A
Range of Operation (Single compressor)		10~100 Hz	10~100 Hz	10~110 Hz
Chassis		UL2	UE	U4
Windings Resistance (at 25 °C)	U-V	1,040 ±7% Ohms	1,125±7% Ohms	0,628 ±7% Ohms
	V-W	1,040 ±7% Ohms	1,125±7% Ohms	0,628 ±7% Ohms
	W-U	1,040 ±7% Ohms	1,125±7% Ohms	0,628 ±7% Ohms

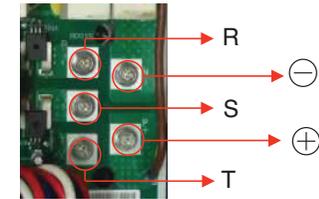
Model	GPT442MBA	GPT442MAA	
Manufacturer	LG	LG	
Type	Twin Rotary	Twin Rotary	
Compression Volume	44,2 cm <sup>3</sup> / rev	44,2 cm <sup>3</sup> / rev	
Refrigerating machine oil	FVC68D / 1,300 cc	FVC68D / 1,300 cc	
Weight	18,9kg	18,9kg	
Internal diameter of inlet	Φ 19,12 mm	Φ 19,12 mm	
Internal diameter of outlet	Φ 12,75 mm	Φ 12,75 mm	
Motor	No. of pole	6	6
	Grade of insulation	E	E
Performance	Cooling Capacity	47,500 Btu/h	47,500 Btu/h
	Power Input	4,241 W	4,241 W
	Running current	14 A	9,5 A
Range of Operation (Single compressor)		15~100 Hz	15~100 Hz
Chassis		U3, U5	U3, U5
Windings Resistance (at 25 °C)	U-V	0,438 ±7% Ohms	0,845 ±7% Ohms
	V-W	0,438 ±7% Ohms	0,859 ±7% Ohms
	W-U	0,438 ±7% Ohms	0,864 ±7% Ohms

## 9. 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.

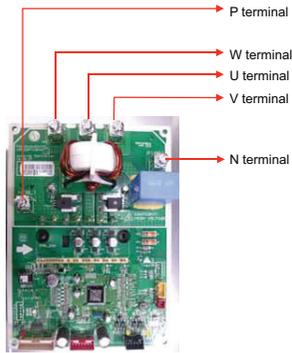
Diode terminal	+ terminal: black(-)	- terminal: red(+)
Tester terminal R(~) : red(+)	0,4 V ~ 0,7 V	-
S(~) : red(+)	0,4 V ~ 0,7 V	-
T(~) : red(+)	0,4 V ~ 0,7 V	-
R(~) : black(-)	-	0,4 V ~ 0,7 V
S(~) : black(-)	-	0,4 V ~ 0,7 V
T(~) : black(-)	-	0,4 V ~ 0,7 V

\* 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

## 10. Inverter IPM Checking Method



Inverter PCB

1. Wait until Comp PCB DC voltage is discharged after main power off.
2. Pull out DC\_Link connector and U,V,W COMP connector connected with fan Comp PCB
3. Set multi tester to resistance mode.
4. If the value between P and N terminal of IPM is short( $0\Omega$ ) or open(hundreds  $M\Omega$ ), PCB needs to be replaced,(IPM damaged)
5. In the measured value with resistance mode should be within  $2,3K \Omega \pm 10\%$ .
6. In case measured value is different from the table, PCB needs to be replaced. (PCB damaged).

	P terminal : black (-)	N terminal : red (-)
U terminal : red(+)	$2,3K \Omega \pm 10\%$	$3,0K \Omega \pm 10\%$
V terminal : red(+)	$2,3K \Omega \pm 10\%$	$3,0K \Omega \pm 10\%$
W terminal : red(+)	$2,3K \Omega \pm 10\%$	$3,0K \Omega \pm 10\%$
	P terminal : red (+)	N terminal : red (+)
U terminal : black(-)	$3,0K \Omega \pm 10\%$	$2,3K \Omega \pm 10\%$
V terminal : black(-)	$3,0K \Omega \pm 10\%$	$2,3K \Omega \pm 10\%$
W terminal : black(-)	$3,0K \Omega \pm 10\%$	$2,3K \Omega \pm 10\%$

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

Multi Split / Single

## VIII. Checking Method for Key Components

1. Process of replacing the compressor	232
2. Compressor	233
3. EEV	234
4. Reverse Valve	235
5. Temperature Sensor	236
6. Pressure Sensor	236

# 1. 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.
- Charging 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 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. Please check by closing the service valve of liquid pipe & gas pipe, whether there is a site of the leak by injecting nitrogen gas(38 kgf/cm<sup>2</sup>G) through the check joint of the high-pressure side and low pressure side.
10. Remove the nitrogen gas.
11. Open the service valve(liquid & gas pipe) of the ODU and do vacuum processing.
12. Install the crank case heater.

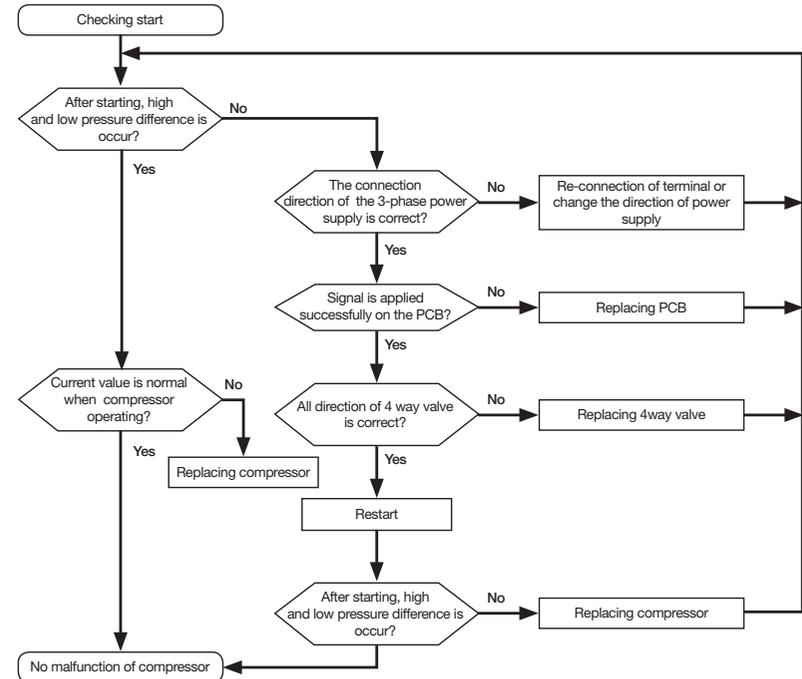
**⚠ Caution** When you install the crank case heater, please install the exact heater valve corresponding to the compressor after checking the both of crankcase heater.

13. Please install the insulation material and the discharge temperature sensor of compressor.
14. Connect power supply cable to terminal of compressor.

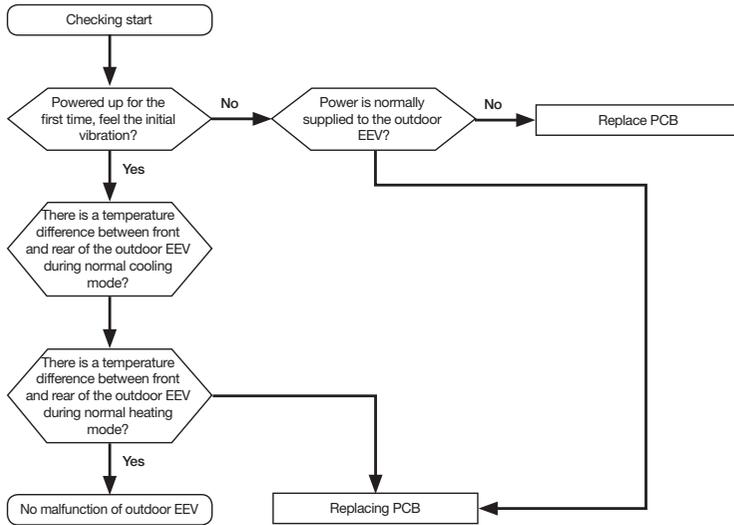
**⚠ Caution** Please be aware that not occur the reverse phase & loss of phase when connecting the phase.

15. 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.
16. 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.
17. Make sure that has been opened the service valve of liquid pipe side and gas pipe side.
18. Please check the operation status after operating all IDU.

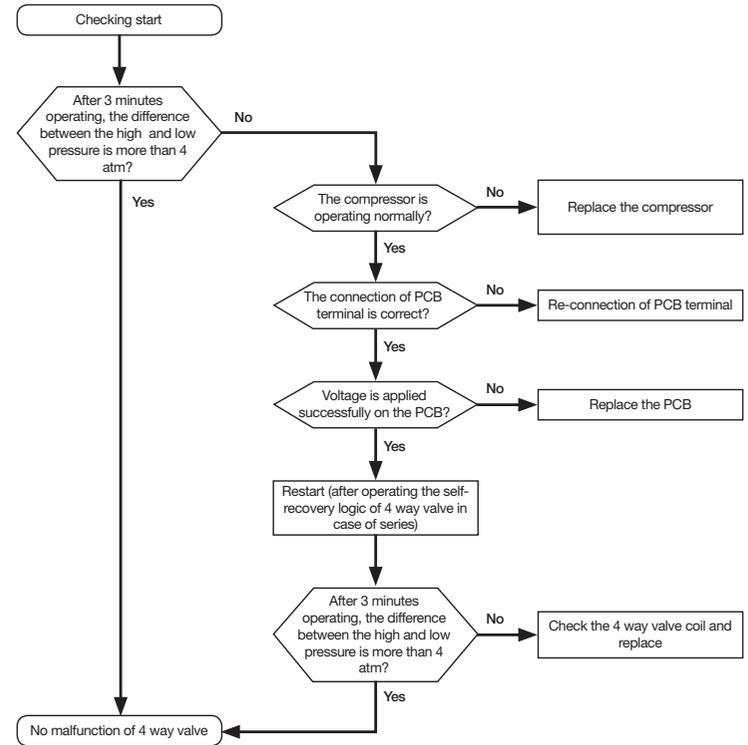
# 2. Compressor



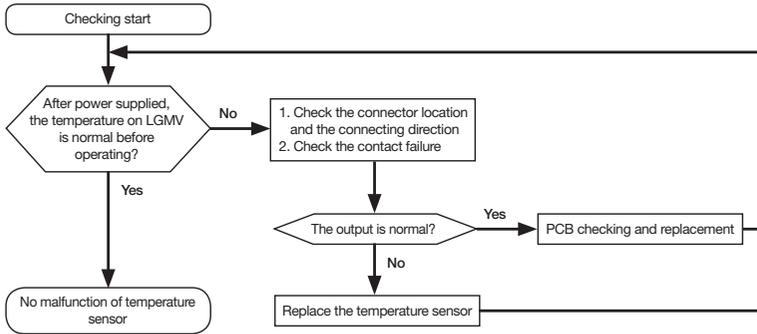
### 3. EEV



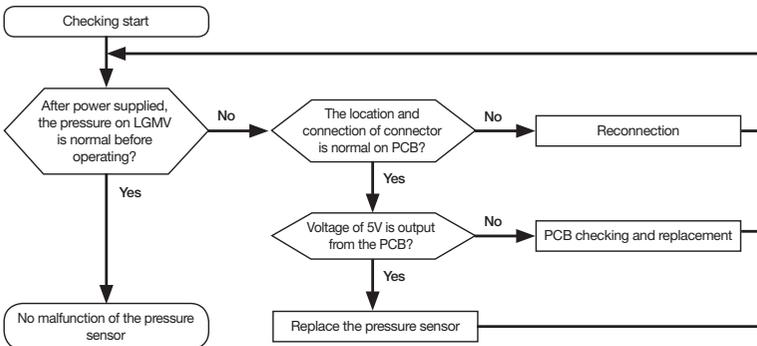
### 4. Reverse Valve



## 5. Temperature Sensor



## 6. Pressure Sensor

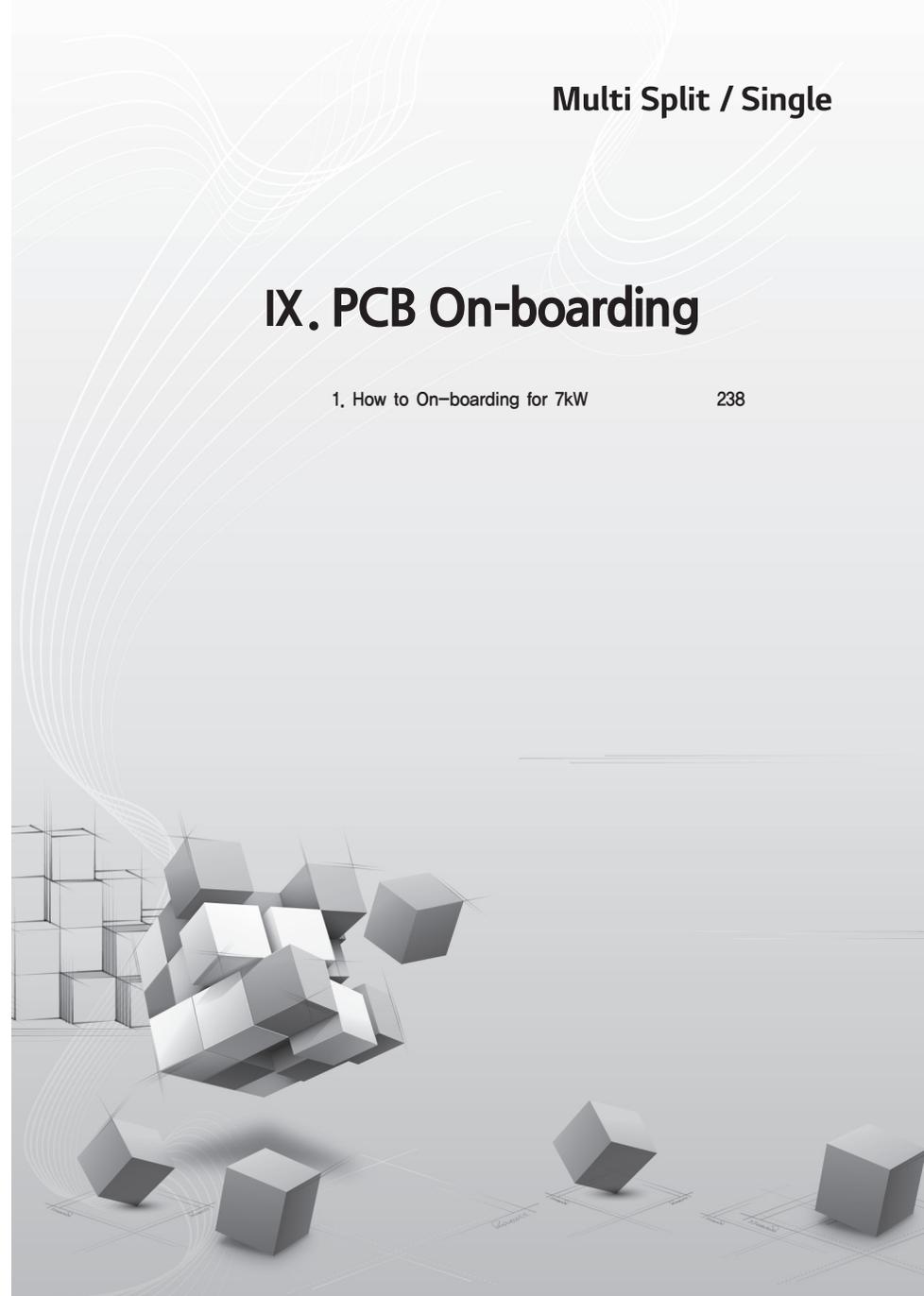


Multi Split / Single

## IX. PCB On-boarding

1. How to On-boarding for 7kW

238



# 1. How to Onboarding for 7kW

## 1.1 Onboarding equipment and Controller

1. Onboarding equipment
  - ① Computer (notebook)
  - ② Jig Box
  - ③ USB 2,0 TO RS232 Cable
  - ④ PCB Connect Cable
  - ⑥ Short Key



Jig Box



USB 2,0 TO RS232 Cable



Short key



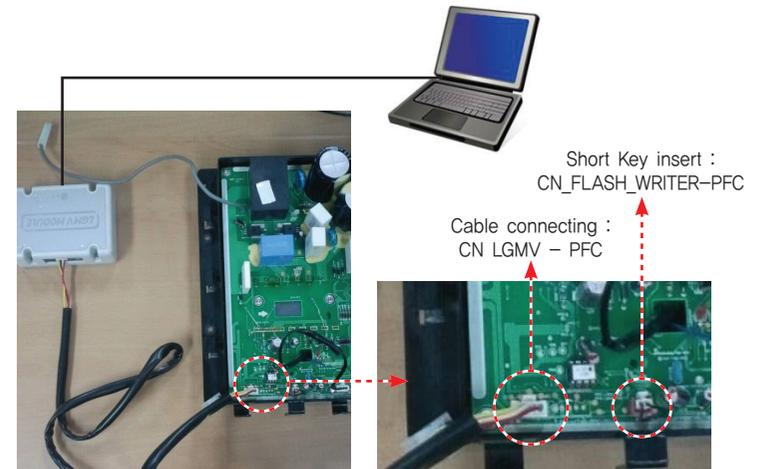
PCB Connecting Cable



INV Controller

## 1.2 On boarding setting and procedure ( Controller )

1. Outdoor unit power off
2. Connecting : PC – USB TO RS232 Cable – Jig Box – Connecting Cable – PCB

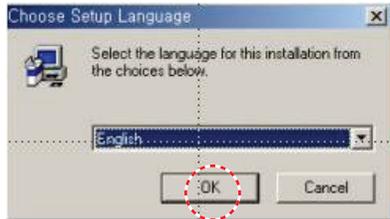


[ On boarding Cable connecting and Short Key setting method]

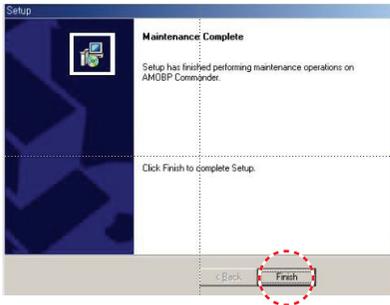
3. Power On → Check the LED has been off-condition → Run the on boarding program → Update → Power OFF → Remove the short key → In 15 minutes, power on

### 1.3 Install of Controller on boarding program

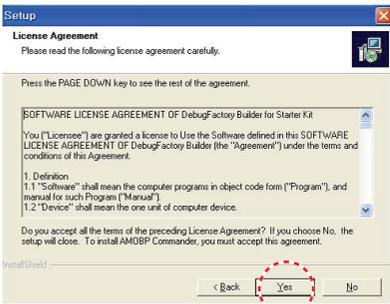
1. Run AMOBPC\_setup.exe
2. Select the language → Click Ok



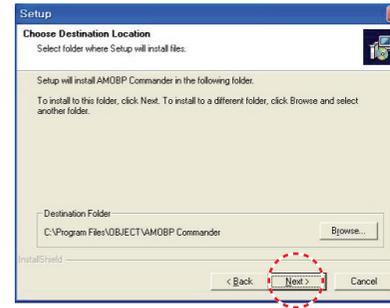
3. Click Finish



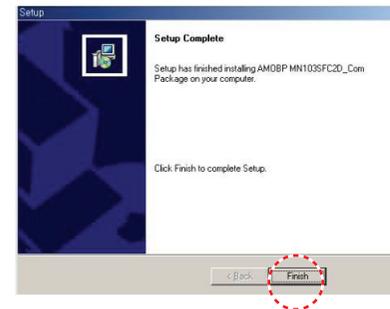
4. Click Yes



5. Select folder where install files and click NEXT



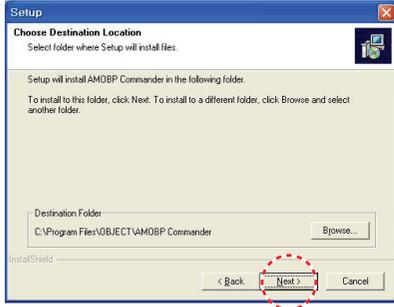
6. Click Finish



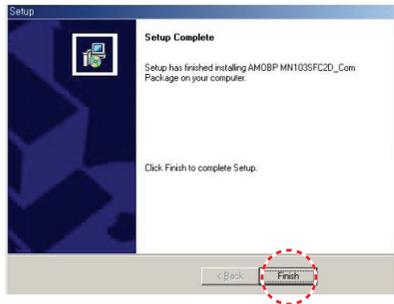
7. Run MOBP\_MN103SFC2D\_ComVL.exe



8. Select folder where install files and click NEXT



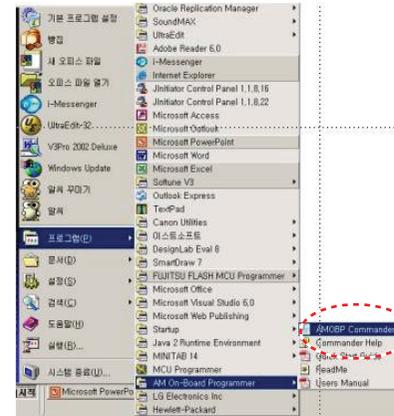
9. Click Finish



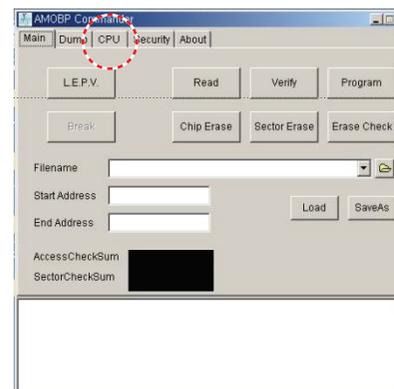
## 1.4 On-boarding setting and procedure

[Install of Controller ]

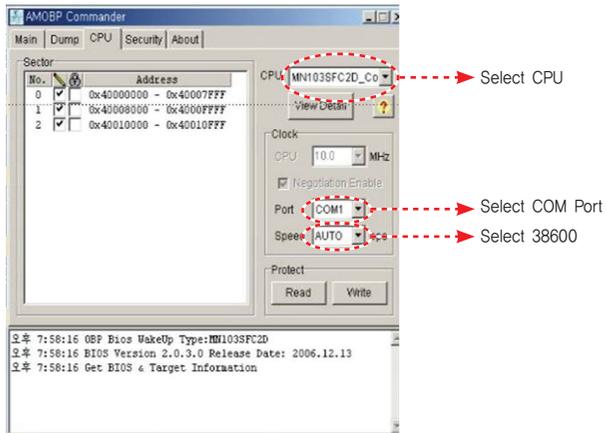
1. Start → Program → AM On-Board Programmer → Click AMOBP Command



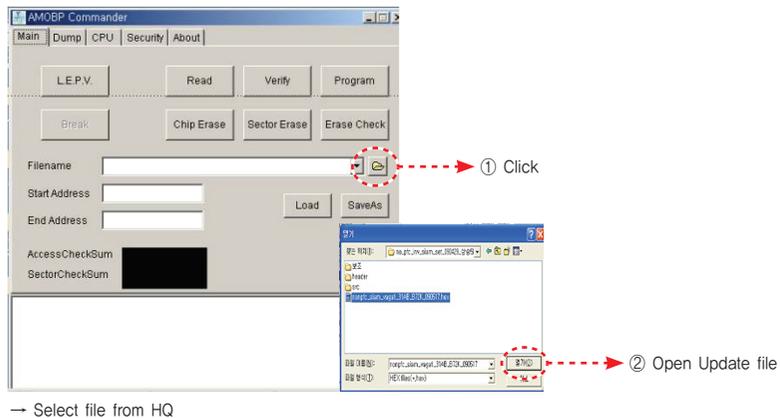
2. Initial setting : Click CPU



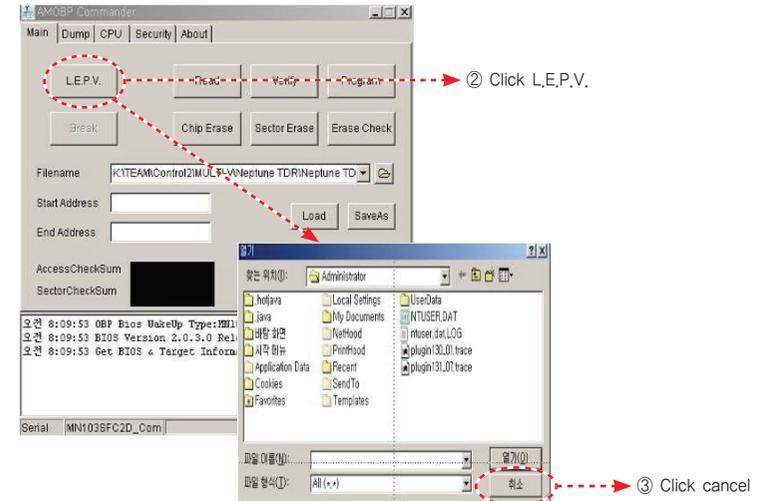
## 3. CPU/COM Port/Speed Setting



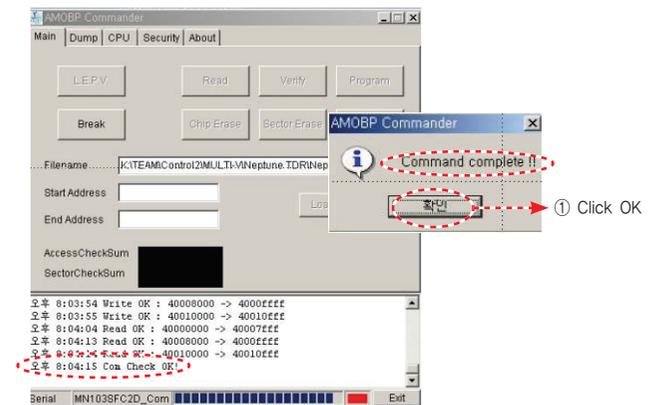
## 4. File Open



## 5. Update



## 6. Complete



# Trouble Shooting Guide Book

## Multi Split / Single

**Publisher** LG Electronics Air Conditioning & Energy Solution Company, SAC Engineering Division  
**Issued date** December 2013  
**Address** LG Twin Towers, 20, Yeouido-dong, Yeongdeungpo-gu, Seoul 150-721, Korea  
**Web** <http://kic.lgeaircon.com>

All rights are reserved by LG Electronics.

