

SAMSUNG

SYSTEM AIR CONDITIONER OUTDOOR UNIT

AM080/100/120/200FXWANR* / AM300KXWANR*
AM072/096/120/192HXWAFR* / AM240KXWAFR*
AM072/096/120/192HXWAJR* / AM240KXWAJR*
AM038/048/055KXWDCH*

SERVICE *Manual*

AIR CONDITIONER



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1. Precautions

1-1 Precautions for the Service

- **Use the correct parts when changing the electric parts.**
 - Please check the labels and notices for the model name, proper voltage, and proper current for the electric parts.
- **Fully repair the connection for the types of harness when repairing the product after breakdown.**
 - A faulty connection can cause irregular noise and problems.
- **When disassembling or assembling, make sure that the product is laid down on a work cloth.**
 - Doing so will prevent scratching to the exterior of the rear side of the product.
- **Completely remove dust or foreign substances on the housing, connection, and inspection parts when performing repairs.**
 - This can prevent fire hazards for tracking, short, etc.
- **Please tighten the service valve of the outdoor unit and the valve cap of the charging valve as securely as possible by using a monkey spanner.**
- **Check whether the parts are properly and securely assembled after performing repairs.**
 - These parts should be in the same condition as before the repair.

1-2 Precautions for the Static Electricity and PL

- **Please carefully handle the PBA power terminal during repair and measurement when it is turned on since it is vulnerable to static electricity.**
 - Please wear insulation gloves before performing PBA repair and measurement.
- **Check if the place of installation is at least 2m away from electronic appliances such as TV, video players, and stereos.**
 - This can cause irregular noise or degrade the picture quality.
- **Please make sure the customer does not directly repair the product.**
 - Arbitrary dismantling may result in electric shock or fire.

1-3 Precautions for the Safety

- **Do not pull or touch the power plug or the subsidiary power switch with wet hands.**
 - This may result in electric shock or fire.
- **If the power line or the power plug is damaged, then it must be changed since this is a hazard.**
- **Do not bend the wire too much or position it so that it can be damaged by a heavy object on top.**
 - This may result in electric shock or fire.
- **The use of multiple electric outlets should be prohibited.**
 - This may result in electric shock or fire.
- **Ground the connection if it is necessary.**
 - The connection must be grounded if there is any risk of electrical short due to water or moisture.
- **Unplug the power or turn off the subsidiary power switch when changing or repairing electrical parts.**
 - Doing so will prevent electric shock.
- **Explain to workers that the battery for the remote control needs to be separated for storage purposes when the product will not be used for a long time.**
 - This can cause a problem for the remote control since battery fluid may trickle out.

1-4 Precautions for Handling Refrigerant for Air Conditioner

Environmental Cautions: Air pollution due to gas release

- **Safety Cautions**

If liquid gas is released, then body parts that come into contact with it may experience frostbite/blister/numbness.

If a large amount of gas is released, then suffocation may occur due to lack of oxygen. If the released gas is heated, then noxious gas may be produced by combustion.

- **Container Handling Cautions**

Do not subject container to physical shock or overheating. (Flowage is possible while moving within the regulated pressure.)

1-5 Precautions for Welding the Air Conditioner Pipe

- **Dangerous or flammable objects around the pipe must be removed before the welding.**

- **If the refrigerant is kept inside the product or the pipe, then remove the refrigerant prior to welding.**

If the welding is carried out while the refrigerant is kept inside, the welding cannot be properly performed. This will also produce noxious gas that is a health hazard. This leakage will also explode with the refrigerant and oil due to an increase in the refrigerant pressure, posing a danger to workers.

- **Please remove the oxide produced inside the pipe during the welding with nitrogen gas.**

Using another gas may cause harm to the product or others.

1-6 Precautions for Additional Supplement of Air Conditioner Refrigerant

- **Precisely calculate the refrigerant by using a scale and S-net, and proceed with the test operation.**

Excessive supplement can cause harm to the product since it can cause an inflow of the liquid refrigerant into the compressor.

- **Do not heat the refrigerant container for a forced injection.**

This may cause harm to the product or others since the refrigerant container may burst.

- **Do not operate the product after removing the product safety pressure switch and sensor.**

If the product is blocked inside, then this may cause harm to the product or others due to the excess pressure increase of the refrigerant gas.

1-7 Other Precautions

- **There should be no leakage of the pipes after installation. When withdrawing the refrigerant, the compressor should be stopped before removing the connecting pipe.**

If the compressor is operating while the refrigerant pipe is not correctly connected and the service valve is opened, then air and other substances can enter the pipe. The interior of the refrigerant cycle may then build up excessive high pressure resulting in explosion and damage.

2. Product Specifications

2-1 Feature of Product

2-1-1 Feature

More efficient, more eco-friendly

The DVM S WATER air conditioning system saves money and the environment, while providing a powerful performance. Its innovative Dual Inverter Compressor with a high efficiency Vapor Injection System ensures powerful, rapid cooling and heating with minimum energy consumption, so it's very eco-friendly. A Plate Heat Exchanger also improves the heat exchange efficiency and ensures stable cooling and heating performances.



Flexible installation almost anywhere

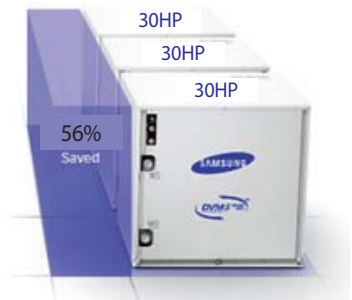
The DVM S WATER air conditioning system can be installed almost anywhere, regardless of its location or distance from the building. It has a maximum piping length of up to 170 meters (558 feet) between the outdoor and indoor units, while still ensuring complete reliability. It can also reach up to a height of 50 meters (164 feet), which is the equivalent of 10 stories.



Lower installation costs, great capacity

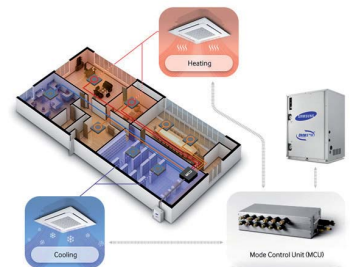
The DVM S WATER air conditioning system is much more economical to install as it has a small footprint and lightweight design, but a large 30 horsepower (HP) capacity.

So instead of installing three 10HP units you only need one 30HP Samsung unit – using 56% less space and significantly reducing the costs of valves, fittings and gauges. You can also combine up to three units to create a total capacity of 90HP.







Independently cool and heat

With the DVM S WATER air conditioning system's optional Mode Control Unit (MCU) you can independently cool and heat different spaces at the same time. Instead of just heating or cooling all spaces at the same time, with the MCU each indoor unit can be operated separately, so you can simultaneously heat some rooms or areas of the building, while cooling others.







2-1 Feature of Product (cont.)

2-1-2 Changes in comparison to basic model (AM300KXWANR)


Changed Part	Changed item And feature	Basic (10HP+20HP)	After changed (DVM S Water 30HP)
Cabinet	Save Installation Space by 40% compared to basic		
	Save Weight by 30% Compared to basic		

2-1-2 Changes in comparison to basic model (AM240KXWAFR)



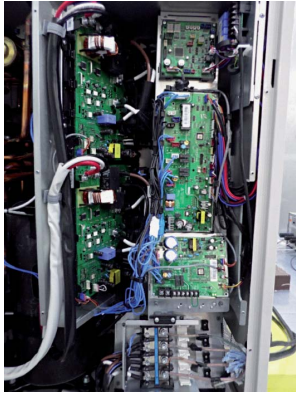
Changed Part	Changed item And feature	Basic (10Ton + 10Ton)	After changed (DVM S Water 20Ton)
Cabinet	Save Installation Space by 33% compared to basic		
	Save Weight by 15% Compared to basic		

2-1 Feature of Product (cont.)

2-1-2 Changes in comparison to basic model (cont.)

Changed Part	Changed item And feature	Basic	After changed (AM300KXWANR/AM240KXWAF(J)R)
Compressor	AM***F(K)XWANR : 52/66cc → 70cc	8/10HP : 52CC 12HP : 66CC 20HP : 52CC	30HP : 70CC
	AM***H(K)XWA*R : 52cc → 66cc	6/8/10Ton : 52cc x 1 16Ton : 52cc x 2	20Ton : 66cc x 2
Plate Heat Exchanger	Capacity Up	8,10,12HP / 20HP	30HP
	Size UP (W x H x D)	8/10/12HP (mm) : 770x1,000x545 6/8/10Ton (inch) : 30.3x39.4x21.5 20HP (mm) : 1,100x1,000x545 16Ton (inch) : 1,100(43.3)x1,000(39.4)x545(21.5)	30HP (mm) : 1,100x1,000x545 20Ton (inch) : 43.3x39.4x21.5
	Socket Size Up	PT 1-1/4"	PT2" (for Europe) 6/8/10/16Ton : NPT 1-1/4 20Ton : NPT 2
	Picture	 AM080/100/120/200FXWANR AM072/096/120/196FXWAF(J)R	 AM300KXWANR/ AM240KXWAF(J)R

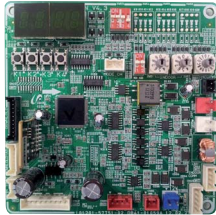




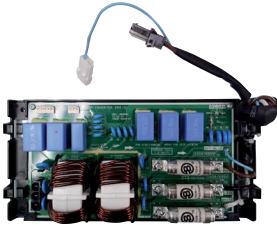


Control Box & PBA

Changed part	Changed item and feature	AM080/100/120/200FXW* AM72/096/120/196HXW*	AM300KXW* AM240KXW*
CONTROL BOX	<ul style="list-style-type: none"> - PBA & WIRE SIZE change <ul style="list-style-type: none"> . INV : 260*240 → 292*242 . EMI : 230*130 → 242*145 . Power WIRE : #12 → #8 - Large IPM cooling 	 <p><8/10/12HP></p>  <p><20HP></p>	 <p><30HP></p>

2-1 Feature of Product (cont.)

2-1-2 Changes in comparison to basic model (cont.)







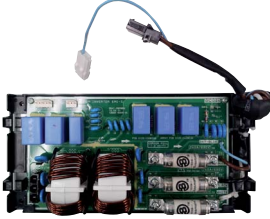







■ AM80/100/120/200FXWA**

Changed part	Changed item and feature	Basic	After changed
Main PCB	Change Main PCB - Separation for load / control. - Option resistance delete by model. (standardization) - When do PCB replace, need option download.		
Hub PCB	Hub PCB newly application - Separation for load / control. - Enhanced fixing of load / sensor wire.		
Inverter PCB (Compressor Control PCB)	Applied inverter Compressor. - Refrigerant cooling method. - Magnet S/W → Did Power Relay mount to PCB.		←
EMI PCB	3 phase power EMI PCB - Fuse mount		←
Communication Terminal block	Did Communication Terminal block mount to PCB.		←
Water Hub PCB	Water Hub PCB - External contact for DVM S WATER		←

2-1 Feature of Product (cont.)

2-1-2 Changes in comparison to basic model (cont.)





■ AM240KXWAF(J)R

Changed part	Changed item and feature	Basic (AM240KXWAF(J)R)	After changed (AM196HXWAF(J)R)
Main PBA	Change Main PBA - Increase MICOM capability		
Hub PCB	Hub PCB newly application - Separation for load / control. - Enhanced fixing of load / sensor wire.		
Inverter PBA (Compressor Control PBA)	- Increases current due to high capacity compressor - Increases capacitor's capacity - Applies EMI coil on board (Deletes core in wire)		
EMI PBA	- Develops 50A EMI PBA → Increases coil size and fuse capacity - Improves EMI characteristic.		
Communication Terminal block	Did Communication Terminal block mount to PCB.		←
Water Hub PCB	Water Hub PCB - External contact for DVM S WATER		←
REACTOR	- Increases current due to high capacity compressor - Improved wire connection terminal		
Refrigerant cooling	- Increases heat cooling capacity - Increases pipe size and heat exchange area		

2-1 Feature of Product (cont.)

2-1-2 Changes in comparison to basic model (cont.)

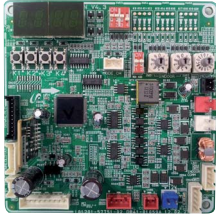




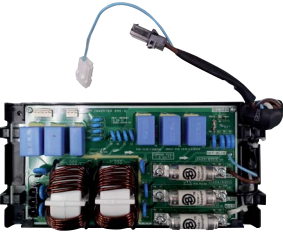



■ AM038/048/055KXWD**

Item	Feture	PBA
Main PCB	Main PCB - Separation for load / control. - Option resistance delete by model. (standardization) - When replace the PCB, must download option. - Enhanced fixing of load / control wire.	
Inverter PCB (Compressor control PCB)	Compressor control Inverter PCB	 3/4HP:PF#4 5/6HP : PF#5
EMI PCB	Single-phase power supply EMI PCB - FUSE mount	
Water Hub PCB	Water Hub PCB -The external contact point of the water-cooled.	

2-1 Feature of Product (cont.)

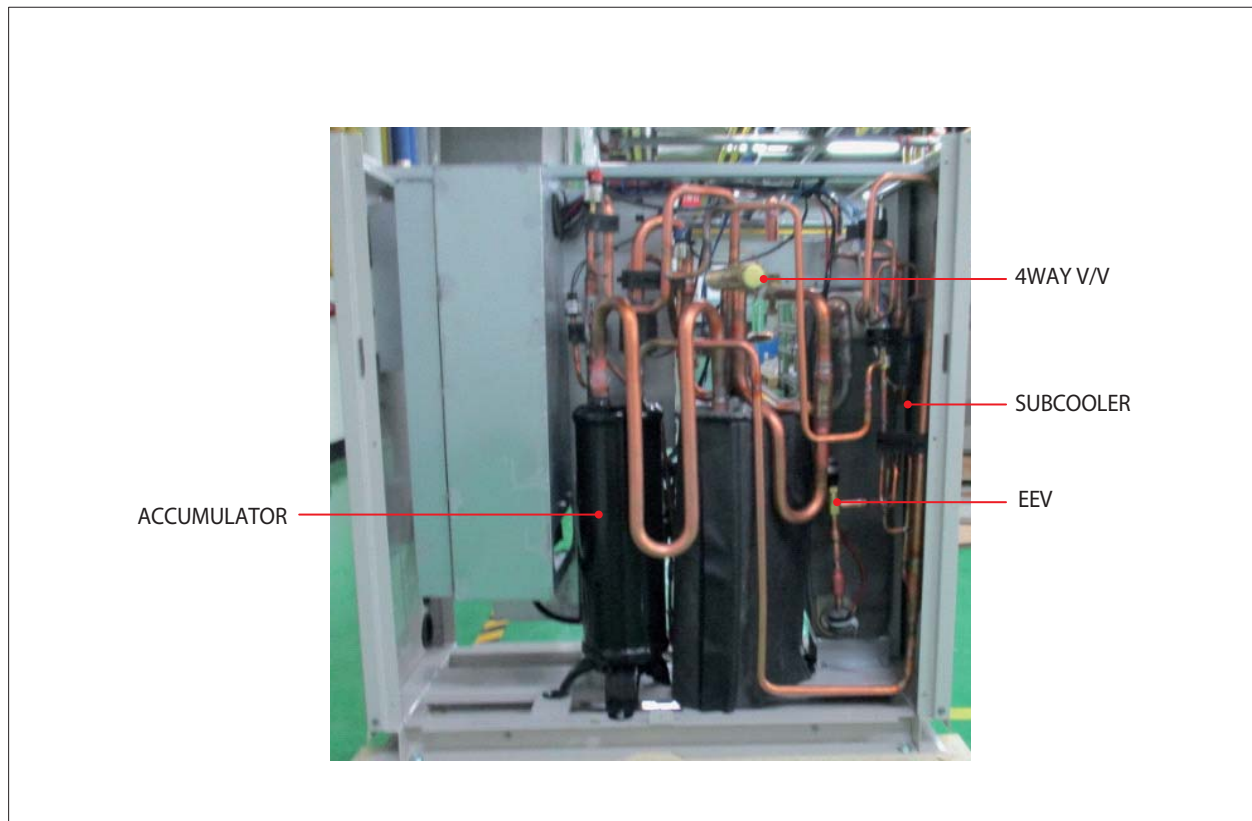
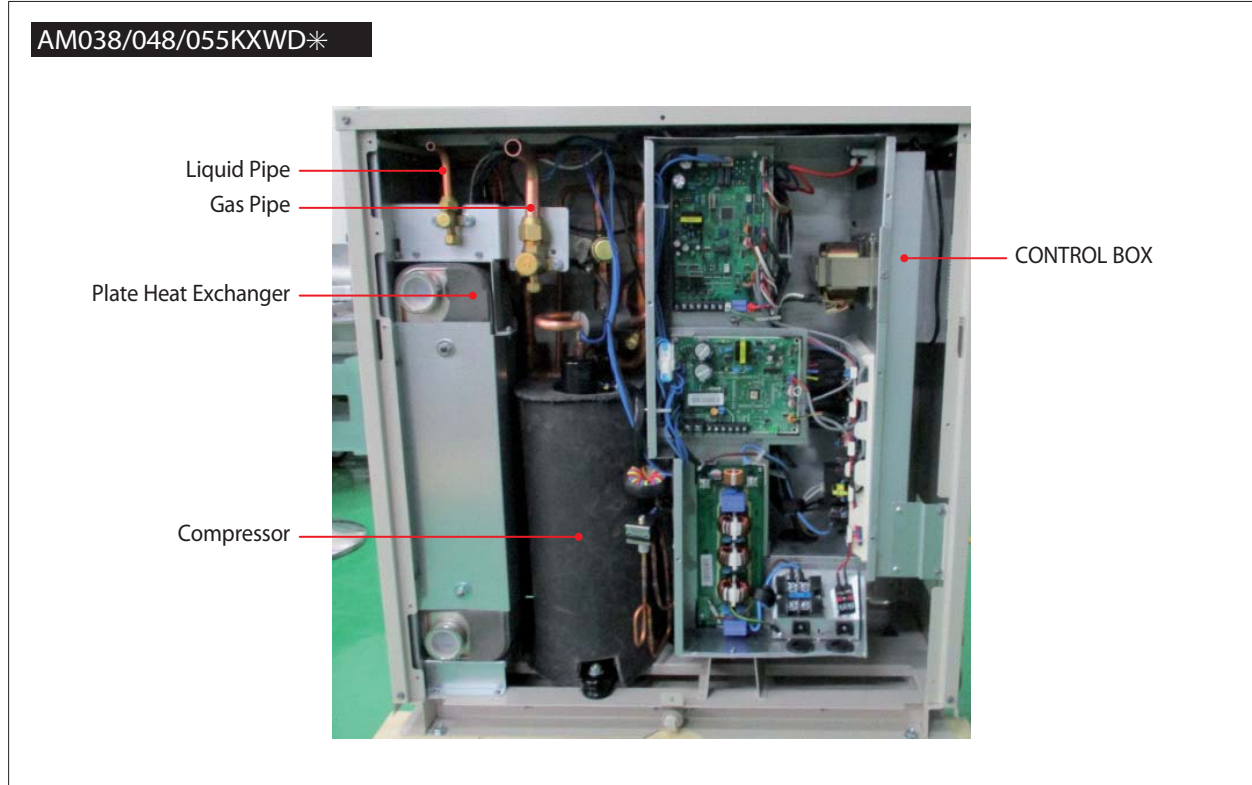
2-1-2 Changes in comparison to basic model (cont.)

■ AM072/096/120/192HXWA**

Changed part	Changed item and feature	Basic	After changed
Main PCB	<p>Change Main PCB</p> <ul style="list-style-type: none"> - Separation for load / control. - Option resistance delete by model. (standardization) - When do PCB replace, need option download. 		
Hub PCB	<p>Hub PCB newly application</p> <ul style="list-style-type: none"> - Separation for load / control. - Enhanced fixing of load / sensor wire. 		
Inverter PCB (Compressor Control PCB)	<p>Applied inverter Compressor</p> <ul style="list-style-type: none"> - Refrigerant cooling method - Magnet S/W → Did Power Relay mount to PCB. 		←
EMI PCB	<p>3 phase power EMI PCB</p> <ul style="list-style-type: none"> - Fuse mount 		←
Communication Terminal block	<p>Did Communication Terminal block mount to PCB.</p>		←
Water Hub PCB	<p>Water Hub PCB</p> <ul style="list-style-type: none"> - External contact for DVM S WATER 		

2-1 Feature of Product (cont.)

2-1-3 Structure of product (AM038/048/055KXWDCH Series)

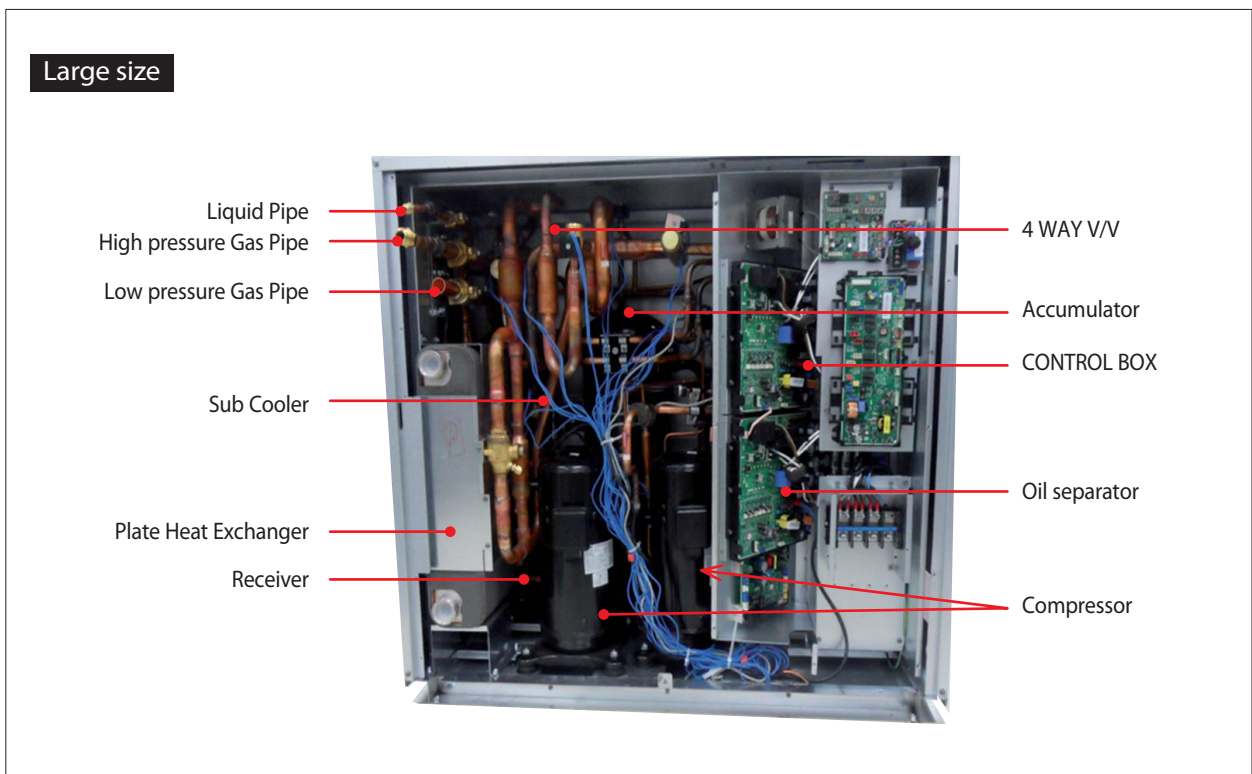
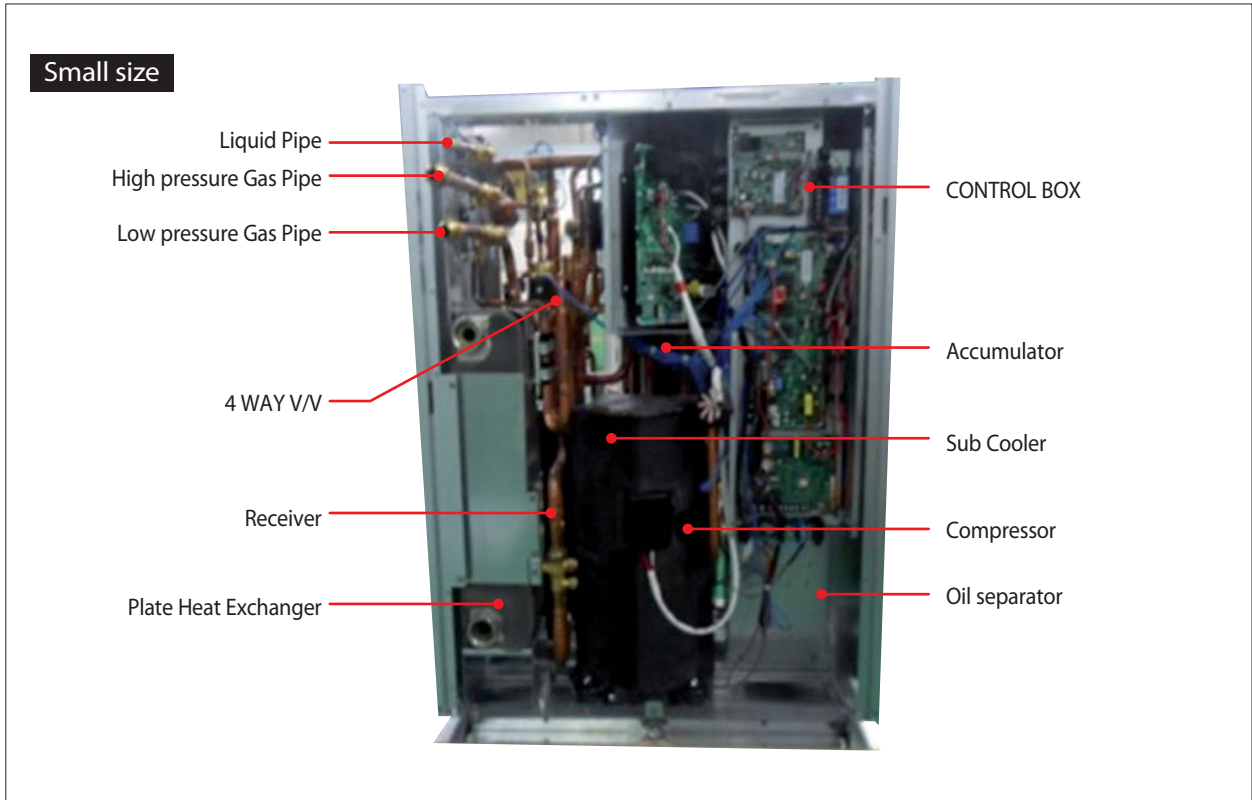


2-1 Feature of Product (cont.)

2-1-4 Structure of product

(Small size : AM080/100FXWANR* / AM072/096/120HXWAFR*

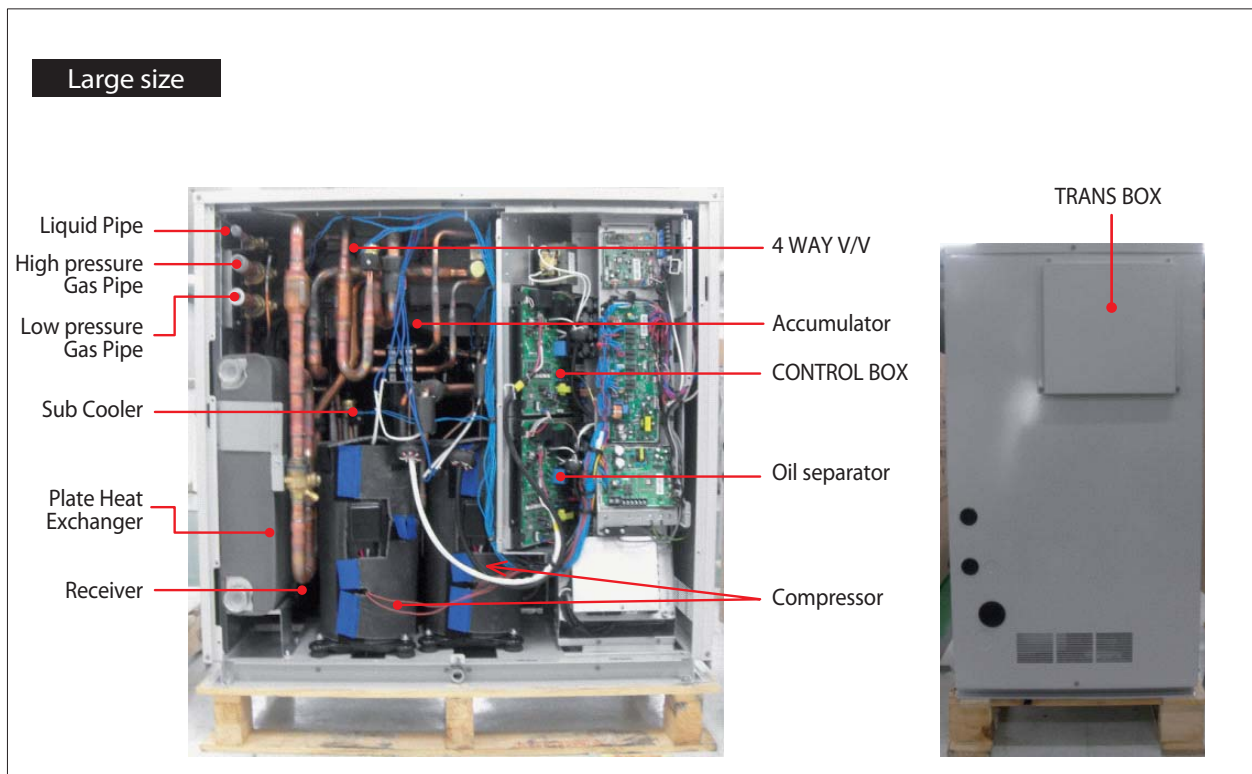
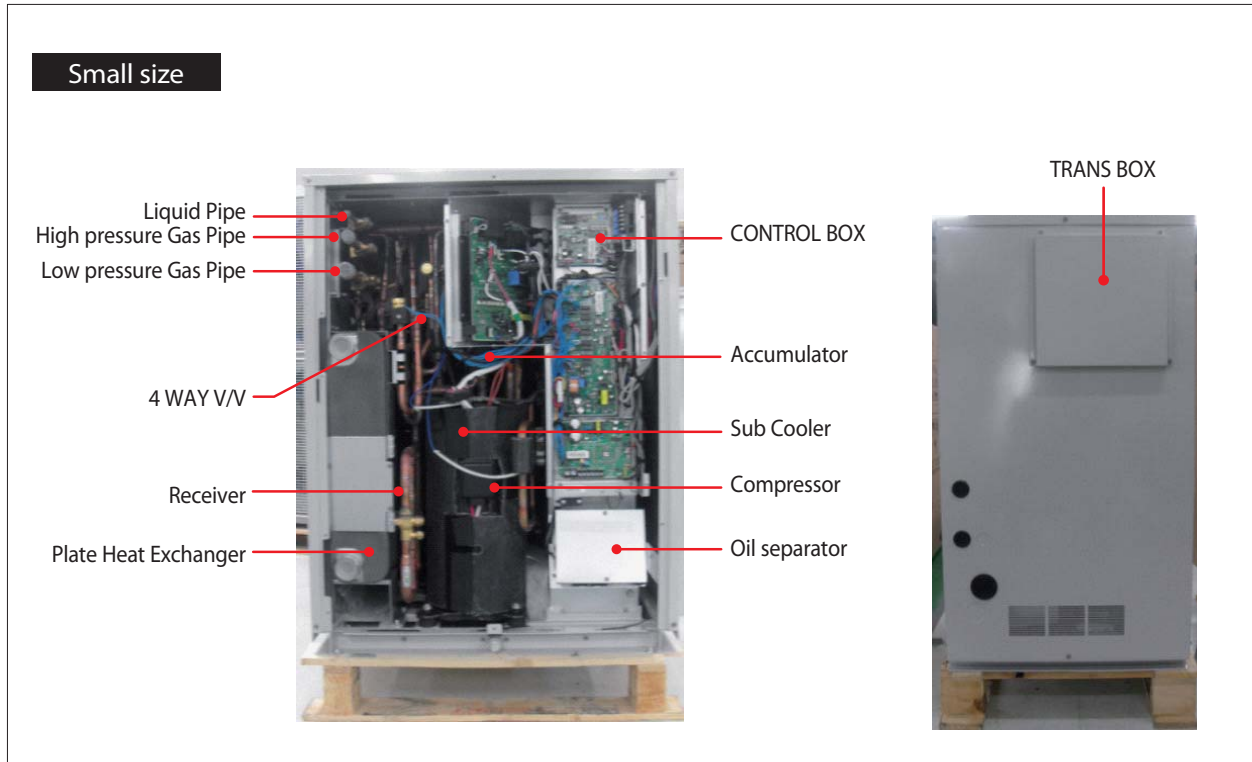
(Large size : AM200FXWANR*,AM300KXWANR* / AM192HXWAFR*,AM240KXWAFR*)



2-1 Feature of Product (cont.)

2-1-5 Structure of product

(Power supply for 460V, 60Hz, 3Φ : AM072/096/120/192/240*XWAJR Series)



2-1 Feature of Product (cont.)

■ 3~6HP DVM S Water : Exploded View

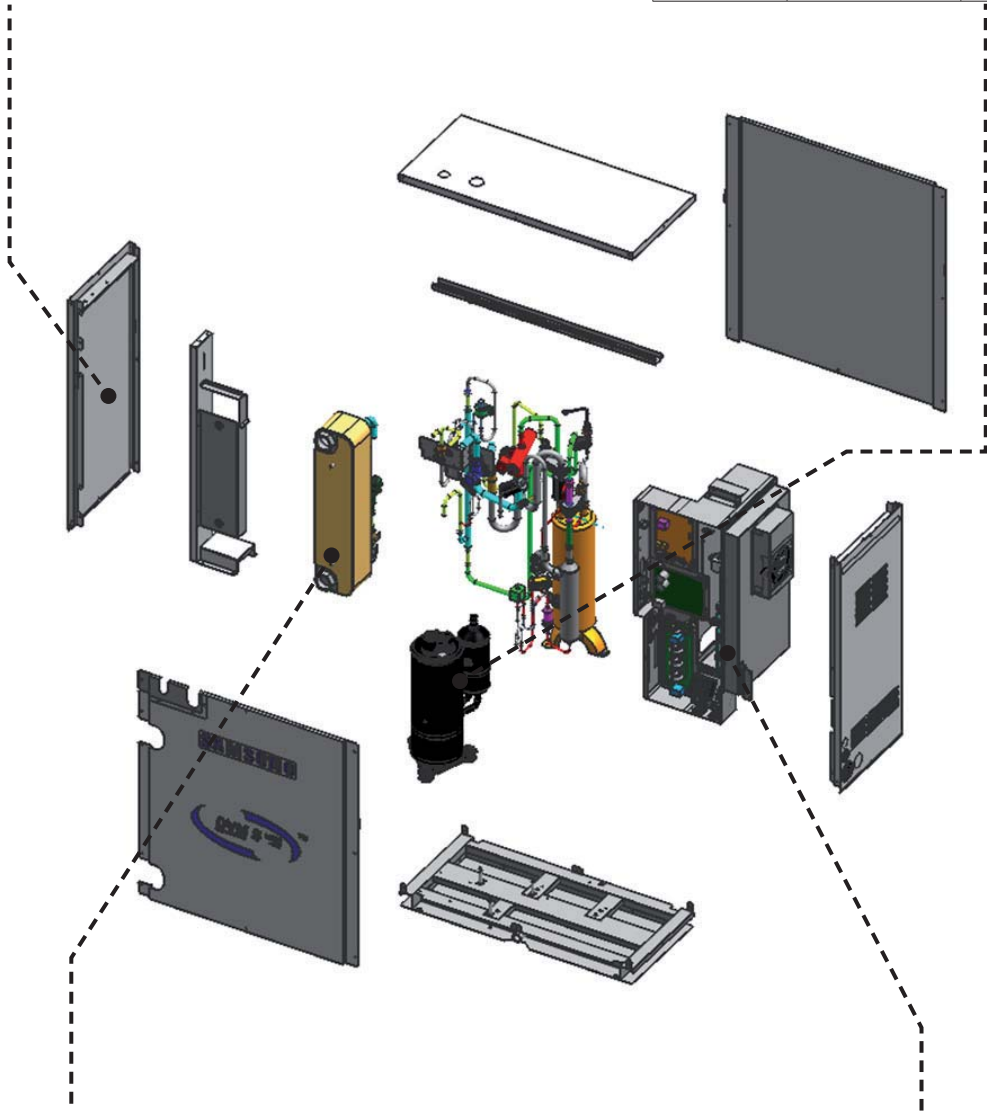
- AM038/048/055KXWD***

ASSY CABINET PARTS

- DVM WATER SMALL FRAME
- SIZE : (750 X 800 X 330)

ASSY COMP PARTS

Model	038	048/055
DVM WATER	UG8T300FUBJSG	UG5T450FUEJXSG



ASSY COND PARTS

Model	038	048/055
DVM WATER	CBH60-24H	CBH60-34H

ASSY CONTROL OUT

Model	038/048/055
DVM WATER	20A

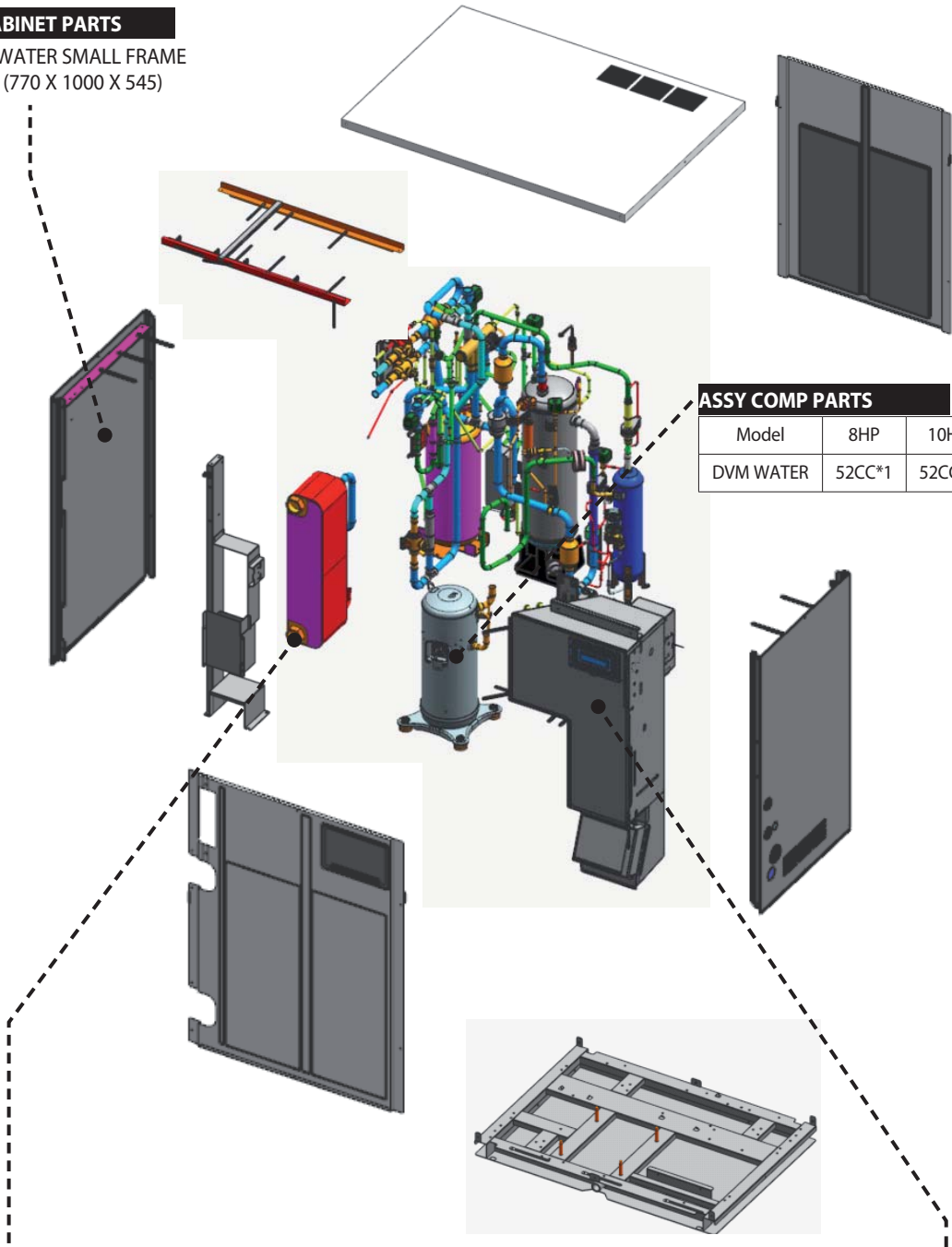
2-1 Feature of Product (cont.)

■ 8~12HP DVM S Water : Exploded View

- AM080/100/120FXWA***
- AM072/096/120HXWA***

ASSY CABINET PARTS

- DVM WATER SMALL FRAME
- SIZE : (770 X 1000 X 545)



ASSY COMP PARTS

Model	8HP	10HP	12HP
DVM WATER	52CC*1	52CC*1	66CC*1

ASSY COND PARTS

Model	8HP	10HP	12HP
DVM WATER	CBH60-54H		

ASSY CONTROL OUT

- Refrigerant cooling system for IPM

Model	8HP	10HP	12HP
DVM WATER	35A		

2-1 Feature of Product (cont.)

■ 20/30HP DVM S Water : Exploded View

- AM200/300*XWA***
- AM192/240*XWA***

ASSY CABINET PARTS

- DVM WATER LARGE FRAME
- SIZE : (1100 x 1000 x 545)

ASSY COMP PARTS

Model	20HP	30HP
DVM WATER	52CC*2	70CC*2

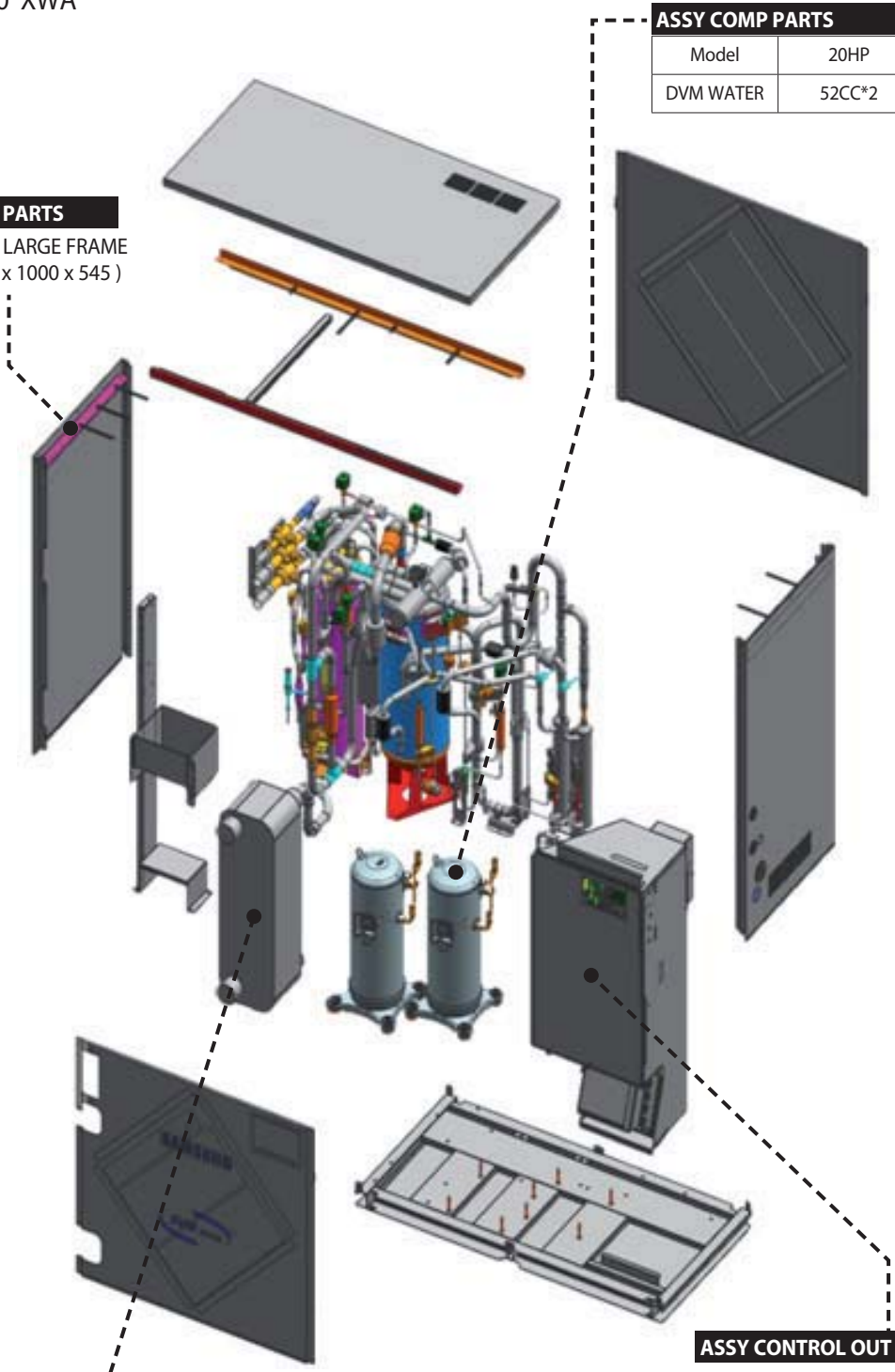
ASSY COND PARTS

Model	20HP	30HP
DVM WATER	CBH60-88H	ACH220EQ-70M

ASSY CONTROL OUT

- Refrigerant cooling system for IPM

Model	20HP	30HP
DVM WATER	35A*2	50A*2



2-2 Model names of Indoor/Outdoor Unit

2-2-1 Outdoor unit combination

■ Premium Energy Efficiency Type (AM***FXWANR*)

System Model			Capacity of Single Unit (HP)			
Capa	Code	No. of Modules	8HP	10HP	12HP	20HP
8	AM080FXWANR	1	1			
10	AM100FXWANR	1		1		
12	AM120FXWANR	1			1	
16	AM160FXWANR2	2	2			
18	AM180FXWANR2	2	1	1		
20	AM200FXWANR	1				1
22	AM220FXWANR2	2		1	1	
24	AM240FXWANR2	2			2	
26	AM260FXWANR2	3	2	1		
28	AM280FXWANR2	2	1			1
30	AM300FXWANR2	2		1		1
32	AM320FXWANR2	2			1	1
34	AM340FXWANR2	3		1	2	
36	AM360FXWANR2	3	2			1
38	AM380FXWANR2	3	1	1		1
40	AM400FXWANR2	2				2
42	AM420FXWANR2	3		1	1	1
44	AM440FXWANR2	3			2	1
48	AM480FXWANR2	3	1			2
50	AM500FXWANR2	3		1		2
52	AM520FXWANR2	3			1	2
60	AM600FXWANR2	3				3

■ Premium compact type (AM***KXWANR*)

System Model			Capacity of Single Unit (HP)				
Capa	Code	No. of Modules	8HP	10HP	12HP	20HP	30HP
30	AM300KXWANR	1					1
38	AM380KXWANR1	2	1				1
40	AM400KXWANR1	2		1			1
42	AM420KXWANR1	2			1		1
46	AM460KXWANR1	3	2				1
48	AM480KXWANR1	3	1	1			1
50	AM500KXWANR1	2				1	1
52	AM520KXWANR1	3		1	1		1
54	AM540KXWANR1	3			2		1
58	AM580KXWANR1	3	1			1	1
60	AM600KXWANR1	2					2
62	AM620KXWANR1	3			1	1	1
68	AM680KXWANR1	3	1				2
70	AM700KXWANR1	3		1			2
80	AM800KXWANR1	3				1	2
90	AM900KXWANR1	3					3

- ▶ Make sure to use an indoor unit that is compatible with DVM S Water-GEO.
- ▶ Indoor units can be connected within the range indicated in following table.
- ▶ If the total capacity of the connected indoor units exceeds the indicated maximum capacity, cooling and heating capacity of the indoor unit may decrease.
- ▶ Total capacity of the connected indoor units can be allowed from 50% to 130% of the total outdoor unit capacity.
 $0.5 \times \Sigma(\text{Outdoor unit capacity}) \leq \text{Total capacity of the connected indoor units} \leq 1.3 \times \Sigma(\text{Outdoor unit capacity})$
 - ※ You can connect maximum 64 indoor units to the outdoor unit. Maximum quantity of connectable indoor unit is set to 64 since outdoor unit only support up to 64 communication address. Indoor unit address can be assigned from 0~63.
 - If the indoor unit address was assigned from 64~79, E201 error will occur.
 - ※ Maximum 32 Wall-mount type indoor units with EEV (AM****NQDEH*, AM***JNV*) can be connected.

2-2 Model names of Indoor/Outdoor Unit (cont.)

2-2-1 Outdoor unit combination (cont.)

■ Premium Energy Efficiency Type (AM***KXWDCH*)

System Model			Capacity of Single Unit (Ton)		
Capa(ton)	Code	No. of Modules	3	4	5
3	AM038KXWDCH*	1	1		
4	AM048KXWDCH*	1		1	
5	AM055KXWDCH*	1			1

- ▶ Make sure to use an indoor unit that is compatible with DVM S Water-GEO.
- ▶ Indoor units can be connected within the range indicated in following table.
- ▶ If the total capacity of the connected indoor units exceeds the indicated maximum capacity, cooling and heating capacity of the indoor unit may decrease.
- ▶ Total capacity of the connected indoor units can be allowed from 50% to 130% of the total outdoor unit capacity.
 $0.5 \times \Sigma(\text{Outdoor unit capacity}) \leq \text{Total capacity of the connected indoor units} \leq 1.3 \times \Sigma(\text{Outdoor unit capacity})$
 - ※ You can connect maximum 64 indoor units to the outdoor unit. Maximum quantity of connectable indoor unit is set to 64 since outdoor unit only support up to 64 communication address. Indoor unit address can be assigned from 0~63. If the indoor unit address was assigned from 64~79, E201 error will occur.
 - ※ Maximum 32 Wall-mount type indoor units with EEV (AM****NQDEH*, AM***JNV*) can be connected.

2-2 Model names of Indoor/Outdoor Unit (cont.)

2-2-1 Outdoor unit combination (cont.)

■ Premium Energy Efficiency Type (AM***HXWAF(J)R*)

System Model			Capacity of Single Unit (Ton)			
Capa(ton)	Code	No. of Modules	6	8	10	16
6	AM072HXWA*R	1	1			
8	AM096HXWA*R	1		1		
10	AM120HXWA*R	1			1	
12	AM144HXWA*R2	2	2			
14	AM168HXWA*R2	2	1	1		
16	AM192HXWA*R	1				1
18	AM216HXWA*R2	2		1	1	
20	AM240HXWA*R2	2			2	
22	AM264HXWA*R2	2	1			1
24	AM288HXWA*R2	2		1		1
26	AM312HXWA*R2	2			1	1
28	AM336HXWA*R2	3	2			1
30	AM360HXWA*R2	3	1	1		1
32	AM384HXWA*R2	2				2
34	AM408HXWA*R2	3		1	1	1
36	AM432HXWA*R2	3			2	1
38	AM456HXWA*R2	3	1			2
40	AM480HXWA*R2	3		1		2
42	AM504HXWA*R2	3			1	2
48	AM576HXWA*R2	3				3






















































■ Premium compact type (AM***KXWAF(J)R*)

System Model			Capacity of Single Unit (Ton)				
Capa(ton)	Code	No. of Modules	6	8	10	16	20
20	AM240KXWA*R	1					1
26	AM312KXWA*R1	2	1				1
28	AM336KXWA*R1	2		1			1
30	AM360KXWA*R1	2			1		1
34	AM408KXWA*R1	3	1	1			1
36	AM432KXWA*R1	3	1		1		1
38	AM456KXWA*R1	3		1	1		1
40	AM480KXWA*R1	2					2
44	AM528KXWA*R1	3		1		1	1
46	AM552KXWA*R1	3	1				2
48	AM576KXWA*R1	3		1			2
50	AM600KXWA*R1	3			1		2

- ▶ Make sure to use an indoor unit that is compatible with DVM S Water-GEO.
- ▶ Indoor units can be connected within the range indicated in following table.
- ▶ If the total capacity of the connected indoor units exceeds the indicated maximum capacity, cooling and heating capacity of the indoor unit may decrease.
- ▶ Total capacity of the connected indoor units can be allowed from 50% to 130% of the total outdoor unit capacity.
 $0.5 \times \Sigma(\text{Outdoor unit capacity}) \leq \text{Total capacity of the connected indoor units} \leq 1.3 \times \Sigma(\text{Outdoor unit capacity})$
 - ※ You can connect maximum 64 indoor units to the outdoor unit. Maximum quantity of connectable indoor unit is set to 64 since outdoor unit only support up to 64 communication address. Indoor unit address can be assigned from 0~63. If the indoor unit address was assigned from 64~79, E201 error will occur.
 - ※ Maximum 32 Wall-mount type indoor units with EEV (AM****NQDEH*, AM***JNV*) can be connected.

2-2 Model names of Indoor/Outdoor Unit (cont.)

2-2-2 Indoor unit

Model	Capacity (kW)								
	1.7	2.2	2.8	3.6	4.5	5.6	6.0	7.1	9.0
Slim 1way cassette (JSF)									
2way cassette									
Global 4way cassette									
4way CST (600 X 600)									
360 CST									
Floor Standing Unit									
Slim duct									
MSP duct									
HSP duct									
Ceiling									
Console									
Neo forte									
Neo forte (with EEV)									
Hydro unit / HE									
Hydro unit / HT									
ERV plus									

2-2 Model names of Indoor/Outdoor Unit (cont.)











2-2-2 Indoor unit (cont.)

Model	Capacity (kW)							
	11.2	12.8	14.0	22.0	28.0	44.8	500CMH	1000CMH
Slim 1way cassette (JSF)								
2way cassette								
Global 4way cassette								
4way CST (600 X 600)								
360 CST								
Floor Standing Unit								
Slim duct								
MSP duct								
HSP duct								
Ceiling								
Console								
Neo forte								
Neo forte (with EEV)								
Hydro unit / HE								
Hydro unit / HT								
ERV plus								

2-2 Model names of Indoor/Outdoor Unit (cont.)

2-2-3 Outdoor unit










■ Premium Energy Efficiency Type (AM***FXWANR*)

Capa [HP]	Model Name	Model	Capa [HP]	Model Name	Model
8	AM080FXWANR		34	AM340FXWANR2	
10	AM100FXWANR		36	AM360FXWANR2	
12	AM120FXWANR		38	AM380FXWANR2	
16	AM160FXWANR2		40	AM400FXWANR2	
18	AM180FXWANR2		42	AM420FXWANR2	
20	AM200FXWANR		44	AM440FXWANR2	
22	AM220FXWANR2		48	AM480FXWANR2	
24	AM240FXWANR2		50	AM500FXWANR2	
26	AM260FXWANR2		52	AM520FXWANR2	
28	AM280FXWANR2			60	
30	AM300FXWANR2				
32	AM320FXWANR2				

2-2 Model names of Indoor/Outdoor Unit (cont.)

2-2-3 Outdoor unit (cont.)


■ Premium Compact Type (AM***KXWANR*)

Capa [HP]	Model Name	Model	Capa [HP]	Model Name	Model
30	AM300KXWANR		58	AM580KXWANR1	
38	AM380KXWANR1		60	AM600KXWANR1	
40	AM400KXWANR1		62	AM620KXWANR1	
42	AM420KXWANR1		68	AM680KXWANR1	
46	AM460KXWANR1		70	AM700KXWANR1	
48	AM480KXWANR1		80	AM800KXWANR1	
50	AM500KXWANR1		90	AM900KXWANR1	
52	AM520KXWANR1				
54	AM540KXWANR1				





















2-2 Model names of Indoor/Outdoor Unit (cont.)

2-2-3 Outdoor unit (cont.)

■ Premium Energy Efficiency Type (AM***KXWDCH*)

Capa (Ton)	Model Name	Model
3	AM038KXWDCH*	
4	AM048KXWDCH*	
5	AM055KXWDCH*	











■ Premium Energy Efficiency Type (AM***HXWAF(J)R*)

Capa (Ton)	Model Name	Model	Capa (Ton)	Model Name	Model
6	AM072HXWA*R		28	AM336HXWA*R2	
8	AM096HXWA*R		30	AM360HXWA*R2	
10	AM120HXWA*R		32	AM384HXWA*R2	
12	AM144HXWA*R2		34	AM408HXWA*R2	
14	AM168HXWA*R2		36	AM432HXWA*R2	
16	AM192HXWA*R		38	AM456HXWA*R2	
18	AM216HXWA*R2		40	AM480HXWA*R2	
20	AM240HXWA*R2		42	AM504HXWA*R2	
22	AM264HXWA*R2		48	AM576HXWA*R2	
24	AM288HXWA*R2				
26	AM312HXWA*R2				

2-2 Model names of Indoor/Outdoor Unit (cont.)

2-2-3 Outdoor unit (cont.)

■ Premium compact type (AM***KXWAF(J)R*)

Capa (Ton)	Model Name	Model	Capa [Ton]	Model Name	Model
20	AM240KXWA*R		40	AM480KXWA*R1	
26	AM312KXWA*R1		44	AM528KXWA*R1	
28	AM336KXWA*R1		46	AM552KXWA*R1	
30	AM360KXWA*R1		48	AM576KXWA*R1	
34	AM408KXWA*R1		50	AM600KXWA*R1	
36	AM432KXWA*R1				
38	AM456KXWA*R1				

2-3 Combination and Connection Ratio limitation

Combination	Indoor Units				Installation and use limitations			
	Normal Units	Hydro	OAP	AHU	Max. number of indoor units for connection	Combination ratio	Other limitations	Piping limitations
DVM S Water	O	O			64	50~130%		
DVM S Water	O	O			64	50~130%		
DVM S Water+Hydro (HP only)	O	O			64	50~180%	Hydro units are applicable to heating only (including floor heating). Other common indoor units are applicable to cooling only- Combination ratio for cooling-only indoor units must be 100% or lower- It is not possible to operate common indoor units and hydro units simultaneously	Level difference ODU-IDU Outdoor unit in highest position : 50m/40m ※ over 50m, install PDM kit Indoor unit in highest position : 50m ※ over 40m, contact local dealer
DVM S Water+OAP (HP only)	O	O	O		64	50~100%	OAP must be lower than 30% of outdoor unit capacity	IND-IND : 50m (DVMs Heat pump) IND-IND : 15m (HR & Water)
DVM S Water+OAP (HP only)			O		64	50~100%		※ Wall mounted with EEV : 15m
DVM S Water+AHU				O	64	50~130%		Piping length from the first branch pipe until the indoor unit : 45m ※ If the condition is satisfied : 90m
DVM S Water+AHU	O	O		O	64	50~130%	AHU must be lower than 50% of outdoor unit capacity	Long piping (equivalent length) : 170m
DVM S Water+(AHU+OAP) (HP only)	O	O	O	O	64	50~100%	OAP must be lower than 30% of outdoor unit capacity- AHU+OAP must be lower than 50% of outdoor unit capacity	Total piping length : 500m

- ※ Normal Units : Cassette, Duct, Ceiling, Console, Wall Mounted, ERV+, Floor stand.
- ※ For wall mounted with EEV, it is possible to install a maximum of 32 units
- ※ ERV (not ERV+) can be installed separately without the need to lay refrigerant pipe.


2-4 Components and Feature

Model	HP	Compressor (Inverter Scroll)	Electronic Expansion Valve	High Pressure Switch	Check valves	Solenoid valves
AM***F(K)XWANR*	8	1	2	1	6	8
	10					
	12					
	20	2		2	7	9
	30					

Model	Ton	Compressor (Inverter Scroll)	Electronic Expansion Valve	High Pressure Switch	Check valves	Solenoid valves
AM***HXWAF(J)R* AM***KXWAF(J)R*	6	1	2	1	6	8
	8					
	10					
	16	2		2	7	9
	20					









2-5 Product Specification

2-5-1 Outdoor Unit

Image								
Model Name				AM080FXWANR/EU	AM100FXWANR/EU	AM120FXWANR/EU	AM200FXWANR/EU	AM300KXWANR/EU
Power Supply			Φ, #, V, Hz	3/AC380~415/50				
Performance	HP		HP	8	10	12	20	30
	Capacity (Nominal)	Cooling	kW	23	29	34.8	58	84.0
			kcal/h	19780	24940	29928	49880	72,240
		Heating	kW	26	32.6	39.2	65.2	94.5
kcal/h			22360	28036	33712	56072	81,270	
Power	Power Input (Nominal)	Cooling	kW	4.18	5.58	6.69	11.15	16.80
		Heating		4.33	5.62	6.76	11.24	16.88
	Current Input (Nominal)	Cooling	A	7.0	9.4	11.3	18.8	26.4
		Heating		7.3	9.5	11.4	19.0	26.5
MFA			-	20	20	30	40	5.00
COP	Nominal Cooling 1)		-	5.50	5.20	5.20	5.20	5.60
	Nominal Heating 2)		-	6.00	5.80	5.80	5.80	5.80
Compressor	Type		-	SSC Scroll x 1	SSC Scroll x 1	SSC Scroll x 1	SSC Scroll x 2	SSC Scrollx2
	Output		kW	4.96	4.96	6.13	4.96 x 2	6.75x2
	Oil	Type	-	PVE	PVE	PVE	PVE	PVE
Initial Charge		Liter	3.9	3.9	3.9	6.2	6.2	
Condenser	Type		-	Stainless steel plate	Stainless steel plate	Stainless steel plate	Stainless steel plate	Plate Heat Exchanger
	Pipe Size		Φ, inch(A)	PT1-1/4 (32)	PT1-1/4 (32)	PT1-1/4 (32)	PT1-1/4 (32)	PT 2(50)
	Pressure Drop		kPa	22	30	43	54	50
	Water Flow Rate		LPM	80	96	114	190	285
	Max. Pressure		MPa	1.96	1.96	1.96	1.96	1.96
Piping Connection	Liquid Pipe		Type	Braze connection				
			Φ, mm	9.52	9.52	12.7	12.7	15.88
			Φ, inch	3/8"	3/8"	1/2"	1/2"	3/4"
	Gas Pipe		Type	Braze connection				
			Φ, mm	19.05	22.22	28.58	28.58	34.92
			Φ, inch	3/4"	7/8"	1-1/8"	1-1/8"	1-3/8"
	Discharge Gas Pipe		Type	Braze connection				
			Φ, mm	15.88	19.05	19.05	22.22	28.58
			Φ, inch	5/8"	3/4"	3/4"	7/8"	1-1/8"
	Piping length	ODU~IDU After branch	Max.	m	170(190)	170(190)	170(190)	170(190)
Max.			m	90	90	90	90	90
Total piping length	System	Actual	m	500	500	500	500	500
Level difference	ODU~IDU	Outdoor unit in highest position	m	50	50	50	50	50
		Indoor unit in highest position	m	40	40	40	40	40
	IDU~IDU	Max.	m	15	15	15	15	15
Refrigerant	Type		-	R410A	R410A	R410A	R410A	R410A
	Factory Charging		kg	5.5	5.8	6.0	9.8	11
External Dimension	Net Weight		kg	160	160	160	240	282
	Shipping Weight		kg	167	167	167	250	292
	Net Dimensions (WxHxD)		kg	770x1000x545	770x1000x545	770x1000x545	1100x1000x545	1100x1000x545
Shipping Dimensions (WxHxD)		kg	840x1200x620	840x1200x620	840x1200x620	1170x1200x620	1170x1200x620	
Operating Temp. Range(Water)	Cooling		°C	10~45	10~45	10~45	10~45	10~45
	Heating		°C	10~45	10~45	10~45	10~45	10~45






2-5 Product Specification (cont.)

2-5-1 Outdoor Unit (cont.)

Image											
Model Name(Samsung Model)			AM038KWDCH/AA	AM048KWDCH/AA	AM058KWDCH/AA	AM072KHWAFR/AA	AM096KHWAFR/AA	AM120KHWAFR/AA	AM192KHWAFR/AA	AM240KHWAFR/AA	
Mode			-	HP	HP	HR	HR	HR	HR	HR	
Power Supply			Q, V, Hz	HP 10,208~230V/60Hz	HP 10,208~230V/60Hz	HR 3,208~230V/60Hz	HR 3,208~230V/60Hz	HR 3,208~230V/60Hz	HR 3,208~230V/60Hz	HR 3,208~230V/60Hz	
Performance	Capacity (Nominal)	Cooling	Ton	3	4	5	6	8	10	16	20
		Capacity (Rated)	Btu/h	38200	47800	54600	72000	96000	120000	192000	240000
		Heating	Btu/h	42600	54600	61400	81000	108000	135000	216000	270000
	Efficiency Ratings	Cooling	Btu/h	38000	48000	54500	69000	92000	114000	184000	229000
		Heating	Btu/h	42000	54000	61000	77000	103000	129000	206000	257000
		EER	Btu/Wh	15	16.2	14.7	20.20	19.90	12.80	11.60	12.4
SEER		Btu/Wh	28	28	26	30.10	28.60	22.20	18.30	22.5	
Power	COP	W/W	5.7	5.6	5.4	6.00	5.90	4.40	4.30	5.3	
	SCHE	Btu/Wh	-	-	-	26.50	17.80	27.40	17.80	20.20	21.0
	MCA	A	20	24	26	16.0	23.0	30.0	39.6	66	
Compressor	MCP		35	40	45	25	40	50	50	90	
	Type		Rotary Inverter	Rotary Inverter	Rotary Inverter	SSC Scroll x 1	SSC Scroll x 1	SSC Scroll x 1	SSC Scroll x 2	SSC Scroll x 2	
	Output	MW x n	2.82	4.11	4.11	4.96	4.96	4.96 x 2	6.13x2	6.13x2	
Condenser	Oil	Type	PVE	PVE	PVE	PVE	PVE	PVE	PVE	PVE	
		Initial Charge	Liter	1.2	1.7	1.7	3.9	3.9	6.2	6.2	
	Type		Plate Heat Exchanger	Plate Heat Exchanger	Plate Heat Exchanger	Plate Heat Exchanger	Plate Heat Exchanger	Plate Heat Exchanger	Plate Heat Exchanger	Plate Heat Exchanger	
Piping Connections	Liquid Pipe	Type	Braze connection	Braze connection	Braze connection	Braze connection	Braze connection	Braze connection	Braze connection	Braze connection	
		Ø, inch	3/8"	3/8"	3/8"	3/8"	3/8"	1/2"	5/8"	5/8"	
	Gas Pipe	Type	Braze connection	Braze connection	Braze connection	Braze connection	Braze connection	Braze connection	Braze connection	Braze connection	
		Ø, mm	15.88	19.05	19.05	19.05	22.22	28.58	28.58	28.58	
	Discharge Gas Pipe (HR)	Type									
Ø, inch		5/8"	3/4"	3/4"	3/4"	7/8"	1 1/8"	1 1/8"	1 1/8"		
Refrigerant	Heat Insulation	Type	Both liquid and gas pipes	Both liquid and gas pipes	Both liquid and gas pipes	Both liquid and gas pipes	Both liquid and gas pipes	Both liquid and gas pipes	Both liquid and gas pipes	Both liquid and gas pipes	
		MAX.	m (ft)	75 (246)	75 (246)	75 (246)	170 (558)	170 (558)	170 (558)	170 (558)	
	Piping length (1st Branch-IDU)	MAX.	m (ft)	40 (131)	40 (131)	40 (131)	90 (295)	90 (295)	90 (295)	90 (295)	
		MAX.	m (ft)	200 (656)	200 (656)	200 (656)	500 (1640)	500 (1640)	500 (1640)	500 (1640)	
	Level difference (IUD in highest position)	MAX.	m (ft)	30 (98)	30 (98)	30 (98)	50 (164)	50 (164)	50 (164)	50 (164)	
		MAX.	m (ft)	30 (98)	30 (98)	30 (98)	40 (131)	40 (131)	40 (131)	40 (131)	
	Level difference (IDU-IDU)	MAX.	m (ft)	15 (49)	15 (49)	15 (49)	50 (164)	50 (164)	50 (164)	50 (164)	
		MAX.	m (ft)	15 (49)	15 (49)	15 (49)	50 (164)	50 (164)	50 (164)	50 (164)	
Sound	Type		R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	
	Factory Charging	kg (lbs)	1.12(4)	1.63(5)	1.63(5)	3.51(12)	5.81(20)	6(13.2)	9.82(34)	11(24.3)	
External Dimension	Shipping Weight	kg (lbs)	801(176)	940(207)	940(207)	167(368)	167(368)	290(639)	290(639)	280(617)	
		mm	750x800x330	750x800x330	750x800x330	770x1000x545	770x1000x545	1100x1000x545	1100x1000x545	1100x1000x545	
Operating Temp. Range(Water)	Cooling	°C (°F)	10~45(50~113)	10~45(50~113)	10~45(50~113)	10~45(50~113)	10~45(50~113)	10~45(50~113)	10~45(50~113)	10~45(50~113)	
		°C (°F)	10~45(50~113)	10~45(50~113)	10~45(50~113)	10~45(50~113)	10~45(50~113)	10~45(50~113)	10~45(50~113)	10~45(50~113)	

2-5 Product Specification (cont.)

2-5-1 Outdoor Unit (cont.)

Image								
Model Name(Samsung Model)			AM072HXWAJR/AA	AM096HXWAJR/AA	AM120HXWAJR/AA	AM192HXWAJR/AA	AM240KXWAJR/AA	
Mode			-	HR	HR	HR	HR	
Power Supply			Φ, V, Hz	3,460V/60Hz				
Performance	Ton		Ton	6	8	10	16	20
	Capacity (Nominal)	Cooling	Btu/h	72,000	96,000	120,000	192,000	240,000
		Heating	Btu/h	81,000	108,000	135,000	216,000	270,000
	Capacity (Rated)	Cooling	Btu/h	69,000	92,000	114,000	184,000	229,000
		Heating	Btu/h	77,000	103,000	129,000	206,000	257,000
	Efficiency Ratings	EER	Btu/W ^h	20.20	19.90	15.40	11.60	12.4
		IEER	Btu/W ^h	30.10	28.60	25.30	18.30	22.5
COP		W/W	6.00	5.90	4.80	4.30	5.3	
SCHE		Btu/W ^h	26.50	27.40	20.30	20.20	21.0	
Power	MCA	A	10.0	11.0	15.6	26.2	33	
	MOP		15	15	25	35	45	
Compressor	Type		-	SSC Scroll x 1	SSC Scroll x 1	SSC Scroll x 1	SSC Scroll x 2	SSC Scrollx2
	Output		kW × n	4.96	4.96	6.13	4.96 x 2	6.13x2
	Oil	Type	-	PVE	PVE	PVE	PVE	PVE
		Initial Charge	Liter	3.9	3.9	3.9	6.2	6.2
Condenser	Type		-	Plate Heat Exchanger	Plate Heat Exchanger	Plate Heat Exchanger	Plate Heat Exchanger	Plate Heat Exchanger
	Pipe Size(Female Thread)		Φ, inch	1-1/4 FPT	1-1/4 FPT	1-1/4 FPT	1-1/4 FPT	NPT 2
	Lost Head		kPa (ftAq)	22(7.3)	30(10.0)	43(14.4)	54(18.1)	33(11.0)
	Water Flow Rate		LPM(GPM)	80(21.1)	96(25.4)	114(30.1)	190(50.2)	228(60.2)
	Water Max. Pressure		Mpa(Psi)	1.96(285)	1.96(285)	1.96(285)	1.96(285)	1.96(285)
Piping Connections	Liquid Pipe		Type	Braze connection	Braze connection	Braze connection	Braze connection	Braze connection
			Φ, mm	9.52	9.52	12.7	15.88	15.88
			Φ, inch	3/8"	3/8"	1/2"	5/8"	5/8"
	Gas Pipe		Type	Braze connection	Braze connection	Braze connection	Braze connection	Braze connection
			Φ, mm	19.05	22.22	28.58	28.58	28.58
			Φ, inch	3/4"	7/8"	1 1/8"	1 1/8"	1 1/8"
	Discharge Gas Pipe (HR)		Φ, mm	15.88	19.05	22.22	28.58	28.58
			Φ, inch	5/8"	3/4"	7/8"	1 1/8"	1 1/8"
			Heat Insulation	-	Both liquid and gas pipes	Both liquid and gas pipes	Both liquid and gas pipes	Both liquid and gas pipes
	Piping length (ODU-IDU)		MAX.	m (ft)	170 (558)	170 (558)	170 (558)	170 (558)
	Piping length (1st Branch-IDU)		MAX.	m (ft)	90 (295)	90 (295)	90 (295)	90 (295)
	Total Piping length (System)		MAX.	m (ft)	500 (1640)	500 (1640)	500 (1640)	500 (1640)
	Level difference (OUD In highest postion)		MAX.	m (ft)	50 (164)	50 (164)	50 (164)	50 (164)
Level difference (IUD In highest postion)		MAX.	m (ft)	40 (131)	40 (131)	40 (131)	40 (131)	
Level difference (IDU-IDU)		MAX.	m (ft)	50 (164)	50 (164)	50 (164)	50 (164)	
Refrigerant	Type		-	R410A	R410A	R410A	R410A	R410A
	Factory Charging		kg (lbs)	5.5(12.1)	5.8(12.8)	6(13.2)	9.8(21.6)	11(24.3)
Sound	Sound Pressure		dB(A)	48	48	50	51	55
	Sound Power			70	70	70	73	74
External Dimension	Net Weight		kg (lbs)	167(368)	167(368)	167(368)	247(545)	287(633)
	Shipping Weight		kg (lbs)	174(384)	174(384)	174(384)	257(567)	297(655)
	Net Dimensions (WxHxD)		mm	790x1000x545	790x1000x545	790x1000x545	1120x1000x545	1,120x1,000x545
			Inch	31.1x39.4x21.5	31.1x39.4x21.5	31.1x39.4x21.5	44.1x39.4x21.5	44.1x39.4x21.5
	Shipping Dimensions (WxHxD)		mm	840x1200x620	840x1200x620	840x1200x620	1170x1200x620	1,170x1,200x620
Inch			33.1x47.2x24.4	33.1x47.2x24.4	33.1x47.2x24.4	46.1x47.2x24.4	46.1x47.2x24.4	
Operating Temp. Range(Water)	Cooling		℃ (°F)	10~45(50~113)	10~45(50~113)	10~45(50~113)	10~45(50~113)	10~45(50~113)
	Heating		℃ (°F)	10~45(50~113)	10~45(50~113)	10~45(50~113)	10~45(50~113)	10~45(50~113)

- * Nominal capacities are based on (Equivalent refrigerant piping : 25ft(7.5m), Level differences : 0ft(0m)
 - Cooling : Indoor temperature : 80°F(26.7°C) DB, 67°F(19.4°C) WB / Inlet water temperature : 85°F (29.4°C)
 - Heating : Indoor temperature : 70°F(21.1°C) DB, 60°F(15.6°C) WB / Inlet water temperature : 68°F (20°C)
- * Rated capacities are based on (Equivalent refrigerant piping : 25ft(7.5m), Level differences : 0ft(0m)
 - Cooling : Indoor temperature : 80.6°F(27°C) DB, 66.2°F(19°C) WB / Inlet water temperature : 86°F (30°C)
 - Heating : Indoor temperature : 68°F(20°C) DB, 59°F(15°C) WB / Inlet water temperature : 68°F (20°C)
- Need special load calculation in case of use by main heating in the winter, and please buy product for low temperature that heating effect excels at low temperature.
- Maximum length between outdoor and indoor units allows up to 656ft (Equivalent length 722ft).
- If the indoor unit is below, height length allows up to 361ft (If over 164ft, decide whether to install the PDM kit). If the outdoor unit is below, allowable height length is 131ft.



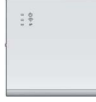



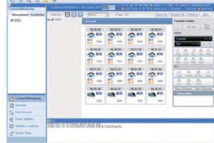



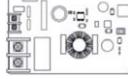

2-6 Accessory and Option Specifications

2-6-1 Controller

Classification	Product	Model	Image	Remark	Using
Individual Control System	Wireless Remote Controller	MR-EH00			DVM, CAC
	Wireless Remote Controller	AR-KH00E		360 CST Only	DVM, CAC
	Wired Remote Controller	MWR-WE11N			DVM, CAC
	Wired Remote Controller - Simple Type	MWR-SH00N			DVM, CAC
	Wired Remote Controller - Touch Simple Type	MWR-SH10N			DVM, CAC
	ERV Wired Remote Controller	MWR-VH12N		ERV Only	DVM, CAC
	Wired Remote Controller	MWR-WW00N		EHS Only	EHS
	Receiver KIT ??	MRK-A10N			DVM, CAC
	Zone Controller	MWR-ZS00N		Master controller+ Damper controller	DVM, CAC
	Zone Controller	MWR-ZS10N		Slave controller	DVM, CAC
	Zone Controller	MRW-TS		External room sensor	DVM, CAC


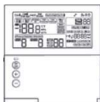

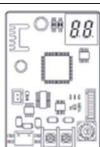





2-6 Accessory and Option Specifications (cont.)

2-6-1 Controller (cont.)

Classification	Product	Model	Image	Remark	Using
Centralized Control System	Onoff Controller	MCM-A202DN			DVM, CAC
	Touch Centralized Controller	MCM-A300N			DVM, CAC
	WIFI KIT	MIM-H03N			DVM, CAC
	Interface Module	MIM-N01			DVM, CAC
	ERV Interface Module	MIM-N10			DVM, CAC
Integrated management System	DMS2.5	MIM-D01AN			DVM, CAC
	S-NET3	MST-P3P			DVM, CAC
Gate Way	BACnet Gateway	MIM-B17BN			DVM, CAC
	Lonworks Gateway	MIM-B18BN			DVM, CAC
	External Contact Interface Module	MIM-B14			DVM, CAC
	MTFC (Multi Tenant Function Controller)	MCM-C210N			DVM
	SIM (Signal Interface Module)	MIM-B12N			DVM, CAC

2-6 Accessory and Option Specifications (cont.)

2-6-1 Controller (cont.)

Classification	Product	Model	Image	Remark	Using
Gate Way	PIM (Pulse Interface Module)	MIM-B16N			DVM, CAC
	Module Controller	MCM-A00N		CHILLER Only	CHILLER
	FCU KIT	MIM-F00N		CHILLER Only	CHILLER
	FCU Interface Module	MIM-F10N		CHILLER Only	CHILLER
Installation /Test run Solution	S-Checker	MIM-C10N			DVM, CAC
	S-Converter	MIM-C02N			DVM, CAC
Others	External Room Sensor	MRW-TA			DVM, CAC
	Operation Mode Selection Switch	MCM-C200			DVM
	Transformer Kit	MVR-TK024			DVM S Water

2-6 Accessory and Option Specifications (cont.)

2-6-2 Piping

Product	Image	Model	Remark
Y-Joint		MXJ-YA1509M	15.0 kW and below
		MXJ-YA2512M	Over 15.0 kW~40.0 kW and below
		MXJ-YA2812M	Over 40.0 kW~45.0 kW and below
		MXJ-YA2815M	Over 45.0 kW~70.3 kW and below
		MXJ-YA3419M	Over 70.3 kW~98.4 kW and below
		MXJ-YA4119M	Over 98.4 kW~135.2 kW and below
		MXJ-YA4422M	Over 135.2 kW
Y-Joint (Only H/R)		MXJ-YA1500M	22.4 kW and below
		MXJ-YA2500M	Over 22.4 kW~70.3 kW and below
		MXJ-YA3100M	Over 70.3 kW~135.2 kW and below
		MXJ-YA3800M	Over 135.2 kW
Y-Joint Outdoor unit		MXJ-TA3419M	135.2 kW and below
		MXJ-TA4122M	140.2 kW and Over
Y-Joint (Only H/R) Outdoor unit		MXJ-TA3100M	135.2 kW and below
		MXJ-TA3800M	140.2 kW and Over
Distribution Header		MXJ-HA2512M	45.0 kW and below (for 4 rooms)
		MXJ-HA3115M	70.3 kW and below (for 8 rooms)
		MXJ-HA3819M	Over 70.3 kW~135.2 kW and below(for 8 rooms)
MCU		MCU-S6NEE1N	~56kW, ~6 indoor units
		MCU-S4NEE1N	~56kW, ~4 indoor units
		MCU-S4NEE2N	~56kW, ~6 indoor units
EEV KIT		MEV-E24SA	1 Indoor
		MEV-E32SA	
		MXD-E24K132A	2 Indoor
		MXD-E24K200A	
		MXD-E32K200A	
		MXD-E24K232A	3 Indoor
		MXD-E24K300A	
		MXD-E32K224A	
PDM KIT		MXD-A38K2A	8~12HP
		MXD-A12K2A	14~16HP
		MXD-A58K2A	18~26HP

2-6 Accessory and Option Specifications (cont.)

2-6-3 Indoor

Product	Image	Model	Remark
Panel		PC1NUSMAN	Slim 1Way Cassette
		PC1NUPMAN	Slim 1Way Cassette (Z-sliding)
		PC1MWSKAN	1Way Cassette (1.7 kW, 2.2 kW)
		PC2NUSMEN	2Way cassette
		PC4SUSMAN	4Way Cassette S(600x600) (Waffle)
		PC4SUSMEN	4Way Cassette S(600x600) (Classic)
		PC4NUSKAN	4Way cassette S (Waffle)
		PC4NUSKEN	4 Way cassette S (Classic)
		PC4NBSKAN	4 Way cassette S (Waffle, Black)
		PC4NUDMAN	360 CST Square (White)
		PC4NUNMAN	360 CST Circular (White)
		PC4NBDMAN	360 CST Square (Black)
		PC4NBNMAN	360 CST Circular (Black)

2-6 Accessory and Option Specifications (cont.)

2-6-3 Indoor (cont.)

Product	Image	Model	Remark			
S-Plasma Ion KIT		MSD-CAN1	[Option] 1Way, 4Way, 4 Way(600x600),360, Big Ceiling, [Included] Console			
		MSD-EAN1	[Option] Duct S, Big Duct, ERV, ERV Plus			
Motion detect Sensor		MCR-SMA	4Way Cassette S(600x600)			
ERV CO2 Sensor		MOS-C1	ERV, ERV PLUS			
External room sensor		MRW-TA	Cassette, Wall-mount, Ceiling, Duct, Console			
Drain Pump		MDP-N047SNC0D	OAP Duct (14.0 kW)			
		MDP-N047SNC1D	HSP Duct (22.0 / 28.0 kW) OAP Duct (22.4 / 28.0 kW)			
		MDP-M075SGU1D	MSP Duct (9.0 / 11.2 kW)			
		MDP-M075SGU2D	MSP Duct (12.8 / 14.0 kW) HSP Duct (11.2 / 12.8 / 14.0 kW)			
		MDP-M075SGU3D	MSP Duct (5.6 / 7.1 kW)			
		MDP-E075SEE3D	Silm Duct (2.0~14.0 kW)			
		MDP-G075SP	Duct S (External, All Capacities)			
		MDP-G075SQ	Duct S (Internal, 3.5 kW~14kW)			
AHU KIT		MXD-K025AN	7.0 kW~8.75kW			
		MXD-K050AN	14.0 kW~17.5kW			
		MXD-K075AN	21.0 kW~26.25kW			
		MXD-K100AN	28.0 kW~35.0kW			
		MCM-D201N	28kW~35kW	56kW~70kW	84kW~105kW	112kW~140kW
		MXD-64K100E X 1EA	MXD-64K100E X 2EA	MXD-64K100E X 3EA	MXD-64K100E X 4EA	

2-6 Accessory and Option Specifications (cont.)

2-6-4 Controller & control Accessory Compatibility

	Item	NASA	Remark
Individual Control System	Wireless Remote Controller	MR-EH00	DVM, CAC
	Wireless Remote Controller	AR-KH00E	DVM, CAC (360 CST)
	Wired Remote Controller	MWR-WE11N	DVM, CAC
	Wired Remote Controller - Simple Type	MWR-SH00N	DVM, CAC
	Wired Remote Controller - Touch Simple Type	MWR-SH10N	DVM, CAC
	ERV Wired Remote Controller	MWR-VH12N	DVM, CAC (ERV)
	Wired Remote Controller	MWR-WW00N	EHS
	Receiver KIT	MRK-A10N	DVM, CAC
	Zone Controller	MWR-ZS00N	DVM, CAC
	Zone Controller	MWR-ZS10N	DVM, CAC
	Zone Controller	MRW-TS	DVM, CAC
Centralized Control System	Onoff Controller	MCM-A202DN	DVM, CAC
	Touch Centralized Controller	MCM-A300N	DVM, CAC
	WIFI KIT	MIM-H03N	DVM, CAC
	Interface Module	MIM-N01	DVM, CAC
	ERV Interface Module	MIM-N10	DVM, CAC
Integrated management System	DMS2.5	MIM-D01AN	DVM, CAC
	S-NET3	MST-P3P	DVM, CAC
Gate Way	BACnet Gateway	MIM-B17BN	DVM, CAC
	Lonworks Gateway	MIM-B18BN	DVM, CAC
	External Contact Interface Module	MIM-B14	DVM, CAC
	MTFC (Multi Tenant Function Controller)	MCM-C210N	
	SIM (Signal Interface Module)	MIM-B12N	DVM, CAC
	PIM (Pulse Interface Module)	MIM-B16N	DVM, CAC
	Module Controller	MCM-A00N	CHILLER ONLY
	FCU KIT	MIM-F00N	CHILLER ONLY
	FCU Interface Module	MIM-F10N	CHILLER ONLY
Installation/ Test run Solution	S-Checker	MIM-C10N	DVM, CAC
	S-Converter	MIM-C02N	DVM, CAC
Others	External Room Sensor	MRW-TA	DVM, CAC
	Operation Mode Selection Switch	MCM-C200	DVM

2-6 Accessory and Option Specifications (cont.)

2-6-5 Indoor units Accessory Compatibility

Product	Model	Remark	1way			2way	4way	360	Mini 4way	Slim duct	MSP Duct				Duct-S	Big Duct	Fresh		RAC	Ceiling	B-Ceiling	Console	PAC	Floor Standing	ERV Plus	AHU
			JSF-0	JSF-1	JSF-2						MSP-5	MSP-0	MSP-1	MSP-2			SHP	8, 10HP								
Panel	PC4NUDMAN	Ceiling																								
	PC4NBDMAN	Ceiling (Black)																								
	PC4NUNMAN	Open																								
	PC4NBNMAN	Open (Black)																								
	PC4NUSKAN	Waffle																								
	PC4NBSKAN	Waffle (Black)																								
	PC4NUSKEN	Classic																								
	PC4SUSMAN	Waffle																								
	PC4SUSMEN	Classic																								
	PC1NUSMAN	Stripe																								
	PC1NUPMAN	Z-Slide																								
	PC1MWSKAN	Fluid																								
	PC1NWSMAN																									
	PC1BWSMAN																									
PC2NUSMEN	Stripe																									
DRAIN PUMP	MDP-N0475NCO0	-																								
	MDP-N0475NC1D	-																								
	MDP-M0755SGU1D	-																								
	MDP-M0755SGU2D	-																								
	MDP-M0755SGU3D	-																								
	MDP-E0755EE3D	-																								
	MDP-G0755P	External, All Capacities																								
	MDP-G0755Q	Internal																								
S-Plasma Ion KIT	MSD-CAN1	-																								
	MSD-EAN1	-																								
Motion detect Sensor	MCR-SMA	-																								
ERV CO2 Sensor	MOS-C1	-																								
EEV KITS	MEV-E**SA	1 Indoor																								
	MXD-E**K***A	2,3 Indoor																								
MCU-KIT	MCU-S6NEE1N	Below 6 IDU, Below 56 kW																								
	MCU-S4NEE1N	Below 4 IDU, Below 56 kW																								
	MCU-S4NEE2N	Below 2 Large Capa IDU, Below 56 kW																								
	MCU-S2NEK1N	Below 2 IDU, Below 28 kW																								
AHU-KIT	MXD-K025AN	only for 2.5Hp's AHU																								
	MXD-K050AN	only for 5Hp's AHU																								
	MXD-K075AN	only for 7.5Hp's AHU																								
	MXD-K100AN	only for 10Hp's AHU																								
	MCM-D201N	only for 10~40Hp's AHU																								

▶ In case you want more information about the accessories, please refer to the control and accessories TDB on pvi.samsung.com site.

3. Disassembly and Reassembly

3-1 Necessary Tools

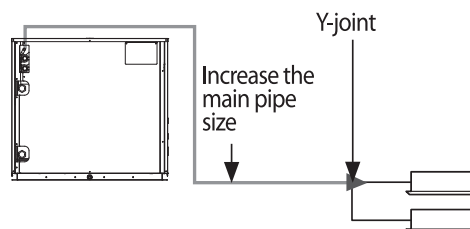
Refrigerant pipe installation

Refrigerant pipe work

- The length of refrigerant pipe should be as short as possible and the height difference between an indoor and outdoor unit should be minimized.
- Piping work must be done within allowable piping length, height difference, and the allowable length after branching.
- The pressure of the R-410A is high. Use only certified refrigerant pipe and follow the installation method.
- After installing the pipes, calculate the total length of the pipe to check if additional refrigerant is needed.
When you need to charge the additional refrigerant, make sure to use R-410A refrigerant.
- Use clean refrigerant pipe and there shouldn't be any harmful ion, oxide, dust, iron content or moisture inside pipe.
- Use tools and accessories that fit on R-410A only.

Tool	Installation process/purpose		Compatibility with conventional tool
Pipe cutter	Refrigerant pipe installation	Pipe cutting	Compatible
Flaring tool		Pipe flaring	
Refrigerant machine oil		Apply refrigerant oil on flared part	Exclusive ether oil, ester oil, alkali benzene oil or synthetic oil
Torque wrench		Connect flare nut with pipe	Compatible
Pipe bender		Pipe bending	
Nitrogen gas	Air tightness test	Prevent oxidation within the pipe	Compatible
Welder		Pipe welding	
Manifold gage	Air tightness test ~ additional refrigerant charging	Vacuuming, charging refrigerant and checking operation	Need exclusive one to prevent mixture of R-22 refrigerant oil use and also the measurement is not available due to high pressure
Refrigerant charging hose			Need exclusive one since there is risk of refrigerant leakage or inflow of impurities
Vacuum pump	Pipe drying		Compatible (Use products which contain the check valve to prevent the oil from flowing backward into the outdoor unit.) Use the one that can be vacuumed up to -100.7kpa(5Torr).
Scale for refrigerant charging	Refrigerant charging		Compatible
Gas leak detector	Gas leak test		Need exclusive one. (Ones used for R-134a is compatible)
Flare nut	Must use the flare nut equipped with the product. Refrigerant leakage may occur when the conventional flare nut for R-22 is used.		

Refrigerant pipe work



- The length of refrigerant pipe should be as short as possible and the height difference between an indoor and outdoor unit should be minimized.
- Install the refrigerant pipe according to main pipe size of each outdoor unit capacity.
- When the pipe length (including elbow) between an outdoor unit and the farthest indoor unit exceeds 90m, you must increase the size of the pipe (main pipe) by one grade which connects between the outdoor unit to the first branch joint.
- For H/R model, When the pipe length (including elbow) between an outdoor unit and the farthest indoor unit exceeds 90m, you must increase the size of the liquid pipe by one grade among the pipes(main pipe) which connects between the outdoor unit to the first branch joint.

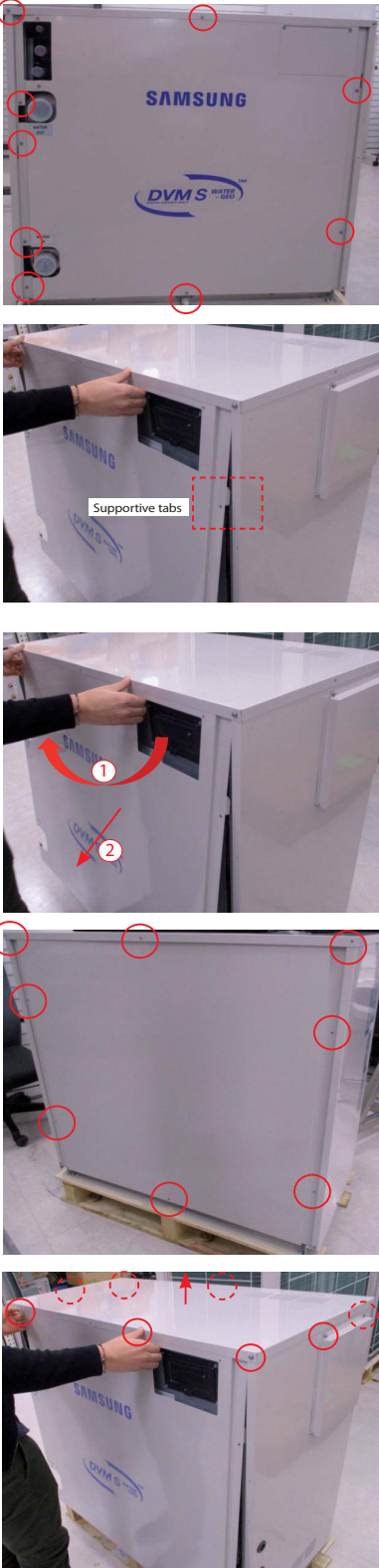
3-2 Disassembly and Reassembly

3-2-1 Checking the Device Condition

No.	Work Procedure	Remark
1	<p>Unfasten the two screws on the inspection window of the Panel Front.</p> <p>Open the rain cover.</p> <p>The rain cover is connected via a ring to the device in order to prevent loss.</p> <ul style="list-style-type: none"> - Operating the device with the rain cover opened may cause rainwater to enter the C-BOX and damage the PBA. <p>Use the inspection window on the Main PBA to check the following.</p> <ul style="list-style-type: none"> - Error code - Operation status (Key Switch K1- K4) - Trial operation - Pump down operation - S-NET connection <p>(specific operation information and the cycle-related status value can be viewed)</p>	


3-2 Disassembly and Reassembly (cont.)

3-2-2 Removal Instructions for Panel

No.	Work Procedure	Remark
2	<p>1) Removing the cabinet front. Unfasten the nine screws on the cabinet front.</p> <p>1) Removing the cabinet front. - Cabinet front is hung on the side frame, using supportive tabs. - Slightly lift and pull the Cabinet towards you, and then detach it downwards.</p> <p>2) Removing the cabinet back. Unfasten the eight screws on the cabinet front Back. Similar to removing the front cabinet.</p> <p>3) Removing the cabinet top. Unfasten the eight screws on the cabinet front slightly lift the cabinet top.</p>	

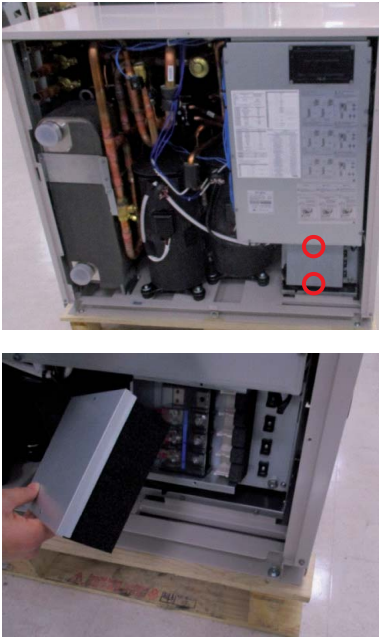
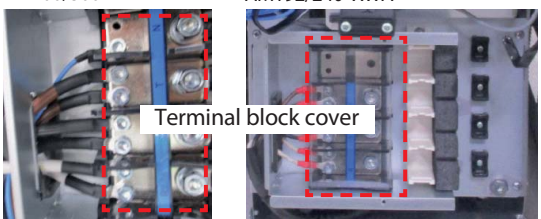
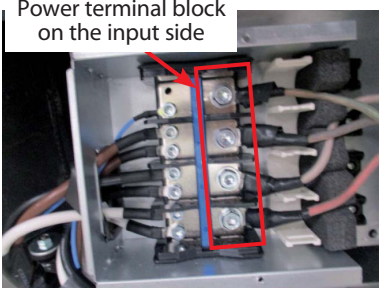
3-2 Disassembly and Reassembly (cont.)

3-2-3 Disconnecting the Power Supply

No.	Work Procedure	Remark
3	<p>⚠ Caution To perform additional internal repair service after removing the panels, be sure to cut off the power supply first.</p> <p>To disconnect the power supply, remove the cabinet-Front and then remove the Control Box cover.</p> <p>Unfasten the seven screws on the Control Box cover.</p> <p>The Control Box cover does not fall off the device even when the screws are unfastened, due to the supportive tab at the top. As shown in the image, pull the lower part of the cover while holding the lower part and remove the cover from the supportive tab.</p> <p>Then pull up the cover to remove it.</p> <ul style="list-style-type: none"> - The power connection box is attached to the lower part of the Control Box. - The power connection box is protected by the metal cover to ensure safety. 	 <p>The 'Remark' column contains four photographs illustrating the disassembly process. The first photo shows the control box inside the cabinet, outlined with a red dashed box and labeled 'Control Box'. The second photo shows the control box cover with seven screws circled in red, also labeled 'Control Box'. The third photo shows the cover being pulled down from the top, with red arrows and numbers 1 and 2 indicating the direction and the supportive tab, labeled 'Supportive tabs'. The fourth photo shows the power connection box highlighted with a red dashed box and an arrow, labeled 'Power connection box'.</p>

3-2 Disassembly and Reassembly (cont.)

3-2-3 Disconnecting the Power Supply

No.	Work Procedure	Remark
1	<p>Be sure to power OFF the circuit breaker before disconnecting the power supply.</p> <p>Unfasten the two screws on the protective cover of the power connection box and remove the protective cover.</p>	 <p>Remove the (transparent) cover on the terminal block.</p>  <p>AM080/100/120FXWA*** AM072/096/120HXWA*** AM200/300*XWA*** AM192/240*XWA***</p> <p>Disconnect the power cables on the input side of the terminal block. The power cables are fixed with screws on the terminal block. Use a spanner or hex wrench to disconnect the power cables. Use insulation tape to wrap each power cable before storage to prevent the cables from coming into contact with each other.</p> 



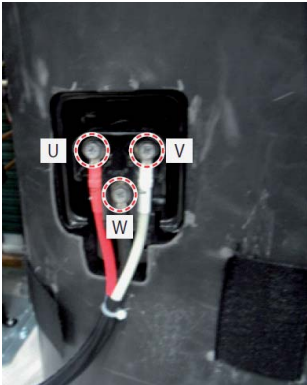
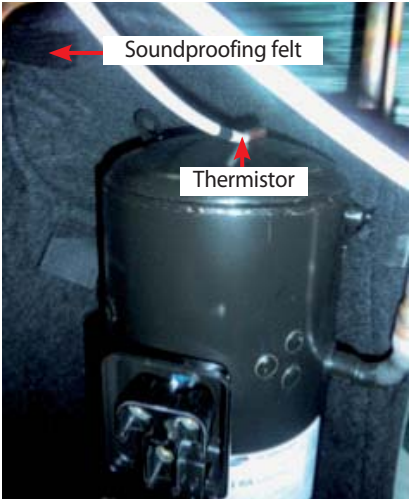
3-2 Disassembly and Reassembly (cont.)

3-2-3 Disconnecting the Power Supply

No.	Work Procedure
3	The front view of the device when it is ready for internal repair after the power supply has been disconnected is shown below.
	Image
	


3-2 Disassembly and Reassembly (cont.)

3-2-4 Removal Instructions for Compressor

No.	Work Procedure	Remark
4	<p>1) Removing the left compressor.</p> <ul style="list-style-type: none"> - Remove the cover of the power terminal block for the compressor. - Use a screwdriver to pull the upper part of the cover towards you and remove the cover, as shown in the image. <ul style="list-style-type: none"> - Unfasten the three screws on the power cables connected to the compressor and then disconnect the power cables. ※ When reassembling it after inspection, be sure to tightly fasten the screws. · Check the cable connection for the U, V and W phases. · A loosely fastened screw may cause a fire. <p>Exercise caution.</p> ※ Terminal fastened with a torque of 25 ~ 35 kgf·m. C124 <ul style="list-style-type: none"> - Separate the velcro on the soundproofing felt covering the compressor and remove the felt from the compressor. - Remove the thermistor on top of the compressor. 	   

3-2 Disassembly and Reassembly (cont.)

3-2-4 Removal Instructions for Compressor

No.	Work Procedure	Remark
1	<p>- Use a torch to heat and separate the three welded joints connecting the compressor to the pipes.</p> <p>- Unfasten the four nuts on the compressor.</p> <p>- Separate the compressor from the device while leaning the compressor towards you.</p> <p>2) Removing the right compressor</p> <p>- Follow the same steps used when removing the right compressor.</p> <p>- Note that the shapes of the pipes are different from the right compressor, as shown in the image. Pay attention when separating the welded joints.</p> <p>※ When reassembling it after inspection, be sure to tightly fasten the screws.</p> <p>· Check the cable connection for the U, V and W phases.</p> <p>· A loosely fastened screw may cause a fire.</p> <p>Be sure to tightly fasten the screws.</p>	

3-2 Disassembly and Reassembly (cont.)

3-2-5 Compressor exchange order

STEP	Occasion that compressor is 1 inside outdoor unit	Occasion that compressor is 2 inside outdoor unit
1	-	Establish compressor to exchange by cutting.
2	-	Refrigerant release driving of applied outdoor unit ※ Refrigerant release driving enforces 1th necessarily. Release driving that enforce contiguously can be responsible for compressor breakdown.
3	Lock all SVC valve of liquid pipe and gas pipe.	
4	Enter in vacuum mode and establish as all EEV and Valve open.	
5	Reclaim refrigerant of outdoor unit using Recovery Unit. ※ When there is no Recovery Unit, refer to below contents. 1. If refrigerant release driving is enforced, refrigerant remaining amount of outdoor unit inside is about 1.5kg ordinarily. Temperature can remain more refrigerant because refrigerant fills to Accumulator in the winter day. 2. Refer to factory charging refrigerant had registered to Label of outdoor unit. 3. Can get help that decide an addition refrigerant quantity if use refrigerant quantity decision function that use S-Checker.	
6	Turn off the power linked by outdoor unit.	
7	Separate compressor that broke down from outdoor unit. ※ Confirm through manifold gauge whether refrigerant of outdoor unit was reclaimed all necessarily before use welding machine for replace of compressor.	
8	Measure quantity of broke down oil of compressor.	
9	Confirm state and color of compressor oil that broke down.	
10	-	When is judged that oil was polluted, compressor beside (ASTM : more than 3) measures quantity of replace and oil.
11	Decide quantity of oil to pour in addition according to sheep of changing oil of compressors.	
12	Change by new compressor. Add oil according to sheep of oil that pour decided addition before.	
13	Establish again by vacuum mode after connect power.	
14	Execute leakage examination using nitrogen → vacuum work	
15	Add a refrigerant quantity deciding from step 5.	
16	Execute Auto Trial Operation after open SVC Valve.	

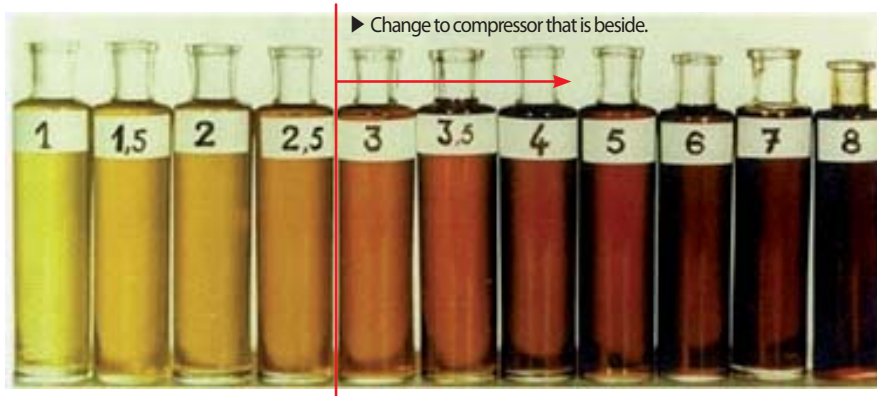
3-2 Disassembly and Reassembly (cont.)

3-2-5 Compressor exchange order (cont.)

■ Check point at compressor replacement

1) Check oil color of broken compressor.

- If one compressor is broken, you are not sure another compressor should be replaced together or not.
At that time, check oil color of broken compressor comparing with below photo.

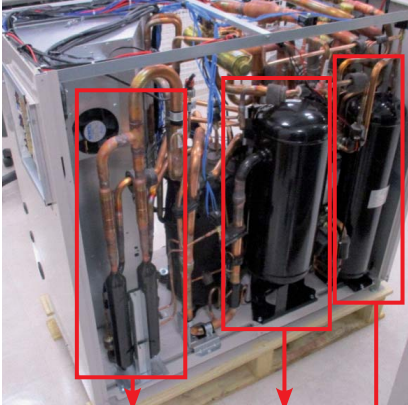

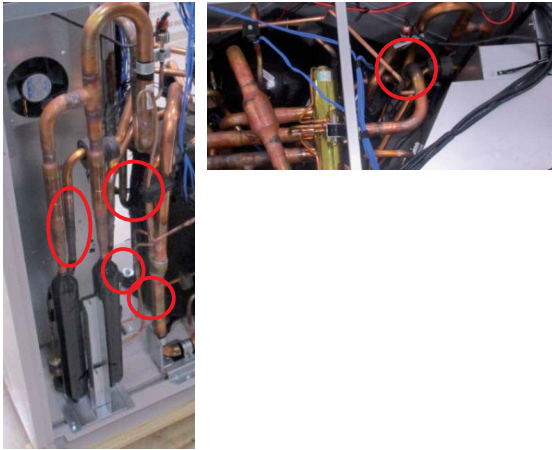


2) Weight of compressor and quantity of oil

- When compressor is shipped at factory, oil of (compressor unit standard) 1100cc was filled up.
- Weight of compressor including oil GB046FA* :
24.3 kg, GB052FA* : 31.6 kg, GB066FA* : 35.4 kg, GB070FA* : 36.7 kg, DS4GJ5080FVA* : 40.9 kg
- Add oil to outdoor unit as much as relevant weight if is heavy than weight of compressor that weight of compressor that is changed to locality is changed newly.
- Quantity(kg) of added oil = Weight(kg) of compressor that broke down - Weight(kg) of newly change compressor
- If quantity of calculated addition oil passes over 1kg, quantity of add oil does by 1kg.
- Problem of that is blocked in oil circulation of (remaining oil of compressor that broke down below 0.3kg) compressor if is light more than 0.8kg than weight of compressor that weight of compressor that is changed to locality is changed newly inspects oil circulating system because possibility occurred is high.

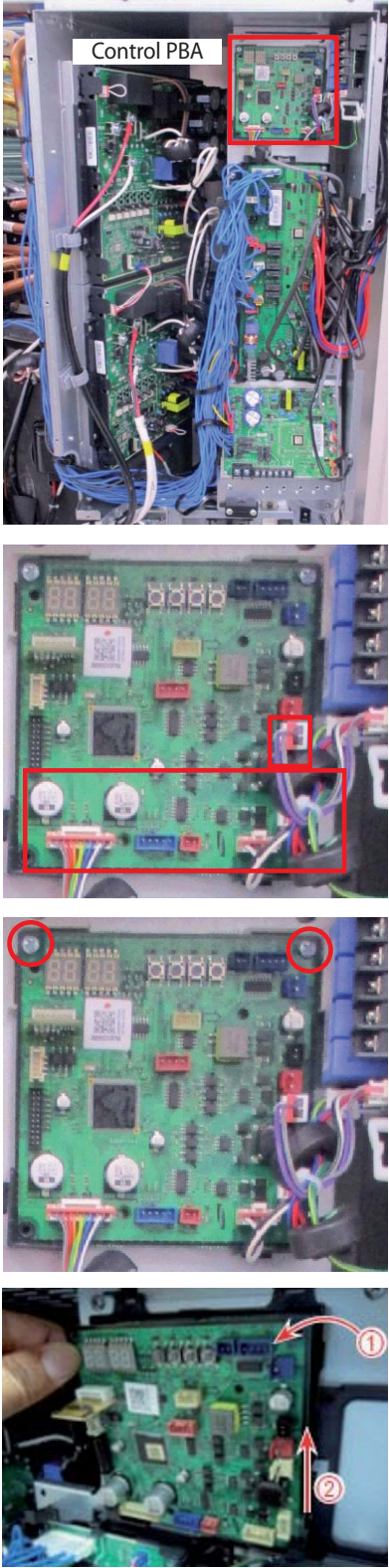
3-2 Disassembly and Reassembly (cont.)

3-2-6 Removal Instructions for Tank

No.	Work Procedure	Remark
1	<p>1) Oil Separator</p> <ul style="list-style-type: none"> - To remove the Oil Separators, first you must Unfasten the two screws on the Oil Separator assembly at the base. - separate the five welded joints. <p>- Unfasten the two screws on the Oil Separator assembly at the base.</p> <p>- Use a torch to heat and separate the six welded joints.</p>	 <p>1)Oil Separator 2)Accumulator 3)Receiver</p>  

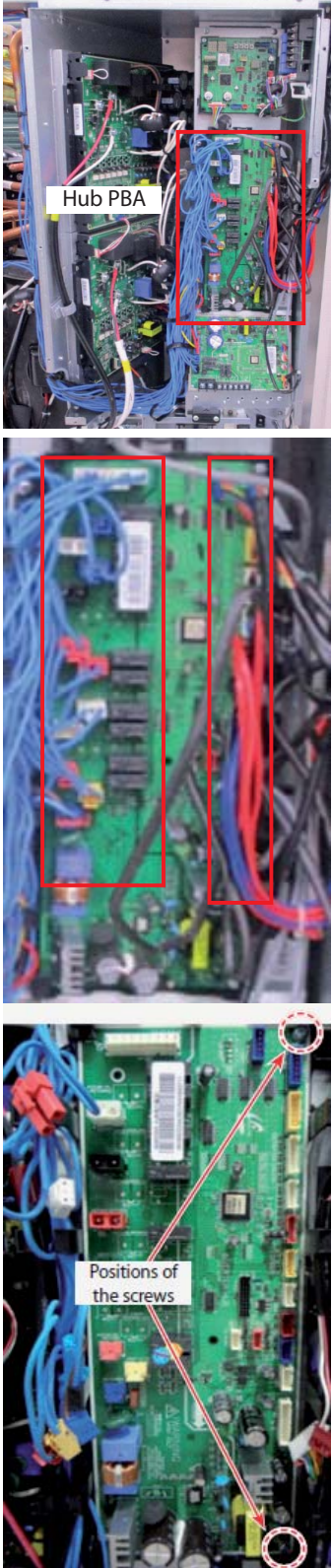
3-2 Disassembly and Reassembly (cont.)

3-2-6 Removal Instructions for Tank (cont.)

No.	Work Procedure	Remark
4	<p>The device control PBA is located in the upper part of the Control Box.</p> <p>Remove the connectors from the control PBA.</p> <p>Unfasten the two screws at the upper part of the Control PBA.</p> <p>Lift and separate the PBA while pulling the upper part towards you.</p>	

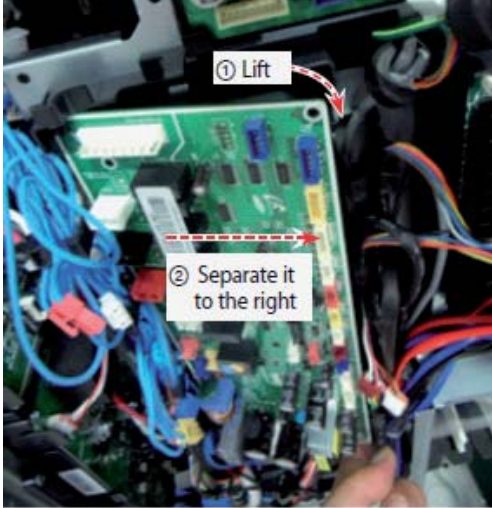
3-2 Disassembly and Reassembly (cont.)

3-2-7 Removal Instructions for the Hub PBA

No.	Work Procedure	Remark
1	<p>- The Hub PBA is located in the middle of the Control Box.</p> <p>- Remove all the connectors from the Control PBA (on the both side)."</p> <p>- Unfasten the two screws on the right side at the upper and lower parts of the Hub PBA.</p>	


3-2 Disassembly and Reassembly (cont.)

3-2-7 Removal Instructions for the Hub PBA (cont.)

No.	Work Procedure	Remark
2	- Lift and separate the Hub PBA to the right.	

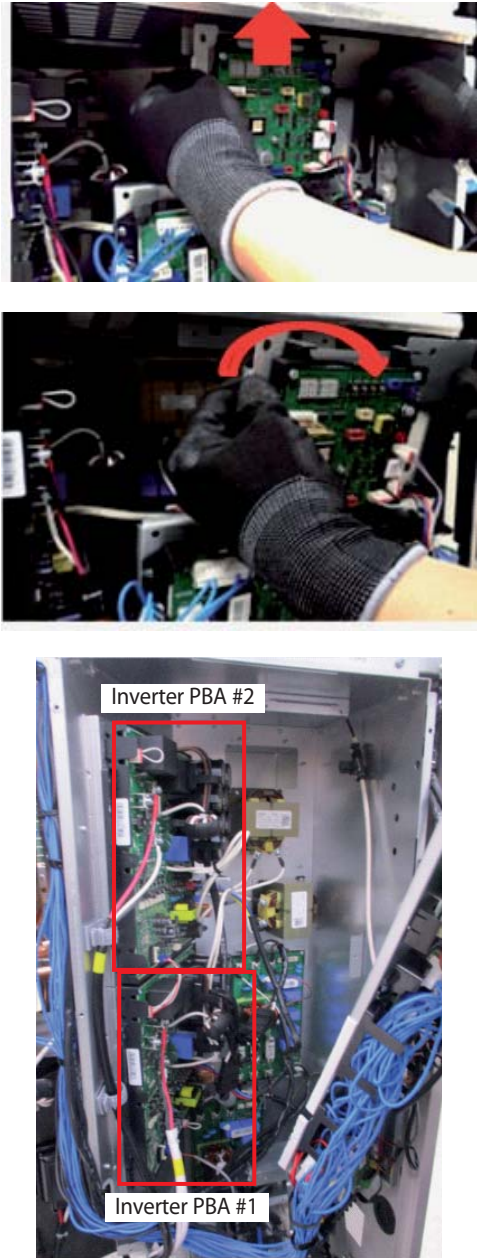
3-2 Disassembly and Reassembly (cont.)

3-2-8 Removal Instructions for the Control Panel Assy

No.	Work Procedure	Remark
2	- Lift and separate the Hub PBA to the right.	 <p>The 'Remark' column contains three sequential photographs illustrating the removal of the Hub PBA. The top photograph shows a hand lifting the Hub PBA from the main board, with a red circle highlighting the top edge of the board. The middle photograph shows the hand moving the Hub PBA to the right, away from the main board. The bottom photograph shows the Hub PBA fully separated and placed to the right of the main board, with four red circles highlighting the connection points between the two boards.</p>

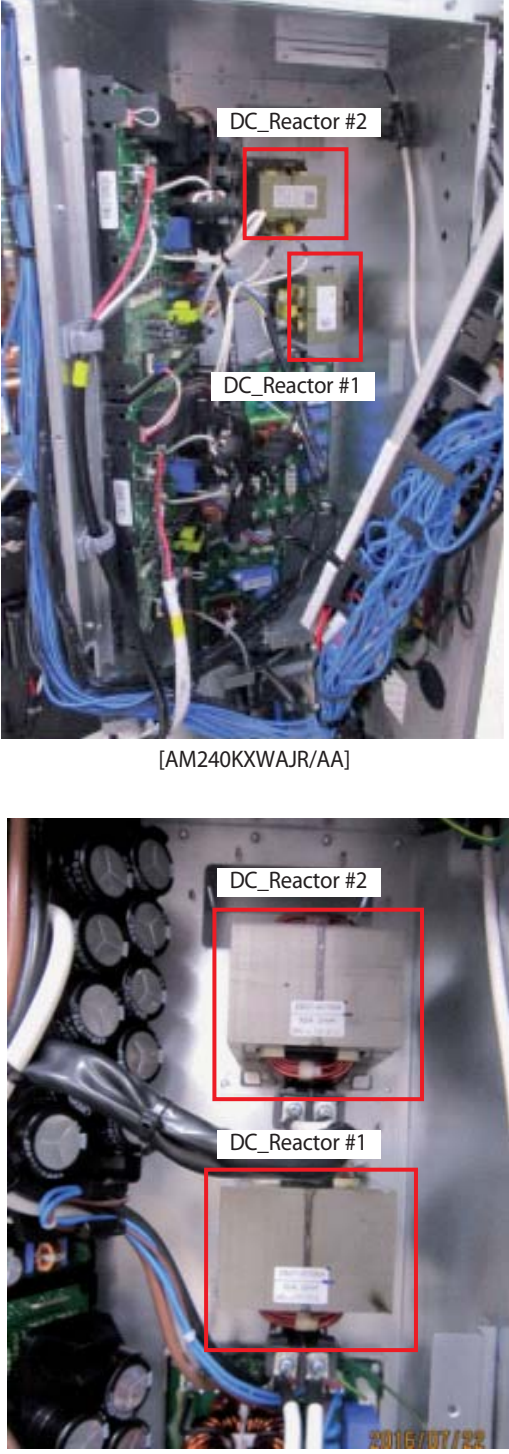
3-2 Disassembly and Reassembly (cont.)

3-2-8 Removal Instructions for the Control Panel Assy (cont.)

No.	Work Procedure	Remark
3	<p>- Turn the Control Panel Assy over towards you while holding the locking hook.</p> <p>- The internal view of the Control Box after the Control Panel Assy has been turned over is shown.</p>	 <p style="text-align: center;">[AM240KXWAJR/AA]</p>

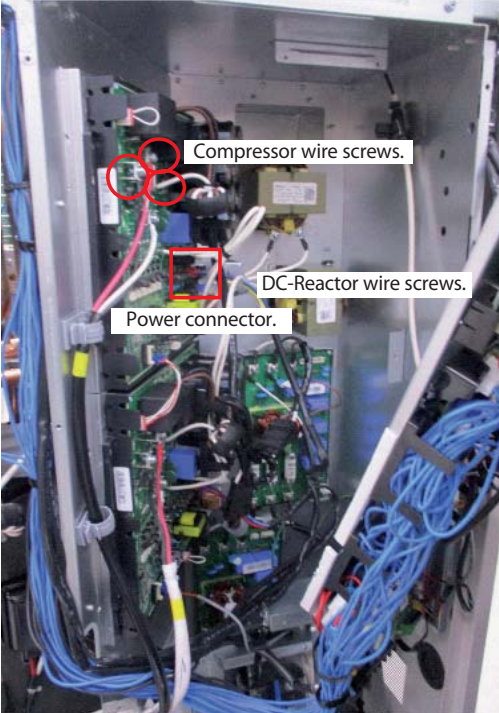
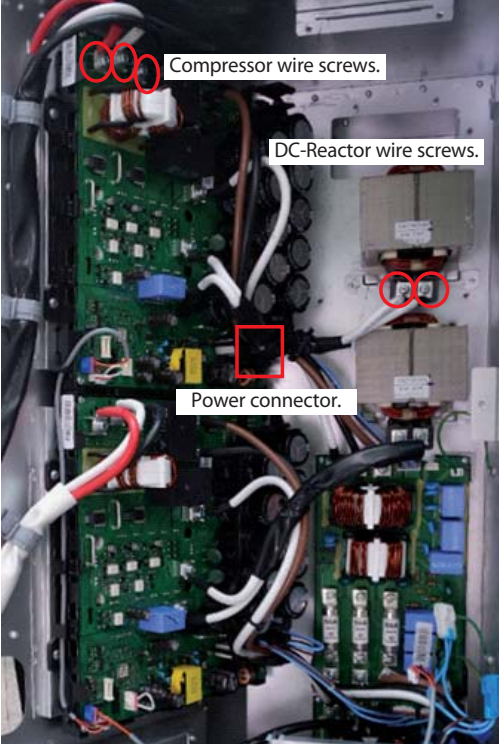
3-2 Disassembly and Reassembly (cont.)

3-2-8 Removal Instructions for the Control Panel Assy (cont.)

No.	Work Procedure	Remark
3	- From the upper part of the power module on the front. ① DC_Reactor #1 ② DC_Reactor #2 ③ EMI PBA #2 ④ EMI PBA #1	 <p data-bbox="1026 1189 1222 1216">[AM240KXWAJR/AA]</p> <p data-bbox="1026 1899 1222 1951">[AM240KXWAFR/AA] [AM300KXWANR/EU]</p>

3-2 Disassembly and Reassembly (cont.)

3-2-9 Removal Instructions for the Inverter PBA

No.	Work Procedure	Remark
1	<p>- To remove the Inverter PBA.</p> <p>① Unfasten the five wire screws for the compressor and reactor.</p> <p>② Remove the power connector.</p>	<div style="text-align: center;">  <p>[AM240KXWAJR/AA]</p> </div> <div style="text-align: center;">  <p>[AM240KXWAFR/AA] [AM300KXWANR/EU]</p> </div>

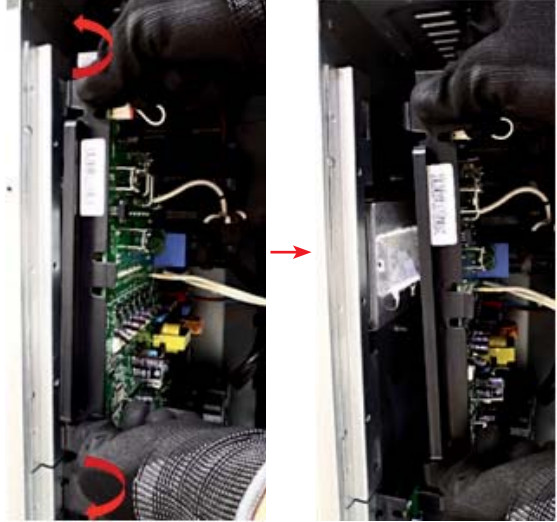






3-2 Disassembly and Reassembly (cont.)

3-2-9 Removal Instructions for the Inverter PBA (cont.)

No.	Work Procedure	Remark
2	<p>③ Unfasten the screws on the case of the Inverter PBA.</p> <p>④ Unfasten the screws on the IPM. AM240KXWAJR/AA : 2EA AM240KXWAFR/AA, AM300KXWANR/EU : 4EA</p> <p>※ After completing the operation, fasten the cable tie as shown in the image.</p>	 <p>[AM240KXWAJR/AA]</p> <p>[AM240KXWAFR/AA, AM300KXWANR/EU]</p>

3-2 Disassembly and Reassembly (cont.)

3-2-9 Removal Instructions for the Inverter PBA (cont.)

No.	Work Procedure	Remark				
3	<p>㉔ Separate the Inverter PBA Case from the front while holding the hook.</p> <p>※ After inspection, check the condition of grease applied.</p>	<div style="text-align: center;">  </div> <p style="text-align: center;">* Conditions of heat transfer grease applied to the Inverter PBA'</p> <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th data-bbox="831 1081 1123 1122">Good</th> <th data-bbox="1123 1081 1415 1122">No Good</th> </tr> </thead> <tbody> <tr> <td data-bbox="831 1122 1123 1406">  </td> <td data-bbox="1123 1122 1415 1406">  </td> </tr> </tbody> </table> <p>⚠ If Thermal Grease is not applied evenly IMP due to the cooling performance may cause malfunction of the product.</p>	Good	No Good		
Good	No Good					
						

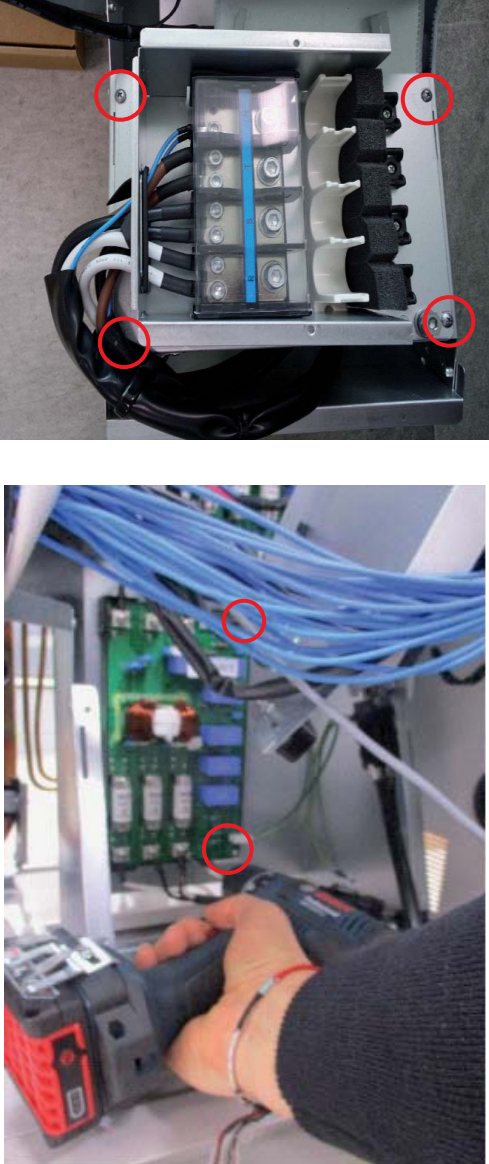
3-2 Disassembly and Reassembly (cont.)

3-2-10 Removal Instructions for the DC Reactors and EMI PBA

No.	Work Procedure	Remark
121	- Unfasten the DC Reactor wire screws, and then lift and separate the Reactors. (applicable to both Reactors #1 and #2).	<div style="text-align: center;">  <p>[AM240KXWAJR/AA]</p>  <p>[AM240KXWAFR/AA] [AM300KXWANR/EU]</p> </div>

3-2 Disassembly and Reassembly (cont.)

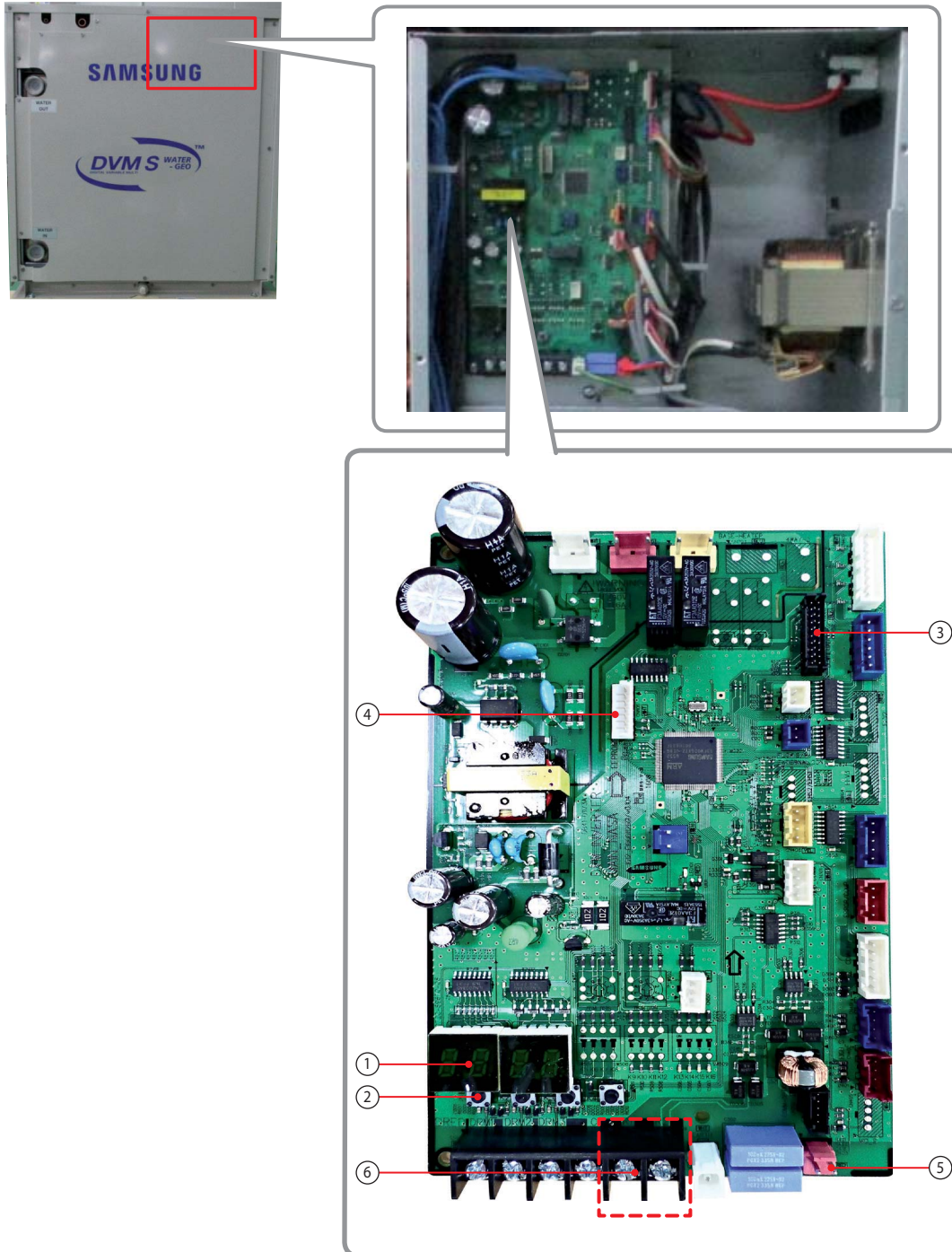
3-2-10 Removal Instructions for the DC Reactors and EMI PBA (cont.)

No.	Work Procedure	Remark
2	<p>- TO Remove the EMI PBA, First you must remove plate as shown in the image.</p> <p>Remove the connectors inside the EMI PBA, and then unfasten the two screws fixing the case on the PBA.</p>	 <p>The top photograph shows the EMI PBA installed within a metal chassis. Four screws, one on each side at the top and bottom, are circled in red to indicate they must be removed. The bottom photograph shows a person wearing an orange glove using a red and black power drill to remove one of these screws from the metal case. Two screws are circled in red in this image as well.</p>

4. Troubleshooting

4-1 Check-up Window Description

■ AM038/048/055KXWDCH*



No.	Specific functions	No.	Specific functions
1	Display	4	EEPROM Connector (B7P-MQ WHT)
2	Tact Switch	5	Communication connector between indoor and outdoor unit.
3	MICOM Download (YDW200-20 BLK)	6	The central controller communication

4-1 Check-up Window Description (cont.)

■ AM038/048/055KXWD** (cont.)

- ▶ Key input of the outdoor unit when the service enters the operation mode.

KEY setting		
K1 (Number of press)	Key operation	Display on segment
1 time	Refrigerant charging in Heating mode	1 1 0 0
2 times	Trial operation in Heating mode	1 2 0 0
3 times	Refrigerant discharging (Outdoor unit address 1)	1 3 0 0
4 times	Vacuum (Outdoor unit address 1)	1 4 0 0
5 times	End KEY operation	-
Press and hold 1 time	Auto inspection operation	1 1 0 0

KEY setting		
K1 (Number of press)	Key operation	Display on segment
1 time	Refrigerant charging in Cooling mode	1 5 0 0
2 times	Trial operation in Cooling mode	1 6 0 0
3 times	Pump down all units in Cooling mode	1 7 0 0
4 times	Auto trial operation	1 8 0 0
5 times	Checking the amount of refrigerant	1 9 X X (Display of last two digits may differ depending on the progress)
6 times	Forced oil collection	1 A 0 0
7 times	Inverter compressor 1 check	1 B 0 0
8 times	Water pipe connection inspection operation	1 C 0 0
9 times	Load inspection operation	1 D 0 0
10 times	End KEY operation	-

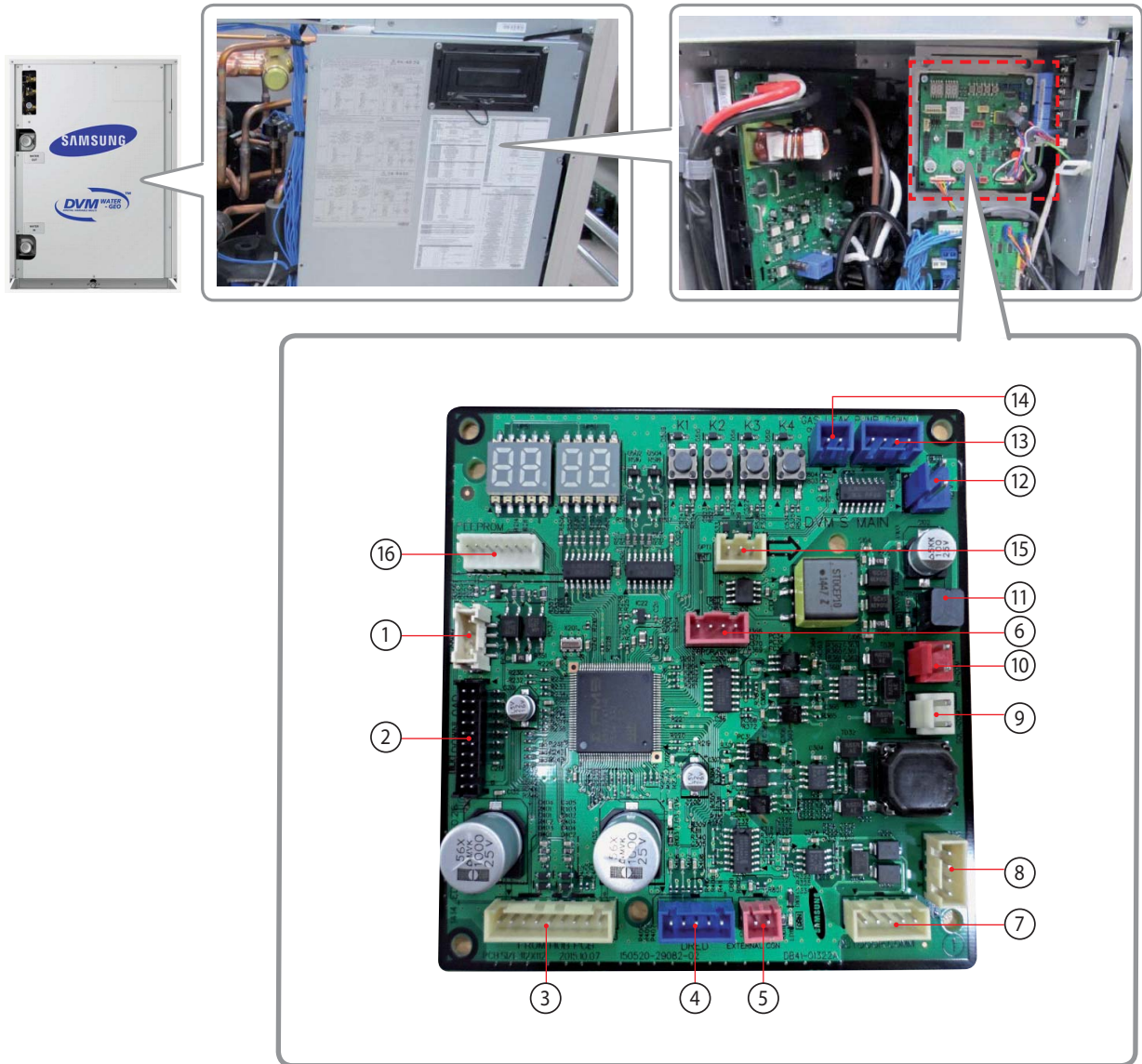
※ Outdoor Power Off even when the Inverter PCB, Fan PCB is a high DC voltage charging contacts at danger.

※ When you run the repair and replacement of the PCB should work after the power is turned off, the DC voltage discharge.
(Natural discharge until Please wait for at least 15 minutes.)

※ If an error occurs, the discharge mode may not work properly.
In particular, E464 & E364 is power devices can be damaged.
Therefore, the discharge mode, do not use. (Natural discharge until Please wait for at least 15 minutes.)

4-1 Check-up Window Description (cont.)

■ AM080/100/120/200FXWANR*, AM300KXWANR* / AM072/096/120/192HXWAF(J)R*, AM240KXWAF(J)R*



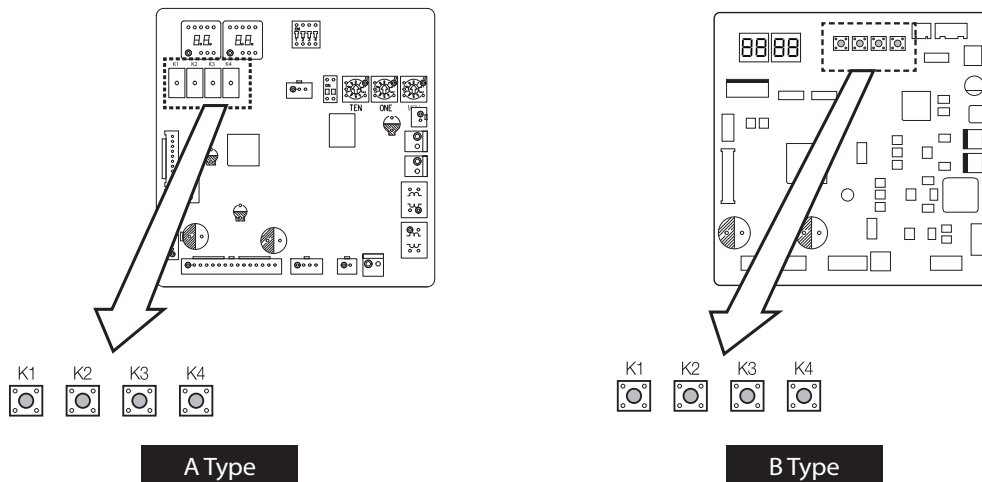
No.	Specific functions	No.	Specific functions
1	Totally PBA-PBA uART comm checking	9	Comm PBA connecting (R1/R2)
2	S/W download for Main PBA	10	Central controller connecting(F1/F2)
3	Hub PBA connecting (uART comm, supplying DC 5,12V from Main)	11	Supplying DC 5V to other component
4	DRED PBA connecting	12	Supplying DC 12V to other component
5	External control using MIM-B14	13	Gas leak detection using MIM-B14
6		14	
7	Comm PBA connecting (OF1/OF2)	15	Option switch
8	Comm PBA connecting (F1/F2)	16	EEPROM PBA connecting
			EEPROM PBA connecting

4-2 Service Operation

4-2-1 Special Operation

■ AM080/100/120/200FXWANR*, AM300KXWANR* / AM072/096/120/192HXWAF(J)R*, AM240KXWAF(J)R*

- ▶ Key input of the outdoor unit when the service enters the operation mode.



K1 (Number of press)	Key operation	Display on segment
Press and hold 1 time	Auto trial operation	K, 1, BLANK, BLANK
1 time	Refrigerant charging in Heating mode	K, 1, BLANK, BLANK
2 times	Trial operation in Heating mode	K, 2, BLANK, BLANK
3 times	Pump out in Heating mode (Outdoor unit address 1)	K, 3, BLANK, 1
4 times	Pump out in Heating mode (Outdoor unit address 2)	K, 3, BLANK, 2
5 times	Pump out in Heating mode (Outdoor unit address 3)	K, 3, BLANK, 3
6 times	Pump out in Heating mode (Outdoor unit address 4)	K, 3, BLANK, 4
7 times	Vacuumig (Outdoor unit address 1)	K, 4, BLANK, 1
8 times	Vacuumig (Outdoor unit address 2)	K, 4, BLANK, 2
9 times	Vacuumig (Outdoor unit address 3)	K, 4, BLANK, 3
10 times	Vacuumig (Outdoor unit address 4)	K, 4, BLANK, 4
11 times	Vacuuming (All outdoor units)	K, 4, BLANK, A
12 times	End Key operation	-

K2 (Number of press)	Key operation	Display on segment
1 time	Refrigerant charging in Cooling mode	K - 5 - BLANK - BLANK
2 times	Trial operation in Cooling mode	K - 6 - BLANK - BLANK
3 times	Pump down all units in Cooling mode	K - 7 - BLANK - BLANK
4 times	HR: Pipe connection inspection H/P: Auto trial operation	K - 8 - BLANK - BLANK
5 times	Checking the amount of refrigerant	K - 9 - X - X (Display of last two digits may differ depending on the status)
6 times	Discharge mode of DC link voltage	K - A - BLANK - BLANK
7 times	Forced oil collection	K - C - BLANK - BLANK
8 times	Inspect inverter compressor 1	K - D - BLANK - BLANK
9 times	Inspect inverter compressor 2	K - E - BLANK - BLANK
10 times	Water pipe valve/Pump check	K - F - BLANK - BLANK

4-2 Service Operation (cont.)

4-2-1 Special Operation (cont.)

■ AM080/100/120/200FXWANR*, AM300KXWANR* / AM072/096/120/192HXWAF(J)R*, AM240KXWAF(J)R*(cont.)

K2 (Number of press)		Key operation	Display on segment
11 times		Cooling fan/Flow control valve check	K - G - BLANK - BLANK
12 times	A type PBA	End key operation	-
	B type PBA	HR : Auto pipe pairing, H/P : Unused	"K" "H" XX Display of last two digits may differ depending on the progress)
13 times	B type PBA	End key operation	-

- ※ During "Discharge mode of DC link voltage," voltage of INV1 and INV2 will be displayed alternately.
- ※ Even when the outdoor unit power is off, it is dangerous when you come in contact with inverter PCB and fan PCB since they are charged with high DC voltage.
- ※ When pressing K2 key 9 to 12 times without inverter checker, error code can be displayed on segment even though the outdoor unit is normal.
- ※ When replacing/repairing the PCB, cut off the power and wait until the DC voltage is discharged before replacing/repairing them (Wait for more than 15 minutes to allow it to discharge naturally.)
- ※ When there were error, 'Discharge mode of DC link voltage' may not have been effective. Especially if error E464 and E364 have been occurred, power element might be damaged by fire and therefore, do not use the 'Discharge mode of DC link voltage.'
- ※ If the 1st-generation MCU is installed, the Auto pipe pairing operation can not be used.
If the 2nd-generation MCU is installed, the Checking the pipe connection can not be used.
 - 1st-generation MCU : MCU-S*NEE*N
 - 2nd-generation MCU : MCU-S*NEK2N,MCU-S4NEK3N,MCU-S1NEK1N
- ※ If there is an A type PBA among the outdoor units installed as a module, the Auto pipe pairing operation can not be used.

4-2 Service Operation (cont.)

4-2-1 Special Operation (cont.)

■ Auto Trial Operation

- ▶ After initial installation, stable operation for a certain period of time limited to operation conditions.

	Cooling	Heating
Method of Entry	K2 Tact Switch twice	K1 Tact Switch twice
Compressor	Normal operation, but the maximum frequency limit (differ by model)	
Indoor Unit	Whole operation (The set temperature=3°C)	Whole operation (The set temperature=40°C)
Other Actuators	Normally control conduct	
Operation time	Min : 60 minutes, Max : 10 hours	
Etc.	<ul style="list-style-type: none"> · Exceed the maximum operating time at stops and waits. · Protection and control, self-diagnosis is performed. 	

■ Refrigerant filling operation

- ▶ Operation to filling the refrigerant compressor was fixed at a certain frequency.

	Cooling	Heating
Method of Entry	K2 Tact Switch one time	K1 Tact Switch one time
Compressor	Starting frequency (Mild Start frequency) operation	
Indoor Unit	Whole operation (The set temperature=3°C)	Whole operation (The set temperature=40°C)
Other Actuators	Normally control conduct	
Operation time	60 minutes	
Etc.	During the filling operation does not enter the special operation, such as oil recovery.	

4-2 Service Operation (cont.)

4-2-1 Special Operation (cont.)

■ Heating Pump Out

- ▶ Operation for the repair of the Individual outdoor unit, the outdoor unit refrigerant emissions to the indoor part.
- ▶ Liquid pipe service valve and the gas pipe service valve operation, the operator manually need to close.
- ▶ Observe low pressure using View Mode of K4 button if compressor operate.
If low pressure goes down below about 0.2 MPa.g : Immediately lock the gas side service valve, Pump Out operation is shut down.
(Pump out operation shut down : K1 button once more press or K3 button one time press)
- ▶ If operation of low pressure goes down below 0.1 MPa.g : Will be stopped automatically for the protection of the compressor.

How to Initiate	K1 Tact Switch 3 times~6 times
Compressor	60Hz
Indoor Unit	Whole Operation (The set temperature=40°C)
4Way Valve	ON (Heating Mode)
Main EEV	Operation side : 700 Step (Stop side : 0 step)
Maximum Operation Time	10 minutes
Protection Control	Conduct the discharge temperature, high pressure control. (Low pressure protection control is not carried out) ※ Low pressure is outside normal limits : Operation is shut down after gas pipe manually closed.
Etc.	Entry after safety start. (Only the corresponding Outdoor Unit operation.) To pump out more than 2 : Except communication between Outdoor Unit of relevant set after working for one, remainder set makes Pump Out add.

■ Cooling Pump Down

- ▶ Recover the refrigerant of Indoor Unit and Piping to outdoor side.
- ▶ Liquid pipe service valve and the gas pipe service valve operation, the operator manually need to close.
- ▶ If the installation of the long pipe : Any refrigerant into the outdoor unit can not be recovered, therefore should use a separate container.
- ▶ Observe low pressure using View Mode of K4 button if compressor operate.
If low pressure goes down below about 0.2 MPa.g : Immediately lock the gas side service valve, Pump Out operation is shut down.
(Pump out operation shut down : K1 button once more press or K3 button one time press)
- ▶ If operation of low pressure goes down below 0.1 MPa.g : Will be stopped automatically for the protection of the compressor.

How to Initiate	K2 Tact Switch 3 times
Compressor	Address No.1 Outdoor Unit- 60Hz (Other Outdoor Unit COMP OFF)
Indoor Unit	Whole Operation (The set temperature=3°C)
4Way Valve	OFF (Cooling Mode)
Main EEV	Operation side : 2000 Step , Stop side : 2000 step
Maximum Operation Time	30 minutes
Etc.	Does not conduct the operation of the special operation, and protection control. Pressure and temperature is outside normal limits : Operation is shut down after gas pipe manually closed. (However, all current limit control, and protection and control of IPM CompDown control is performed.)

4-2 Service Operation (cont.)

4-2-1 Special Operation (cont.)

■ Vacuum Operation

- ▶ Operation to facilitate vacuum to open the valve after the Outdoor Unit repair.

How to Initiate	K1 Tact Switch 7 times~11 times
Compressor	OFF
Indoor unit	OFF
4WayValve	OFF
Valves	Open all valves maximum
Etc.	If not turn off the vacuum mode, the start of normal operation is prohibited.

■ Piping Inspection Operation

- ▶ Operation mode to check the status of the piping between the MCU and the indoor unit.
- ▶ Heat Pump Model : Water temperature is more than 25°C / Cooling Auto Trial Operation start
Water temperature is less than 25°C / Heating Auto Trial Operation start

■ Discharge Mode Operation

- ▶ Outdoor power is turned off, the Inverter PBA charging a high DC voltage, so dangerous to touch.
 - To replace the PBA, first turn off the power and the begin if DC voltage is discharged.
 - If not use the discharge mode, the discharge time of about 15 minutes takes.
 - If an error occurs, the discharge mode may not properly run. (Wait until natural discharge.)
 - In particular, E 464, E364, power devices may be damaged, therefore do not use the discharge mode. (Natural discharge until Please wait for at least 15 minutes.)
- ▶ Block the Inverter PBA 3-phase relay after connected the power, and through compressor, DC voltage is discharging.
 - INV1 and INV2 DC voltage during discharge mode are displayed alternately.
 - Discharge mode Display (Rotate the three page display, as shown below.)
'K' 'A' ' ' ' ' → DC Link Volt1 (For example, 120[V] 0 1 2 0 display)
→ DCLinkVolt2 (For example, 120[V] 0 1 2 0 display) → 'K' 'A' ' ' ' ' → DC Link Volt1 ...
- ▶ Discharge is complete, the power of the Inverter PBA is being blocked, communication function is blocked, E206 will occur.
- ▶ If want operation again after complete discharge mode : Restart after K3 key to Reset or Power Reset.

4-2 Service Operation (cont.)

4-2-1 Special Operation (cont.)

■ Forced oil recovery operation

- ▶ Forced oil recovery operation : Oil recovery in the outdoor unit for the purpose of moving, installation if necessary.

Method of Entry	K2 Tact Switch 7 times
Start pattern	Water temperature is more than 10°C : Cooling Auto Trial Operation Water temperature is less than or equal to 10°C : Heating Auto Trial Operation
Oil recovery start	Oil recovery start : It is after 10 minutes which Safety Start finishes.
Etc.	Oil recovery shut down and stop the normal pattern of the outdoor unit stop.

4-2 Service Operation (cont.)

4-2-2 DVM S Models EEPROM Code Table

■ EEP file is under table

No.	Model Name	Inverter PBA	EEP Code	No.	Model Name	Inverter PBA	EEP Code
1	AM038KXWDCH	DB92-03686A	DB82-03454A	13	AM240KXWAJR	DB92-03526A	DB82-03802A
2	AM048KXWDCH	DB92-03687A	DB82-03455A	14	AM080FXWANR/EU	DB92-03526A	DB82-03319A
3	AM055KXWDCH	DB92-03687A	DB82-03456A	15	AM100FXWANR/EU	DB92-03526A	DB82-03320A
4	AM072HXWAFR	DB92-03526C	DB82-03335A	16	AM120FXWANR/EU	DB92-03526A	DB82-03321A
5	AM096HXWAFR	DB92-03526C	DB82-03336A	17	AM200FXWANR/EU	DB92-03526A	DB82-03322A
6	AM120HXWAFR	DB92-03526C	DB82-03337A	18	AM300KXWANR	DB92-03337A	DB82-03800A
7	AM192HXWAFR	DB92-03526C	DB82-03338A	19	AM080FXWAGR/SC	DB92-03526A	DB82-03331A
8	AM240KXWAFR	DB92-03337B	DB82-03801A	20	AM100FXWAGR/SC	DB92-03526A	DB82-03332A
9	AM072HXWAJR	DB92-03526A	DB82-03323A	21	AM120FXWAGR/SC	DB92-03526A	DB82-03333A
10	AM096HXWAJR	DB92-03526A	DB82-03324A	22	AM200FXWAGR/SC	DB92-03526A	DB82-03334A
11	AM120HXWAJR	DB92-03526A	DB82-03325A				
12	AM192HXWAJR	DB92-03526A	DB82-03326A				

4-2 Service Operation (cont.)

4-2-3 Number Display Method (Outdoor Unit, MCU, Cable remote control, wall-mount, etc.)

■ How to Display Integrated Error Code

- ▶ Meanings of First Alphabetical Character / Number of Error Code

Displayed alphabet	Explanation	
<i>E</i>	When displaying Error 101~700	
<i>P</i>	When displaying Error 701~800	
<i>C</i>	When E206 error occurs	Displays address of subordinate within the set C001 : HUB, C002: FAN, C003: INV1, C004: INV2
	When MCU error occurs	Displays address of MCU Ex) C100: MCU address 0, C101: MCU address 1, C102: MCU address 2
<i>P</i>	When displaying outdoor unit address Ex) U200~203 main, Sub 1, 2, 3	
<i>U</i>	When displaying indoor unit address Ex) A000: Indoor unit adress 0, A001: Indoor unit address 1, A002: Indoor unit address 2	

- ▶ Order of Error Display

Classification	Error display method	Display Example
Display method for error that occurred in indoor unit	Error Number → Indoor unit address → Error Number, repeat display	E471 → A002 → E471 → A002
Display method for error that occurred in outdoor unit and other methods of error display	Error Number → Outdoor unit address → Error Number, repeat display	E471 → U200 → E471 → U200 E206 → C001 → E206 → C002

■ How to display alphabetic & numbers on 7-SEG

Alphabet	7-SEG display	Alphabet	7-SEG display	Alphabet	7-SEG display	Number	7-SEG display	Number	7-SEG display
A		J		S		0		5	
B		K		T		1		6	
C		L		U		2		7	
D		M		V		3		8	
E		N		W		4		9	
F		O		X					
G		P		Y					
H		Q		Z					
I		R		bar					

4-2 Service Operation (cont.)

4-2-3 Number Display Method (Outdoor Unit, MCU, Cable remote control, wall-mount, etc.)

■ Diagnosis and Adjustment (Error Code)

▶ Error code related indoor unit

CODE	Explanation
E-101	Indoor unit communication error. Indoor unit can not receive any data from outdoor unit.
E-102	Communication error between indoor unit and outdoor unit. Displayed in indoor unit.
E-108	Error due to repeated address setting (When 2 or more devices have same address within the network)
E-109	Incomplete communication error of indoor unit address
E-121	Error on indoor temperature sensor of indoor unit (Short or Open)
E-122	Error on EVA IN sensor of indoor unit (Short or Open)
E-123	Error on EVA OUT sensor of indoor unit (Short or Open)
E-128	EVA IN temperature sensor of indoor unit is detached from EVA IN pipe
E-129	EVA OUT temperature sensor of indoor unit is detached from EVA OUT pipe
E-130	Heat exchanger in/out sensors of indoor unit are detached
E-135	RPM feedback error of indoor unit's cleaning fan
E-149	Error due to AHU master indoor unit sensor setting.
E-151	Error due to opened EEV of indoor unit (2nd detection)
E-152	Error due to closed EEV of indoor unit (2nd detection)
E-153	Error on floating switch of indoor unit (2nd detection)
E-154	RPM feedback error of indoor unit
E-161	Mixed operation mode error of indoor unit; When outdoor unit is getting ready to operate in cooling (or heating) and some of the indoor unit is trying to operate in heating (or cooling) mode
E-162	EEPROM error of MICOM (Physical problem of parts/circuit)
E-163	Indoor unit's remote controller option input is Incorrect or missing. Outdo or unit EEPROM data error
E-180	Simultaneous opening of cooling/heating MCU SOL V/V (1st detection)
E-181	Simultaneous opening of cooling/heating MCU SOL V/V (2nd detection)
E-185	Cross wiring error between communication and power cable of indoor unit
E-186	Connection error or problem on SPi
E-190	No temperature changes in EVA IN during pipe inspection or changes in temperature is seen in indoor unit with wrong address
E-191	No temperature changes in EVA OUT during pipe inspection or changes in temperature is seen in indoor unit with wrong address
E-198	Error due to disconnected thermal fuse of indoor unit
E-201	Communication error between indoor and outdoor units (installation number setting error, repeated indoor unit address, indoor unit communication cable error)
E-202	Communication error between indoor and outdoor units (Communication error on all indoor unit, outdoor unit communication cable error)

4-2 Service Operation (cont.)

4-2-3 Number Display Method (Outdoor Unit, MCU, Cable remote control, wall-mount, etc.)

■ Diagnosis and Adjustment (Error Code)

▶ Error code related to the Communications / Settings / HW (cont.)

Error mode	Cause
E-203	Communication error between main and sub outdoor units
E-205	Communication error on all PBA within the outdoor unit C-Box, communication cable error
E-206	E206-C001: HUB PBA communication error / E206-C002: FAN PBA communication error E206-C003: INV1 PBA communication error / E206-C004: INV2 PBA communication error E206-C005 : Water Hub PBA communication error
E-211	When single indoor unit uses 2 MCU ports that are not in series.
E-212	If the rotary switch (on the MCU) for address setting of the indoor unit has 3 or more of the same address
E-213	When total number of indoor units assigned to MCU is same as actual number of installed indoor units but there is indoor unit that is not installed even though it is assigned on MCU
E-214	When number of MCU is not set correctly on the outdoor unit or when two or more MCU was installed some of them have the same address
E-215	When two different MCU's have same address value on the rotary switch
E-216	When indoor unit is not installed to a MCU port but the switch on the port is set to On.
E-217	When indoor unit is connected to a MCU port but indoor unit is assigned to a MCU and the switch on the port is set to Off
E-218	When there's at least one or more actual number of indoor unit connection compared to number of indoor units assigned to MCU
E-219	Error on temperature sensor located on MCU intercooler inlet (Short or Open)
E-220	Error on temperature sensor located on MCU intercooler outlet (Short or Open)
E-221	Error on outdoor temperature sensor of outdoor unit (Short or open)
E-224	Error on water temperature sensor of main outdoor unit (Short or Open)
E-225	Error on control box temperature sensor of main outdoor unit (Short or Open)
E-231	Error on COND OUT temperature sensor of main outdoor unit (Short or Open)
E-241	COND OUT sensor is detached
E-251	Error on discharge temperature sensor of compressor 1 (Short or Open)
E-257	Error on discharge temperature sensor of compressor 2 (Short or Open)
E-262	Discharge temperature sensor of compressor 1 is detached from the sensor holder on the pipe
E-263	Discharge temperature sensor of compressor 2 is detached from the sensor holder on the pipe
E-266	Top sensor of compressor 1 is detached
E-267	Top sensor of compressor 2 is detached
E-269	Suction temperature sensor is detached from the sensor holder on the pipe
E-276	Error on top sensor of compressor 1 (Short or Open)
E-277	Error on top sensor of compressor 2 (Short or Open)
E-291	Refrigerant leakage or error on high pressure sensor (Short or Open)
E-296	Refrigerant leakage or error on low pressure sensor (Short or Open)
E-308	Error on suction temperature sensor (Short or Open)
E-311	Error on temperature sensor of double layer pipe/liquid pipe(sub heat exchanger) (Short or Open)
E-321	Error on EVI (ESC) IN temperature sensor (Short or Open)
E-322	Error on EVI (ESC) OUT temperature sensor (Short or Open)
E-323	Error on suction sensor 2 (Short or Open)
E-346	Error due to operation failure of Fan2
E-347	Motor wire of Fan2 is not connected
E-348	Lock error on Fan2 of outdoor unit

4-2 Service Operation (cont.)

4-2-3 Number Display Method (Outdoor Unit, MCU, Cable remote control, wall-mount, etc.)

■ Diagnosis and Adjustment (Error Code)

▶ Error code related to the Communications / Settings / HW (cont.)

Error mode	Cause
E-353	Error due to overheated motor of outdoor unit's Fan2
E-355	Error due to overheated IPM of Fan2
E-361	Error due to operation failure of inverter compressor 2
E-364	Error due to over-current of inverter compressor 2
E-365	V-limit error of inverter compressor 2
E-366	Error due to over voltage /low voltage of inverter PBA2
E-367	Error due to unconnected wire of compressor 2
E-368	Output current sensor error of inverter PBA2
E-369	DC voltage sensor error of inverter PBA2
E-371	Error due to the INV2 Data Flash
E-374	Heat sink temperature sensor error of inverter PBA2
E-378	Error due to overcurrent of Fan2
E-383	Error due to over current of Fan2
E-385	Error due to input current of inverter 2
E-386	Over-voltage/low-voltage error of Fan2
E-387	Hall IC connection error of Fan2
E-389	V-limit error on Fan2 of compressor
E-391	Error due to the Fan2 DataFlash
E-393	Output current sensor error of Fan2
E-396	DC voltage sensor error of Fan2
E-399	Heat sink temperature sensor error of Fan2
E-400	Error due to overheat caused by contact failure on IPM of Inverter PBA2
E-407	Compressor operation stop due to high pressure protection control
E-410	Compressor operation stop due to low pressure protection control or refrigerant leakage
E-416	Compressor operation stop due to discharge temperature protection control
E-425	Phase reversal or phase failure (3Ø outdoor unit wiring, R-S-T-N), connection error on 3 phase input
E-428	Compressor operation stop due abnormal compression ratio
E-435	Flow Switch Error
E-436	Error on the Heat exchanger frost protection
E-438	EVI (ESC) EEV leakage or internal leakage of intercooler or incorrect connector insertion of EVI (ESC) EEV
E-439	Error due to refrigerant leakage
E-440	Heating mode restriction due to high air temperature In case of DVM water, Heating mode restriction due to high water temperature
E-441	Cooling mode restriction due to low air temperature In case of DVM water, Heating mode restriction due to low water temperature
E-442	Refrigerant charging restriction in heating mode when air temperature is over 15 °C
E-443	Operation prohibited due to low pressure
E-445	CCH is deatched
E-446	Error due to operation failure of Fan1
E-447	Motor wire of Fan1 is not connected
E-448	Lock error on Fan1
E-452	Error due to ZPC detection circuit problem or power failure

4-2 Service Operation (cont.)

4-2-3 Number Display Method (Outdoor Unit, MCU, Cable remote control, wall-mount, etc.)

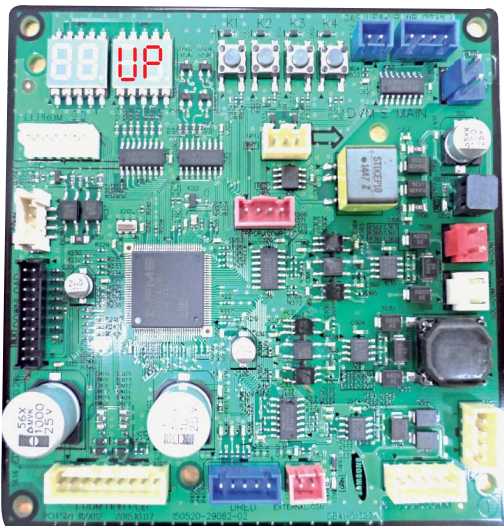
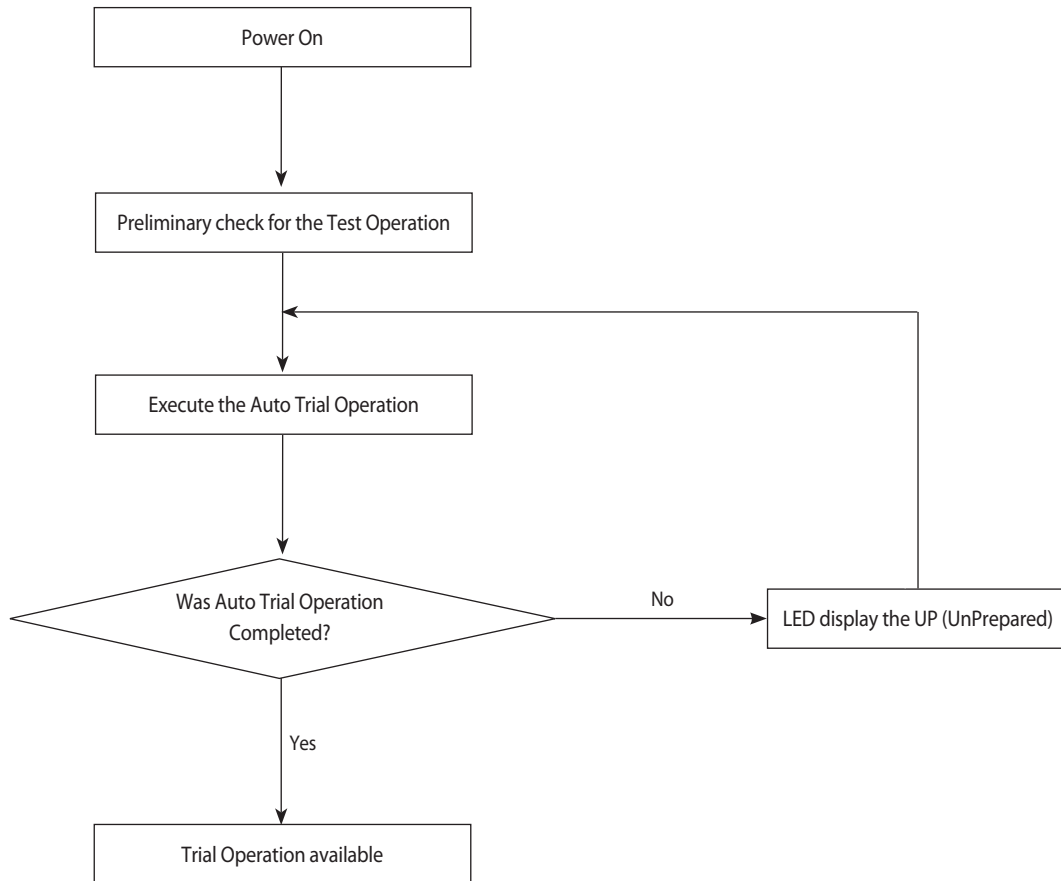
■ Diagnosis and Adjustment (Error Code)

▶ Error code related to the Communications / Settings / HW (cont.)

Error mode	Cause
E-453	Error due to overheated motor of outdoor unit's Fan1
E-454	Error due to the outdoor unit fan RPM
E-455	Error due to the over heat Fan1 IPM
E-457	Outdoor unit Reversed direction of the wind Error
E-461	Error due to operation failure of inverter compressor 1
E-462	Compressor stop due to full current control or error due to low current on CT2
E-464	Error due to over-current of inverter compressor 1
E-465	V-limit error of inverter compressor 1
E-466	Error due to over voltage /low voltage of Inverter PBA1
E-467	Error due to unconnected wire of compressor 1
E-468	Output current sensor error of inverter PBA1
E-469	DC voltage sensor error of inver PBA1
E-471	Error due to the INV1 Data Flash
E-474	Heat sink temperature sensor error of inverter PBA1
E-478	Error due to overcurrent of Fan1
E-483	Error due to over current of Fan1
E-485	Error due to input current of inverter 1
E-486	Error due to over voltage/low voltage of Fan
E-487	Hall IC error of Fan1
E-489	V-limit error on Fan1 of compressor
E-491	Error due to the Fan1 DataFlash
E-493	Output current sensor error of Fan1
E-496	DC voltage sensor error of Fan1
E-499	Heat sink temperature sensor error of Fan1
E-500	Error due to overheat caused by contact failure on IPM of Inverter PBA1
E-503	Error due to alert the user to check if the service valve is closed
E-504	Error due to self diagnosis of compressor operation
E-505	Error due to self diagnosis of high pressure sensor
E-506	Error due to self diagnosis of low pressure sensor
E-515	Error due to the over heat Control Box
E-516	Error due to the no feedback from the Fan of the control Box
E-552	Comp down due to the low discharge pressure
E-560	Outdoor unit's option switch setting error (when inappropriate option switch is on)
E-563	Error due to module installation of indoor unit with old version (Micom version needs to be checked)
E-573	Error due to using single type outdoor unit in a module installation
E-702	Error due to closed EEV of indoor unit (1st detection)
E-703	Error due to opened EEV of indoor unit (1st detection)
UP	Auto Trial Operation incompleted (UnPrepared)

4-3 Appropriate Measures for Different Symptom

4-3-1 Outdoor Unit Test Operation Flow



If the Auto Trial Operation is not completed- UP is displayed(UnPrepared)

Prior to starting the air conditioning operation after the initial installation and Auto Trial Operation is carried out. This process, the stable operation to protect the system and verify the defect of the product.

1. Tracking is complete and after the initial installation, if you do not have a history of Auto Trial Operation is completed, UP will be displayed.
2. Execute the Auto Trial Operation by Tact Switch.
3. UP display disappears after Auto Trial Operation is complete, normal operation is possible.
4. Auto Trial Operation is completed, if there is a history, normal operation execution.

4-3 Appropriate Measures for Different Symptom (cont.)

4-3-1 Outdoor Unit Test Operation Flow (cont.)

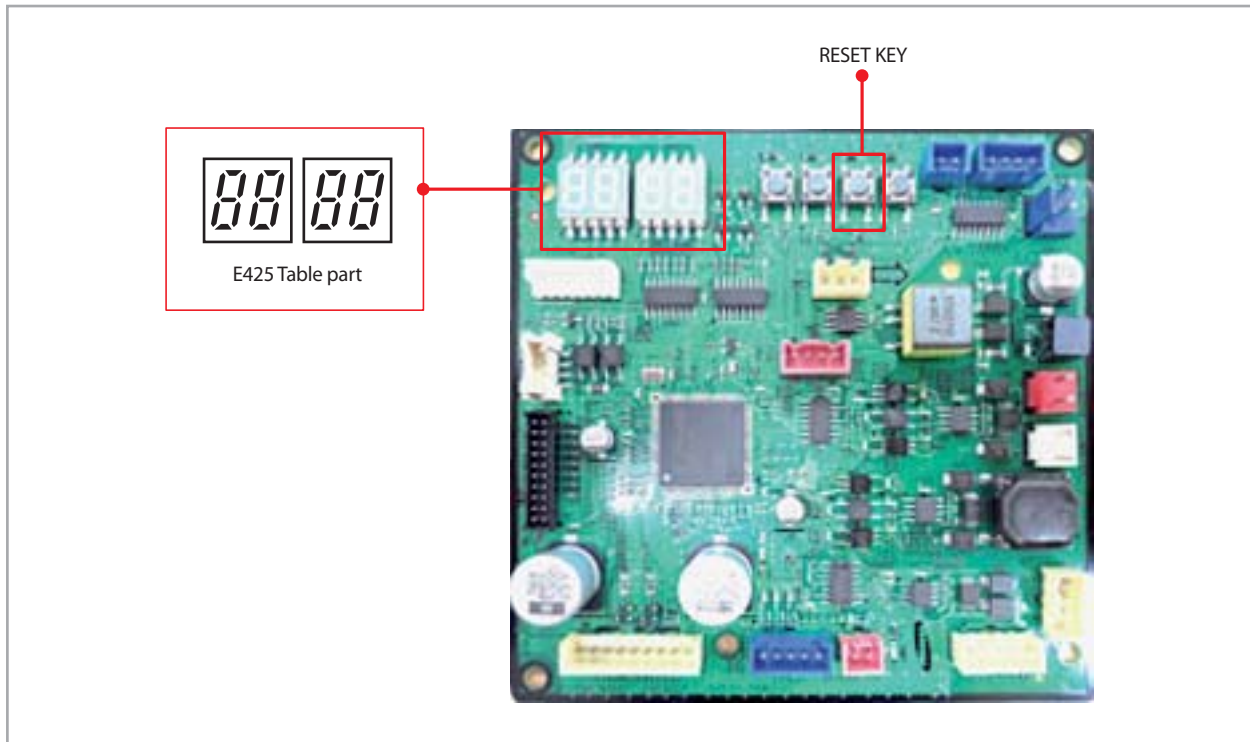
■ Reversed Phase/No Phase Check (Outdoor Unit with 3 Phase power) – Display *E425* for Problem

1. When the power is on, check the status of the power from the inverter.

Three-phase L1(R)-L2(S)-L3(T) order, regardless of the power connection on the inverter does not phase power (no phase) can occur.

In this case, E425 or E466 (E366) is displayed, and then air conditioner will then maintain normal conditions.

However) N phase must be connected properly.



- 1) Check the voltage for L1 (R)-L2 (S) phase/L1 (R)-L3 (T) phase/L2 (S)-L3 (T) phase.
- 2) If there is any terminal without normal voltage, then check the power outside the air conditioner and take the appropriate measures.
- 3) If the 3-phase voltage is normal, then use the 3-phase tester to display the phase of the power cable.
Change the power cable connection if reversed phase is displayed.
- 4) Take the above measures, press the reset key (K3), and then check the power once more.
- 5) Check the EMI PBA Fuse connection and wiring.
- 6) If the same problem occurs after another check, check the Inverter PBA.



- In case of wiring error (N-phase is changed with one of R, S and T) with the N-phase, will operate the power protection function, display E425 or stop the power. This is not a PBA power defect in this case, before PBA replacement, please check the power on.

4-3 Appropriate Measures for Different Symptom (cont.)

4-3-1 Outdoor Unit Test Operation Flow (cont.)

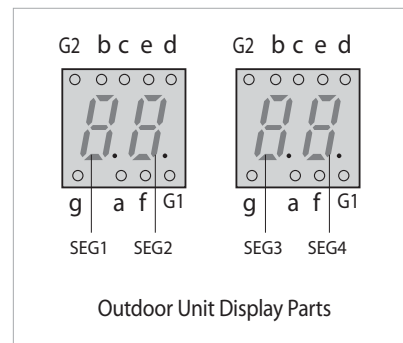
■ Initial Tracking (Communication Check-up)- Display *E201* for Problem

1. For the display module of the outdoor unit, there are differences in the contents displayed depending on whether the relevant outdoor unit is a master unit or a sub unit.

1) Master Unit

- The outdoor unit Micom attempts communication with the indoor unit connected to the communication cable (F1/F2) when the power is turned on.
- Basic segment display

Step	Display content	Display			
		SEG1	SEG2	SEG3	SEG4
At initial power input	Checking segment display	SEG1	SEG2	SEG3	SEG4
		"8"	"8"	"8"	"8"
While setting communication between indoor and outdoor unit (Addressing)	Number of connected indoor units	SEG1	SEG2	SEG3, 4	SEG3, 4
		"A"	"d"	Number of communicated units ※ Refer to "View Mode" for communication address	
After communication setting (usual occasion)	Transmit/Reception address	SEG1	SEG2	SEG3, 4	SEG3, 4
		I/U: "A" MCU: "C"	I/U: "0" MCU: "1"	Reception address (in decimal number)	



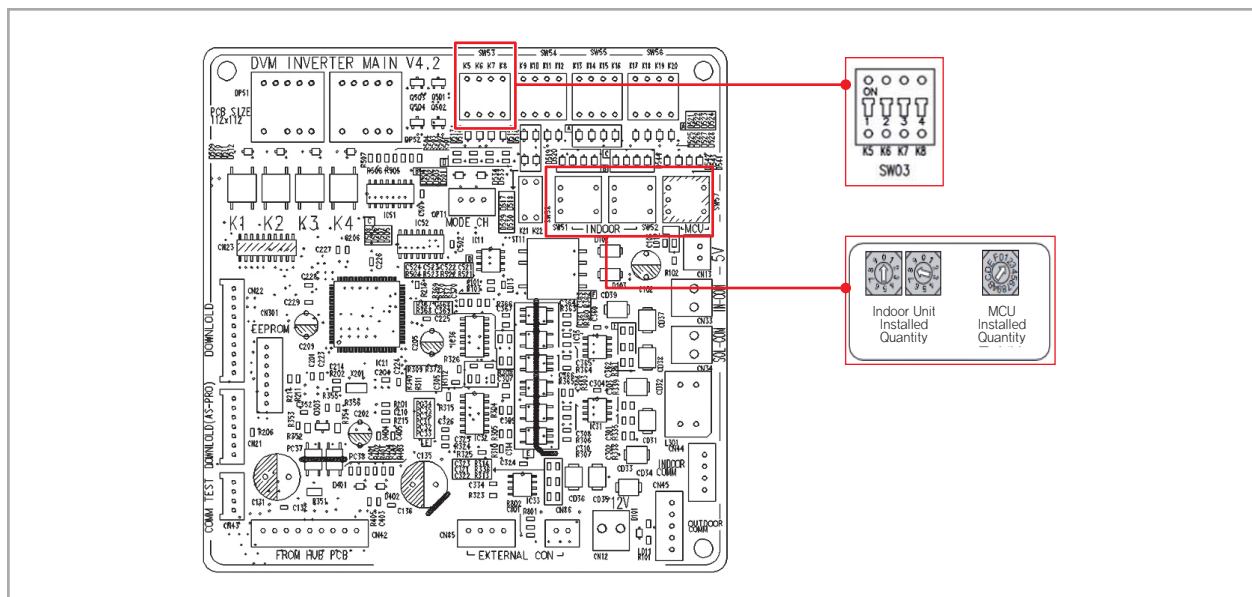
※ I/U : Indoor unit

- If the number of indoor units set by the outdoor unit is not in accordance with the number of indoor units that succeeded with communication, then the four displaying parts will display *E201*.

2) Sub(Slave) Unit

- The two left hand displays show its own address and the two right hand displays show the outdoor unit's address.
Main address : C8, Sub1 address : C9, Sub2 address : CA, Sub3 address : CB

2. The number of the indoor Units Connected to the outdoor unit can be configured by using the indoor unit installation quantity setup switch.



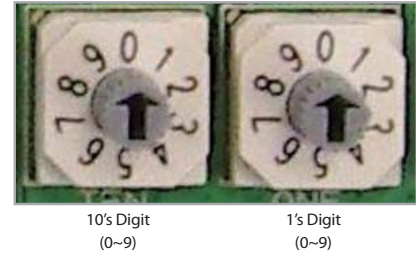
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-1 Outdoor Unit Test Operation Flow (cont.)

■ Quantity of indoor unit [DIP S/W Type]

1. The following is an example of how to use the switch according to the number of indoor unit installations.
2. The maximum number of possible indoor unit connections is 64.

3Units Connected		17Units Connected		31Units Connected		64Units Connected	
10's Digit	1's Digit	10's Digit	1's Digit	10's Digit	1's Digit	10's Digit	1's Digit
0	3	1	7	3	1	6	4



3. If the quantity of the indoor units configured with the indoor unit installation quantity setup switch does not match the quantity of the indoor units found during the tracking process, E201 and U200 will be displayed in order on the display module.
4. When you install more than one MCU, set the quantity of installed MCU.

■ Quantity of indoor unit [Push Button Type]

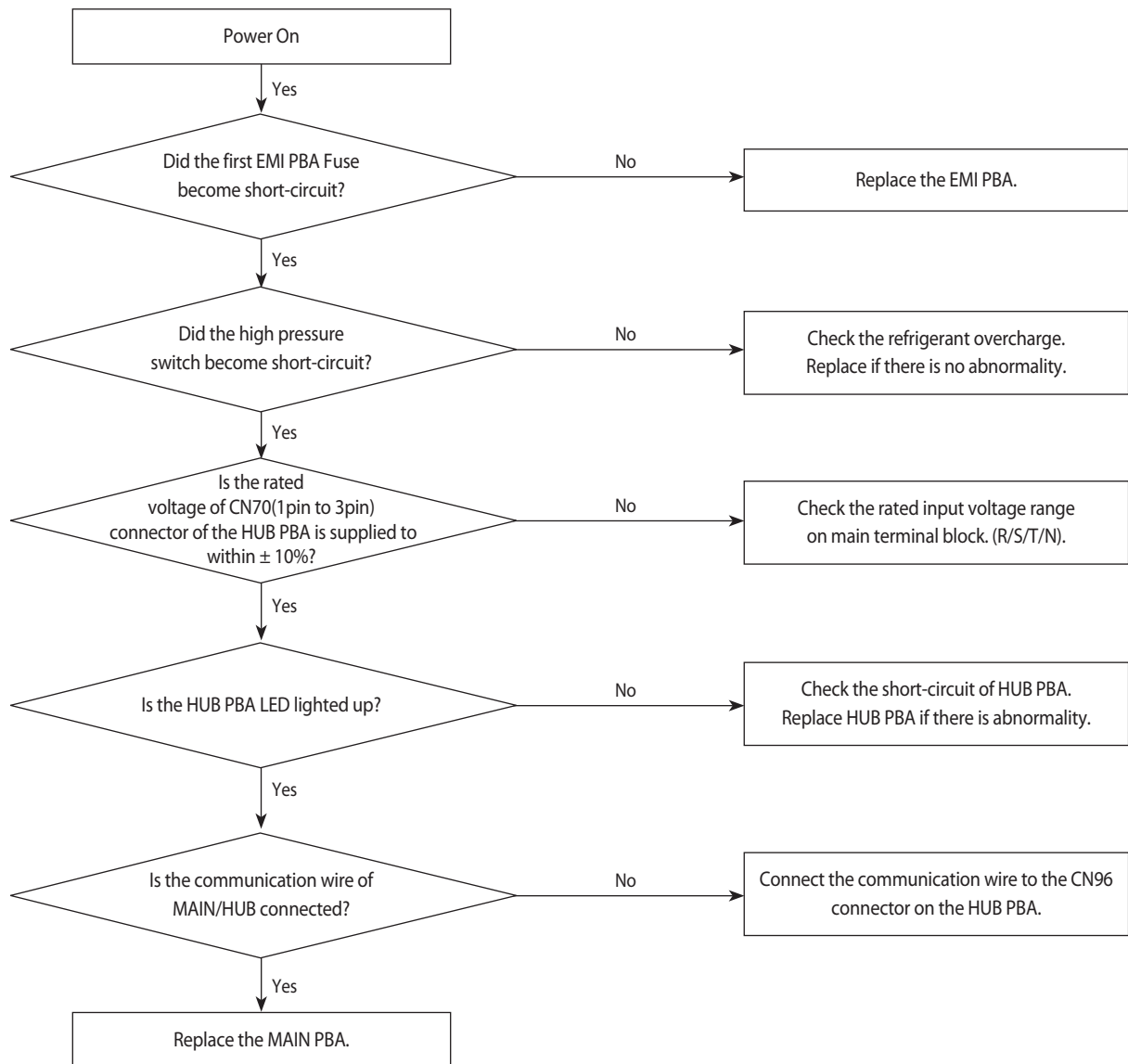
Display	Description
	<ul style="list-style-type: none"> · Manual setting mode (Default) <ul style="list-style-type: none"> - Press the K2 button shortly : Setting a 10-digit - Press the K4 button shortly : Setting a 1-digit · Automatic settings mode (Option) <ul style="list-style-type: none"> Press and hold the K4 button : It is changed to the automatic setting mode, and displays the number of the connected indoor unit. (Ex. Of 10 indoor units are connected, "id 10" is indicated.) - If press the K2, K4 button shortly in the automatic setting mode, it is changed to the manual mode. (Ex. If 10 is indicated and press the K4 button, 11 is indicated and changed to the manual mode.)

4-3 Appropriate Measures for Different Symptom (cont.)

4-3-2 Main PBA has no power phenomenon

Outdoor unit display	Main PBA has no power phenomenon (7-seg does not blink)
Judgment Method	Hub PBA power and connection wire to detect.
Connector check Method	CN96 on HUB PBA - 1pin to 4pin : DC 12V - 9pin to 4pin : DC 5V
Cause of problem	<ul style="list-style-type: none"> · HUB PBA connector wire defects and the connection is not. · Main PBA defective. · Hub PBA defective. · High pressure switch operation · Water hub PBA defective. CN96 on HUB PBA

1. Cause of problem

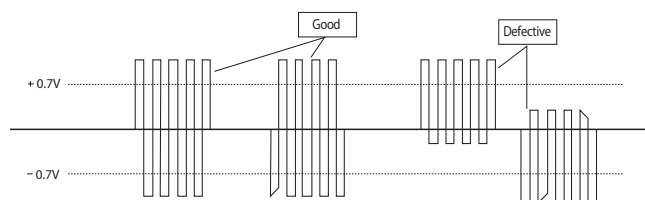
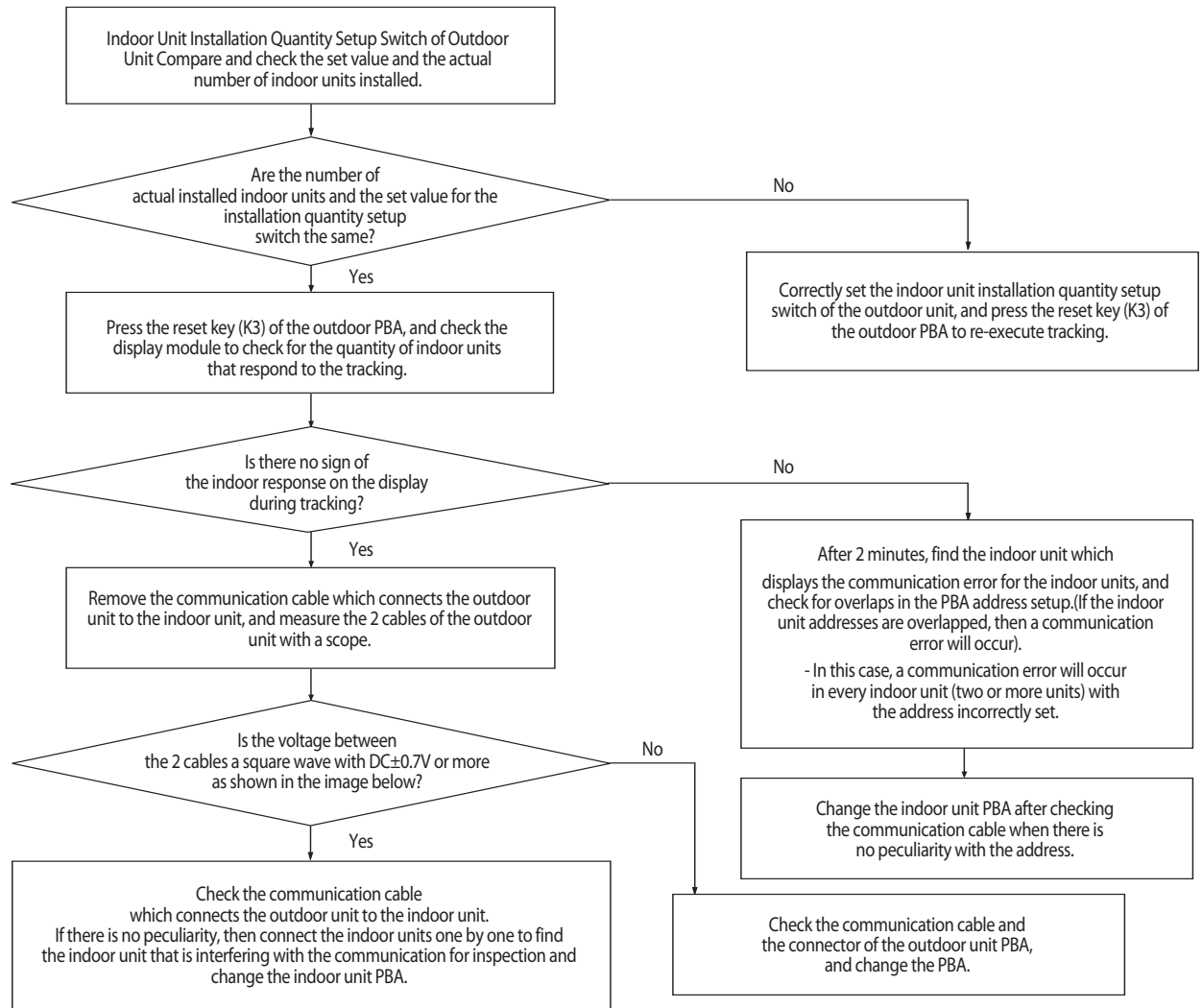


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-3 Communication Error between Indoor and Outdoor Units during Tracking

Outdoor unit display	E201													
Indoor unit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)				
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24°C	27°C
	×	×	●	●	×	×	●	●	×	×	×	●	●	×
Judgment Method	· Communication error between indoor and outdoor units.													
Cause of problem	· Refer to the judgment method below.													

1. Cause of problem



* Essential Requirements before Changing PBA in Case of Communication Error: Refer to p.50

4-3 Appropriate Measures for Different Symptom (cont.)

4-3-3 Communication Error between Indoor and Outdoor Units during Tracking (cont.)

※ Essential Requirements before PBA Changes in Case of Communication Error Occurrence

1. Find the communication IC near the communication terminal.

- **Indoor Unit**

- Coil side or PTC (SMD) side : Communication IC between indoor and outdoor units.

- **Outdoor Unit**

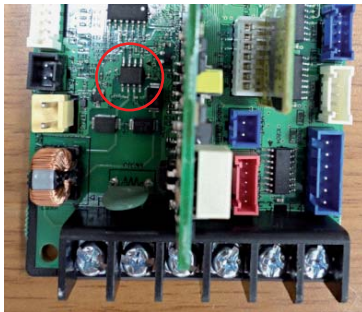
- When there is module communication as in PLUS II and PLUS III –

- Above Red Connector of Main Unit : Communication IC between indoor and outdoor units.

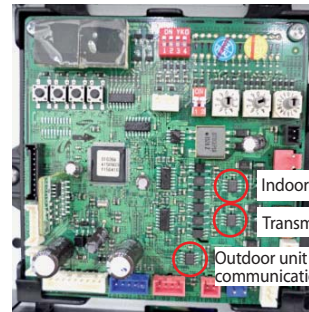
- When there is no module communication as in PLUS II and PLUS III –

- Above Yellow Connector of Each Unit : Communication IC between outdoor units.

- Other Outdoor Unit- Above Communication Connector : Communication IC between indoor and outdoor unit.



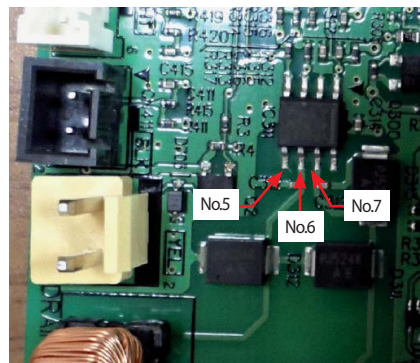
Indoor Unit



Outdoor Unit

2. Measure the resistance of the communication IC.

- **Measurement Method** : Measure the No.5- No.6 Pin resistance
Measure the No.5- No.7 Pin resistance



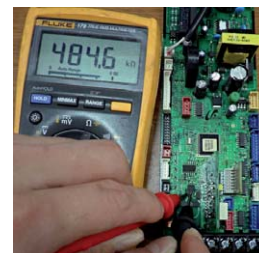
3. Defectiveness decision of the communication IC which uses a measurement resistance value.

- **Judging as Normal**

- Each resistance value should be measured in tens of kΩ~to hundreds of kΩ.
- Difference between the two resistance values should be of some number of kΩ.

- **Judging as defective**

- One or both are low with tens of Ω
- One or both of them is open

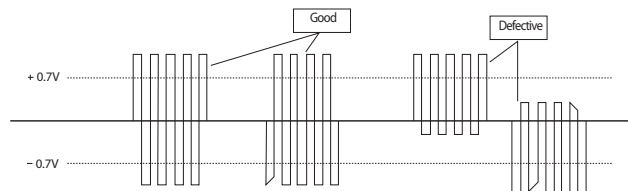
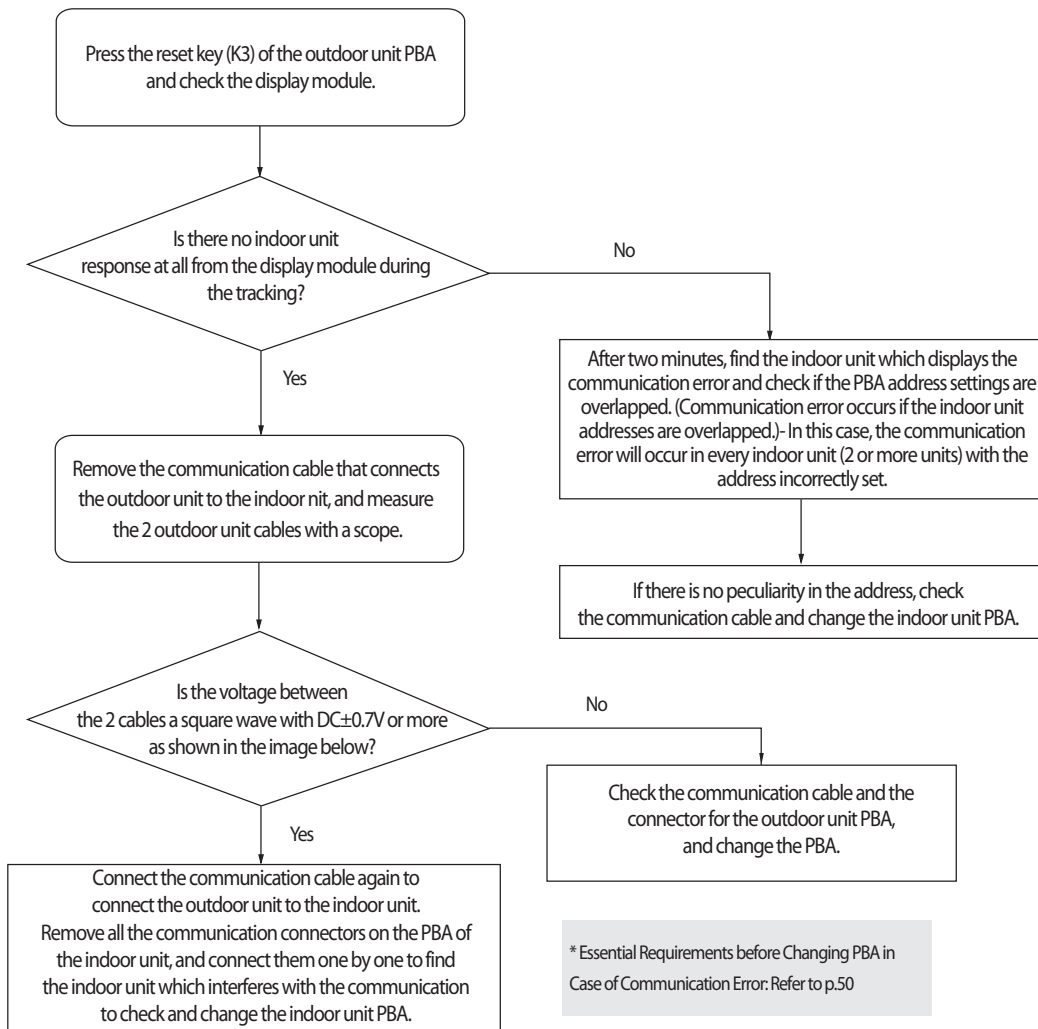


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-4 Communication Error between Indoor and Outdoor Units after Tracking

Outdoor unit display	E202														
Indoor unit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)					
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24°C	27°C	
	×	×	●	●	×	×	●	●	×	×	×	●	●	×	
Judgment Method	· Outdoor unit is unable to communicate for two minutes during operation. (no reception of relocation)														
Cause of problem	· Communication error between indoor and outdoor units and setup error of indoor unit installation quantity setup switch.														

1. Cause of problem

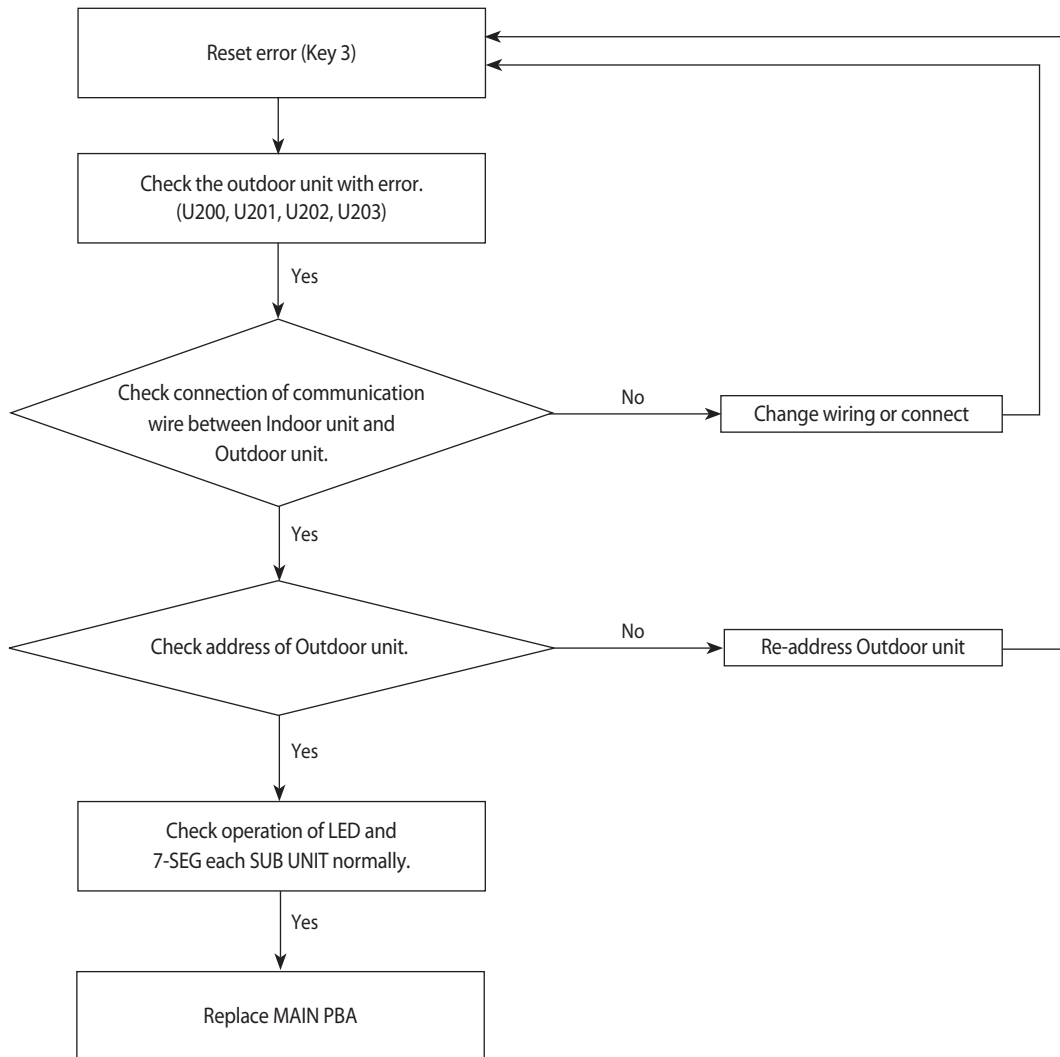


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-5 Communication error between main and sub Unit of outdoor unit or between outdoor units

Outdoor unit display	E203											
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)		
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo
	×	×	●	●	×	×	●	●	×	×	●	●
Judgment Method	· Refer to the judgment method below.											
Cause of problem	· Communication error between outdoor units.											

1. Cause of problem



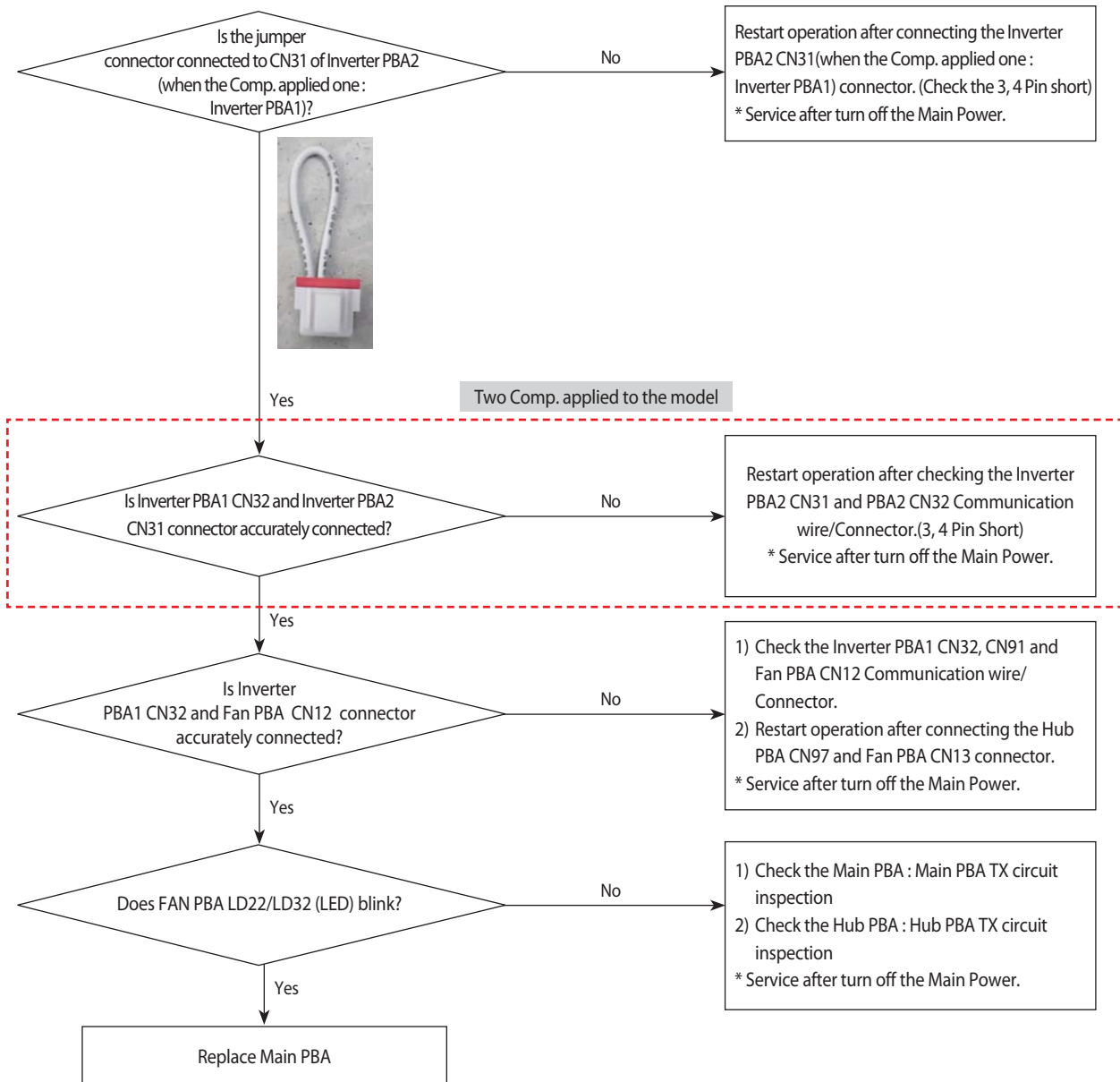
Essential Requirements before Changing PBA in Case of Communication Error: Refer to p.59

4-3 Appropriate Measures for Different Symptom (cont.)

4-3-6 Internal Communication error of the Outdoor Unit C-Box

Outdoor unit display	E205 - All boards of outdoor unit are not communicating											
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)		
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo
	×	×	●	●	×	×	●	●	×	×	●	●
※ ● : ON ○ : Flash × : OFF												
Judgment Method	· Main PBA detecting uART communication other PBA. (Hub, Inverter, Fan)											
Cause of problem	· Communication wire inside the C-Box is unconnected · Main PBA defective											

1. Cause of problem

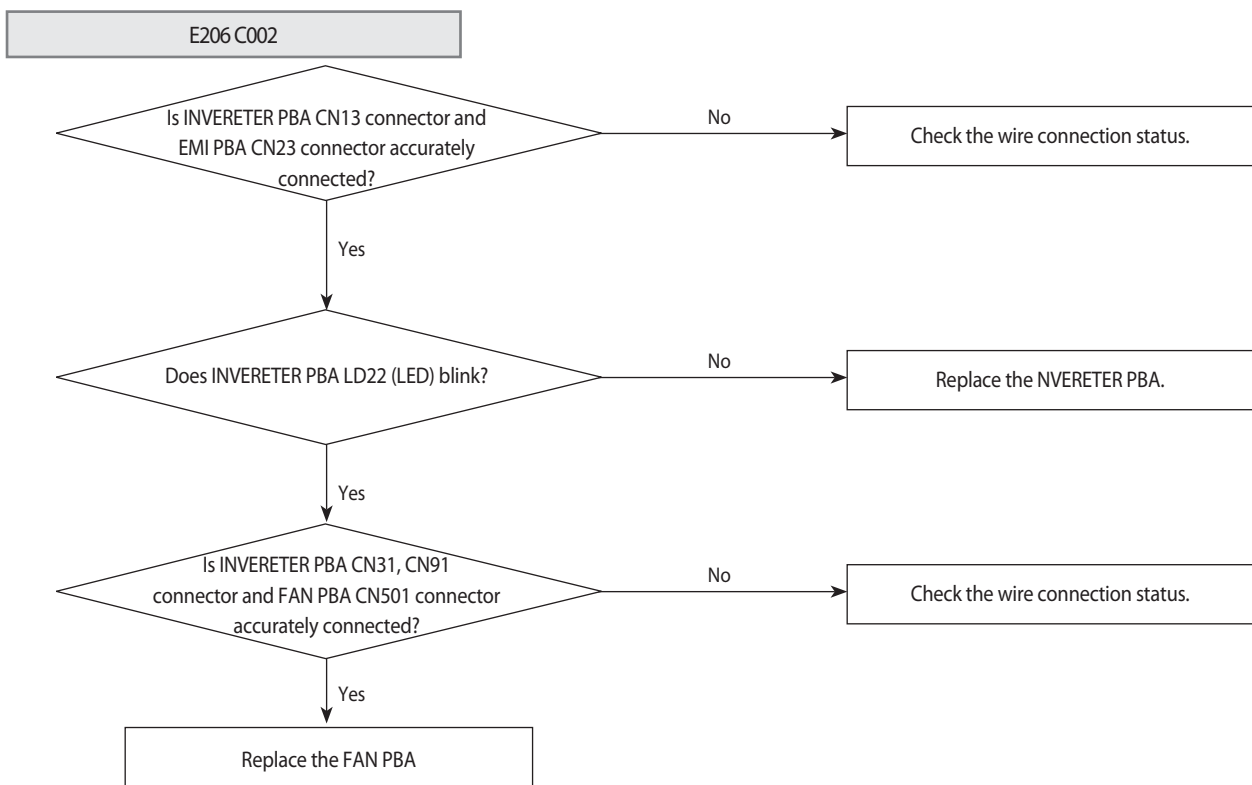
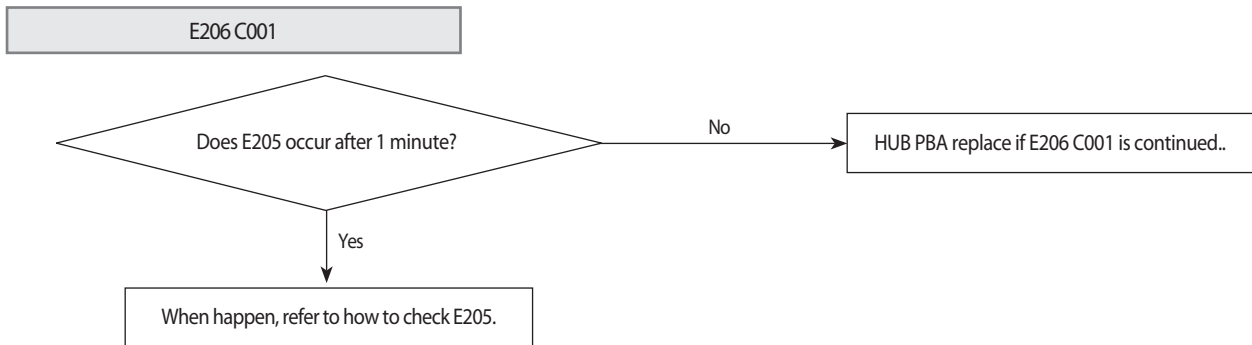


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-7 Internal PBA Communication error of the Outdoor Unit C-Box

Outdoor unit display	E206 (C001 ~ C005) - some boards of outdoor unit are not communicating											
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)		
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo
	×	×	●	●	×	×	●	●	×	×	●	●
※ ● : ON ○ : Flash × : OFF												
Judgment Method	· PBA does not respond to the invoked Main PBA											
Cause of problem	· C-Box internal Inverter PBA, Fan PBA, Hub PBA, Water Hub PBA defective.											

1. Cause of problem



4-3 Appropriate Measures for Different Symptom (cont.)

4-3-7 Internal PBA Communication error of the Outdoor Unit C-Box (cont.)

E206 C003/C004

C003 : Replace the INVERTER PBA 1

C004 : Replace the INVERTER PBA 2

C005 : Replace the Water Hub PBA

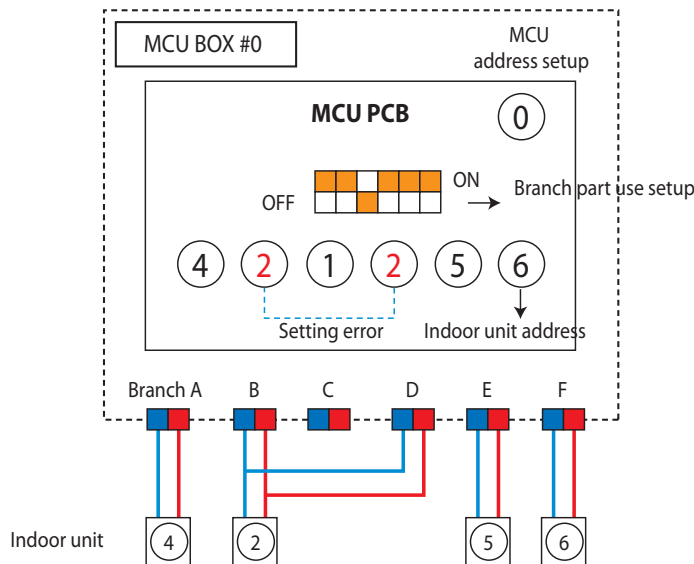
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-8 MCU branch part setup error – inconsecutive connection with the use of 2 branch parts

Outdoor unit display	E211													
Indoor unit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)				
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24°C	27°C
	×	×	●	●	×	×	●	●	×	×	×	●	●	×
Judgment Method	※ ●: ON ○: Flash ×: OFF • When 2 branch parts are used for one indoor unit without connecting them consecutively.													
Cause of problem	• Branch part assembly error													

1. How to check

Find an MCU that is composed as the following picture to carry out assembly of branch part again. After completing the re-setting, press K3 button on the button to reset or turn it off to restart.



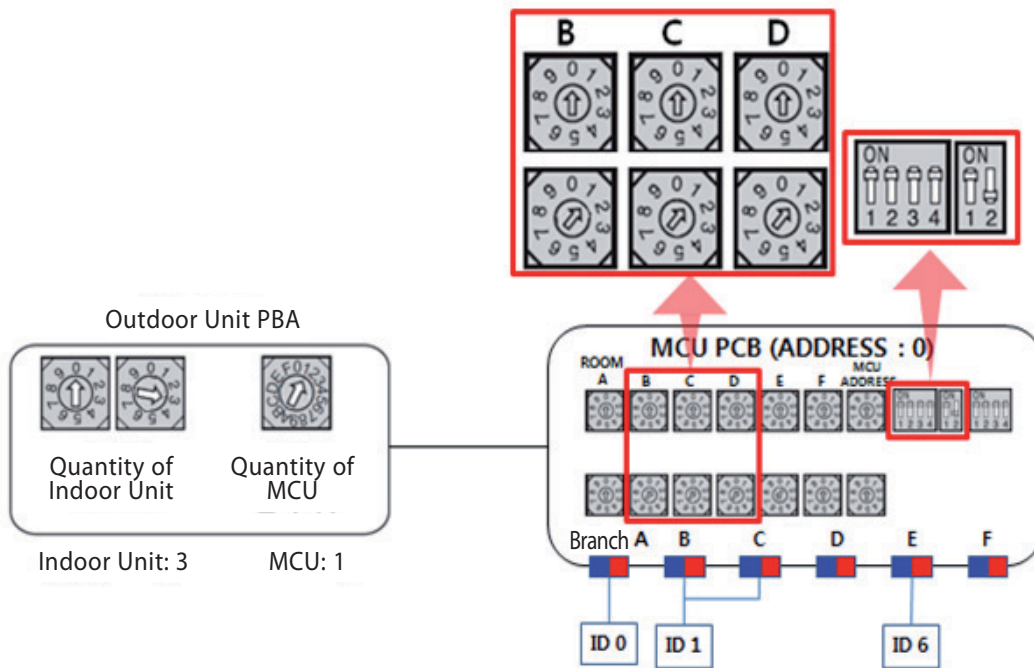
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-9 MCU branch part setup error – Repeated setup for the same address over 3 times

Outdoor unit display	E2 12													
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)				
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24°C	27°C
	×	×	●	●	×	×	●	●	×	×	×	●	●	×
Judgment Method	※ ●: ON ○: Flash ×: OFF • The same indoor unit address was setup more than 3 times in MCU													
Cause of problem	• MCU indoor unit address setting error													

1. How to check

Find an MCU that is composed as the following picture to carry out assembly of branch part again. After completing the re-setting, press K3 button on the button to reset or turn it off to restart.



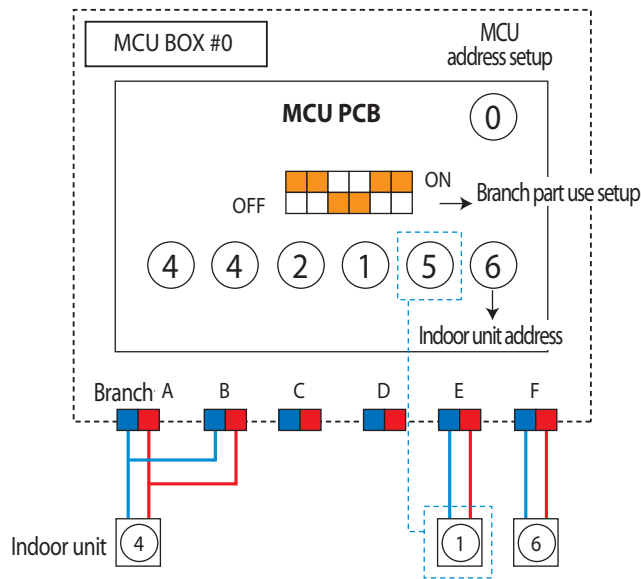
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-10 MCU branch part setup error – non-installed address setup

Outdoor unit display	E2 13													
Indoor unit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)				
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24°C	27°C
	×	×	●	●	×	×	●	●	×	×	×	●	●	×
	※ ●: ON ○: Flash ×: OFF													
Judgment Method	• If there is an indoor unit that is not installed among MCU registered indoor units													
Cause of problem	• Indoor unit, with the assigned address on MCU, not installed.													

1. How to check

Find an MCU that is composed as the following picture to carry out assembly of branch part again. After completing the re-setting, press K3 button on the button to reset or turn it off to restart.



4-3 Appropriate Measures for Different Symptom (cont.)

4-3-11 Setup Error for MCU Branch part – Setup Error for MCU Quantity Used

Outdoor unit display	E2 14													
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)				
	Operation	Defrost	Timer	Fan	Filter/ MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24°C	27°C
	×	×	●	●	×	×	●	●	×	×	×	●	●	×
※ ●: ON ○: Flash ×: OFF														
Judgment Method	<ul style="list-style-type: none"> Occurs when the quantity of MCU is incorrectly set by the outdoor unit. Occurs when same addresses are found when two or more MCU are connected. 													
Cause of problem	<ul style="list-style-type: none"> Outdoor unit MCU setup and same address errors when connecting two or more MCUs . 													

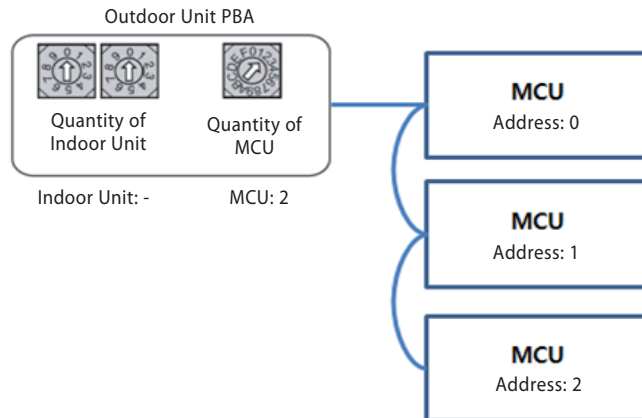
1. Inspection Method

Check the Main PBA MCU quantity setting switch of the outdoor unit and check the installed MCU quantity matches. Check whether each MCU PBA address switch was duplicated.

To use, reset by pressing the K3 button of the outdoor unit after the reset is completed, or reset after turning off the power and then turn it on again.

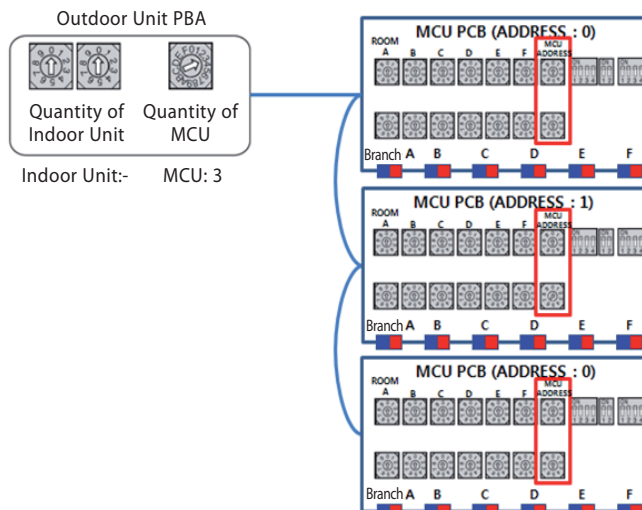
• Example of MCU quantity setting error

ex) PBA MCU setting quantity of outdoor unit = 2 / MCU installed Quantity = 3



• Example of MCU address setting error

ex) Two among three of MCU address was set to 0



4-3 Appropriate Measures for Different Symptom (cont.)

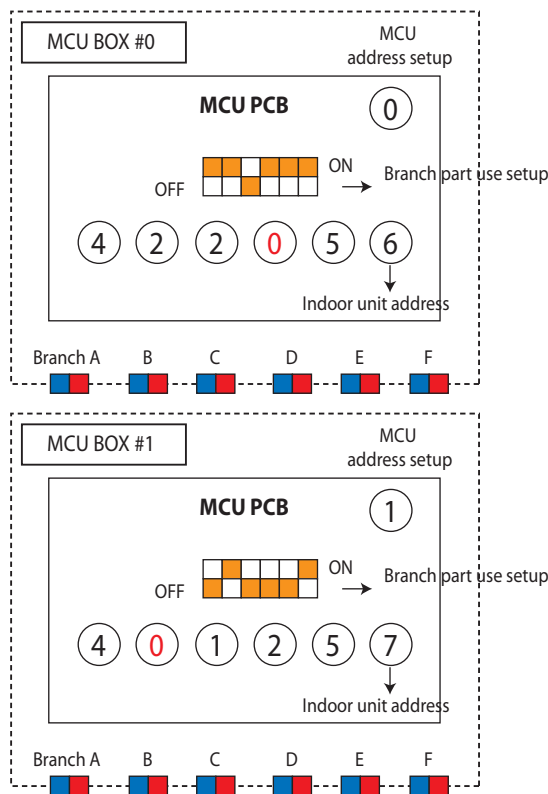
4-3-12 MCU branch part setup error – Overlapping Indoor unit Address setup

Outdoor unit display	E2 15													
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)				
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24°C	27°C
	×	×	●	●	×	×	●	●	×	×	×	●	●	×
	※ ●: ON ○: Flash ×: OFF													
Judgment Method	• Occurs when an indoor unit address setup switch in MCU has been overlapped													
Cause of problem	• Repeated indoor unit address													

1. How to check

Check the setup switch for the number of indoor units in MCU

After completing resetting, press the outdoor unit's K3 button to reset or turn off to restart.



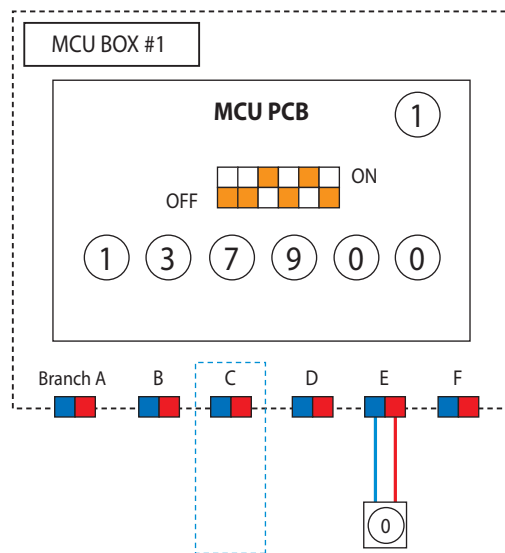
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-13 MCU branch part setup error – Set as being used without connection to an Indoor unit

Outdoor unit display	E2 16													
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)				
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24°C	27°C
	×	×	●	●	×	×	●	●	×	×	×	●	●	×
	※ ●: ON ○: Flash ×: OFF													
Judgment Method	• Occurs when MCU PIPE is set as being used, yet not connected to an indoor unit													
Cause of problem	• Pipe is not installed to the indoor unit with assigned address on MCU													

1. How to check

Adjust the Dip switch that sets up the use of MCU branch part to 'Not-Used'. After completing resetting, press the outdoor unit's K3 button to reset or turn off to restart.



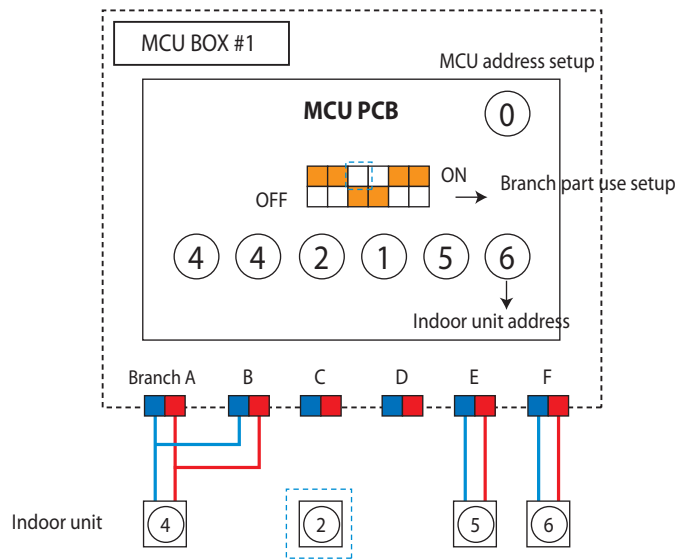
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-14 MCU branch part setup error – Connect an Indoor unit to a branch part not being used

Outdoor unit display	E2 17													
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)				
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24°C	27°C
	×	×	●	●	×	×	●	●	×	×	×	●	●	×
	※ ●: ON ○: Flash ×: OFF													
Judgment Method	• Occurs when MCU PIPE is turned off, yet an indoor unit is registered													
Cause of problem	• Indoor unit connection to the unused branch part													

1. How to check

Check the actual use of the branch part. If it is used, turn on the Dip switch for branch part setup. After completing resetting, press the outdoor unit's K3 button to reset or turn off to restart.



4-3 Appropriate Measures for Different Symptom (cont.)

4-3-15 MCU branch part setup error – Connect more Indoor units than what is actually set up in MCU

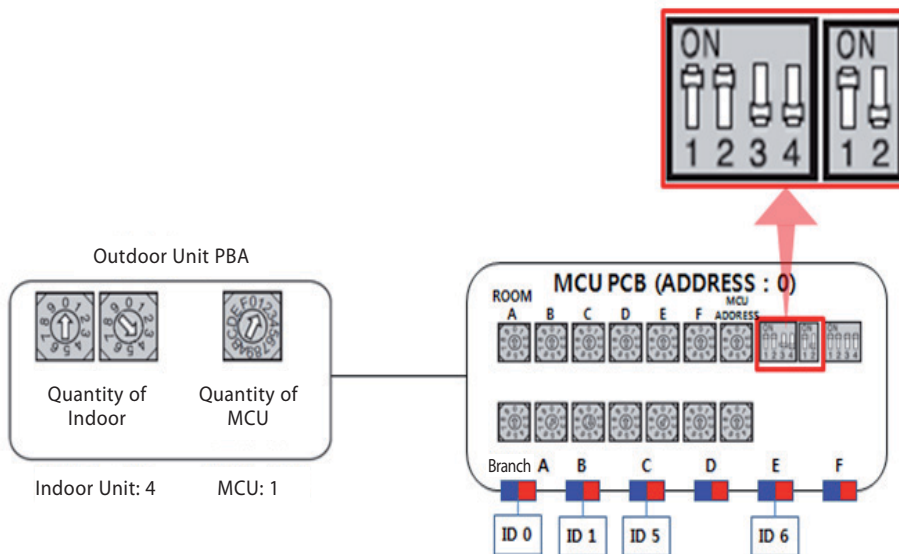
Outdoor unit display	E2 18													
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)				
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24°C	27°C
	×	×	●	●	×	×	●	●	×	×	×	●	●	×
	※ ●: ON ○: Flash ×: OFF													
Judgment Method	• Occurs when the number of indoor unit installed exceeds that setting in MCU													
Cause of problem	• Number of indoor units exceeds number of indoor units entered on MCU setting													

1. How to check

Check the number of indoor units connected to MCU then readjust the switch for the number of units
 After completing resetting, press the outdoor unit's K3 button to reset or turn off to restart.

• Example of MCU indoor unit setting DIP switch error

ex) Indoor unit No.5 was connected to branch part C, but DIP switch No.3 (branch part C) is off.

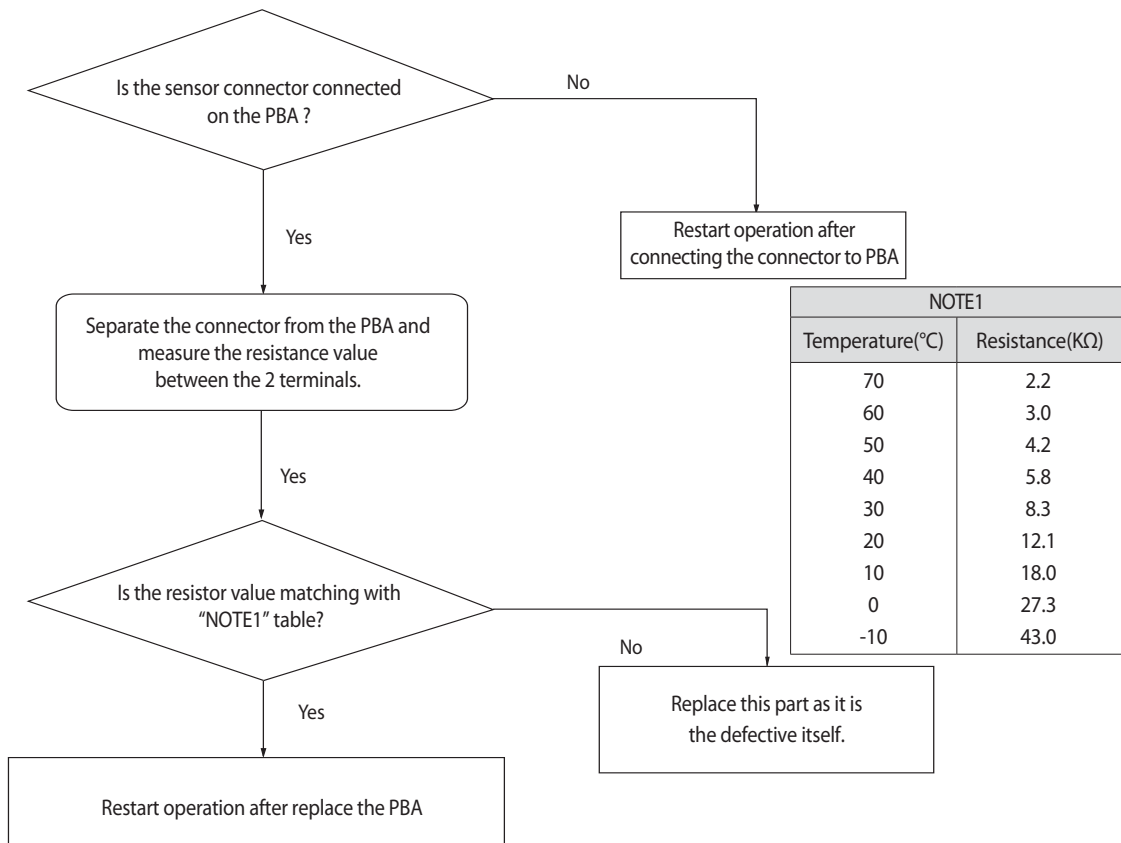


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-16 MCU/MCU subcooler entrance/exit sensor error (Open/Short)

Outdoor unit display	<i>E219</i> (MCU subcooler) <i>E220</i> (MCU)											
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)		
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo
	×	×	●	●	●	×	●	●	●	●	●	●
	※ ● : ON ● : Flash ×: OFF											
Judgment Method	Detect according to temperature detected with the MCU / MCU subcooler entrance/exit pipe temperature thermistor.											
Cause of problem	MCU / MCU subcooler pipe entrance/exit sensor is defective. (open/short)											

1. Cause of problem

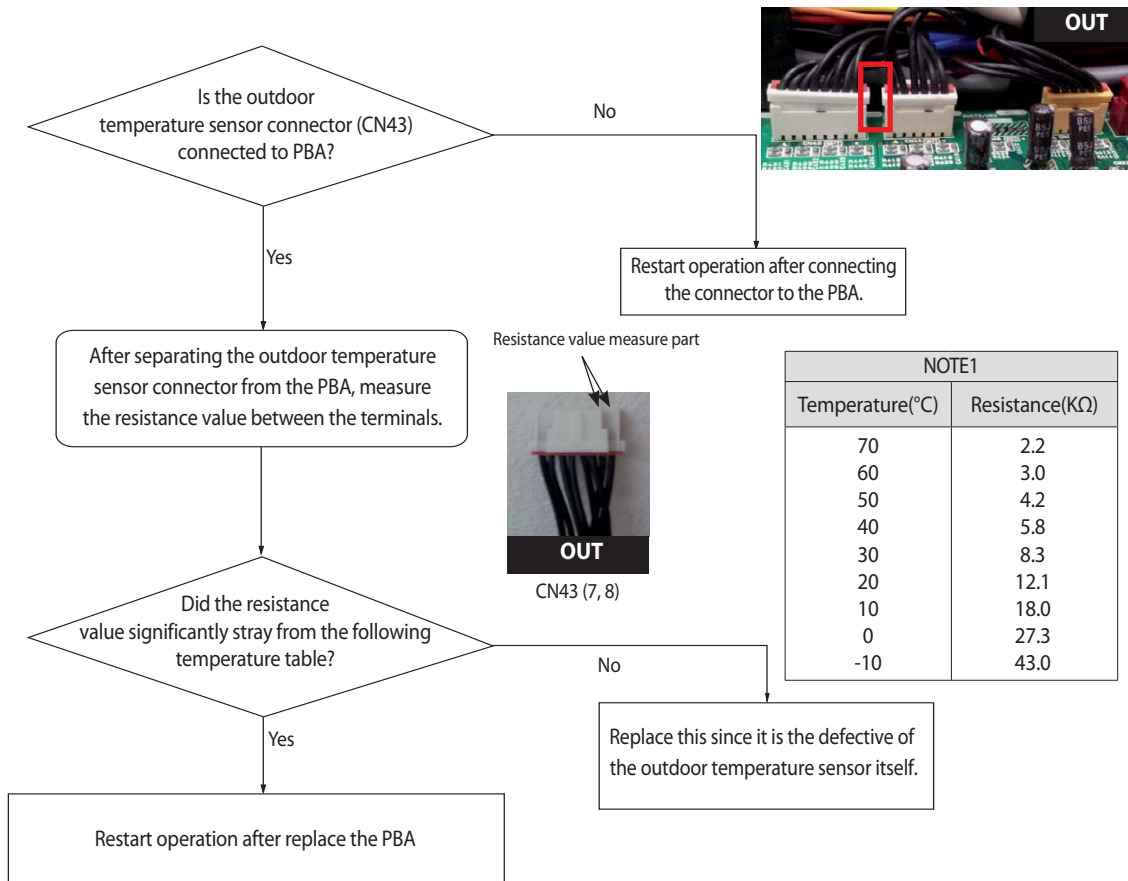


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-17 Outdoor Temperature Sensor Error

Outdoor unit display	E221													
Indoor unit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)				
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24°C	27°C
	●	×	×	●	×	●	×	●	×	●	×	×	●	×
	※ ●: ON ○: Flash ×: OFF													
Judgment Method	- Detect according to temperature detected with the outdoor-ambient temperature thermistor.													
Cause of problem	- Outdoor temperature sensor is defective. (open/short)													

1. Cause of problem

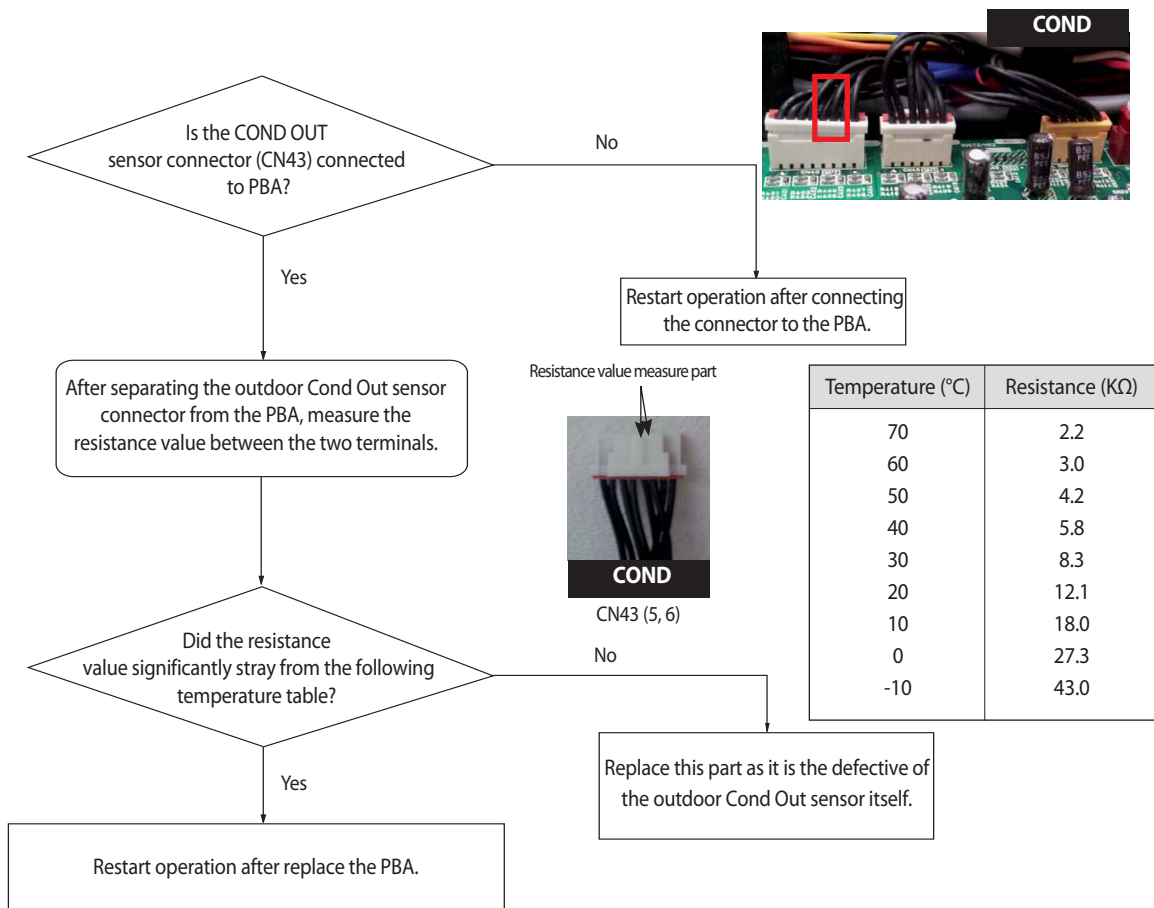


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-18 Cond Out Temperature Sensor Error (Open/Short)

Outdoor unit display	E231													
Indoor unit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)				
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24°C	27°C
	●	×	×	●	×	●	×	●	×	●	×	×	●	×
	※ ●: ON ○: Flash ×: OFF													
Judgment Method	- Detect according to temperature detected with the cond-out temperature thermistor.													
Cause of problem	- Cond-out temperature sensor is defective. (open/short)													

1. Cause of problem



4-3 Appropriate Measures for Different Symptom (cont.)

4-3-19 Outdoor Cond Out sensor breakaway error

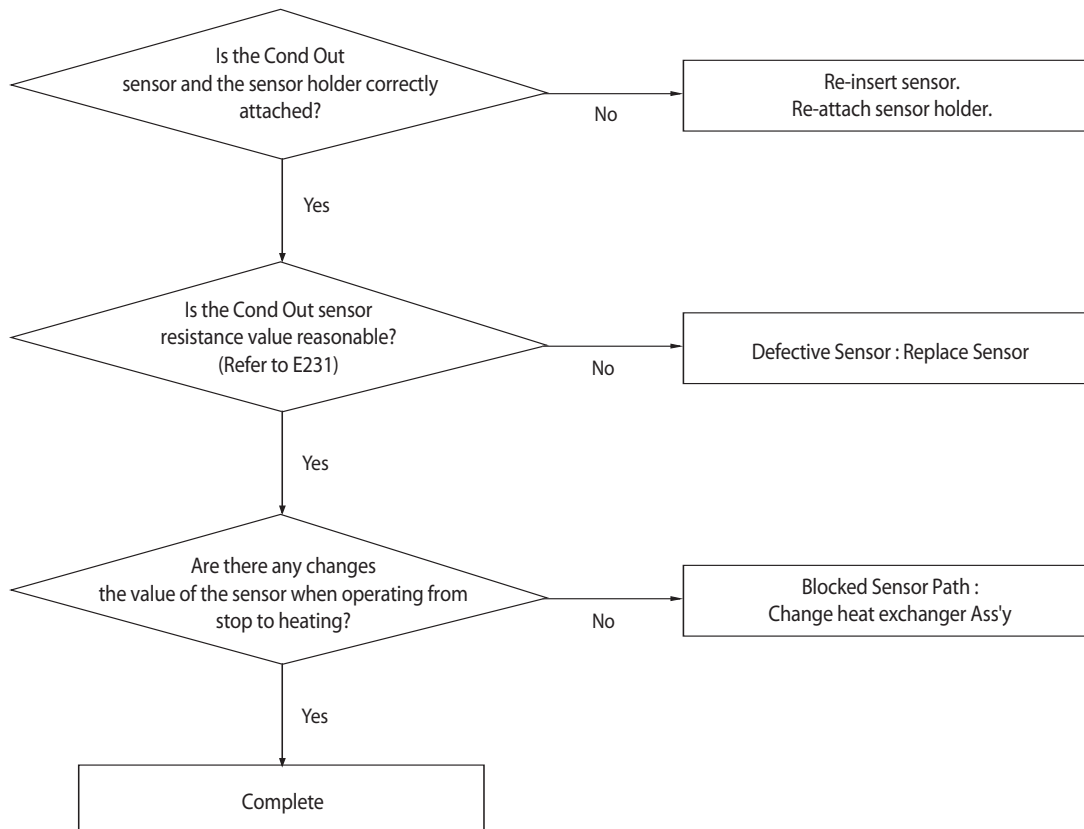
Outdoor unit display	E241 (Air Cooled)											
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)		
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo
	×	×	●	●	●	×	●	●	●	●	●	●
	※ ● : ON ● : Flash × : OFF											
Judgment Method	- Detect according to temperature detected with the cond-out temperature thermistor											
Cause of problem	· Outdoor Cond Out sensor breakaway/defective/ relevant path blocked.											

1. Judgment Method

- 1) No inspection for Cooling operation.
- 2) For heating operation (Each of the conditions below needs to be satisfied for more than 20 minutes.)

Checking of condition	satisfy condition ?
High pressure average > 25kg/cm ²	Yes
Low pressure average < 8.5kg/cm ²	Yes
Teva, out- Tair, in ≥ 3°C	Yes
Teva, in- Tair, in ≥ 2°C	Yes
Tcond, out- Tair, out ≤ 0°C	No
Every compressor is in operation & indoor unit operation and Thermo On	Yes
Error Content	Outdoor Cond Out sensor breakaway error

2. Cause of problem



4-3 Appropriate Measures for Different Symptom (cont.)

4-3-19 Outdoor Cond Out sensor breakaway error (cont.)

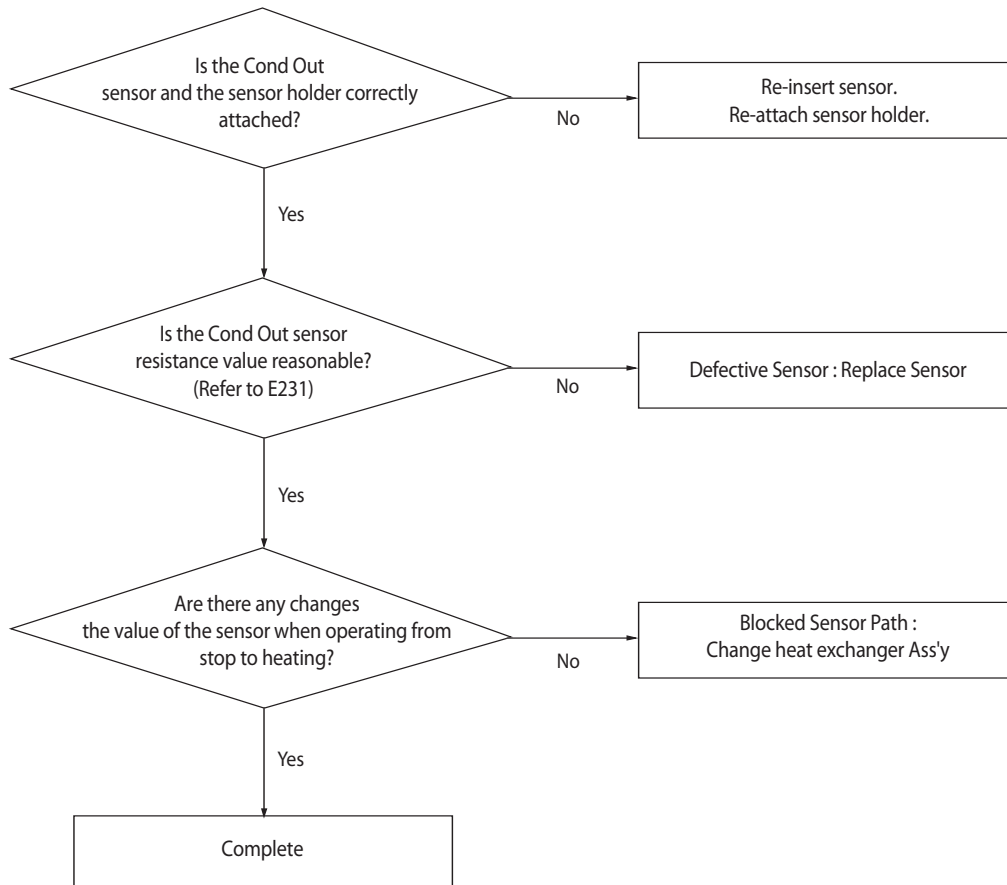
Outdoor unit display	E241 (Water Cooled)											
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)		
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo
	×	×	●	●	●	×	●	●	●	●	●	●
	※ ● : ON ● : Flash × : OFF											
Judgment Method	· Refer to the judgment method below.											
Cause of problem	· Outdoor Cond Out sensor breakaway/defective/ relevant path blocked.											

1. Judgment Method

- 1) No inspection for Cooling operation.
- 2) For heating operation (Each of the conditions below needs to be satisfied for more than 20 minutes.)
 1. Point of enter.
 - ① Detected only when heating operation.(Except main heating operation)
 - ② Compressor operation maintained 40 minutes after start.
 2. Point of enter
 - ① $|T_{condout_real} - T_{condout_ini}| < 2^{\circ}C$ maintain conditions during 40 minutes.

※ $T_{condout_ini}$: Condout out temperature just before the compressor operating starts.
 $T_{condout_real}$: Condout temperature of the current compressor.

2. Cause of problem

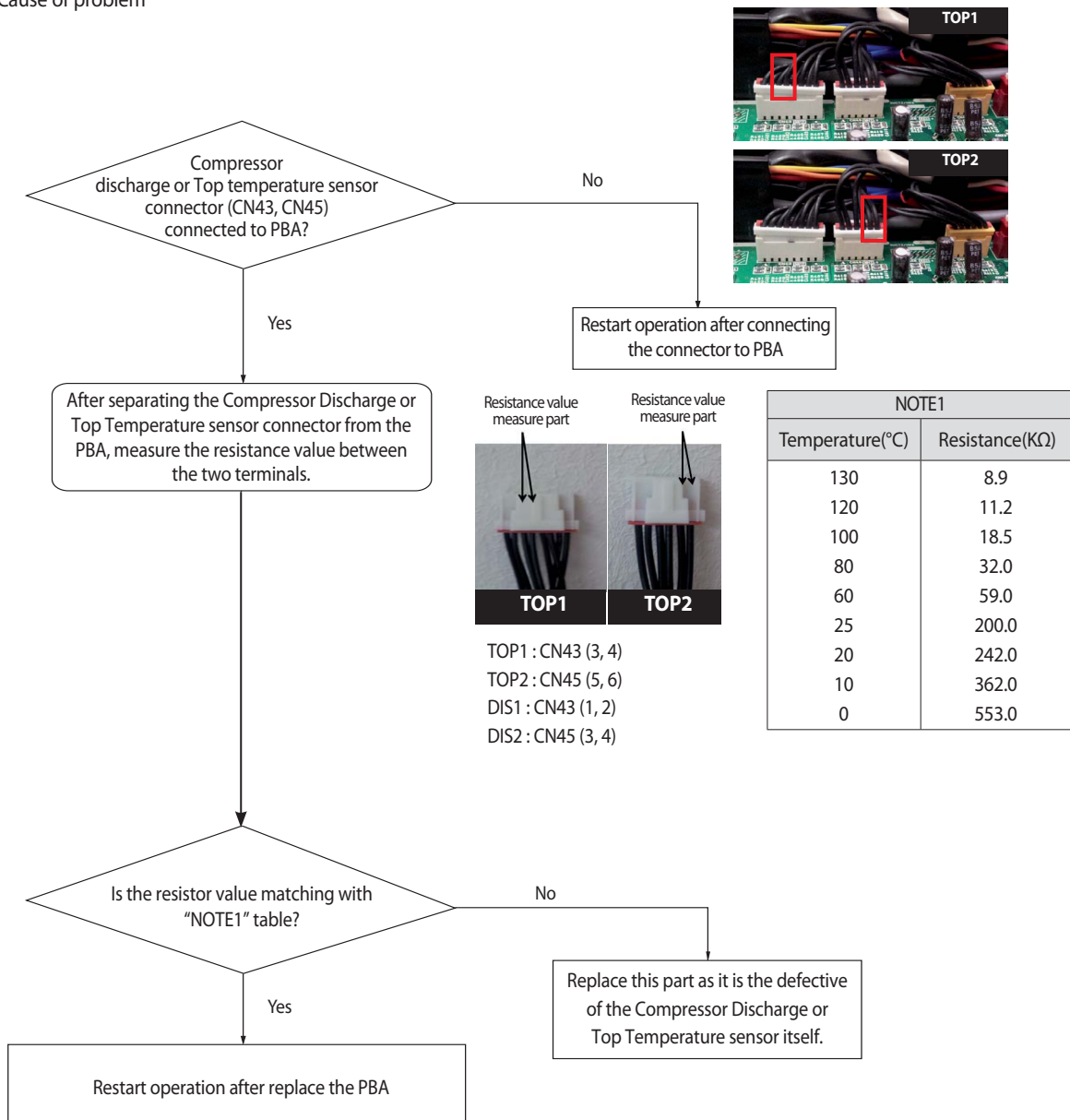


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-20 Compressor Discharge or Top 1/2 Temperature sensor error

Outdoor unit display	<i>E251</i> (Compressor 1 Discharge) <i>E257</i> (Compressor 2 Discharge)											
	<i>E276</i> (Compressor 1 Top) <i>E277</i> (Compressor 2 Top)											
Indoor unit display	Duct, Cassette (1/2 Way), Console, Ceiling				Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)			
	Operation	Defrost	Timer	Fan	Filter/MPL	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo
	●	×	×	●	×	●	×	●	×	●	×	●
	※ ● : ON ● : Flash × : OFF											
Judgment Method	· Detect according to temperature detected with the compressor discharge pipe temperature thermistor.											
Cause of problem	· Compressor Discharge or Top Temperature sensor defective. (Open/Short)											

1. Cause of problem

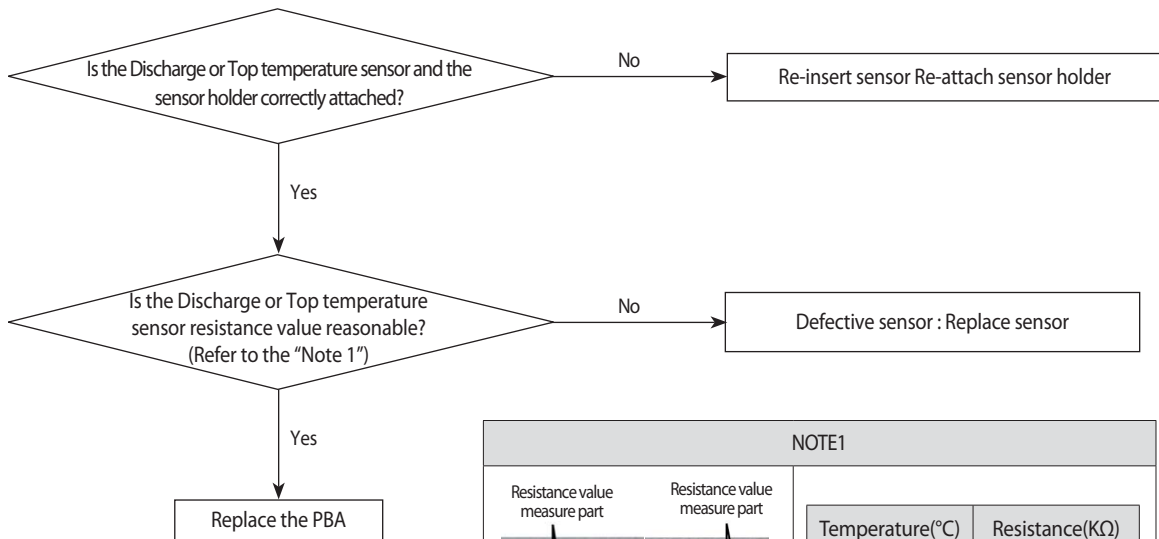




4-3 Appropriate Measures for Different Symptom (cont.)

4-3-21 Compressor Discharge or Top temperature sensor breakaway error

Outdoor unit display	<i>E262</i> (Compressor 1 Discharge) <i>E263</i> (Compressor 2 Discharge)													
	<i>E266</i> (Compressor 1 Top) <i>E267</i> (Compressor 2 Top)													
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)				
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24°C	27°C
	×	×	●	●	●	×	●	●	●	×	×	●	●	●
	※ ● : ON ● : Flash × : OFF													
Judgment Method	1) Faulty compressor frequency of 60Hz or higher. 2) Suction temperature > Low pressure saturation temperature +10 °C 3) Relevant discharge or Top temperature < High pressure saturation temperature 4) In case of keep 30 minutes in state that satisfy all above conditions (1,2&3) for 30min.													
Cause of problem	· Compressor discharge or Top temperature sensor breakaway and defective / Ineffective start of compressor													

1. Cause of problem



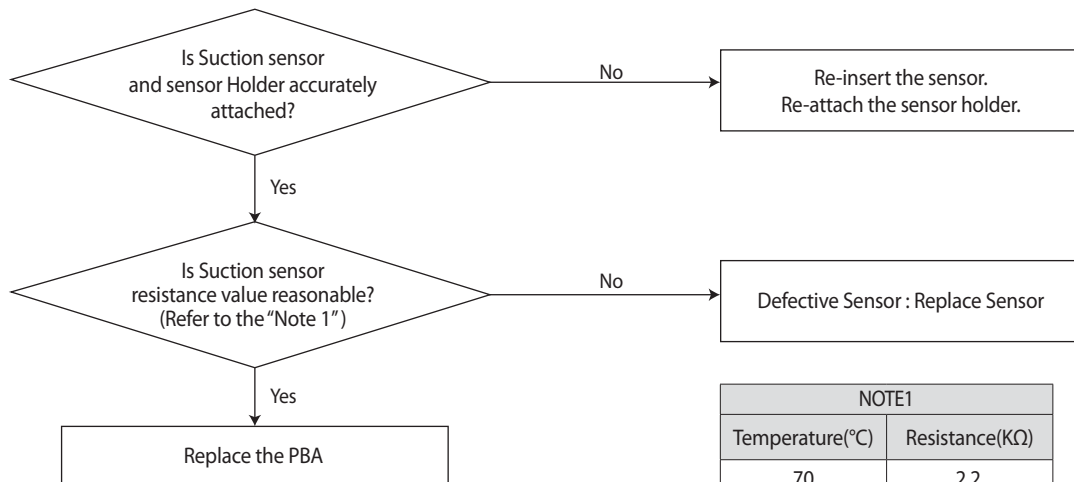
NOTE1	
Resistance value measure part	Resistance value measure part
	
TOP1 : CN43 (3, 4)	
TOP2 : CN45 (5, 6)	
DIS1 : CN43 (1, 2)	
DIS2 : CN45 (3, 4)	
Temperature(°C)	Resistance(KΩ)
130	8.9
120	11.2
100	18.5
80	32.0
60	59.0
25	200.0
20	242.0
10	362.0
0	553.0

4-3 Appropriate Measures for Different Symptom (cont.)

4-3-22 E269 : Suction Temperature sensor breakaway error

Outdoor unit display	E269											
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)		
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo
	×	×	●	●	●	×	●	●	●	●	●	●
	※ ● : ON ○ : Flash × : OFF											
Judgment Method	· Judgment Method : Difference of suction temperature of compressor starting verge and suction temperature that is on present operation : If less than 2 °C for 30 minutes to keep.(Judgment at heating operation only)											
Cause of problem	· Suction temperature sensor breakaway/defective.											

1. Cause of problem



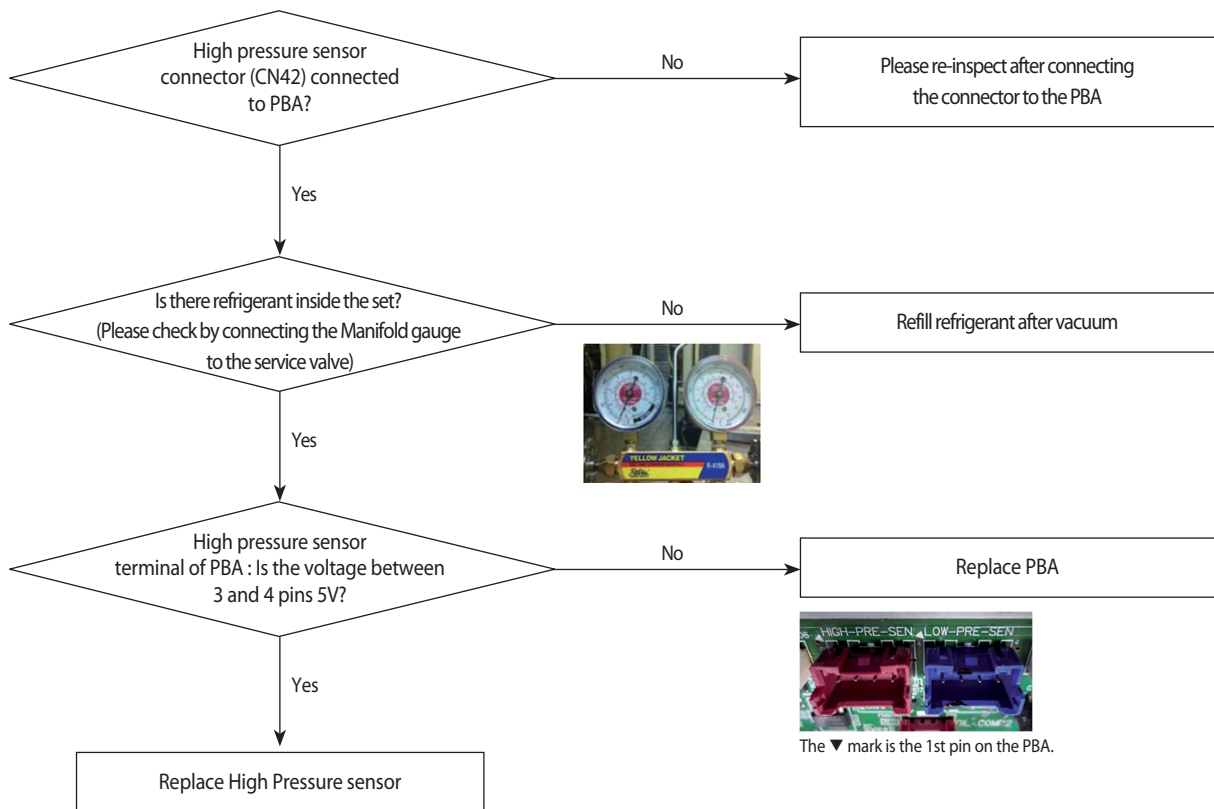
NOTE1	
Temperature(°C)	Resistance(KΩ)
70	2.2
60	3.0
50	4.2
40	5.8
30	8.3
20	12.1
10	18.0
0	27.3
-10	43.0

4-3 Appropriate Measures for Different Symptom (cont.)

4-3-23 High Pressure sensor error (Open/Short)

Outdoor unit display	E291											
Indoor unit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)		
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo
	×	×	●	●	●	×	●	●	●	●	●	●
	※ ● : ON ● : Flash × : OFF											
Judgment Method	· Detect according to temperature detected with the high pressure sensor.											
Cause of problem	· Disconnection or breakdown of relevant sensor.											

- High Pressure sensor Open/Short error determination method
 - Identifies from when power is supplied or 2 minutes after RESET, and only when set is stopped.
 - An Open/Short error will occur if the input voltage standard range of 0.5V ~ 4.95V is exceeded.
- Inspection Method

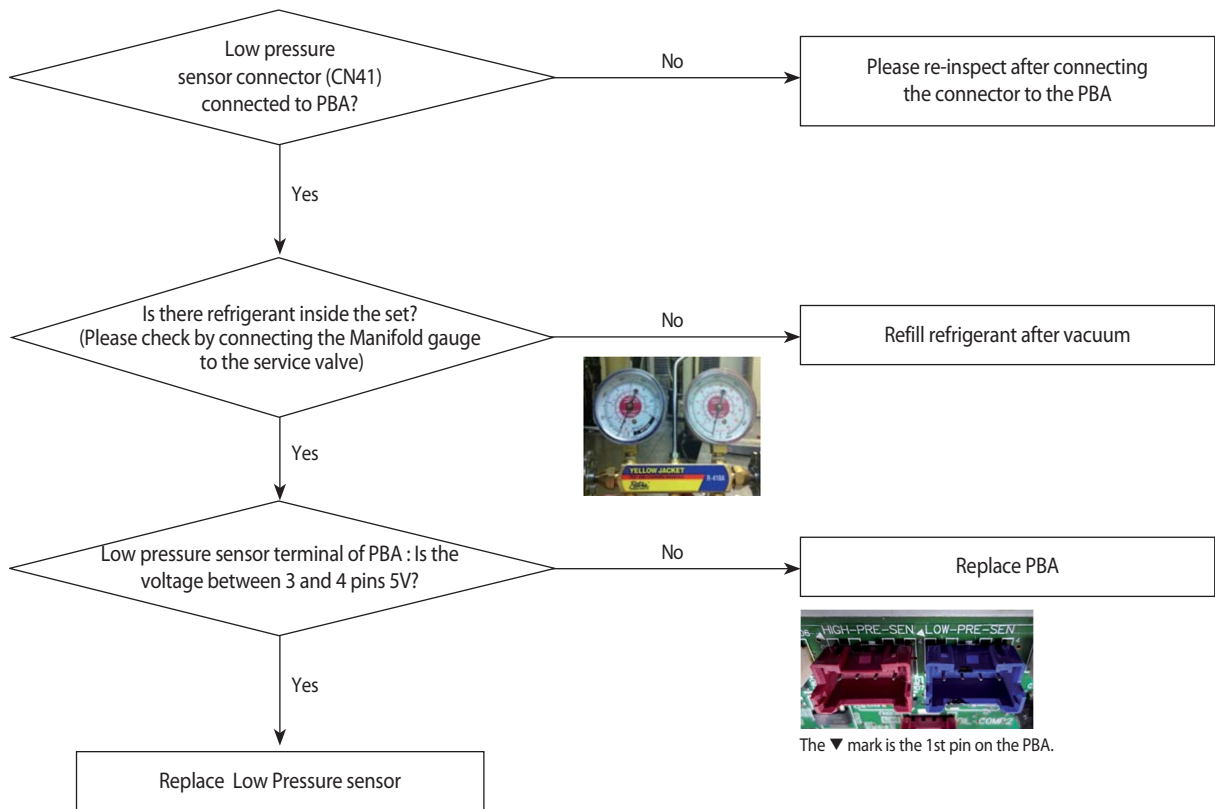


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-24 Low Pressure sensor error (Open/Short)

Outdoor unit display	E296											
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)		
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo
	×	×	●	●	●	×	●	●	●	●	●	●
※ ● : ON ● : Flash × : OFF												
Judgment Method	· Detect according to temperature detected with the low pressure sensor.											
Cause of problem	· Disconnection or breakdown of relevant sensor.											

1. Low Pressure sensor Open/Short error determination method
 - 1) Identifies from when power is supplied or 2 minutes after RESET, and only when set is stopped.
 - 2) An Open/Short error will occur if the input voltage standard range of 0.5V ~ 4.95V is exceeded.
2. Inspection Method

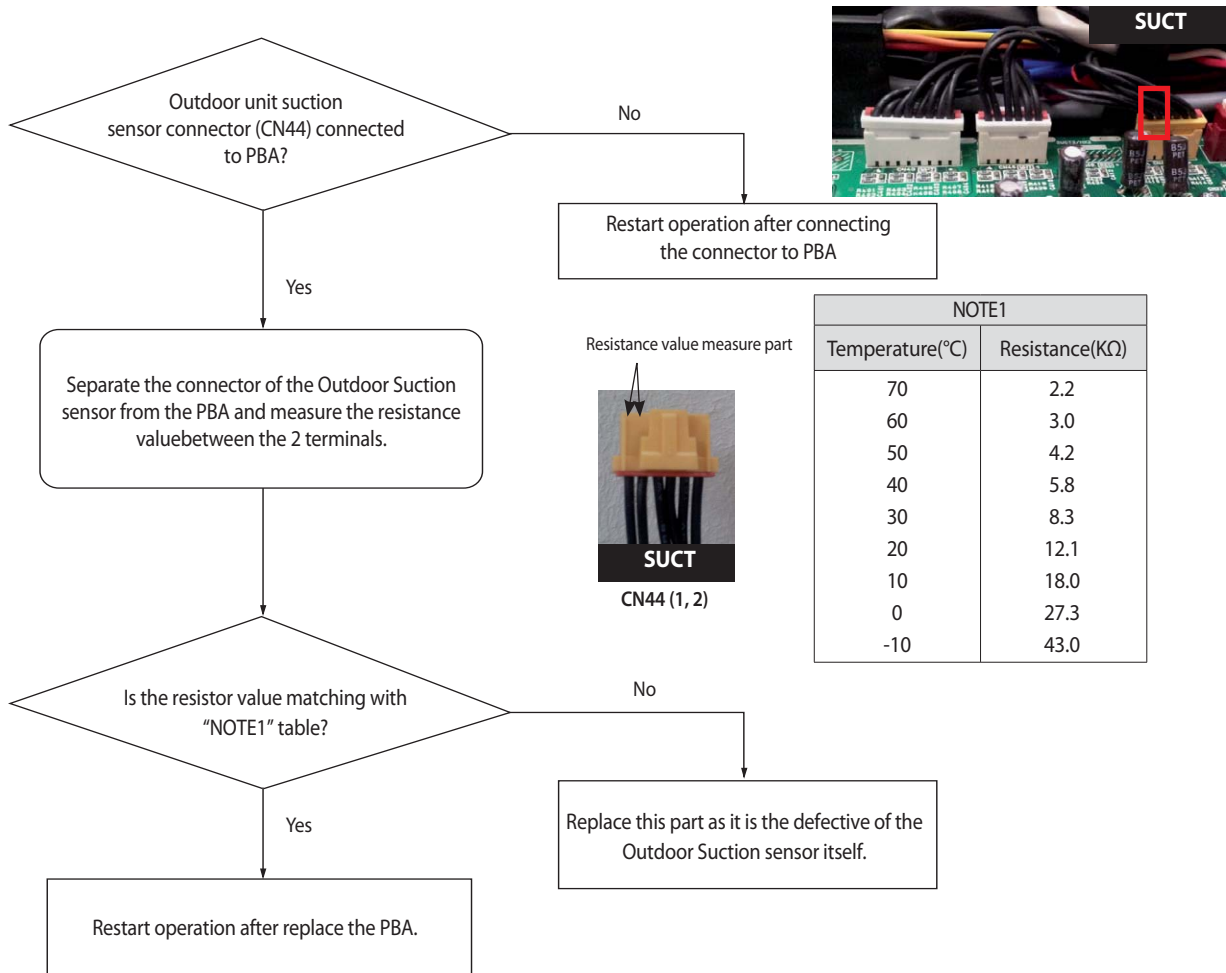


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-25 Suction Temperature sensor error (Open/Short)

Outdoor unit display	E308											
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)		
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo
	×	×	●	●	●	×	●	●	●	●	●	●
※ ● : ON ○ : Flash × : OFF												
Judgment Method	· Detect according to temperature detected with the suction #1 pipe temperature thermistor.											
Cause of problem	· Disconnection or breakdown of relevant sensor. (More than 4.5V or 0.5V less than)											

1. Cause of problem

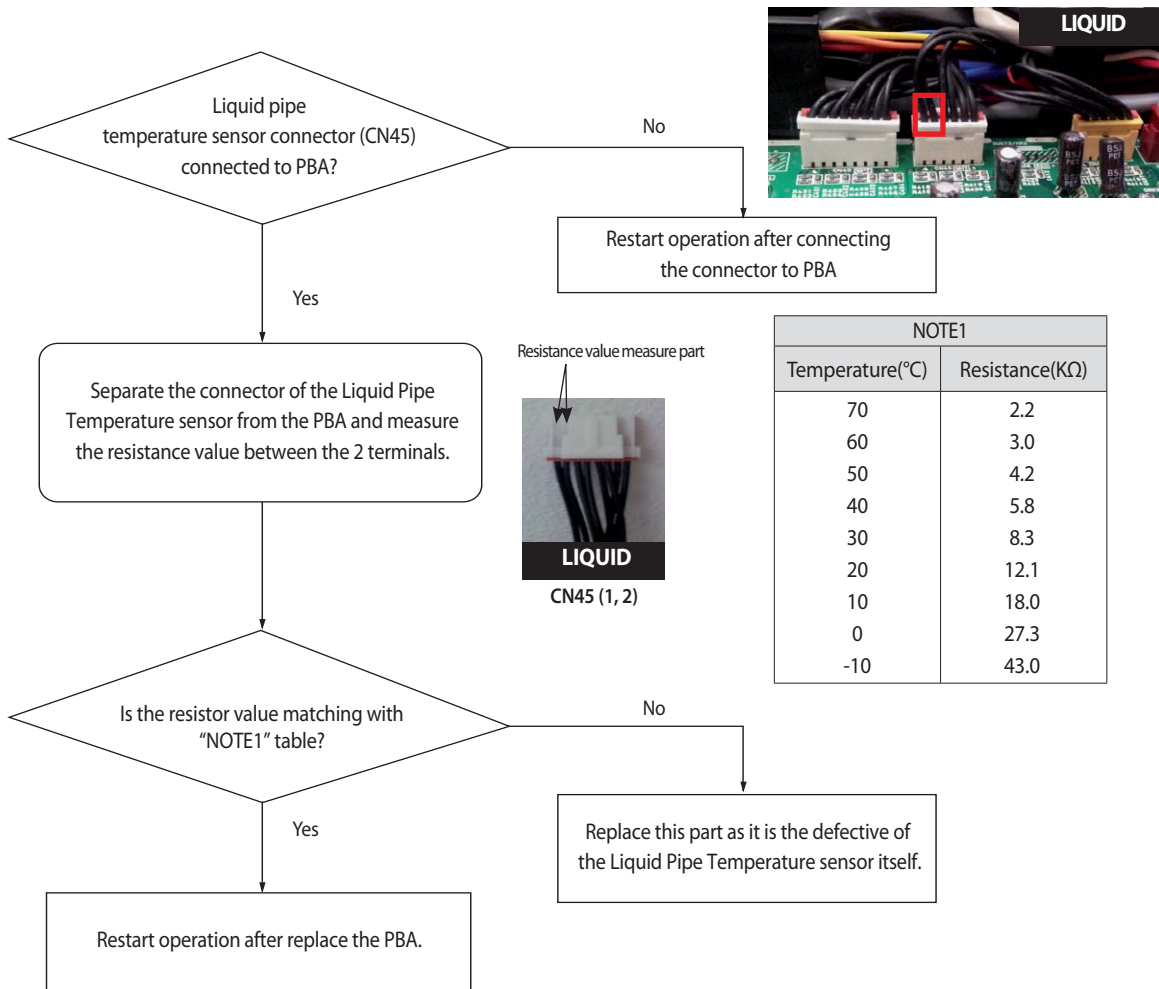


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-26 Liquid Pipe Temperature sensor error (Open/Short)

Outdoor unit display	E311											
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)		
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo
	×	×	●	●	●	×	●	●	●	●	●	●
※ ● : ON ○ : Flash × : OFF												
Judgment Method	· Detect according to temperature detected with the liquid pipe temperature thermistor											
Cause of problem	· Liquid pipe temperature sensor is defective. (open/short)											

1. Cause of problem

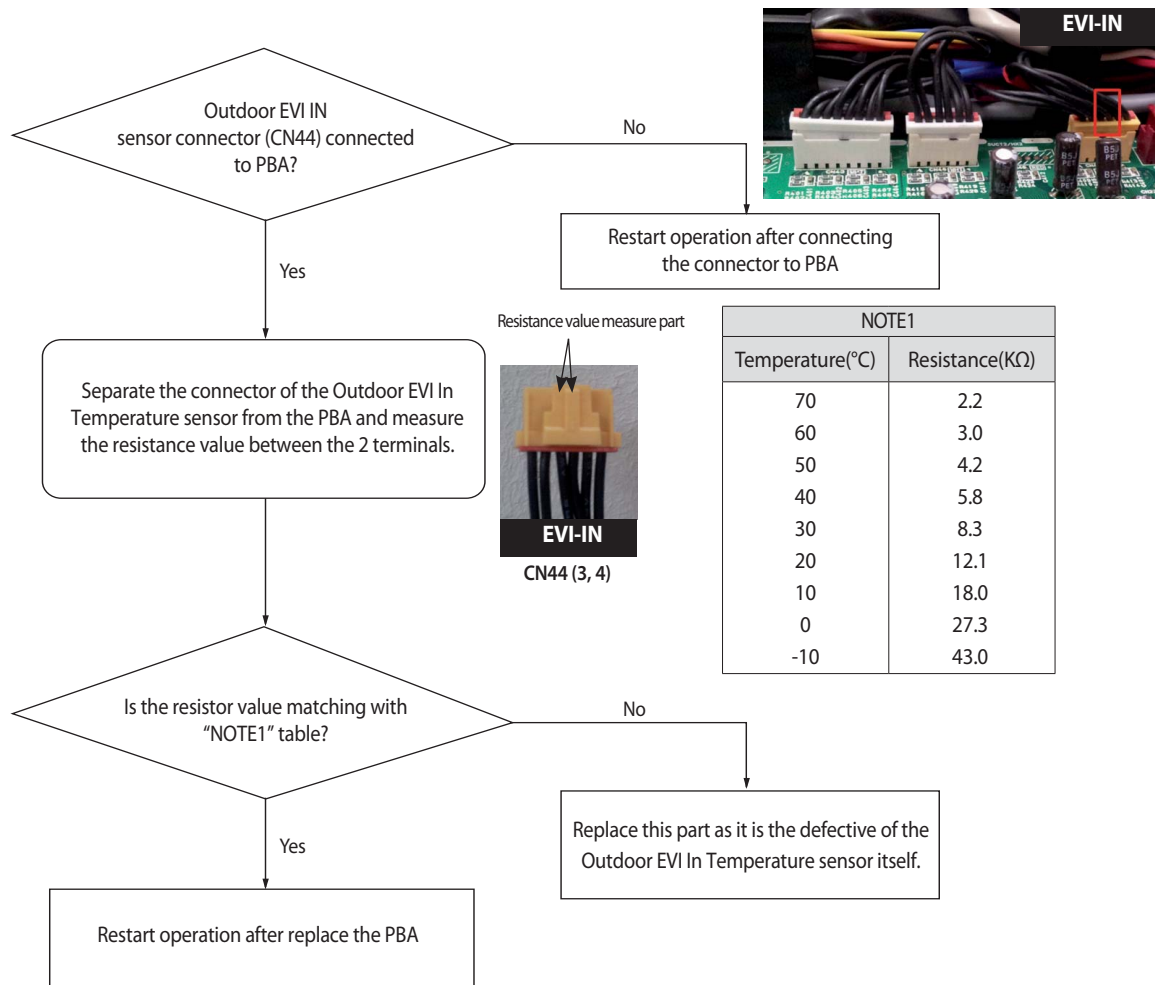


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-27 EVI In Temperature sensor error (Open/Short)

Outdoor unit display	E321											
Indoor unit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)		
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo
	×	×	●	●	●	×	●	●	●	●	●	●
※ ● : ON ○ : Flash × : OFF												
Judgment Method	· Detect according to temperature detected with the EVI-In pipe temperature thermistor.											
Cause of problem	· EVI-In temperature sensor is defective. (open/short)											

1. Cause of problem

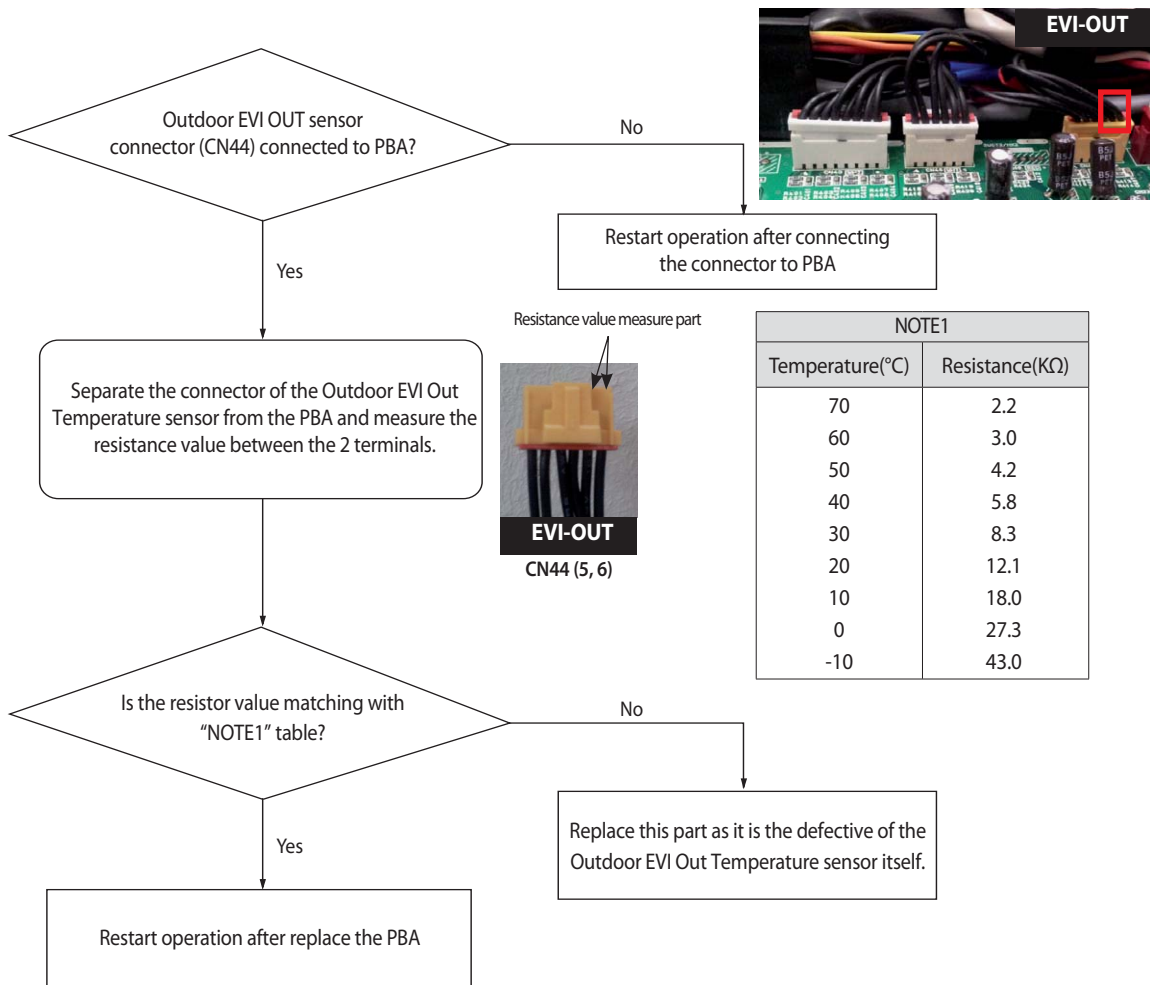


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-28 EVI Out Temperature sensor error (Open/Short)

Outdoor unit display	E322											
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)		
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo
	×	×	●	●	●	×	●	●	●	●	●	●
※ ● : ON ● : Flash × : OFF												
Judgment Method	· Detect according to temperature detected with the EVI-Out pipe temperature thermistor.											
Cause of problem	· EVI-Out temperature sensor is defective. (open/short)											

1. Cause of problem

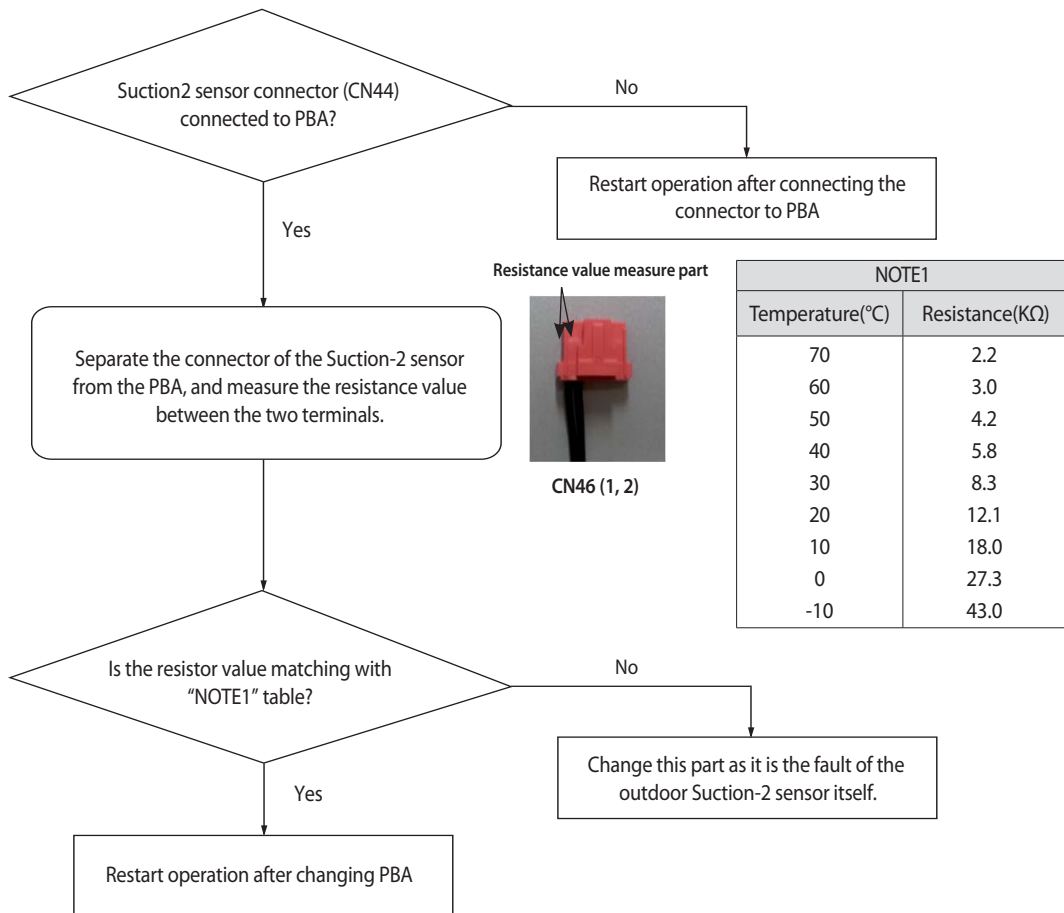


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-29 Suction-2 Temperature Sensor Error (OPEN/SHORT)

Outdoor unit display	E323											
Indoor unit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)		
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo
	×	×	●	●	●	×	●	●	●	●	●	●
	※ ● : ON ● : Flash × : OFF											
Judgment Method	· Detect according to temperature detected with the Suction #2 pipe temperature thermistor.											
Cause of problem	· Suction #2 temperature sensor is defective. (open/short)											

1. Inspection Method



4-3 Appropriate Measures for Different Symptom (cont.)

4-3-30 Measures of other outdoor unit error

Outdoor unit display	<i>E367</i> COMP.2 wire unconnected error	<i>E374</i> Inverter PBA2 IGBT temperature sensor error										
	<i>E467</i> COMP.1 wire unconnected error	<i>E474</i> Inverter PBA1 IGBT temperature sensor error										
Indoor unit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)		
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo
	×	×	●	●	●	×	●	●	●	●	●	●
	※ ● : ON ● : Flash × : OFF											
Judgment Method	· Refer to the measures code below.											
Cause of problem	· Refer to the measures code below.											

1. Judgement by code

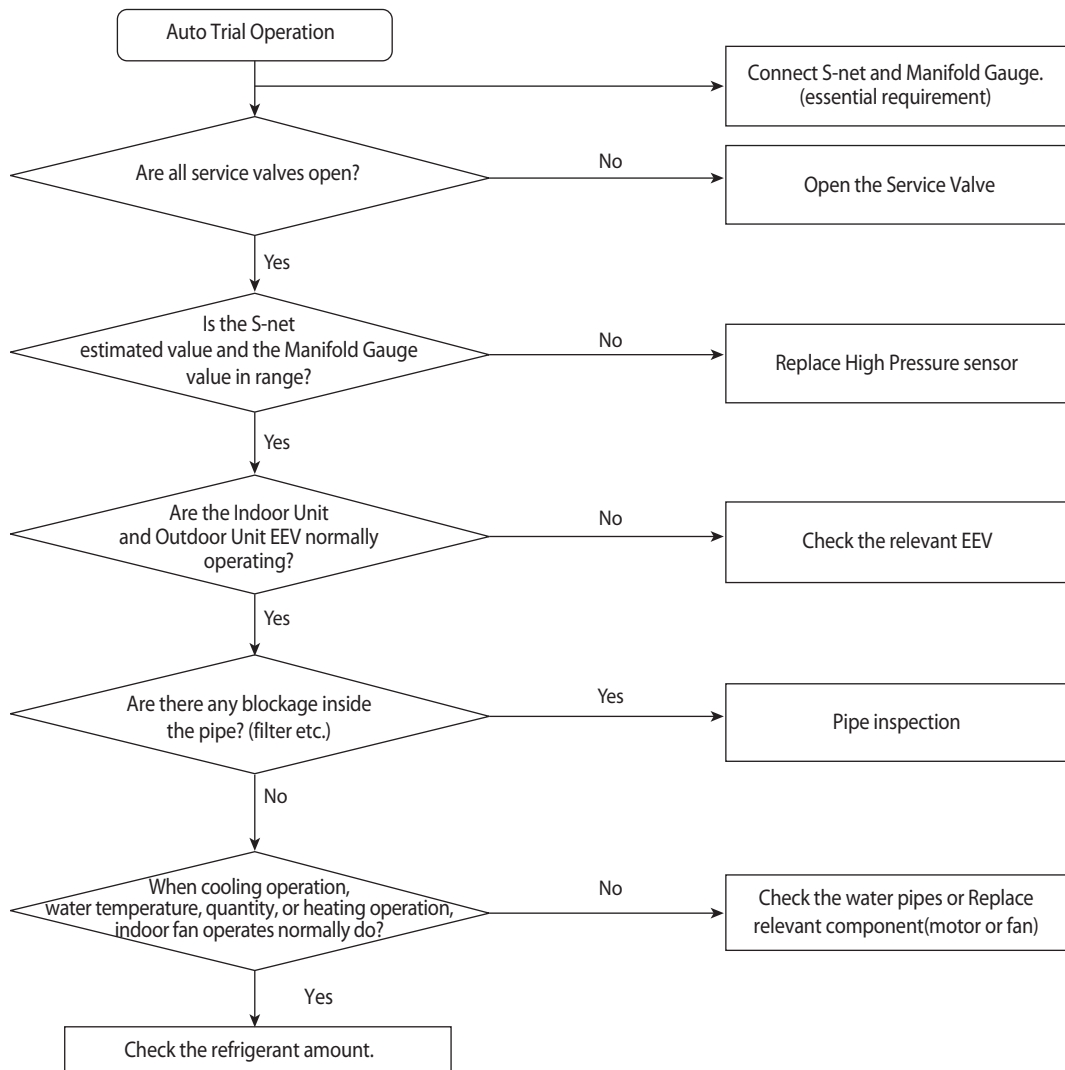
Code	Error	Measures
E367	COMP.2 wire unconnected error	1. Check the Compressor and Inverter PBA connection. 2. When connected inverter checker, if LED operates in the normality : External factors or when LED operates by abnormality, replace the Inverter PBA.
E467	COMP.1 wire unconnected error	1. Check the Compressor and Inverter PBA connection. 2. When connected inverter checker, if LED operates in the normality : External factors or when LED operates by abnormality, replace the Inverter PBA.
E374	Inverter PBA2 IGBT temperature sensor error	Replace Inverter PBA
E474	Inverter PBA1 IGBT temperature sensor error	Replace Inverter PBA

4-3 Appropriate Measures for Different Symptom (cont.)

4-3-31 E407 : Comp. Down due to High Pressure Protection Control

Outdoor unit display	E407 (Water Cooled)											
Indoor unit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)		
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo
	×	×	●	●	●	×	●	●	●	●	●	●
※ ● : ON ○ : Flash × : OFF												
Judgment Method	· Value of the high pressure sensor is detected at 41kg/cm ² or more											
Cause of problem	<p><Cooling operation></p> <ul style="list-style-type: none"> · Overheat of supplying water · Shortage of supplying water · Outdoor heat exchanger is contaminated. · Service valve locked/Fill refrigerant <p><Heating operation></p> <ul style="list-style-type: none"> · Indoor unit fan motor problem(constrained, defective) · Service valve locked/Excessive refrigerant 											

1. Cause of problem

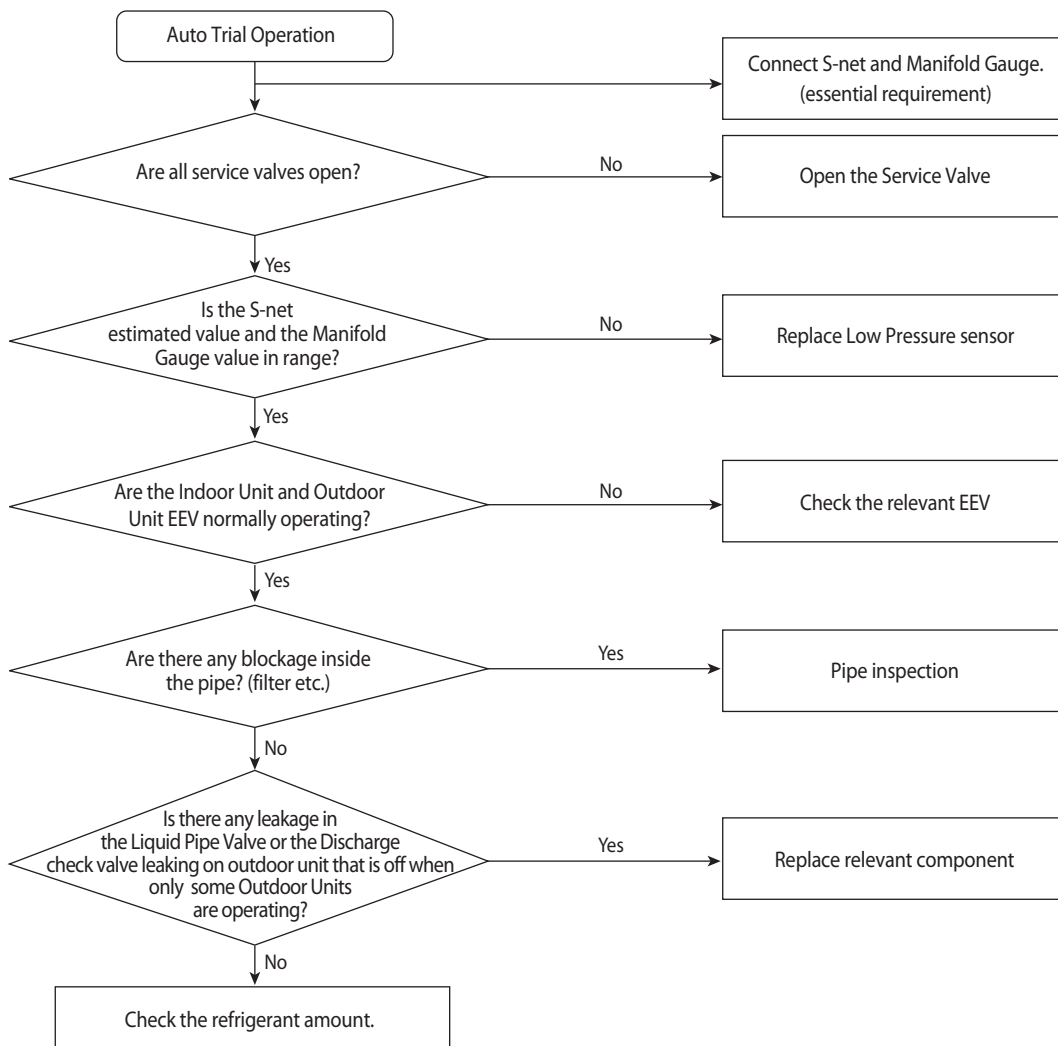


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-32 E4 10 : Comp. Down due to Low Pressure Protection Control

Outdoor unit display	E4 10 (Water Cooled)											
Indoor unit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)		
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo
	×	×	●	●	●	×	●	●	●	●	●	●
※ ● : ON ● : Flash × : OFF												
Judgment Method	· Judgment Method : Inspection when the value of low pressure sensor is 1.8kg/cm ² , or less for air conditioning and 0.8kg/cm ² for heating											
Cause of problem	<ul style="list-style-type: none"> · Refrigerant shortage · Electronic expansion valve blocked · Service valve blocked · Low pressure sensor defective · Discharge check valve leaking on outdoor unit that is off · Error may be found when used in temperature range outside the conditions of use (Operating outside temperature at -20°C or less for heating and operating outside temperature at -5°C or less for Cooling) 											

1. Cause of problem

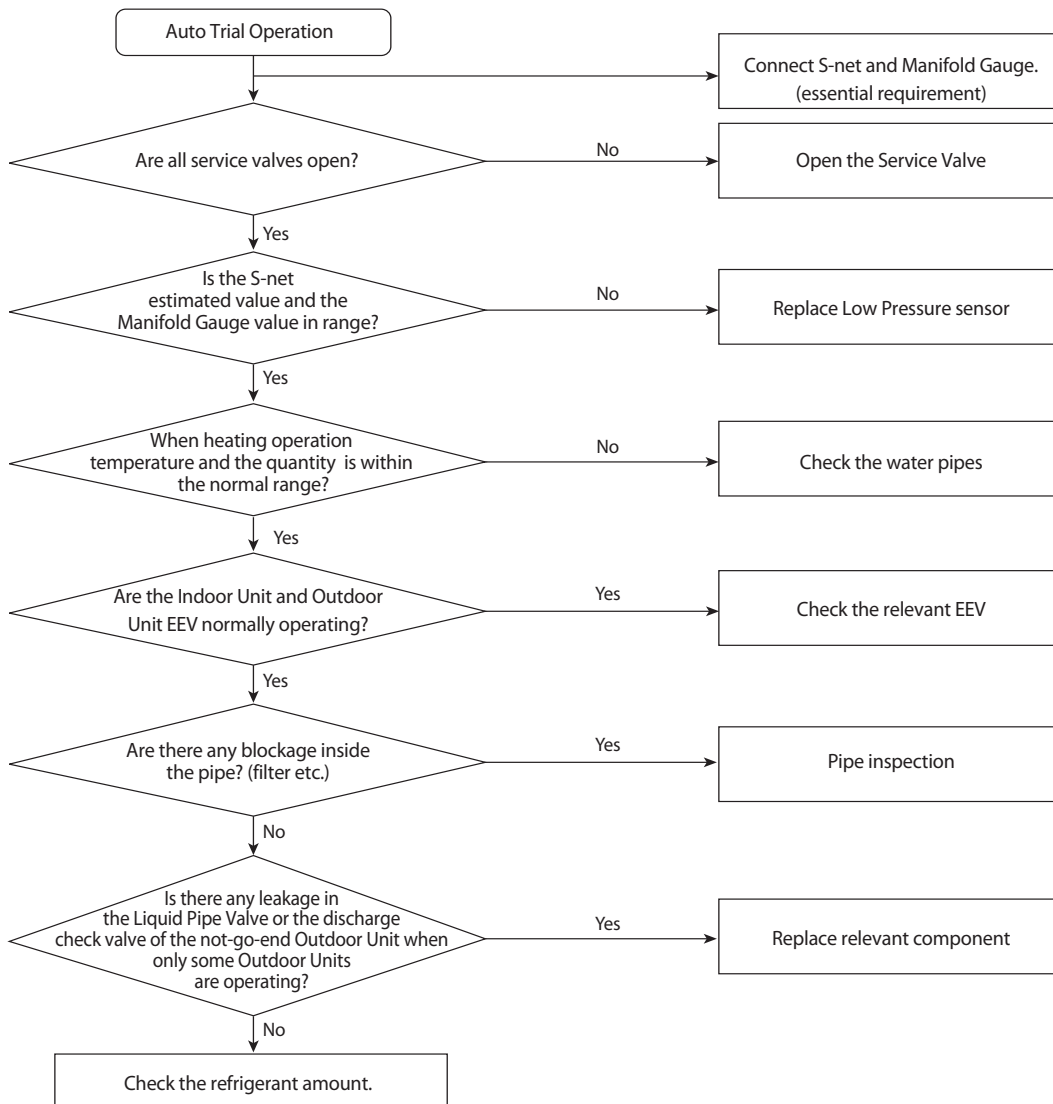


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-32 E4 10 : Comp. Down due to Low Pressure Protection Control (cont.)

Outdoor unit display	E4 10 (Water Cooled)											
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)		
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo
	×	×	●	●	●	×	●	●	●	●	●	●
※ ● : ON ○ : Flash × : OFF												
Judgment Method	· Inspection when the value of low pressure sensor is 2.6kg/cm ² , or less for air conditioning and 1.4kg/cm ² for heating.											
Cause of problem	<ul style="list-style-type: none"> · Refrigerant shortage · Electronic expansion valve blocked · Service valve blocked · Low pressure sensor defective · Leakage of compressor discharge check valve of not-go-end outdoor unit · Error may be found when used in temperature range outside the conditions of use (Operating outside temperature at -20°C or less for heating and operating outside temperature at -5°C or less for Cooling) · When heating operation, if the water temperature and quantity are below the normal range. 											

1. Cause of problem

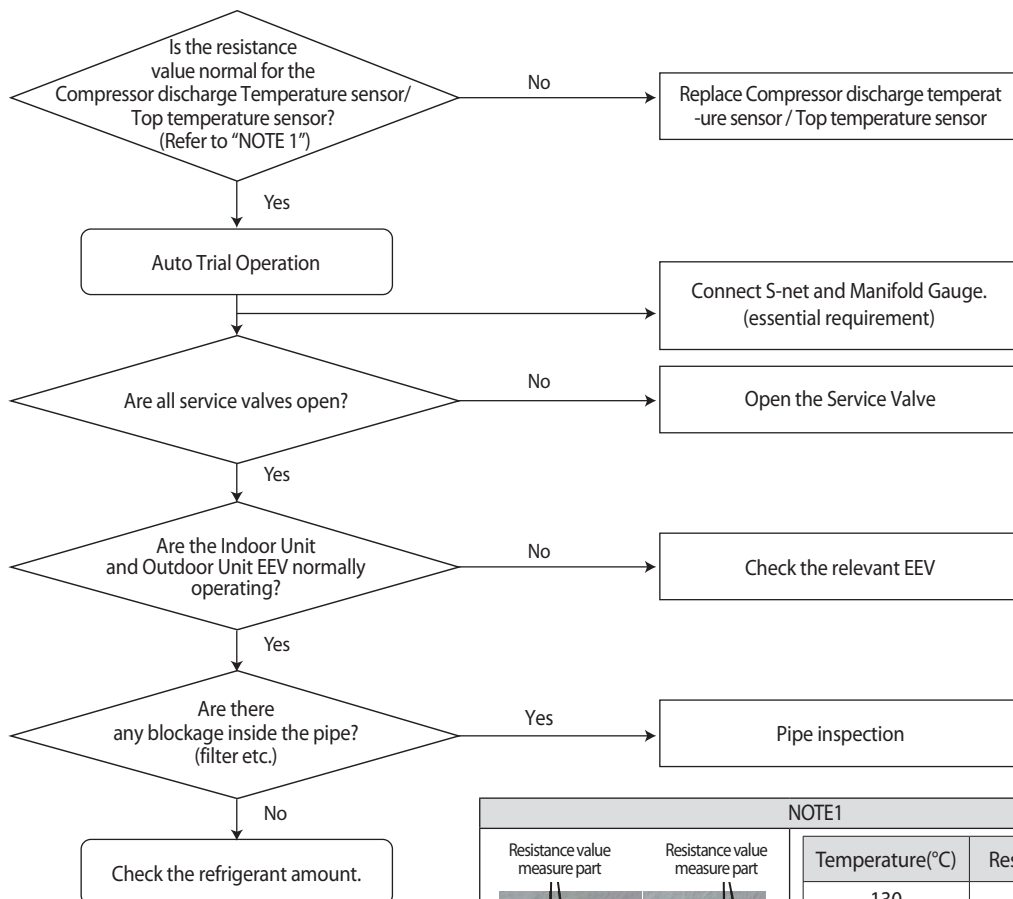


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-33 E4 16 : Suspension of starting due to Compressor discharge temperature sensor / Top temperature sensor

Outdoor unit display	E4 16											
Indoor unit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)		
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo
	×	×	●	●	●	×	●	●	●	●	●	●
※ ● : ON ● : Flash × : OFF												
Judgment Method	· When value of Compressor discharge temperature sensor / Top temperature sensor is checked at 120°C or more											
Cause of problem	<ul style="list-style-type: none"> · Refrigerant shortage · Electronic expansion valve is blocked. · Service valve blocked · Defective discharge temperature sensor · TOP temperature sensor defective · Blocked pipe and defective · Discharge check valve leaking on outdoor unit that is off 											

1. Cause of problem



Resistance value measure part		Resistance value measure part	
Temperature(°C)	Resistance(KΩ)	Temperature(°C)	Resistance(KΩ)
130	8.9		
120	11.2		
100	18.5		
80	32.0		
60	59.0		
25	200.0		
20	242.0		
10	362.0		
0	553.0		

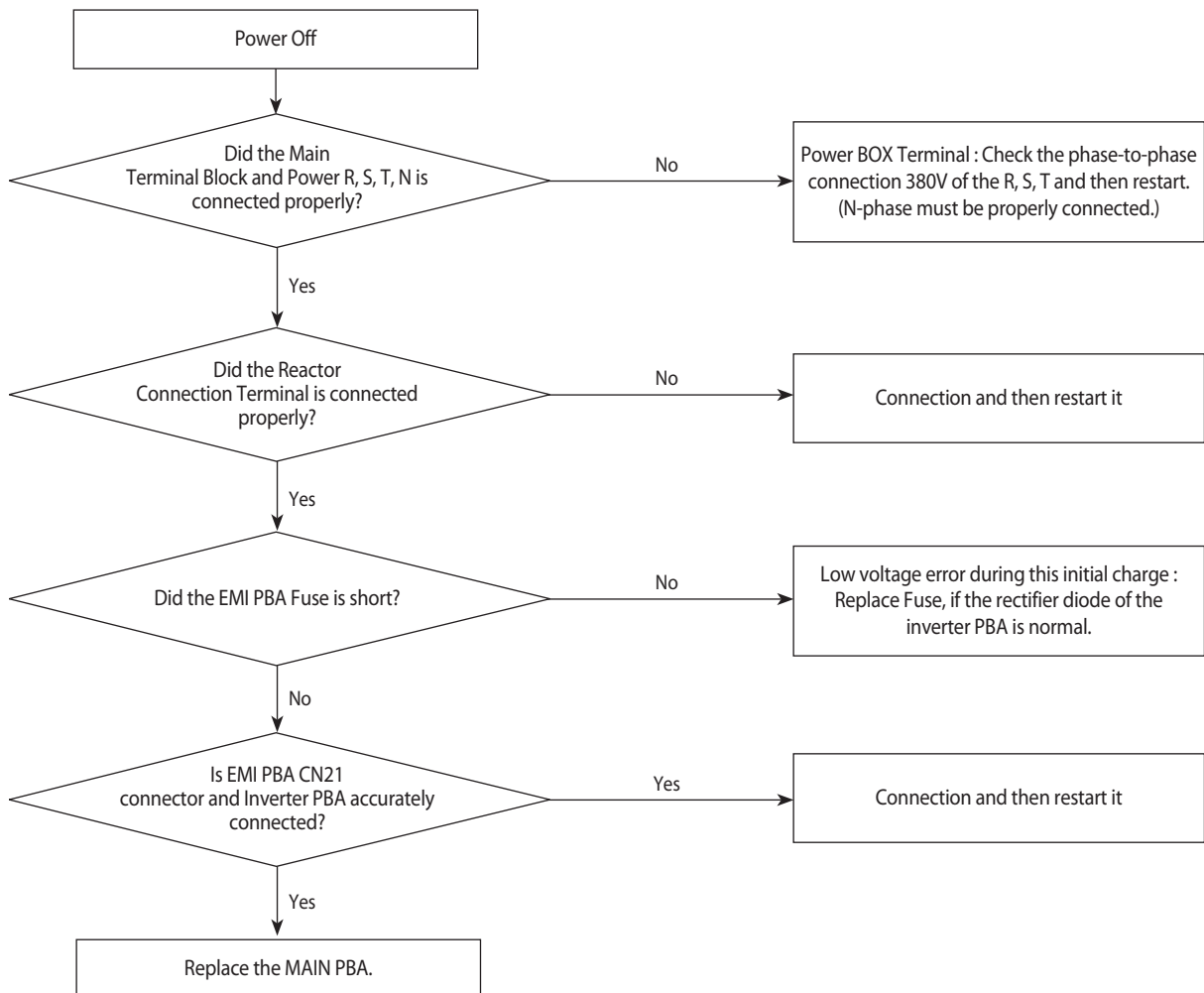
TOP1 : CN43 (3, 4)
 TOP2 : CN45 (5, 6)
 DIS1 : CN43 (1, 2)
 DIS2 : CN45 (3, 4)

4-3 Appropriate Measures for Different Symptom (cont.)

4-3-34 3-phase Input Wiring error

Outdoor unit display	E425											
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)		
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo
	×	×	●	●	●	×	●	●	●	●	●	●
※ ● : ON ● : Flash × : OFF												
Judgment Method	<p>· When turn on the power and check the status of the power from the inverter. If the phase does not connect the power(no phase) : E425 or E466 (E366) is displayed (Air conditioner to maintain the normal state.) However) N-phase must be properly connected.</p>											
Cause of problem	<p>· Check the input wiring · EMI Fuse short</p>											

1. Cause of problem

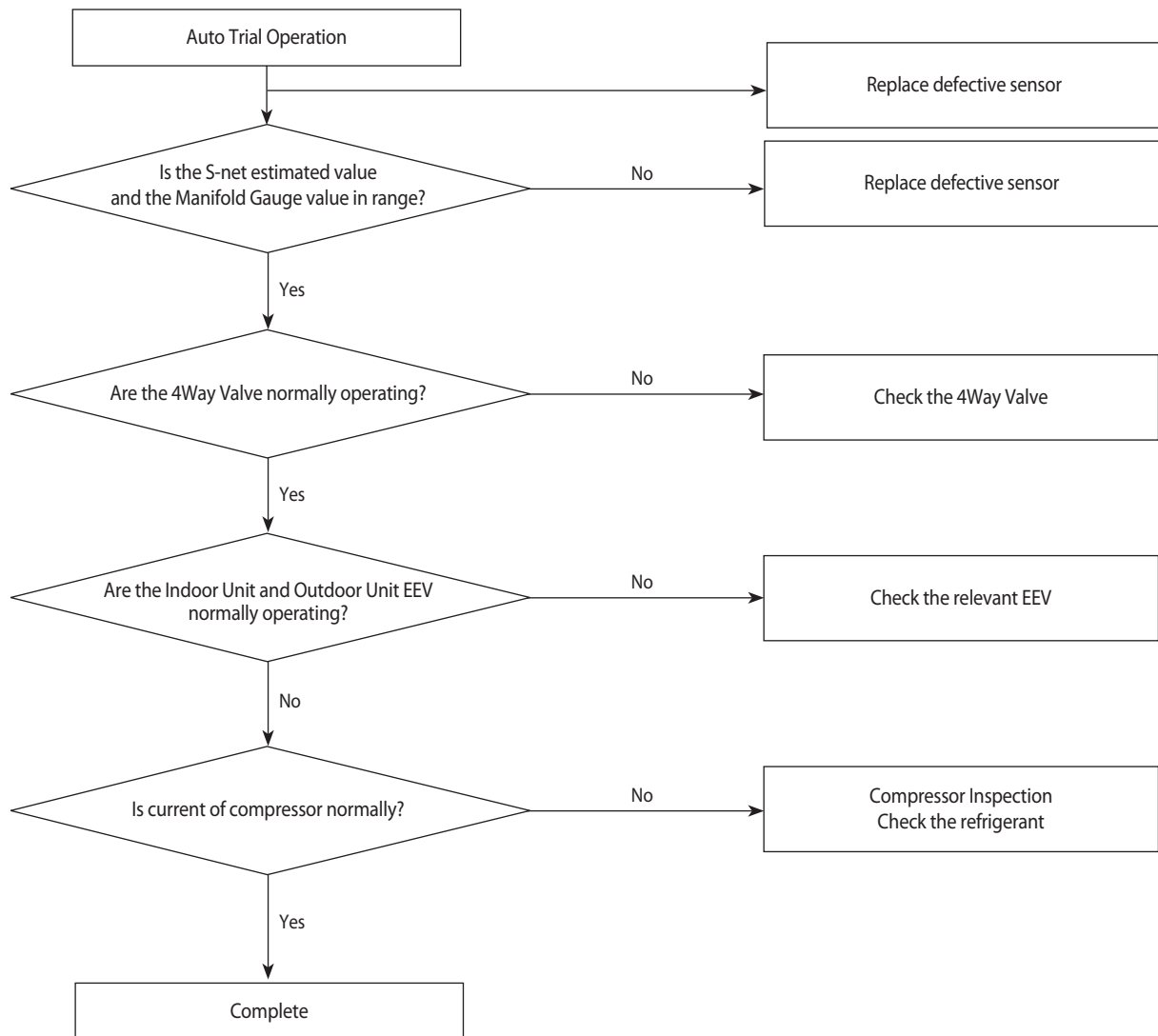


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-35 E428 : Suspension of starting by abnormal compression ratio

Outdoor unit display	E428											
Indoor unit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)		
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo
	×	×	●	●	●	×	●	●	●	●	●	●
※ ● : ON ● : Flash × : OFF												
Judgment Method	<ul style="list-style-type: none"> · Compression ratio [(High pressure+1.03)/(Low pressure+1.03)] less than 1.5 and lasts for 10 minutes or more · Differential pressure (high pressure- low pressure) less than 0.4 MPa.g and lasts for 10 minutes or more 											
Cause of problem	<ul style="list-style-type: none"> · Indoor and Outdoor EEV breakdown · 4Way Valve breakdown · High and Low pressure sensor defective · Refrigerant shortage 											

1. Cause of problem



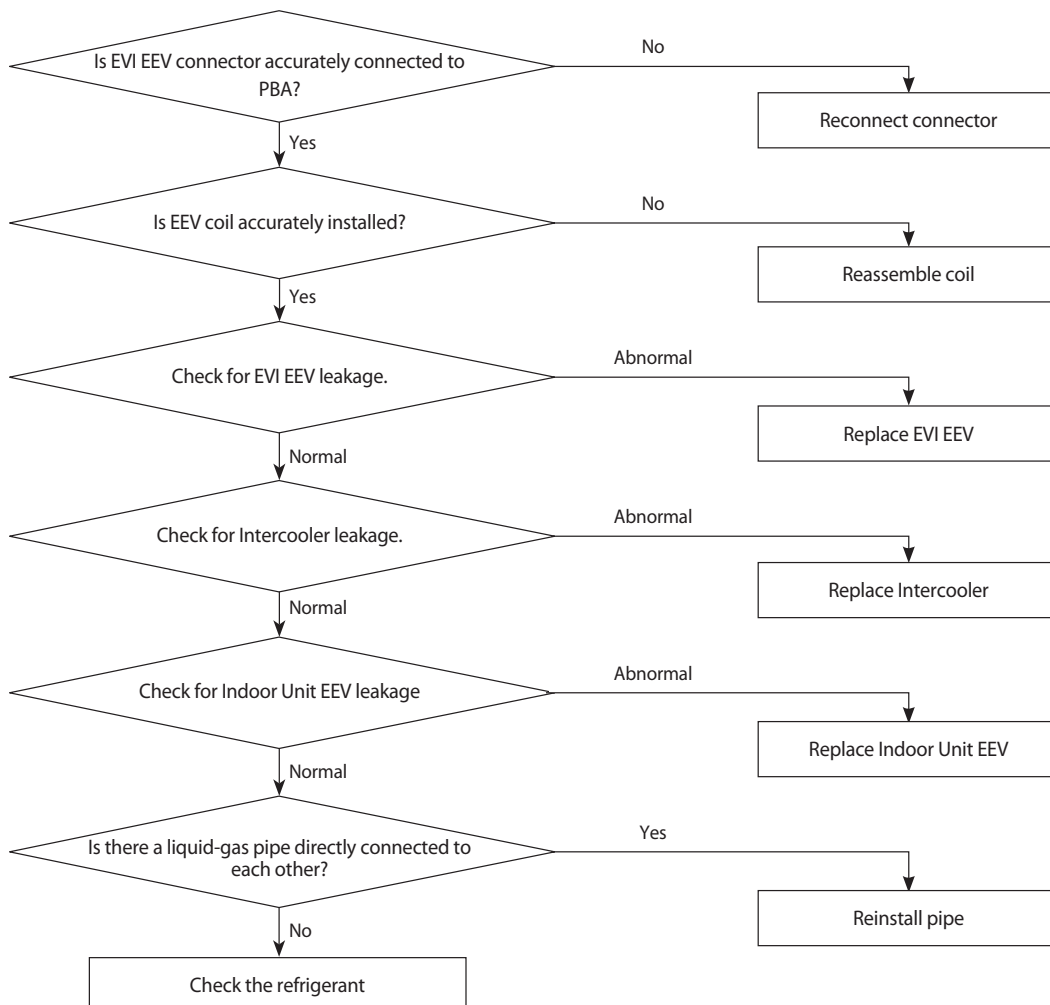
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-36 EVI EEV Open error

Outdoor unit display	E438													
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)				
	Operation	Defrost	Timer	Fan	Filter/ MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24°C	27°C
	×	×	●	●	●	×	●	●	●	●	●	●	●	×
※ ● : ON ● : Flash ×: OFF														
Judgment Method	. DSH<5℃ , EVI Out-EVI In<0℃ & frequency> 65Hz 40 minutes maintaining													
Cause of problem	. EVI EEV and Intercooler leakage, excessive refrigerant amount, Outdoor Check Valve inserted opposite. . Indoor Unit EEV leakage, direct connection between Indoor Liquid Pipe and the Gas Pipe.													

- ※ For the indoor EEV leakage check, operate one of the indoor units in cooling mode and the others in fan mode.
 - In case of normal units in fan mode, EVA In/Out temperatures become close to the room temperature within 5minutes.
 - Change the cooling unit to the fan mode and one of the fan unit to the cooling mode, and then check again.
- ※ If the refrigerant amount was excessively charged, DSH may be decreased during the cooling operation at low temperature.
- ※ For the EVI EEV leakage check, check for the EVI in sensor temperature when the cooling operation with the EVI EEV 0step.
 - Separate the EVI EEV connector from the HUB PBA, when the outdoor unit is off.
 - In case of EVI EEV leakage in cooling mode, EVI In temperature at least 10℃ lower than the outside temperature.

1. Cause of problem



4-3 Appropriate Measures for Different Symptom (cont.)

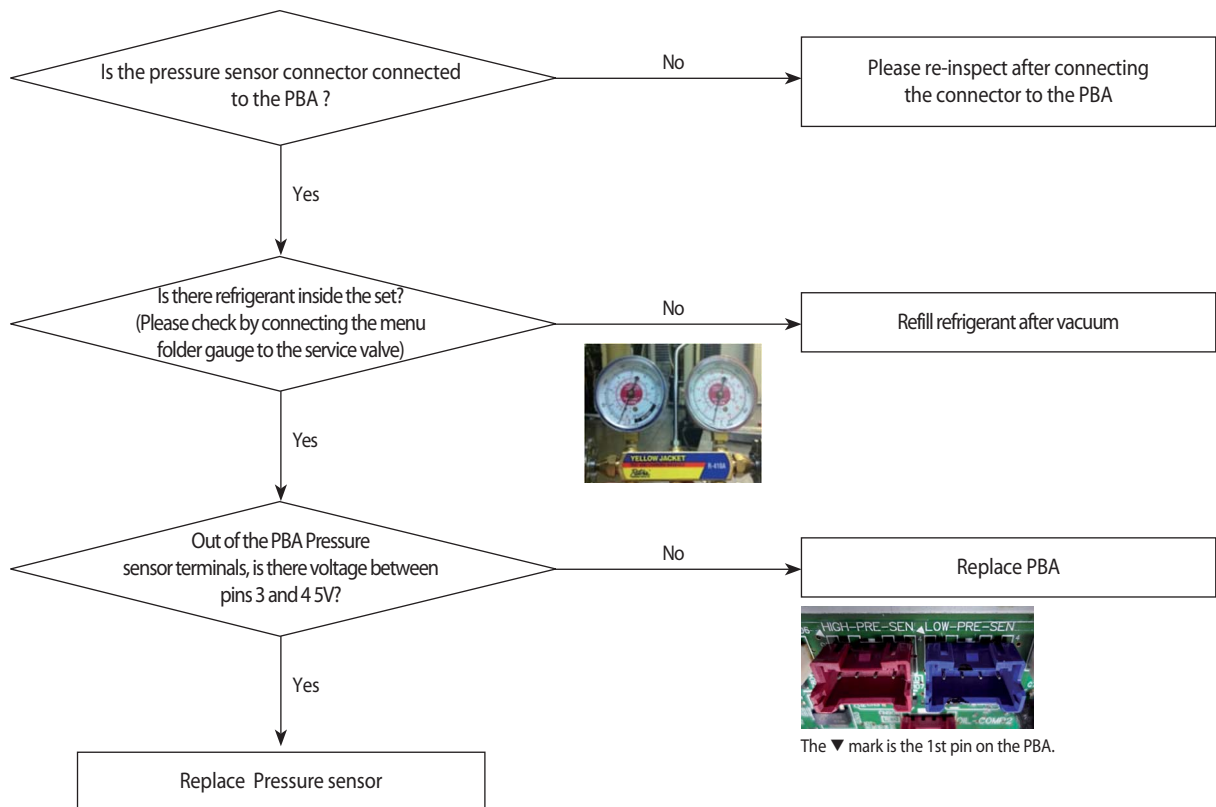
4-3-37 Refrigerant leakage error

Outdoor unit display	E439 (Refrigerant leakage judgment before starting) E443 (When start, refrigerant leakage judgment)
Judgment Method	<ul style="list-style-type: none"> · Before starting : Before compressor starting after system halt 2 minutes (High & low pressure sensor Open / Short error occurs and 1kg/cm² or less) · When start : When the high pressure sensor value(cooling 3.1kg/ cm² , heating 2.2kg/ cm²) is detection continuously for 3 seconds
Cause of problem	<ul style="list-style-type: none"> · Refrigerant leakage and shortage · Disconnection or breakdown of high & low pressure sensor

1. Pressure sensor Open/Short error determination method

- 1) Identifies from when power is supplied or 2 minutes after RESET, and only when set is stopped.
- 2) An Open/Short error will occur if the input voltage standard range of 0.5V ~ 4.95V is exceeded.

2. Inspection Method



4-3 Appropriate Measures for Different Symptom (cont.)

4-3-38 Prevention of heating / cooling operation due to outdoor temperature

Outdoor unit display	E440 (Prevention of heating operation due to high temperature of Water) E441 (Prevention of cooling operation due to low temperature of Water)													
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)				
	Operation	Defrost	Timer	Fan	Filter/ MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24°C	27°C
	×	×	●	●	●	×	●	●	●	●	●	●	●	×
	※ ● : ON ● : Flash × : OFF													
Judgment Method	<ul style="list-style-type: none"> · Heating operation(E441) : When the water temperature is more than 51 °C . · Heating operation(E440) : When the water temperature is less than 5 °C . · Cooling operation(E441) : When the water temperature is more than 48 °C . · Cooling operation(E440) : When the water temperature is less than 5 °C . 													
Cause of problem	<ul style="list-style-type: none"> · System protection operation status (Is not breakdown). · If the water temperature is satisfied the operating range, it will clear the error and start the operation automatically. 													

4-3 Appropriate Measures for Different Symptom (cont.)

4-3-39 Prevention of heating refrigerant charge due to outdoor temperature

Outdoor unit display	E442													
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)				
	Operation	Defrost	Timer	Fan	Filter/ MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24°C	27°C
	×	×	●	●	●	×	●	●	●	●	●	●	●	×
	※ ● : ON ● : Flash × : OFF													
Judgment Method	• When the heating refrigerant charge : If the outdoor temperature is more than 15°C													
Cause of problem	• System protection operation status (Is not breakdown)													

4-3 Appropriate Measures for Different Symptom (cont.)

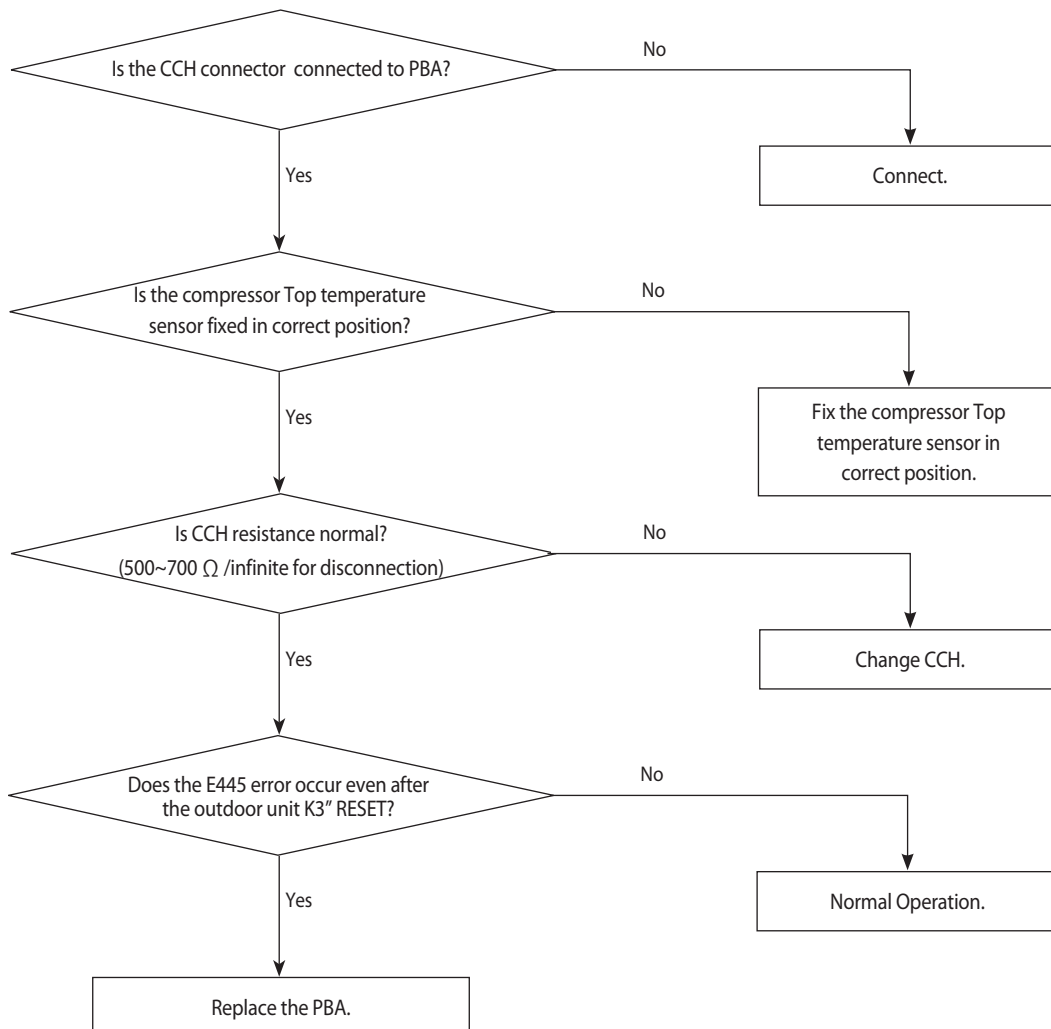
4-3-40 CCH wire breaking error

Outdoor unit display	E445 (Water Cooled)														
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)					
	Operation	Defrost	Timer	Fan	Filter/ MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24°C	27°C	
	×	×	●	●	●	×	●	●	●	●	●	●	●	×	
※ ● : ON ● : Flash × : OFF															
Judgment Method	. Refer to the judgment method below.														
Cause of problem	. CCH Connector PBA is not connected / Compressor Top sensor breakaway / Own problem of CCH														

1. Judgment Method (2hours after reset or power on, It will be judged once.)

- ① Compressor Top temperature at the time of judgment- $T_{ini} < 2^{\circ}\text{C}$ (※ T_{ini} : Power on or temperature of initial compressor Top after reset)
- ② Compressor Top temperature at the time of judgment- suction1 temp. sensor $< 30^{\circ}\text{C}$
- ③ Outdoor temperature $< 30^{\circ}\text{C}$
- ④ UP state

※ If all the conditions are satisfied at the same time : Mark the CCH wire breaking error (E445)



4-3 Appropriate Measures for Different Symptom (cont.)

4-3-41 Momentary Blackout error

Outdoor unit display	<i>E452</i>													
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)				
	Operation	Defrost	Timer	Fan	Filter/ MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24°C	27°C
	×	×	●	●	●	×	●	●	●	●	●	●	●	×
※ ● : ON ● : Flash × : OFF														
Judgment Method	· Momentary stop of compressor due to momentary blackout.													
Cause of problem	· Momentary stop of compressor due to momentary blackout.													

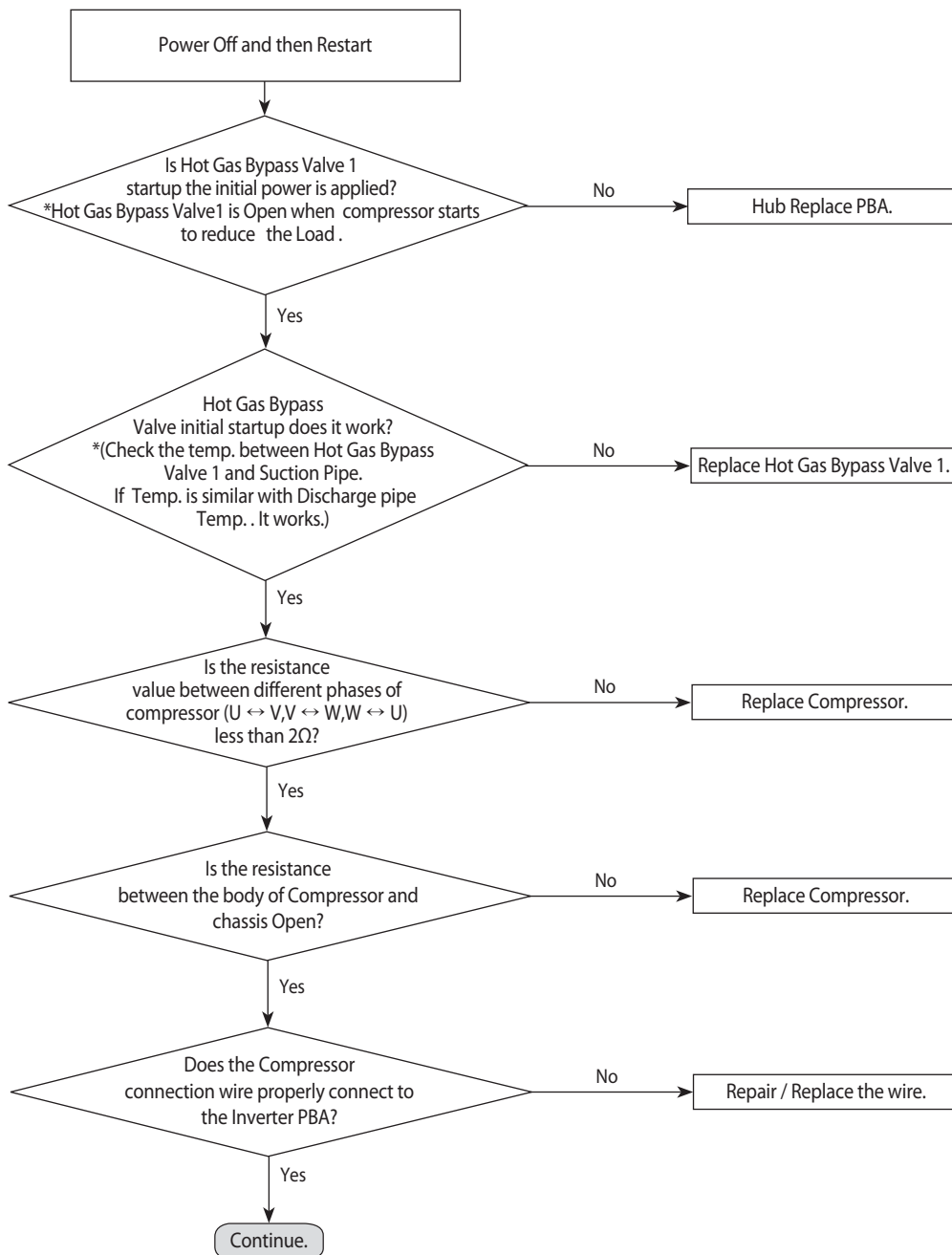
1. Precautions : Replace Hub PBA or Main PBA.

4-3 Appropriate Measures for Different Symptom (cont.)

4-3-42 Compressor starting error

Outdoor unit display	<i>E461</i> (INVERTER1 PBA) <i>E361</i> (INVERTER2 PBA)
Judgment Method	<ul style="list-style-type: none"> · Startup, and then if the speed increase is not normally. · Detected by H/W or S/W.
Cause of problem	<ul style="list-style-type: none"> · Compressor connection error · Defective Compressor

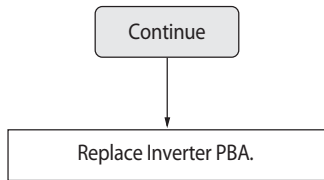
1. Cause of problem



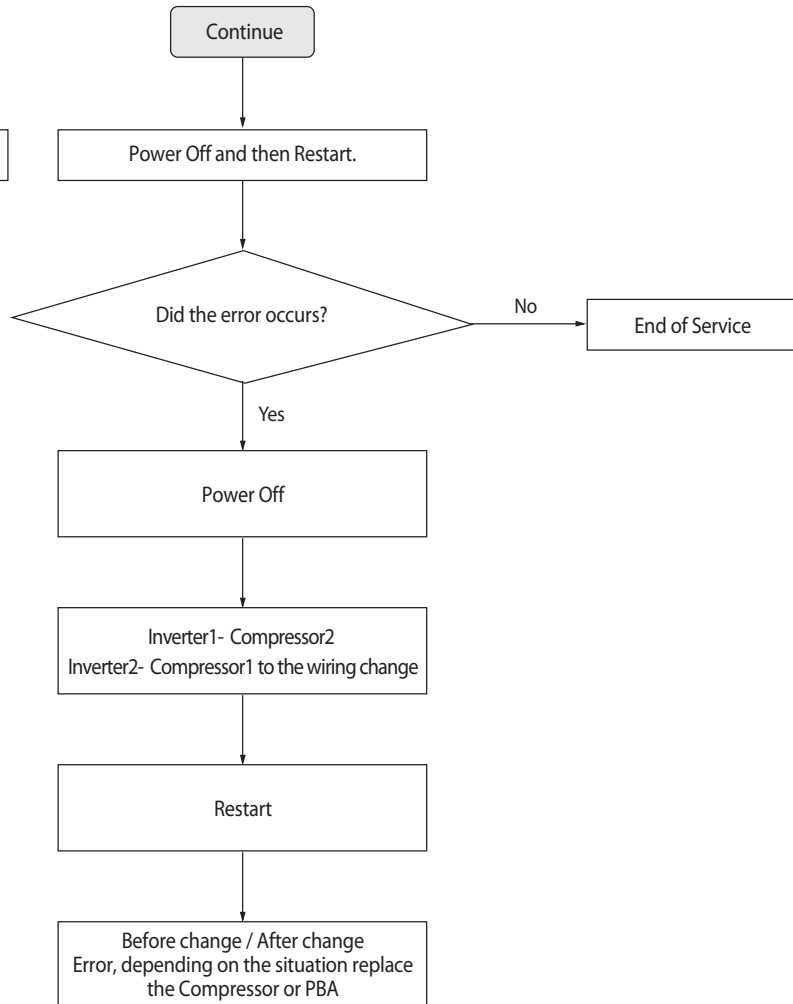
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-42 Compressor starting error (cont.)

■ Compressor applied one



■ Compressor applied two



Before change	After change	Measure
E464	E464	Replace No.1 Inverter PBA
E464	E364	Replace No.1 Compressor
E364	E364	Replace No.2 Inverter PBA
E364	E464	Replace No.2 Compressor

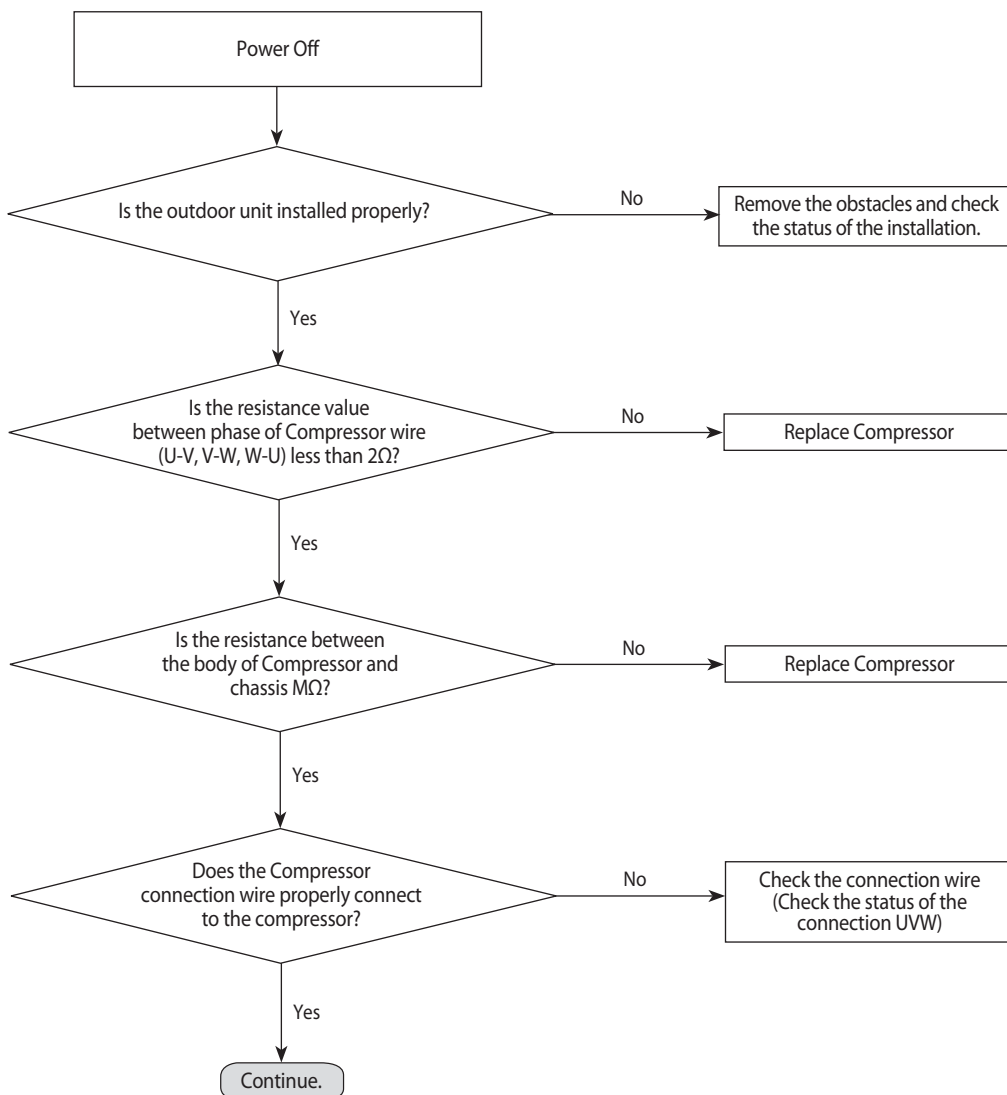
See the "Contain of compressor Exchange (3-XX)" in service manual when you replace the compressor.

4-3 Appropriate Measures for Different Symptom (cont.)

4-3-43 COMP Overcurrent error

Outdoor unit display	<i>E464/E465</i> (INVERTER1 PBA) <i>E364/E365</i> (INVERTER2 PBA)
Judgment Method	<ul style="list-style-type: none"> · Will occur if the overcurrent flowing in the IPM. · Detected by H/W or S/W
Cause of problem	<ul style="list-style-type: none"> · COMP. defective. · Inverter PBA Defective.

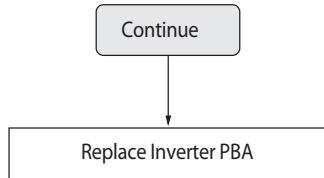
1. Cause of problem



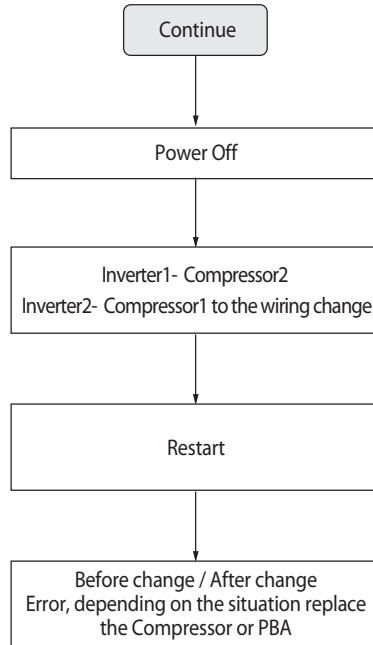
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-43 COMP Overcurrent error (cont.)

■ Compressor applied one



■ Compressor applied two



Before change	After change	Measure
E464	E464	Replace No.1 Inverter PBA
E464	E364	Replace No.1 Compressor
E364	E364	Replace No.2 Inverter PBA
E364	E464	Replace No.2 Compressor

See the "Contain of compressor Exchange (3-XX)" in service manual when you replace the compressor.

4-3 Appropriate Measures for Different Symptom (cont.)

4-3-43 COMP Overcurrent error (cont.)

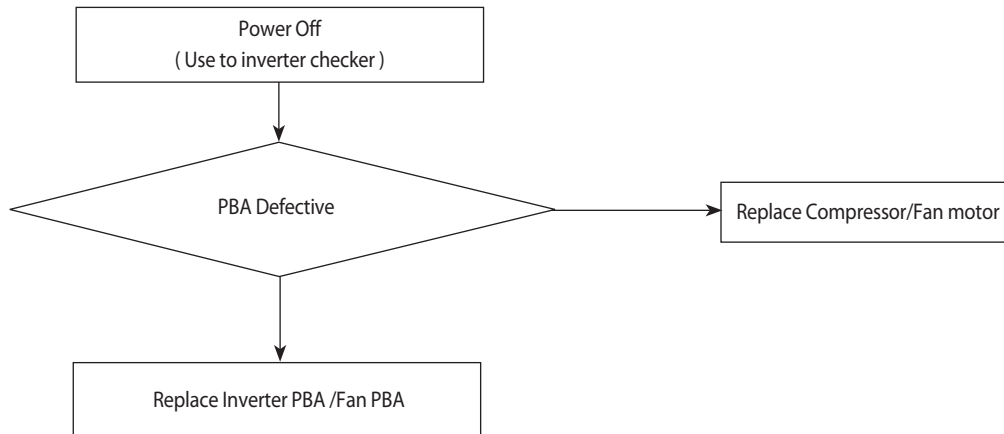
■ How to use inverter checker (Warning for high pressure)

▶ Check between MOTOR ↔ FAN PBA

- 1) After cut off, connect inverter checker with U,V,W of Motor
- 2) After turn on, enter Comp. check mode by pushing K2 in main PBA
- 3) Judgment
 - 6 LEDs of inverter checker are lightning successively (MOTOR PBA OK, MOTOR NG)
 - If one of 6 LEDs in inverter checker is not lightning (MOTOR PBA NG, MOTOR OK)

■ How to enter check mode/7Seg display

Type	DVM S	
Model	Air Cooled	Water Cooled
COMP 1	9times (KD__)	8times (KD__)
COMP 2	10times (KE__)	9times (KE__)
MOTOR 1	11times (KF__)	
MOTOR 2	12times (KG__)	



4-3 Appropriate Measures for Different Symptom (cont.)

■ IPM [IGBT] breakdown diagnostics (Inverter PBA)

1. Preparations before checking

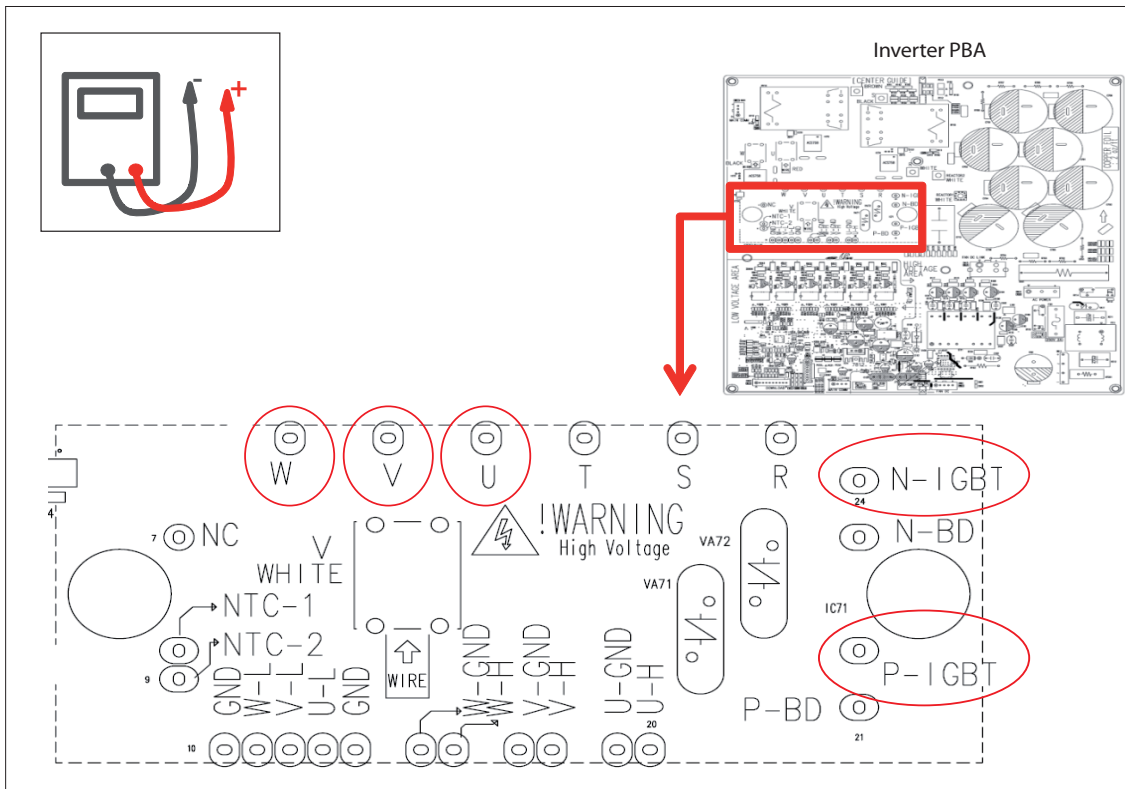
- 1) Power Off.
- 2) IPM failure, discharge mode may not work properly. Therefore, wait more than 15 minutes after the Power Off.
- 3) Remove all of the Inverter PBA connectors and wire that is fixed as screw.
(Include wire that is fixed to compressor and DC Reactor.)
- 4) Prepare the digital multi tester.

2. Inspection Method

- 1) Refer to Figure1 and Table1, respectively the resistance value and diode voltage value measure.
- 2) According to the criterion in Table 1 to determine whether the failure of IPM.

Division	Measured Point		Criterion	Remark
	+	-		
Measure the resistance values	P-IGBT	U	More than 500 kΩ	Measurement error can occur for reasons such as the initial measurement condenser discharge. Measured over at least three times.
	P-IGBT	V		
	P-IGBT	W		
	U	N-IGBT		
	V	N-IGBT		
	W	N-IGBT		
Measure the diode voltage values	U	P-IGBT	0.3~0.7V	
	V	P-IGBT		
	W	P-IGBT		
	N-IGBT	U		
	N-IGBT	V		
	N-IGBT	W		

< Table 1 >



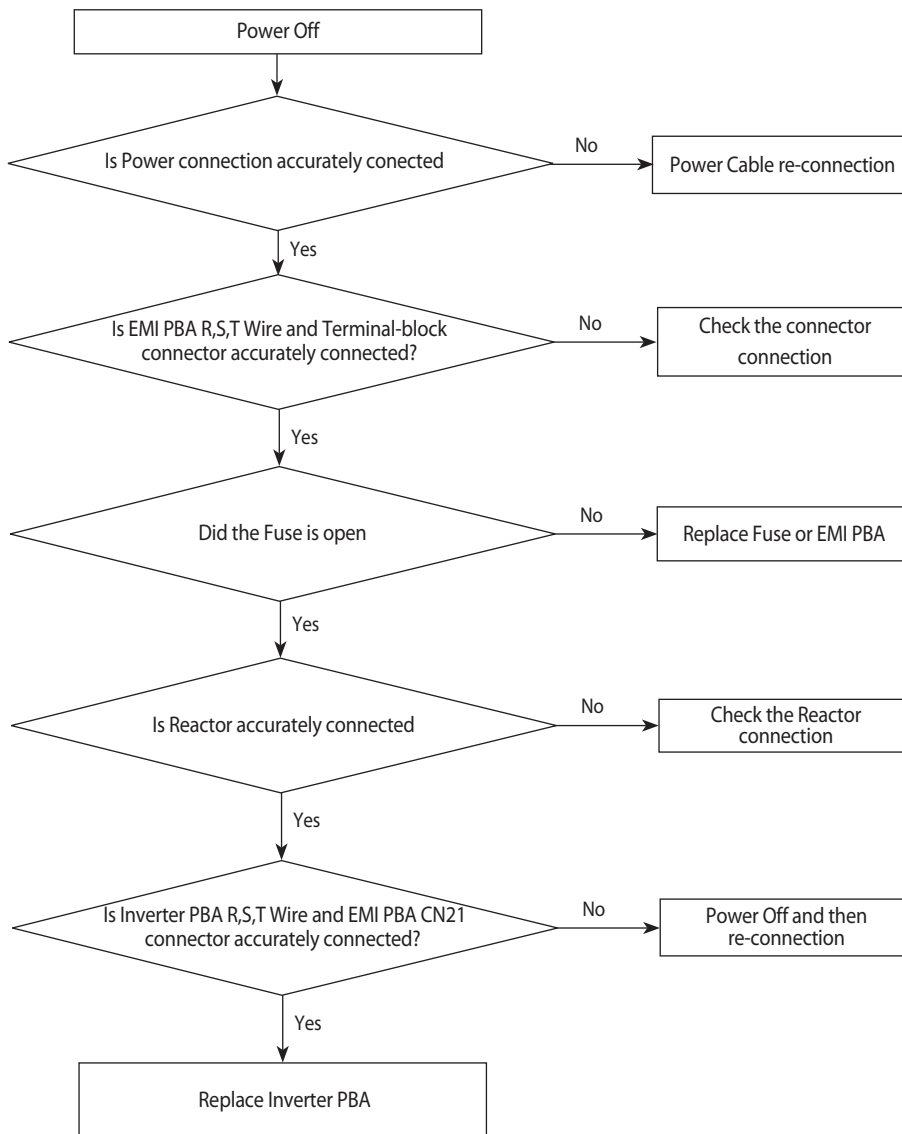
< Figure 1 >

4-3 Appropriate Measures for Different Symptom (cont.)

4-3-44 Overvoltage / Low voltage error

Outdoor unit display	<i>E466</i> (INVERTER1 PBA) <i>E366</i> (INVERTER2 PBA)
Judgment Method	<ul style="list-style-type: none"> · Input wiring error EMI fuse open. · DC-Link Overvoltage / Low voltage occurs.
Cause of problem	<ul style="list-style-type: none"> - Check the power source wiring. (R/S/T/N wire crossed or not connected) - Check the power source voltage. (Rated voltage $\pm 10\%$) - Check the fuses on EMI PBA. (fuse is normally short)

1. Cause of problem



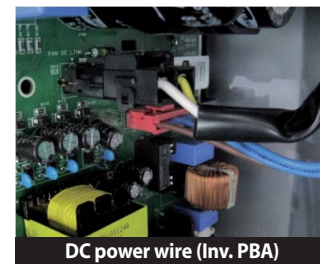
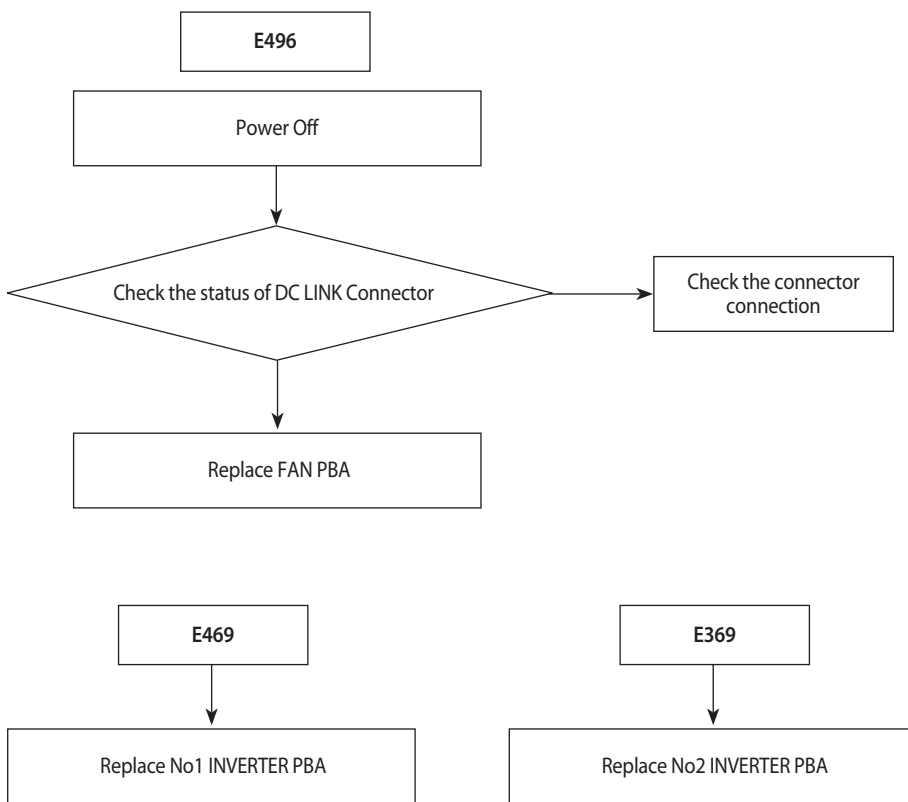
Type of Power Source	AC Input Voltage	Standard AC Voltage(Vac)		Standard DC Voltage(Vdc)	
		Min.	Max.	Min.	Max.
F	208~230V	177	265	250	374
J	460V	391	552	553	781

4-3 Appropriate Measures for Different Symptom (cont.)

4-3-45 DC Link voltage sensor error

Outdoor unit display	<i>E469</i> (INVERTER1 PBA) <i>E369</i> (INVERTER2 PBA) <i>E496</i> (OUTDOOR FAN 1 PBA)
Judgment Method	· DC voltage detection : Error judgment where the voltage value is more than 4.8V or less than 0.2V.
Cause of problem	· DC Link Connector disconnected · PBA voltage sensing circuit defective

1. Cause of problem

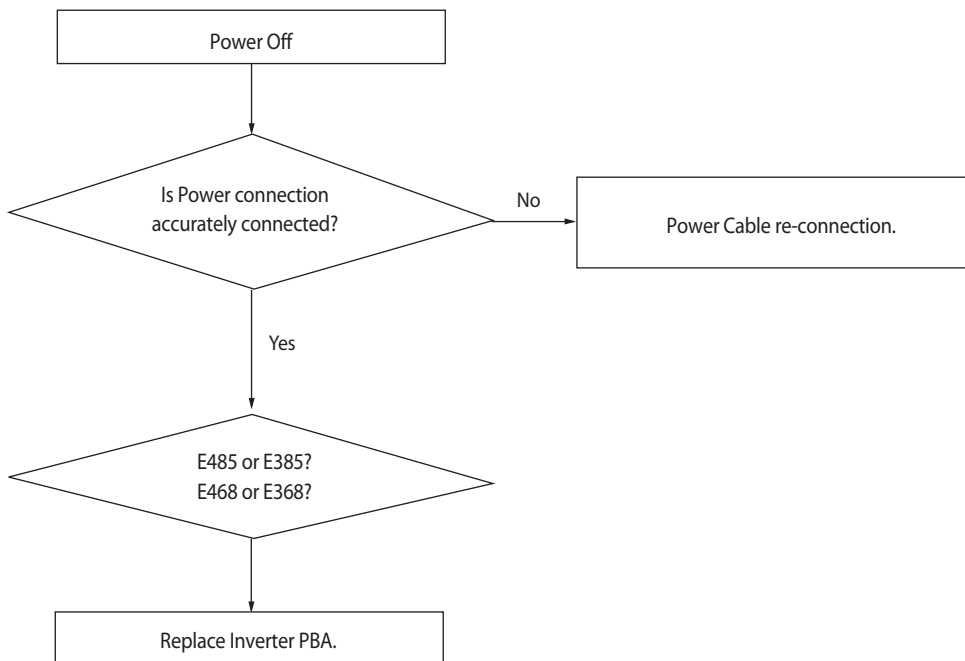


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-46 Input / Output Current sensor error

Outdoor unit display	<p><i>E485</i> INVERTER1 PBA(Input Current sensor)</p> <p><i>E385</i> INVERTER2 PBA(Input Current sensor)</p> <p><i>E468</i> INVERTER1 PBA(Output Current sensor)</p> <p><i>E368</i> INVERTER 2 PBA(Output Current sensor)</p> <p><i>E493</i> OUTDOOR FAN PBA (FAN1 Output Current sensor)</p> <p><i>E393</i> OUTDOOR FAN PBA (FAN2 Output Current sensor)</p>
Judgment Method	· Sensor Output detection : Judged as an error if the detected value is More than 4.5V or less than 0.5V
Cause of problem	<ul style="list-style-type: none"> · Input voltage defective · PBA voltage sensing circuit defective

1. Cause of problem



4-3 Appropriate Measures for Different Symptom (cont.)

4-3-47 Inverter PBA IPM overheating error

Outdoor unit display	E500 (INVERTER1 PBA) E400 (INVERTER2 PBA)
Judgment Method	- Inverter PBA IPM internal temperature is more than 105°C.
Cause of problem	- Heat sink and the IPM surface contact assembly defective. - Refrigerant cooling heat sink and refrigerant piping assembly defective. - Assembled bolt defective..

Table 1

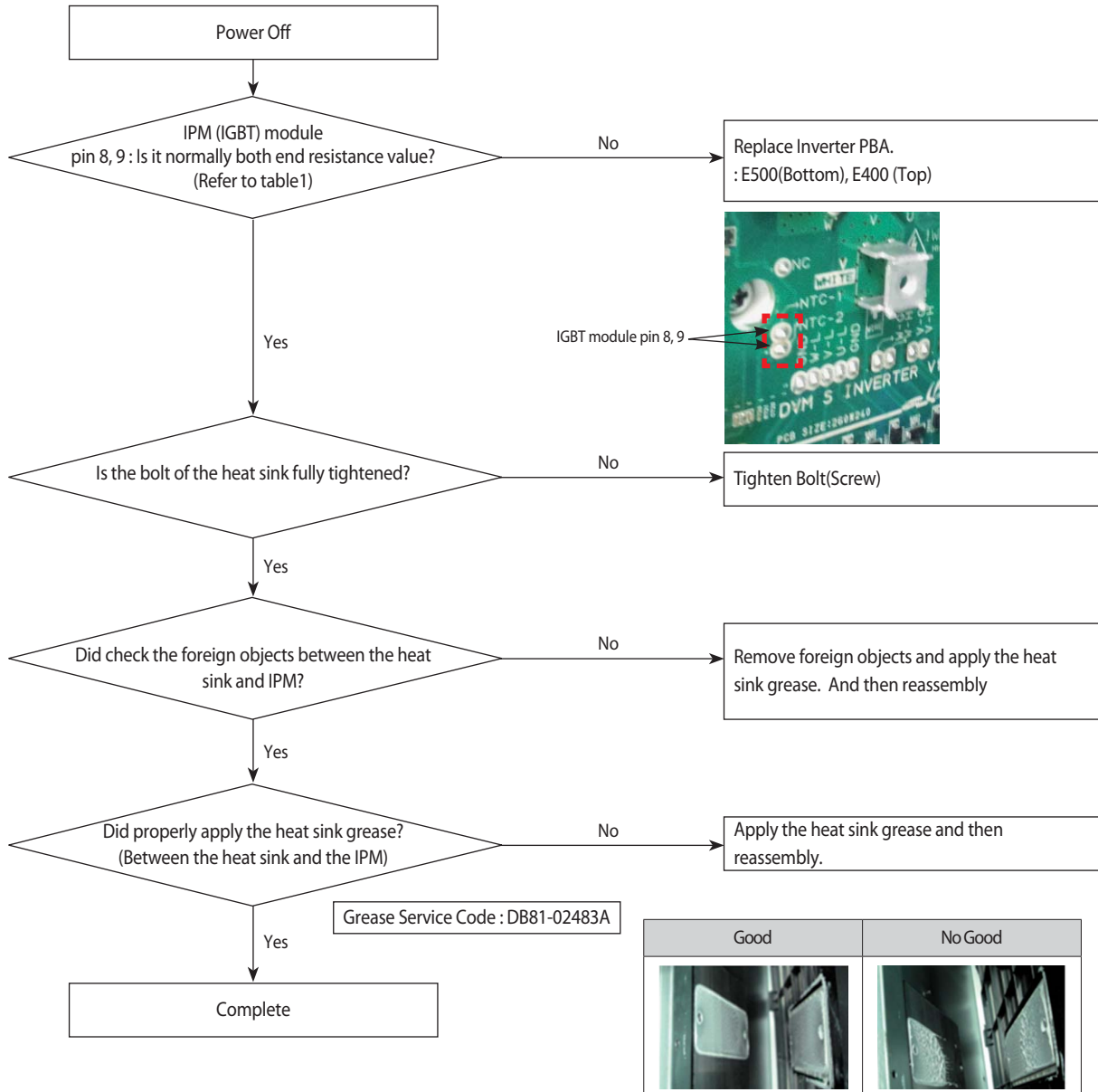
Both end resistance values of IGBT module pin(8, 9 pin)

Temperature [°C]	NTC [ohm]
10	9000
20	6000
30	4000
40	3000
50	2000
60	1600
70	1200
80	750

Measure the resistance after the power is turned off.

* Enforce the discharge mode before Power Off.
(K2 : press the 6 times)

1. Cause of problem

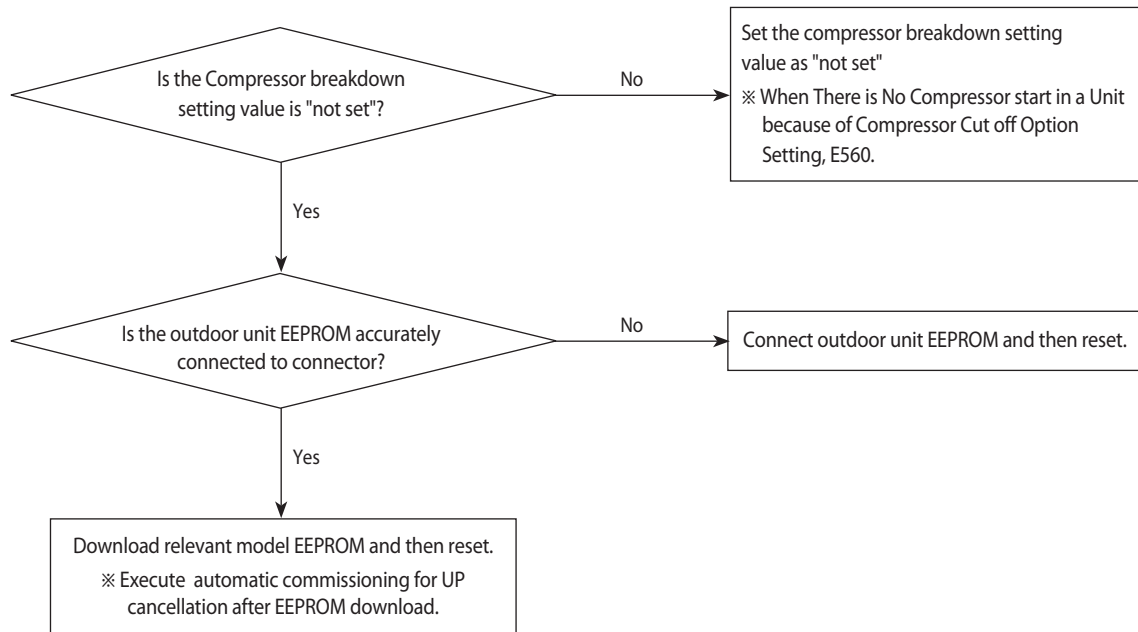


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-48 Option setting error of outdoor unit

Outdoor unit display	<i>E560</i>
Indoorunit display	●(Operation) ×(Reservation) ●(Blast) ×(Filter) ×(Defrost)
Judgment Method	• Refer to the judgment method below.
Special Cause	• Option setting error of outdoor unit (There is No Compressor start in a Unit because of Compressor Cut off Option Setting.)

1. Cause of problem

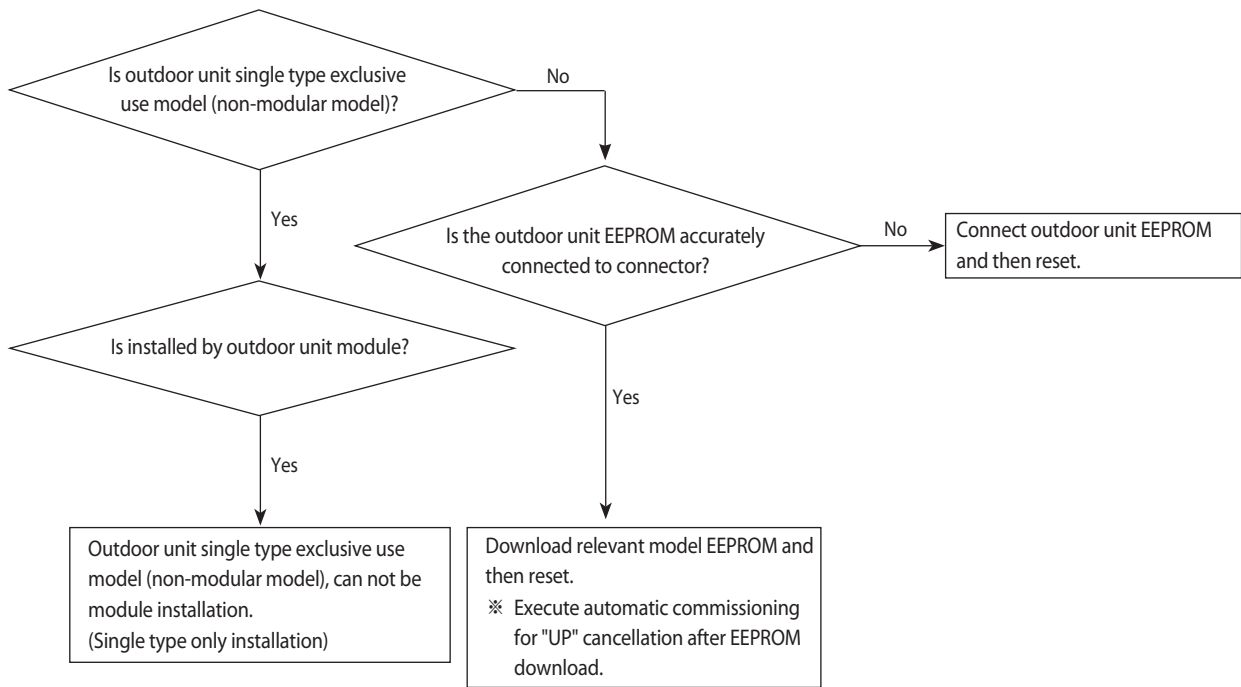


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-49 Error due to using single type outdoor unit in a module installation

Outdoor Unit Display	<i>E573</i>
Indoor Unit Display	-
Judgment Method	• Refer to the judgment method below.

1. Cause of problem

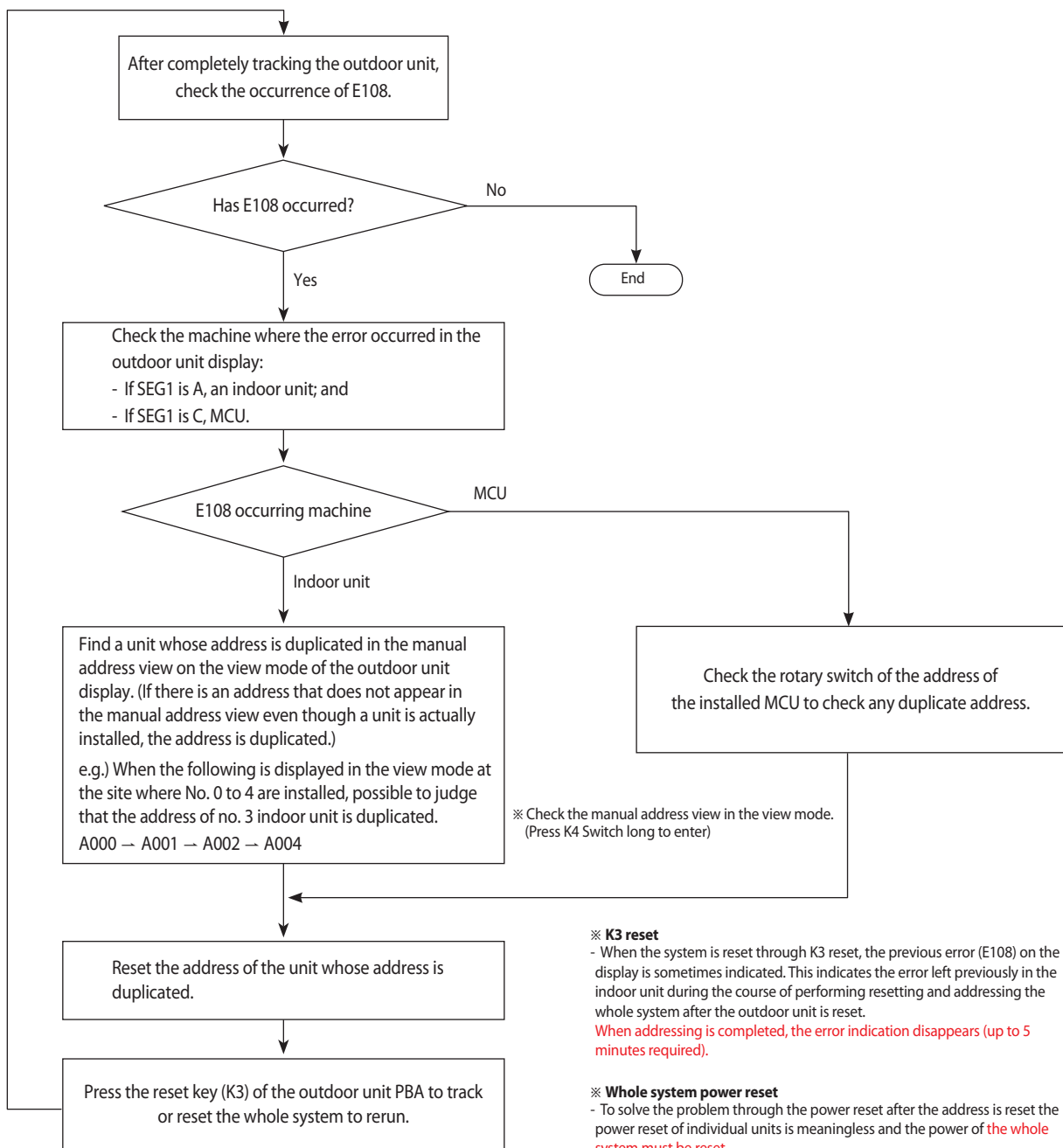


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-50 Indoor unit and MCU address duplication error

Outdoor unit display	E 108 - A00X (X : Address of duplicate indoor unit)				
Indoor unit display	Operation	Defrost	Timer	Fan	Filter/EMI
	×	×	●	●	×
※ ● : ON ○ : Flash × : OFF					
Judgment Method	Refer to the judgment method below.				
Cause of problem	· Indoor unit and MCU address duplication.				

1. Cause of problem

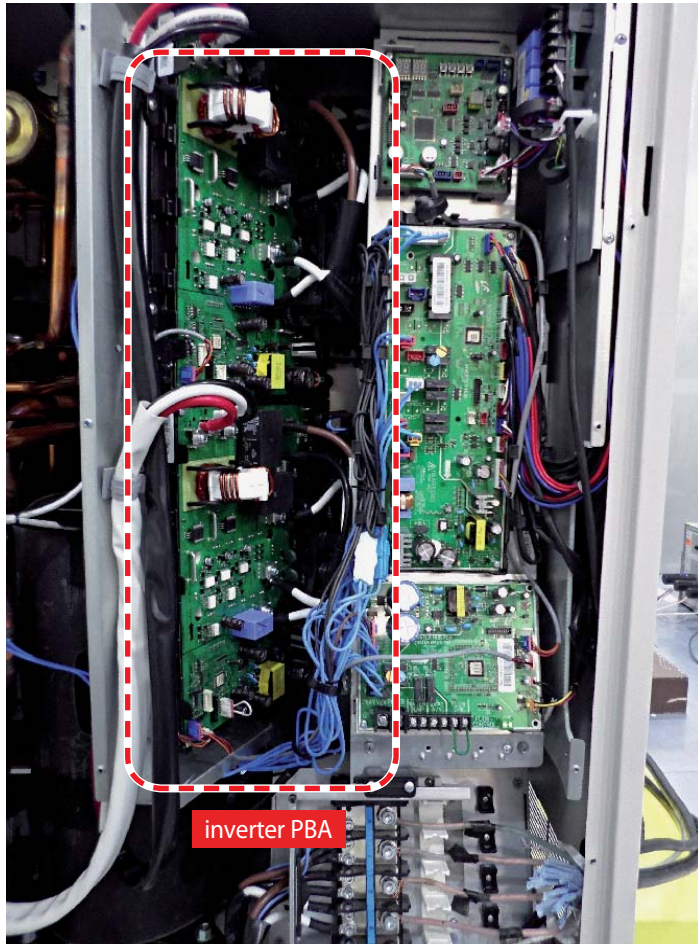




4-4 Case study for trouble shoots

4-4-1 Electric discharge mode

■ Warning of Electrical Shock from DC Power

- It is seriously dangerous to touch inverter PBA as high DC voltage is charged.
- Must do key operation "Discharge mode" or Wait for more 15 minutes to discharge naturally.



 WARNING	
	<p>ELECTRICAL SHOCK DISCONNECT ALL ELECTRIC POWER, INCLUDING REMOTE CONTROLLING DEVICES, BEFORE SERVICING. FOLLOW PROPER LOCKOUT/TAGOUT PROCEDURES TO ENSURE THE POWER CANNOT BE INADVERTENTLY ENERGIZED.</p> <p>VERIFY WITH AN APPROPRIATE VOLTMETER THAT ALL CAPACITORS HAVE DISCHARGED. FAILURE TO DISCONNECT POWER AND DISCHARGE CAPACITORS BEFORE SERVICING COULD RESULT IN DEATH OR SERIOUS INJURY.</p>
	<p>BEFORE INSPECTING THE CONTROL BOX, <u>EXECUTE DISCHARGE MODE</u> (BY PRESSING THE K2 BUTTON 6 TIMES), FLIP THE CIRCUIT BREAKER AND DISCONNECT CONNECTORS (SHOWN WITH DOTTED CIRCLES IN THE ILLUSTRATION).</p>

< Warning Label >

4-4 Case study for trouble shoots (cont.)

4-4-1 Electric discharge mode (cont.)

■ How to proceed

K2 (Number of press)	KEY operation	Display on 7-Segment	
1times	Refrigerant charging in Cooling mode	K - 5 - BLANK - BLANK	
2times	Trial operation in Cooling mode	K - 6 - BLANK - BLANK	
3times	Pump down all units in Cooling mode	K - 7 - BLANK - BLANK	
4times	HR: Pipe connection inspection H/P: Auto trial operation	K - 8 - BLANK - BLANK	
5times	Checking the amount of refrigerant	K - 9 - X - X (Display of last two digits may differ depending on the status)	
6times	Discharge mode of DC link voltage	K - A - BLANK - BLANK	
7times	Forced oil collection	K - C - BLANK - BLANK	
8times	Inspect inverter compressor 1	K - D - BLANK - BLANK	
9times	Inspect inverter compressor 2	K - E - BLANK - BLANK	
10times	Water pipe valve/Pump check	K - F - BLANK - BLANK	
11times	Cooling fan/Flow control valve check	K - G - BLANK - BLANK	
12times	A type PBA	End key operation	-
	B type PBA	HR : Auto pipe pairing, H/P : Unused	"K" "H" XX (Display of last two digits may differ depending on the progress)
13times	B type PBA	End key operation	-

- During "Discharge mode of DC link voltage," voltage of INV1 and INV2 will be displayed alternately.
- Even when the outdoor unit power is off, it is dangerous when you come in contact with inverter PCB and fan PCB since they are charged with high DC voltage.
- When pressing K2 key 9 to 12 times without inverter checker, error code can be displayed on segment even though the outdoor unit is normal.
- When replacing/repairing the PCB, cut off the power and wait until the DC voltage is discharged before replacing/repairing them (Wait for more than 15 minutes to allow it to discharge naturally.)
- When there were error, 'Discharge mode of DC link voltage' may not have been effective. Especially if error E464 and E364 have been occurred, power element might be damaged by fire and therefore, do not use the 'Discharge mode of DC link voltage.'
- If the 1st-generation MCU is installed, the Auto pipe pairing operation can not be used.
- If the 2nd-generation MCU is installed, the Checking the pipe connection can not be used.
 - 1st-generation MCU : MCU-S*NEE*N
 - 2nd-generation MCU : MCU-S*NEK2N,MCU-S4NEK3N,MCU-S1NEK1N
- If there is an A type PBA among the outdoor units installed as a module, the Auto pipe pairing operation can not be used.

4-4 Case study for trouble shoots (cont.)

4-4-1 Electric discharge mode (cont.)

- ▶ During Discharging mode, voltage of Inv1 and Inv2 will be displayed alternately.
- ▶ Even when the power is off, it is dangerous when you come in contact with inverter PBA, fan PBA since high pressure DC voltage is charged to those parts.
- ▶ When replacing or repairing the PBA, cut-off the power and wait until the DC voltage is discharged before replacing/repairing them.
 - Wait for more than 15 minutes to allow those parts to be fully discharged.



- ▶ When there is error, Discharge mode of DC link voltage may not have been effective. Especially when E464 and E364 error is displayed, power element might be damaged so do not use the Discharge mode of DC link voltage.

■ How to proceed

Press K2 button 6 times shortly.



Items		Cooling
Key	Number	K2
	Push time	6
Display		<p>“E” “E” Inv. 2 DC voltage “E” “E” Inv. 1 DC volt Ex) 445V → 0445</p> <p>※ Below 30 Volt, “E” “E” “E” “E” displays.</p>

4-4 Case study for trouble shoots (cont.)

4-4-2 Pump down operation

Recover the refrigerant of Indoor Unit and Piping to outdoor side.

The operator need to **close** liquid service valve and the gas service valve **manually**



Caution

1. If the installation of the long pipe : Any refrigerant into the outdoor unit can not be recovered, therefore should use a **separate container**
2. Observe low pressure using View Mode of K4 button if compressor operate.
 - If low pressure goes down below about **0.2MPa.g**
: Immediately close the gas side service valve, then shut down the Pump Out operation
(Pump out operation shut down : K1 button once more press or K3 button one time press)
 - If operation of low pressure goes down below **0.1MPa.g**
: Pump down operation will be **stopped automatically** to protect the compressor.
3. After pump out about 1kg of refrigerant will be remained in the pipe so use pipe cutter to detach the pipe.
(Do not use flame to detach the pipe)

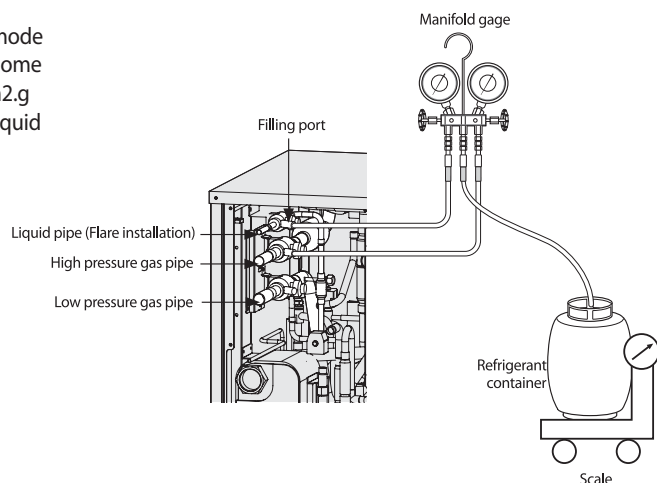


How to Initiate	K2 Tact Switc 3 times
Compressor	Address No.1 Outdoor Unit-60Hz (Other Outdoor Unit COMP OFF)
Indoor Unit	Whole Operation (The set temperature=3°C)
4Wasy Valve	OFF (Cooling Mode)
Main EEV	Operation side : 2000Step, Stop side : 2000Step
Maximum Operation Time	30 minutes
Etc.	Does not conduct the operation of the special operation, and protection control. Pressure and temperature is outside normal limits : Operation is shut down after gas pipe manually closed.

► How to store refrigerant to the separate container.

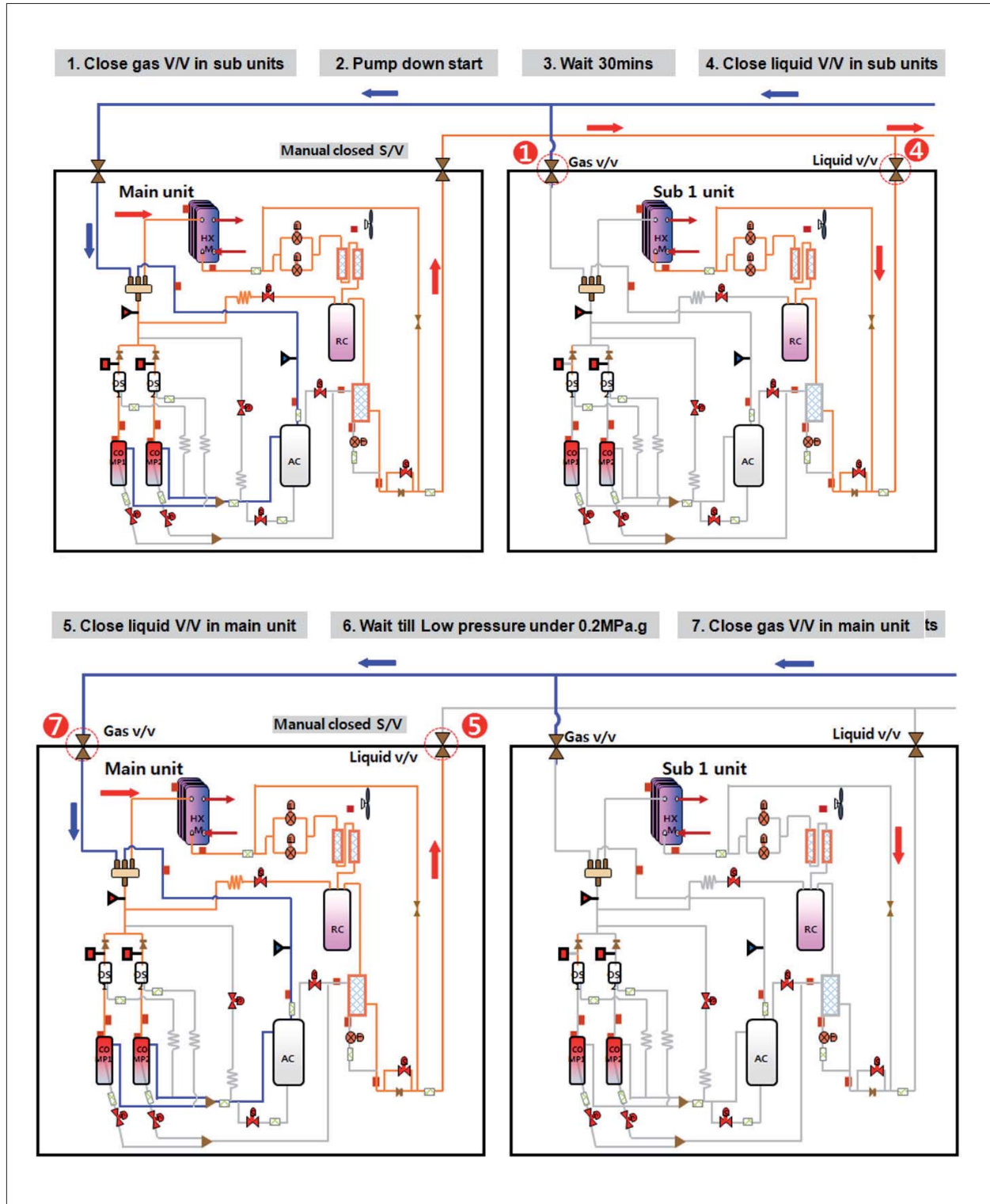
1. Prepare manifold gage, container, scale.
2. Check total refrigerant in the system.
3. Connect manifold gage hose & Turn on 50% IDUs in cooling mode
4. 10mins later if the high pressure is over 30kg/cm2.g, turn off some indoor unit till high pressure is same or lower than 30kg/cm2.g
5. If high pressure is same or lower than 30kg/cm2.g, open the liquid valve and container valve.
6. Check the weight of container and then close the valve.

- * Recommend to store 50% of total refrigerant.
- * If too much refrigerant is stored in the container system can't proceed pump down properly.



4-4 Case study for trouble shoots (cont.)


4-4-2 Pump down operation (cont.)



4-4 Case study for trouble shoots (cont.)

4-4-3 Pump out operation

Operation for the repair of the Individual outdoor unit, **refrigerant emissions to the indoor part.**
 The operator need to **close** liquid service valve and the gas service valve **manually**.

 Caution	1. Observe low pressure using View Mode of K4 button if compressor operate. - If low pressure goes down below about 0.2MPa.g : Immediately close the gas side service valve, then shut down the Pump Out operation (Pump out operation shut down : K1 button once more press or K3 button one time press) - If operation of low pressure goes down below 0.1MPa.g : Pump down operation will be stopped automatically to protect the compressor.
	2. After pump out about 1kg of refrigerant will be remained in the pipe so use pipe cutter to detach the pipe. (Do not use flame to detach the pipe)

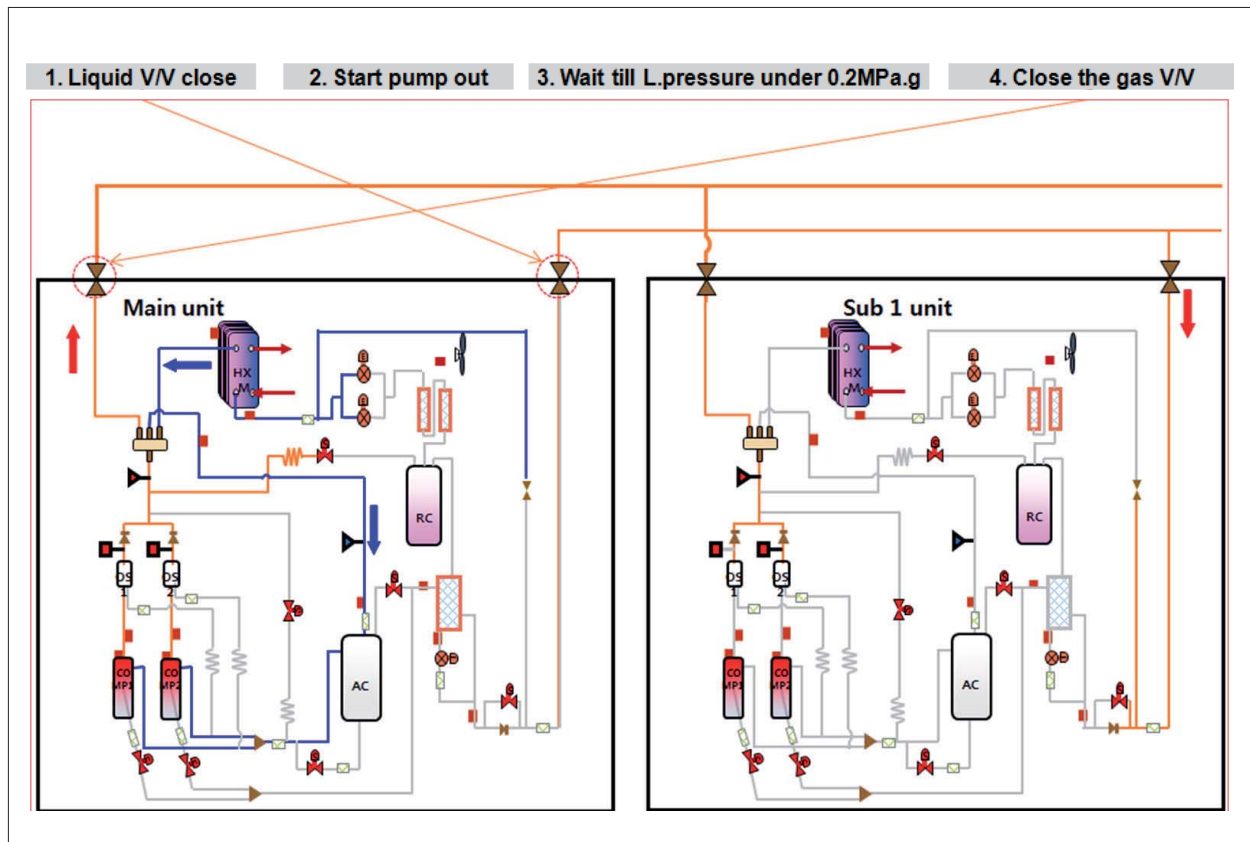
Outdoor unit	Main	Sub1	Sub2	Sub3
Key number	K1			
Push time	3	4	5	6



How to Initiate	K1 Tact Switche 3 times~6 times
Compressor	60Hz
Indoor Unit	Whole Operation (The set temperature=40°C)
4Wasy Valve	ON (Heating Mode)
Outdoor Fan	Maximum air flow
Main EEV	Operation side : 700Step, Stop side : 0Step
Maximum Operation Time	10 minutes
Protection Contol	Conduct the discharge temperature, high pressure control. (Low pressure protection control is not carried out) ※Low pressure is outside normal limite : Operation is shut down after as pipe manually closed.
Etc.	Entry after safety start. (Only the corresponding Outdoor Unit operation.) To pump out more than 2 : Except communicatio between Outdoor unit of relevant set after working for one, remainder set makes Pump Out add.

4-4 Case study for trouble shoots (cont.)

4-4-3 Pump out operation (cont.)



4-4 Case study for trouble shoots (cont.)

4-4-4 Vacuum

Operation to facilitate vacuum to open the valve after the Outdoor Unit repair.
 There are several EEV & solenoid valve so to secure perfect vacuum this function is required.

K1 button	Display on 7-Segment	Function
7times	"8" "8" "8" "8"	Vacuuming(Outdoor unit address 1)
8times	"8" "8" "8" "2"	Vacuuming(Outdoor unit address 2)
9times	"8" "8" "8" "3"	Vacuuming(Outdoor unit address 3)
10times	"8" "8" "8" "4"	Vacuuming(Outdoor unit address 4)
11times	"8" "8" "8" "8"	Vacuuming(All outdoor units)

How to Initiate	K1 Tact Swithc 7 times~11 times
Compressor	OFF
Indoor Unit/Outdoor Unit	OFF
4Wasy Valve	OFF
Valve	Open all valves maximum
Etc.	If not turn off the vacuum mode, the start of normal operation is prohibited.

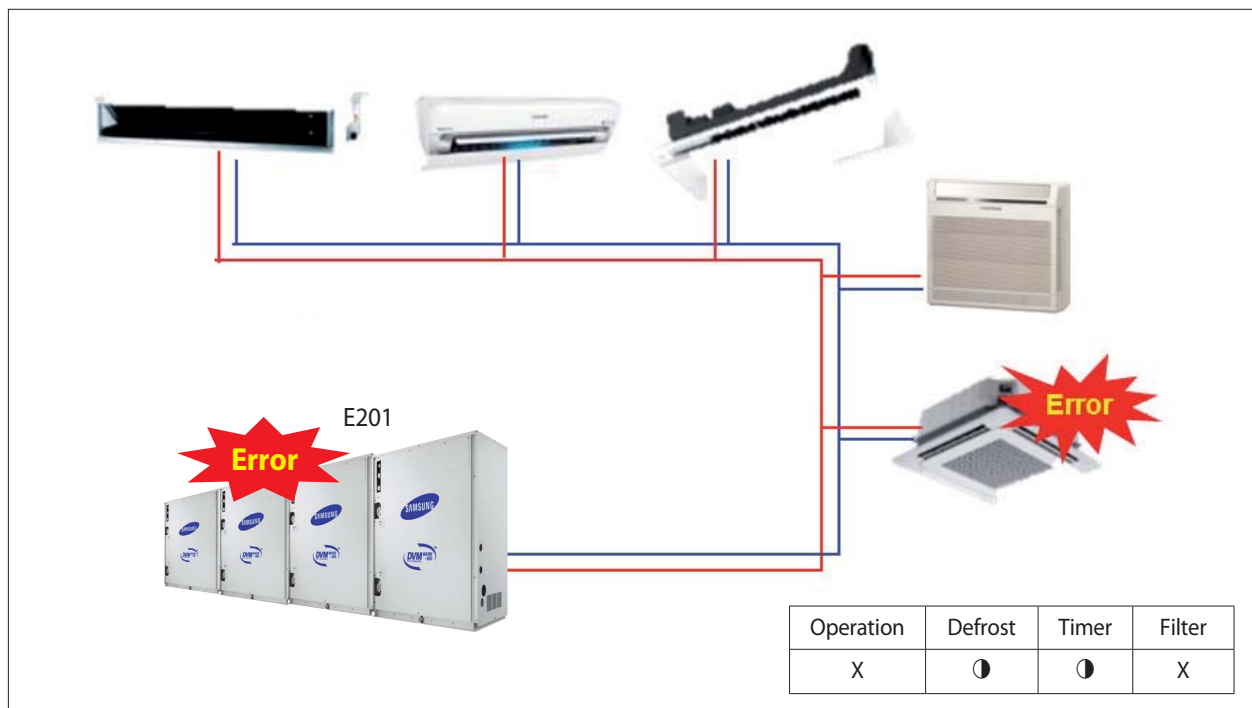
4-4 Case study for trouble shoots (cont.)

4-4-5 Case study – E201 (Communication error between indoor & outdoor unit)

Outdoor unit display	E201														
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)					
	Operation	Defrost	Timer	Fan	Filter/ MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24°C	27°C	
	x	x	●	●	x	x	●	●	x	x	x	●	●	x	
※ ● : ON ○ : Flash x: OFF															
Judgment Method	· Communication error between indoor and outdoor units.														
Cause of problem	· Refer to the judgment method below.														

Cause	Solution
Indoor unit's quantity installed ≠ IDU quantity setting value in Outdoor unit's main PBA	Adjust the setting
F1,F2 wire disconnection	Check the F1,F2 wire
Communication IC faulty	Check the IC
Duplicated address setting(E108 will be shown as well)	Change the indoor unit's address
Cause	Cause

- Problem : System stop by E201 intermittently
- Condition : System was ok when commissioning



4-4 Case study for trouble shoots (cont.)

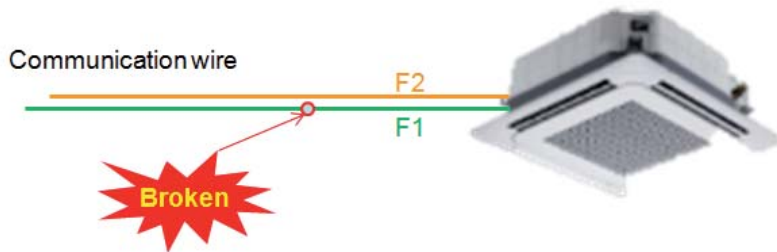
4-4-5 Case study – E201 (Communication error between indoor & outdoor unit) (cont.)

▪ Action

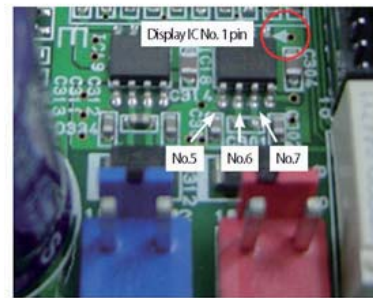
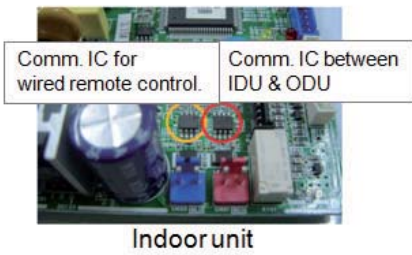
Action	Result
Check wiring to F1,F2 terminal block	OK
Comm. IC check	OK
Check ODU PBA setting	OK
Check Other error occurrence	OK
Wiring broken check	NG – middle of the F1 wire was broken

▪ Solution

- Change the wire to new one



● How to check the Comm. IC

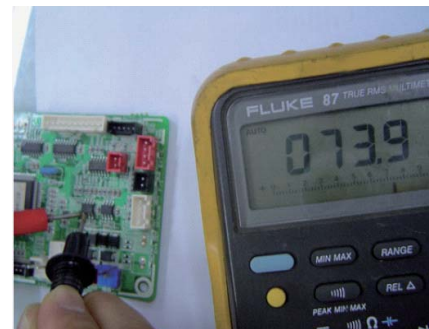


▪ Measurement Method

Measure the No.5- No.6 / No.5- No.7 / No.5- No.8 Pin resistance

▪ Judgment

- Normal : Each resistance value = in hundreds Ω ~ to hundreds of $k\Omega$.
- Defective : One or both are low with tens of Ω
One or both of them is open

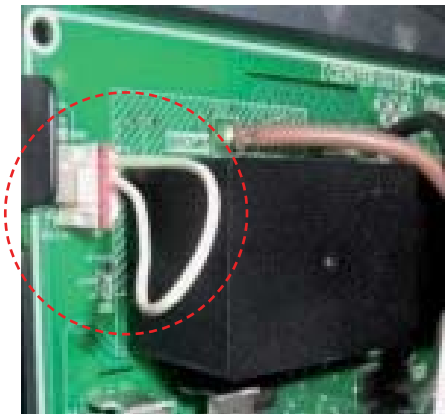


4-4 Case study for trouble shoots (cont.)

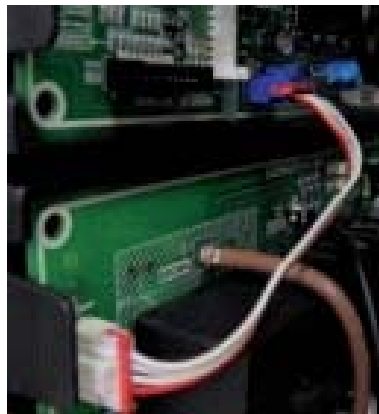
4-4-6 Case study – E205 (Internal communication error of the outdoor unit C-box)

Outdoor unit display	E205														
Indoorunit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)					
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24°C	27°C	
	×	×	●	●	×	×	●	●	×	×	×	●	●	×	
	※ ● : ON ● : Flash × : OFF														
Judgment Method	· Communication error between the C-Box PBA.														
Cause of problem	· Communication wire inside the C-Box is unconnected. · Main PBA defective.														

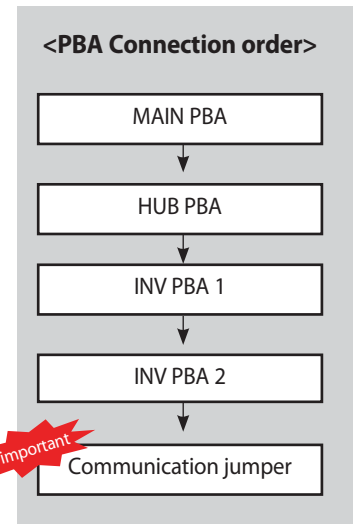
Possibility	<ol style="list-style-type: none"> 1) No communication jumper connector on Inverter PBA. 2) No power supply to inverter PBA. 3) Poor connection of communication wiring and connector. 4) Wrong HP information in EEPROM.
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Comm. jumper



Connection Inv1 and inv2



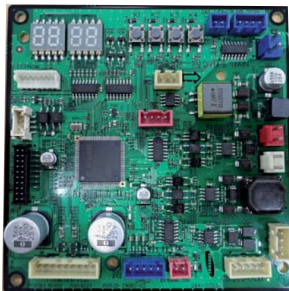
4-4 Case study for trouble shoots (cont.)

4-4-7 Case study – E206 (Internal communication error of the outdoor unit C-box)

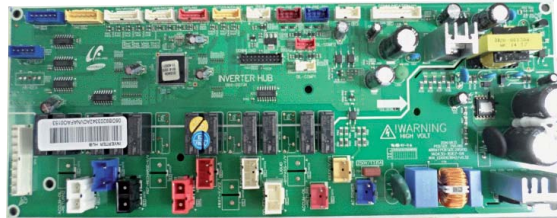
Outdoor unit display	<i>E206</i>														
Indoor unit display	Duct, Cassette (1/2 Way), Console, Ceiling					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)					
	Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24°C	27°C	
	×	×	●	●	×	×	●	●	×	×	×	●	●	×	
	※ ● : ON ● : Flash ×: OFF														
Judgment Method	· PBA does not respond to the invoked Main PBA														
Cause of problem	· C-Box internal Inverter PBA, Fan PBA, Hub PBA defective														
Possibility	1) Poor connection of communication wiring and connector 2) Defect of related electric component														

*** Reference**

E206- C001 : HUB PBA communication error / E206-C002 : FAN PBA communication error
 E206- C003 : INV1 PBA communication error / E206-C004 : INV2 PBA communication error
 E206- C005 : Water Hub PBA communication error



Main PBA



Hub PBA



Inverter PBA

4-4 Case study for trouble shoots (cont.)

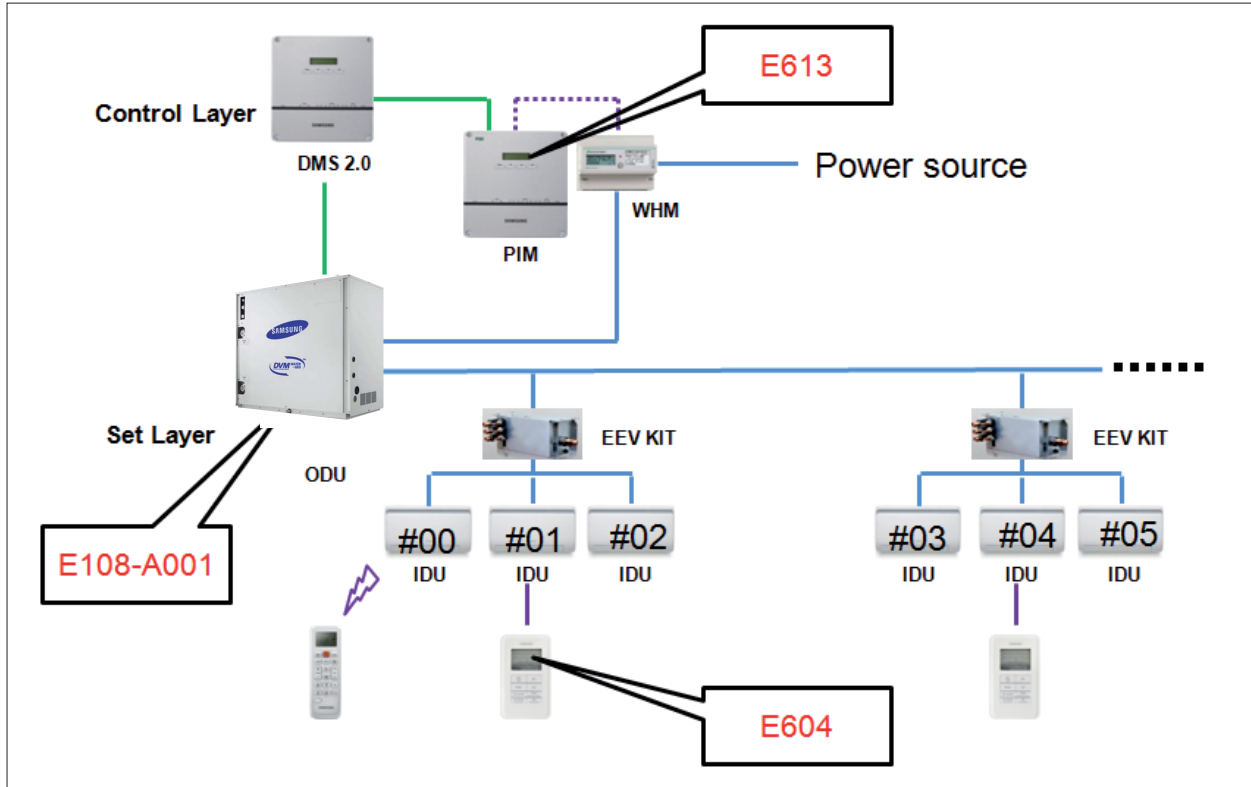
4-4-8 Case study – E108 (Error due to repeated address setting)

Outdoor unit display	E 108 - A00X (X : Address of duplicate indoor unit)				
Indoorunit display	Operation	Defrost	Timer	Fan	Filter/EMI
	x	x	●	●	x
※ ● : ON ● : Flash x: OFF					
Judgment Method	· Refer to the judgment method below.				
Cause of problem	· Indoor unit and MCU address duplication.				

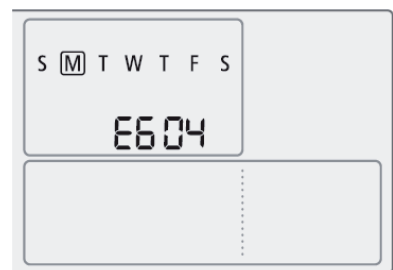
Cause	Solution
Display : E108-A001-E108-A001... Duplicated address of indoor unit	Find IDU address #01 & another indoor unit which LED is blinking Then change the address. 1. Press K4 button for 3sec in ODU PBA 2. Press K4 button 8times. 3. Check the displayed address which you set manually Display : MANU-A000-A001-A002-A004-MANU-A001-A002-A004... If you can't see address "03" probably #03 IDU has wrong address
Duplicated address of indoor unit in EEV kit	Check the EEV Kit setting
Display : E108-C101-E108-C101... → Duplicated address of MCU	Check MCU address rotary switch

4-4 Case study for trouble shoots (cont.)

4-4-9 Case study – E108, E604, E613



PIM display	E604
Contents	Communication error between wired remote controller & Indoor unit
Error result	Remote controller stop
Cause	<ul style="list-style-type: none"> - When tracking between wired remote controller and indoor unit/ventilator (ERV) is not complete for more than 3 minutes(ex: System communication error like E201, E108...) - IDU address has been changed after wired remote controller tracking completion
Treatment	1) Power reset of Wired Remote controller (Manual reset ; re connect the power wire)



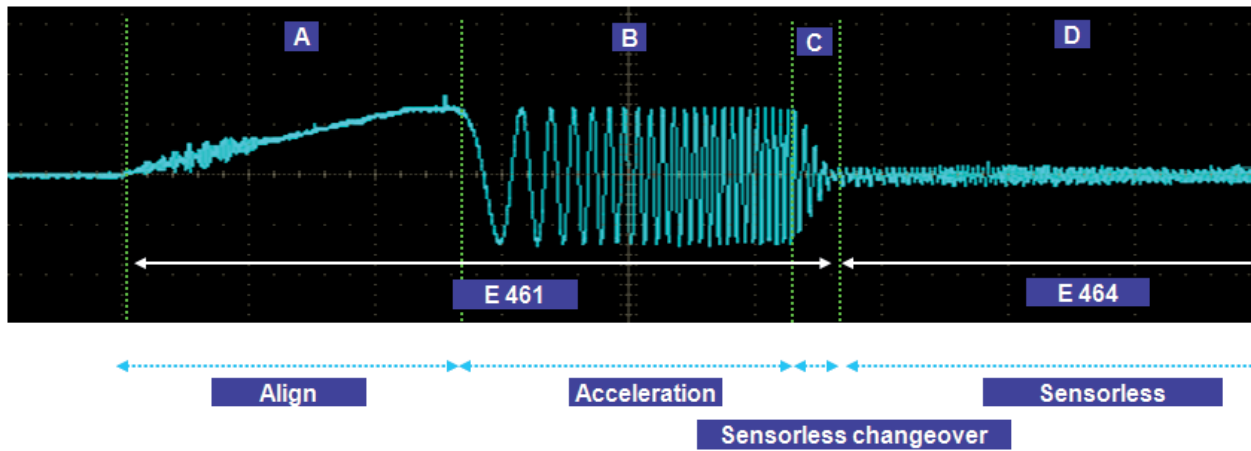
PIM display	E613
Contents	Error which occurs when there is no communication between DMS and PIM/SIM for 15 minutes
Error result	PIM stop
Cause	<ul style="list-style-type: none"> - System communication error like E201, E108... - Wired disconnection
Treatment	<ul style="list-style-type: none"> - System communication error fix - Check the wire

Error code	Description	Cause	Solution
E613	Comm. error between DMS and PIM/SIM	Comm. was not finished Because of E108	Fix E108
E108	Address duplication of IDU/MCU/EEV kit	EEV KIT address setting Failure (human error)	Fix IDU address
E604	Tracking error between remote controller and the IDU	Tracking fail because of E108	Power reset on Wired remote controller

4-4 Case study for trouble shoots (cont.)

4-4-10 Case study – E461, E361 (Error due to operation failure of inverter compressor)

Outdoor unit display	<i>E461</i> (INVERTER1 PBA) <i>E361</i> (INVERTER2 PBA)
Judgment Method	<ul style="list-style-type: none"> · Startup, and then if the speed increase is not normally. · Detected by H/W or S/W.
Cause of problem	<ul style="list-style-type: none"> · Compressor connection error · Defective Compressor · Defective PBA



4-4 Case study for trouble shoots (cont.)

4-4-11 Case study – Inverter PBA error

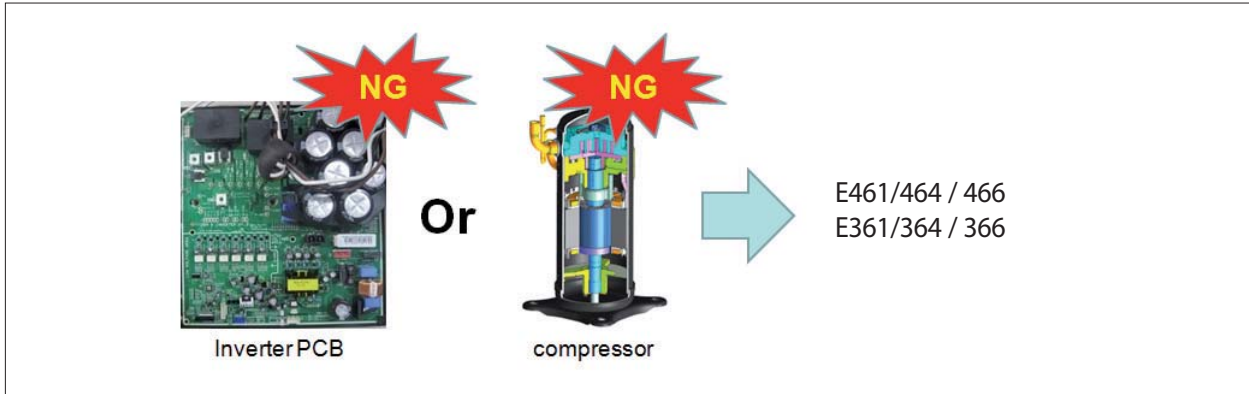
Outdoor unit display	<i>E464/E465</i> (INVERTER1 PBA) <i>E364/E365</i> (INVERTER2 PBA)
Judgment Method	<ul style="list-style-type: none"> · Will occur if the overcurrent flowing in the IPM. · Detected by H/W or S/W
Cause of problem	<ul style="list-style-type: none"> · Installation defective · Comp. defective · PBA defective · Connection wire error · Motor defective

Outdoor unit display	<i>E466</i> (INVERTER1 PBA) <i>E366</i> (INVERTER2 PBA)
Judgment Method	<ul style="list-style-type: none"> · N-phase wiring error and EMI Fuse short. · DC-Link Overvoltage / Low voltage occurs.
Cause of problem	<ul style="list-style-type: none"> · Check the input wiring · EMI Fuse short

4-4 Case study for trouble shoots (cont.)

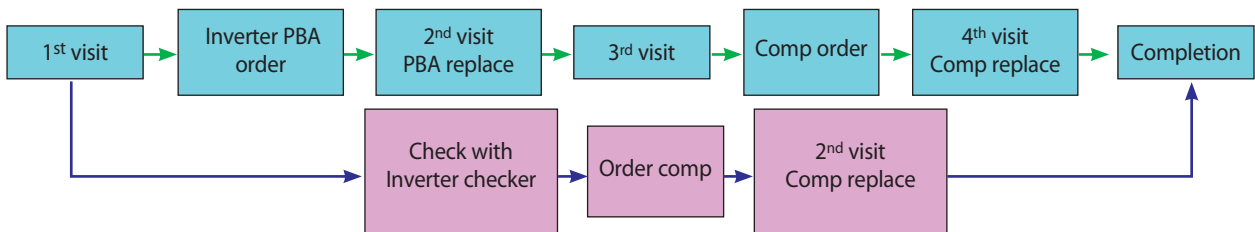
4-4-12 Case study – E461/361 & E464/364 & E466/366

- Check whether compressor defect or Inverter PBA defect.



▪ Diagnosis 1 : Using inverter checker

1. Power Off
2. Wait more than 15 minutes after the Power Off as in case of IPM failure, discharge mode may not work properly.
3. Connect inverter checker(Phase checker)(U : RED / V : WHT / W : BLK)
4. Execute inverter checker function in OUD main PBA.
5. If any LED is not blinking → PBA defect → Change PBA

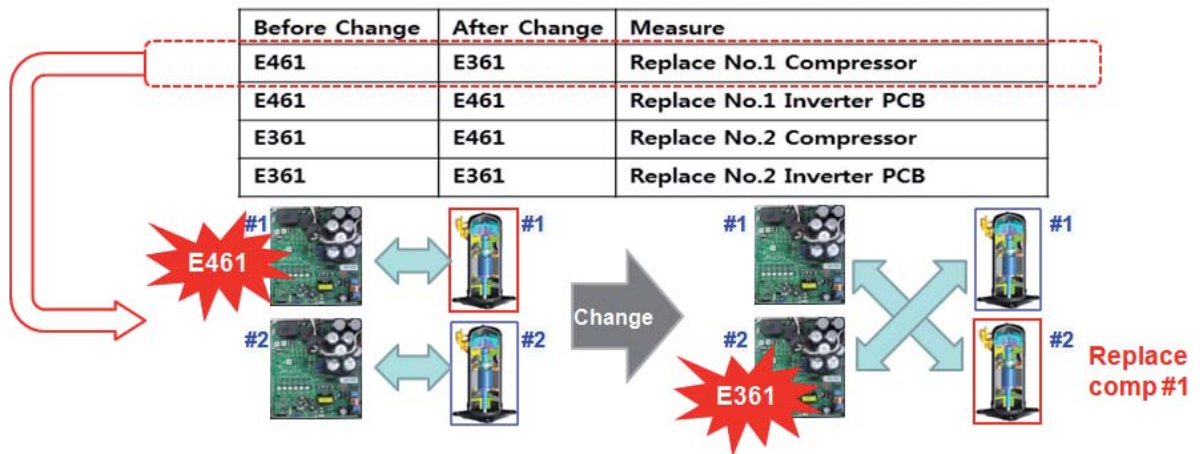


4-4 Case study for trouble shoots (cont.)

4-4-12 Case study – E461/361 & E464/364 & E466/366 (cont.)

▪ **Diagnosis 2 : When 2comp system**

1. Power Off
2. Wait more than 15 minutes after the Power Off.
3. Exchange comp wire (Inverter PBA 1 ↔ comp 2 & Inverter PBA 2 ↔ comp 1)
4. Take measure according to the result



4-4 Case study for trouble shoots (cont.)

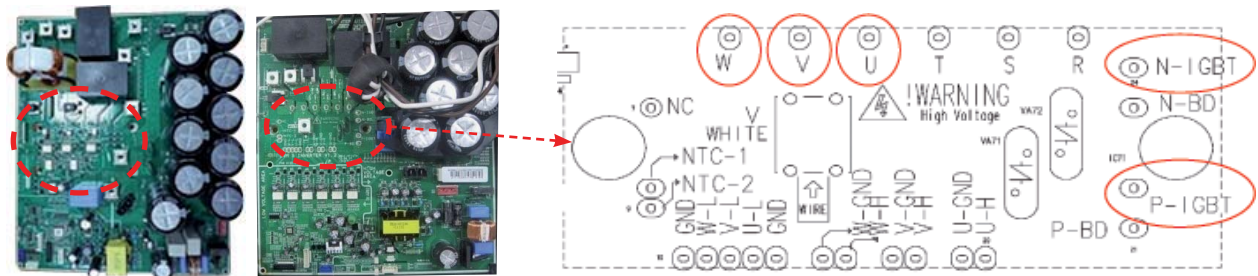
4-4-12 Case study – E461/361 & E464/364 & E466/366 (cont.)

▪ **Diagnosis 3 : Check Inverter PBA defect with Tester**

1. Power Off.
2. Wait more than 15 minutes after the Power Off as in case of IPM failure, discharge mode may not work properly.
3. Remove all of the Inverter PBA connectors and wire that is fixed as screw. (Include wire that is fixed to compressor and DC Reactor.)
4. Prepare the digital multi tester.



Division	Measured Point		Criterion	Remark
	+	-		
Measure the resistance values	P-IGBT	U	More than 500KΩ	Measurement error can occur for reasons such as the initial measurement condenser discharge. Measured over at least three times.
	P-IGBT	V		
	P-IGBT	W		
	U	N-IGBT		
	V	N-IGBT		
	W	N-IGBT		
Measure the diode voltage values	U	P-IGBT	0.3~0.7V	
	V	P-IGBT		
	W	P-IGBT		
	N-IGBT	U		
	N-IGBT	V		
	N-IGBT	W		



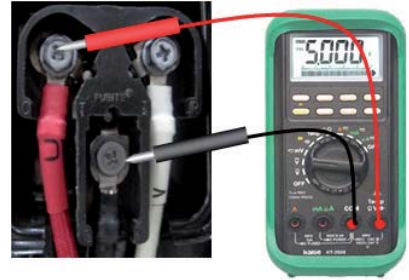
4-4 Case study for trouble shoots (cont.)

4-4-12 Case study – E461/361 & E464/364 & E466/366 (cont.)

▪ **Diagnosis 4 : Check compressor defect with Tester**

1. Power Off.
2. Wait more than 15 minutes after the Power Off as in case of IPM failure, discharge mode may not work properly.
3. Prepare the digital multi tester.

Resistance test	Normal Value
Resistance value of (U↔V,V↔W,W↔U) on compressor	less than 2Ω
Resistance value between the body of compressor and chassis	MΩ



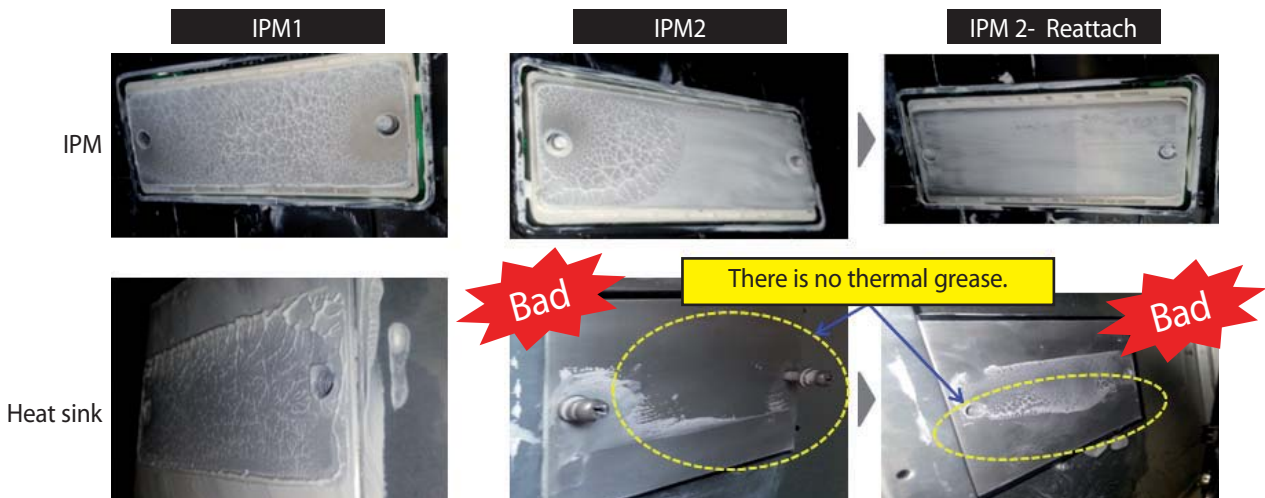
4-4 Case study for trouble shoots (cont.)

4-4-13 Case study – Poor cooling caused by IPM overheated

- Problem : Poor cooling
- Condition : Compressor frequency doesn't increase, IPM temperature is too high, Low pressure is high
- History
 - : 13.05.07 Trial operation
 - : 13.05.27 Inverter PBA, EMI PBA, Reactor replacement
 - : 13.05.27 IPM temperature ↑ → comp Hz ↓ → cooling capacity ↓

Test	5/27	5/28		
		case 1	case 2	case 3
		upper PBA change	lower PBA change	exchange PBA position each other
Upper PBA (inv 2)	PBA_A freq. 55hz IPM 89℃	PBA C freq. 54hz IPM 82℃	PBA C freq. 55hz IPM 79℃	PBA D freq. 55hz IPM 81℃
Lower PBA (inv 1)	PBA B freq. 52hz IPM 86℃	PBA B freq. 51hz IPM 92℃	CB D freq. 52hz IPM 91℃	PBA C freq. 52hz IPM 89℃

- Root cause : Bad contact of IPM cause by faulty bolt.



4-4 Case study for trouble shoots (cont.)

4-4-13 Case study – Poor cooling caused by IPM overheated (cont.)

- Conclusion : Change bolt to new one, reattach the IPM → Problem solved

Date	5/28	5/29
OD Temp	38	38
High pressure	30.5	30.4
Low pressure	10.9	11.4
Comp1	52	52
Comp2	55	55
Current1	12.3	15.3
Current2	10.3	14.2
IPM1	86	89
IPM2	89	81
	Basic	Reattach #1

※ IPM Temp Protection

- Hz Hold : 90 °C
- Hz Down : 93 °C



Date	6/5	6/5
OD Temp	41.6	40.8
High pressure	34.7	36.4
Low pressure	10.5	9.9
Comp1	61	82
Comp2	64	85
Current1	14.9	20.2
Current2	14.2	19.3
IPM1	88	85
IPM2	90	86
	Reattach #2	Solved

※ HP Protection

- Hz Hold : 36 kgf/cm²
- Hz Down : 37 kgf/cm²

4-4 Case study for trouble shoots (cont.)

4-4-14 Case study – Related error with IPM

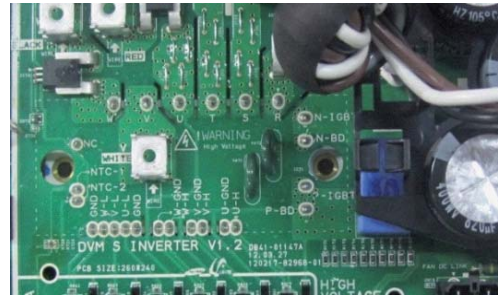
Error code	E500 (INV 1) / E400 (INV 2)
Contents	IGBT module over heated error
Error result	
Possibility	1) Loose screw connection between IGBT module and heat sink 2) No thermal grease on Heat sink 3) Defect of related electronic component
Treatment	1) Check status of screws on IGBT module 2) Plastering thermal grease to IGBT module or heat sink 3) Change INV PBA



Heat sink



IGBT(IPM) module



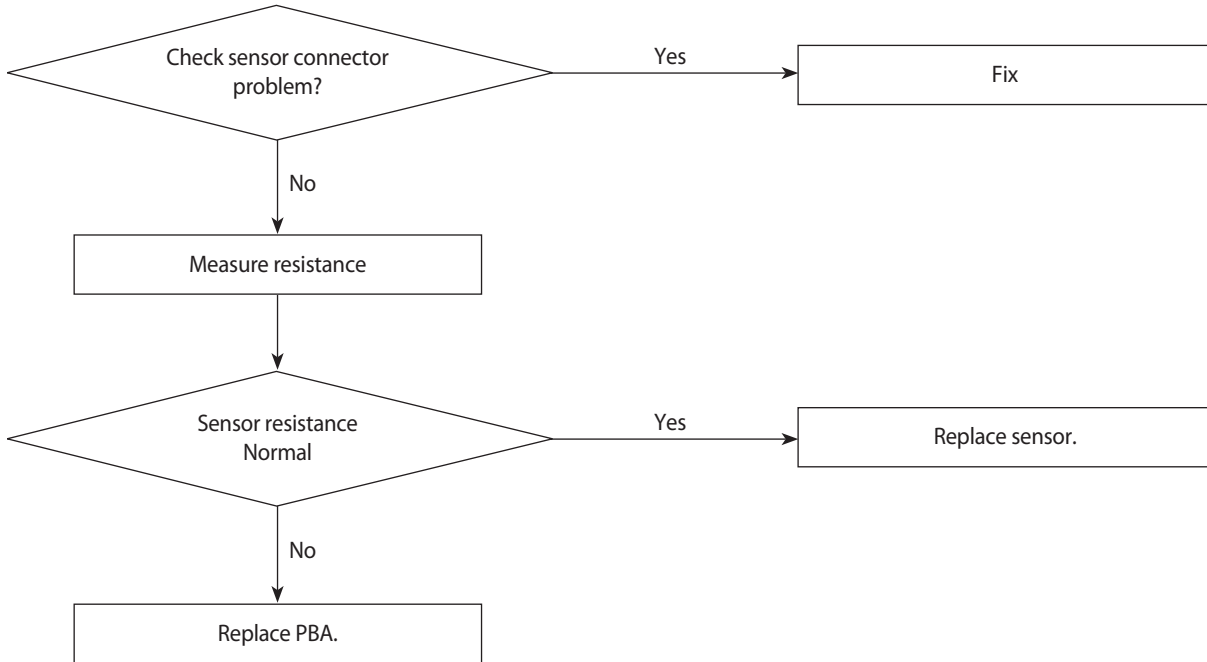
Inv. PBA

Good	No Good

4-4 Case study for trouble shoots (cont.)

4-4-15 Case study – Temperature sensor open/short

- Disconnection or breakdown of relevant sensor.



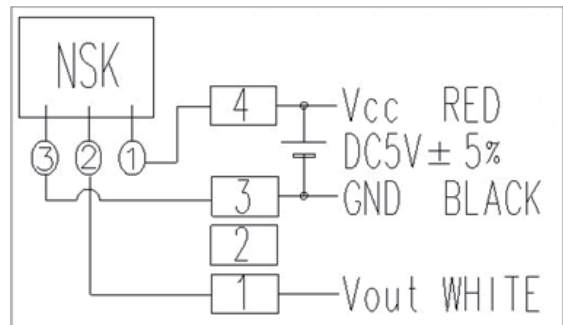
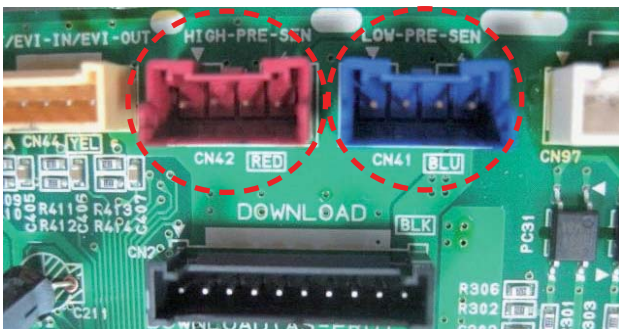
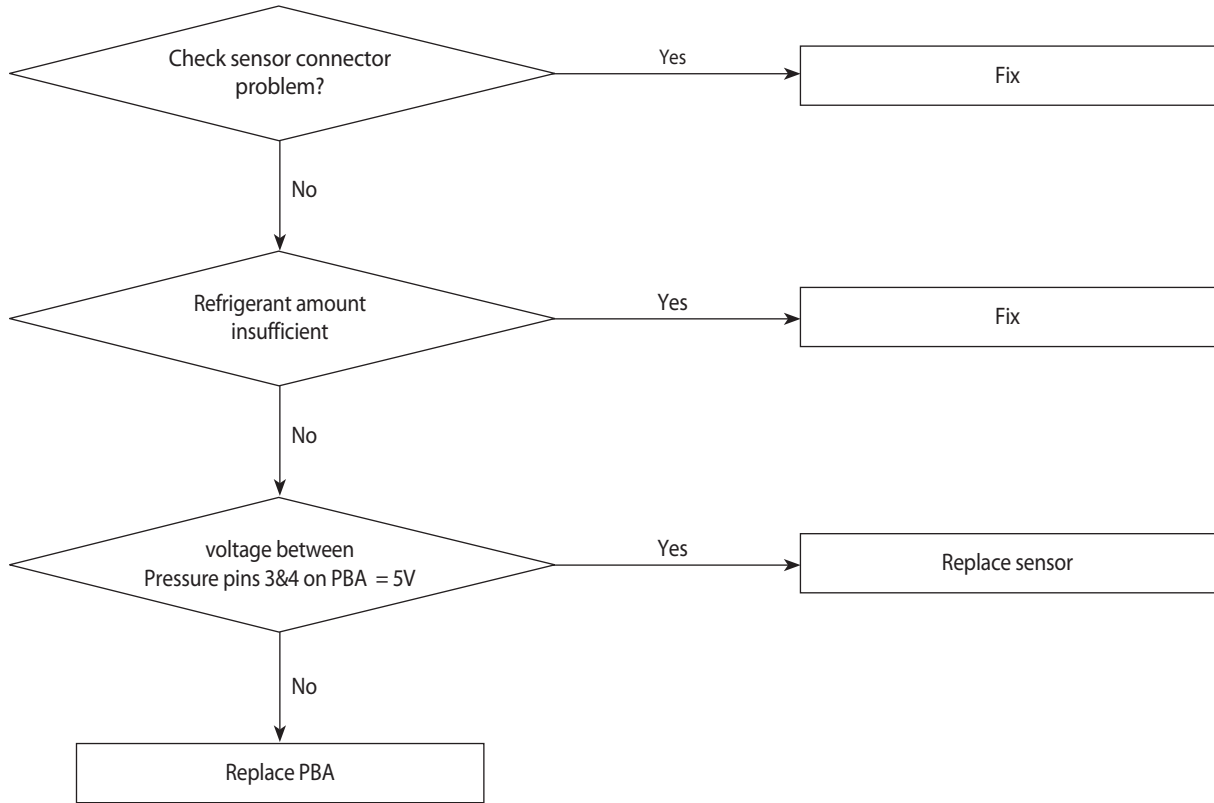
Name	Type	Error
Ambient temp. sensor	103AT	E221
Cond_out temp. sensor	103AT	E231
EVI in/out temp. sensor	103AT	E321,322
Liquid tube temp. sensor	103AT	E311
Suction temp. sensor	103AT	E308,323
Discharge temp. sensor	204CT	E251,257
Comp. top temp. sensor	204CT	E276,277

103 AT		204 CT	
Temp. (°C)	Resistance (kΩ)	Temp. (°C)	Resistance (kΩ)
70	2.2	130	8.9
60	3.0	120	11.2
50	4.2	100	18.5
40	5.8	80	32
30	8.3	60	59
21	12.1	25	200
10	18.0	20	242
0	27.3	10	362
-10	43.0	0	553

4-4 Case study for trouble shoots (cont.)

4-4-16 Case study – Pressure sensor open/short

- Disconnection or breakdown of relevant sensor.
- E291 : High pressure sensor error
- E296 : Low pressure sensor error



5-1 ASS'Y PBA MAIN (cont.)

■ Push buttons Type

<p>① CN22-DOWNLOAD</p> <p>#1 : RX-DOWN #2 : TX-DOWN #3 : N-TRST #4 : TDO #5 : TCK #6 : TDI #7 : TMS #8 : #9 : GND #10 : VCC</p>	<p>② CN43-COMM TEST</p> <p>#1 : 12V #2 : INVERTER-INRUSH-OUT #3 : INVERTER-COMM #4 : GND</p>	<p>③ CN301-EEPROM</p> <p>#1 : GND #2 : #3 : VCC #4 : EEPROM-SELECT #5 : EEPROM-SO #6 : EEPROM-SI #7 : EEPROM-CLOCK</p>	<p>④ CN42 - HUB COMM</p> <p>#1 : 12V #2 : INVERTER-INRUSH-OUT #3 : INVERTER-COMM #4 : GND #5 : HIGH-PRESSURE-SENSOR #6 : LOW-PRESSURE-SENSOR #7 : ZERO-CROSSING #8 : GND #9 : VCC</p>
<p>⑤ CN901-DRED</p> <p>#1 : KEY3 #2 : GRID #3 : KEY4 #4 : GND #5 : VCC</p>	<p>⑥ OPT1 -MODE SELECTOR</p> <p>#1 : KEY3 #2 : GRID #3 : KEY4</p>	<p>⑦ CN85-CONDITION CHECK</p> <p>#1 : 12V #2 : ERROR-CHECK-OUT #3 : 12V #4 : COMP-CHECK-OUT</p>	<p>⑧ CN86-EXTERNAL CONTROL</p> <p>#1 : CONTROL #2 : GND</p>
<p>⑨ CN12 - 12V POWER</p> <p>#1 : 12V #2 : GND</p>	<p>⑩ CN45 -OUTDOOR COMM</p> <p>#1 : COM-C #2 : COM-D #3 : #4 : 12V #5 : GND</p>	<p>⑪ CN44 - INDOOR COMM</p> <p>#1 : COM-A #2 : COM-B #3 : 5V #4 : AGND</p>	<p>⑫ CN34- UNUSED COMM</p> <p>#1 : COM-E #2 : COM-F</p>
<p>⑬ CN33-INDOOR COMM</p> <p>(EXTRA) #2 : COM-B</p>	<p>⑭ CN13-5V POWER</p> <p>#1 : COM-A #2 : COM-B</p>	<p>⑮ CN88-GAS LEAK</p> <p>#1 : VCC #2 : COM-B</p>	<p>⑯ CN87-PUMP DOWN</p> <p>#1 : 12V #2 : PUMP DOWN START OUT #3 : 12V #4 : PUMP DOWN END OUT</p>

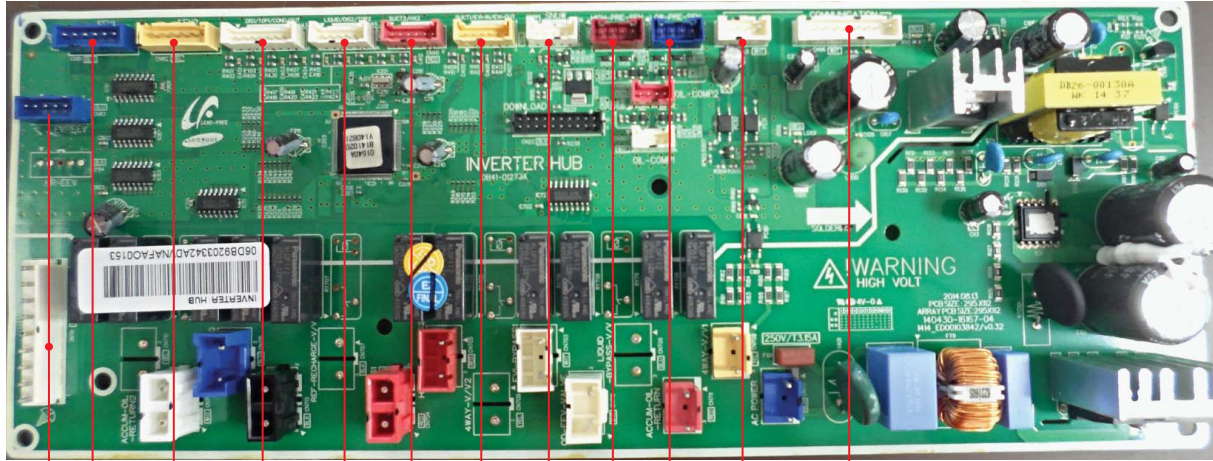
5-1 ASS'Y PBA MAIN (cont.)

■ DIP S/W Type

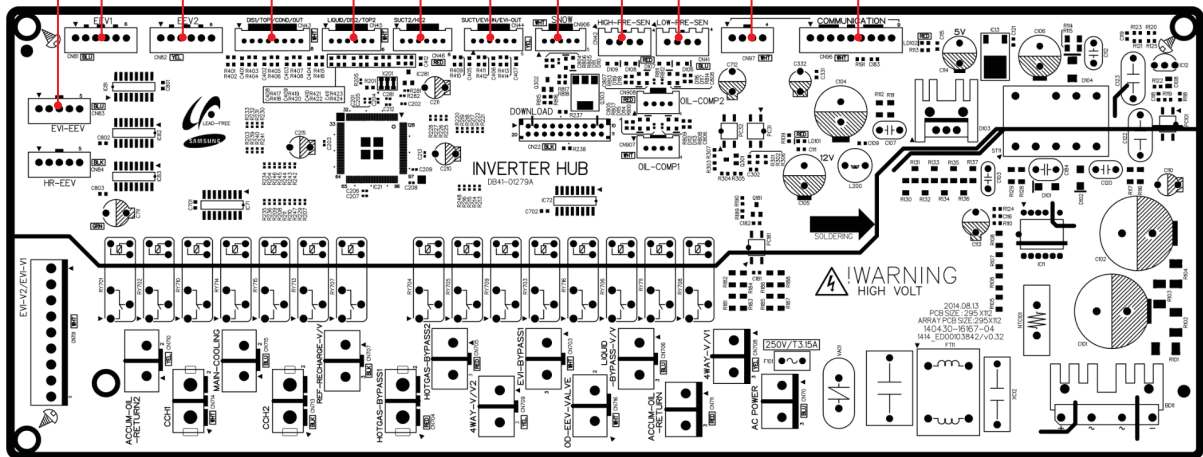
<p>① CN22-DOWNLOAD</p> <p>#1 : RX-DOWN #2 : TX-DOWN #3 : N-TRST #4 : TDO #5 : TCK #6 : TDI #7 : TMS #8 : #9 : GND #10 : VCC</p>	<p>② CN21-ASPRO DOWNLOAD</p> <p>#1 : VCC #2 : MODE0 #3 : RESET_MAIN #4 : #5 : F_SCLK #6 : F_SDAT #7 : GND</p>	<p>③ CN43-COMM TEST</p> <p>#1 : 12V #2 : INVERTER-INRUSH-OUT #3 : INVERTER-COMM #4 : GND</p>	<p>④ CN301-EEPROM</p> <p>#1 : GND #2 : #3 : VCC #4 : EEPROM-SELECT #5 : EEPROM-SO #6 : EEPROM-SI #7 : EEPROM-CLOCK</p>
<p>⑤ CN42 - HUB COMM</p> <p>#1 : 12V #2 : INVERTER-INRUSH-OUT #3 : INVERTER-COMM #4 : GND #5 : HIGH-PRESSURE-SENSOR #6 : LOW-PRESSURE-SENSOR #7 : ZERO-CROSSING #8 : GND #9 : VCC</p>	<p>⑥ CN901-DRED</p> <p>#1 : KEY3 #2 : GRID #3 : KEY4 #4 : GND #5 : VCC</p>	<p>⑦ OPT1 -MODE SELECTOR</p> <p>#1 : KEY3 #2 : GRID #3 : KEY4</p>	<p>⑧ CN85-CONDITION CHECK</p> <p>#1 : 12V #2 : ERROR-CHECK-OUT #3 : 12V #4 : COMP-CHECK-OUT</p>
<p>⑨ CN86-EXTERNAL CONTROL</p> <p>#1 : CONTROL #2 : GND</p>	<p>⑩ CN12 - 12V POWER</p> <p>#1 : 12V #2 : GND</p>	<p>⑪ CN45 -OUTDOOR COMM</p> <p>#1 : COM-C #2 : COM-D #3 : #4 : 12V #5 : GND</p>	<p>⑫ CN44 - INDOOR COMM</p> <p>#1 : COM-A #2 : COM-B #3 : 5V #4 : AGND</p>
<p>⑬ CN34- UNUSED COMM</p> <p>#1 : COM-E #2 : COM-F</p>	<p>⑭ CN33-INDOOR COMM (EXTRA)</p> <p>#1 : COM-A #2 : COM-B</p>	<p>⑮ CN13-5V POWER</p> <p>#1 : COM-A #2 : COM-B</p>	

5-2 ASS'Y PBA MAIN-HUB

■ AC



- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12



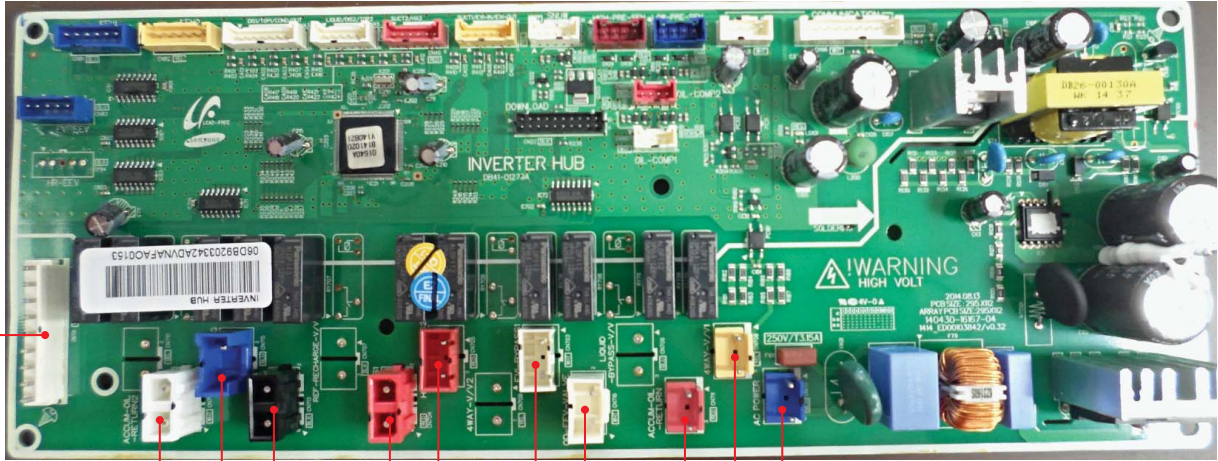
5-2 ASS'Y PBA MAIN-HUB (cont.)

■ AC

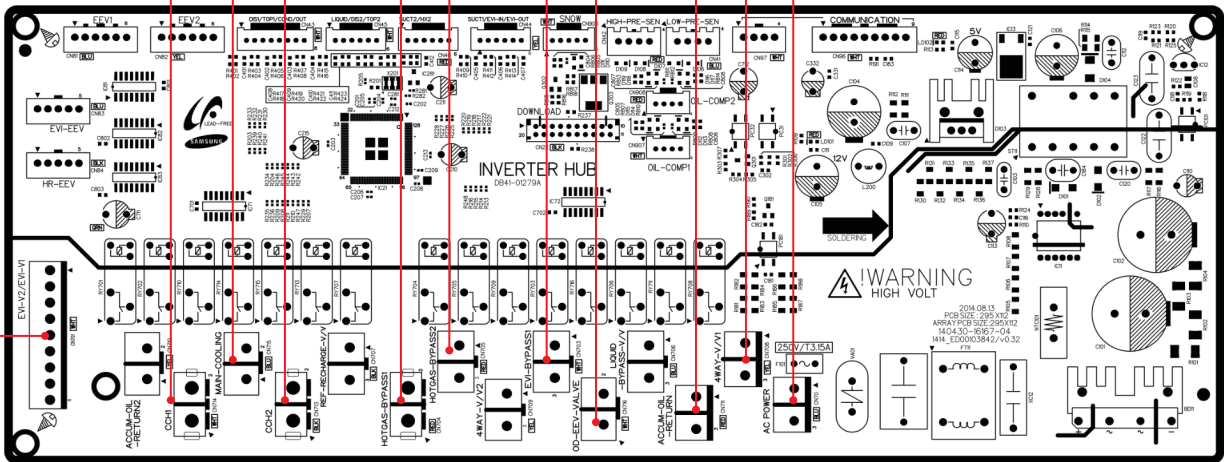
<p>① CN83-EVI EEV</p> <p>#1 : EEV3_A_OUT #2 : EEV3_B_OUT #3 : EEV3_A'_OUT #4 : EEV3_B'_OUT #5 : 12V</p>	<p>② CN81-EEV1</p> <p>#1 : EEV1_B'_OUT #2 : EEV1_A'_OUT #3 : EEV1_B_OUT #4 : EEV1_A_OUT #5 : 12V #6 : 12V</p>	<p>③ CN82-EEV2</p> <p>#1 : EEV2_B'_OUT #2 : EEV2_A'_OUT #3 : EEV2_B_OUT #4 : EEV2_A_OUT #5 : 12V #6 : 12V</p>	<p>④ CN43-TEMP. SENSOR</p> <p>#1 : COMP1 DISACHRGE #2 : COMP1 DISCHARGE #3 : COMP1 TOP #4 : COMP1 TOP1 #5 : COND OUT #6 : COND OUT #7 : OUTDOOR TEMP. #8 : OUTDOOR TEMP.</p>
<p>⑤ CN45-TEMP. SENSOR</p> <p>#1 : LIQUID #2 : LIQUID #3 : COMP2 DISCHARGE #4 : COMP2 DISCHARGE #5 : COMP2 TOP #6 : COMP2 TOP</p>	<p>⑥ CN46-SUCT</p> <p>#1 : SUCTION 2 #2 : SUCTION 2 #3 : GND #4 : GND #6 : GND</p>	<p>⑦ CN44 - TEMP. SENSOR</p> <p>#1 : SUCTION 1 #2 : SUCTION 1 #3 : EVI INLET #4 : ENI INLET #5 : ENI OUT ##6 : EVI OUT</p>	<p>⑧ CN906 - SNOW SENSOR</p> <p>#1 : 12V #3 : GND #4 : SNOW_SENSOR #5 : PSD_POWER</p>
<p>⑨ CN42 -HIGH PRESSURE SENSOR</p> <p>#1 : HIGH PRESSURE SENSOR #3 : GND #4 : VCC</p>	<p>⑩ CN41- LOW PRESSURE SENSOR</p> <p>#2 : LOW PRESSURE SENSOR #3 : GND #4 : VCC</p>	<p>⑪ CN97- INV COMM</p> <p>#1 : 12V #2 : INV_SMPS_RELAY #3 : COMM OUT #4 : GND</p>	<p>⑫ CN96 - MAIN-HUB COMM.</p> <p>#1 : 12V #2 : INV_SMPS_RELAY #3 : COMM-MAIN #4 : GND #5 : HIGH-PRESSURE-SENSOR #6 : LOW-PRESSURE-SENSOR #7 : ZERO-CROSSING #8 : GND #9 : VCC</p>

5-2 ASS'Y PBA MAIN-HUB (cont.)

■ DC



- 11
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10



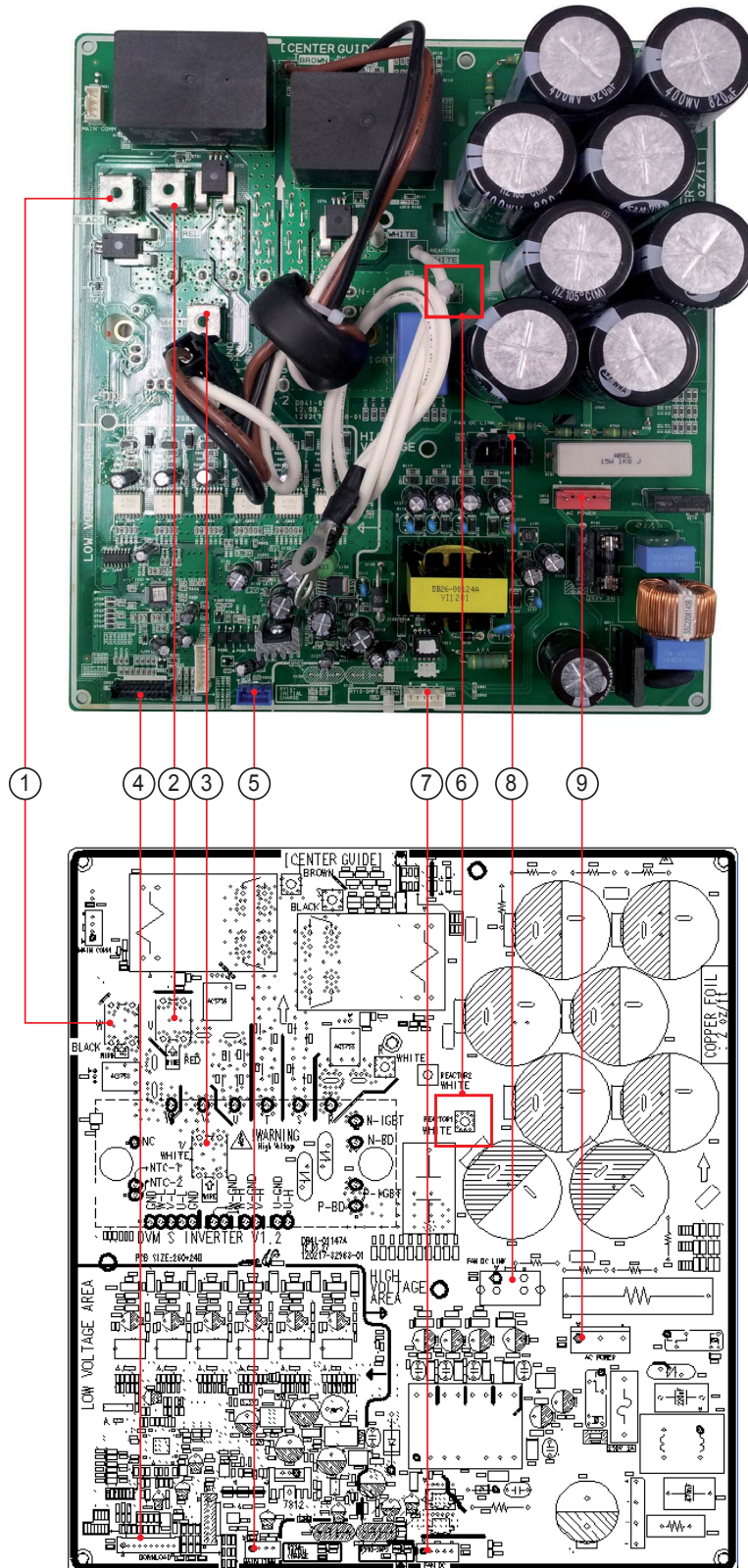
5-2 ASS'Y PBA MAIN-HUB (cont.)

■ DC

<p>① CN714-CCH1 #1: CCH1 #2: CCH1</p>	<p>② CN715-MAIN-COOLING #1: MAIN-COOLING #2: MAIN-COOLING</p>	<p>③ CN713-CCH2 ##1: CCH2 #2: CCH2</p>	<p>④ CN704-HOTGAS-VALVE1 #1: HOTGAS BYPASS1 #2: HOTGAS BYPASS1</p>
<p>⑤ CN705-HOTGAS-BYPASS2 #1: HOTGAS BYPASS2 #2: HOTGAS BYPASS2</p>	<p>⑥ CN703-EVI-BYPASS #1: EVI BYPASS1 #2: EVI BYPASS1</p>	<p>⑦ CN716-OD-EEV-VALVE #1: OD EEV VALVE #2: OD EEV VALVE</p>	<p>⑧ CN711-OIL-RETURN-VALVE #1: ACCUM OIL RETURN VALVE #2: ACCUM OIL RETURN VALVE</p>
<p>⑨ CN708-4-WAY-VALVE #1: 4-WAY VALVE #2: 4-WAY VALVE</p>	<p>⑩ CN70-AC POWER INPUT #1: AC LIVE #2: AC NEUTRAL</p>	<p>⑪ CN701 EVIVALVE 1,2 #1: EVIVALVE 1 #3: EVIVALVE 2 #7: EVIVALVE 1 #8: EVIVALVE 2 #9: AC NEUTRAL</p>	

5-3 ASSY PBA INVERTER

- Model : AM080/100/120/200FXWANR* / AM072/096/120/192HXWAF(J)R*



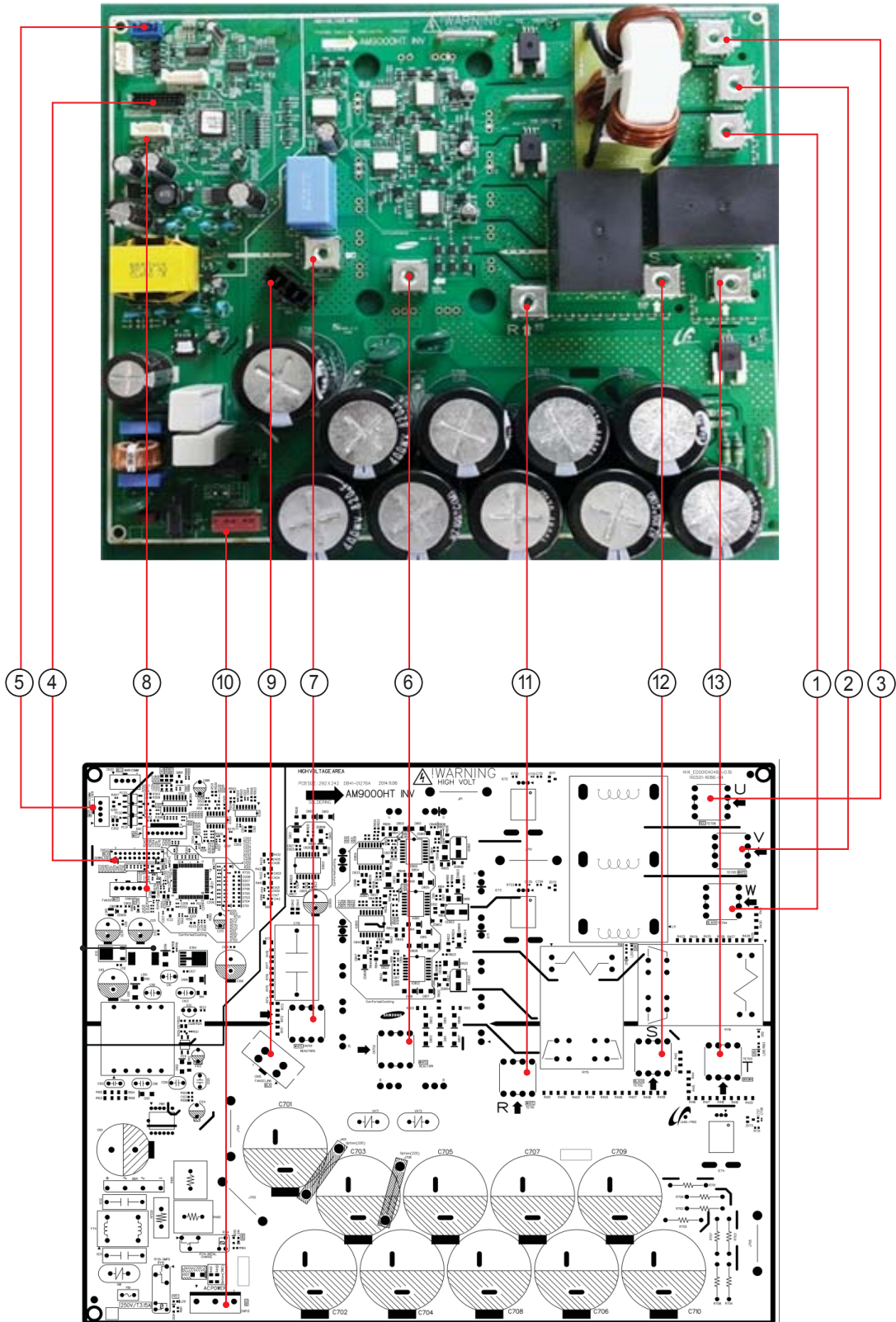
5-3 ASSY PBA INVERTER (cont.)

- Model : AM080/100/120/200FXWANR* / AM072/096/120/192HXWAF(J)R*

<p>① W-COMPW #1:COMPW</p>	<p>② U-COMP U #1:COMP U</p>	<p>③ V-COMP V #1:COMPV</p>	<p>④ CN22-DOWNLOAD #1:RX-DOWN #2:TX-DOWN #3:N-TRST #4:TDO #5:TCK #6:TDI #7:TMS #8: #9:GND #10:VCC</p>
<p>⑤ CN32 – MAIN COMM #1:12V-MAIN #2:IN-SMPS-RELAY #3:COMM-IN #4:GND-MAIN</p>	<p>⑥ REACTOR (WIRE CONNECTION) #1:REACTOR #2:REACTOR</p>	<p>⑦ CN91- FAN DC #1:18V #2:GND #3:5V-FAN #4:AD-SELECT</p>	<p>⑧ CN15-FAN DC LINK #1:500V #2:GND(500V)</p>
<p>⑨ CN13 - ACPOWER #1:AC #2: #3:AC</p>			

5-3 ASSY PBA INVERTER (cont.)

- Model : AM300KXWANR* / AM240KXWAF(J)R*



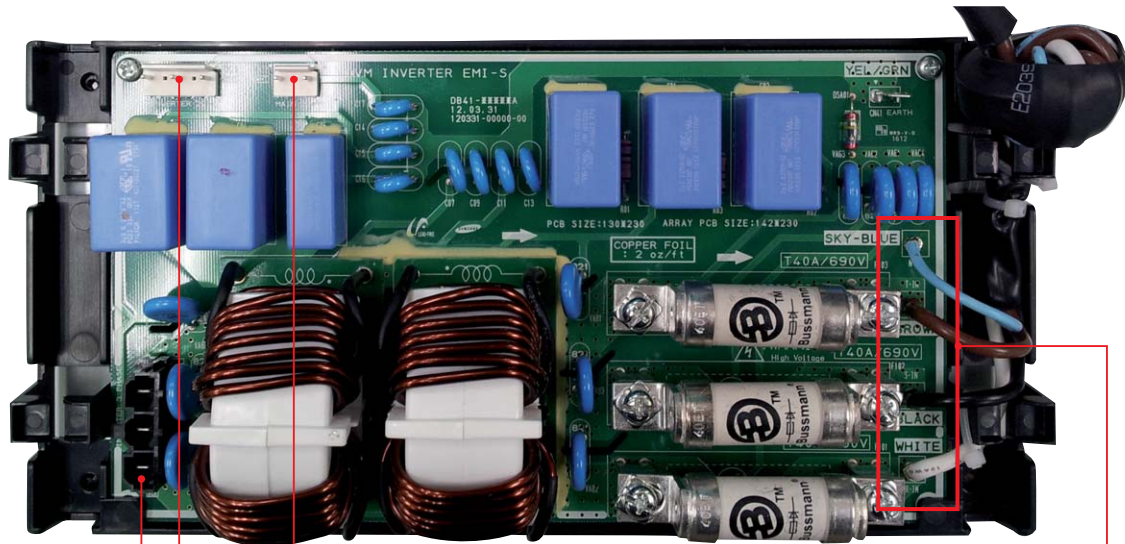
5-3 ASSY PBA INVERTER (cont.)

- Model : AM300KXWANR* / AM240KXWAF(J)R*

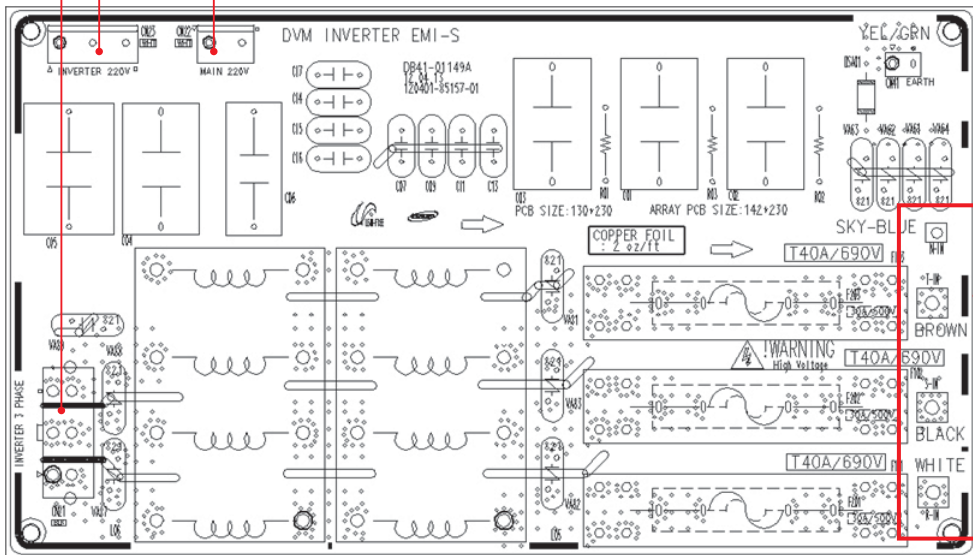
<p>① W-COMP W #1:COMP W</p>	<p>② U-COMP U #1:COMP U</p>	<p>③ V-COMP V #1:COMP V</p>	<p>④ CN22-DOWNLOAD #1:RX-DOWN #2:TX-DOWN #3:BOOT #4:TDO #5:TCK #6:TDI #7:TMS #9:GND #10:VCC</p>
<p>⑤ CN32 – MAIN COMM #1:12V-MAIN #2:IN-SMPS-RELAY #3:COMM-IN #4:GND-MAIN</p>	<p>⑥ CN702-REACTOR1 #1:REACTOR1</p>	<p>⑦ CN701-REACTOR2 #1:REACTOR2</p>	<p>⑧ CN91-FAN DC #1:18V #2:GND #3:5V-FAN #4:AD-SELECT</p>
<p>⑨ CN15-FAN DC LINK #1:AC #2: #3:AC</p>	<p>⑩ CN13-AC POWER #1:AC LIVE #2:AC NEUTRAL #3:AC NEUTRAL</p>	<p>⑪ R-INPUT R TOP #1:R-IN</p>	<p>⑫ S-INPUT S TOP #1:S-IN</p>
<p>⑬ T-INPUT T TOP #1:T-IN</p>			

5-4 ASS'Y PBA EMI

- Model : AM080/100/120/200FXWANR* / AM072/096/120/192HXWAF(J)R*



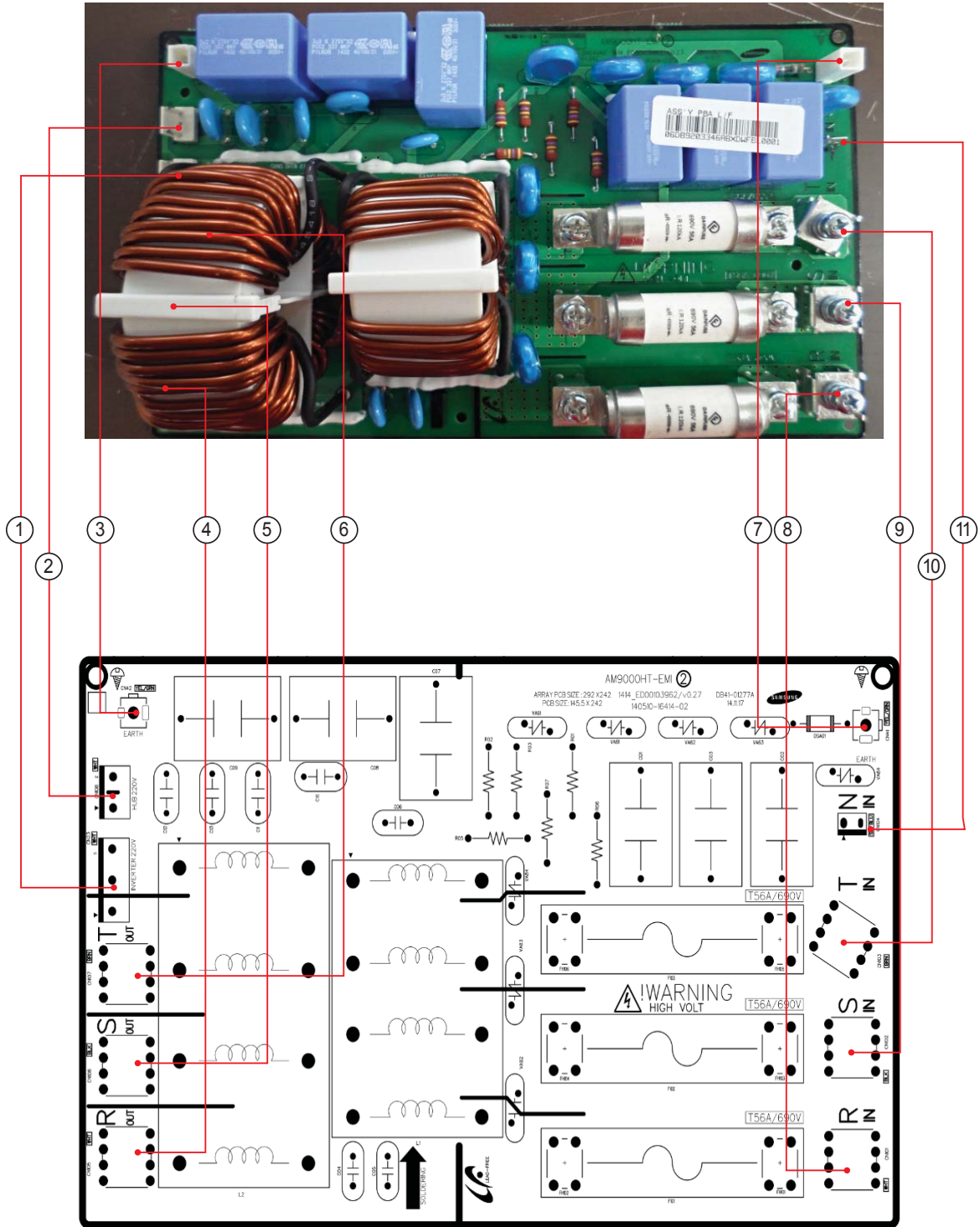
- ①
- ②
- ③
- ④



<p>① CN23-INVERTER 220V</p> <p>#1:AC #2: #3:AC</p>	<p>② CN21-FAN A</p> <p>#1:R #2:S #3:T</p>	<p>③ CN22-MAIN 220</p> <p>#1:AC #2:AC</p>	<p>④ RST-RST INPUT</p> <p>T-IN S-IN R-IN</p>
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5-4 ASS'Y PBA EMI (cont.)

- Model : AM300KXWANR* / AM240KXWAF(J)R*



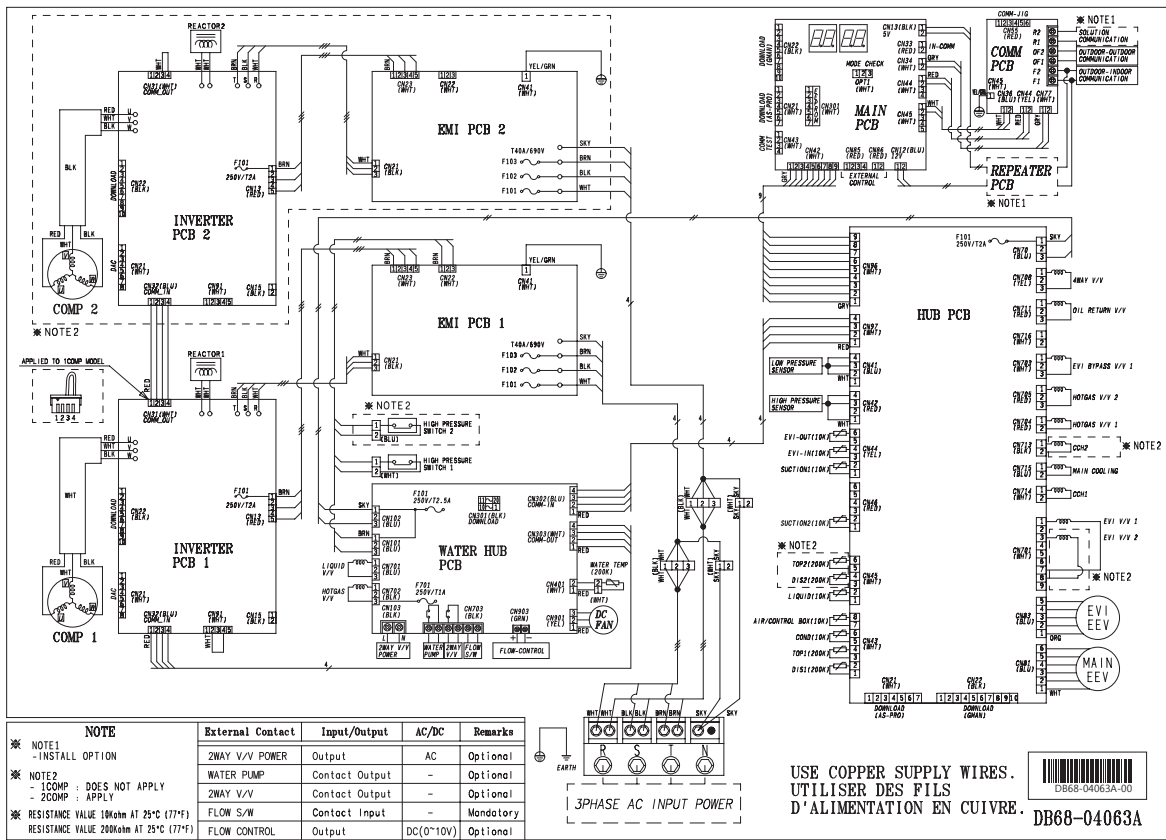
5-4 ASS'Y PBA EMI (cont.)

- Model : AM300KXWANR* / AM240KXWAF(J)R*

<p>① CN23-INVERTER 220V #1: AC LIVE #2: #3: AC NEUTRAL #4: #5: AC NEUTRAL</p>	<p>② CNCN108-HUB 220V #1: AC LIVE #2: #3: AC NEUTRAL</p>	<p>③ CN502-COMMUNICATION #1: EARTH (PE)</p>	<p>④ CN501-COMMUNICATION #1: R-OUT</p>
<p>⑤ CN106-S OUT #1: S-OUT</p>	<p>⑥ CN107-T OUT #1: T-OUT</p>	<p>⑦ CN41-EARTH #1: EARTH (PE)</p>	<p>⑧ CN101-R IN #1: R-IN</p>
<p>⑨ CN102-S IN #1: S-IN</p>	<p>⑩ CN103-T IN #1: T-IN</p>	<p>⑪ R-INPUT R TOP #1: R-IN</p>	

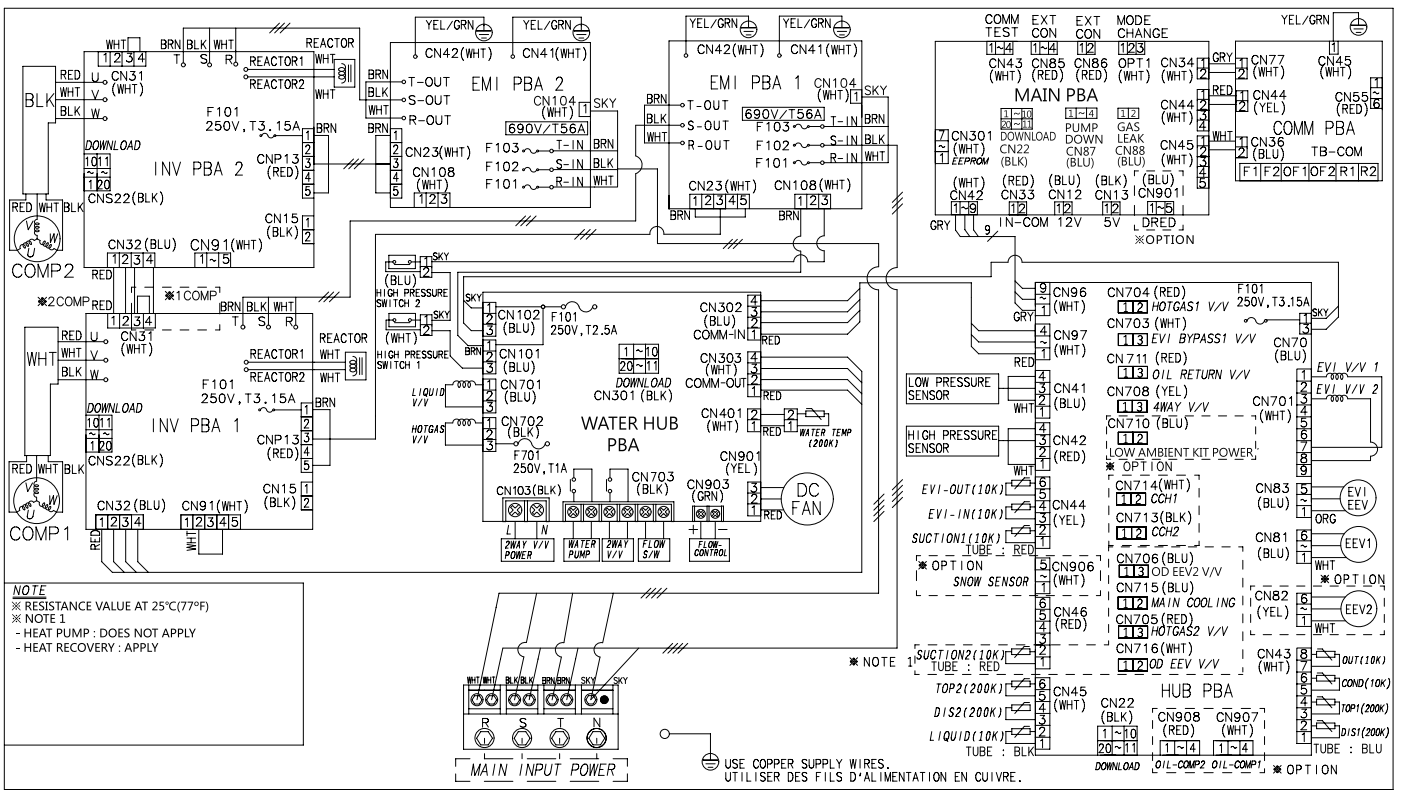
6. Wiring Diagram

6-1 AM080/100/120/200FXWA**



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6-2 AM300FXWA**



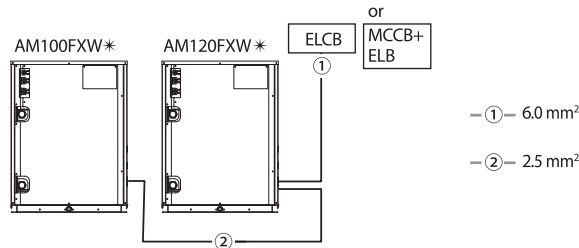
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6-3 Field Wiring

Electrical wiring work

※ When installing outdoor units in module, select the power supply cable according to the sum of outdoor unit capacity.
(Refer to the table for each model)

ex) Outdoor unit installation (AM100FXW* + AM120FXW*)



NOTE

- This device is intended for the connection to a power supply system with a maximum permissible system impedance shown in the table (on the left page) at the interface point (power service box) of the user's supply.
- The user must ensure that this device is connected only to a power supply system which fulfills the requirement above. If necessary, the user can ask the public power supply company for the system impedance at the interface point.
- This equipment complies with IEC 61000-3-12 provided that the short-circuit power S_{sc} is greater than or equal to $S_{sc}(*2)$ at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with a short-circuit power S_{sc} greater than or equal to $S_{sc}(*2)$.

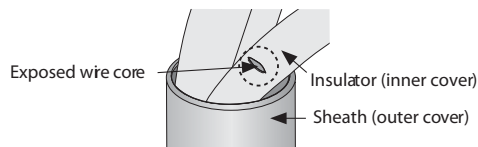
[$S_{sc}(*2)$]

Model	S_{sc} [MVA]
AM080FXWA**	3.9
AM100FXWA**	3.9
AM120FXWA**	4.8
AM200FXWA**	7.7
AM300KXWA**	11.5

CAUTION

Caution for electrical work

- You must install ELCB or MCCB + ELB
 - ELCB: Earth leakage breaker
 - MCCB: Molded case circuit breaker
 - ELB: Earth leakage breaker
- Do not operate the outdoor unit before completing the refrigerant pipe work.
- Do not disconnect or change the cable inside the product. It may cause damage to the product.
- Specification of the power cable is selected based on following installation condition; culvert installation/ambient temperature 30 °C/ single multi conductor cables. If the condition is different from the ones stated, please consult an electrical installation expert and re-select the power cable.
 - If the length of power cable exceed 50m, re-select the power cable considering the voltage drop.
- Use a power cable made out of incombustible material for the insulator (inner cover) and the sheath (outer cover)
- Do not use the power cable with the core wire exposed due to insulator damage occurred during removal of the sheath. When the core wire is exposed, it may cause fire.



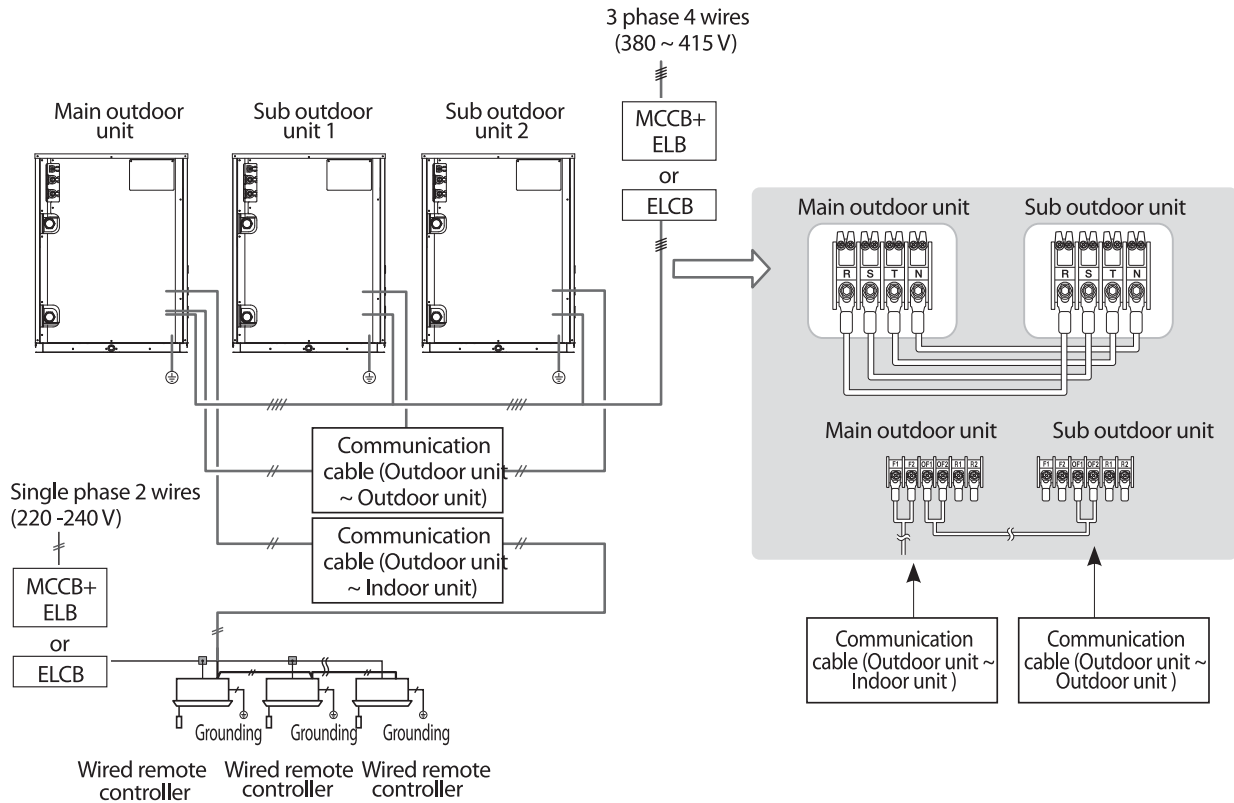
<The example of exposed core wire>

6-3 Field Wiring (cont.)

Electrical wiring work (cont.)

Power and communication cable configuration

- Main power and the ground cable must be withdrawn through the knock-out hole on the bottom-right or right side of the cabinet.
- Withdraw the communication cable from the designated knock-out hole on the bottom-right side of the front part.
- Install the power and communication cable using separate cable protection tube.
- Fix a protection tube to the knock-out hole on the outdoor unit by using a CD connector or bushing. Make sure to use insulating bushing.



Specification of the protection tube

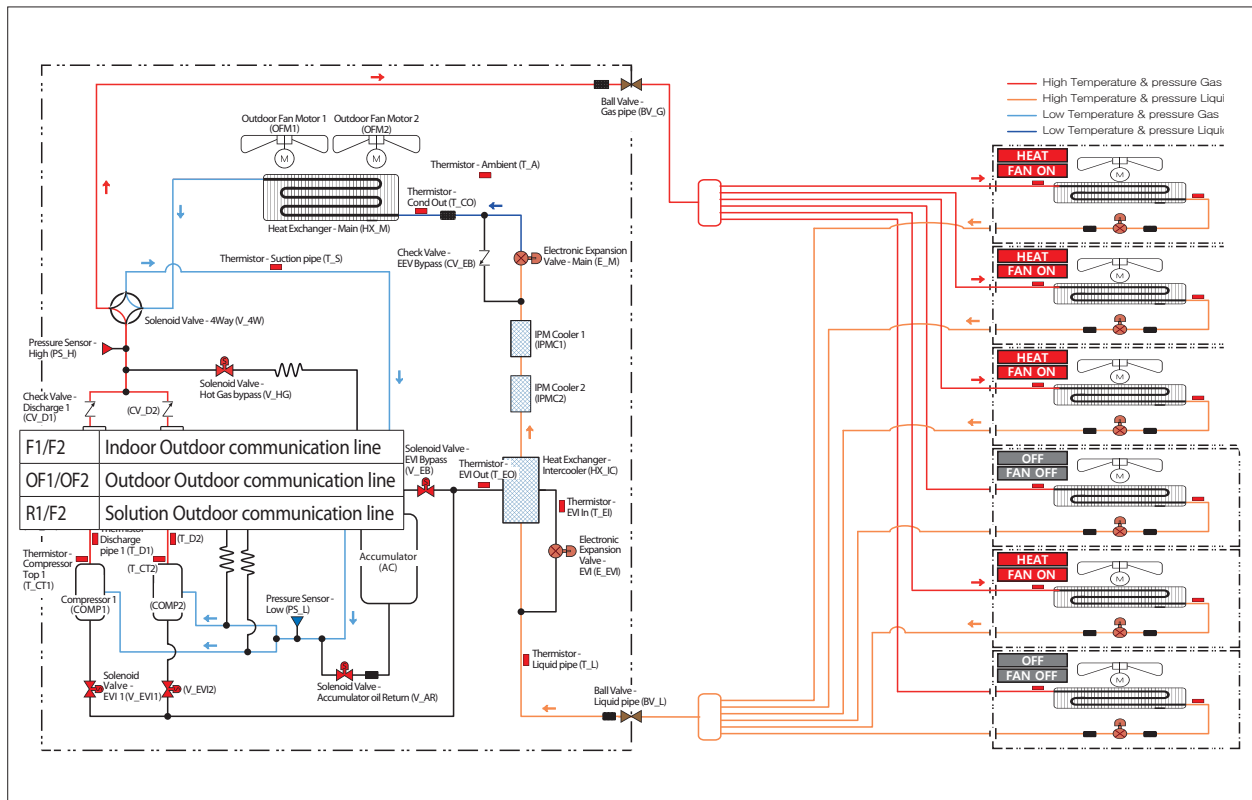
Name	Temper grade	Applicable conditions
Flexible PVC conduit	PVC	When the protection tube is installed indoor and not exposed to outside, because it is embedded in concrete structure
Class 1 PVC flexible conduit	Galvanized steel sheet	When the protection tube is installed indoor but exposed to outside so there are risk of damage to the protection tube
Class 1 PVC coated flexible conduit	Galvanized steel sheet and Soft PVC compound	When the protection tube is installed outdoor and exposed to outside so there are risk of damage to the protection tube and extra waterproof is needed

6-3 Field Wiring (cont.)

Electrical wiring work (cont.)

Specification of Cable and Connecting method













- Connect the cables to the terminal board with solderless ring terminals.
- Properly connect the cables by using certified and rated cables and make sure to fix them properly so that external force is not applied to the terminal.
- Use a driver and wrench that can apply the rated torque when tightening the screws on the terminal board.
- Tighten the terminal screws by complying rated torque value. If the terminal is loose, fire can occur due to arc heat generation and if the terminal is too tight, terminal board could get damaged.



7. Piping Diagram



7-1 Piping Diagram

- Cycle component Symbol and Function

No	Part Name	Abbreviation	Symbol	Function
1	Inverter Compressor	INV		This type of compressor uses a drive to control the compressor motor speed to modulate cooling capacity.
2	Outdoor Heat Exchanger (Heat Exchanger - Main (Outdoor unit))	HX_PHE		By heat exchange of the Water air and the refrigerant thereby condensing the refrigerant during a cooling operation and evaporating the refrigerant during a heating operation.
3	Accumulator	AC		It prevents liquid compression to separate the liquid refrigerant flowing into the compressor.
4	Oil Separator	OS		Separating the oil from the refrigerant discharged from the compressor, and sends the separated oil to the compressor.
5	Reservoir	RE		When cooling operation stores the liquid refrigerant, when heating operation and stores the gaseous refrigerant. When the refrigerant flow heating and cooling operation to eliminate imbalances.
6	Intercooler (Heat Exchanger - Intercooler)	IC (HX_IC)		The heat exchange between the refrigerant in the pipe and passing through the EVIEEV.
7	IPM Cooler	IPMC		By heat exchange between the liquid refrigerant and IPM, prevent overheating of IPM and protect the system.
8	High Pressure Sensor (Pressure Sensor-High)	HPS (PS_H)		By measuring the pressure (high pressure) of the compressor discharge, protects the pressure control & system.
9	Low Pressure Sensor (Pressure Sensor-Low)	LPS (PS_L)		By measuring the pressure (low pressure) of the compressor suction, protects the pressure control & system.
10	High Pressure Switch (Pressure Switch-High)	HPSW (PW_H)		By stopping the system immediately to the high pressure exceeds the set pressure and protects the system.
11	Main EEV (Electronic Expansion Valve-Main)	E_M		By controlling the amount of refrigerant during the heating operation and it controls the superheat.
12	EVI EEV (Electronic Expansion Valve-EVI)	E_EV (E_EVI)		By controlling the amount of refrigerant passing through the intercooler
13	EVI Sol. Valve (Solenoid valve-EVI)	V_ES (V_EVI)		"When the compressor stops, close the valve. The refrigerant having passed through the EVI EEV prevents the inflow of the stopped compressor."
14	EVI Bypass Valve (Solenoid valve-EVI Bypass)	V_EB		In Vapor/Flash Injection Requires close the valve to flow the refrigerant to the compressor.
5	Hot Gas Bypass Valve (Solenoid valve-Hot Gas Bypass)	V_HG		When high pressure is abnormally high, when low pressure is abnormally low, Opening the valve by-pass the high-pressure gas to the low pressure pipe to protect the system.
16	Hot Gas Bypass Valve 2 (Solenoid valve-Hot Gas Bypass 2)	V_HG2		To open the valve when the cooling operation alone. Convert the high-pressure gas pipe to the low pressure gas pipe. (HR Only)
17	Liquid tube Valve (Solenoid valve-Liquid tube)	V_L		Valve is Closed to prevent refrigerant from accumulating in receiver tank.
18	Main Cooling Valve (Solenoid valve - Main Cooling)	V_MC		Opening the valve during cooling operation and sends a high-pressure gas into the indoor unit for the heating operation. (HR Only)
19	Accumulator Oil Return Valve (Solenoid valve-Accumulator Oil Return)	V_AR		Opening the valve during operation and sends the oil which accumulates in the lower liquid separator to the compressor.
20	Hot Gas Charging Valve (Solenoid valve-Hot Gas Charging)	V_HC		Valve is opened when high pressure is low in cooling operation.

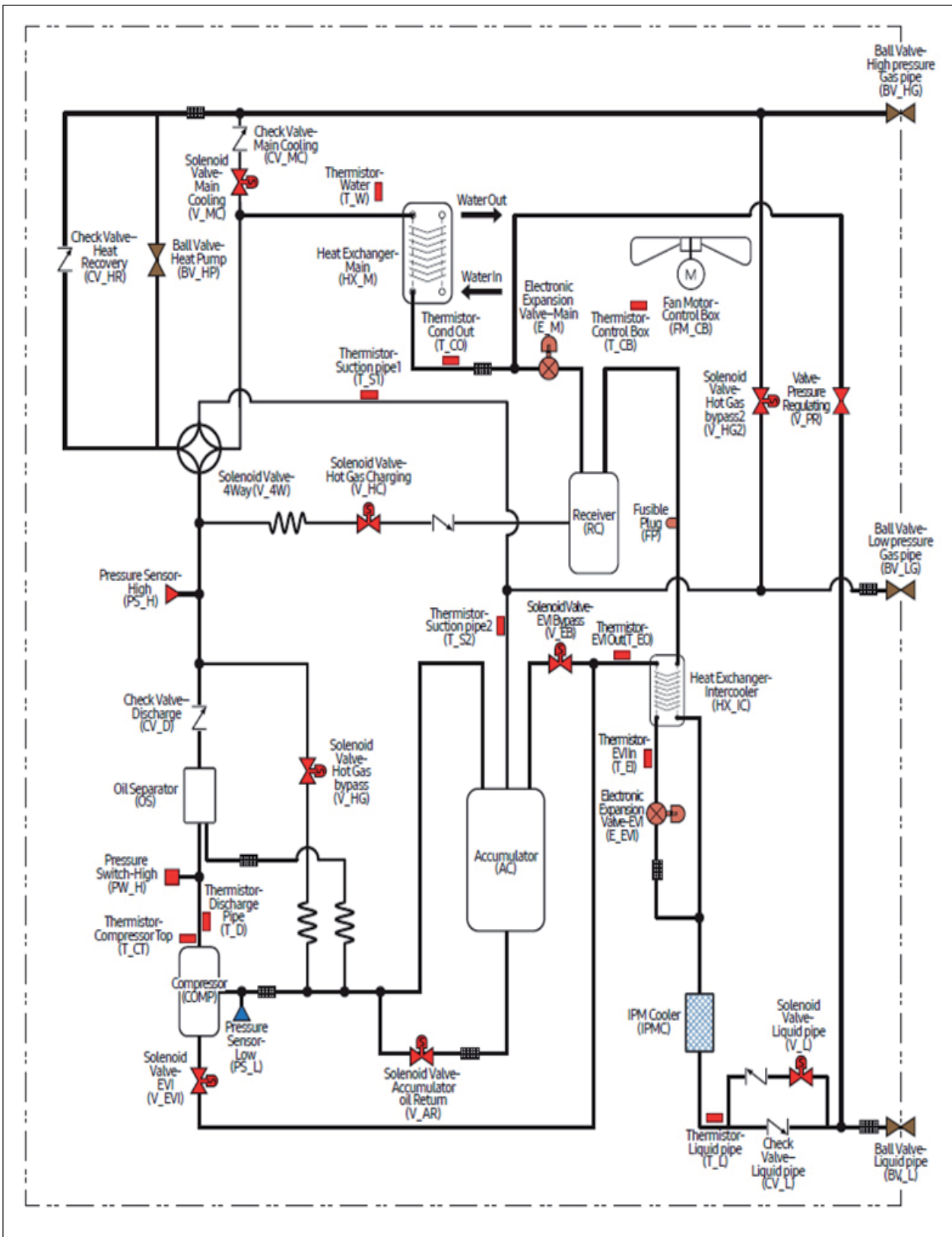
7-1 Piping Diagram (cont.)

- Cycle component Symbol and Function (cont.)

No	Part Name	Abbreviation	Symbol	Function	
21	4Way Valve (Solenoid valve-4Way)	V_4W		It determines the cooling / heating operation mode. (The valve signal when the heating operation is ON)	
22	Discharge Temp. Sensor (Thermistor-Discharge pipe)	T_D		Measure the temperature of the compressor discharge pipe. It is mainly used to protect the compressor.	
23	Suction Temp. Sensor (Thermistor-Suction pipe)	T_S		Measure the temperature of the compressor suction line. It is used to determine the suction superheat of the compressor.	
24	Cond Out Temp. Sensor (Thermistor-Cond Out)	T_CO		Measure the liquid pipe temperature of the heat exchanger. Used to enter in defrosting operation and escape judgment.	
25	EVI In Temp. Sensor (Thermistor-EVI In)	T_EI		Measure the temperature of the intercooler inlet pipe (EVI EEV side). It is used to determine the superheat of the EVI In / Out.	
26	EVI Out Temp. Sensor (Thermistor-EVI Out)	T_EO		Measure the temperature of the intercooler outlet pipe (EVI EEV side). It is used to determine the superheat of the EVI In / Out.	
27	Liquid Tube Temp. Sensor (Thermistor- Liquid pipe)	T_L		Measure the temperature of the outdoor liquid pipe. It is used to determine the supercooling.	
28	Comp. Top Temp. Sensor (Thermistor-Compressor Top)	T_CT		To measure the surface temperature of the compressor Top Cover. It is mainly used to protect the compressor.	
29	Ambient Temp. Sensor (Thermistor-Ambient)	T_A		Measure the temperature of the outdoor air.	
30	Water Temp. Sensor (Thermistor-Water)	T_W			Water

7-1 Piping Diagram (cont.)

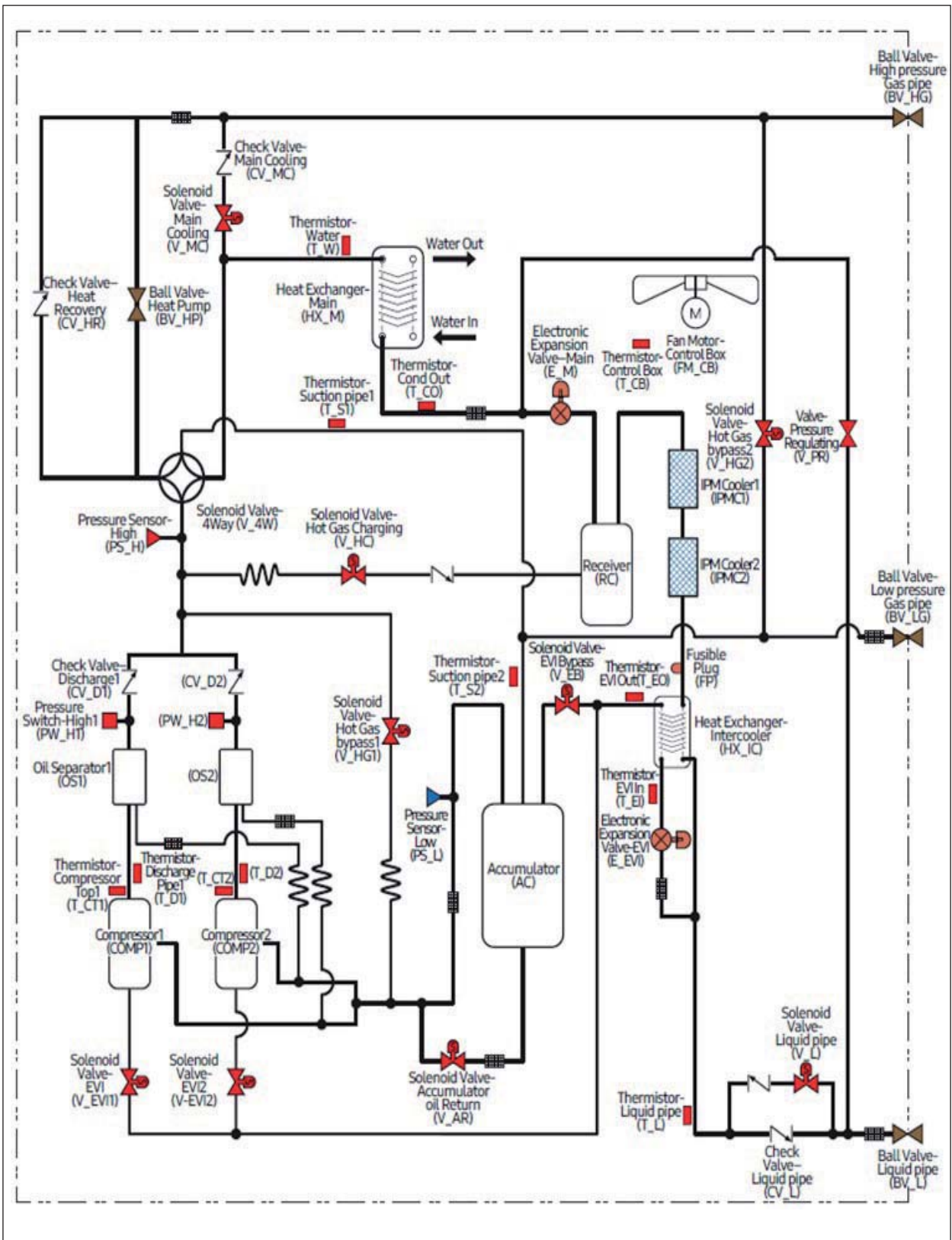
7-1-1 AM300KXWANR*, AM240KXWAF(J)R* (DVM S Water Heat Recovery)



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7-1 Piping Diagram (cont.)

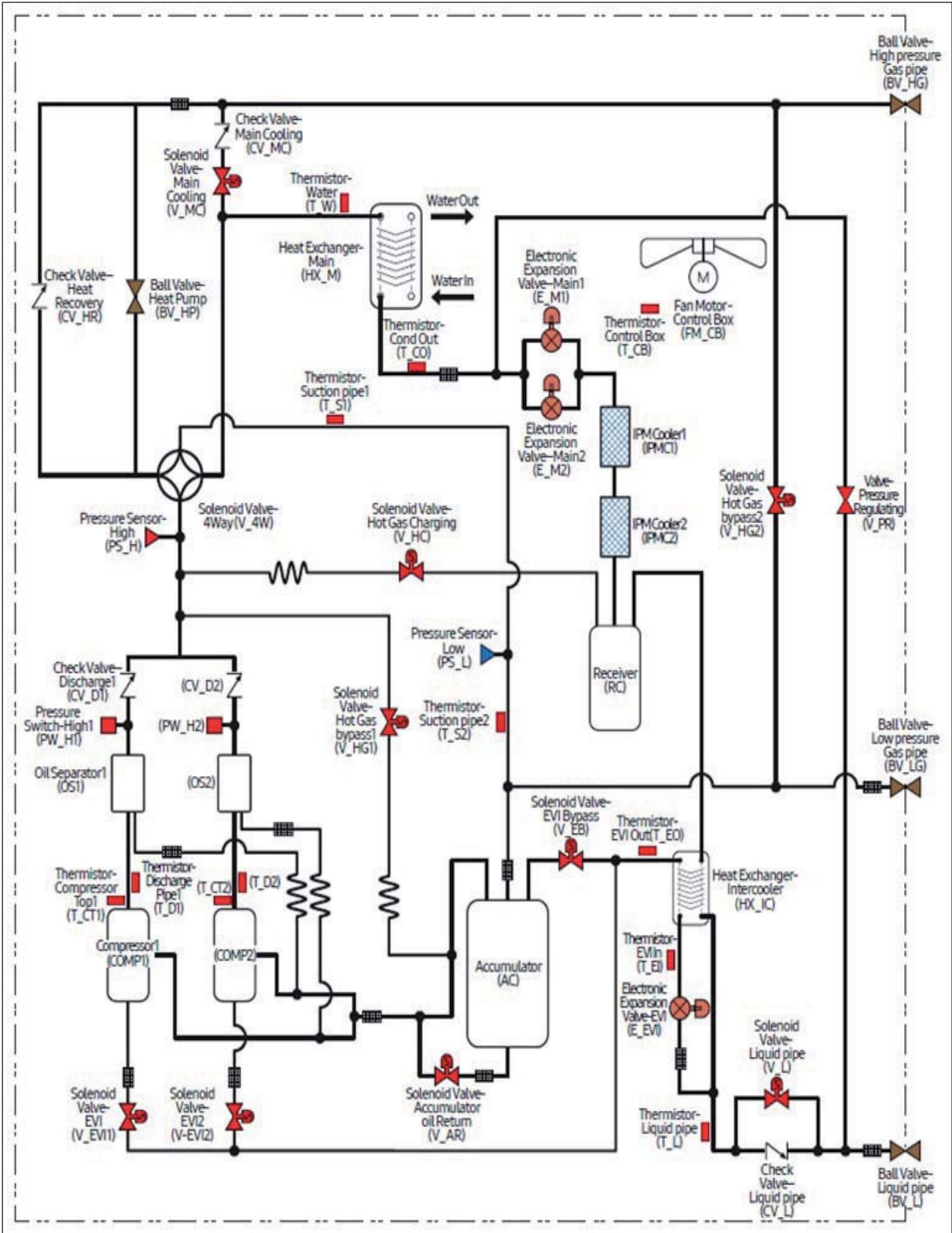
7-1-2 AM200FXWANR*, AM192HXWAF(J)R (DVM S Water Heat Recovery)



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7-1 Piping Diagram (cont.)

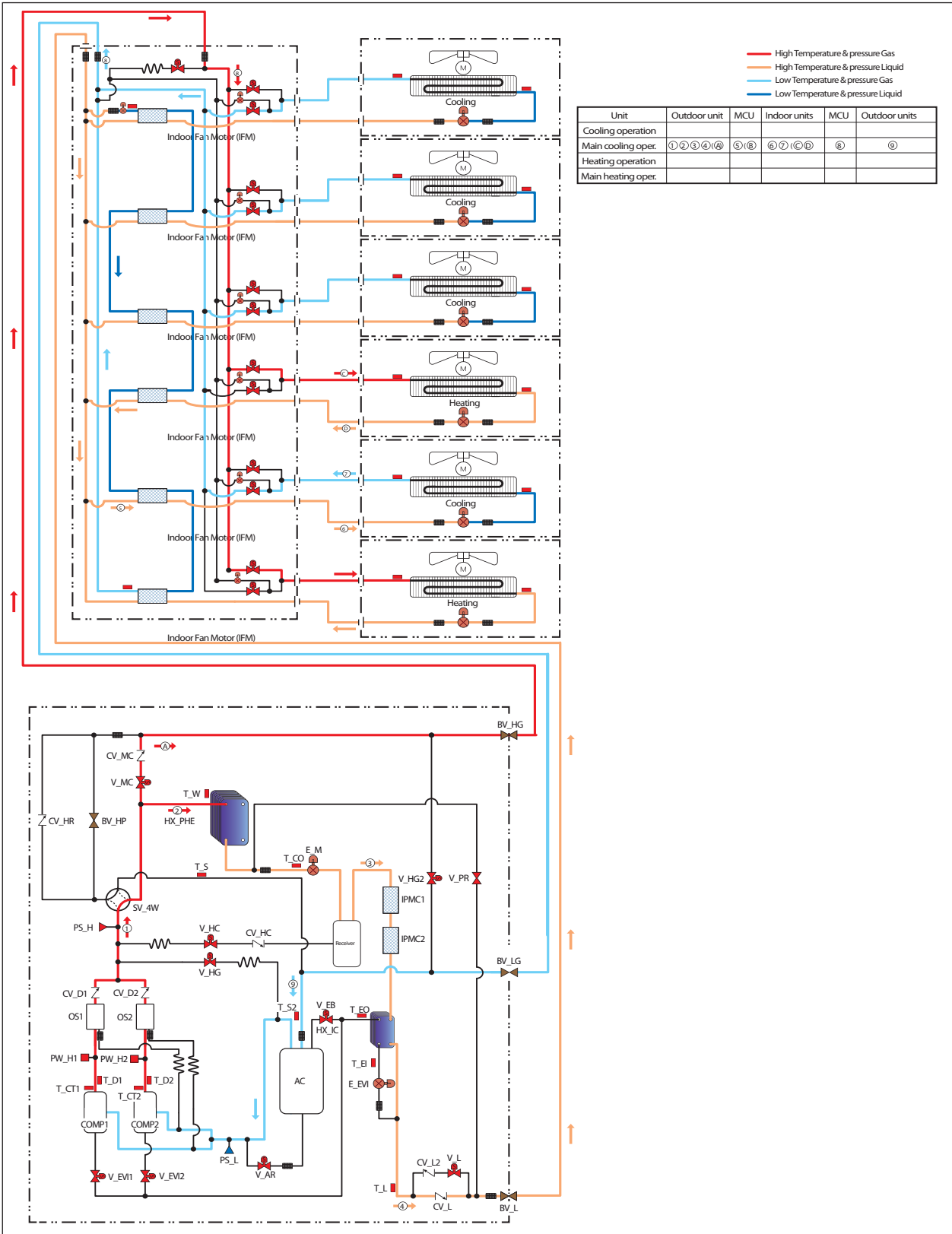
7-1-3 AM300KXWANR*, AM240KXWAF(J)R* (DVM S Water Heat Recovery)



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7-2 Refrigerant Flow for Each Operation Mode (cont.)

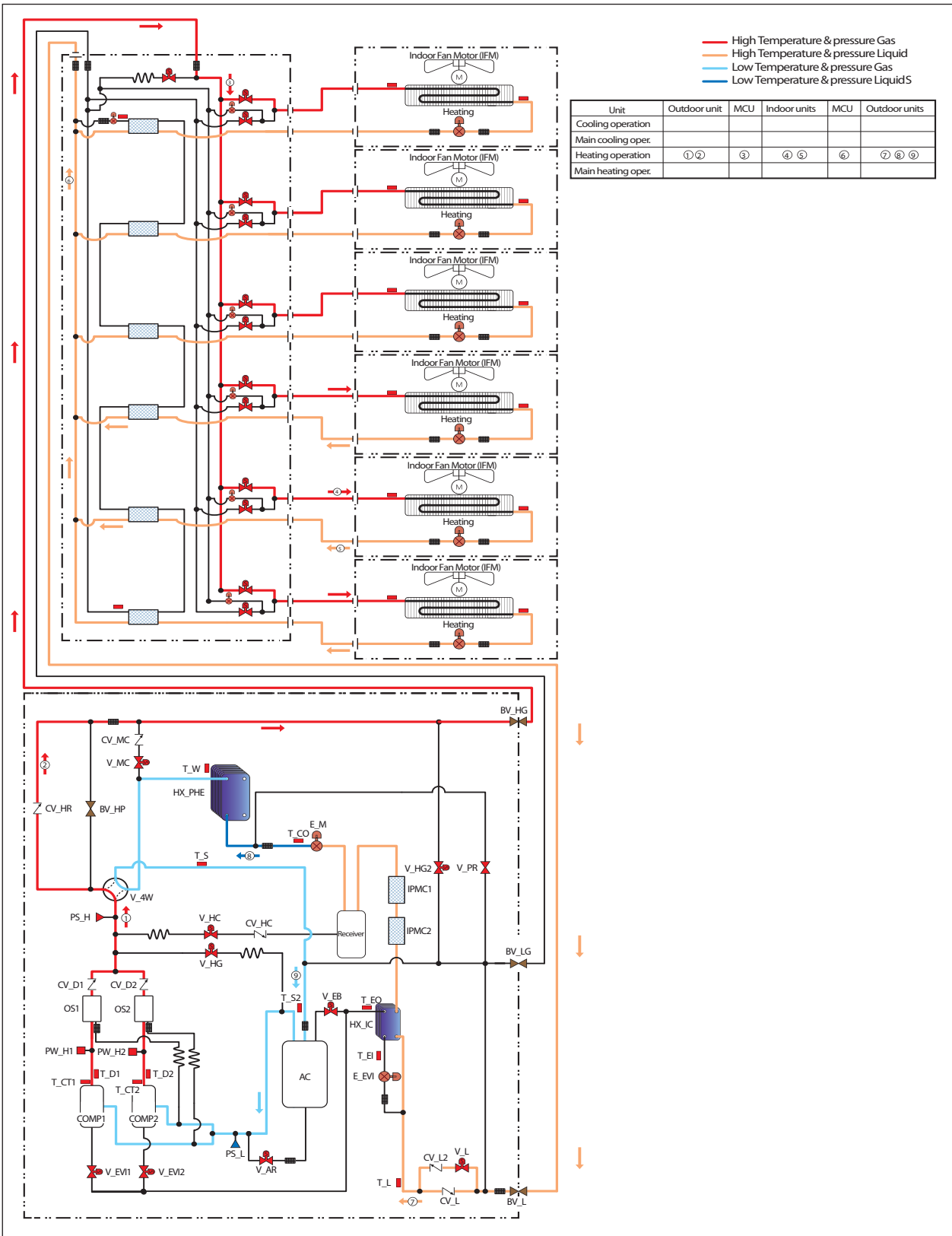
7-2-2 Main cooling operation(H/R)



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7-2 Refrigerant Flow for Each Operation Mode (cont.)

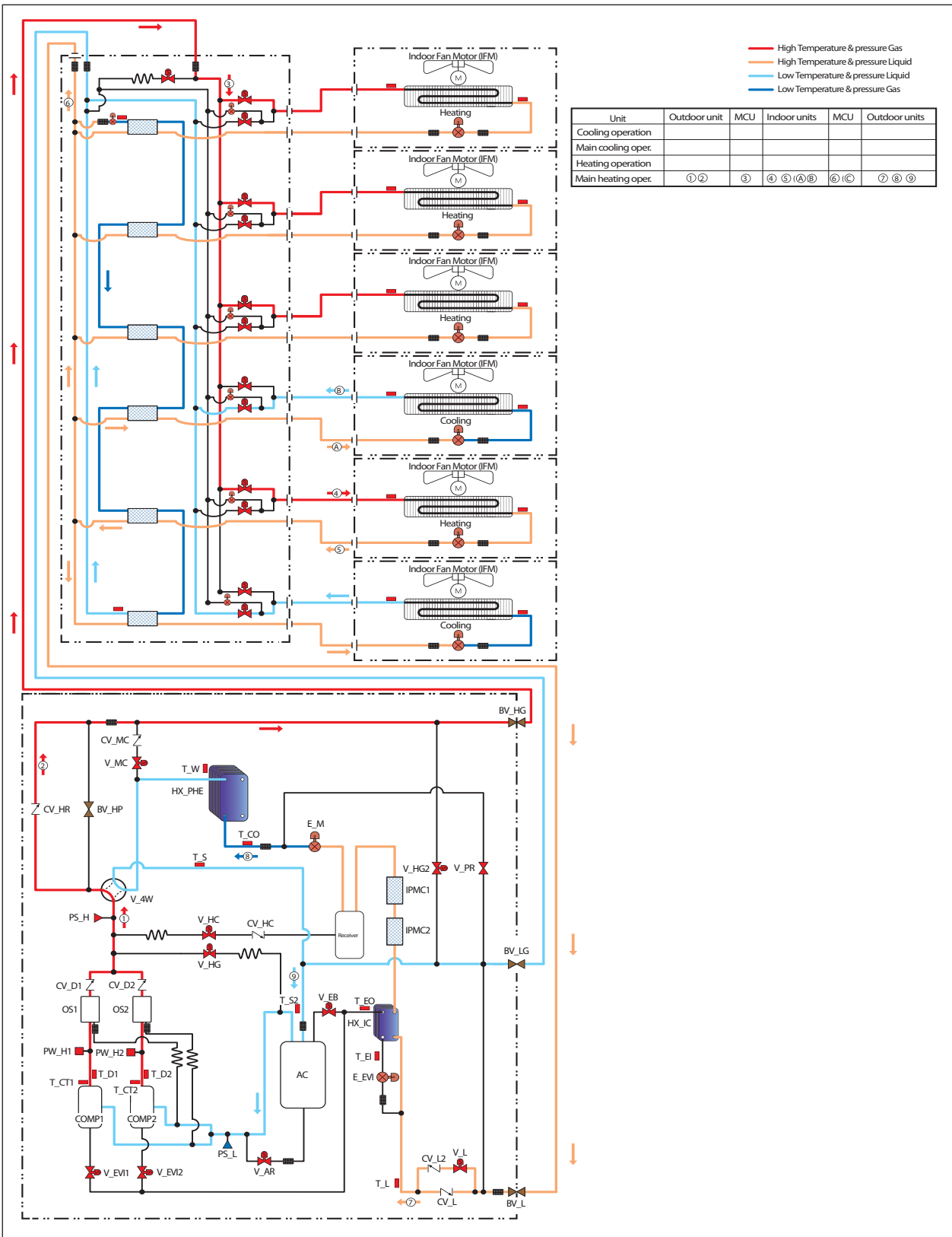
7-2-3 Heating operation(H/R)



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7-2 Refrigerant Flow for Each Operation Mode (cont.)

7-2-4 Main heating operation(H/R)



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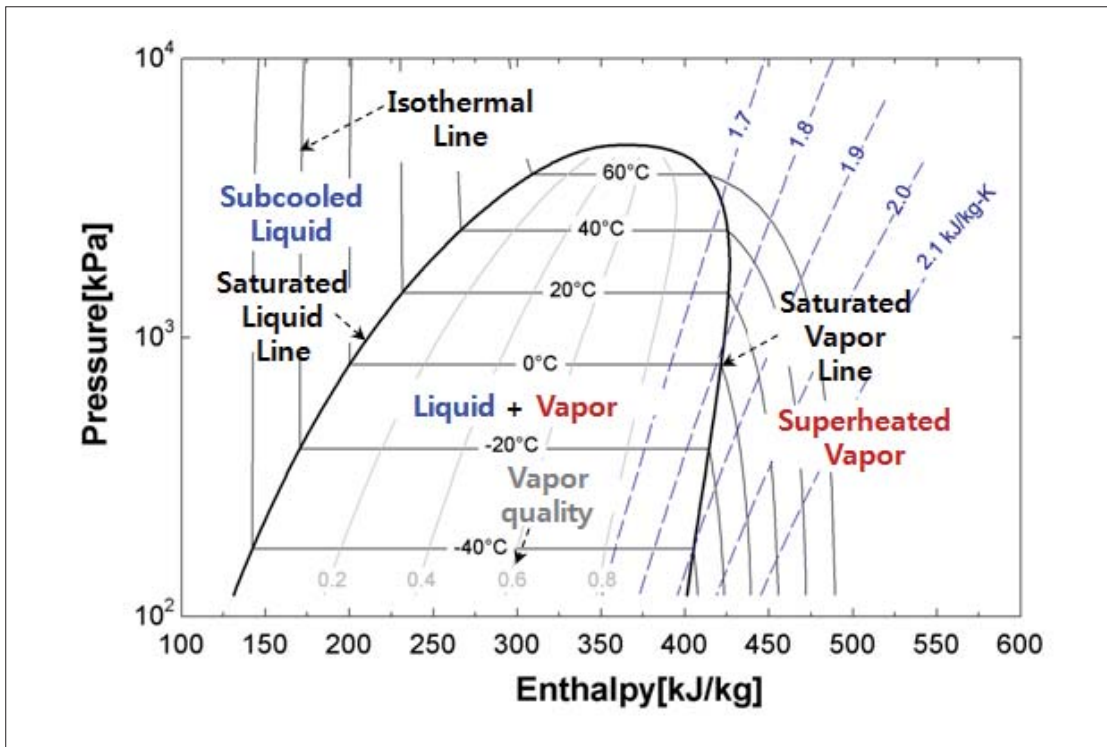
7-3 Functions

7-3-1 Basics

7-3-1-1 P-h Diagram

P-h Diagram

In the following P-h diagram, the horizontal and vertical axes indicate enthalpy and pressure respectively. This diagram shows material properties for refrigerant.



- The process where gas refrigerant becomes liquid refrigerant is called condensation. The process where liquid becomes gas is called evaporation. The process where gas becomes liquid or vice versa is called phase change.
- The temperature where the phase changes is called saturation temperature. The saturation temperature depends on the refrigerant type and pressure. Saturation temperature properties can be viewed using the saturation curve in the P-h diagram.
- Pressure-specific temperature, also called isothermal line, is shown in the P-h diagram. It is possible to view the refrigerant status by locating the point that is intersected by the pressure and isothermal lines and divided by the saturation curve. The intersecting point can be derived by measuring refrigerant temperature and pressure at a certain point.
- Refrigerant consisting of a single component does not have a temperature gradient during the phase change process. Refrigerant mixtures may have a temperature gradient during the phase change process, as the saturation temperature for components of the refrigerant vary. This type of refrigerant is called non-azeotropic refrigerant. R410A refrigerant is referred to as a near-azeotropic refrigerant.
- Superheated vapor indicates to the vapor state found to the right of the Saturated vapor line.
- Two-phase state refers to a state where gas and liquid phases are mixed.
- Subcooled liquid refers to the liquid state found to the left of the Saturated liquid line.

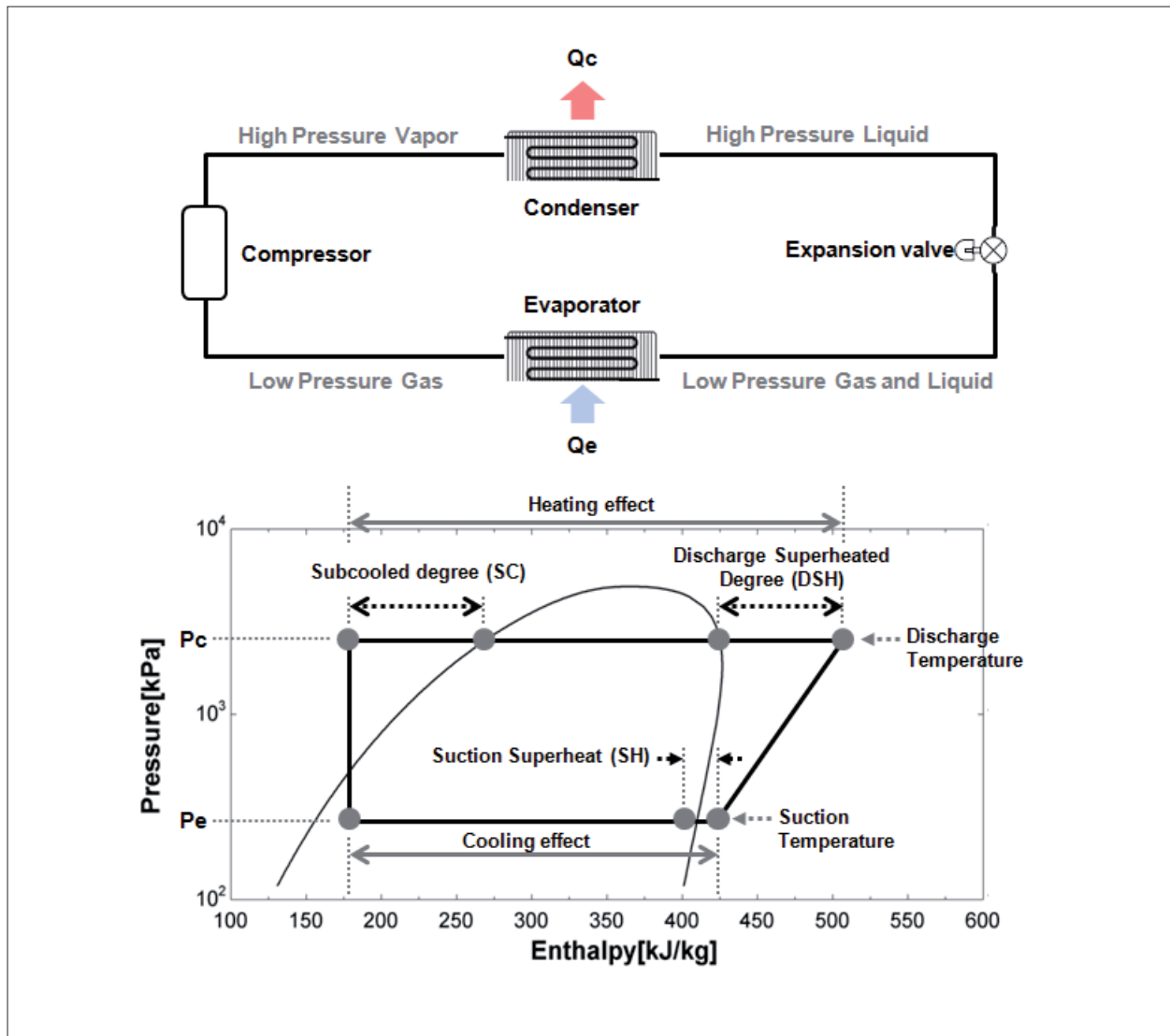
7-3 Functions (cont.)

7-3-1 Basics (cont.)

7-3-1-2 Refrigeration Cycle

Basic Refrigeration Cycle

The following figure shows the basic refrigeration cycle.



- Difference between discharge temperature and high pressure saturation temperature is referred to as discharge superheated degree.
- Difference between suction temperature and low pressure saturation temperature is referred to as suction superheated degree.
- Difference between condenser exit temperature and high pressure saturation temperature is referred to as subcooled degree.
Superheated degree must be calculated at the evaporator exit. This prevents wet compression. Refrigerant flow from the evaporator must be adjusted using the expansion valve so that only superheated vapor can flow into the compressor.

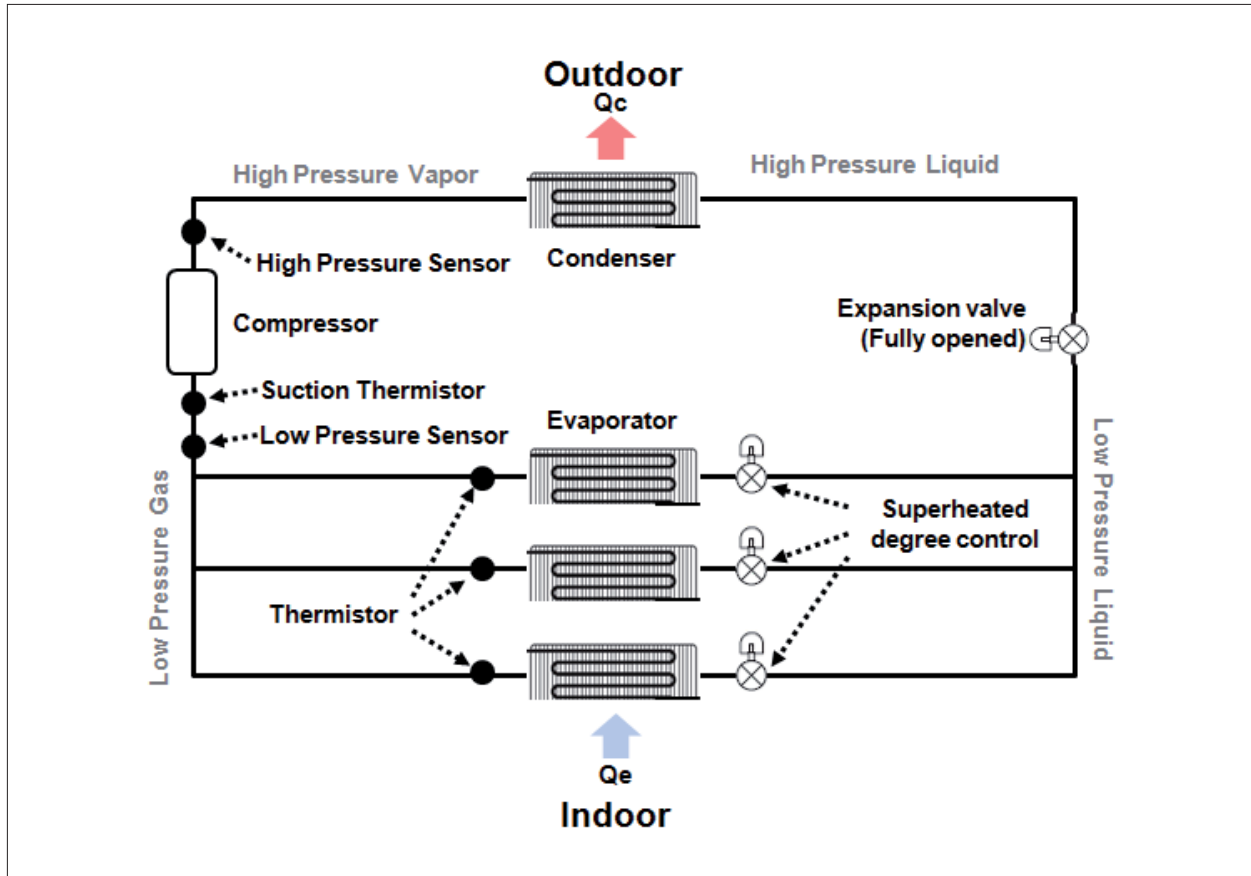
7-3 Functions (cont.)

7-3-1 Basics (cont.)

7-3-1-2 Refrigeration Cycle (cont.)

Points of Refrigerant Control (Cooling Operation)

Cooling mode is affected by the quantity, capacity, and fan speed of active indoor units. Indoor air temperature and humidity also affect the mode.



- Adjusting the compressor capacity
Adjust the compressor speed to match the evaporation pressure to the target pressure. Evaporation pressure is measured by the low pressure sensor on the outdoor unit in order to adjust the cooling capacity according to load.
- Adjust the indoor unit EEV to sync the refrigerant superheated degree for the indoor heat exchanger (formula: exit refrigerant temperature - entrance refrigerant temperature) with the target superheated degree.

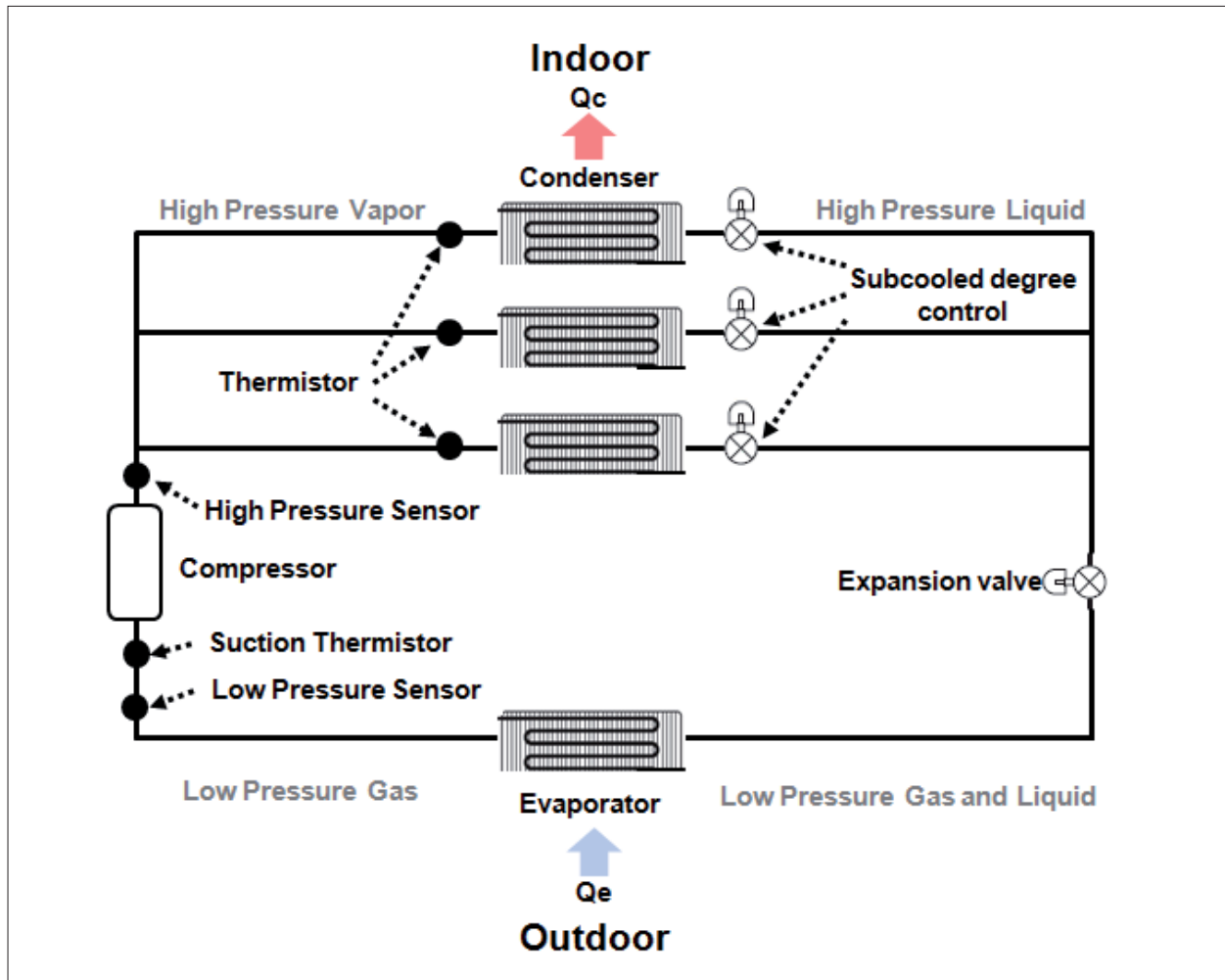
7-3 Functions (cont.)

7-3-1 Basics (cont.)

7-3-1-2 Refrigeration Cycle (cont.)

Points of Refrigerant Control (Heating Operation)

Cooling mode is affected by the quantity, capacity, and fan speed of active indoor units. Indoor air temperature and humidity also affect the mode.



- Adjusting the compressor capacity
Adjust the compressor speed to match the condensing pressure to the target pressure. Condensing pressure is measured by the high pressure sensor on the outdoor unit in order to adjust the heating capacity according to load.
- Adjust the outdoor unit EEV to sync the refrigerant superheated degree for the outdoor heat exchanger (formula: compressor suction temperature - low pressure saturation temperature) with the target superheated degree.
- Adjust the indoor unit EEV to sync the refrigerant supercooling degree for the indoor heat exchanger (formula: high pressure saturation temperature - entrance refrigerant temperature) with the target supercooling degree.

7-3 Functions (cont.)

7-3-2 Control

7-3-2-1 Actuator

Compressor – Capacity control

- **Purpose**

Adjust the compressor operation frequency through fuzzy control. This adjusts the capacity according to load in cooling or heating mode.

- **Concept**

The compressor frequency is adjusted through fuzzy control to enable cooling according to the target low pressure. The compressor frequency is adjusted through fuzzy control to enable heating according to the target high pressure.

- **Control specifications in detail**

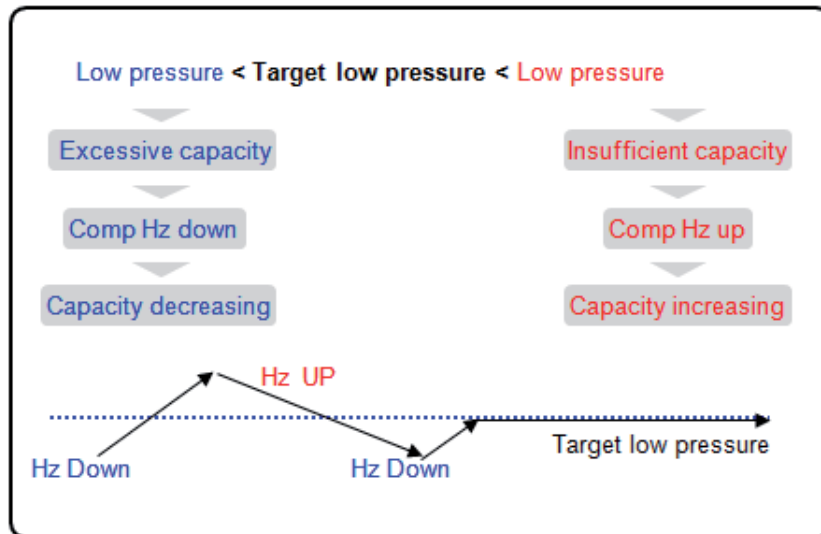
In cooling case

The capacity of a compressor is controlled by assuming the target pressure during cooling operation.

Measure pressure using the pressure sensor (low pressure sensor) installed in the outdoor unit.

In case that the measured value is lower than the target pressure, lower the operating capacity of the compressor considering that the operating capacity is higher compared to load.

In case that the measured value is higher than the target pressure, raise the operating capacity of the compressor considering that the operating capacity is lower compared to load.



7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-1 Actuator (cont.)

Compressor – Capacity control

- The target pressure value is as in the table and the initial setting value is 8.0 kgf/cm²,g. The target pressure is adjusted considering the rise and fall of the pressure in the pipe. It is calculated using evap in temperature representing the pressure of the indoor unit. In case that rise and fall of the pressure within the pipe are big, the pressure cannot be maintained in accordance with load due to high evaporated pressure of the indoor unit despite the target pressure met. The level of rise and fall of the pressure within the pipe is recognized considering the evaporated pressure using evap in. In case the temperature reaches the setting temperature, maintain the target pressure judging from the evaporated pressure at a certain point. In case that the evap in temperature is higher than the setting value, lower the target pressure. Reversely, in case that the evap in temperature is lower than the setting value, raise the target pressure. In case that the setting value of the evap in temperature is required to be adjusted, it can be adjusted in the main PBA by referring to the installation manual.

✓ **Target low pressure control**

- avg. evap in temp. = setting → target low p. maintain
- avg. evap in temp. < setting → target low p. increase
- avg. evap in temp. > setting → target low p. decrease

Target low pressure (kgf/cm ² ,g)						
6.0	6.5	7.0	7.5	8.0	8.5	9.0

- Default target : 8.0 kgf/cm²,g
- Setting for target avg. evap in = ODU option setting

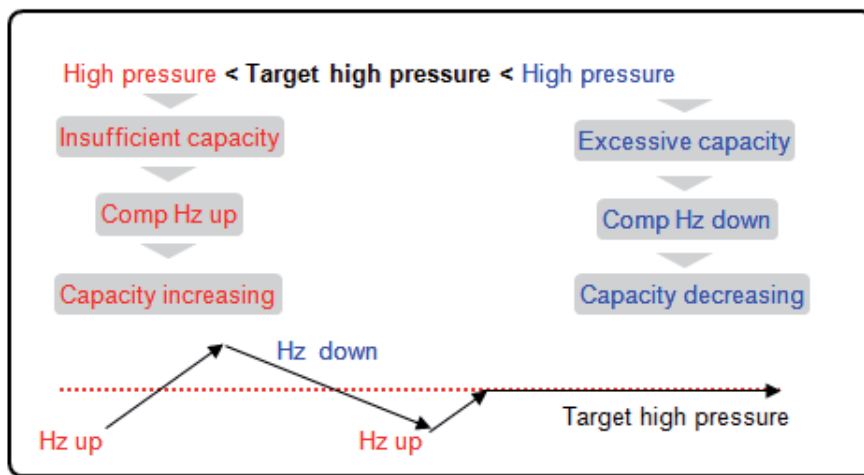
7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-1 Actuator (cont.)

• **In heating case**

The capacity of the compressor is controlled by assuming the target pressure during a heating operation process. Measure the pressure using the pressure sensor (high pressure sensor) installed in the outdoor unit. In case the measured value is lower than the target pressure, enhance the operating capacity of the compressor according to fuzzy control considering that the operating capacity is lower compared to load. In case the measured value is higher than the target pressure, lower the operating capacity of the compressor according to fuzzy control considering that the operating capacity is higher compared to load.



The target pressure value is as in the table and the initial setting value is 28.0 kgf/cm².g. In case that the setting value of the target pressure shall be adjusted, it can be adjusted in the main PBA by referring to the installation manual.

• **ODU option setting**

	Seg1	Seg2	Seg3	Seg4	Pressure(kgf/cm ² .g)
Main	0	2	0	0	2.8 (Factory default)
			0	1	2.5
			0	2	2.6
			0	3	2.7
			0	4	2.9
			0	5	3.0
			0	6	3.1
			0	7	3.2
			0	8	3.3

7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-1 Actuator (cont.)

Compressor – Module capacity control

- **Purpose**

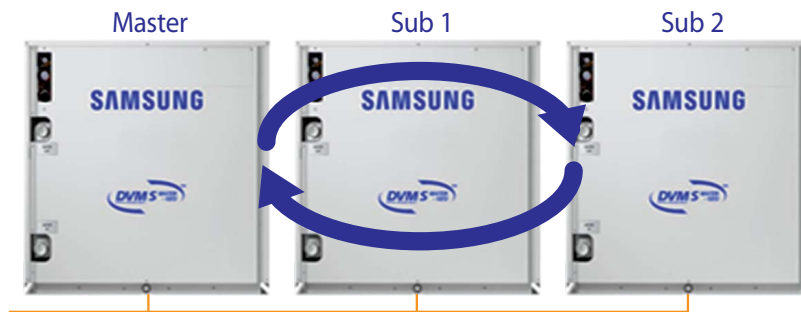
Improve efficiency through appropriate capacity distribution among units.
 Maximize the lifespan through equalization of the duration of operation among outdoor units.

- **Concept**

The duration of operation is equally distributed among outdoor units through rotational operation of the outdoor units.
 The duration of operation is equally distributed among the compressors on indoor units through rotational operation of the compressors.
 The operation efficiency is optimized by setting the operation capacity for each outdoor unit according to the outdoor unit capacity ratio.

- **Control specifications in detail**

It shall be operated according to priority to prevent operational time from being concentrated on any of outdoor units during the operation of Hysteresis. Operating outdoor unit can be circulated in case only some outdoor units are operated under partial load in case of operation by priority. Driving priority can be changed in case that oil recovery and entire outdoor units are off.



- **Master unit priority**

- At initial starting from power supply : ODU address setting.

- **Maser unit rotation**

1. After defrost / Oil recovery / All unit off (Master unit operates more than 60 minutes)
2. A unit is stopped over 40 minutes

Master	Sub1	Sub2
Sub2	Master	Sub1
Sub1	Sub2	Master

7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-1 Actuator (cont.)

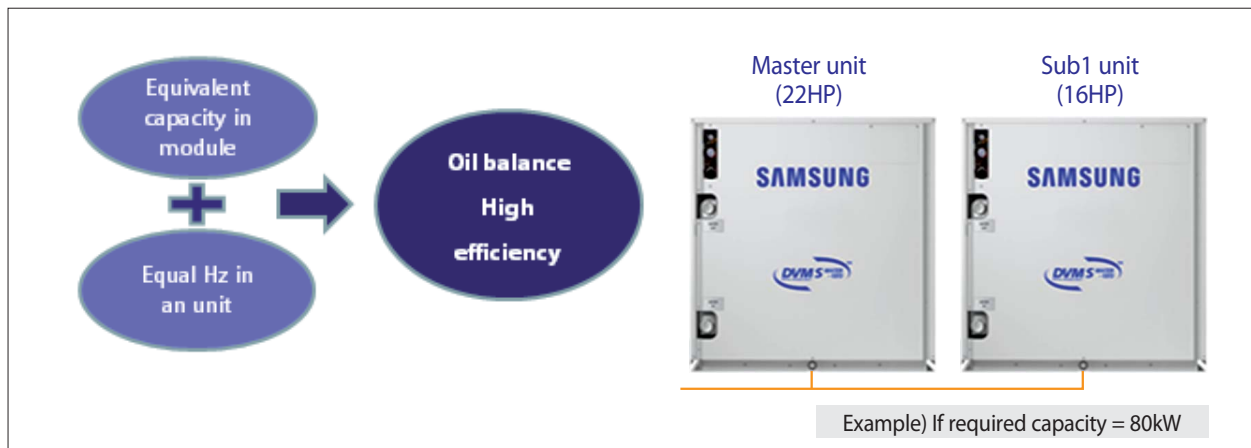
Operation of a compressor shall be performed after adjusting priority to prevent operating time from being concentrated on only certain compressor. Add the first priority to a compressor with less operational time accumulated during the operation of an outdoor unit.

Operate additional compressor in case the operating frequency are operated at more than 76Hz or at more than 60Hz for 3 minutes while the outdoor unit is operated only with one compressor. It is designed that the efficiency of the compressor is operated in the most ideal section.



- **Compressor priority in an unit**
 1. Which stopped longer
 2. INV1 at initial starting from power supply
- **Additional compressor starting condition.**
 1. Over 60Hz & over 3mins operation
 2. Over 76Hz operation
 - ※ Efficiency of 30~80Hz is better than higher frequency
 - ※ Each unit will decide individually

The capacity of the outdoor unit and a compressor shall be distributed to optimize its performance with each operating. The capacity during outdoor period shall be distributed based on the capacity ratio. The operating capacity distributed to each outdoor unit shall be redistributed by each compressor. It shall be operated starting from the low frequency so that the calculated frequency can be operated within a certain scope established and the frequency shall be raised by entering the comp operation capacity control.



Compressor	Master unit		Sub 1 unit	
	Comp 1(66cc)	Comp 2(66cc)	Comp 1(52cc)	Comp 2(52cc)
Module Capacity[kW]	$80 \times 22\text{HP} / (22\text{HP} + 16\text{HP}) = 46.32$		$80 \times 16\text{HP} / (22\text{HP} + 16\text{HP}) = 33.68$	
Comp Capacity [kW]	23.16	23.16	16.84	16.84
Frequency	67hz	67hz + a	62hz	62hz + a

7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-1 Actuator (cont.)

Electronic Expansion Valve – Main (Main EEV)

▪ **Purpose**

Control the EEV to adjust the refrigerant flow according to the amount of heat exchanged by the outdoor heat exchanger in heating mode.

▪ **Concept**

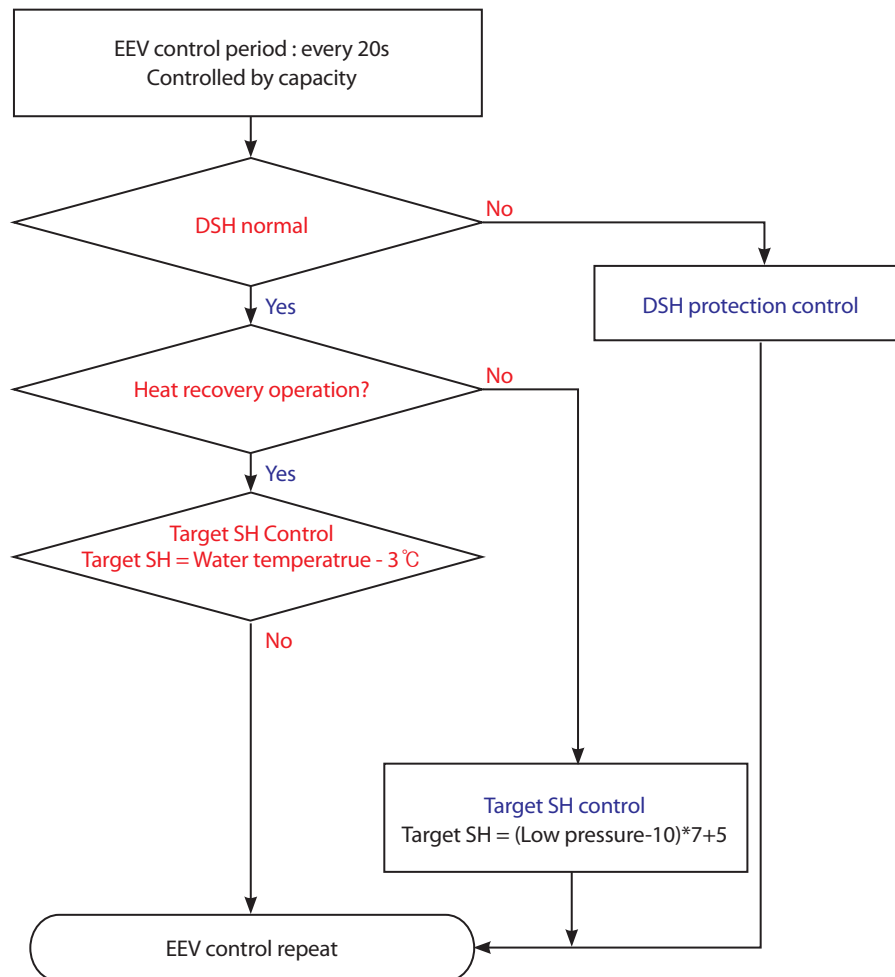
The valve is fully opened in cooling mode.

The EEV step is regulated through PD control to enable operation according to the target SH (superheat) degree in heating mode.

▪ **Control specifications in detail**

In case of cooling operation, leave Main EEV fully open. In case of heating operation, control the Main EEV by assuming the outdoor unit SH. In case that DSH is over the setting value, control it via SH control.

Make sure to perform a balanced control so that the required vapor cannot be concentrated to a certain outdoor unit considering the evaporated pressure during outdoor period.



7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-1 Actuator (cont.)

Electronic Expansion Valve – EVI (EVI EEV)

▪ **Purpose**

Control the EVI EEV to secure a subcooling degree in cooling mode.
Control the EVI EEV to optimize the performance in heating mode.

▪ **Concept**

The EVI EEV is regulated through PD control to secure the target subcooling degree in cooling mode.

The EVI EEV step is regulated through PD control to enable operation according to the target EVI SH (superheat) degree in heating mode.

The EVI EEV step is regulated to adjust the compressor discharge temperature (Td) to obtain the target Td if additional performance is required in the low temperature section while in heating mode.

▪ **Control specifications in detail**

In case you need additional refrigerant flow in the compressor at a low temperature heating, or if you can operate compressor effectively by increasing the flow rate through the injection, it controls the EVI EEV in the EVI ON mode status.

In addition, in case of cooling, it controls EVI EEV when needs super cooling in order to deal with the installation conditions such as the long pipe installation or a high head.

In EVI ON mode, optimizes the performance improvement through the injection by controlling the SH as 2 K and 5 K to EVI EEV.

When there is need of sub cooling in cooling mode, it controls the degree of sub cooling as 20 K.

EVI mode	Cooling	Heating
EVI Bypass mode	<ul style="list-style-type: none"> Sub-cooling control : 20 K (High pressure Saturated temp. – Liquid tube temp.) 	<ul style="list-style-type: none"> SH control 1. EVI Out – EVI In temp. > 10 K (priority) 2. Tdis = 90 °C
EVI On mode		<ul style="list-style-type: none"> (EVI out temp. – EVI in temp.) control : 2 K
Remark	※ If comp discharge temp. is abnormally high, open EVI EEV to decrease the discharge temperature.	

7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-1 Actuator (cont.)

Solenoid Valve – Main EEV

▪ **Purpose**

In main cooling mode, enable the Main EEV to control the amount of refrigerant flowing in the cooling indoor units.

▪ **Concept**

- In main cooling mode, the valve is closed to prevent refrigerant from flowing using Check Valve – EEV Bypass and enable the Main EEV to control the amount of refrigerant flowing into the cooling indoor units.
- If the valve is opened, most refrigerant is bypassed via the valve which flows into the cooling indoor units. As a result, there is insufficient refrigerant in active indoor units that are under heating mode.
- HR Only

▪ **Control specifications in detail**

In main cooling mode, the valve is Off (closed).

Solenoid Valve – Main Cooling

▪ **Purpose**

In main cooling mode, enable operation of heating indoor units.

▪ **Concept**

- In main cooling mode, the valve is opened to send the high pressure to heating indoor units and enable heating.
- HR Only

▪ **Control specifications in detail**

In main cooling mode, the valve is On (opened)

7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-1 Actuator (cont.)

Solenoid Valve - Accumulator Oil Return (ARV)

▪ **Purpose**

Return oil stagnating in the accumulator.

▪ **Concept**

- During compressor operation, the valve is opened to return oil stagnating in the accumulator.
- The valve is closed to protect the compressor in start-up mode or in a section where there is concern about the potential for liquid compression due to low DSH.

▪ **Control specifications in detail**

- Condition(s) required to close (Off) the valve : [A or B or C]
 - A. The system has stopped
 - B. DSH is higher than 10 K during start-up
 - C. The valve is closed for 2 minutes if DSH is higher than 10 K in air conditioning mode.
- Condition(s) required to open (On) the valve : None of the conditions required to close the valve are satisfied.

Compressor Coil Heater (CCH)

▪ **Purpose**

Prevent compressor failure due to liquid compression or poor lubrication during compressor start-up.

▪ **Concept**

If the internal temperature of an inactive compressor is abnormally low, the internal temperature is increased through the CCH to evaporate the liquid refrigerant that has flowed into the compressor. This will prevent liquid compression and poor lubrication.

▪ **Control specifications in detail**

- It is turned On if A or B is satisfied.
 - A. The highest temperature of the compressor has remained below 50 °C for 2 min.
 - B. The CCH has been Off for longer than 6 hours.
- Condition(s) required to turn Off the CCH: [A or B]
 - A. The highest temperature of the compressor has remained above 55 °C for 30 min.
 - B. The CCH has been On for longer than 6 hours.

7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-2 Start-up modes

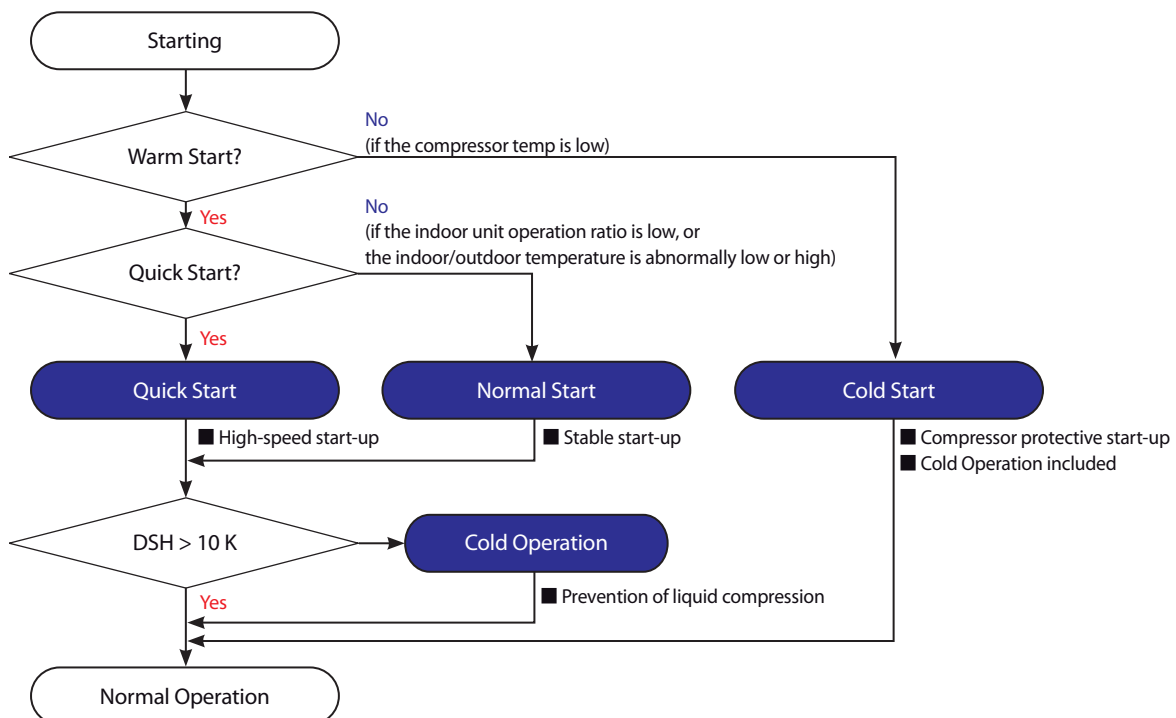
Safety Start

▪ **Purpose**

- Protect the system and compressors by preventing poor lubrication due to liquid compression or oil foaming.
- Enable high-speed cooling and heating through fast start-up if there is no risk of liquid compression.

▪ **Concept**

- A start-up pattern is decided taking into account the compressor temperature, indoor and outdoor temperatures, and operation ratio during start-up.
- Cold Start :
If the compressor temperature is low, a low start-up frequency is used to protect the compressor from liquid compression as well as poor lubrication due to oil foaming.
- Warm Start :
If the compressor temperature is high, a standard start-up frequency is used as there is no risk of liquid compression.
- Quick Start :
If the operation ratio is high, compressors start at the same time to quickly improve the performance.
- Normal Start :
Compressors start one after another to enable safe operation if the operation ratio of indoor units is low and the indoor or outdoor temperature is high or low.
- Cold Operation :
If DSH is low, the frequency increase speed is decreased to protect the compressors from liquid compression.



- DSH = Compressor discharge temp.
- High pressure saturation temp.
- Definition of compressor discharge temperature from DSH :

$$\text{Min} \{ \text{Max}(T_{\text{dis_comp1}}, T_{\text{top_comp1}}), \text{Max}(T_{\text{dis_comp2}}, T_{\text{top_comp2}}) \}$$

7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-2 Start-up modes (cont.)

Safety Start – Cold Start

▪ **Purpose**

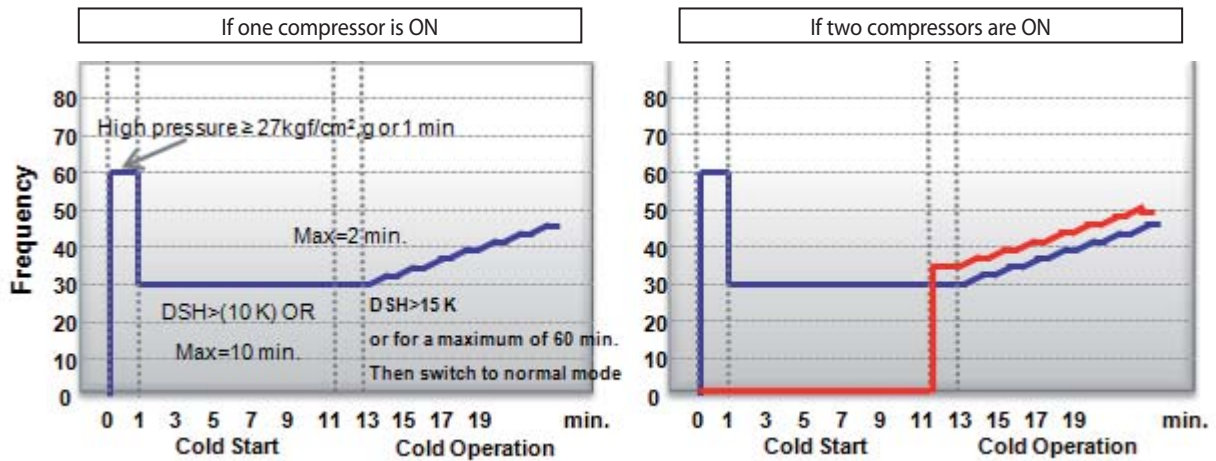
Protect the system and compressors by preventing poor lubrication due to liquid compression or oil foaming.

▪ **Concept**

- A low start-up frequency is used to protect the compressors from liquid compression as well as poor lubrication due to oil foaming.
- After the Cold Start process, Cold Operation mode is on for a maximum of 60 minutes to decrease the compressor frequency increase speed until DSH is secured. This prevents liquid compression.

▪ **Control specifications in detail**

- Condition(s) required to enter Cold Start mode : [(A or B) & C & D]
 - B. Max (T_{top}, T_{dis}) < 30 °C
 - C. Less than 12 hours after the power supply
 - D. Cooling : Water temp. < 20 °C , Heating : Water temp. < 10 °C
- In Cold Start mode, the target SH of 6 K is regulated and compressors are controlled as shown below. (See the charts below for conditions required to complete specific steps)



In Cold Operation mode, the compressor frequency increase speed is restricted to 1Hz per 60 sec.

Condition(s) required to close Cold Operation mode: [A or B]

- A. A maximum of 60 min has elapsed
- B. DSH > 15 K

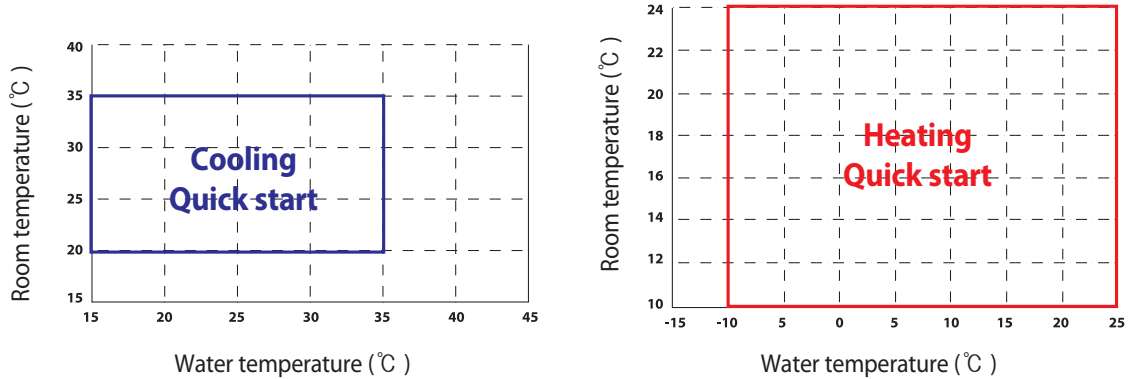
7-3 Functions (cont.)

7-3-2 Control (cont.)

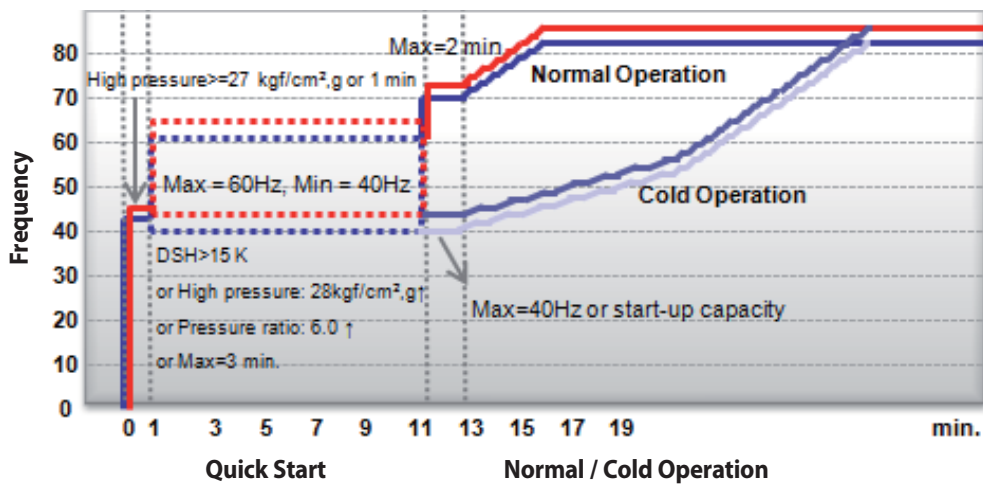
7-3-2-2 Start-up modes (cont.)

Safety Start – Quick Start

- **Purpose**
Enable high-speed cooling and heating through quick start-up
- **Concept**
Compressors start at the same time to quickly improve the performance.
- **Control specifications in detail**
 - Condition(s) required to enter Quick Start mode: [A & B]
 - A. Required capacity is 30% or higher
 - B. Indoor and outdoor temperatures satisfy the Quick Start range shown below.



- In Quick Start mode, compressors are controlled as shown below.
(See the chart below for conditions required to complete specific steps)



- Condition(s) required to enter Normal Operation mode: [A or B]
 - A. DSH > 10 K
 - B. Max (Tdis, Ttop) ≥ 30 °C
- Cold Operation mode will activate if none of the conditions required to enter Normal Operation mode are satisfied.
- In Cold Operation mode, the compressor frequency increase speed is restricted to 1Hz per 30 sec.
- Condition(s) required to close Cold Operation mode: [A or B]
 - A. A maximum of 30 min has elapsed
 - B. DSH > 15 K

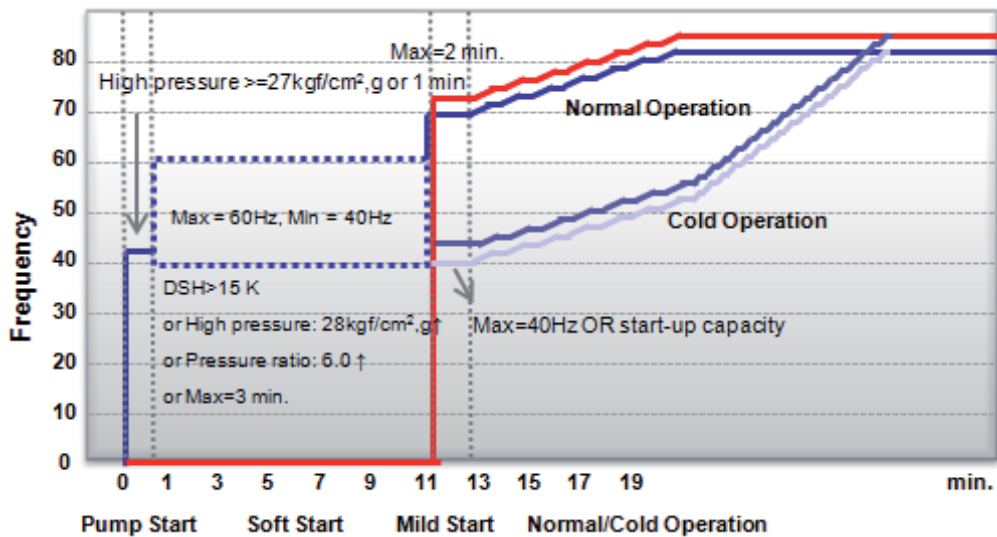
7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-2 Start-up modes (cont.)

Safety Start – Normal Start

- **Purpose**
Stable start-up in a low-temperature section with overload
- **Concept**
Compressors start in sequential order to ensure stable operation if the indoor unit operation ratio is low or there is an overload.
- **Control specifications in detail**
 - Condition(s) required to enter Normal Start mode : None of the conditions required to enter Quick Start mode are satisfied.
 - In Normal Start mode, compressors are controlled as shown below.
(See the chart below for conditions required to complete specific steps)



- Condition(s) required to enter Normal Operation mode : [A or B]
 - A. DSH > 10 K
 - B. Max (Tdis, Ttop) ≥ 30 °C
- Cold Operation mode will activate if none of the conditions required to enter Normal Operation mode are satisfied.
- In Cold Operation mode, the compressor frequency increase speed is restricted to 1Hz per 30 sec.
- Condition(s) required to close Cold Operation mode: [A or B]
 - A. A maximum of 30 min has elapsed
 - B. DSH > 15 K

7-3 Functions (cont.)

7-3-2 Control (cont.)

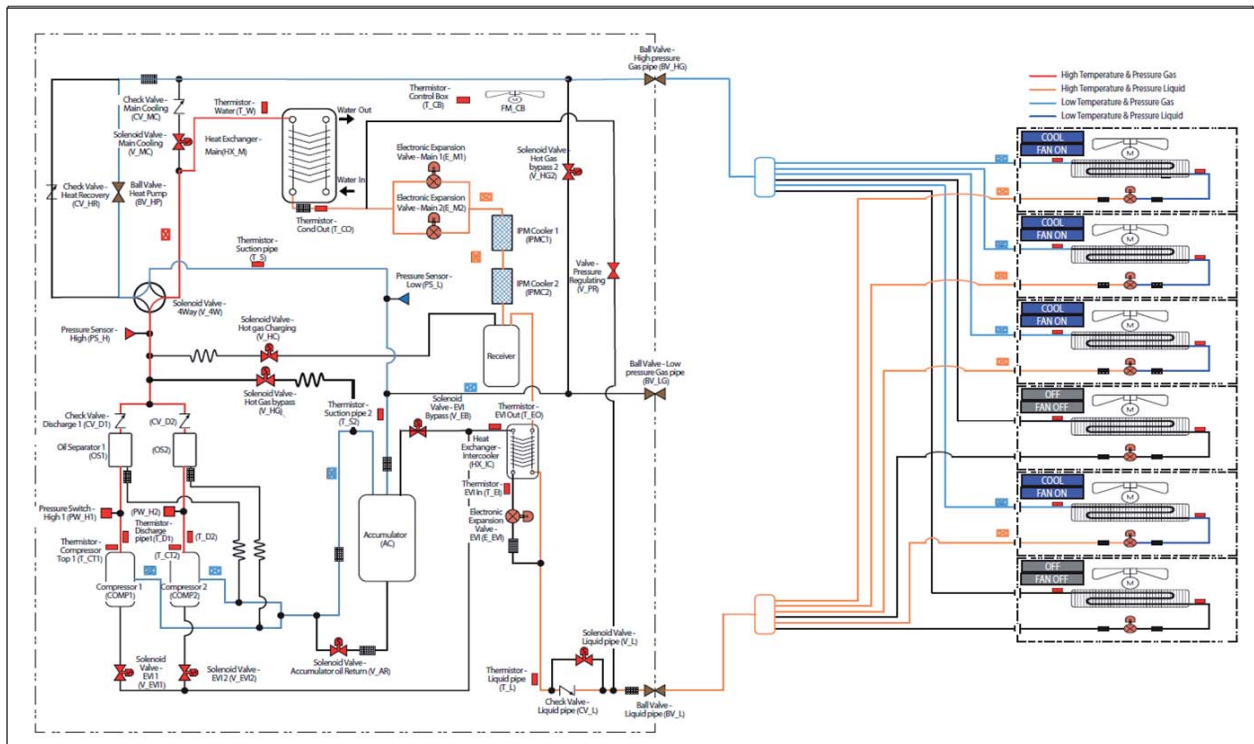
7-3-2-3 Normal operation modes

Cooling operation

- Purpose**
 Enable cooling in the entire target space.
- Control specifications in detail**
 - Condition(s) required to enter Quick Start mode: [A & B]

Actuator	Abbrev.	-	Normal Cooling
Compressor	COMP	Operation	Target low pressure control (default : 8kgf/cm ² ,g)
		Range	14~120Hz
Electronic Expansion Valve - Main (Main EEV)	E_M	Operation	Full Open
		Range	2000step
Electronic Expansion Valve - EVI (EVI EEV)	E_EVI	Operation	*Subcooling control (default: SC 20 K)
		Range	0-480step
Solenoid Valve - 4way	V_4W	Operation	Off
Solenoid Valve - EVI Bypass	V_EB	Operation	On (Open): *T_w > 40 °C or 50Hz ↓ Off (Close): T_w < 38 °C ↓ and 65Hz ↑
Solenoid Valve - EVI	V_EVI	Operation	On (Open)
Solenoid Valve - Hot Gas Bypass	V_HG	Operation	Off (Close)
Solenoid Valve - Accumulator Oil Return	V_AR	Operation	On (Open)
Solenoid Valve - Hot Gas Bypass 2	V_HG2	Operation	Main Cooling : On(Open), Cooling : Off(Close)
Solenoid Valve-Liquid Tube	V_L	Operation	Off (Close)
Solenoid Valve - Main Cooling	V_MC	Operation	Off (Close)
Solenoid Valve-Hot Gas Charging	V_HC	Operation	Off(Close) / On(Open) when high pressure is low

Refrigerant Flow Heat pump

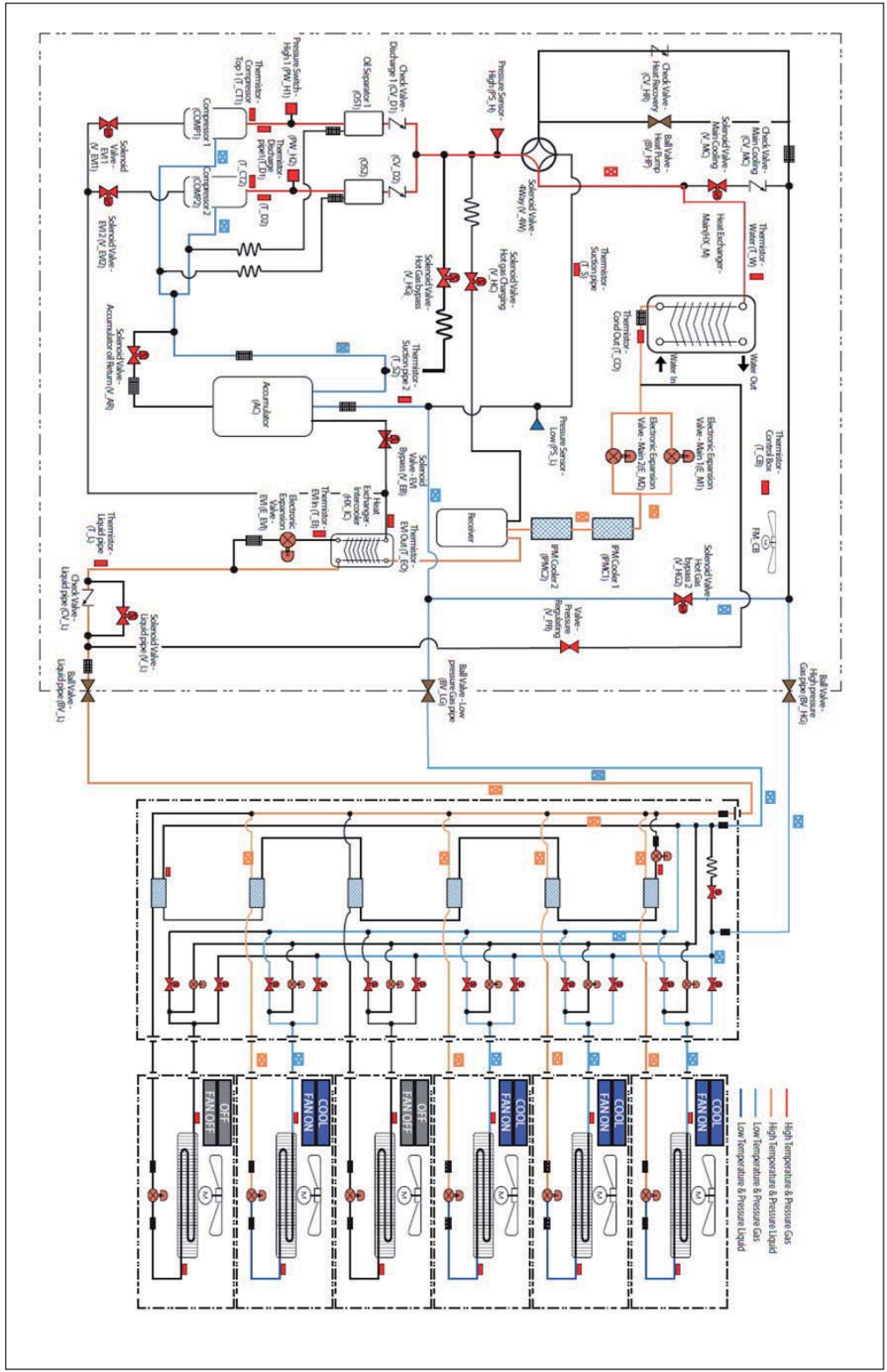


7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-3 Normal operation modes (cont.)

- Refrigerant Flow Heat Recovery



7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-3 Normal operation modes (cont.)

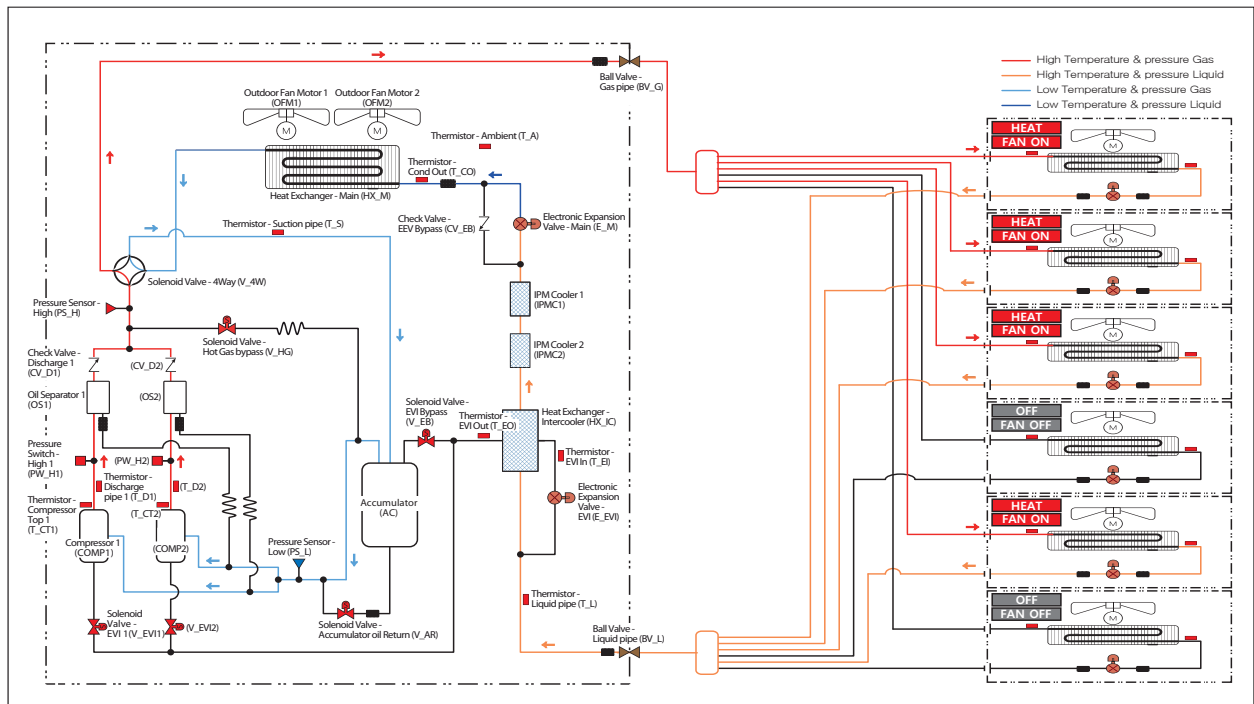
Heating operation

- **Purpose**
Enable heating in the entire target space.

- **Control specifications in detail**

Actuator	Abbrev.	-	Normal Cooling
Compressor	COMP	Operation	Target high pressure control(default : 28kgf/ cm ²)
		Range	14 - 120Hz
Electronic Expansion Valve – Main (Main EEV)	E_M	Operation	Target SH control
		Range	125step ~ 2000step
Electronic Expansion Valve – EVI (EVI EEV)	E_EVI	Operation	Vapor injection control
		Range	0-480step
Solenoid Valve - 4way	V_4W	Operation	On
Solenoid Valve – EVI Bypass	V_EB	Operation	On (Open): *T_w > 28 °C or 50Hz ↓ Off (Close): T_w < 25 °C ↓ and 65Hz ↑
Solenoid Valve – EVI	V_EVI	Operation	On (Open)
Solenoid Valve – Hot Gas Bypass	V_HG	Operation	Off (Close)
Solenoid Valve – Accumulator Oil Return	V_AR	Operation	On (Open)
Solenoid Valve – Hot Gas Bypass 2	V_HG2	Operation	Off (Close)
Solenoid Valve-Liquid Tube	V_L	Operation	Off (Close)
Solenoid Valve – Main Cooling	V_MC	Operation	Off (Close)
Solenoid Valve-Hot Gas Charging	V_HC	Operation	Off (Close)

- **Refrigerant Flow**
Heat pump

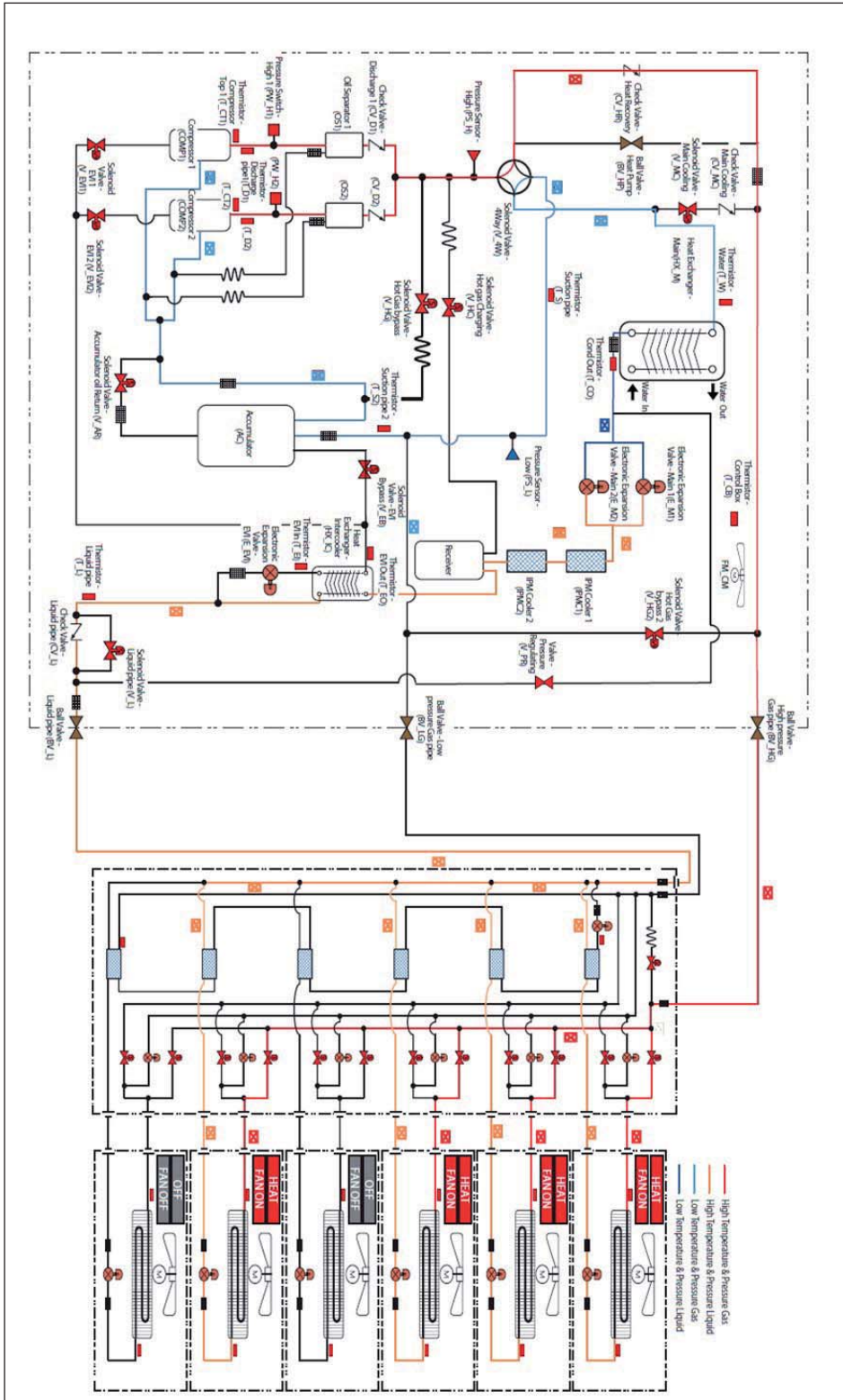


7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-3 Normal operation modes (cont.)

Heat Recovery



7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-3 Normal operation modes (cont.)

Main cooling operation

▪ **Purpose**

Switch to heating mode on some indoor units while using cooling mode

▪ **Control specifications in detail**

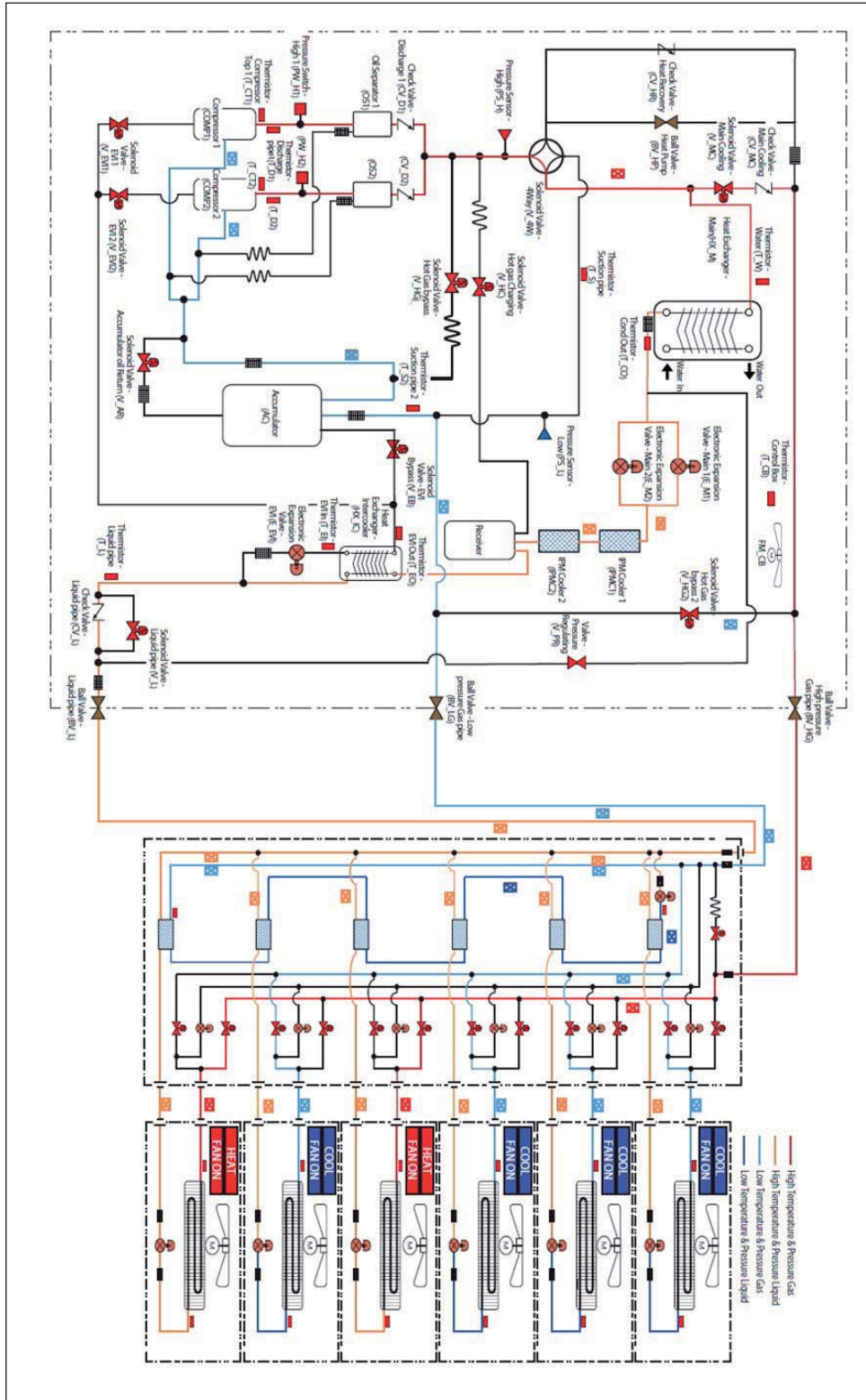
Actuator	Abbrev.	-	Normal Cooling
Compressor	COMP	Operation	Target high pressure control (default : 7kgf/ cm ²)
		Range	14 - 120Hz
Electronic Expansion Valve – Main (Main EEV)	E_M	Operation	Cooling & Heating capacity balance control
		Range	300 ~ 2000step
Electronic Expansion Valve – EVI (EVI EEV)	E_EVI	Operation	*Subcooling control (default : SC 20k)
		Range	0-480step
Solenoid Valve - 4way	V_4W	Operation	Off
Solenoid Valve – EVI Bypass	V_EB	Operation	On (Open): *T _w > 40 °C or 50Hz ↓ Off (Close): T _w < 38 °C ↓ and 65Hz ↑
Solenoid Valve – EVI	V_EVI	Operation	On (Open)
Solenoid Valve – Hot Gas Bypass	V_HG	Operation	Off (Close)
Solenoid Valve – Accumulator Oil Return	V_AR	Operation	On (Open)
Solenoid Valve – Hot Gas Bypass 2	V_HG2	Operation	Main Cooling : On(Open), Cooling : Off(Close)
Solenoid Valve-Liquid Tube	V_L	Operation	Off (Close)
Solenoid Valve – Main Cooling	V_MC	Operation	Off (Close)
Solenoid Valve-Hot Gas Charging	V_HC	Operation	Off(Close) / On(Open) when high pressure is low

7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-3 Normal operation modes (cont.)

- Refrigerant Flow



7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-3 Normal operation modes (cont.)

Main heating operation

▪ **Purpose**

Switch to cooling mode on some indoor units while using heating mode.

▪ **Control specifications in detail**

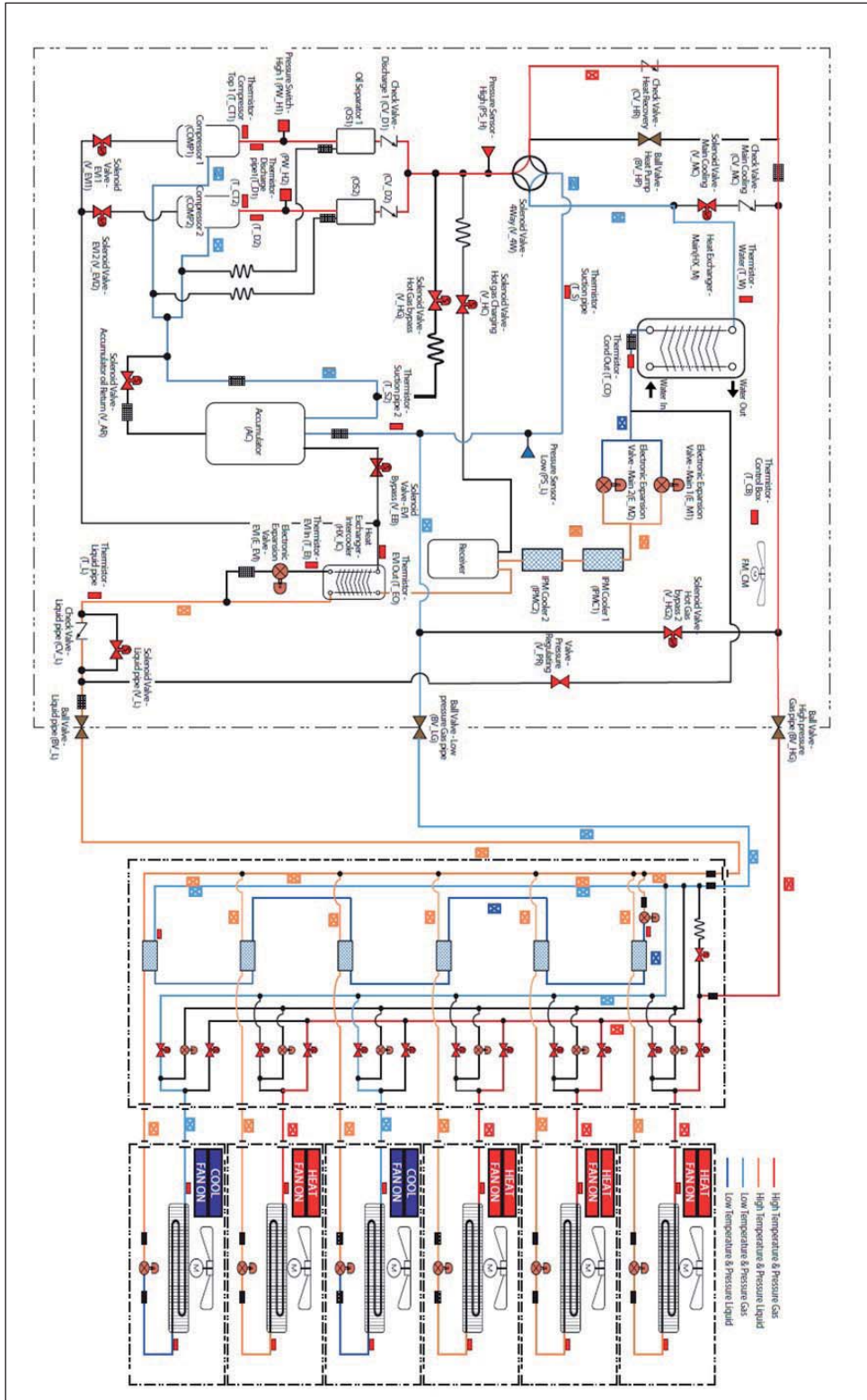
Actuator	Abbrev.	-	Normal Cooling
Compressor	COMP	Operation	Target high pressure control (default : 28kgf/ cm ²)
		Range	14 - 120Hz
Electronic Expansion Valve – Main (Main EEV)	E_M	Operation	Target SH control
		Range	125step ~ 2000step
Electronic Expansion Valve – EVI (EVI EEV)	E_EVI	Operation	Vapor injection control
		Range	0-480step
Solenoid Valve - 4way	V_4W	Operation	On
Solenoid Valve – EVI Bypass	V_EB	Operation	On (Open): *T _w > 28°C or 50Hz ↓ Off (Close): T _w < 25°C ↓ and 65Hz ↑
Solenoid Valve – EVI	V_EVI	Operation	On (Open)
Solenoid Valve – Hot Gas Bypass	V_HG	Operation	Off (Close)
Solenoid Valve – Accumulator Oil Return	V_AR	Operation	On (Open)
Solenoid Valve – Hot Gas Bypass 2	V_HG2	Operation	Off(Close)
Solenoid Valve-Liquid Tube	V_L	Operation	Off (Close)
Solenoid Valve – Main Cooling	V_MC	Operation	Off (Close)
Solenoid Valve-Hot Gas Charging	V_HC	Operation	Off(Close)

7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-3 Normal operation modes (cont.)

- Refrigerant Flow



7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-4 Special operation modes (cont.)

Oil return operation

▪ **Purpose**

Perform oil return after a specified amount of time has elapsed in order to prevent an insufficient amount of oil in compressors.

▪ **Concept**

The compressor capacity is raised to increase the amount of refrigerant circulation. This will return oil remaining in indoor units and piping.

▪ **Control specifications in detail**

- Oil recovery operation shall be performed to prevent a compressor from being short of oil. Oil in pipes or indoor unit will be collected to outdoor unit by starting oil collecting operation.
- Oil collecting operation will begin 7 hours after outdoor unit starts to operate but time might be reduced depending on the operating condition (# of compressor in operation and operating frequency).
- Master outdoor unit will be changed after oil collecting operation.

Actuator		Oil return Operation
Capacity of compressor		Current capacity + additional capacity
Outdoor EEV		Normal control
Indoor EEV	Operating indoor units	Higher step of [400(C)/300(H) or Current step]
	Stopped indoor units	400(C)/300(H)
Indoor Fan		Normal control
Time		3min(C) / 6min(H)

*Additional capacity = Compensation capacity of stop units

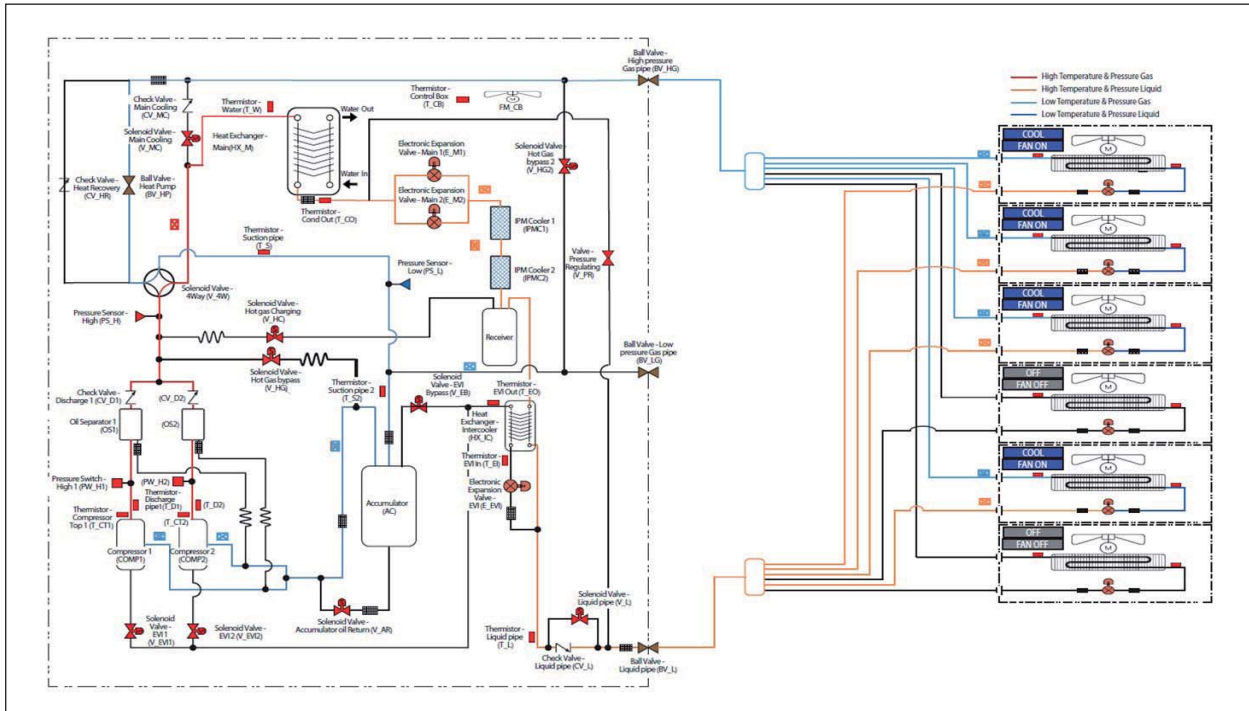
* EEV step can be varied by cycle condition.

7-3 Functions (cont.)

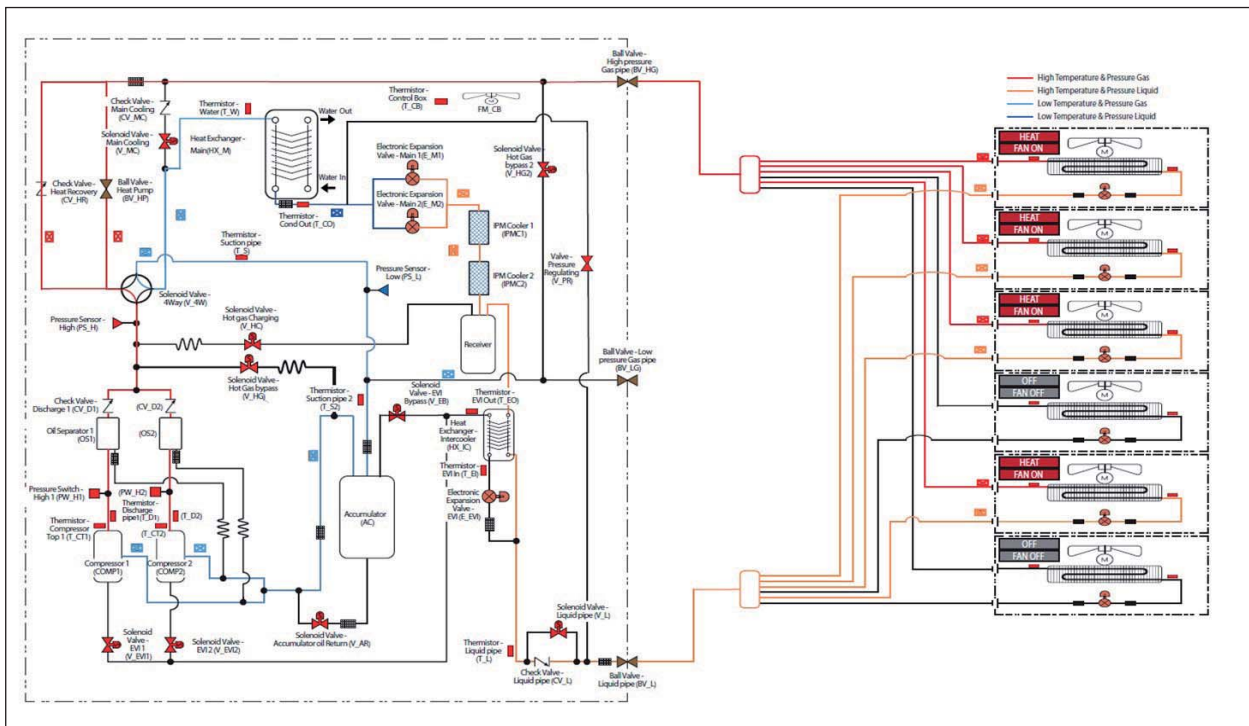
7-3-2 Control (cont.)

7-3-2-4 Special operation modes (cont.)

- Refrigerant Flow
Heat Pump - Cooling



Heat Pump - Heating

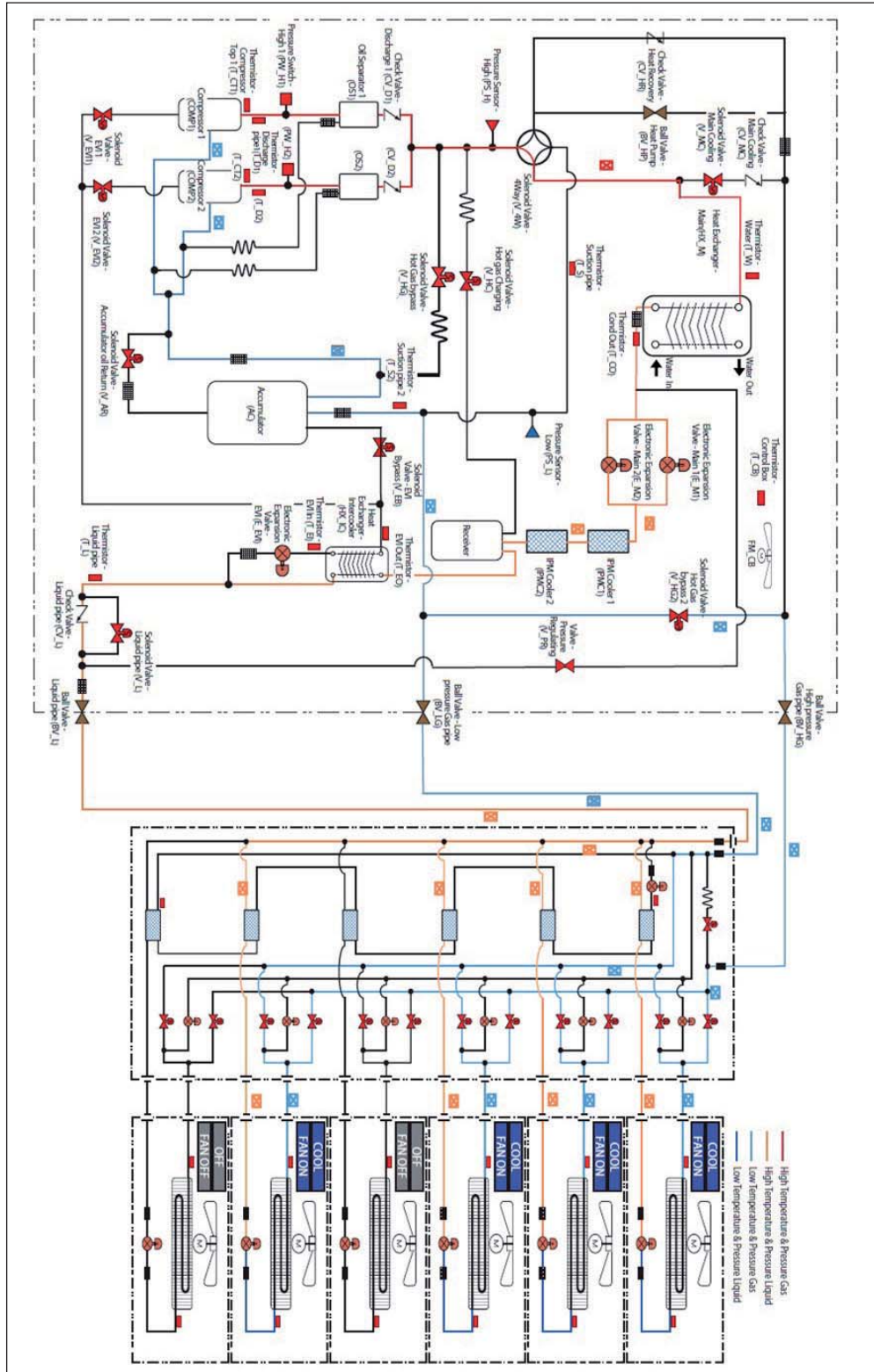


7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-4 Special operation modes (cont.)

- Refrigerant Flow
Heat Recovery - Cooling

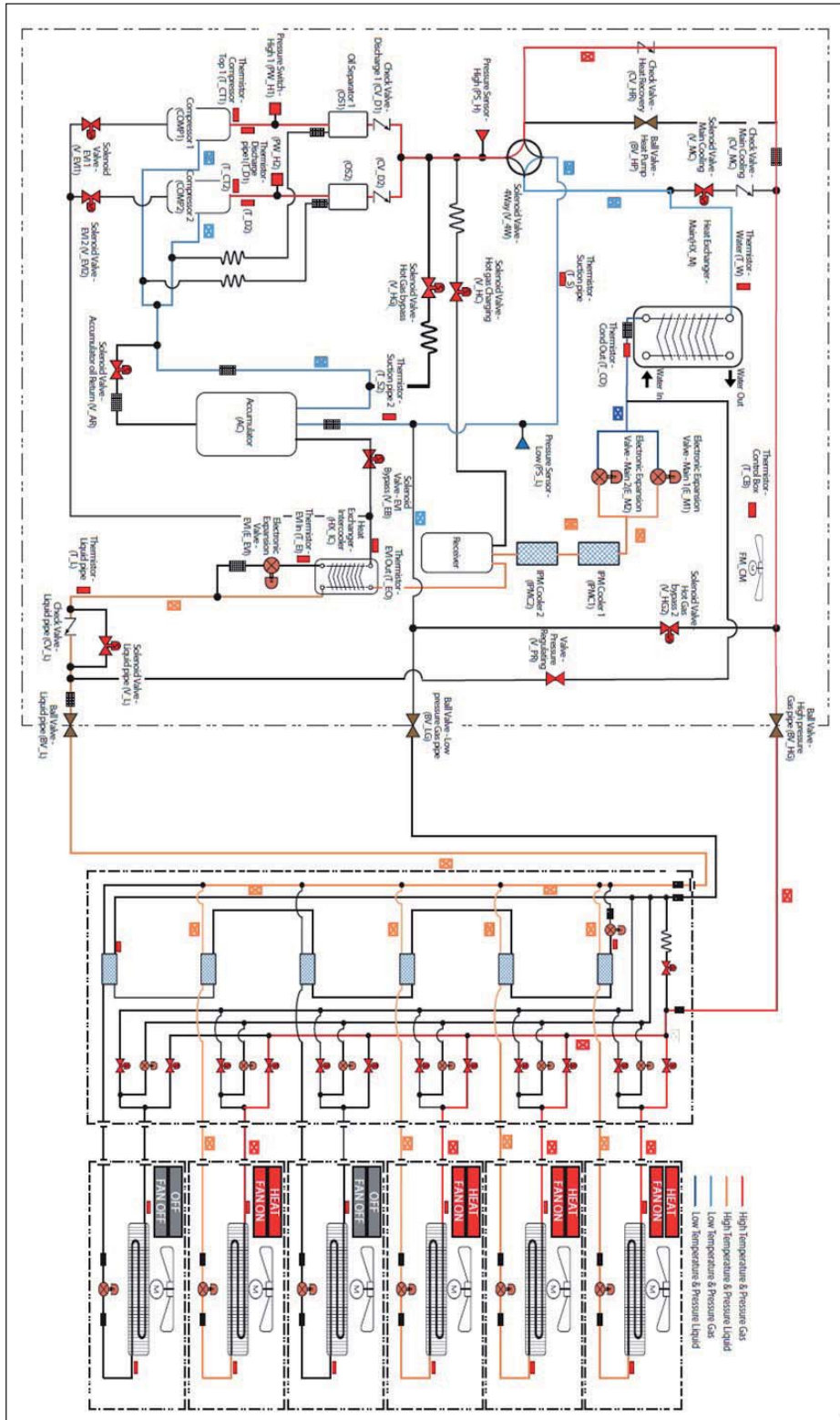


7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-4 Special operation modes (cont.)

- Refrigerant Flow
Heat Recovery - Heating



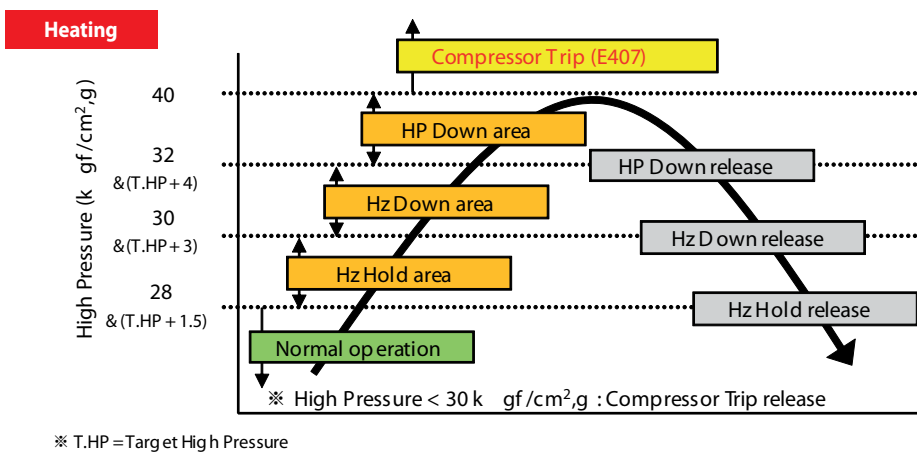
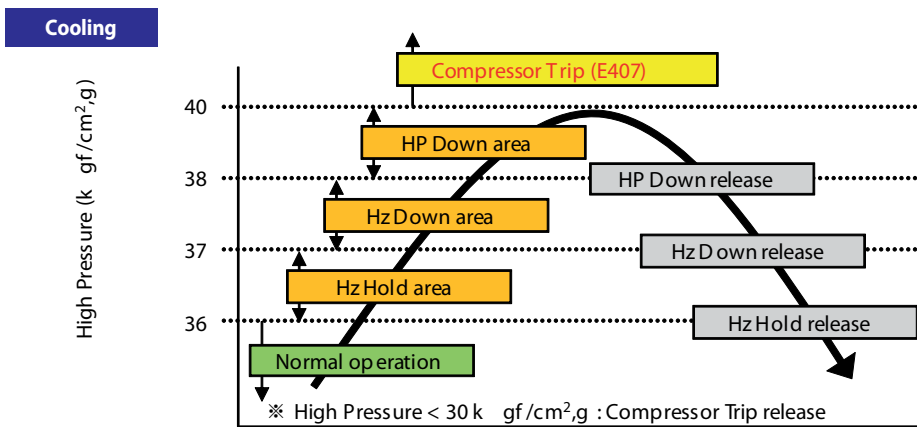
7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-5 Protective control

High Pressure Protection

- **Purpose**
Prevent abnormal high pressure to protect the system and compressors.
- **Concept**
The compressor operation frequency is lowered to decrease the high pressure.
- **Control specifications in detail**
 - The compressor operation frequency is controlled according to the high pressure, as shown below.
 - 1st step Hz hold: The current frequency is fixed. (It is possible to lower the frequency if necessary)
 - 2nd step Hz down: The frequency is forcibly lowered by 5Hz at specified intervals.
 - 3rd step HP down: The frequency is forcibly lowered by 1Hz every second.
 - 4th step Comp trip: Compressors stop and an error is triggered (E407).



7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-5 Protective control (cont.)

Low Pressure Protection

▪ Purpose

Prevent abnormal low pressure to protect the system and compressors.

▪ Concept

The compressor operation frequency is lowered to increase the low pressure.

The Hotgas Bypass Valve is opened to bypass the high pressure to the suction pipe. This will increase the low pressure.

▪ Control specification in detail (Cooling mode)

- Control of the operation frequency (see the chart in the previous page for pressure conditions.)
 - 1st step Hz hold : Fix the current frequency if the discharge temperature is higher than 70 °C .
(It is possible to lower the frequency)
 - 2nd step Hz down : Automatically lower the frequency by 5Hz at specified intervals if the discharge temperature is higher than 70 °C .
 - 3rd step HP down : Automatically lower the frequency by 1Hz every second if the discharge temperature is higher than 70 °C .
 - 4th step Comp trip : If in critical state for 3 min, stop the compressors and trigger an error (E410).
- Control of the Hot Gas Bypass Valve
 - Open the valve if low pressure is 3.2kgf/cm²,g.
 - Close the valve if low pressure is 4.2kgf/cm²,g.
- Others
 - If the water temperature is abnormally low, limit opening of the valve. This reduces the need to repeatedly turn on the low pressure protective control.
 - When cooling mode is on and the water temperature is 25 °C or lower, one of the Hz Hold through HP Down steps is activated if the low pressure is -1kgf/cm²,g.

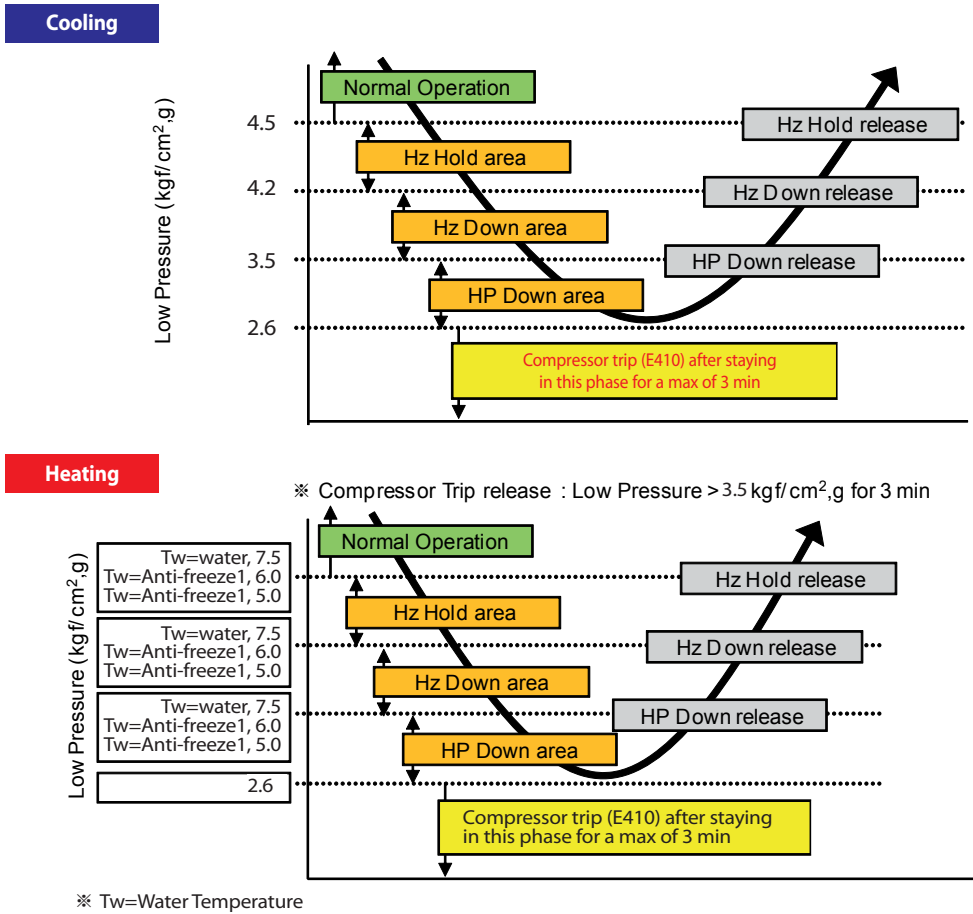
▪ Control specification in detail(Heating mode)

- 1st step Hz Hode : Fix the current frequency
- 2nd step Hz down : Automatically lower the frequency by 5hz at specified intervals
- 3rd step HP down : Automatically lower the frequency by 1hz every second
- 4th step Comp trip : low pressure is less than 2.6 after HP down control entry 1min(in case of water circulation)
- Control of the Hot Gas Bypass Valve(in case of water circulation).
 - Open the valve if low pressure is 7.5 or lower.
 - Close the valve if low pressure is 9.5 or higher.

7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-5 Protective control (cont.)



7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-5 Protective control (cont.)

Compression ratio protection

▪ **Purpose**

Prevent compressor damage due to abnormal operation.

Failure may occur due to an overload of compressors if the compression ratio is high.

Compressor failure may occur due to poor lubrication if the compression ratio is low.

▪ **Concept**

If the compression ratio is high, the compressor frequency is lowered to decrease the ratio.

If the compression ratio is low, the superheat degree for compressor suction is raised and the compressor frequency is increased.

This will increase the compression ratio.

Compression ratio = $(\text{High Pressure}(\text{kgf/cm}^2, \text{g}) + 1.03) / (\text{Low Pressure}(\text{kgf/cm}^2, \text{g}) + 1.03)$

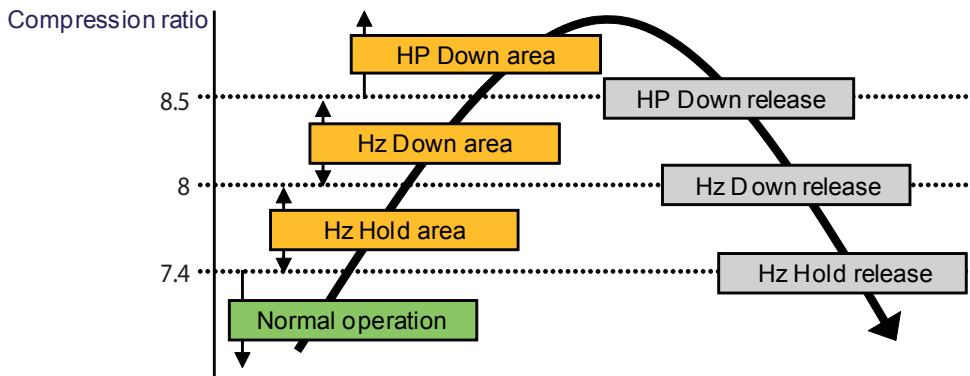
▪ **Control specifications in detail**

- If the compression ratio is high,

1st step Hz hold : The current frequency is fixed. (It is possible to lower the frequency if necessary)

2nd step Hz down : The frequency is forcibly lowered by 5Hz at specified intervals.

3rd step HP down : The frequency is forcibly lowered by 1Hz every second.



7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-5 Protective control (cont.)

Discharge temperature protection

▪ **Purpose**

Prevent abnormal discharge temperature to protect the system and compressors.

▪ **Concept**

Two-phase refrigerant is injected into compressors to decrease the discharge temperature.
The compressor frequency is lowered to decrease the discharge temperature.

▪ **Control specifications in detail**

- The compressor frequency is controlled according to the discharge temp, as shown below.

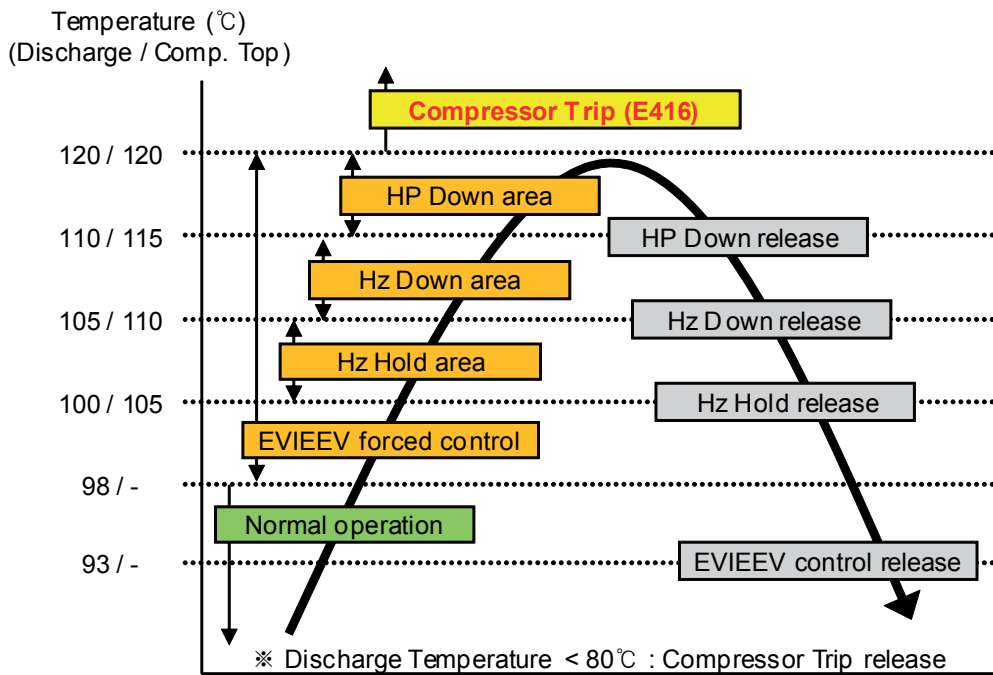
1st step EVIEEV Open : EVIEEV is forcibly opened.

2nd step EVIEEV Open : The current frequency is fixed. (It is possible to lower the frequency if necessary)

3rd step Hz down : The frequency is forcibly lowered by 5Hz at specified intervals.

4th step HP down : The frequency is forcibly lowered by 1Hz every second.

5th step Comp trip : Compressors stop and an error is triggered (E416).

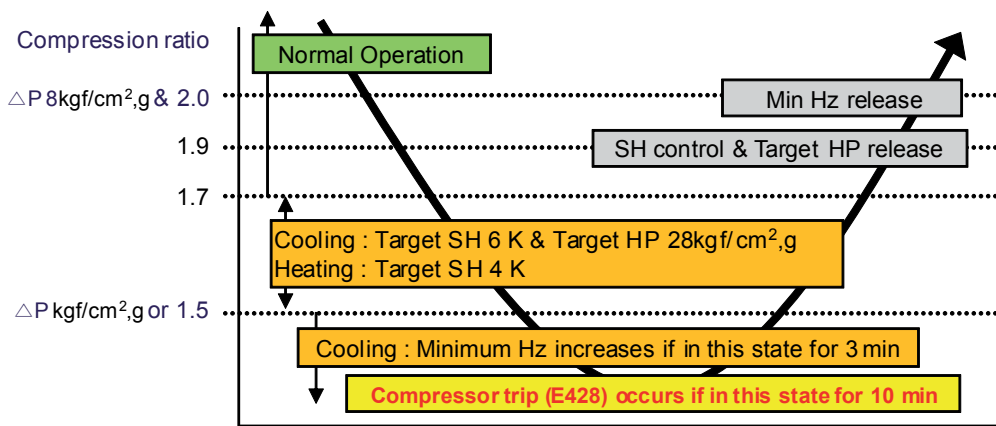


7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-5 Protective control (cont.)

- If the compression ratio is low,
 - 1st step Increase of the superheat degree : The superheat degree for compressor suction is increased .
 - 2nd step Increase of the minimum compressor frequency : The minimum compressor frequency is increased to the predefined model-specific frequency.
 - 3rd step Comp Trip : If in critical state for 10 min, stop the compressors and trigger an error (E428).



※ ΔP = High Pressure - Low Pressure

7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-5 Protective control (cont.)

Discharge temperature protection

▪ **Purpose**

Prevent abnormal discharge temperature to protect the system and compressors.

▪ **Concept**

Two-phase refrigerant is injected into compressors to decrease the discharge temperature.
The compressor frequency is lowered to decrease the discharge temperature.

▪ **Control specifications in detail**

- The compressor frequency is controlled according to the discharge temp, as shown below.

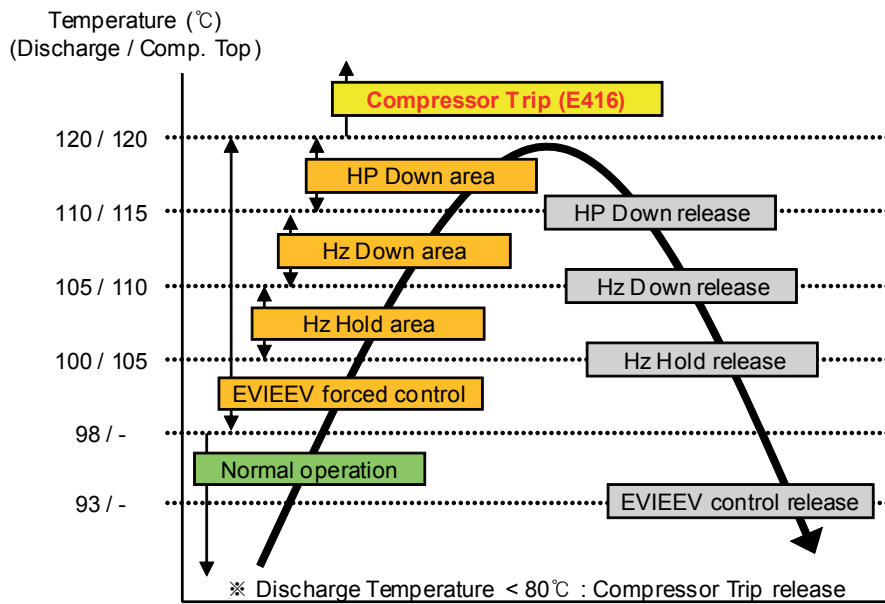
1st step EVIEEV Open : EVIEEV is forcibly opened.

2nd step EVIEEV Open : The current frequency is fixed. (It is possible to lower the frequency if necessary)

3rd step Hz down : The frequency is forcibly lowered by 5Hz at specified intervals.

4th step HP down : The frequency is forcibly lowered by 1Hz every second.

5th step Comp trip : Compressors stop and an error is triggered (E416).



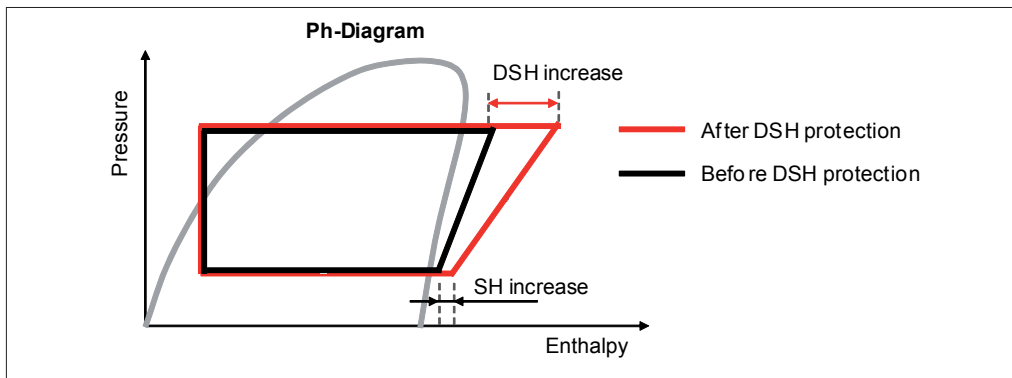
7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-5 Protective control (cont.)

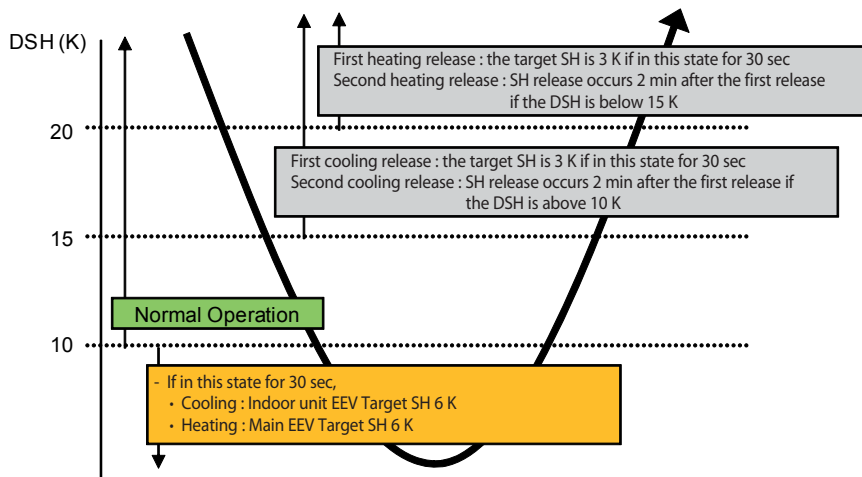
DSH (Discharge Super Heat) protection

- **Purpose**
Prevent liquid compression to protect the system and compressors.
- **Concept**
The compressor Suction Super Heat (SH) is raised to increase the DSH.



- DSH = Compressor discharge temp. – High pressure saturation temp.
- The compressor discharge temperature is defined during DSH protection control :
Min { Max(Tdis_comp1, Ttop_comp1), Max(Tdis_comp2, Ttop_comp2) }

- **Control specifications in detail**
 - The target superheat changes to 6 K if the DSH is 10 K or lower.



7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-5 Protective control (cont.)

IPM (Intelligent Power Module) temperature protection

- **Purpose**

Prevent IGBT module damage due to overheating.

- **Concept**

The compressor operation frequency is lowered to decrease the IPM temperature.

- **Control specifications in detail**

- The compressor frequency is controlled according to the IPM temperature, as shown below.

- 1st step Hz hold : The current frequency is fixed. (It is possible to lower the frequency if necessary)

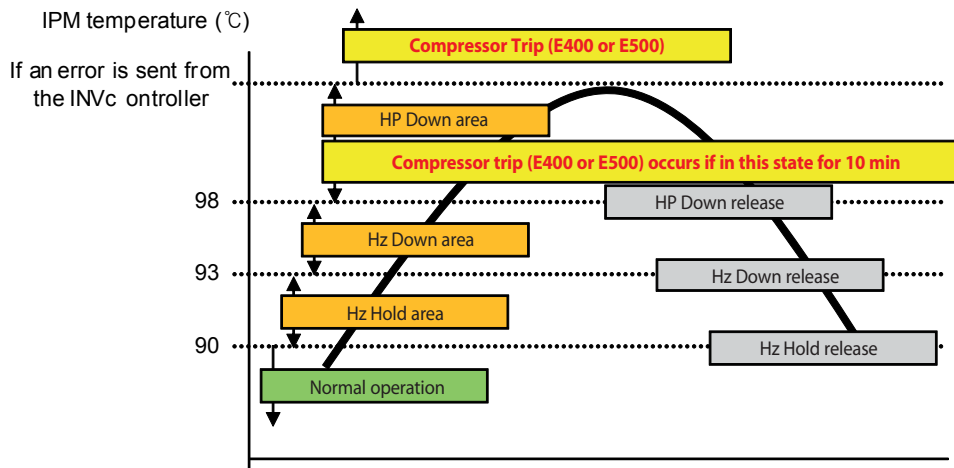
- 2nd step Hz down : The frequency is forcibly lowered by 5Hz at specified intervals.

- 3rd step HP down : The frequency is forcibly lowered by 1Hz every second.

- If in this state for 10min, compressors stop and an error is triggered (E400 or E500).

- 4th step Comp trip : Compressors stop and an error is triggered (E400 or E4500).

- If restarting the compressor, -10 °C is applied for 60 min as the temperature required to enter protective control mode.



7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-5 Protective control (cont.)

Maximum current limit (total)

▪ **Purpose**

Prevent operation if the electric current capacity is exceeded.

▪ **Concept**

- The compressor operation frequency is lowered to prevent the electric current used to operate outdoor units from exceeding the maximum electric current.
- Outdoor unit current = Compressor current + Outdoor fan current (= CT1 + CT2)
 - ※ CT1 = Compressor 1 current + Fan current
- Maximum outdoor unit current = Maximum current of the system x Set value
- Set value : 50-100% (default 100%). The value can be set from outdoor unit options or the upper-level controller.
A value below 100% will degrade performance.

▪ **Control specifications in detail**

- The frequency is controlled according to the outdoor unit current, as shown below.
 - 1st step Hz hold : The current frequency is fixed if the outdoor unit current at present is higher than 95% of the maximum current.
(It is possible to lower the frequency if necessary)
 - 2nd step Hz down : The frequency is forcibly lowered by 5Hz at specified intervals
if the outdoor unit current at present is higher than the maximum current.

7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-5 Protective control (cont.)

Maximum current limit (each compressor)

▪ **Purpose**

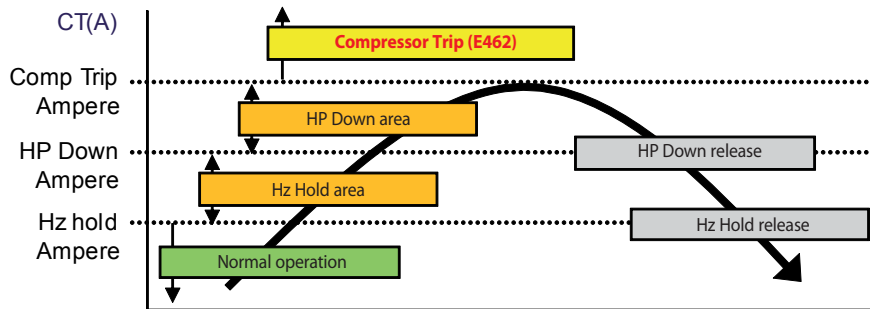
Prevent device damage due to excess current in circuit components or overheating of the IPM module.

▪ **Concept**

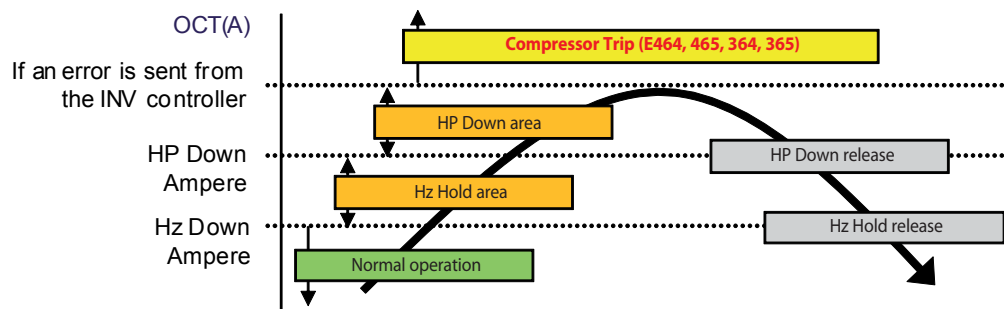
- The compressor operation frequency is controlled to prevent each INV PBA input current (CT) from exceeding the designed current limit.
- The compressor operation temperature is controlled to prevent each INV PBA output current (OCT) from exceeding the designed current limit.

▪ **Control specifications in detail**

- The compressor frequency is controlled according to the INV PBA input current (CT) for each compressor, as shown below.
 - 1st step Hz hold: The current frequency is fixed. (It is possible to lower the frequency if necessary)
 - 2nd step HP down: The frequency is forcibly lowered by 1Hz at specified intervals.
 - 3RD step Comp trip: Compressors stop and an error is triggered (E462).



- The compressor frequency is controlled according to the INV PBA output current (OCT) for each compressor, as shown below.
 - 1st step Hz hold: The current frequency is fixed. (It is possible to lower the frequency if necessary)
 - 2nd step HP down: The frequency is forcibly lowered by 1Hz at specified intervals.
 - 3RD step Comp trip: Compressors stop and an error is triggered (E462).



7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-5 Protective control (cont.)

Freezing prevention

▪ **Purpose**

Prevent frost in indoor units to protect compressors. Prevent other accidents.

If there is frost in indoor units, refrigerant will not evaporate. As a result, compressor failure will occur due to liquid compression.

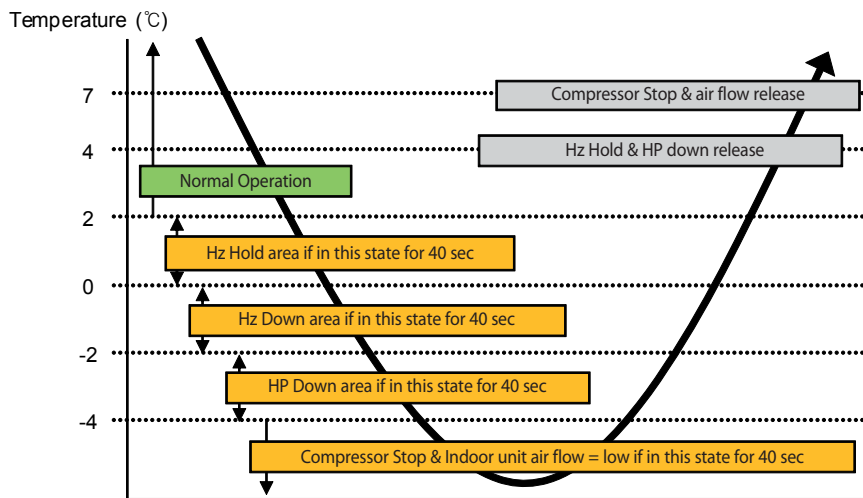
If there is frost in indoor units, ice may form and fall causing an accident.

▪ **Concept**

- Frost is detected based on the temperature of indoor unit heat exchangers.
- The compressor frequency is lowered to prevent frost in indoor unit heat exchangers.
- The temperature for indoor unit heat exchangers is defined during frost preventive control:
- Minimum temperature of temperature at the exit of indoor unit heat exchangers and temperature at the entrance of indoor unit heat exchangers)

▪ **Control specifications in detail**

- The compressor operation frequency is controlled according to the temperature of indoor unit heat exchangers, as shown below.
- 1st step Hz hold : The current frequency is fixed. (It is possible to lower the frequency if necessary)
- 2nd step Hz down : The frequency is forcibly lowered by 5Hz at specified intervals.
- 3rd step HP down : The frequency is forcibly lowered by 1Hz every second.
- 4th step Comp stop : Compressors stop and the fan speed changes for indoor units to the mid level.



7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-6 Indoor unit control

Operation modes

▪ **Purpose**

Classify operation modes to provide optimum performance to satisfy different user preferences.

▪ **Concept**

Cooling, heating, dehumidifying, and fan modes are provided, allowing users to control the indoor temperature and humidity. Operation modes can be switched either automatically or manually. Defrost and oil return modes are also available. These modes are used to maintain system performance.

▪ **Control specifications in detail**

- How to turn on a mode : Select a mode via user input
- User input options: remote control, key options, Wi-Fi kit, centralized control, and external contact
- Available modes: Auto / Cooling / Heating / Dry / Fan / Defrost / Oil Recovery / Turbo

Fan speed, EEV regulating method, and set temperature range for each operation mode are shown below.

Mode	Fan speed	EEV	Set temp	Remark
Auto	Fixed Auto1)	Control	18-30°C	User selection
Cooling	User input Low, Mid, High, Auto	Control	18-30°C	User selection Min.16°C for RAC
Dry	Fixed Auto2)	Control	18-30°C	User selection Min.16°C for RAC
Heating	User input Low, Mid, High, Auto	Control	16-30°C	User selection
Turbo	Fixed High, Turbo	Control	Unable	Operating for 30mins then return to previous
Fan	User input Low, Mid, High	Fixed (Close)	-	User selection
Defrost	Stop	Fixed (Open)	-	System
Oil recovery	User input Low, Mid, High, Auto	Control	-	System

1) The fan speed is adjusted based on the difference (ΔT) between the set temperature (T_s) and indoor temperature (T_i).

$ T_s - T_i \leq 1 \text{ K}$	$1 \text{ K} < T_s - T_i \leq 3 \text{ K}$	$3 \text{ K} < T_s - T_i $
Low	Mid	High

2) The fan speed is automatically adjusted as shown below, irrespective of inputs on the remote control.

Relay fan	Other fans
Low	Low Low

7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-6 Indoor unit control (cont.)

Auto Change Over

▪ **Purpose**

Automatically turn on heating or cooling mode according to the indoor temperature when using auto mode on HR model units.

▪ **Concept**

- How to turn on the mode : Select Auto Changeover
- Heating or cooling mode automatically turns on after comparing the indoor temperature (Tr) with the set temperature (Ts). It is possible to adjust the Auto Changeover condition according to the value of installation option 2.

▪ **Control specifications in detail**

1. Initial operation mode determination	
If $Tr \geq Ts - A + 1\text{ K}$	If $Tr < Ts - A + 1\text{ K}$
Auto Cooling	Auto Heating
2. Mode change	
Cooling → Heating	Heating → Cooling
Thermo off for T & $Tr < Ts - D$	Thermo off for T & $Tr \geq Ts + C$
3. Thermo On/Off	
In cooling mode	In heating mode
Thermo on : $Tr \geq Ts + B + 1\text{ K}$ Thermo off : $Tr < Ts + B - 1\text{ K}$	Thermo on : $Tr < Ts - A - 1\text{ K}$ Thermo off : $Tr \geq Ts - A + 1\text{ K}$

- Install Option 2 value

Symbol	Function	0	1	2	3	4	5	6	7
A	Offset the set heating temp	0	0.5	1	1.5	2	2.5	3	3.5
B	Offset the set cooling temp	0	0.5	1	1.5	2	2.5	3	3.5
C	Change the mode (heat → cool)	1	1.5	2	2.5	3	3.5	4	4.5
D	Change the mode (cool → heat)	1	1.5	2	2.5	3	3.5	4	4.5
T	T time	5	7	9	11	13	15	20	30

7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-6 Indoor unit control (cont.)

Thermo On/Off

▪ **Purpose**

Maintain the custom indoor temperature.

▪ **Concept**

Thermo is turned on or off through comparison between the indoor temperature and set temperature.

▪ **Control specifications in detail**

Cooling mode

- Thermo on:

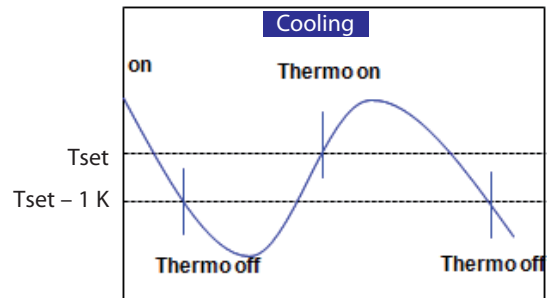
Room temp. \geq Set temp.

Room temp. \geq Set temp.+1 K (RAC only)

- Thermo off:

Room temp. \leq Set temp. -1 K

Room temp. \leq Set temp (RAC only)



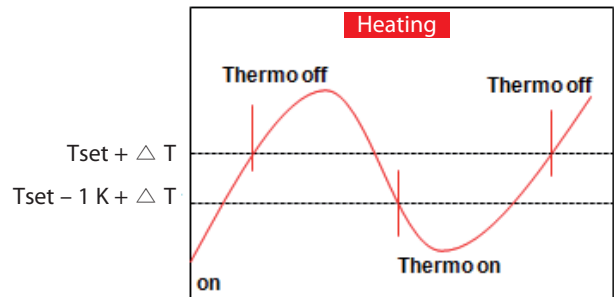
Heating mode

- Thermo on:

Room temp. \leq Set temp. -1 K+ ΔT^*

- Thermo off:

Room temp. \geq Set temp. + ΔT



▪ **Notes**

- In case of cooling operation, if the indoor temperature is above the setting temperature, thermo becomes on and if it is below the setting temperature, thermo becomes off.
- In case of heating operation, occupants' comfort shall be optimized by operating thermo on and off at the higher temperature than the setting temperature considering that high temperature tends to go up.
- In case of a normal indoor unit, heating offset value of 2 K is applied and this can be adjusted with the option code. Offset value shall not be applied in case that users set up the room temperature using the cable remote control where the temperature sensor is built in

7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-6 Indoor unit control (cont.)

Temperature Compensation

▪ **Purpose**

Compensate for variances in temperature affecting people differently in the room. Wind chill is caused by indoor temperature stratification when using the internal temp sensors on indoor units instead of using external temp sensors in the room.

▪ **Concept**

If measuring the indoor temperature using the internal temp sensors on indoor units in heating mode, the temperature is controlled under the assumption that the actual indoor temperature is lower than the temperature inside the indoor units and the temperature difference is equivalent to the compensation temperature.

▪ **Control specifications in detail**

- Factory default (product option code SEG6)

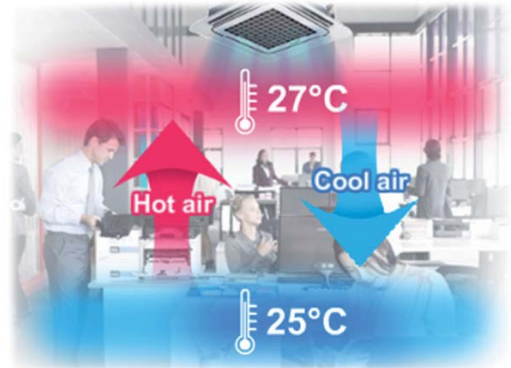
- 4way type : $\Delta T^* = 5 \text{ K}$
- others : $\Delta T^* = 2 \text{ K}$

- Installation setting(installation option code SEG21)

SEG21 Setting	ΔT^*
0	Factory default
1	2 K
2	5 K

* ΔT : Heating compensation temperature

- In case of using external room temp. sensor
(Installation option SEG4 = 1) : $\Delta T = 0$



▪ **Notes**

- Order of priority : Use of external temp sensor > Install offset > Basic option.

7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-6 Indoor unit control (cont.)

Fan Control in Thermo-Off Condition

▪ **Purpose**

Regulate the fan operation specifications when the Thermo is off to stop the fans if the Thermo turns off.

▪ **Concept**

If the install options are changed, fans turn off when the Thermo turns off in cooling mode. If the options are not changed, fans turn on by default under the same condition.

If the install options are changed, fans turn off when the Thermo turns off in heating mode.

If the options are not changed, fans turn on or off by default according to the status under the same condition.

▪ **Control specifications in detail**

Condition(s) required to use the mode : Install options are changed

The mode to turn on or off the fans when the Thermo turns off in cooling or heating mode is changed as shown below.

Mode	Thermo	EEV	Fan	"02" SEG4 setting
Cooling	ON	Open	On	all
	OFF	Closed (0 or 35)	On Off	0,1,2,3 4,5,6,7
Heating	ON	Open	On	all
	OFF	Open in 120step	Off & On (20°C ↑)	0,4
			Off & On (20°C ↑ , 20 sec on every 5 min)	2,6
			Off	1,3,5,7

"02" SEG 4	External room sensor	Minimizing fan operation
0	Disuse	Disuse
1	Use	Disuse
2	Disuse	Use-Heating
3	Use	Use-Heating
4	Disuse	Use-Cooling
5	Use	Use-Cooling
6	Disuse	Use-Both
7	Use	Use-Both

▪ **Notes**

If you set "02" SEG4 as external room s/s use, Heating compensation temperature will be set as 0°C .

7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-6 Indoor unit control (cont.)

Fan Speed Control

▪ **Purpose**

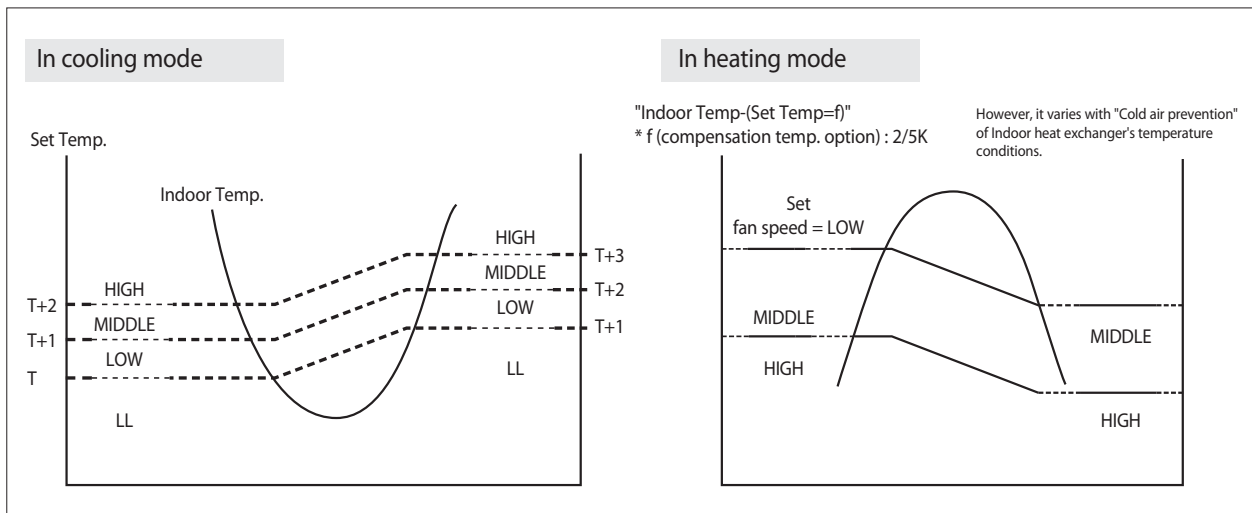
Provide automatic and manual fan speed control options, allowing users to obtain the desired fan speed.

▪ **Concept**

Auto control automatically adjusts the fan speed according to the indoor temperature and set temperature.
Manual control adjusts the fan speed according to the fan speed selected by the remote control.

▪ **Control specifications in detail**

If automatic fan speed control mode is on in cooling mode, the fan speed changes as shown in the following charts.



- Manual fan speed control

User control	
System control	<ul style="list-style-type: none"> - Ultra Low : minimum step(* non feedback type : 5 step + Low step x 0.25) - Low Low : Low - 1 step (* 1step : about 20rpm) - High High : High + 1 step - Ultra High : High + 2 step

- Quiet mode : it can reduce the noise from fan motor during cooling or heating mode.

- Fan feedback indoor unit(ex. RAC, 1way, 2way, 4way): Current Fan speed -1 step (1step = about 20 rpm)

- Fan non feedback indoor unit(ex. duct) : H → M, M → L, L → L

7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-6 Indoor unit control (cont.)

Electronic Expansion Valve(EEV) Control

▪ **Purpose**

General control: Maintain the amount of refrigerant flowing into the indoor units at the appropriate level.
 Inactive indoor unit control: Prevent insufficient refrigerant due to refrigerant stagnating in the piping connected to inactive indoor units.

▪ **Concept**

General control: Control is performed with the superheat degree in cooling mode. In heating mode, control is performed with the subcooling degree.
 Inactive indoor unit control: The gas pipe is kept open slightly in heating mode to prevent refrigerant from stagnating in the piping.

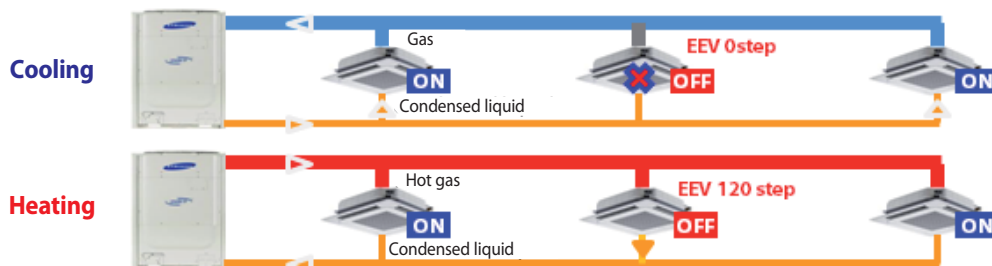
▪ **Control specifications in detail**

- Condition(s) required to use modes
 - General control : Thermo on indoor units are on
 - Inactive indoor unit EEV control: (Comp OFF) or (Comp ON and Indoor unit Thermo-OFF)
- Operation specifications
 - General control: Control is performed with the superheat degree at the exit of indoor heat exchanges in cooling mode. In heating mode, control is performed with the subcooling degree.
 - Inactive indoor unit EEV control: Control is performed as shown in the following table.

Outdoor unit operation		COMP ON		COMP OFF		
Indoor unit operation		Cooling	Heating	COMP stops - 3 min	COMP stops 3 - 5 min	COMP stops 5 min elapses
(Auto) cooling / Dehumidification / Fan	Thermo On	Cooling EEV control		0	0	35
	Thermo Off	0	Note 1*	0	0	35
(Auto) heating	Operation On	Heating EEV control		35	35	35
	Operation Off	0	Note 1*	35	35	35

* Note 1 : Control of inactive heating units (lower noise/general)

Outdoor unit for first priority outdoor unit	CAM	EDM high-head	EDM general
0°C or lower	80	130	200
Above 0°C	80	120	180



7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-6 Indoor unit control (cont.)

Drain Pump Control

▪ **Purpose**

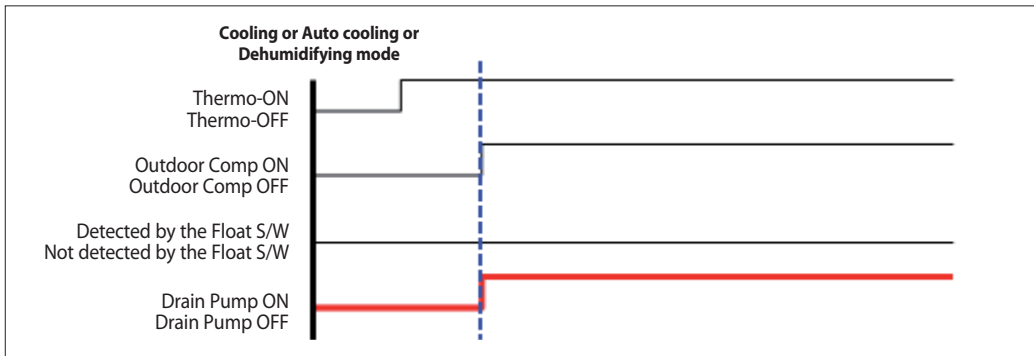
Discharge the condensate stagnating in the indoor unit's drainage plate to prevent the condensate from overflowing indoor units.

▪ **Concept**

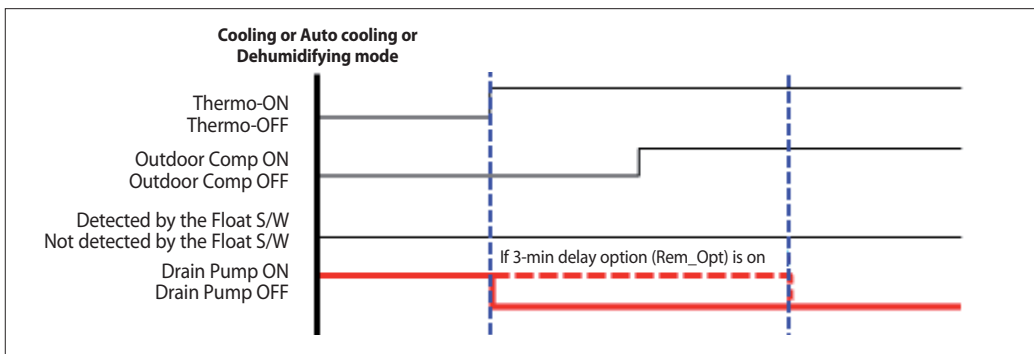
If the amount of condensate stagnating in the drainage plate reaches a certain level where it may overflow, the Float software detects this and activates the drain pump to discharge the condensate to the outside via the hose.

▪ **Control specifications in detail**

- Condition(s) required to use the mode : The Drain Pump Option is used, or the model name (Rem_Opt) is set to 1-Way, 2-Way, or 4-Way
- Drain Pump ON : (Cooling or Auto cooling or Dehumidifying mode ON) and (Outdoor Comp ON) and (Indoor unit Thermo-ON)

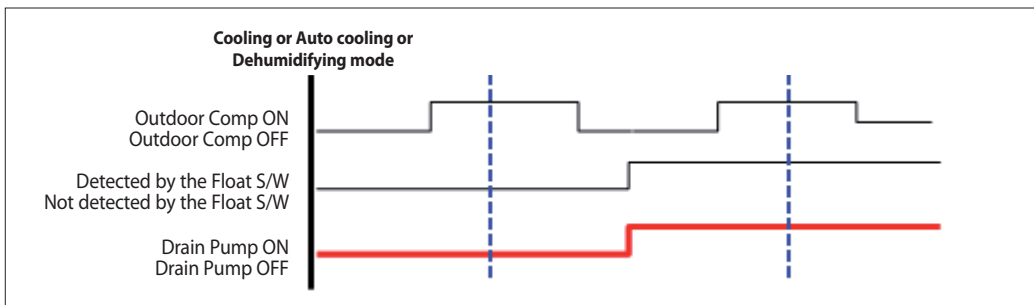


- Drain Pump OFF : (Operation OFF) or (Indoor unit Thermo OFF)



▪ **Notes**

The drain pump activates if the Float S/W operates in heating mode



7-3 Functions (cont.)

7-3-2 Control (cont.)

7-3-2-6 Indoor unit control (cont.)

Cold Air Prevention

▪ **Purpose**

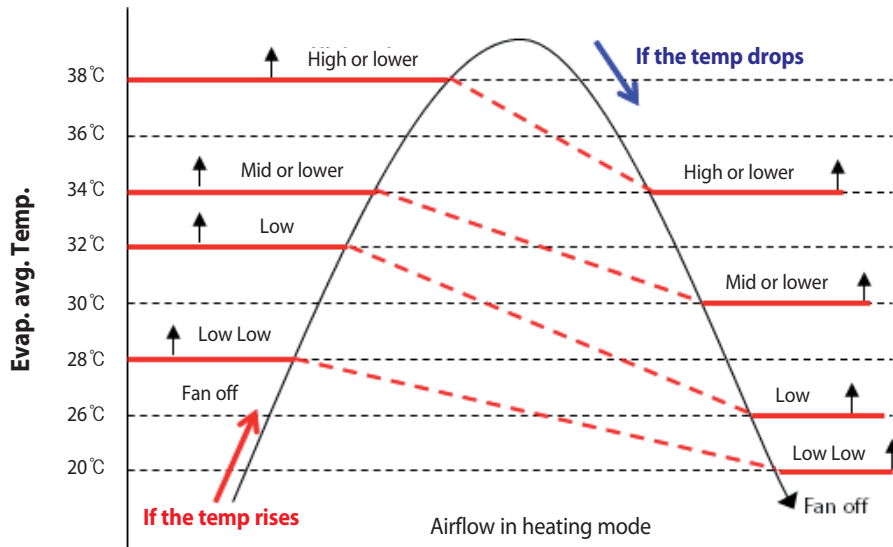
Control the fan speed to avoid discomfort of people in the room due to cold air in cooling mode or during the initial start-up of heating.

▪ **Concept**

- The fan does not operate if the indoor heat exchanger temperature is low in heating mode.
- The fan speed is restricted if the temperature is low.

▪ **Control specifications in detail**

- Condition(s) required to use the mode : Indoor units are operating in heating mode
- The fan speed is restricted according to the average heat exchanger temperature and temperature variations (increase/decrease).



7-3 Functions (cont.)

7-3-3 Others

7-3-3-1 Field Setting

Emergency operation for compressor malfunction

- **Purpose**
Perform emergency operation until servicing if there is compressor failure when using more than one compressor.
- **Concept**
Faulty compressors are disabled and turned off.
- **Control specifications in detail**
Disabled compressors are excluded from capacity distribution, heat treatment of winding wire, protective control, and self-diagnosed error detection.

Setting Outdoor	Seg1	Seg2	Seg3	Seg4	Emergency operation for compressor malfunction
Individual	0	0	0	0	Disabled (Default)
			0	1	Set compressor 1 as malfunction state
			0	2	Set compressor 2 as malfunction state

- **Notes**
 - The performance may degrade if this option is changed.
 - Make sure to return the option to the default value after servicing the compressor.
 - Error E560 will be triggered if all the compressors on outdoor units are disabled.
(The SVC V/V must be closed for outdoor units if modules are installed and all the compressors on a single outdoor unit are disabled.)

7-3 Functions (cont.)

7-3-3 Others (cont.)

7-3-3-1 Field Setting (cont.)

Cooling capacity correction

▪ **Purpose**

Control the cooling performance.

▪ **Concept**

The Target Evap In temperature is changed to control the low pressure in cooling mode.

▪ **Control specifications in detail**

- The target low pressure for outdoor units and the compressor operation frequency are controlled according to the Target Evap In Temp. that was configured in cooling mode.
- See "Compressor capacity control" for details on compressor operation specifications.

Input unit	Seg1	Seg2	Seg3	Seg4	Temperature(°C)
Main	0	0	0	0	7 - 9 (default)
			0	1	5 - 7
			0	2	9 - 11
			0	3	10 - 12
			0	4	11 - 13
			0	5	12 - 14
			0	6	13 - 15

▪ **Notes**

- The performance may degrade if this option is changed.
- Make sure to return the option to the default value after servicing the compressor.
- Error E560 will be triggered if all the compressors on outdoor units are disabled.
(The SVC V/V must be closed for outdoor units if modules are installed and all the compressors on a single outdoor unit are disabled.)

7-3 Functions (cont.)

7-3-3 Others (cont.)

7-3-3-1 Field Setting (cont.)

Heating capacity correction

- **Purpose**

Control the heating performance.

- **Concept**

The Target high pressure is changed to control the pressure in heating mode.

- **Control specifications in detail**

- The high pressure for outdoor units and the compressor operation frequency are controlled according to the Target high pressure that was configured in cooling mode.
- See "Compressor capacity control" for details on compressor operation specifications.

Input unit	Seg1	Seg2	Seg3	Seg4	Pressure(kgf/cm ² ,g)
Main	0	2	0	0	2.8 (Factory default)
			0	1	2.5
			0	2	2.6
			0	3	2.7
			0	4	2.8
			0	5	2.9
			0	6	3.1
			0	7	3.2
			0	8	3.3

- **Notes**

- When low pressure value is set, discharged air temperature of the indoor unit will decrease and power of outdoor will increase.

7-3 Functions (cont.)

7-3-3 Others (cont.)

7-3-3-1 Field Setting (cont.)

Current restriction rate

- **Purpose**
Reduce the electric current used for operation.
- **Concept**
The max electric current (50% - 100%) is restricted.
- **Control specifications in detail**
 - The maximum current for outdoor units is restricted according to the current ratio that was configured while in cooling or heating mode.
 - See "Maximum current limit (total)" for details.

Input unit	Seg1	Seg2	Seg3	Seg4	Current restriction rate
Individual	0	2	0	0	100% (default)
			0	1	95%
			0	2	90%
			0	3	85%
			0	4	80%
			0	5	75%
			0	6	70%
			0	7	65%
			0	8	60%
			0	9	55%
			1	0	50%
			1	1	No restriction

- **Notes**
 - When current restriction option is set, cooling and heating performance may decrease and power of outdoor will increase.
 - To set no restriction, make sure to contact an expert install service provider.
Outdoor units operate with an abnormal current.
This may affect the power and operation. The electric current protective control remains on to protect the units.

Oil collection interval

- **Purpose**
The oil return cycle is shortened by half.
- **Concept**
 - Oil recovery is performed at the halved oil return interval.
 - See "Oil return operation" for details on oil return operation specifications.

Input unit	Seg1	Seg2	Seg3	Seg4	Oil collection interval
Main	0	4	0	0	Standard (default)
			0	1	Shorten the interval by 1/2

- **Notes**
Change the option if an oil leak occurs. Performance may degrade if the option is not changed.
Make sure to restore the original value after refilling the oil.

7-3 Functions (cont.)

7-3-3 Others (cont.)

7-3-3-1 Field Setting (cont.)

High-head condition setting

▪ **Purpose**

Secure performance and reliability when using units installed under a high-head condition.

▪ **Concept**

- Control of the compressor frequency, outdoor fans, EEV, and valves is optimized to facilitate the circulation of refrigerant in any head condition.

▪ **Control specifications in detail**

- In Type 1 heating mode, the initial EEV opening degree increases.
The compressor frequency increase speed decreases if the low pressure is low (see "Main EEV control" for details on EEV control).
- In Type 2 heating mode, the initial EEV opening degree decreases.
The compressor frequency increase speed decreases if the low pressure is low (see "Main EEV control" for details on EEV control).
- In Type 2 cooling mode, the target high pressure for outdoor fans increases to 28kgf/cm²,g. (see "Fan control" for details on controlling outdoor fans).
- In Type 1 and 2 cooling modes, EVI bypass mode turns on (see "EVI EEV control" for details).

Input unit	Seg1	Seg2	Seg3	Seg4	Silent mode for night - time
Main	0	8	0	0	Disabled (default)
			0	1	Level 1 of Type1 (When outdoor unit is located 40~80m above the indoor unit)
			0	2	Level 2 of Type 1 (When outdoor unit is located over 80m above the indoor unit)
			0	3	Type 2 (When indoor unit is over 30m above the outdoor unit)

▪ **Notes**

- Incorrect settings may damage the system.

7-3 Functions (cont.)

7-3-3 Others (cont.)

7-3-3-1 Field Setting (cont.)

Long-piping condition setting

▪ **Purpose**

Secure performance and reliability when the units are used with long piping.

▪ **Concept**

- Control of the compressor frequency, EEV, and valves is optimized to facilitate the circulation of refrigerant in a long piping condition.

▪ **Control specifications in detail**

- In heating mode, the initial EEV opening degree increases.
The compressor frequency increase speed decreases if the low pressure is low.
(see "Main EEV control" for details on EEV control).
- In cooling mode, the initial value for target low pressure decreases to 0.7kgf/cm²,g.
(see "Compressor capacity control" for details).
- In cooling mode, EVI bypass mode turns on (see "EVI EEV control" for details).

Input unit	Seg1	Seg2	Seg3	Seg4	Long-piping condition setting
Main	0	9	0	0	Disabled (default)
			0	1	Level 1 (When equivalent length of farthest indoor unit from the outdoor unit is between 100~170m)
			0	2	Level 2 (When equivalent length of farthest indoor unit from the outdoor unit is over 170m)

▪ **Notes**

- Incorrect settings may seriously damage the system.
- Setting is unnecessary if high-head condition is set.

7-3 Functions (cont.)

7-3-3 Others (cont.)

7-3-3-1 Field Setting (cont.)

Energy control operation (ECO)

▪ **Purpose**

Energy saving mode: Save energy by optimizing the operation load according to the indoor and outdoor temperatures.
 Power mode: Quickly cool down the room by increasing the initial cooling speed.

▪ **Concept**

- Energy saving mode : The operation capacity is controlled based on the difference between the indoor temperature and the set temperature for indoor units.
- Power mode: The initial target low pressure is lowered to increase the cooling speed in cooling mode.

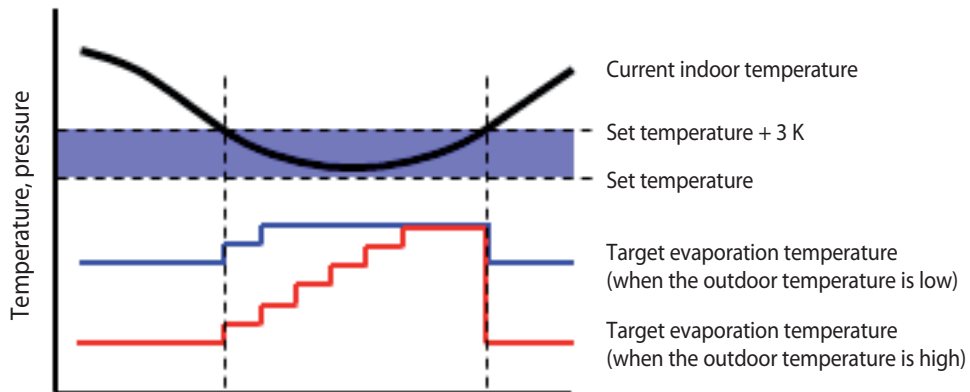
▪ **Control specifications in detail**

- Energy saving mode:

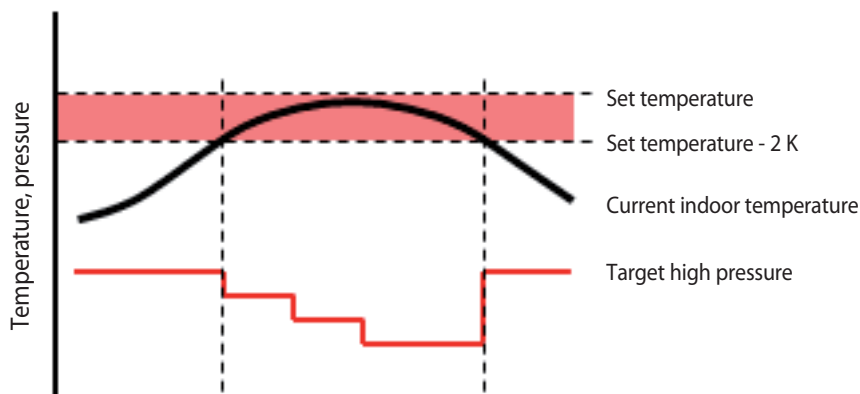
The compressor frequency is lowered by increasing the target evaporation temperature if the maximum difference between the indoor temperature and set temperature among active cooling indoor units is 3 K or lower.
 (see "Compressor capacity control" for details on controlling the compressor frequency).

The compressor frequency is lowered by decreasing the target high pressure if the maximum difference between the indoor unit and set temperature among active heating indoor units is 2 K or lower.
 (see "Compressor capacity control" for details on controlling the compressor frequency).

ECO for cooling



ECO for heating

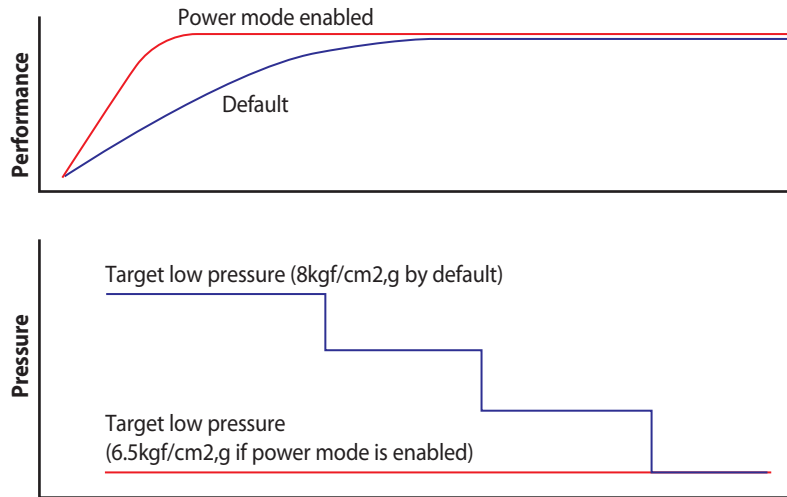


7-3 Functions (cont.)

7-3-3 Others (cont.)

7-3-3-1 Field Setting (cont.)

Power mode: In cooling mode, the initial target low pressure is lowered to increase the compressor frequency increase speed.



Input unit	Seg1	Seg2	Seg3	Seg4	Energy control Operation
Main	1	0	0	0	Disabled (default)
			0	1	Energy saving
			0	2	Power

▪ **Notes**

- Operating in energy saving mode, capacity might decrease compared to normal operation mode.

7-3 Functions (cont.)

7-3-3 Others (cont.)

7-3-3-1 Field Setting (cont.)

Channel address

- **Purpose**

Identify multiple main outdoor units connected to upper-level controllers, such as DMS and S-NET3.

- **Concept**

- If the Channel address is set, the same channel address is assigned to the sub outdoor units, indoor units, and MCUs connected to a main outdoor unit.

- **Control specifications in detail**

Input unit	Seg1	Seg2	Seg3	Seg4	Channel address
Main	1	3	A	U	Automatic setting (default)
			0~15		Manual setting for channel 0 - 15

7-3 Functions (cont.)

7-3-3 Others (cont.)

7-3-3-1 Field Setting (cont.)

Channel address

- **Purpose**

Identify multiple main outdoor units connected to upper-level controllers, such as DMS and S-NET3.

- **Concept**

- If the Channel address is set, the same channel address is assigned to the sub outdoor units, indoor units, and MCUs connected to a main outdoor unit.

- **Control specifications in detail**

Input unit	Seg1	Seg2	Seg3	Seg4	Expand operational temperature range for cooling operation (HR only)
Main	1	2	A	U	Automatic setting (default)
			0 - 15		Manual setting for channel 0 - 15

7-3 Functions (cont.)

7-3-3 Others (cont.)

7-3-3-1 Field Setting (cont.)

Speed operation

- **Purpose**
Enabling this setting will command the air conditioner to cool/heat faster at initial start-up.
- **Concept**
The cooling or heating speed is increased by raising the compressor frequency increase speed.
- **Control specifications in detail**
 - The frequency and increase speed are increased in Safety Start mode.
 - The control speed is improved by changing the interval to control the target heating pressure to 20 sec from 40 sec.

Input unit	Seg1	Seg2	Seg3	Seg4	Speed operation
Main	1	7	0	0	Disabled (default)
			0	1	Enabled

- **Notes**
 - This function will not work when High-head condition setting or Long-piping condition setting is enabled.

Max capacity restriction

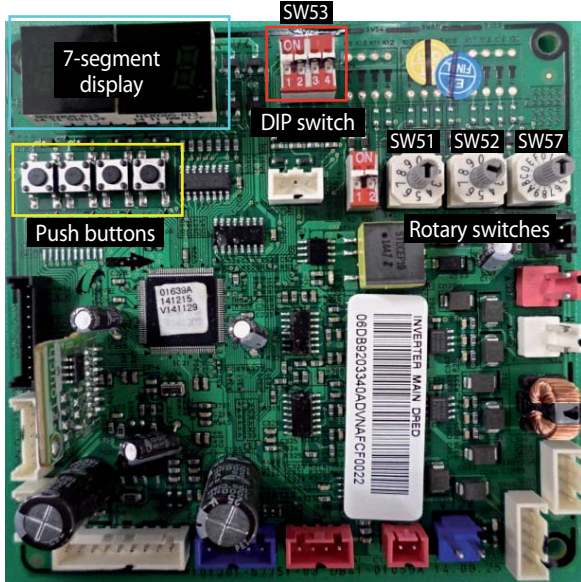
- **Purpose**
Prevent an excessive increase of compressor performance compared to the capacity of indoor units (default option).
- **Concept**
The maximum capacity for outdoor units is restricted taking into account the capacity of indoor units and the outdoor temperature.
- **Control specifications in detail**
 - The maximum operation capacity is restricted, taking into account the capacity of indoor units, set fan speed, outdoor temperature, and indoor temperature if the system cooling operation status is within the normal operation range.
 - The maximum cooling capacity is not restricted if the outdoor temperature is low and it is difficult to secure low and high pressures.

Input unit	Seg1	Seg2	Seg3	Seg4	Max capacity restriction
Main	1	8	0	0	Enabled (default)
			0	1	Disabled

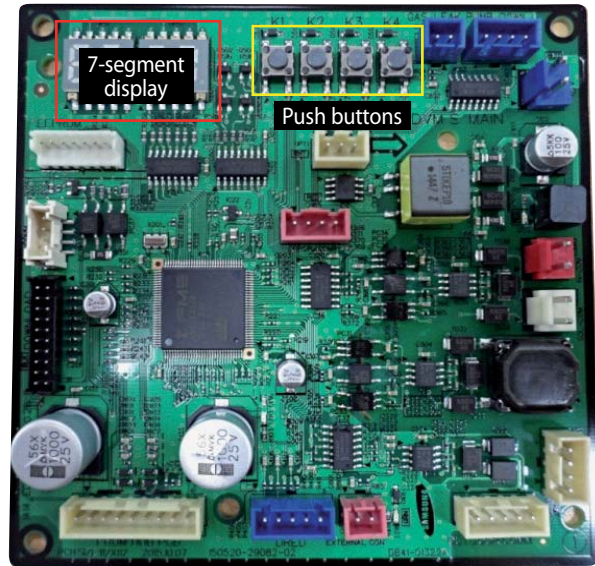
8. Key Options

8-1 System Configuration

■ DIP S/W Type



■ Push Button Type



The 7-segment display indicates system power and communication status.

Step	Display content	Display			
		SEG 1	SEG 2	SEG 3	SEG 4
At initial power input	Checking segment display	SEG 1	SEG 2	SEG 3	SEG 4
		"8"	"8"	"8"	"8"
While setting communication between indoor and outdoor unit (Addressing)	Number of connected indoor units	SEG 1	SEG 2	SEG 3	SEG 4
		"A"	"d"	Number of communicated units ※ Refer to "View Mode" for communication address	
After communication setting (usual occasion)	MCU, Indoor unit address	SEG 1	SEG 2	SEG 3	SEG 4
		I/U: "A" MCU: "C"	I/U: "0" MCU: "1"	Reception address (in decimal number)	

※ I/U : Indoor unit

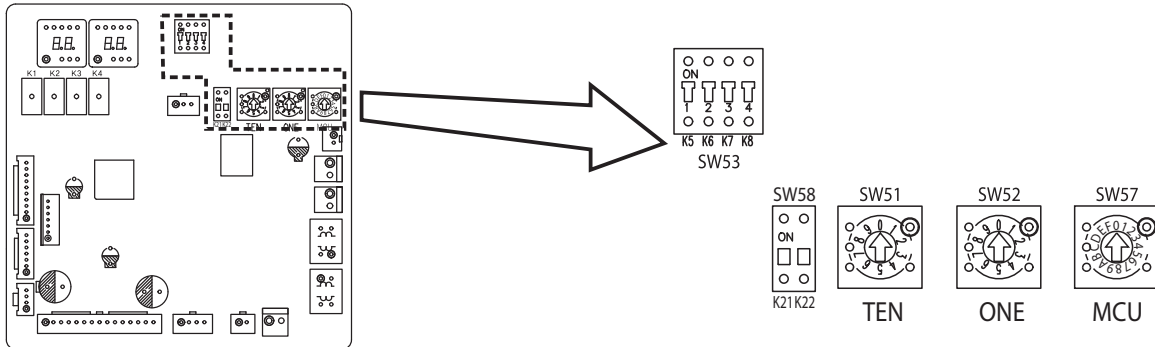
Table A. 7-segment display

8-2 List of Field Setting Items

No	Optional item	Purpose
00	Emergency operation for compressor malfunction	To exclude the faulty compressor from the system. (emergency use only)
01	Cooling capacity correction	By this option system cooling capacity can be increased or decreased as evaporator's temperature will be colder or hotter than default.
02	Capacity correction for heating	By this option system heating capacity can be increased or decreased as evaporator's temperature will be colder or hotter than default.
03	Current restriction rate	To control the power consumption of the system for the building management for peak control.
04	Oil collection interval	To shorten the Oil collection interval by 1/2 (Service use only)
05	Temperature to trigger defrost operation	To secure clean defrost in harsh condition. (Air-cooled type only)
06	Fan speed correction	Increase maximum fan rpm range to secure enough airflow when discharge guide duct for outdoor unit is adapted. (Air-cooled type only)
07	Silent mode for night-time	Limit Maximum fan rpm & compressor frequency to reduce noise during the night time → Max 15dB reduction. * Only for cooling & Main cooling operation. (Air-cooled type only)
08	High-head condition setting	To optimize the refrigerant control of the system according to the installation condition.
09	Long-piping condition setting	To optimize the system control according to the installation condition.
10	Energy saving setting	To save energy in heating mode by controlling the target high pressure in heating.
11	Rotation defrost	Continuous heating operation during defrost in module installation. (HR model only) During the R-defrost Heating Indoor unit's airflow will be set as low. (Air-cooled type only)
12	Expand operational temperature range for cooling	To expand cooling operation range up to -15°C . (HR model only, Default : -5°C) (Air-cooled type only)
13	Channel address	To recognize each outdoor system when using centralized controller.
14	Snow accumulation prevention	To prevent snow is accumulating on the outdoor unit fan discharge guide. (Air-cooled type only)
17	Speed operation	To increase cooling or heating speed.
18	Max. capacity restriction	Restrict excessive capacity increase when operating indoor units with small capacity.
19	Gas leak Pump down	If the gas leak occurred it should be entered in the pump down operation.
20	Circulation fluid flow setting	Circulation fluid type setting.
21	Low ambient kit	Setting of the low ambient kit use for cooling operatin in low ambient temperature condition. (Air-cooled type only)
22	Emergency operatin	When set, emergency operation is possible even if an indoor communication error occurs.

8-3 Outdoor unit option switch settings

● Setting outdoor unit option switches : A TYPE PBA



※ If you install HR products, you must match the address between the MCU and the indoor unit.



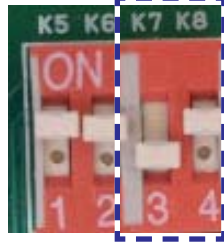

Switch	Setting	Function	Remarks	
SW51/ SW52		Setting total number of installed indoor unit SW51: Tens digit, SW52: Units digit	Setting can be done from the main outdoor unit only (sub unit: setting is unnecessary) Ex) When 12 indoor units are installed → SW51: 1, SW52: 2	
	K5	ON	H/P(Heat Pump) System	Connect Liguid pipe and High pressure gas pipe
		OFF	HR(Heat Recovery) System	Close outdoor unit's heatpump valve
	K6	ON	Enable maximum capacity restriction for cooling operation	Restrict excessive capacity increase when operating indoor units with small capacity
		OFF	Disable maximum capacity restriction for cooling operation	-
	K7	K8	Selecting outdoor unit address	
	ON	ON	Outdoor unit address: No 1	Main unit
	ON	OFF	Outdoor unit address: No 2	Sub unit 1
	OFF	ON	Outdoor unit address: No 3	Sub unit 2
OFF	OFF	Outdoor unit address: No 4	Sub unit 3	
SW57		Setting total number of connected MCU	Setting can be done from main unit only Ex) When 3 MCUs are installed → SW57: 3, SW52: 2	
SW58	K21	K22	Selecting type of circulating water	
	ON	ON	Water circulation	-
	ON	OFF	Anti-freeze circulation (freezing point of anti-freeze must be below -8 °C)	Minimum temperature of entering water -5 °C
	OFF	ON	Anti-freeze circulation (freezing point of anti-freeze must be below -15 °C)	Minimum temperature of entering water -10 °C

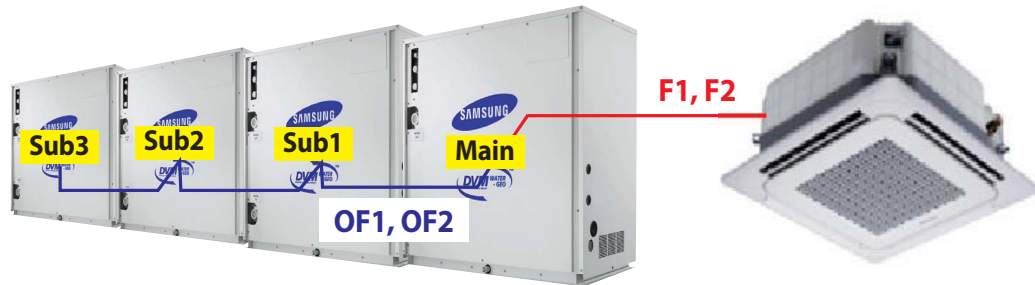
※ Maintain appropriate concentration level of anti-freeze according to SW58 switch setting.

8-3 Outdoor unit option switch settings (cont.)

※ **1. Outdoor unit's address setting – K7 & K8**

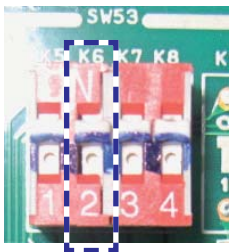
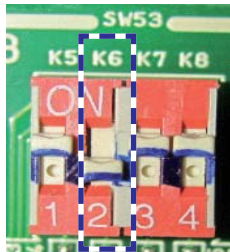
: In module installation each ODU will have different address.

Address	Main Unit	Sub1 Unit	Sub 2 Unit	Sub3 Unit
Setting	<p>K7 : on, K8 : on</p> 	<p>K7 : on, K8 : off</p> 	<p>K7 : off, K8 : on</p> 	<p>K7 : off, K8 : off</p> 



※ **2. Maximum capacity restriction for cooling - K6**

: To restrict excessive capacity increasing for cooling operation.
 (Just leave it on position, Used to be expressed with Anti-dewing operation)

Function	Use(default)	No use
Setting	<p>K6 : on</p> 	<p>K6 : off</p> 


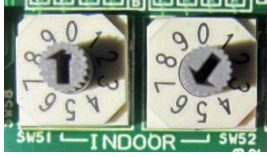

- In humid condition, it's easy to be dewing on the surface of indoor unit's panel because of cold draft from the indoor unit. So system will limit compressor maximum operable frequency to prevent dewing problem. This doesn't mean shortage of cooling capacity but better reliability.

8-3 Outdoor unit option switch settings (cont.)

※ **3. Quantity of indoor unit**

: To set the quantity of connected indoor unit. (Main outdoor unit only)

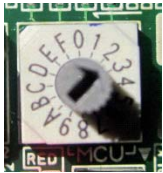
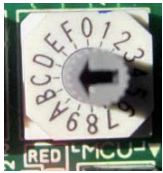
- If the quantity of IDU which is communicating with outdoor unit is different error will be displayed.(E201)

IDU Quantity	Ex) IDU 6ea	Ex) IDU 26ea
 <p>10-digit 1-digit</p>	 <p>0 2</p>	 <p>2 6</p>

※ **4. Quantity of MCU**

: To set the quantity of connected MCU. (Main outdoor unit only)

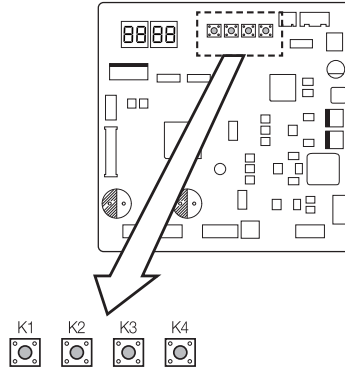
- If the quantity of MCU which is communicating with outdoor unit is different error will be displayed.(E214)

Setting	Ex) MCU 2ea	Ex) MCU 12ea
<p>MCU Quantity 1~F (A=10, B=11, ~, F=15)</p>	 <p>2</p>	 <p>C</p>

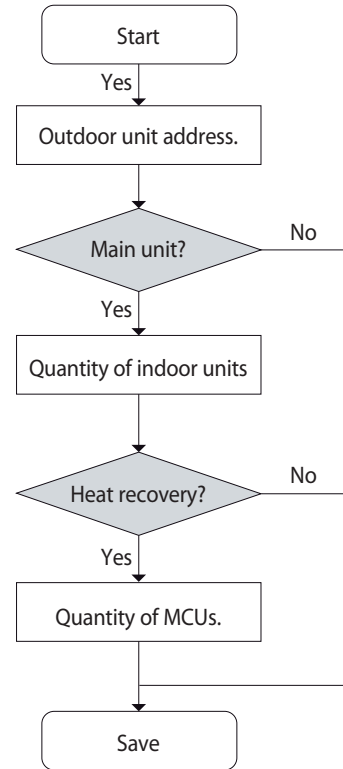
8-3 Outdoor unit option switch settings (cont.)

■ Push Button Type

- Setting outdoor unit option switches : B TYPE PBA








Step	Button	Display	Description	Note
Outdoor unit address				
Step1	Outdoor unit display	88 88	Setting required	-
Step2	Press (K1+K2) for 2 seconds	88 00	Unit address for module combination	00: Main unit
	K4 x 1 time	88 01		01: Sub1 unit
	K4 x 2 times	88 02		02: Sub2 unit
	K4 x 3 times	88 03		03: Sub3 unit
Step3	If it is main unit, go to step4. Otherwise, press K2 button for 2 seconds to save & exit (system will be reset)			
Quantity of indoor units				
Step3	Press K1	88 00	Ready to set	-
Step5	K2 x n times	88 X0	Tens digit (0 ~ 6)	Ex) 03 : 3 units 64 : 64 units
	K4 x n times	88 0X	Ones digit (0 ~ 9)	
Step6	If it is heat recovery model, go to step 7. Otherwise, press K2 button for 2 seconds to save & exit (system will be reset)			
Quantity of MCUs * Heat recovery model only				
Step7	Press K1	8E 00	Ready to set	-
Step8	K2 x n times	8E X0	Tens digit (0 ~ 1)	Ex) 03 : 3 units 16 : 16 units
	K4 x n times	8E 0X	Ones digit (0 ~ 9)	
	* K4: Press for 2 seconds - automatic detection of MCUs' quantity			
Step9	Press K1	8E 00	Ready to set	00 : Heat pump system 01 : Heat recovery system
Step10	Press K4	8E 01	Ones digit (0 ~ 1)	
Step9	K2: long	88 00	Save	Restart
* Press K1 for 2 seconds to exit without save regardless of setting step.				






8-3 Outdoor unit option switch settings (cont.)

● Outdoor unit Address setting

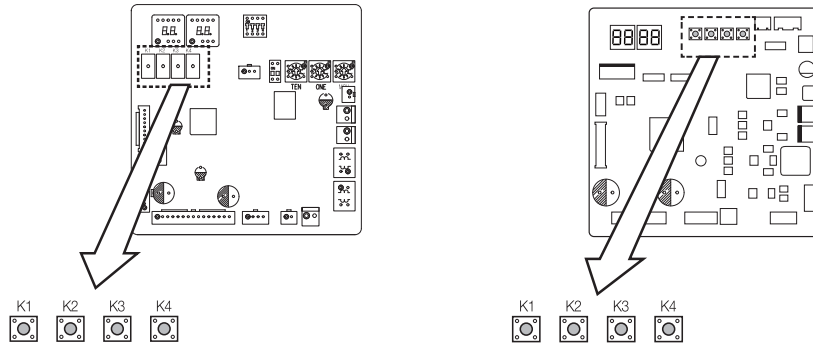
Order	Display	Description
1		▪ Normal display : "Ad 00"
		▪ Outdoor address is not set : "od nd"
2		▪ Press and hold simultaneously K1, K2 to enter the setting mode. (When entering the setting mode, letters are displayed as the left : "od 00") - od means Outdoor unit
3		▪ Press the K4 button shortly : Setting a 1-digit
4		▪ Press the K1 button shortly : Setting a indoor quantity

● Quantity of indoor unit

Order	Display	Description
1		▪ When entering the Indoor setting mode, letters are displayed as the left : "id 00" - id means Indoor unit
2		▪ Manual setting mode (Default) - Press the K2 button shortly : Setting a 10-digit - Press the K4 button shortly : Setting a 1-digit
		▪ Automatic setting mode (Option) Press and hold the K4 button : It is changed to the automatic setting mode, and displays the number of the connected indoor unit. (Ex. If 10 indoor units are connected, "id 10" is indicated.) - If press the K2, K4 button shortly in the automatic setting mode, it is changed to the manual mode. (Ex. If 10 is indicated and press the K4 button, 11 is indicated and changed to the manual mode.)
3		▪ Heat recovery model : Setting Mcu address. - Press the K1 button shortly : Setting a MCU address
		▪ Heat Pump model : Confirm settings - Press and hold the K2 button - All settings are saved - After a screen flickers between 3 seconds, and tracking normally ▪ Cancel settings - Press and hold the K1 button to exit without saving the settings

8-4 How to check the view mode using a tact switch

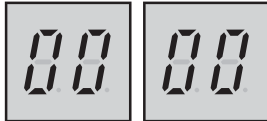
Setting outdoor unit key function



Installing and setting the option with tact switch and explanation of the functions

Setting the option

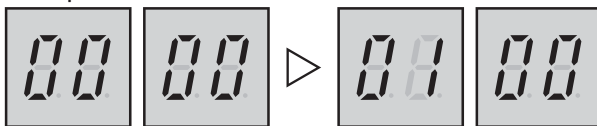
1. Press and hold K2 to enter the option setting. (Only available when the operation is stopped)
 - If you enter the option setting, display will show the following. (If you have set the 'Emergency operation for compressor malfunction', 1 or 2 will be displayed on Seg 4.)



- Seg 1 and Seg 2 will display the number for selected option.
- Seg 3 and Seg 4 will display the number for set value of the selected option.

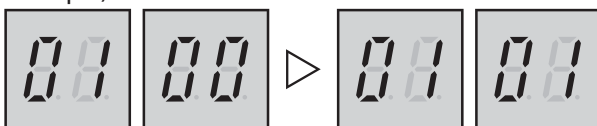
2. If you have entered option setting, you can shortly press the K1 switch to adjust the value of the Seg 1, Seg 2 and select the desired option. (Refer to pages 74~77 for the Seg number of the function for each option)

Example)



3. If you have selected desired option, you can shortly press the K2 switch to adjust the value of the Seg 3, Seg 4 and change the function for the selected option. (Refer to pages 74~77 for the Seg number of the function for each option)

Example)



8-4 How to check the view mode using a tact switch (cont.)

AM080/100/120/200FXWA**

Optional item	Input unit	SEG1	SEG2	SEG3	SEG4	Function of the option	Remarks
Emergency operation for compressor malfunction	Individual	0	0	0	0	Disabled (Factory default)	E560 will occur when all the compressors are set as malfunction state.
				0	1	Set compressor 1 as malfunction state	
				0	2	Set compressor 2 as malfunction state	
Cooling capacity correction	Main	0	1	0	0	7-9 (Factory default)	Targeted evaporation temperature [°C]. (When low temperature value is set, discharged air temperature of the indoor unit will decrease)
				0	1	5-7	
				0	2	9-11	
				0	3	10-12	
				0	4	11-13	
				0	5	12-14	
Capacity correction for heating	Main	0	2	0	0	2.8 (Factory default)	Targeted high pressure [MPa]. (When low pressure value is set, discharged air temperature of the indoor unit will decrease)
				0	1	2.5	
				0	2	2.6	
				0	3	2.7	
				0	4	2.9	
				0	5	3.0	
				0	6	3.1	
				0	7	3.2	
Current restriction rate	Individual	0	3	0	0	100% (Factory default)	
				0	1	95 %	
				0	2	90 %	
				0	3	85 %	
				0	4	80 %	
				0	5	75 %	
				0	6	70 %	
				0	7	65 %	
				0	8	60 %	
				0	9	55 %	
				1	0	50 %	
Oil collection interval	Main	0	4	0	0	Factory default	
				0	1	Shorten the interval by 1/2	
Disable	Main	0	5	0	0	Disable	This function is not applicable for this model
				0	1	Disable	
Disable	Individual	0	6	0	0	Disable	This function is not applicable for this model
				0	1	Disable	
Disable	Main	0	7	0	0	Disable	This function is not applicable for this model
				0	1	Disable	
				0	2	Disable	
Setting highhead condition	Main	0	8	0	0	Disable (Factory default)	
				0	1	Level 1 of height difference type 1 (Indoor unit is lower than outdoor unit)	
				0	2	Level 2 of height difference type 1 (Indoor unit is lower than outdoor unit)	
				0	3	Height difference type 2 (Outdoor unit is lower than indoor unit)	

8-4 How to check the view mode using a tact switch (cont.)

AM080/100/120/200FXWA** (cont.)

Optional item	Input unit	SEG1	SEG2	SEG3	SEG4	Function of the option	Remarks
Setting longpiping condition (Setting is unnecessary if high-head condition is set.)	Main	0	9	0	0	Disable (Factory default)	
				0	1	Long piping level 1	When equivalent length of farthest indoor unit from the outdoor unit is between 100~170 m
				0	2	Long piping level 2	When equivalent length of farthest indoor unit from the outdoor unit is over 170 m
Energy saving/ rapid cooling setting (B type PBA)	Main	1	0	0	0	Disable (Factory default)	
				0	1	Energy saving mode	Energy saving mode triggers when the room temperature reaches desired temperature while operating in cooling or heating mode.
				0	2	Rapid cooling	This function increases cooling speed.
Disable	Main	1	1	0	0	Disable	This function is not applicable for this model
				0	1	Disable	
Expand operational temperature range for cooling operation	Main	1	2	0	0	Disable	
				0	1	Enable	
Channel address	Main	1	3	A	U	Automatic setting (Factory default)	Address for classifying the product from upper level controller (DMS, S-NET 3, etc)
				0~15		Manual setting for channel 0~15	
Disable	Main	1	4	0	0	Disable	This function is not applicable for this model
				0	1	Disable	
Circulation water flow control	Individual	1	5	0	0	Disable (Factory default)	
				0	1	7-10 V	When variable flow control valve is applied
				0	2	5-10 V	
				0	3	3-10 V	
Forced quiet mode (Disuse)	Main	1	6	0	0	Disused option	
High-speed operation (B type PBA)	Main	1	7	0	0	Disable (Factory default)	High-speed operation
				0	1	Enable	
Max. capacity restriction (B type PBA)	Main	1	8	0	0	Enable	Maximum cooling capacity restriction
				0	1	Disable	
Gasleak Pumpdown (B type PBA)	Main	1	9	0	0	Disable	Leaked refrigerant collection
				0	1	Enable	
Note 1) Circulation fluid flow setting (B type PBA)	Individual	2	0	0	0	Water	Circulation fluid flow setting
				0	1	Anti-freeze solution 1	
				0	2	Anti-freeze solution 2	
Disable	Main	2	1	0	0	Disable	This function is not applicable for this model
				0	1	Disable	
Emergency operation for indoor unit communication error (B type PBA)	Main	2	2	0	0	Disabled (Factory default)	When set, emergency operation is possible even if an indoor communication error occurs.
				0	1	Indoor high humidity condition (operating for up to 12hours)	
				0	2	Indoor low humidity condition (operating for up to 24hours)	

Note 1) Anti-freeze solution 1: Freezing point of anti-freeze must be below -8 °C. (Minimum temperature of entering water: -5 °C)

Anti-freeze solution 2: Freezing point of anti-freeze must be below -15 °C. (Minimum temperature of entering water: -10 °C)

8-5 Applications

8-5-1 Application of Auxiliary Heat Module

■ Introduction of Auxiliary Heat Module

Auxiliary Heat Module Configuration

The indoor unit firmware may need to be updated depending on the date of indoor unit manufacture. Firmware installation instructions, which can be found on Comfort site, must be followed exactly.

Important: Avoid system failure and loss of all system programming by following firmware installation instructions exactly. Failure to do so will cause system data to be deleted. Data is not recoverable! The unit will not function! Using the Technician Utilities Tool (TUT) or the remote control, con-figure indoor unit options as required by customer application. Refer to Table 2, Figure 4, and the configuration section of the indoor unit installation manual.

Table 2. Option settings for auxiliary heat

The indoor unit firmware may need to be updated depending on the date of indoor unit manufacture. Firmware installation instructions, which can be found on Comfort site, must be followed exactly.

Option setting mode: Digit 2=2 ^(a)	Option setting	Example Option 3: Temperature offset, No delay 02xxxx 1xxxxx 2x2xxx 3xxxxx 05xxxx 1xxxxx 2xxxx3 3xxxxx	
Digit 15	"2"		
Option setting mode: Digit 2=5 ^(b)	Option setting	Terminals 3,4 Temperature offset	Time output
Digit 18	"0"	No temperature offset	No delay
	"1"		+10 minute delay
	"2"		+20 minute delay
	"3"	Temperature offset: 2.7°F (1.5°C)+	No delay
	"4"		+10 minute delay
	"5"		+20 minute delay

(a) Refer to "Configuration" in the indoor unit installation manual for more details.

(b) If further temperature offsets are desired, contact technical support.

8-5 Applications (cont.)

8-5-1 Application of Auxiliary Heat Module (cont.)

Auxiliary Heat Sequence of Operation

When a call for heat occurs, the indoor unit will energize internal heat.

The auxiliary contact will energize as described:

- If Digit 18 is set to 0, 1, or 2, after an appropriate time delay, auxiliary heat will energize. Auxiliary heat will remain in operation until the indoor unit heat set point is satisfied.
- If Digit 18 is set to 3, 4, or 5, the auxiliary heat will remain unenergized until calls for heat and minimum temperature offset are received. On receiving calls for heat and minimum temperature offset, auxiliary heat will energize after the selected time delay. Auxiliary heat will remain in operation until the temperature offset has been satisfied. The indoor unit will continue to operate without regard to auxiliary heat until the indoor unit heat set point is satisfied.

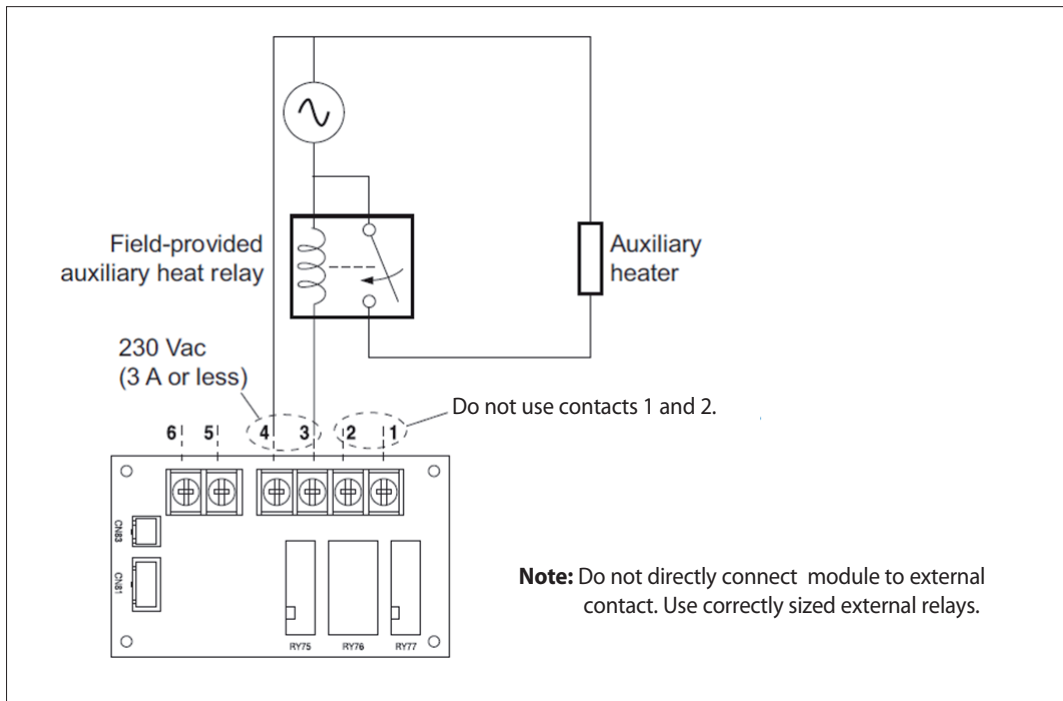
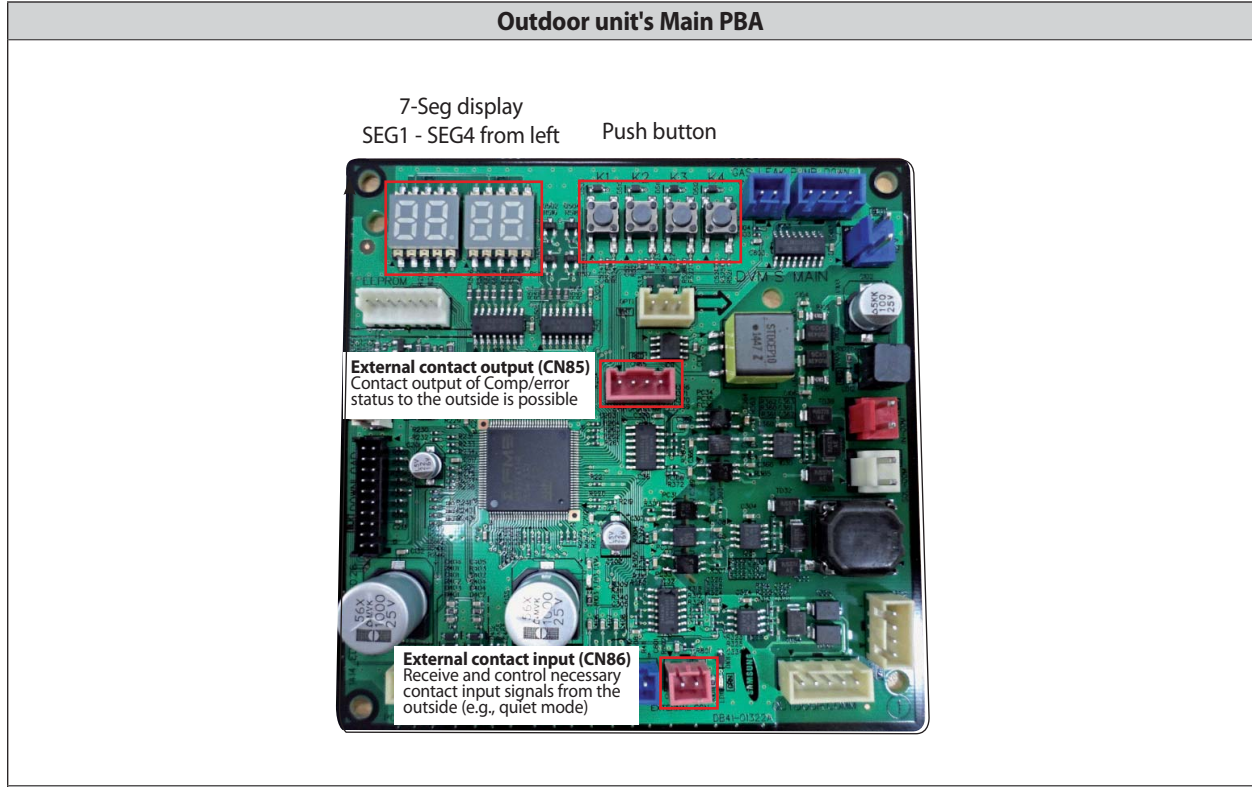


Figure 4. External contact interface module: wiring diagram for auxiliary heat

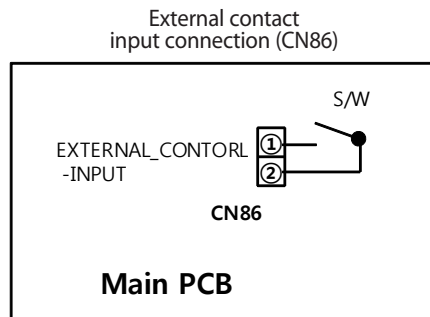
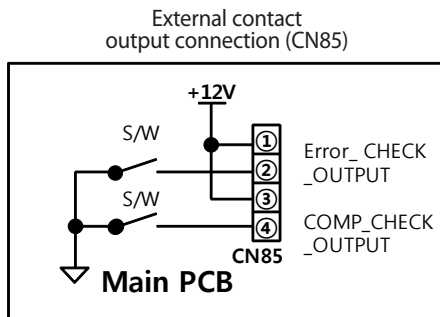
8-5 Applications (cont.)

8-5-1 Application of Auxiliary Heat Module (cont.)

■ Connecting the external contact software to the outdoor unit's Main PBA



How to use external contacts



Setting outdoor unit option switch and key function

Optional item	Input unit	SEG1	SEG2	SEG3	SEG4	Function of the option	Remarks
Silent mode for night-time	Main	0	7	0	0	Disabled (Factory default)	Enables the silent mode for night-time (It operates automatically depending on the temperature.) However, if the external contact interface module (MIM-B14) is used, entering the silent mode is available with contact signal.
				0	1	LEVEL 1 / Auto	
				0	2	LEVEL 2 / Auto	
				0	3	LEVEL 3 / Auto	
				0	4	LEVEL 1 / External contact	
				0	5	LEVEL 2 / External contact	
				0	6	LEVEL 3 / External contact	

8-5 Applications (cont.)

8-5-2 Application of Mode select Switch

■ Introduction Mode Select Switch

Mixed operation-preventive control is used to prevent the HP (Heat Pump) from sending requests for different cycle operation modes to the same outdoor unit.

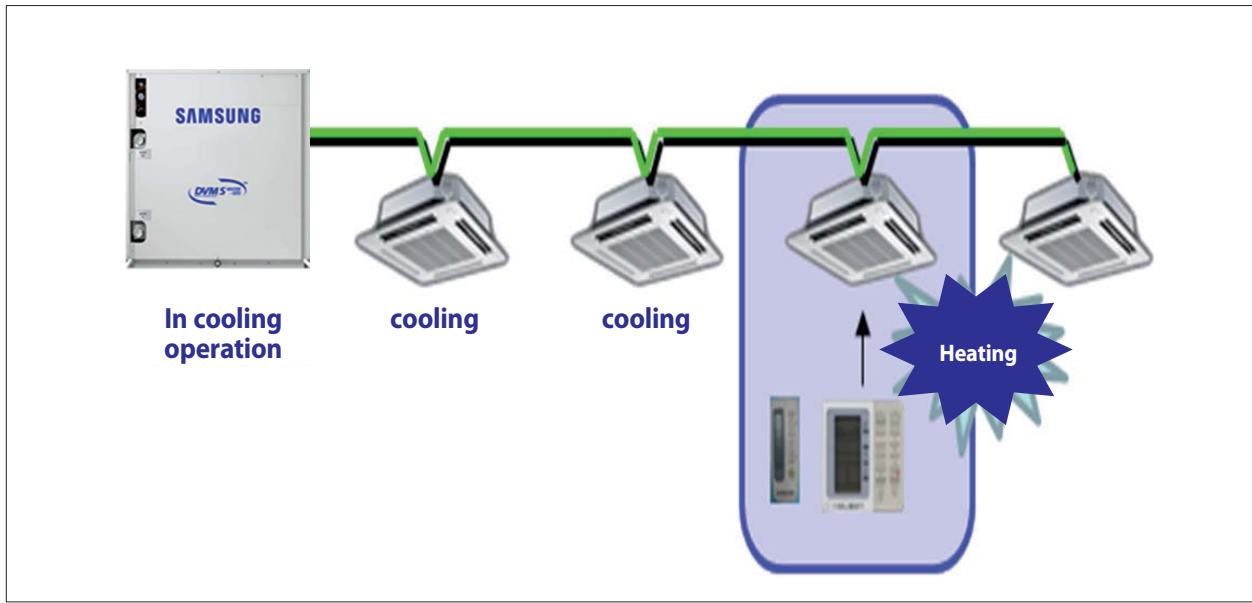


Figure 4. External contact interface module: wiring diagram for auxiliary heat

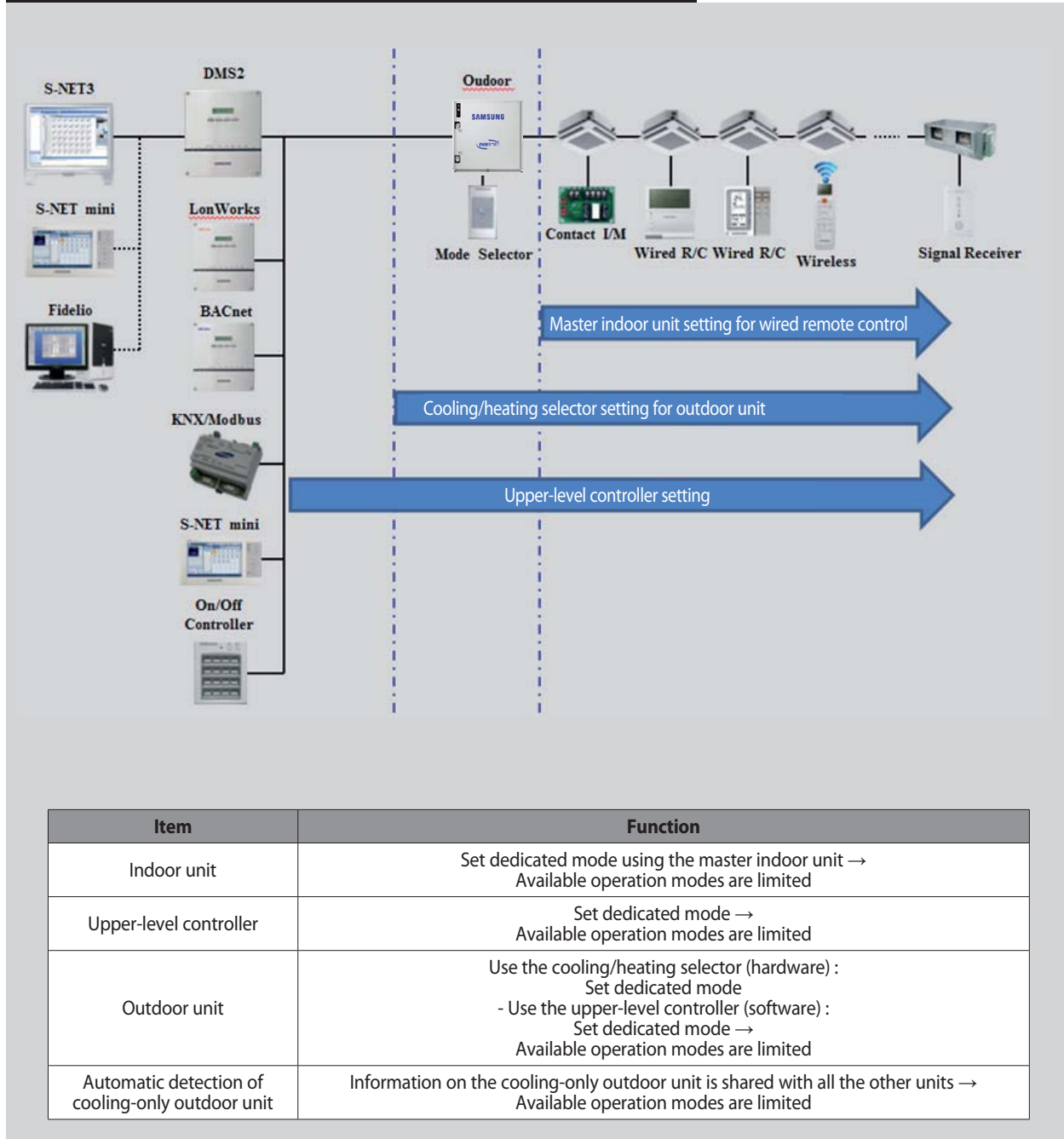
HP (common in the SAC market)

- Operation of both heating and cooling modes is not possible. Single cycle control is only possible →
- ※ HR (Heat Recovery) : Operation of both cooling and heating modes is possible (relatively costly)

8-5 Applications (cont.)

8-5-2 Application of Mode select Switch (cont.)

Setting the dedicated mode according to the installation environment



8-5 Applications (cont.)

8-5-2 Application of Mode select Switch (cont.)

■ MCM-C200 (Mode Selector)

- Operation mode lock (Cooling, Heating, Auto)
- Direct connection to outdoor unit
- Applied to DVM Plus II/III, mini DVM outdoor units

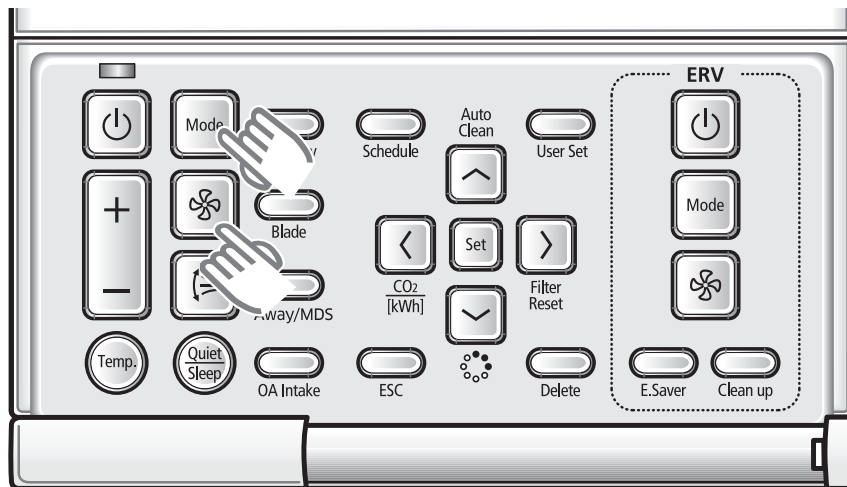
How to use

1. Connect the outdoor unit, according to the instructions in the installation manual.
2. Use the select switch to select Cool, Heat, or Auto.
3. All indoor units connected to the outdoor unit operate using the mode selected in step 2.



■ Mode Master (Wired Remote controller & DMS 2)

- Mode master indoor unit setting is simply selecting an indoor unit that will become standard among many indoor units to prevent mixed operation (which one or more indoor units operating in different operation mode).
- Setting : Connect just 1 indoor unit and stop the operation. Then press and hold the Mode button for 5 seconds to set the indoor unit as 'Mode master indoor unit'
- Cancelling : Connect just 1 indoor unit and stop the operation. Then press and hold the Fan speed button for 5 seconds to cancel the 'Mode master indoor unit' setting.




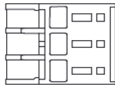
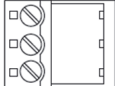


8-5 Applications (cont.)

8-5-2 Application of Mode select Switch (cont.)

■ Mode Select Switch Installation Instructions

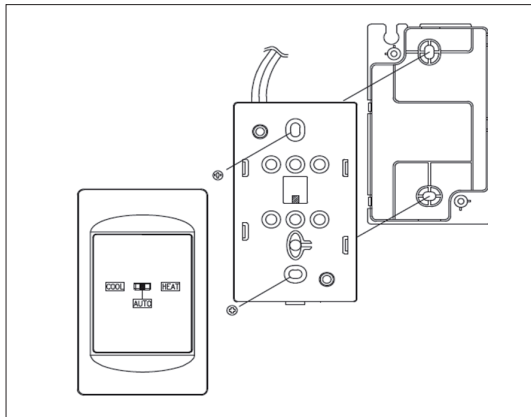
Components

The Mode Select Switch is shipped with the following parts:

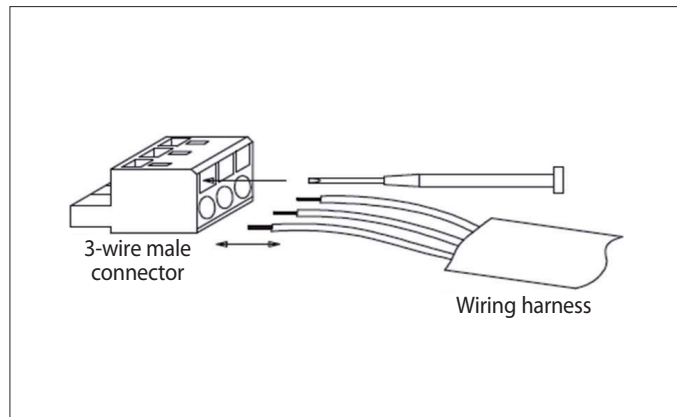
Mode Switch Selector, Assembled	3-wire male connector	3-wire female connector	M4X16 screws(2)	Wiring harness
				

Installation

1. Disassemble the Mode Select Switch (Figure 1).
2. Insert a small screwdriver into one of the three square holes on the end of the 3-wire male connector and carefully depressing the tab (Figure 2).
3. Connect the correctly colored wire (refer to Figure 3) on the supplied wiring harness into the hole below the screwdriver. Use caution to prevent damage to the tabs.
4. Repeat for the other two wires.



< Figure 1. Mode Select Switch assembly drawing >



< Figure 2. Connecting the wiring harness to the 3-wire male Connector. >

[WARNING]

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing.

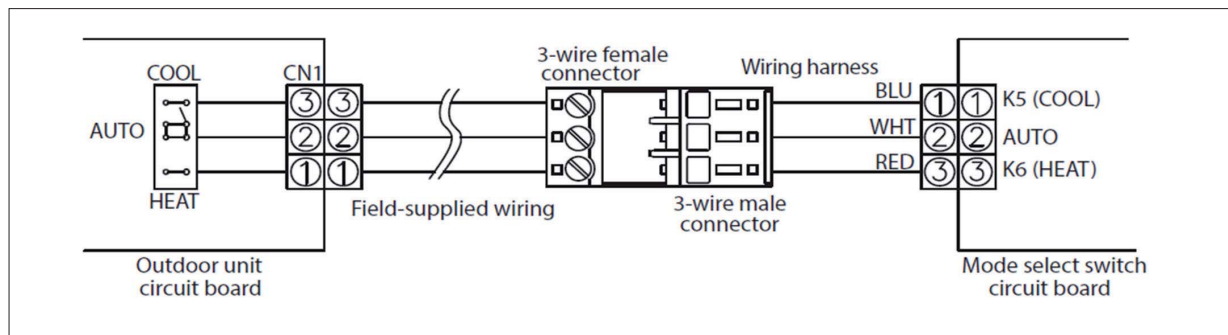
Follow proper lockout/tagout procedures to ensure the power can-not be inadvertently energized.

Failure to disconnect power before servicing could result in death or serious injury.

8-5 Applications (cont.)

8-5-2 Application of Mode select Switch (cont.)

5. Shut off power to the outdoor unit.
6. Connect field-supplied wires between the outdoor unit circuit board at CN1 and the 3-wire female connector.
Secure the wires in the connector with a small screw driver.
7. Attach the 3-wire female connector to the 3-wire male connector.
8. Connect the plug end of the wiring harness to the Mode Select Switch.
9. Re-assemble the Mode Select Switch (refer to Figure 1).
10. Restore power to the outdoor unit.



<Figure 3. Connecting the Mode Select Switch to the outdoor unit>

Operation

The mode select switch is a control option for a heat pump unit

It is set to operate as follows:

- If set to Cool, the outdoor unit operates in cooling mode only.
- If set to Heat, the outdoor unit operates in heating mode only.
- If set to Auto, the local wired or wireless remote control determines the operating mode (heat/cool) of the outdoor unit.

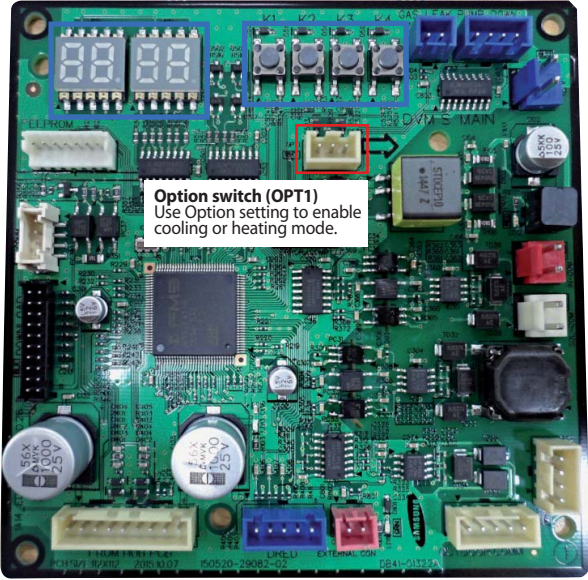
8-5 Applications (cont.)

8-5-2 Application of Mode select Switch (cont.)

■ Connecting the Mode Select switch to the outdoor unit's Main PBA

Outdoor unit's Main PBA

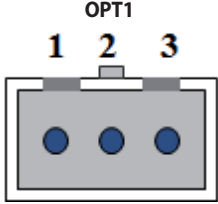
7-Seg display
SEG1 - SEG4 from left Push button



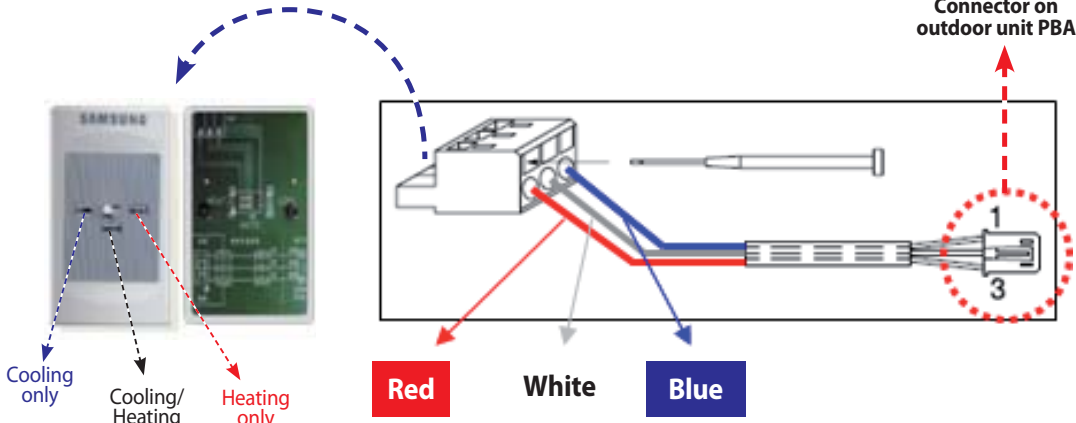
How to use the Mode Select switch

Pin1-2	Pin2-3	State
Short	Open	Cooling only
Open	Short	Heating only
Open	Open	Cooling/Heating

OPT1



Connector on outdoor unit PBA



Operation

The mode select switch is a control option for a heat pump unit.

It is set to operate as follows:

- If set to Cool, the outdoor unit operates in cooling mode only.
- If set to Heat, the outdoor unit operates in heating mode only.
- If set to Auto, the local wired or wireless remote control determines the operating mode (heat/cool) of the outdoor unit.

9. Test Operation

9-1 Auto Trial Operation

9-1-1 Overview of Auto Trial Operation

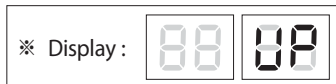
1) What is the Auto Trial Operation?

Auto Trial Operation is an operation mode designed to provide guidelines for inspecting the status of the device installation and the main components for quick and accurate troubleshooting. If Auto Trial Operation is not performed, it is not possible to start general operation due to UP (Un Prepared) mode.

2) Preliminary inspection before Auto Trial Operation

- (1) Preliminary inspection before Auto Trial Operation (service valve) on the outdoor unit is opened.
- (2) Indoor: Check the communication and power lines related to the outdoor air.
- (3) Turn on the system 6 hours before Auto Trial Operation to sufficiently preheat the compressor.
- (4) Before connecting the power supply, use a voltmeter and phase tester to check the voltage and phase.
 - R, S, T, N terminals: Make sure that the turn-to-turn voltage is 380-415V (R-S, S-T, T-R) and the phase-to-phase voltage is 200-240V (R-N, S-N, T-N).
- (5) After the power supply is connected, configure devices such as indoor units and MCUs connected to the outdoor unit, and optional settings.

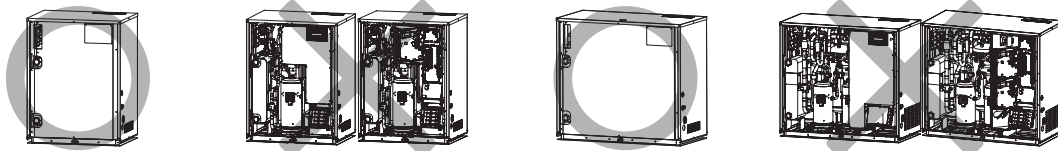
After the required settings are configured, the communication status between the outdoor unit and the connected devices is checked. The outdoor unit then displays "UP" (Un Prepared).



After Auto Trial Operation, the outdoor unit repeatedly displays the addresses of the connected devices. (See Chapter 8.)

- (6) Record installation details in the installation check card attached on the front of the control box.
- (7) Be sure to close the frontal cabinet on the outdoor unit before starting operation.

Operation with the frontal cabinet opened may damage the system and degrade the inspection accuracy.



3) What is checked during Auto Trial Operation

- Outdoor unit's thermistors (EVA In/Out and indoor thermistors on each indoor unit)
 - Outdoor unit's thermistors (Cond_Out, EVI In/Out, Suction, liquid line thermistors and outdoor (or water temp) thermistors on each outdoor unit)
 - Outdoor unit's high pressure and low pressure sensors
 - Whether the outdoor unit's ball valve (service valve) is opened or closed is checked
 - Operation electric current on the outdoor unit's compressor is checked
 - Outdoor unit's CYCLE status is checked
 - Outdoor unit's 4-way valve operation related to outdoor air is checked
 - Outdoor unit's EVI EEV operation is checked
 - Outdoor unit's Main EEV operation is checked
- (※ Checked only if "heating" mode is on during Auto Trial Operation)

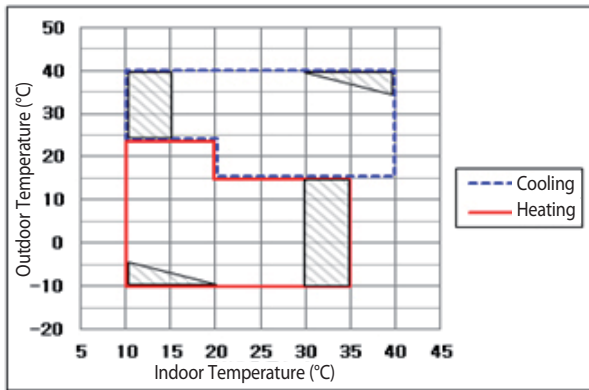
9-1 Auto Trial Operation (cont.)

9-1-1 Overview of Auto Trial Operation (cont.)

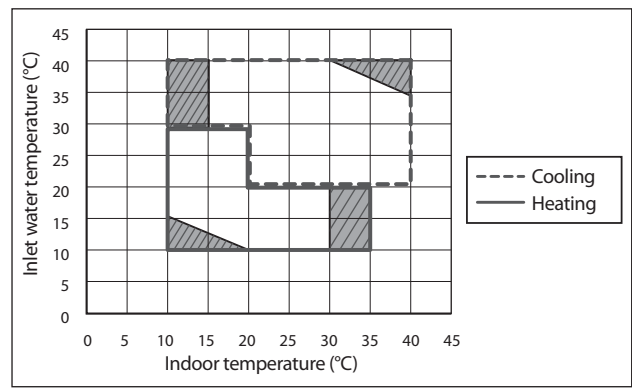
4) Valid temperature range for Auto Trial Operation

To ensure accurate inspection, perform Auto Trial Operation at the indoor and outdoor temperature conditions shown below.

- Auto Trial Operation automatically switches between cooling and heating modes according to the indoor and outdoor temperatures.
- In the area of deviant crease lines, system protective control may activate during Auto Trial Operation. Protective control degrades the inspection accuracy.
- Inspection accuracy may decrease if the temperature is outside the valid range or at the threshold.



< AM080~300*XV*** >



< AM080/100/120/200FXWA*** >

5) How to perform Auto Trial Operation

- (1) How to enter the mode: See the instructions on Key operation modes. (Press and hold the Tact Switch K1.)
 - The operation mode automatically changes to cooling or heating mode, according to the indoor and outdoor temp.
 - The duration of Auto Trial Operation can vary from 20 min up to two hours, depending on the operation conditions.
 - Noise may occur during valve inspection. Check the valve if an abnormal noise persists.
 - UP mode automatically turns off as soon as Auto Trial Operation is completed.
- (2) If an error occurs during Auto Trial Operation, check the error code and take corrective measures.
 - Auto Trial Operation-specific error codes.
 - (see the error codes and troubleshooting guide in the service manual for other error codes.)

Error code	Description	Remarks
E503	Ball valve (service valve) locked	To resolve NG items, see the troubleshooting instructions on the ball valve To resolve NG items, see the troubleshooting instructions on the pressure sensor (applicable when the outdoor unit is installed with two or more modules)
E505	Faulty high pressure sensor	
E506	Faulty low pressure sensor	

- (3) After Auto Trial Operation, use the S-NET or S-CHECKER to issue a result report.
 - For items indicated as "NG" in the result report, take corrective measures according to the troubleshooting instructions on NG items in this Manual. See the service manual if necessary.
 - After resolving all the "NG" items, perform Auto Trial Operation again.
 - Items indicated as "Unidentified" are not items that have issues. Some items are not inspected, depending on the installation environment and operation condition. These items are indicated as "Unidentified".
e.g., If the system is installed with modules and none of the outdoor units operate due to insufficient indoor load, items related to the outdoor units will not be inspected.

9-1 Auto Trial Operation (cont.)

9-1-1 Overview of Auto Trial Operation (cont.)

6) Trial Operation (Cooling/Heating)

This operation is designed to inspect items that are not inspected during Auto Trial Operation.

(1) How to enter the mode: See the instructions on Key operation modes.

(2) Check the following during Trial Operation.

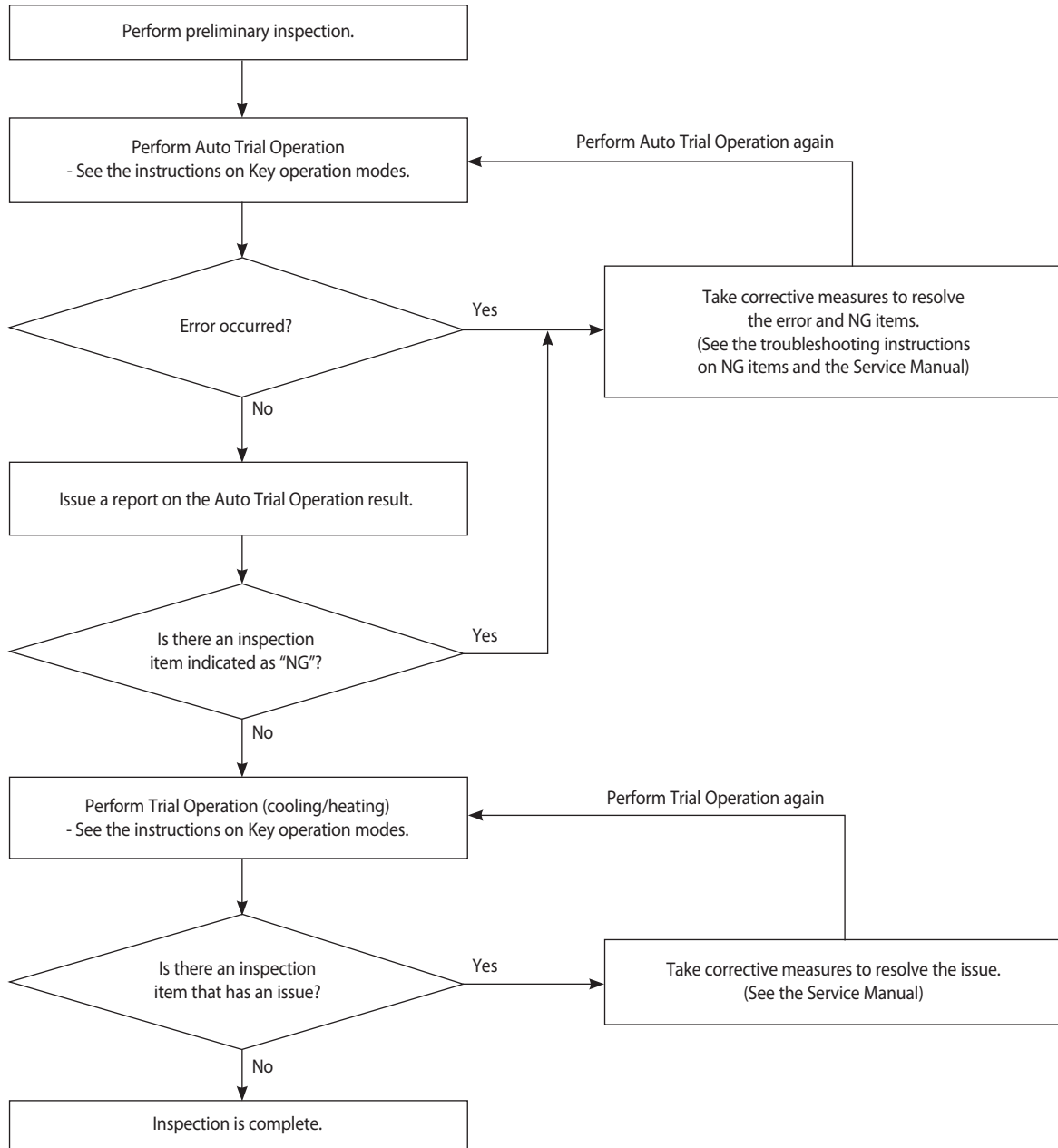
- Check to make sure that heating and cooling are properly performed.
- Check to make sure that each indoor unit is properly controlled by configuring settings, such as operation mode, air flow direction, and fan speed.
- Check the active outdoor and indoor units for the presence of noise.
- Check the outdoor and indoor units for drainage.
- To check more specific operation status, use the S-NET.

※ Use the User Manual to explain how to use the air conditioning system to the user.

9-1 Auto Trial Operation (cont.)

9-1-2 Auto Trial Operation Flow Chart

1) Auto Trial Operation Flow Chart



■ Precautions

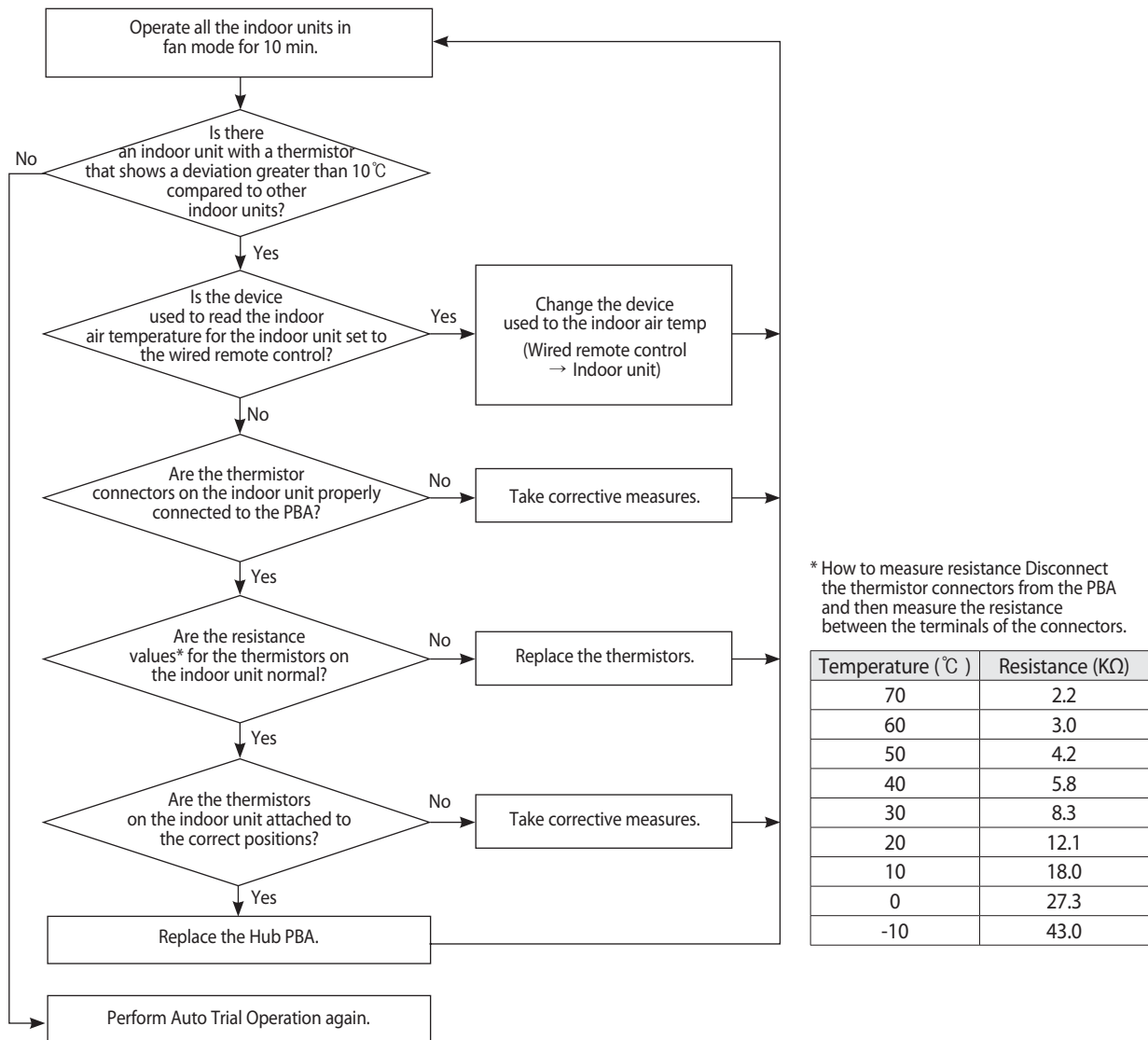
- If issues occur on multiple components at the same time, the inspection accuracy may degrade.
- Items indicated as "Unidentified" in the result report are not items that have issues.
Some items are not inspected, depending on the installation environment and operation condition.
These items are indicated as "Unidentified".
- After resolving an error and NG items, be sure to perform Auto Trial Operation again.
- To perform Auto Trial Operation again, wait until the pressure sensor and indoor/outdoor thermistors become stable.
The same applies when performing Auto Trial Operation after a compressor is operated (generally, leave idle for at least one hour).
Starting the operation when the pressure sensors and thermistors are not stable can degrade the inspection accuracy.

9-1 Auto Trial Operation (cont.)

9-1-3 How to resolve NG items

1) Indoor unit's thermistors

- What to inspect: Indoor unit's thermistors (the temperature of the indoor air and the temperatures at the entrance and exit of the heat exchanger on the indoor unit)
- Error code: None ("NG" is only indicated in the result report)
- How to determine error: Check the temperature difference between the thermistors on the indoor units before the compressors are started.
- Perform inspection according to the steps shown below.



■ Precautions

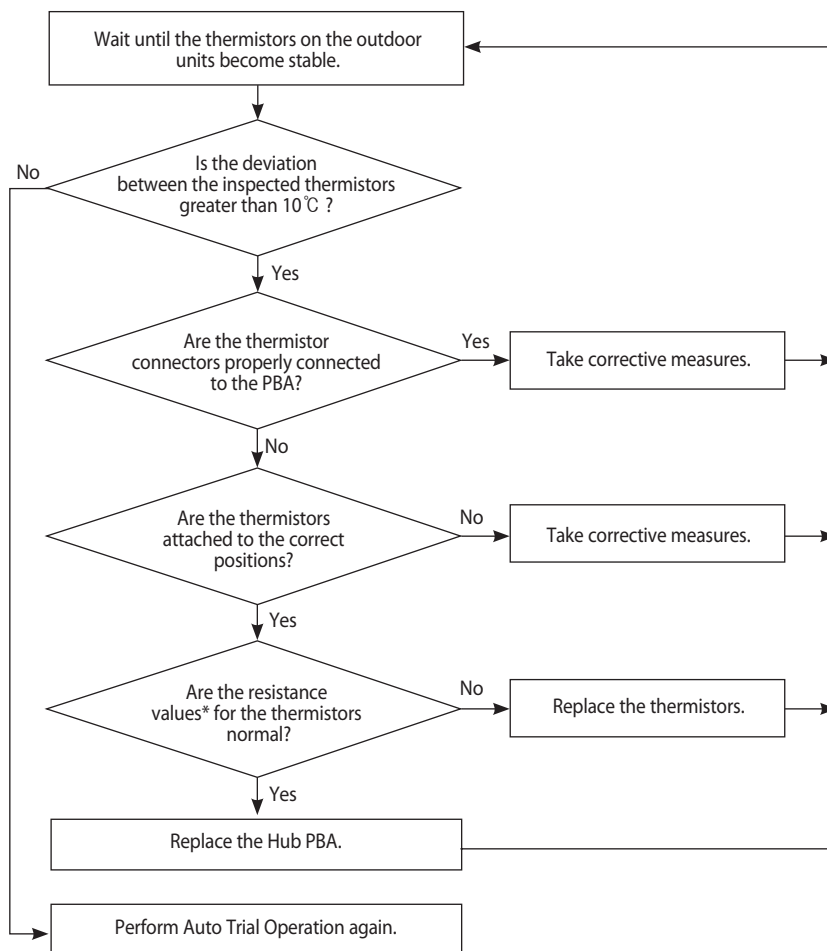
- If issues occur on multiple components at the same time, the inspection accuracy may degrade.
- If the device used to read the indoor temperature is set to the wired remote control, change the device to the indoor unit's thermistors and then perform Auto Trial Operation.
Presence of an "NG" item may occur due to a temp difference according to the positions of the indoor unit and the wired remote control.
- Thermistors on indoor units where outdoor air is applied are excluded from inspection.
- To replace a component or inspect the PBA, be sure to cut off the power supply first. If inspection must be performed with the power supply on, exercise extra care to prevent electric shock.

9-1 Auto Trial Operation (cont.)

9-1-3 How to resolve NG items (cont.)

2) Outdoor unit's thermistors

- What to inspect: Outdoor unit's thermistors (temperatures of outdoor air (or water temp), Cond out, EVI entrance/exit, Suction, and liquid line)
- Error code: None ("NG" is only indicated in the result report)
- How to determine error: Check the temperature difference between the thermistors on the outdoor units before the compressors are started.
- Perform inspection according to the steps shown below.



* How to measure Resistance Disconnect the thermistor connectors from the PBA and then measure the resistance between the terminals of the connectors.

Temperature (°C)	Resistance (KΩ)
70	2.2
60	3.0
50	4.2
40	5.8
30	8.3
20	12.1
10	18.0
0	27.3
-10	43.0

■ Precautions

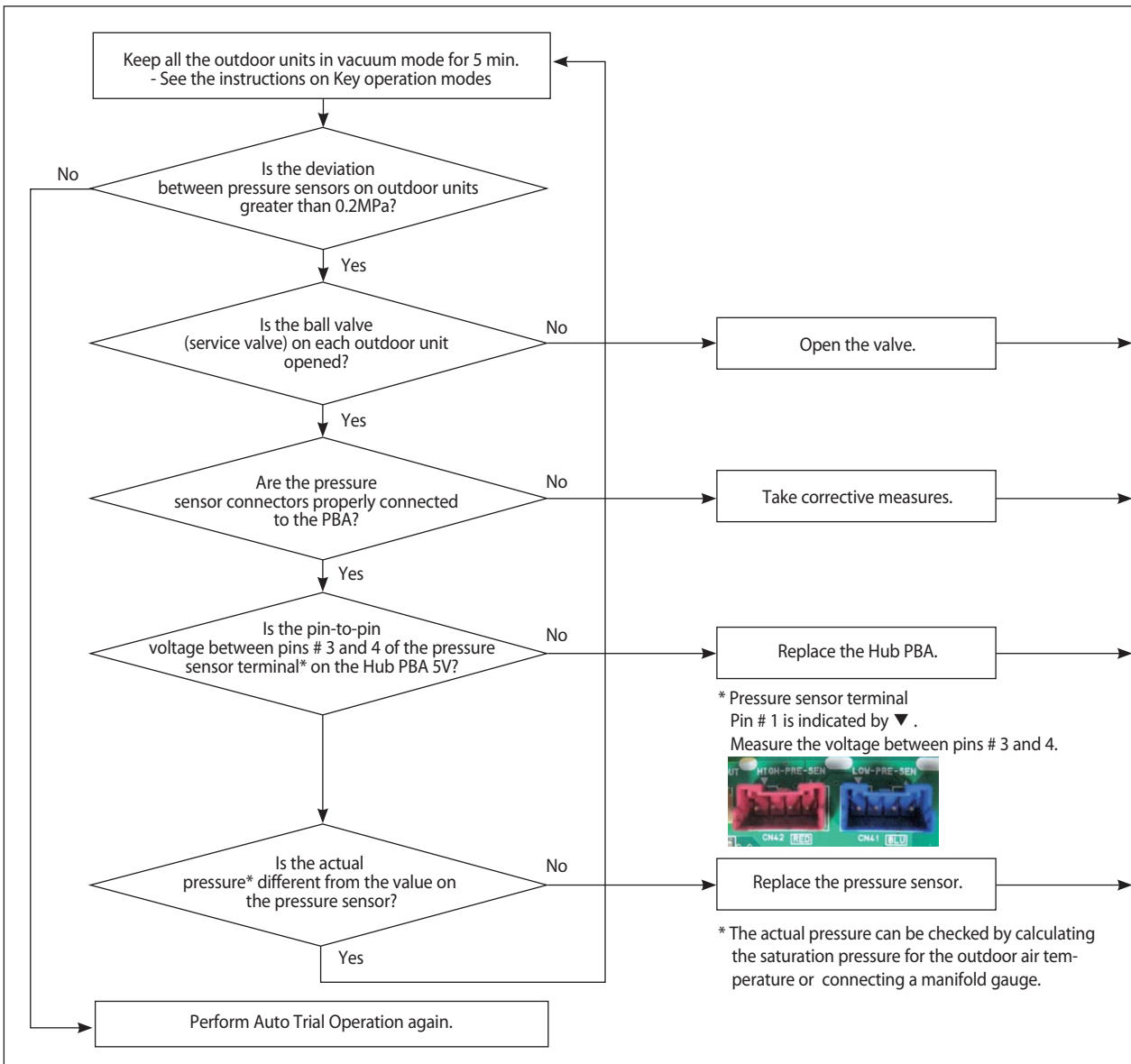
- Start inspection after the outdoor unit's thermistors become stable (generally, leave idle for at least one hour). If you start inspection immediately after operation, the temperature is not stable and this can degrade the inspection accuracy.
- To replace a component or inspect the PBA, be sure to cut off the power supply first. If inspection must be performed with the power supply on, exercise extra care to prevent electric shock.

9-1 Auto Trial Operation (cont.)

9-1-3 How to resolve NG items (cont.)

3) Pressure sensor (when the outdoor unit is installed with two or more modules)

- What to inspect: Pressure sensors (high and low pressures)
- Error code:
 - High pressure sensor: E505 ("NG" is indicated in the result report)
 - Low pressure sensor: E506 ("NG" is indicated in the result report)
- How to determine error: Check the pressure difference between the high pressure sensors on each outdoor unit as well as the pressure difference between the low pressure sensors on the outdoor unit before the compressors are started.
- Perform inspection according to the steps shown below.



■ Precautions

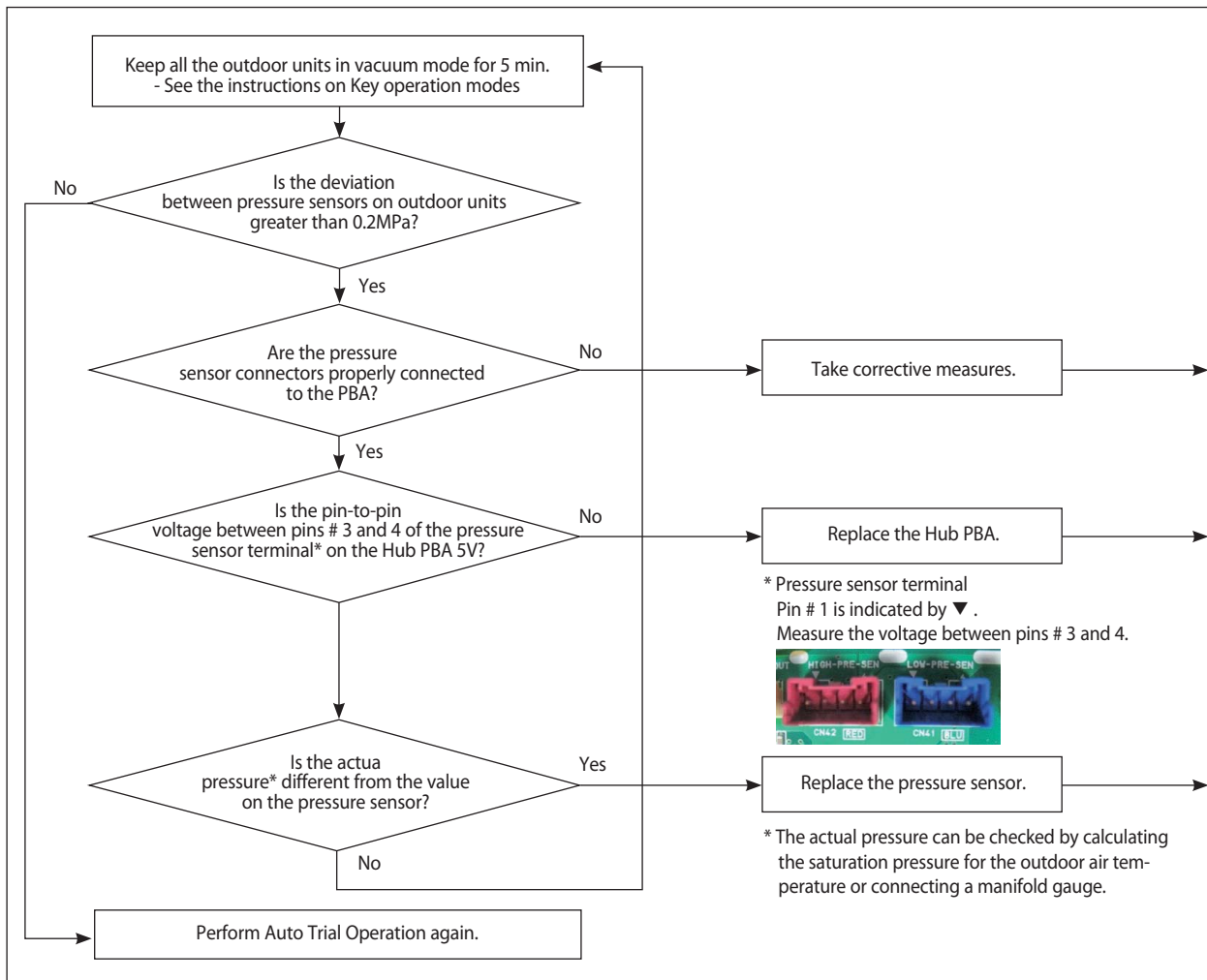
- If an error occurs, Auto Trial Operation stops immediately.
An error may occur if there is an air temperature difference between the areas where outdoor units are installed. Use the blower to regulate the air temperature to a similar level.
- To replace a component or inspect the PBA, be sure to cut off the power supply first.
If inspection must be performed with the power supply on, exercise extra care to prevent electric shock.

9-1 Auto Trial Operation (cont.)

9-1-3 How to resolve NG items (cont.)

4) Pressure sensor (when only one outdoor unit is installed)

- What to inspect: Pressure sensors (high and low pressures)
- Error code: None ("NG" is only indicated in the result report)
- How to determine error: Check the pressure difference between the high and low pressure sensors before the compressors are started.
- Perform inspection according to the steps shown below.



■ Precautions

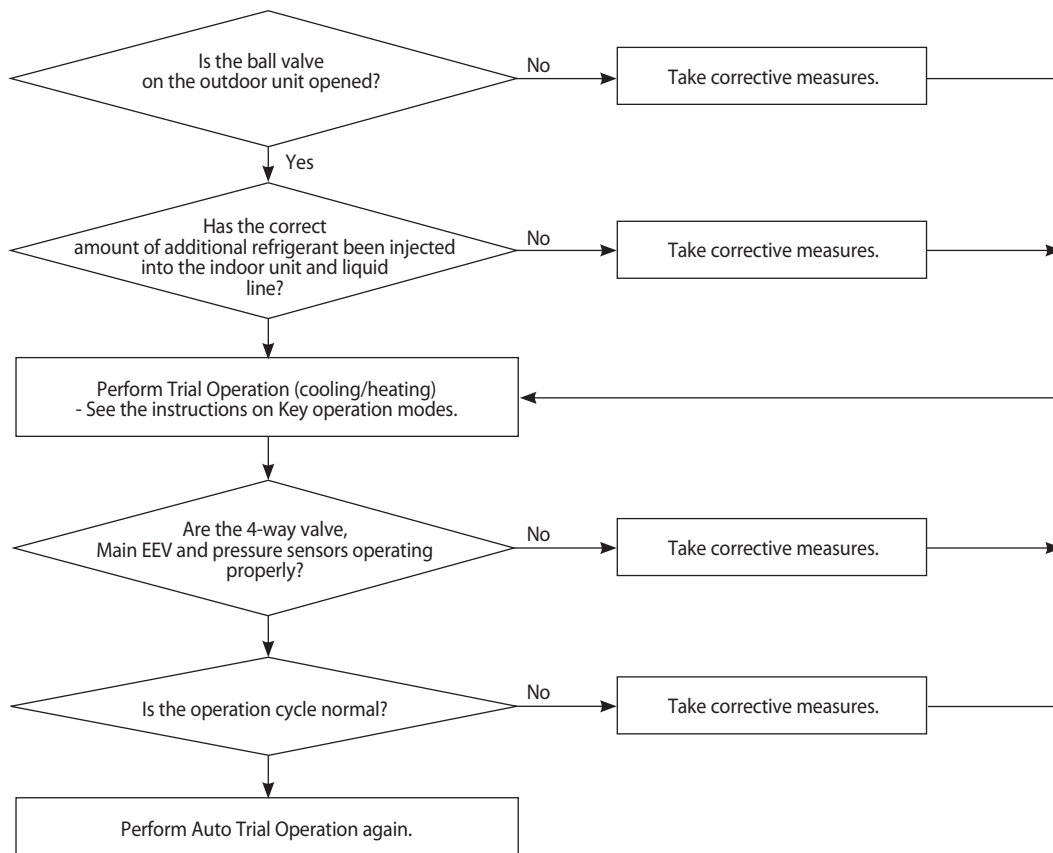
- To replace a component or inspect the PBA, be sure to cut off the power supply first.
If inspection must be performed with the power supply on, exercise extra care to prevent electric shock.

9-1 Auto Trial Operation (cont.)

9-1-3 How to resolve NG items (cont.)

5) Ball valve (service valve)

- What to inspect: Status of the outdoor unit's ball valve (service valve)
- Error code: E503 ("NG" is indicated in the result report)
- How to determine error: Check the variations of the operation frequency and pressure on the compressors during operation.
- Perform inspection according to the steps shown below.



■ Precautions

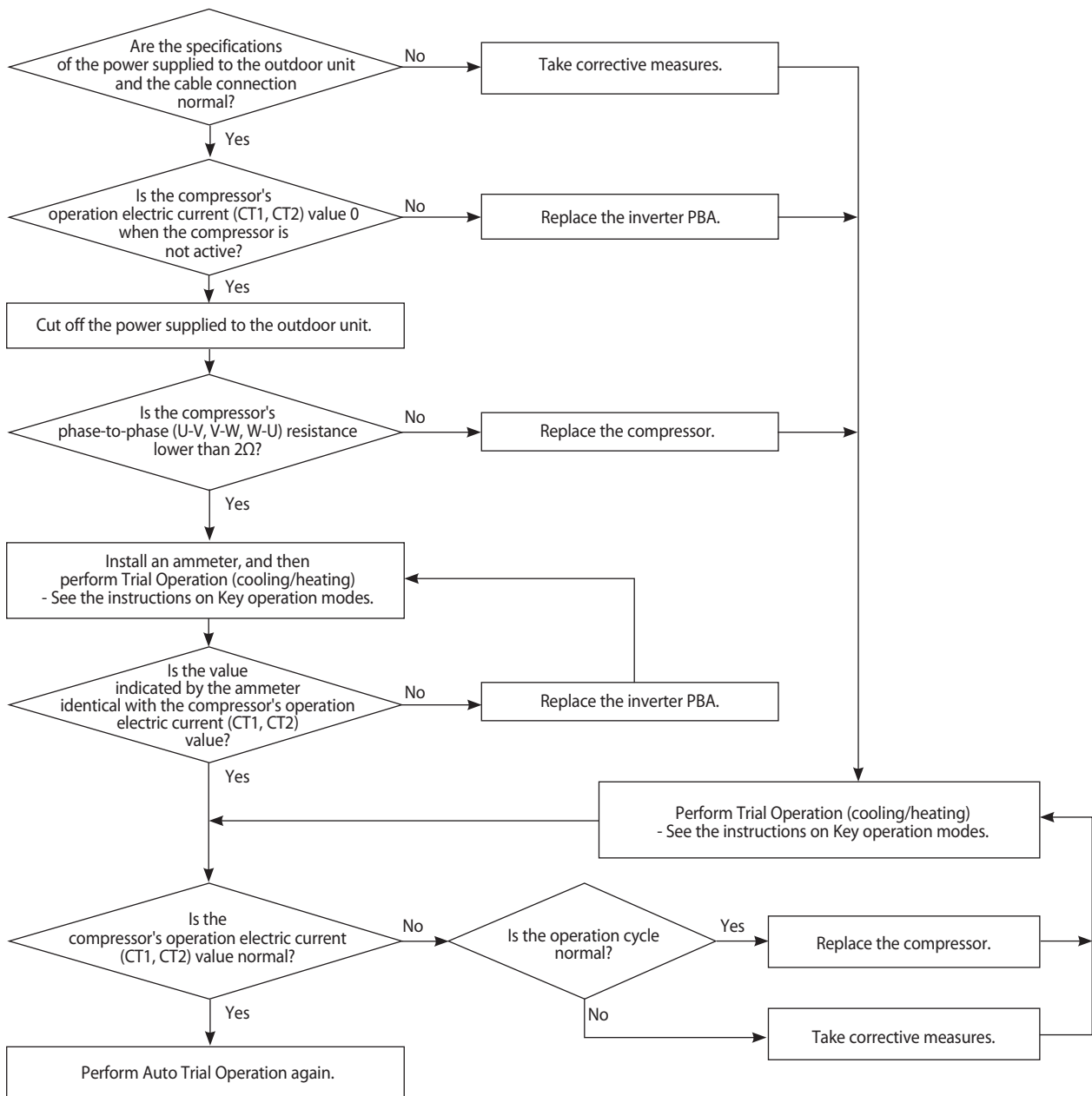
- If an error occurs, Auto Trial Operation stops immediately.
- When inspecting the ball valve, inspect the liquid line, gas line, and high pressure line (HR only) together.
- Symptoms in the event of an issue on the 4-way valve
 - Abnormal noise during compressor operation
 - Increase in the suction temperature
 - See the troubleshooting instructions on NG items related to the 4-way valve
- Symptoms in the event of an issue on the Main EEV
 - It is not possible to control the superheat (SH)
 - It is not possible to secure a DSH of higher than 20K
 - See the troubleshooting instructions on NG items related to the Main EEV
- If any abnormality occurs on the pressure sensor, see the troubleshooting instructions on NG items related to the pressure sensor
- If there frost has formed on the outdoor heat exchanger, perform Trial Operation or forced defrost operation to eliminate the frost, and then perform Auto Trial Operation again.
- To replace a component or inspect the PBA, be sure to cut off the power supply first.
If inspection must be performed with the power supply on, exercise extra care to prevent electric shock.

9-1 Auto Trial Operation (cont.)

9-1-3 How to resolve NG items (cont.)

6) Compressors

- What to inspect: Compressor's operation electric current
- Error code: None ("NG" is only indicated in the result report)
- How to determine error: Compare the compressor's operation electric current and the reference electric current.
- Perform inspection according to the steps shown below.



■ Precautions

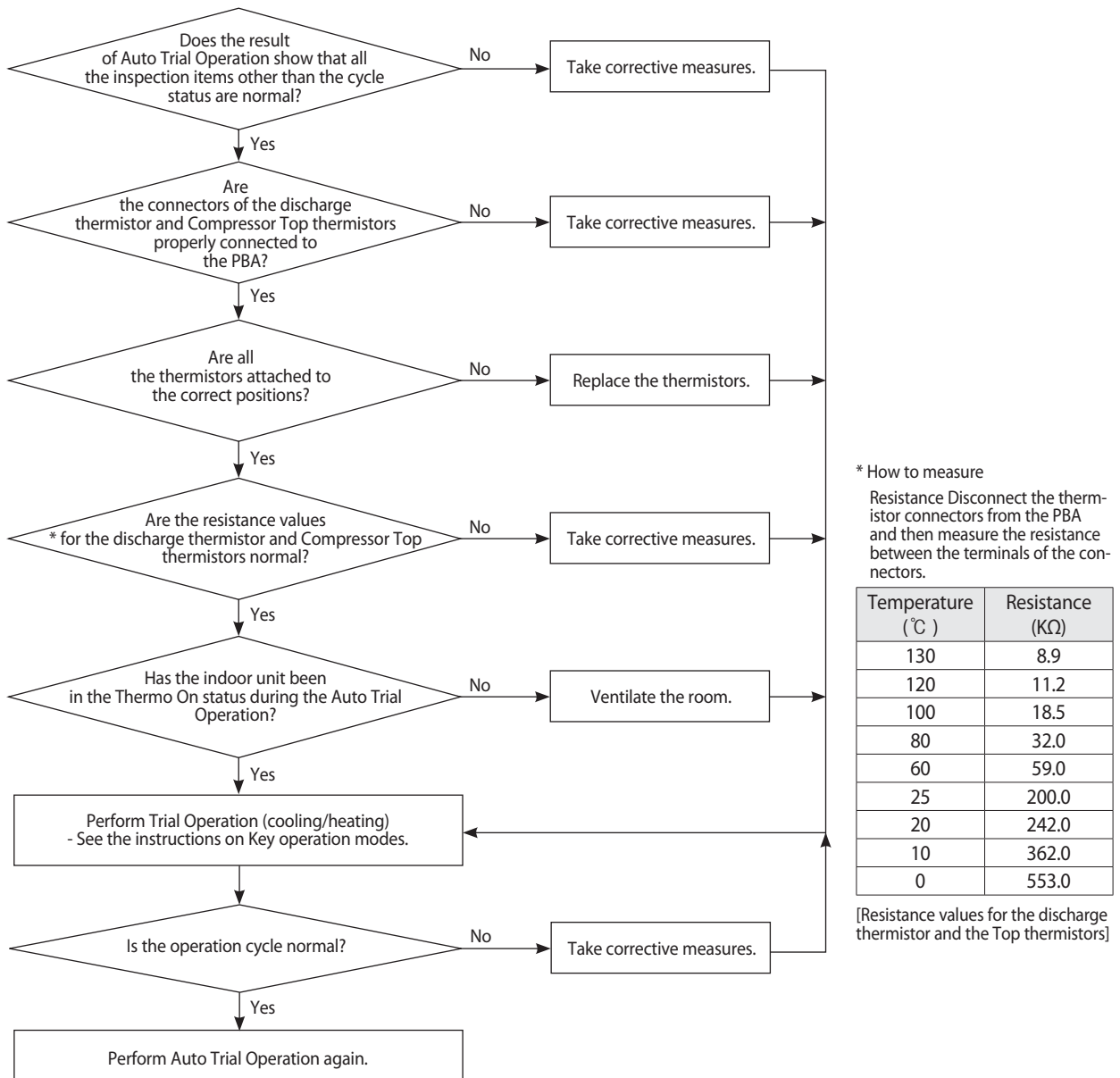
- To replace a component or inspect the PBA, be sure to cut off the power supply first.
If inspection must be performed with the power supply on, exercise extra care to prevent electric shock.

9-1 Auto Trial Operation (cont.)

9-1-3 How to resolve NG items (cont.)

7) Cycle status

- What to inspect: Outdoor unit's operation cycle status
- Error code: None ("NG" is only indicated in the result report)
- How to determine error: View the DSH status during operation.
- Perform inspection according to the steps shown below.



■ Precautions

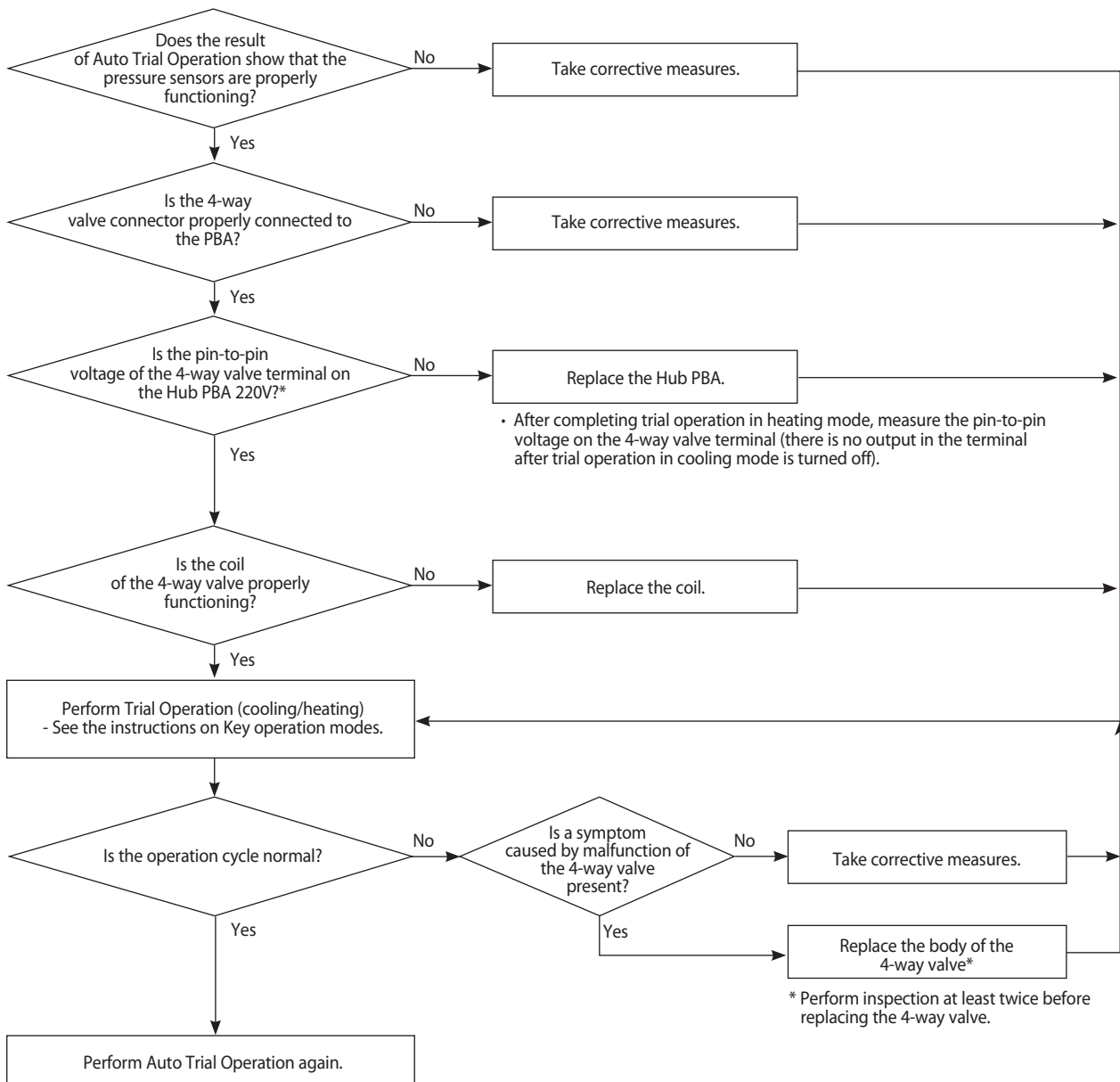
- To replace a component or inspect the PBA, be sure to cut off the power supply first.
If inspection must be performed with the power supply on, exercise extra care to prevent electric shock.

9-1 Auto Trial Operation (cont.)

9-1-3 How to resolve NG items (cont.)

8) 4-way valve

- What to inspect: Outdoor unit's 4-way valve operation
- Error code: None ("NG" is only indicated in the result report)
- How to determine error: Check the variations of pressure when the 4-way valve is operating.
- Perform inspection according to the steps shown below.



■ Precautions

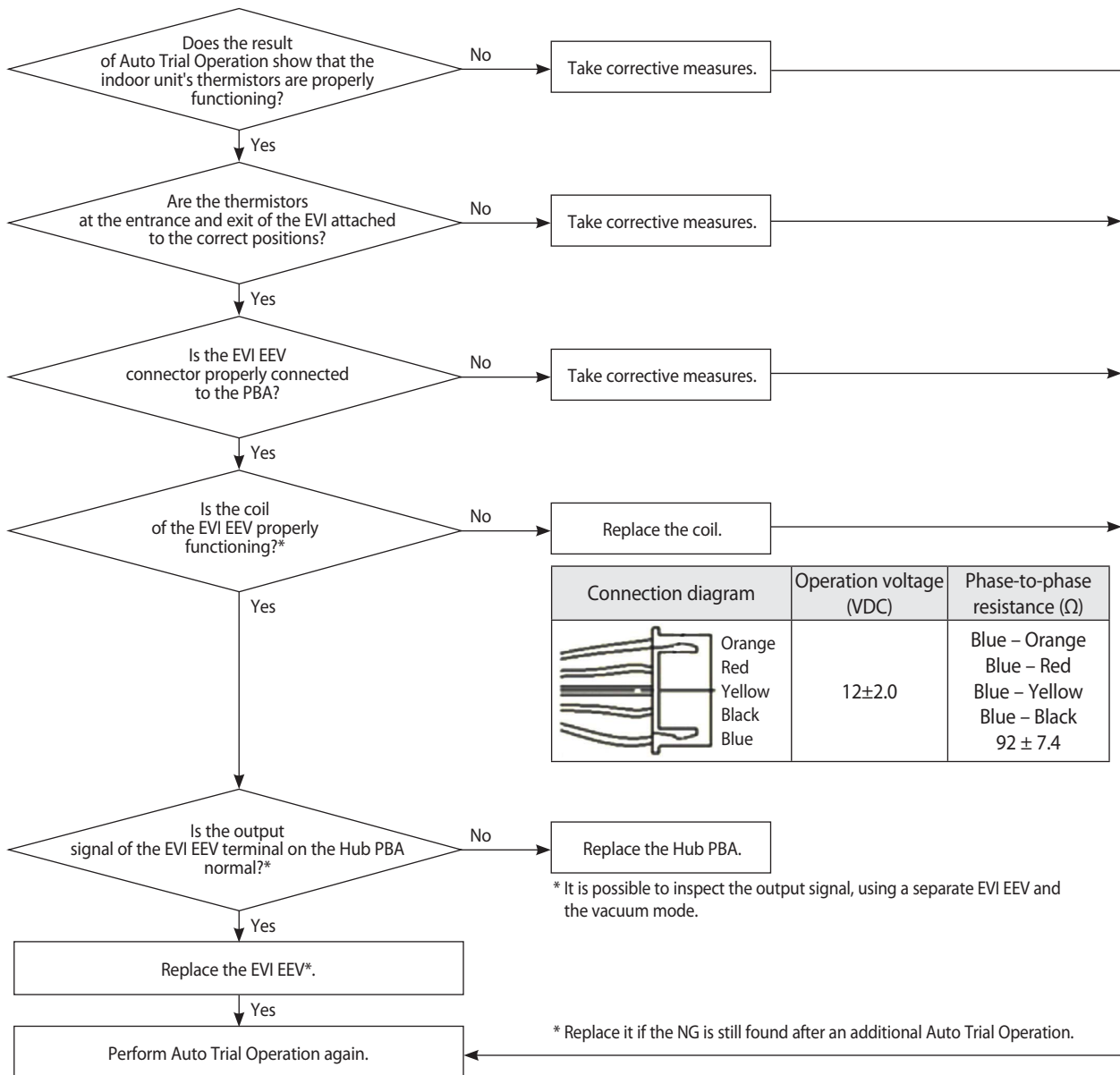
- To replace a component or inspect the PBA, be sure to cut off the power supply first.
If inspection must be performed with the power supply on, exercise extra care to prevent electric shock.

9-1 Auto Trial Operation (cont.)

9-1-3 How to resolve NG items (cont.)

9) Electronic Expansion Valve – EVI (EVI EEV)

- What to inspect: Outdoor unit's EVI EEV operation
- Error code: None ("NG" is only indicated in the result report)
- How to determine error: Check variations of the temperatures at the entrance and exit of the EVI during operation of the EVI EEV
- Perform inspection according to the steps shown below.



■ Precautions

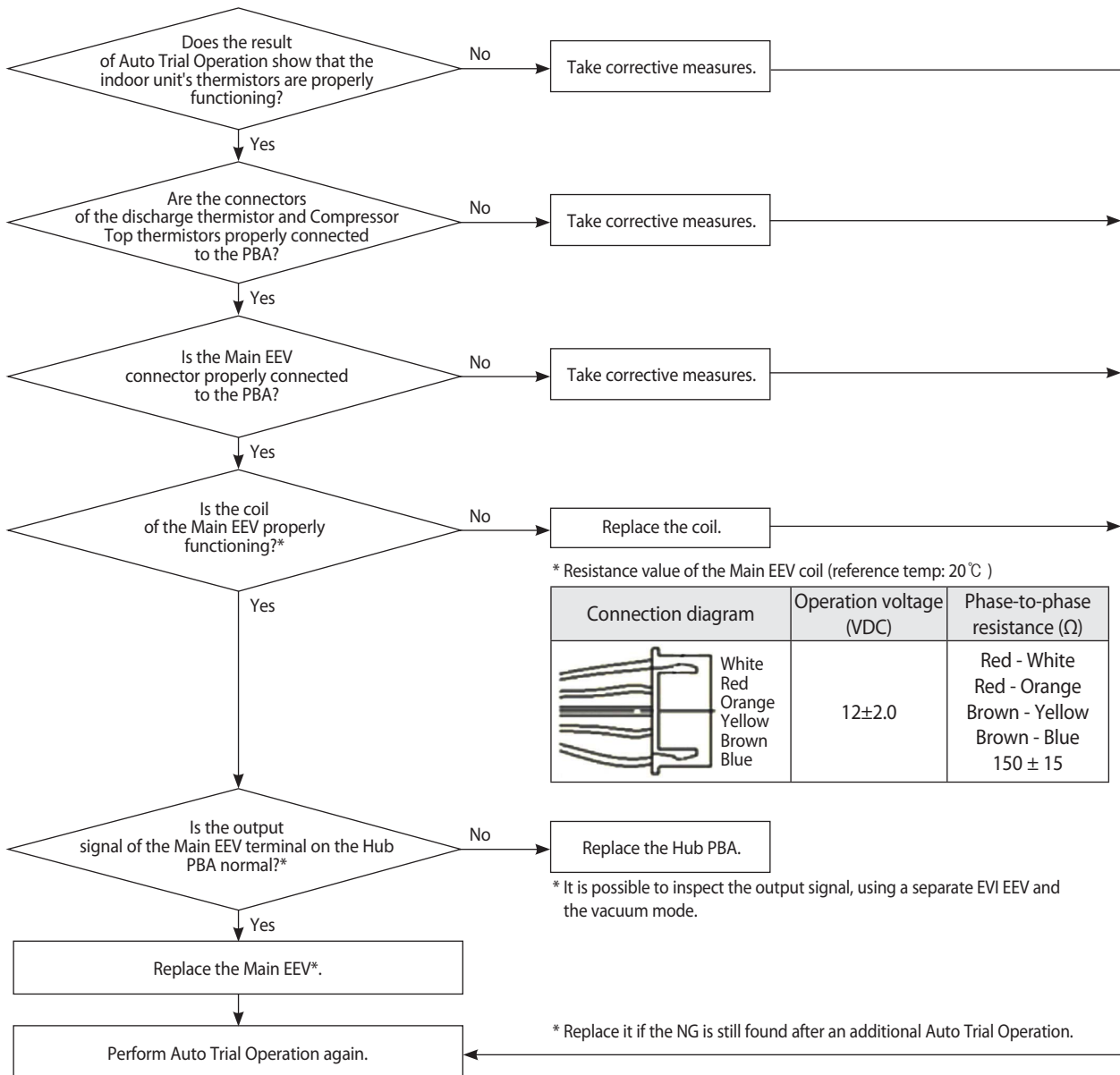
- To replace a component or inspect the PBA, be sure to cut off the power supply first. If inspection must be performed with the power supply on, exercise extra care to prevent electric shock.

9-1 Auto Trial Operation (cont.)

9-1-3 How to resolve NG items (cont.)

10) Electronic Expansion Valve – Main (Main EEV)

- What to inspect: Outdoor unit's Main EEV operation .
(applicable only when performing Auto Trial Operation in heating mode)
- Error code: None ("NG" is only indicated in the result report)
- How to determine error: Check the variations of the pressure and the compressor's discharge temperature during operation of the Main EEV.
- Perform inspection according to the steps shown below.

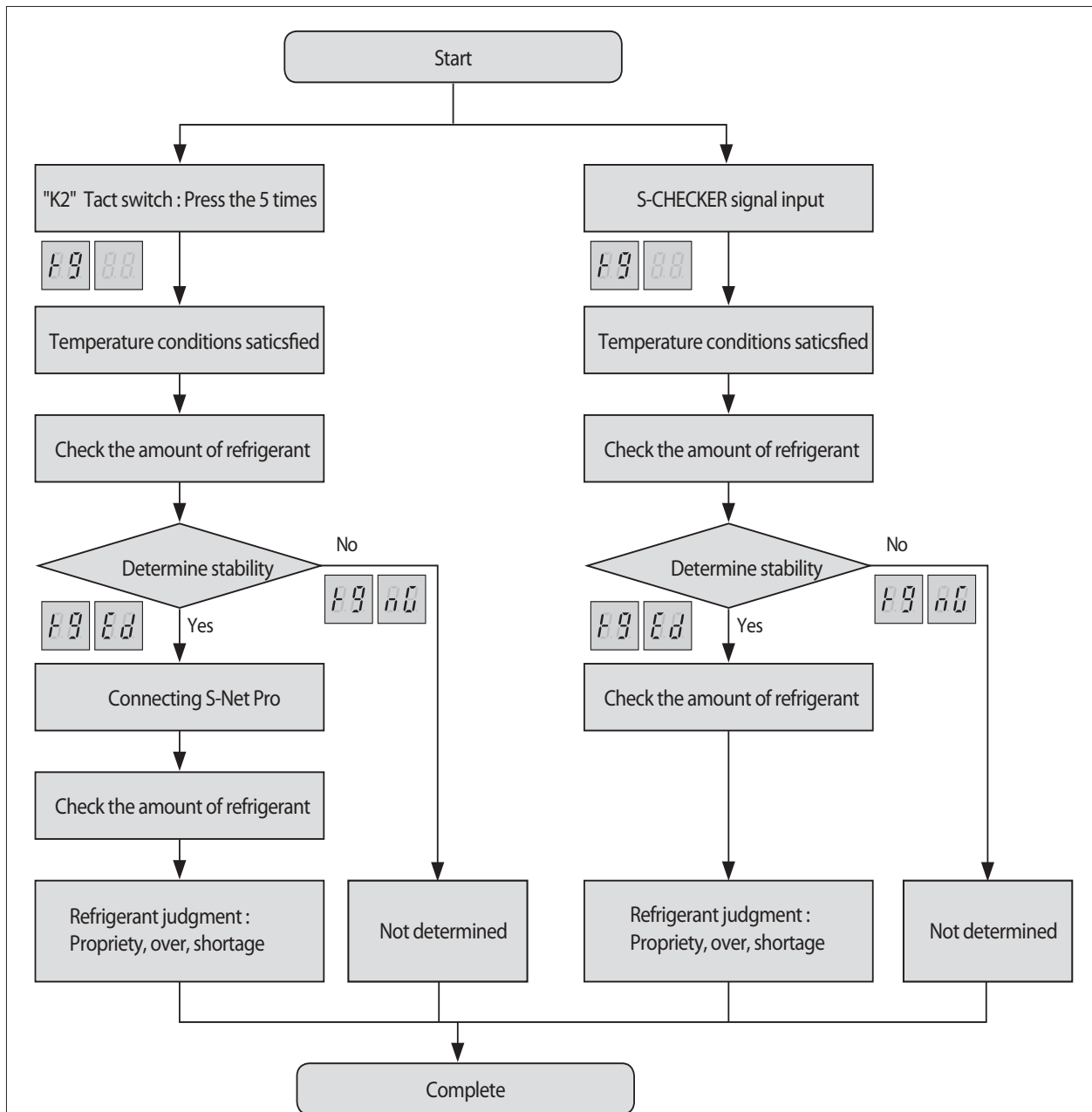


■ Precautions

- To replace a component or inspect the PBA, be sure to cut off the power supply first.
If inspection must be performed with the power supply on, exercise extra care to prevent electric shock.

9-2 Amount of refrigerant automatically checking

Through the detect operation is the ability to verify automatically for the amount of refrigerant.



⚠ [Caution]

- If escape the warranty temperatures, can not get the accurate results.
 - Indoor : 20~30°C
 - Outdoor : 5~43°C
- If operation cycle is not stable, Checking the amount of refrigerant can be forced to shut down.
- If did not operation for a long time, or when running the heating operation, the accuracy may be lower. Therefore carried out for more than 30 minutes cooling operation.
- Depending on the installation environment, system protection operation is performed, in this case, the check result may be inaccurate.

[How to troubleshoot the judged results]

- Excessive of refrigerant amount : After the 5% emissions of calculated total refrigerant amount, retry Checking the amount of refrigerant.
- Deficiency of refrigerant amount : After the 5% addition of calculated total refrigerant amount, retry Checking the amount of refrigerant.
- Deficiency of Over-cooling : After the 10% addition of calculated total refrigerant amount, retry Checking the amount of refrigerant.
- Undetermined : Checking the amount of refrigerant confirms that is performed in warranty temperatures area. Ensure that there is no other problems in the system by Test Operation.

10. Nomenclature

10-1 Model Naming



(1) Classification

AM	DVM
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(5) Feature (Model Group)

V	Inverter
M	DVM S Eco
W	DVM S Water

(2) Capacity (3Digit)

HP	x 1/10
BTU	x 1000

(6) Feature2 (Grade)

A	Standard + General Temp. + Module
H	High EER + Low Temp + Module
G	High EER + General temp. + Module
S	Flagship + General Temp. + Module

(3) Version (Model Year)

F	2013
H	2014
J	2015
K	2016
M	2017

(7) Rating Voltage

E	1ø, 220~240V, 50Hz
G	3ø, 380~415V, 50Hz
F	208~230V, 60Hz, 3ø
J	460V, 60Hz, 3ø
N	380~415V, 50/60Hz, 3ø

(4) Product type

X	Outdoor Unit
N	Indoor Unit

(8) Mode (Function)

H	Heat Pump
R	Heat Recovery



GSPN (GLOBAL SERVICE PARTNER NETWORK)

Area	Web Site
Europe, CIS, Mideast & Africa	gspn1.samsungcsportal.com
Asia	gspn2.samsungcsportal.com
North & Latin America	gspn3.samsungcsportal.com
China	china.samsungportal.com

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