SERVICE MANUAL

OUTDOOR UNIT (R410A)

VPC/VRC072/096/120/144/168/192/216/240S4M-4*
VPC/VRC072/096/120L4M-4*

VRF
(VARIABLE REFRIGERANT FLOW)

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

CONTENTS

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

VRF start with a new logo to suit the innovative product.

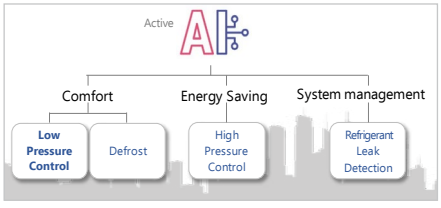
VRF

The collaboration with WindFree TM which another core product of air conditioner technology, clearly impresses our key products to our customers and clear differentiation from other brands.
Compatible means that the core technology called active frequency control that makes the wind suitable for naming is mounted on VRF. In addition to this technology, it means the connectivity with WindFree TM, but also the connectivity of VRF that can be freely compatible to our all indoor units and connect up to 64 indoor devices.

Lennox VRF offers innovative features to benefit the indoor comfort as well operational costs of the system through technological advances such as:

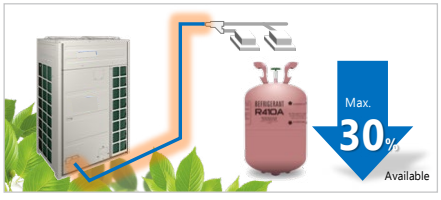
Top Energy Efficiency

VRF will maintain the highest energy efficiency during the platform operation period.



Active AI

Active AI function will gives customers more benefits.



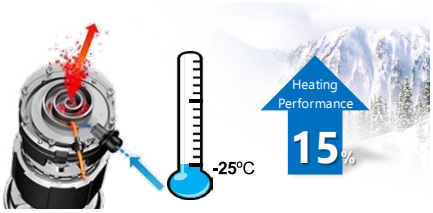
Ref. reduction

Refrigerant reduction and pipe diameter scale down will give the benefit to installer.

2-1 Feature of Product (cont.)

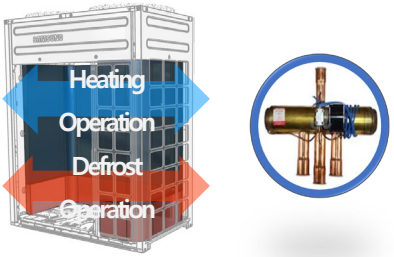
2-1-1 Feature (cont.)

Lennox VRF offers innovative features to benefit the indoor comfort as well operational costs of the system through technological advances such as:



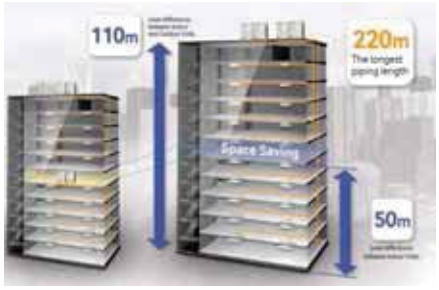
Advanced Flash Injection

More powerful heating performance will provide ultimate comfort.



Enhanced Defrost Control

Quick & effective defrost operation by adding 4way valve



Extended Piping Length Limits.

Allows extended piping length of up to 220m, and units will still give a great performance over wide areas. With this technology, installation is available with a maximum height level of 110m, which is equivalent to 20 stories (each story is considered 5m high).

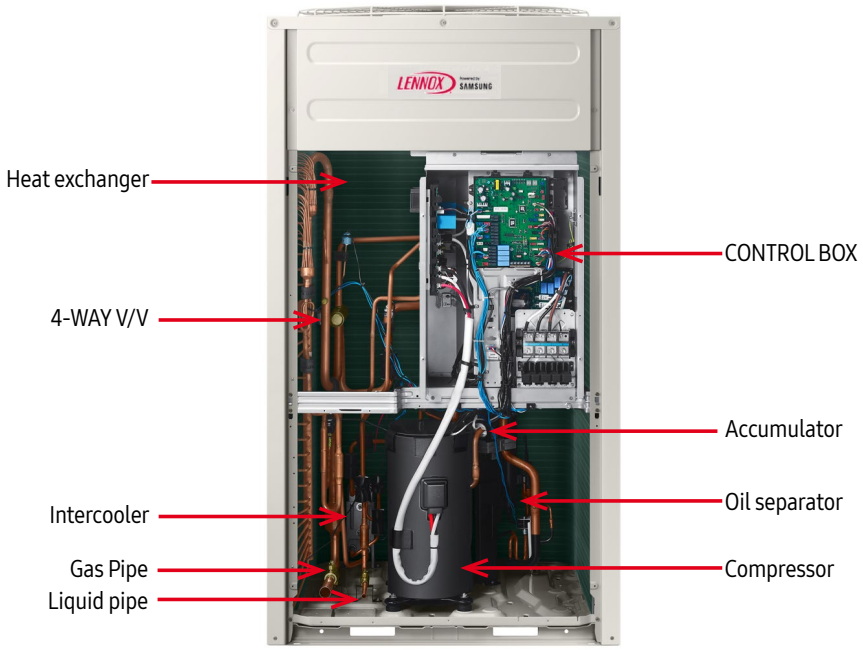
Smart management.

Further improves system's energy efficiency due to precise indoor climate control. Web-based remote monitoring and management system allows quick and easy HVAC control and breakdown alert.

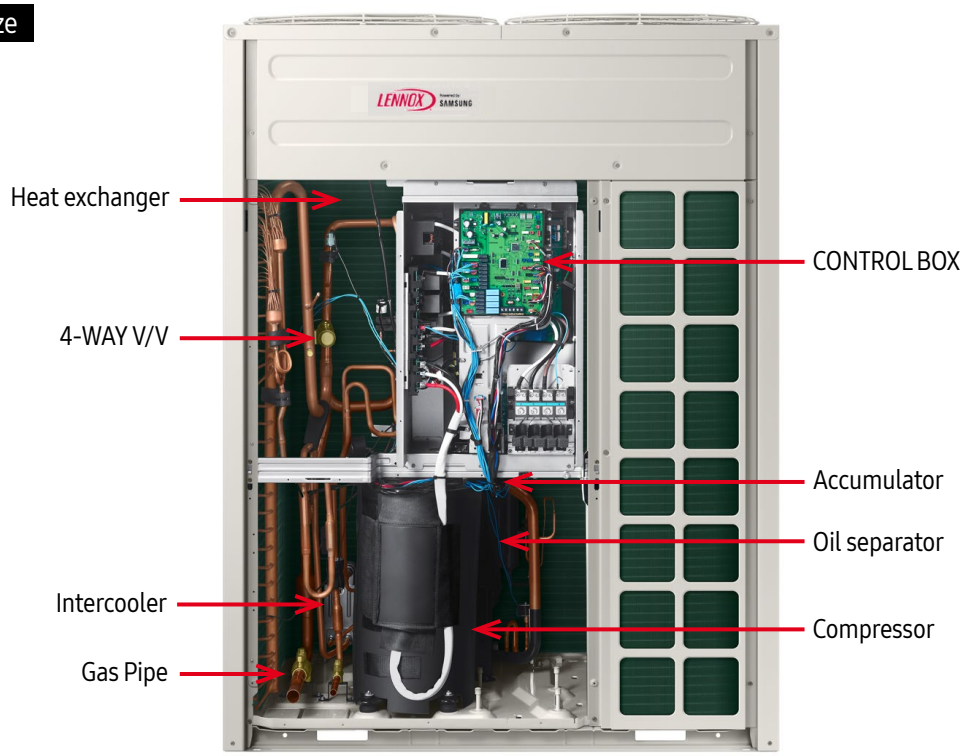
2-1 Feature of Product (cont.)

2-1-2 Structure of product (VPC/VRC***S4M-4Y)

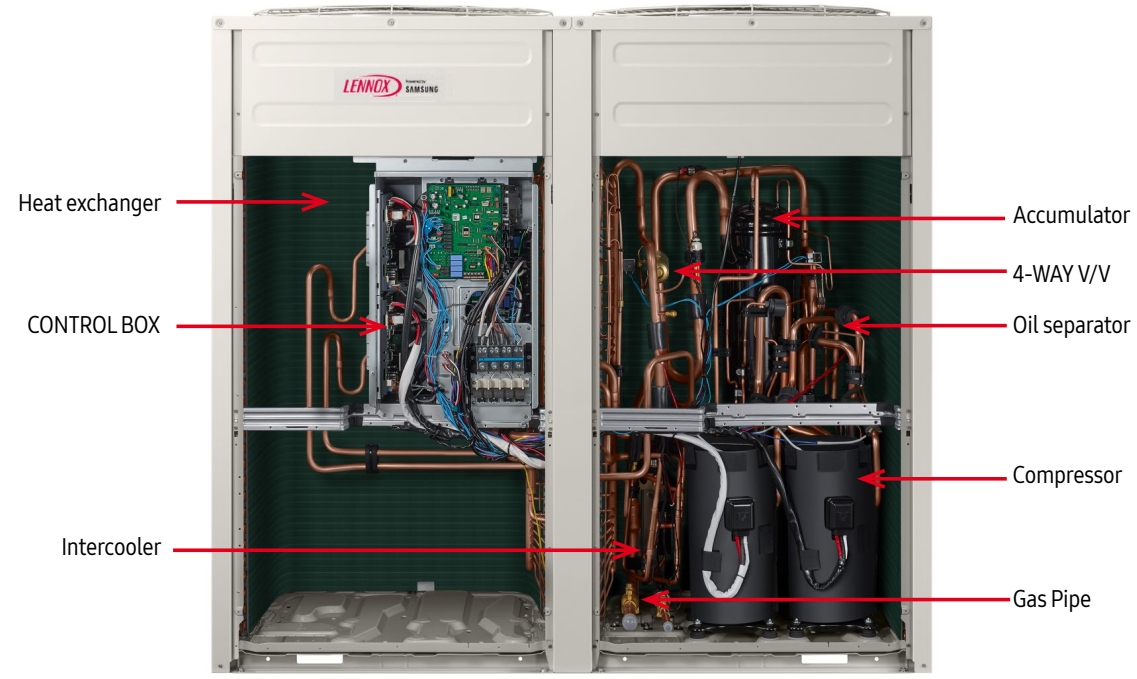
Small size



Large size



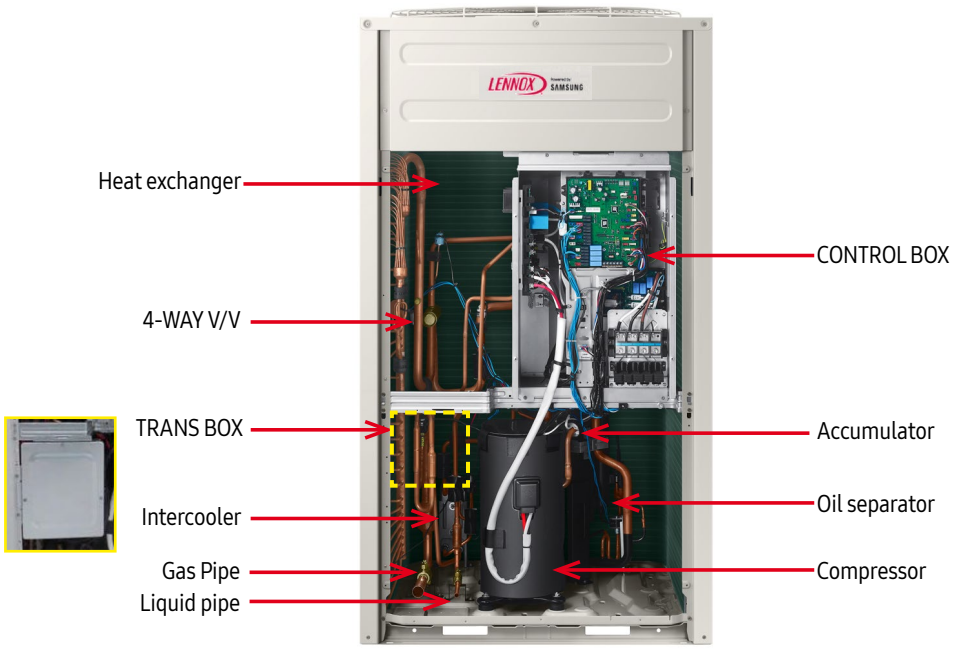
X-Large size


Heat exchanger
CONTROL BOX
Intercooler
Accumulator
4-WAY V/V
Oil separator
Compressor
Gas Pipe

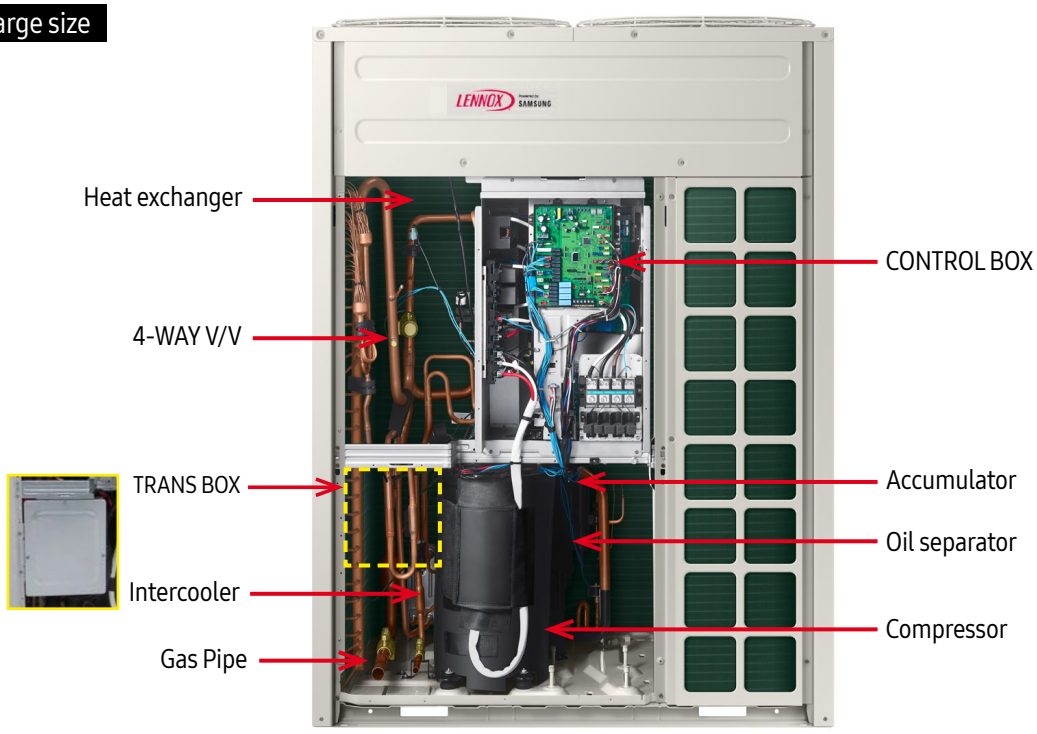
2-1 Feature of Product (cont.)

2-1-3 Structure of product (VPC/VRC***S4M-4G, VPC/VRC***S4M-4J)

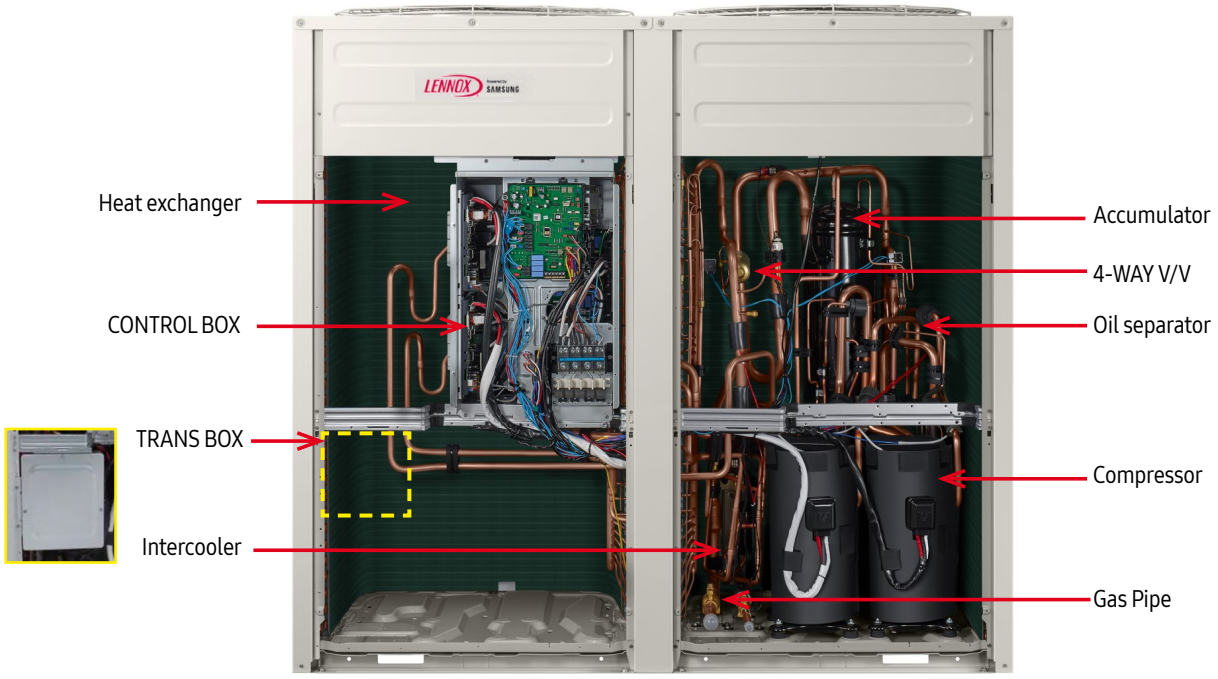
Small size



Large size



X-Large size


Heat exchanger
CONTROL BOX
TRANS BOX
Intercooler
Accumulator
4-WAY V/V
Oil separator
Compressor
Gas Pipe

2-2 Model names of Indoor/Outdoor Unit

2-2-1 Outdoor unit combination

■ VPC/VRC***S4M-4* (High Efficiency) series

Model name for combination	Numberof individual outdoor units	Nominal Capacity		Rated Capacity		Total cooling capacity of the connected indoorunits		Maximum number of connectable indoorunits	Combined outdoorunits							
									VPC/VRC***S4M-4*							
		Cooling (Btu/h)	Heating (Btu/h)	Cooling (Btu/h)	Heating (Btu/h)	Minimum (Btu/h)	Maximum (Btu/h)		072 (6Ton)	096 (8Ton)	120 (10Ton)	144 (12Ton)	168 (14Ton)	192 (16Ton)	216 (18Ton)	240 (20Ton)
VPC/VRC072S4M-4*	1	72000	81000	69000	77000	36000	93600	12	1							
VPC/VRC096S4M-4*	1	96000	108000	92000	103000	48000	124800	16		1						
VPC/VRC120S4M-4*	1	120000	135000	114000	129000	60000	156000	20			1					
VPC/VRC144S4M-4*	1	144000	162000	138000	154000	72000	187200	25				1				
VPC/VRC168S4M-4*	1	168000	189000	160000	180000	84000	218400	29					1			
VPC/VRC192S4M-4*	1	192000	216000	184000	206000	96000	249600	33						1		
VPC/VRC216S4M-4*	1	216000	243000	206000	232000	108000	280800	37							1	
VPC/VRC240S4M-4*	1	240000	270000	228000	258000	120000	312000	41								1
VPC/VRC264S4M-4*	2	264000	297000	252000	282000	132000	343200	45		1			1			
VPC/VRC288S4M-4*	2	288000	324000	274000	308000	144000	374400	49		1				1		
VPC/VRC312S4M-4*	2	312000	351000	298000	334000	156000	405600	54		1					1	
VPC/VRC336S4M-4*	2	336000	378000	320000	360000	168000	436800	58		1						1
VPC/VRC360S4M-4*	2	360000	405000	342000	386000	180000	468000	62			1					1
VPC/VRC384S4M-4*	2	384000	432000	366000	412000	192000	499200	64						2		
VPC/VRC408S4M-4*	2	408000	459000	388000	438000	204000	530400	64						1	1	
VPC/VRC432S4M-4*	3	432000	486000	412000	462000	216000	561600	64		2			1			
VPC/VRC456S4M-4*	3	456000	513000	436000	488000	228000	592800	64			1	1		1		

▶ Make sure to use an indoor unit that is compatible with VRF.

▶ 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 × Σ(Outdoor unit capacity) ≤ Total capacity of the connected indoor units ≤ 1.3 × Σ(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 can be connected.

■ VPC/VRC***S4M-4J (Canada 575V) series

Model name for combination	Numberof individual outdoor units	Nominal Capacity		Rated Capacity		Total cooling capacity of the connected indoorunits		Maximum number of connectable indoorunits	Combined outdoorunits							
									VRC***S4M-4J							
		Cooling (Btu/h)	Heating (Btu/h)	Cooling (Btu/h)	Heating (Btu/h)	Minimum (Btu/h)	Maximum (Btu/h)		072 (6Ton)	096 (8Ton)	120 (10Ton)	144 (12Ton)	168 (14Ton)	192 (16Ton)	216 (18Ton)	240 (20Ton)
VPC/VRC072S4M-4J	1	72000	81000	69000	77000	36000	93600	12	1							
VPC/VRC096S4M-4J	1	96000	108000	92000	103000	48000	124800	16		1						
VPC/VRC120S4M-4J	1	120000	135000	114000	129000	60000	156000	20			1					
VPC/VRC144S4M-4J	1	144000	162000	138000	154000	72000	187200	25				1				
VPC/VRC168S4M-4J	1	168000	189000	160000	180000	84000	218400	29					1			
VPC/VRC192S4M-4J	1	192000	216000	184000	206000	96000	249600	33						1		
VPC/VRC216S4M-4J	1	216000	243000	206000	232000	108000	280800	37							1	
VPC/VRC240S4M-4J	1	240000	270000	228000	258000	120000	312000	41								1
VPC/VRC264S4M-4J	2	264000	297000	252000	282000	132000	343200	45		1			1			
VPC/VRC288S4M-4J	2	288000	324000	274000	308000	144000	374400	49		1				1		
VPC/VRC312S4M-4J	2	312000	351000	298000	334000	156000	405600	54		1					1	
VPC/VRC336S4M-4J	2	336000	378000	320000	360000	168000	436800	58		1						1
VPC/VRC360S4M-4J	2	360000	405000	342000	386000	180000	468000	62			1					1
VPC/VRC384S4M-4J	2	384000	432000	366000	412000	192000	499200	64						2		
VPC/VRC408S4M-4J	2	408000	459000	388000	438000	204000	530400	64						1	1	
VPC/VRC432S4M-4J	3	432000	486000	412000	462000	216000	561600	64		2			1			
VPC/VRC456S4M-4J	3	456000	513000	436000	488000	228000	592800	64			1	1		1		

▶ Make sure to use an indoor unit that is compatible with VRF.

▶ 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 × Σ(Outdoor unit capacity) ≤ Total capacity of the connected indoor units ≤ 1.3 × Σ(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 can be connected.

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

2-2-1 Outdoor unit combination

■ VPC/VRC***L4M-4* (Max Heat) series

Model name for combination	Number of Individual outdoor units	Nominal Capacity		Rated Capacity		Total cooling capacity of the connected indoor units		Maximum number of connectable indoor units	Combined outdoor units		
									VPC***L4M-4G		
		Cooling (Btu/h)	Heating (Btu/h)	Cooling (Btu/h)	Heating (Btu/h)	minimum (Btu/h)	Maximum (Btu/h)		072 (6Ton)	096 (8Ton)	120 (10Ton)
VPC/VRC072L4M-4*	1	72000	81000	69000	77000	36000	93600	12	1		
VPC/VRC096L4M-4*	1	96000	108000	92000	103000	48000	124800	16		1	
VPC/VRC120L4M-4*	1	120000	135000	114000	129000	60000	156000	20			1
VPC/VRC144L4M-4*	2	144000	162000	138000	154000	72000	187200	25	2		
VPC/VRC168L4M-4*	2	168000	189000	161000	180000	84000	218400	29	1	1	
VPC/VRC192L4M-4*	2	192000	216000	183000	206000	96000	249600	33		2	
VPC/VRC216L4M-4*	3	216000	243000	206000	232000	108000	280800	37	3		
VPC/VRC240L4M-4*	3	240000	270000	228000	258000	120000	312000	41	2	1	
VPC/VRC264L4M-4*	3	264000	297000	252000	283000	132000	343200	45	2		1
VPC/VRC288L4M-4*	3	288000	324000	275000	309000	144000	374400	49	1	1	1

▶ Make sure to use an indoor unit that is compatible with VRF.

▶ 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 × Σ(Outdoor unit capacity) ≤ Total capacity of the connected indoor units ≤ 1.3 × Σ(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 can be connected.

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

2-2-2 Outdoor unit

■ VRF High Efficiency HP/HR (208~230V)

Capa [TON]	Model Name	Model	Capa [TON]	Model Name	Model
6	VPC/VRC072S4M-4Y		24 26 28 30	VPC/VRC288S4M-4Y VPC/VRC312S4M-4Y VPC/VRC336S4M-4Y VPC/VRC360S4M-4Y	
8 10 12 14	VPC/VRC096S4M-4Y VPC/VRC120S4M-4Y VPC/VRC144S4M-4Y VPC/VRC168S4M-4Y		32 34	VPC/VRC384S4M-4Y VPC/VRC408S4M-4Y	
16 18 20	VPC/VRC192S4M-4Y VPC/VRC216S4M-4Y VPC/VRC240S4M-4Y		36	VPC/VRC432S4M-4Y	
22	VPC/VRC264S4M-4Y		38	VPC/VRC456S4M-4Y	

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

2-2-2 Outdoor unit (cont.)

■ VRF High Efficiency HP/HR (460V)

Capa [TON]	Model Name	Model	Capa [TON]	Model Name	Model
6	VPC/VRC072S4M-4G		24 26 28 30	VPC/VRC288S4M-4G VPC/VRC312S4M-4G VPC/VRC336S4M-4G VPC/VRC360S4M-4G	
8 10 12 14	VPC/VRC096S4M-4G VPC/VRC120S4M-4G VPC/VRC144S4M-4G VPC/VRC168S4M-4G		32 34	VPC/VRC384S4M-4G VPC/VRC408S4M-4G	
16 18 20	VPC/VRC192S4M-4G VPC/VRC216S4M-4G VPC/VRC240S4M-4G		36	VPC/VRC432S4M-4G	
22	VPC/VRC264S4M-4G		38	VPC/VRC456S4M-4G	

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

2-2-2 Outdoor unit (cont.)

■ VRF High Efficiency HP/HR (575V)

Capa [TON]	Model Name	Model	Capa [TON]	Model Name	Model
6	VPC/VRC072S4M-4J		24 26 28 30	VPC/VRC288S4M-4J VPC/VRC312S4M-4J VPC/VRC336S4M-4J VPC/VRC360S4M-4J	
8 10 12 14	VPC/VRC096S4M-4J VPC/VRC120S4M-4J VPC/VRC144S4M-4J VPC/VRC168S4M-4J		32 34	VPC/VRC384S4M-4J VPC/VRC408S4M-4J	
16 18 20	VPC/VRC192S4M-4J VPC/VRC216S4M-4J VPC/VRC240S4M-4J		36	VPC/VRC432S4M-4J	
22	VPC/VRC264S4M-4J		38	VPC/VRC456S4M-4J	

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

2-2-2 Outdoor unit (cont.)

■ VRF Max Heat HP/HR (208~230V)

<table>
<tr><th>Capa [TON]</th><th>Model Name</th><th>Model</th><th>Capa [TON]</th><th>Model Name</th><th>Model</th></tr>
<tr><td>6
8
10</td><td>VPC/VRC072L4M-4Y
VPC/VRC096L4M-4Y
VPC/VRC120L4M-4Y</td><td>  </td><td rowspan="2">18
20
22
24</td><td rowspan="2">VPC/VRC216L4M-4Y
VPC/VRC240L4M-4Y
VPC/VRC264L4M-4Y
VPC/VRC288L4M-4Y</td><td rowspan="2">  </td></tr>
<tr><td>12
14
16</td><td>VPC/VRC144L4M-4Y
VPC/VRC168L4M-4Y
VPC/VRC192L4M-4Y</td><td>  </td></tr>
</table>

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

2-2-2 Outdoor unit (cont.)

■ VRF Max Heat HP/HR (460V)

Capa [TON]	Model Name	Model	Capa [TON]	Model Name	Model
6 8 10	VPC/VRC072L4M-4G VPC/VRC096L4M-4G VPC/VRC120L4M-4G		18 20 22 24	VPC/VRC216L4M-4G VPC/VRC240L4M-4G VPC/VRC264L4M-4G VPC/VRC288L4M-4G	
12 14 16	VPC/VRC144L4M-4G VPC/VRC168L4M-4G VPC/VRC192L4M-4G				

2-3 Combination and Connection Ratio limitation

	Indoor Units				Installation and use limitations			
Combination	Normal Units	Hydro	OAP	AHU	Max. number of indoor units for connection	Combination ratio	Other limitations	Piping limitations
VRF	O	O			64	50~130%		Level difference ODU-IDU Outdoor unit in highest position: 110m(361') ※ over 50m(164'), install PDM kit Indoor unit in highest position: 110m(361') ※ over 40m(131'), contact local dealer IND-IND: 50m(164') (DVMs Heat pump) IND-IND: 15m(49.2') (HR & Water) ※ Wall mounted with EEV: 15m(49.2') Piping length from the first branch pipe until the indoor unit: 45m(148') ※ If the condition is satisfied: 90m(295') Long piping (equivalent length): 220m(722') Total piping length: 1,000m(3281')
VRF	O	O			64	50~130%		
VRF+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	
VRF+OAP (HP only)	O	O	O		64	50~100%	OAP must be lower than 30% of outdoor unit capacity	
VRF+OAP (HP only)			O		64	50~100%		
VRF+AHU				O	64	50~130%		
VRF+AHU	O	O		O	64	50~130%	AHU must be lower than 50% of outdoor unit capacity	
VRF+ (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	

※ 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 Product Specification

2-4-1 Outdoor Unit

■ **VRF High Efficiency HP (208~230V)**

Type				VRF HP - 208-230V								
												
Model CODE				VPC072S4M-4Y	VPC096S4M-4Y	VPC120S4M-4Y	VPC144S4M-4Y	VPC168S4M-4Y	VPC192S4M-4Y	VPC216S4M-4Y	VPC240S4M-4Y
Power Supply			Φ, #, V, Hz	3,3,208~230,60	3,3,208~230,60	3,3,208~230,60	3,3,208~230,60	3,3,208~230,60	3,3,208~230,60	3,3,208~230,60	3,3,208~230,60
Mode			-	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP
Performance	Ton		TON	6	8	10	12	14	16	18	20
	Capacity (Nominal)	Cooling	Btu/h	72,000	96,000	120,000	144,000	168,000	192,000	216000	240000
		Heating	Btu/h	81,000	108,000	135,000	162,000	189,000	216,000	243000	270000
	Capacity (Rated)	Cooling	Btu/h	69000	92000	114000	138000	160000	184000	206000	228000
		Heating	Btu/h	77000	103000	129000	154000	180000	206000	232000	258000
Maximum number of connectable indoor units			EA	12	16	20	25	29	33	37	41
Total capacity of the connected indoor units		Min.	Btu/h	36000	48000	60000	72000	84000	96000	108000	120000
		Max.	Btu/h	93600	124800	156000	187200	218400	249600	280800	312000
Power	Power Input	Cooling	kW	5.80	7.10	9.20	11.10	13.80	15.20	18.50	20.90
		Heating		5.80	7.60	9.70	11.90	14.40	16.40	19.00	22.50
	Current Input	Cooling	A	15.7	19.4	24.8	30.0	37.2	41.0	49.9	56.4
		Heating		15.7	20.7	26.2	32.1	38.9	44.3	51.3	60.7
	MCA		A	28.0	36.0	40.8	52.6	54.4	60.0	64.0	68.0
	MFA (MOP)		A	35.0	40.0	45.0	60.0	60.0	70.0	80.0	80.0
COP	Cooling		(Btu/h)/W	11.9	13.0	12.4	12.4	11.6	12.1	11.1	10.9
	Heating		(Btu/h)/W	13.3	13.6	13.3	12.9	12.5	12.6	12.2	11.5
Efficiency	IEER (AHRI)		W/W	24.20	25.10	24.60	25.70	24.83	26.00	23.70	23.30
Casing	Material	Body	-	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate
		Base	-	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate
Heat ex-changer	Type		-	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube
	Material	Fin	-	Al	Al	Al	Al	Al	Al	Al	Al
		Tube	-	Cu	Cu	Cu	Cu	Cu	Cu	Cu	Cu
	Fin Treatment		-	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion
Compressor	Type		-	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll
	Output		kW × n	4.39x1	4.39x2	4.39x2	4.39x2	6.45 x 2	6.45 x 2	6.45 x 2	6.45 x 2
	Model Name		-	DS2GT7046EVASG×1	DS2GT7046EVASG×2	DS2GT7046EVASG×2	DS2GT7046EVASG×2	DS4GT5066EVASG×2	DS4GT5066EVASG×2	DS4GT5066EVASG×2	DS4GT5066EVASG×2
	Oil	Type	-	PVE	PVE	PVE	PVE	PVE	PVE	PVE	PVE
		Initial charge	cc x n	900 x 1	900 x 2	900 x 2	900 x 2	1,100 x 2	1,100 x 2	1,100 x 2	1,100 x 2
Fan	Type		-	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller
	Output x n		W	-	-	-	-	-	-	-	-
	Discharge direction		-	Top	Top	Top	Top	Top	Top	Top	Top
	Quantity		-	1	2	2	2	2	2	2	2
	Air Flow Rate		CMM	158	281	281	288	302	364	377	390
			l/s	2633	4683	4683	4800	5033	6067	6283	6500
	External Static Pressure	Max	mmAq	11	11	11	11	11	8	8	8
			Pa	110	110	110	110	110	80	80	80
Fan Motor	Type		-	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor
	Output x n		W x n	630 x 1	620 x 2	620 x 2	620 x 2	620 x 2	630 x 2	630 x 2	630 x 2

■ VRF High Efficiency HP (208~230V) (cont.)

Type				VRF HP - 208-230V							
											
Model CODE				VPC072S4M-4Y	VPC096S4M-4Y	VPC120S4M-4Y	VPC144S4M-4Y	VPC168S4M-4Y	VPC192S4M-4Y	VPC216S4M-4Y	VPC240S4M-4Y
Piping Connections	Liquid Pipe		Φ, mm(inch)	9.52 (3/8)	9.52 (3/8)	12.7 (1/2)	12.7 (1/2)	15.88 (5/8)	15.88 (5/8)	15.88 (5/8)	15.88 (5/8)
			Type	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection
	Gas Pipe		Φ, mm(inch)	19.05 (3/4)	22.22 (7/8)	28.58 (1 1/8)	28.58 (1 1/8)	28.58 (1 1/8)	28.58 (1 1/8)	28.58 (1 1/8)	34.92 (1 3/8)
			Type	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection
	Discharge Gas Pipe		Φ, mm(inch)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)
			Type	-	-	-	-	-	-	-	-
	Heat Insulation		-	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
	Installation Limitation	Max. Length	m	220	220	220	220	220	220	220	220
		Max. Height	m	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)
	Piping length (ODU-IDU)	Max. [Equiv.]	m	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]
	Piping length (1st Branch-IDU)	Max.	m	90	90	90	90	90	90	90	90
	Total piping length (System)	Max.	m	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	Level difference (ODU in highest position)	Max.	m	110	110	110	110	110	110	110	110
	Level difference (IDU in highest position)	Max.	m	110	110	110	110	110	110	110	110
	Level difference (IDU-IDU)	Max.	m	50	50	50	50	50	50	50	50
Field Wiring	Power Source Wire		mm2	-	-	-	-	-	-	-	-
	Transmission Cable	Min.	mm2	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
	Transmission Cable	Remark	-	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2
	Power supply intake			Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU
Refrigerant	Type		-	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
	Factory Charging		kg	6.2	8.0	8.0	10.5	10.5	12.5	15.5	15.5
			lbs	13.7	17.6	17.6	23.1	23.1	27.6	34.2	34.2
External Dimension	Net Weight		kg	174	251	251	270	292	373	382	382
			lbs	384	553	553	595	644	822	842	842
	Shipping Weight		kg	188	268	268	287	309	399	408	408
			lbs	414	591	591	633	681	880	900	900
	Net Dimensions (WxHxD)		mm	930x1695x765	1295x1695x765	1295x1695x765	1295x1695x765	1295x1695x765	1860x1695x765	1860x1695x765	1860x1695x765
			inch	36-5/8 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	73-1/4 x 66-3/4 x 30-1/8	73-1/4 x 66-3/4 x 30-1/8	73-1/4 x 66-3/4 x 30-1/8
	Shipping Dimensions (WxHxD)		mm	998x1887x829	1363x1887x829	1363x1887x829	1363x1887x829	1363x1887x829	1928x1887x829	1928x1887x829	1928x1887x829
			inch	39-5/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	75-7/8 x 74-5/16 x 32-5/8	75-7/8 x 74-5/16 x 32-5/8	75-7/8 x 74-5/16 x 32-5/8
Operating Temp. Range	Cooling		℃	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1
			℉	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1
	Heating		℃	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24
			℉	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0

※1: In order to operate cooling under the installation conditions specified in the installation manual (outdoor temperature below minus 5 degrees Celsius), a separate windproof guard must be installed on the suction side of the heat exchanger and at least 50% of the installed indoor units must be operated. However, if the outdoor unit is installed below the indoor unit, cooling operation is possible only at 5 degrees or higher.) It is a possible condition when satisfied, and if the condition is not satisfied, the temperature range is -5°C to 50°C.

■ VRF High Efficiency HR (208~230V)

Type				VRF HR - 208-230V								
												
Model CODE				VRC072S4M-4Y	VRC096S4M-4Y	VRC120S4M-4Y	VRC144S4M-4Y	VRC168S4M-4Y	VRC192S4M-4Y	VRC216S4M-4Y	VRC240S4M-4Y
Power Supply			Φ, #, V, Hz	3,3,208~230,60	3,3,208~230,60	3,3,208~230,60	3,3,208~230,60	3,3,208~230,60	3,3,208~230,60	3,3,208~230,60	3,3,208~230,60
Mode			-	HEAT RECOVERY	HEAT RECOVERY	HEAT RECOVERY	HEAT RECOVERY	HEAT RECOVERY	HEAT RECOVERY	HEAT RECOVERY	HEAT RECOVERY
Performance	Ton		TON	6	8	10	12	14	16	18	20
	Capacity (Nominal)	Cooling	Btu/h	72,000	96,000	120,000	144,000	168,000	192,000	216000	240000
		Heating	Btu/h	81,000	108,000	135,000	162,000	189,000	216,000	243000	270000
	Capacity (Rated)	Cooling	Btu/h	69000	92000	114000	138000	160000	184000	206000	228000
		Heating	Btu/h	77000	103000	129000	154000	180000	206000	232000	258000
Maximum number of connectable indoor units			EA	12	16	20	25	29	33	37	41
Total capacity of the connected indoor units		Min.	Btu/h	36000	48000	60000	72000	84000	96000	108000	120000
		Max.	Btu/h	93600	124800	156000	187200	218400	249600	280800	312000
Power	Power Input	Cooling	kW	5.80	7.10	9.20	11.10	13.80	15.20	18.50	20.90
		Heating		5.80	7.60	9.70	11.90	14.40	16.40	19.00	22.50
	Current Input	Cooling	A	15.7	19.4	24.8	30.0	37.2	41.0	49.9	56.4
		Heating		15.7	20.7	26.2	32.1	38.9	44.3	51.3	60.7
	MCA		A	28.0	36.0	40.8	52.6	54.4	60.0	64.0	68.0
	MFA (MOP)		A	35.0	40.0	45.0	60.0	60.0	70.0	80.0	80.0
COP	Cooling		(Btu/h)/W	11.9	13.0	12.4	12.4	11.6	12.1	11.1	10.9
	Heating		(Btu/h)/W	13.3	13.6	13.3	12.9	12.5	12.6	12.2	11.5
Efficiency	IEER (AHRI)		W/W	24.20	25.10	24.60	25.70	24.83	26.00	23.70	23.30
Casing	Material	Body	-	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate
		Base	-	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate
Heat ex-changer	Type		-	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube
	Material	Fin	-	Al	Al	Al	Al	Al	Al	Al	Al
		Tube	-	Cu	Cu	Cu	Cu	Cu	Cu	Cu	Cu
	Fin Treatment		-	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion
Compressor	Type		-	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll
	Output		kW × n	4.39x1	4.39x2	4.39x2	4.39x2	6.45 x 2	6.45 x 2	6.45 x 2	6.45 x 2
	Model Name		-	DS2GT7046EVASG×1	DS2GT7046EVASG×2	DS2GT7046EVASG×2	DS2GT7046EVASG×2	DS4GT5066EVASG×2	DS4GT5066EVASG×2	DS4GT5066EVASG×2	DS4GT5066EVASG×2
	Oil	Type	-	PVE	PVE	PVE	PVE	PVE	PVE	PVE	PVE
		Initial charge	cc x n	900 x 1	900 x 2	900 x 2	900 x 2	1,100 x 2	1,100 x 2	1,100 x 2	1,100 x 2
Fan	Type		-	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller
	Output x n		W	-	-	-	-	-	-	-	-
	Discharge direction		-	Top	Top	Top	Top	Top	Top	Top	Top
	Quantity		-	1	2	2	2	2	2	2	2
	Air Flow Rate		CMM	158	281	281	288	302	364	377	390
			l/s	2633	4683	4683	4800	5033	6067	6283	6500
	External Static Pressure	Max	mmAq	11	11	11	11	11	8	8	8
			Pa	110	110	110	110	110	80	80	80
Fan Motor	Type		-	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor
	Output x n		W x n	630 x 1	620 x 2	620 x 2	620 x 2	620 x 2	630 x 2	630 x 2	630 x 2

■ VRF High Efficiency HR (208~230V) (cont.)

Type				VRF HR - 208-230V							
											
Model CODE				VRC072S4M-4Y	VRC096S4M-4Y	VRC120S4M-4Y	VRC144S4M-4Y	VRC168S4M-4Y	VRC192S4M-4Y	VRC216S4M-4Y	VRC240S4M-4Y
Piping Connections	Liquid Pipe		Φ, mm(inch)	9.52 (3/8")	9.52 (3/8")	12.7 (1/2")	12.7 (1/2")	15.88 (5/8")	15.88 (5/8")	15.88 (5/8")	15.88 (5/8")
			Type	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection
	Gas Pipe		Φ, mm(inch)	19.05 (3/4")	22.22 (7/8")	28.58 (1 1/8")	28.58 (1 1/8")	28.58 (1 1/8")	28.58 (1 1/8")	28.58 (1 1/8")	34.92 (1 3/8")
			Type	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection
	Discharge Gas Pipe		Φ, mm(inch)	15.88 (5/8")	19.05 (3/4")	19.05 (3/4")	22.22 (7/8")	22.22 (7/8")	28.58 (1 1/8")	28.58 (1 1/8")	28.58 (1 1/8")
			Type	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection
	Heat Insulation		-	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
	Installation Limitation	Max. Length	m	220	220	220	220	220	220	220	220
		Max. Height	m	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)
	Piping length (ODU-IDU)	Max. [Equiv.]	m	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]
	Piping length (1st Branch-IDU)	Max.	m	90	90	90	90	90	90	90	90
	Total piping length (System)	Max.	m	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	Level difference (ODU in highest position)	Max.	m	110	110	110	110	110	110	110	110
	Level difference (IDU in highest position)	Max.	m	110	110	110	110	110	110	110	110
	Level difference (IDU-IDU)	Max.	m	40	40	40	40	40	40	40	40
Field Wiring	Power Source Wire		mm2	-	-	-	-	-	-	-	-
	Transmission Cable	Min.	mm2	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
	Transmission Cable	Remark	-	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2
	Power supply intake			Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU
Refrigerant	Type		-	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
	Factory Charging		kg	6.2	8.0	8.0	10.5	10.5	12.5	15.5	15.5
			lbs	13.7	17.6	17.6	23.1	23.1	27.6	34.2	34.2
External Dimension	Net Weight		kg	179	257	257	276	299	380	389	389
			lbs	395	567	567	608	659	838	858	858
	Shipping Weight		kg	193	274	274	293	316	406	415	415
			lbs	425	604	604	646	697	896	915	915
	Net Dimensions (WxHxD)		mm	930x1695x765	1295x1695x765	1295x1695x765	1295x1695x765	1295x1695x765	1860x1695x765	1860x1695x765	1860x1695x765
			inch	36-5/8 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	73-1/4 x 66-3/4 x 30-1/8	73-1/4 x 66-3/4 x 30-1/8	73-1/4 x 66-3/4 x 30-1/8
	Shipping Dimensions (WxHxD)		mm	998x1887x829	1363x1887x829	1363x1887x829	1363x1887x829	1363x1887x829	1928x1887x829	1928x1887x829	1928x1887x829
			inch	39-5/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	75-7/8 x 74-5/16 x 32-5/8	75-7/8 x 74-5/16 x 32-5/8	75-7/8 x 74-5/16 x 32-5/8
Operating Temp. Range	Cooling		℃	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1
			℉	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1
	Heating		℃	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24
			℉	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0

※1: In order to operate cooling under the installation conditions specified in the installation manual (outdoor temperature below minus 5 degrees Celsius), a separate windproof guard must be installed on the suction side of the heat exchanger and at least 50% of the installed indoor units must be operated. However, if the outdoor unit is installed below the indoor unit, cooling operation is possible only at 5 degrees or higher.) It is a possible condition when satisfied, and if the condition is not satisfied, the temperature range is -5°C to 50°C.

■ VRF High Efficiency HP (460V)

Type				VRF HP - 460V							
											
Model CODE				VPC072S4M-4G	VPC096S4M-4G	VPC120S4M-4G	VPC144S4M-4G	VPC168S4M-4G	VPC192S4M-4G	VPC216S4M-4G	VPC240S4M-4G
Power Supply			Φ, #, V, Hz	3,3,460,60	3,3,460,60	3,3,460,60	3,3,460,60	3,3,460,60	3,3,460,60	3,3,460,60	3,3,460,60
Mode			-	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP
Performance	Ton		TON	6	8	10	12	14	16	18	20
	Capacity (Nominal)	Cooling	Btu/h	72,000	96,000	120,000	144,000	168,000	192,000	216,000	240000
		Heating	Btu/h	81,000	108,000	135,000	162,000	189,000	216,000	243,000	270000
	Capacity (Rated)	Cooling	Btu/h	69000	92000	114000	138000	160000	184000	206000	228000
		Heating	Btu/h	77000	103000	129000	154000	180000	206000	232000	258000
Maximum number of connectable indoor units			EA	12	16	20	25	29	33	37	41
Total capacity of the connected indoor units		Min.	Btu/h	36000	48000	60000	72000	84000	96000	108000	120000
		Max.	Btu/h	93600	124800	156000	187200	218400	249600	280800	312000
Power	Power Input	Cooling	kW	5.80	7.10	9.20	11.10	13.80	15.20	18.50	20.90
		Heating		5.80	7.60	9.70	11.90	14.40	16.40	19.00	22.50
	Current Input	Cooling	A	7.8	9.7	12.4	15.0	18.6	20.5	25.0	28.2
		Heating		7.8	10.4	13.1	16.1	19.4	22.1	25.6	30.4
	MCA		A	15.0	18.0	19.4	26.2	29.0	34.0	38.0	40.0
	MFA (MOP)		A	20.0	20.0	25.0	35.0	35.0	40.0	50.0	50.0
COP	Cooling		(Btu/h)/W	11.9	13.0	12.4	12.4	11.6	12.1	11.1	10.9
	Heating		(Btu/h)/W	13.3	13.6	13.3	12.9	12.5	12.6	12.2	11.5
Efficiency	IEER (AHRI)		W/W	24.20	25.10	24.60	25.70	24.83	26.00	23.70	23.30
Casing	Material	Body	-	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate
		Base	-	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate
Heat ex-changer	Type		-	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube
	Material	Fin	-	Al	Al	Al	Al	Al	Al	Al	Al
		Tube	-	Cu	Cu	Cu	Cu	Cu	Cu	Cu	Cu
	Fin Treatment		-	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion
Compressor	Type		-	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll
	Output		kW x n	4.39x1	4.39x2	4.39x2	4.39x2	6.67 x 2	6.67 x 2	6.67 x 2	6.67 x 2
	Model Name		-	DS2GR7046FVASG×1	DS2GR7046FVASG×2	DS2GR7046FVASG×2	DS2GR7046FVASG×2	DS4GR7066FVASG×2	DS4GR7066FVASG×2	DS4GR7066FVASG×2	DS4GR7066FVASG×2
	Oil	Type	-	PVE	PVE	PVE	PVE	PVE	PVE	PVE	PVE
		Initial charge	cc x n	900 x 1	900 x 2	900 x 2	900 x 2	1,100 x 2	1,100 x 2	1,100 x 2	1,100 x 2
Fan	Type		-	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller
	Output x n		W	-	-	-	-	-	-	-	-
	Discharge direction		-	Top	Top	Top	Top	Top	Top	Top	Top
	Quantity		-	1	2	2	2	2	2	2	2
	Air Flow Rate		CMM	158	281	281	288	302	364	377	390
			l/s	2633	4683	4683	4800	5033	6067	6283	6500
	External Static Pressure	Max	mmAq	11	11	11	11	11	8	8	8
			Pa	110	110	110	110	110	80	80	80
Fan Motor	Type		-	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor
	Output x n		W x n	630 x 1	620 x 2	620 x 2	620 x 2	620 x 2	630 x 2	630 x 2	630 x 2

■ VRF High Efficiency HP (460V) (cont.)

Type				VRF HP - 460V							
											
Model CODE				VPC072S4M-4G	VPC096S4M-4G	VPC120S4M-4G	VPC144S4M-4G	VPC168S4M-4G	VPC192S4M-4G	VPC216S4M-4G	VPC240S4M-4G
Piping Connections	Liquid Pipe		Φ, mm(inch)	9.52 (3/8")	9.52 (3/8")	12.7 (1/2")	12.7 (1/2")	15.88 (5/8")	15.88 (5/8")	15.88 (5/8")	15.88 (5/8")
			Type	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection
	Gas Pipe		Φ, mm(inch)	19.05 (3/4")	22.22 (7/8")	28.58 (1 1/8")	28.58 (1 1/8")	28.58 (1 1/8")	28.58 (1 1/8")	28.58 (1 1/8")	34.92 (1 3/8")
			Type	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection
	Discharge Gas Pipe		Φ, mm(inch)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)
			Type	-	-	-	-	-	-	-	-
	Heat Insulation		-	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
	Installation Limitation	Max. Length	m	220	220	220	220	220	220	220	220
		Max. Height	m	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)
	Piping length (ODU-IDU)	Max. [Equiv.]	m	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]
	Piping length (1st Branch-IDU)	Max.	m	90	90	90	90	90	90	90	90
	Total piping length (System)	Max.	m	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	Level difference (ODU in highest position)	Max.	m	110	110	110	110	110	110	110	110
	Level difference (IDU in highest position)	Max.	m	110	110	110	110	110	110	110	110
	Level difference (IDU-IDU)	Max.	m	50	50	50	50	50	50	50	50
Field Wiring	Power Source Wire		mm2	-	-	-	-	-	-	-	-
	Transmission Cable	Min.	mm2	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
	Transmission Cable	Remark	-	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2
	Power supply intake			Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU
Refrigerant	Type		-	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
	Factory Charging		kg	6.2	8.0	8.0	10.5	10.5	12.5	15.5	15.5
			lbs	13.7	17.6	17.6	23.1	23.1	27.6	34.2	34.2
External Dimension	Net Weight		kg	182	259	259	278	300	378	387	387
			lbs	401	571	571	613	661	833	853	853
	Shipping Weight		kg	196	276	276	295	317	404	413	413
			lbs	432	608	608	650	699	891	911	911
	Net Dimensions (WxHxD)		mm	930x1695x765	1295x1695x765	1295x1695x765	1295x1695x765	1295x1695x765	1860x1695x765	1860x1695x765	1860x1695x765
			inch	36-5/8 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	73-1/4 x 66-3/4 x 30-1/8	73-1/4 x 66-3/4 x 30-1/8	73-1/4 x 66-3/4 x 30-1/8
	Shipping Dimensions (WxHxD)		mm	998x1887x829	1363x1887x829	1363x1887x829	1363x1887x829	1363x1887x829	1928x1887x829	1928x1887x829	1928x1887x829
			inch	39-5/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	75-7/8 x 74-5/16 x 32-5/8	75-7/8 x 74-5/16 x 32-5/8	75-7/8 x 74-5/16 x 32-5/8
Operating Temp. Range	Cooling		℃	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1
			℉	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1
	Heating		℃	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24
			℉	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0

※1: In order to operate cooling under the installation conditions specified in the installation manual (outdoor temperature below minus 5 degrees Celsius), a separate windproof guard must be installed on the suction side of the heat exchanger and at least 50% of the installed indoor units must be operated. However, if the outdoor unit is installed below the indoor unit, cooling operation is possible only at 5 degrees or higher.) It is a possible condition when satisfied, and if the condition is not satisfied, the temperature range is -5°C to 50°C.

■ VRF High Efficiency HP (575V)

Type				VRF HP~575V							
											
Model CODE				VPC072S4M-4J	VPC096S4M-4J	VPC120S4M-4J	VPC144S4M-4J	VPC168S4M-4J	VPC192S4M-4J	VPC216S4M-4J	VPC240S4M-4J
Power Supply			Φ, #, V, Hz	3,3,575,60	3,3,575,60	3,3,575,60	3,3,575,60	3,3,575,60	3,3,575,60	3,3,575,60	3,3,575,60
Mode			-	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT PUMP
Performance	Ton		TON	6	8	10	12	14	16	18	20
	Capacity (Nominal)	Cooling	Btu/h	72,000	96,000	120,000	144,000	168,000	192,000	216,000	240,000
		Heating	Btu/h	81,000	108,000	135,000	162,000	189,000	216,000	243,000	270,000
	Capacity (Rated)	Cooling	Btu/h	69,000	92,000	114,000	138,000	160,000	184,000	206,000	228,000
		Heating	Btu/h	77,000	103,000	129,000	154,000	180,000	206,000	232,000	258,000
Maximum number of connectable indoor units			EA	12	16	20	25	29	33	37	41
Total capacity of the connected indoor units		Min.	Btu/h	36000	48000	60000	72000	84000	96000	108000	120000
		Max.	Btu/h	93600	124800	156000	187200	218400	249600	280800	312000
Power	Power Input	Cooling	kW	5.80	7.10	9.20	11.10	13.80	15.20	18.50	20.90
		Heating		5.80	7.60	9.70	11.90	14.40	16.40	19.00	22.50
	Current Input	Cooling	A	6.90	8.50	10.90	13.10	16.20	17.70	21.20	23.70
		Heating		6.80	9.00	11.40	13.90	16.70	18.90	21.70	25.40
	Minimum Ssc		MVA	-	-	-	-	-	-	-	-
	MCA		A	13.40	16.10	17.40	22.20	24.80	30.50	34.00	35.80
	MFA (MOP)		A	20.00	20.00	20.00	25.00	30.00	40.00	45.00	45.00
COP	Cooling		(Btu/h)/W	11.90	12.96	12.39	12.43	11.59	12.11	11.14	10.91
	Heating		(Btu/h)/W	13.28	13.55	13.30	12.94	12.50	12.56	12.21	11.47
Efficiency	IEER		(Btu/h)/W	23.00	24.10	22.60	24.40	23.30	24.10	22.30	22.00
Casing	Material	Body	-	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate
		Base	-	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate
Heat exchanger	Type		-	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube
	Material	Fin	-	Al	Al	Al	Al	Al	Al	Al	Al
		Tube	-	Cu	Cu	Cu	Cu	Cu	Cu	Cu	Cu
	Fin Treatment		-	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion
Compressor	Type		-	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll
	Output		kW × n	4.39 x 1	4.39 x 2	4.39 x 2	4.39 x 2	6.67 x 2	6.67 x 2	6.67 x 2	6.67 x 2
	Model Name		-	DS2GR7046FVBSG×1	DS2GR7046FVBSG×2	DS2GR7046FVBSG×2	DS2GR7046FVBSG×2	DS4GR7066FVASG×2	DS4GR7066FVASG×2	DS4GR7066FVASG×2	DS4GR7066FVASG×2
	Oil	Type	-	PVE	PVE	PVE	PVE	PVE	PVE	PVE	PVE
		Initial charge	cc x n	900 x 1	900 x 2	900 x 2	900 x 2	1,100 x 2	1,100 x 2	1,100 x 2	1,100 x 2
Fan	Type		-	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller
	Output x n		W	-	-	-	-	-	-	-	-
	Discharge direction		-	Top	Top	Top	Top	Top	Top	Top	Top
	Quantity		-	1	2	2	2	2	2	2	2
	Air Flow Rate		CMM	158	281	281	288	302	364	377	390
			l/s	2633	4683	4683	4800	5033	6067	6283	6500
	External Static Pressure	Max.	mmAq	11	11	11	11	11	8	8	8
			Pa	110	110	110	110	110	80	80	80
Fan Motor	Type		-	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor
	Output x n		W x n	630 x 1	630 x 2	630 x 2	630 x 2	630 x 2	630 x 2	630 x 2	630 x 2

■ VRF High Efficiency HP (575V) (cont.)

Type				VRF HP~575V								
												
Model CODE				VPC072S4M-4J	VPC096S4M-4J	VPC120S4M-4J	VPC144S4M-4J	VPC168S4M-4J	VPC192S4M-4J	VPC216S4M-4J	VPC240S4M-4J	
Piping Connections	Liquid Pipe		Φ, mm(inch)	9.52 (3/8")	9.52 (3/8")	12.7 (1/2")	12.7 (1/2")	15.88 (5/8")	15.88 (5/8")	15.88 (5/8")	15.88 (5/8")	
			Type	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	
	Gas Pipe		Φ, mm(inch)	19.05 (3/4")	22.22 (7/8")	28.58 (11/8")	28.58 (11/8")	28.58 (11/8")	28.58 (11/8")	28.58 (11/8")	34.92 (1 3/8")	
			Type	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	
	Discharge Gas Pipe		Φ, mm(inch)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	
			Type	-	-	-	-	-	-	-	-	
	Heat Insulation		-	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	
	Installation Limitation	Max. Length	m	220	220	220	220	220	220	220	220	
		Max. Height	m	50 (110)/40(110)	50 (110)/40(110)	50 (110)/40(110)	50 (110)/40(110)	50 (110)/40(110)	50 (110)/40(110)	50 (110)/40(110)	50 (110)/40(110)	
	Piping length (ODU-IDU)	Max. [Equiv.]	m	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]	
	Piping length (1st Branch-IDU)	Max.	m	90	90	90	90	90	90	90	90	
	Total piping length (System)	Max.	m	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	
	Level difference (ODU in highest position)	Max.	m	110	110	110	110	110	110	110	110	
	Level difference (IDU in highest position)	Max.	m	110	110	110	110	110	110	110	110	
	Level difference (IDU-IDU)	Max.	m	50	50	50	50	50	50	50	50	
Field Wiring	Power Source Wire		mm2	-	-	-	-	-	-	-	-	
	Transmission Cable	Min.	mm2	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	
	Transmission Cable	Remark	-	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2	
	Power supply intake			Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	
Refrigerant	Type		-	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	
	Factory Charging		kg	6.2	8.0	8.0	10.5	10.5	12.5	15.5	15.5	
			lbs	13.7	17.6	17.6	23.1	23.1	27.6	34.2	34.2	
External Dimension	Net Weight		kg	190	274.0	274.0	293.0	315	386	395	395	
			lbs	419.0	604.0	604.0	646.0	694	851	871	871	
	Shipping Weight		kg	204	291.0	291.0	310.0	332	412	421	421	
			lbs	450	642.0	642.0	683.0	732	908	928	928	
	Net Dimensions (WxHxD)		mm	930x1695x765	1295x1695x765	1295x1695x765	1295x1695x765	1295x1695x765	1860x1695x765	1860x1695x765	1860x1695x765	
			inch	36-5/8 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	73-1/4 x 66-3/4 x 30-1/8	73-1/4 x 66-3/4 x 30-1/8	73-1/4 x 66-3/4 x 30-1/8	
	Shipping Dimensions (WxHxD)		mm	998x1887x829	1363x1887x829	1363x1887x829	1363x1887x829	1363x1887x829	1928x1887x829	1928x1887x829	1928x1887x829	
			inch	39-5/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	75-7/8 x 74-5/16 x 32-5/8	75-7/8 x 74-5/16 x 32-5/8	75-7/8 x 74-5/16 x 32-5/8	
Operating Temp. Range	Cooling		℃	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	
			℉	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	
	Heating		℃	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	
			℉	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	

※1: In order to operate cooling under the installation conditions specified in the installation manual (outdoor temperature below minus 5 degrees Celsius), a separate windproof guard must be installed on the suction side of the heat exchanger and at least 50% of the installed indoor units must be operated. However, if the outdoor unit is installed below the indoor unit, cooling operation is possible only at 5 degrees or higher.) It is a possible condition when satisfied, and if the condition is not satisfied, the temperature range is -5°C to 50°C.

■ VRF High Efficiency HR (575V)

Type				VRF HR ~575V							
											
Model CODE				VRC072S4M-4J	VRC096S4M-4J	VRC120S4M-4J	VRC144S4M-4J	VRC168S4M-4J	VRC192S4M-4J	VRC216S4M-4J	VRC240S4M-4J
Power Supply			Φ, #, V, Hz	3,3,575,60	3,3,575,60	3,3,575,60	3,3,575,60	3,3,575,60	3,3,575,60	3,3,575,60	3,3,575,60
Mode			-	HEAT PUMP	HEAT PUMP	HEAT RECOVERY	HEAT RECOVERY	HEAT RECOVERY	HEAT RECOVERY	HEAT RECOVERY	HEAT RECOVERY
Performance	Ton		TON	6	8	10	12	14	16	18	20
	Capacity (Nominal)	Cooling	Btu/h	72,000	96,000	120,000	144,000	168,000	192,000	216,000	240,000
		Heating	Btu/h	81,000	108,000	135,000	162,000	189,000	216,000	243,000	270,000
	Capacity (Rated)	Cooling	Btu/h	69,000	92,000	114,000	138,000	160,000	184,000	206,000	228,000
		Heating	Btu/h	77,000	103,000	129,000	154,000	180,000	206,000	232,000	258,000
Maximum number of connectable indoor units			EA	12	16	20	25	29	33	37	41
Total capacity of the connected indoor units		Min.	Btu/h	36000	48000	60000	72000	84000	96000	108000	120000
		Max.	Btu/h	93600	124800	156000	187200	218400	249600	280800	312000
Power	Power Input	Cooling	kW	5.80	7.10	9.20	11.10	13.80	15.20	18.50	20.90
		Heating		5.80	7.60	9.70	11.90	14.40	16.40	19.00	22.50
	Current Input	Cooling	A	6.90	8.50	10.90	13.10	16.20	17.70	21.20	23.70
		Heating		6.80	9.00	11.40	13.90	16.70	18.90	21.70	25.40
	Minimum Ssc		MVA	-	-	-	-	-	-	-	-
	MCA		A	13.40	16.10	17.40	22.20	24.80	30.50	34.00	35.80
	MFA (MOP)		A	20.00	20.00	20.00	25.00	30.00	40.00	45.00	45.00
COP	Cooling		(Btu/h)/W	11.90	12.96	12.39	12.43	11.59	12.11	11.14	10.91
	Heating		(Btu/h)/W	13.28	13.55	13.30	12.94	12.50	12.56	12.21	11.47
Efficiency	IEER		(Btu/h)/W	23.00	24.10	22.60	24.40	23.30	24.10	22.30	22.00
Casing	Material	Body	-	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate
		Base	-	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate
Heat exchanger	Type		-	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube
	Material	Fin	-	Al	Al	Al	Al	Al	Al	Al	Al
		Tube	-	Cu	Cu	Cu	Cu	Cu	Cu	Cu	Cu
	Fin Treatment		-	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion
Compressor	Type		-	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll
	Output		kW × n	4.39 x 1	4.39 x 2	4.39 x 2	4.39 x 2	6.67 x 2	6.67 x 2	6.67 x 2	6.67 x 2
	Model Name		-	DS2GR7046FVBSG×1	DS2GR7046FVBSG×2	DS2GR7046FVBSG×2	DS2GR7046FVBSG×2	DS4GR7066FVASG×2	DS4GR7066FVASG×2	DS4GR7066FVASG×2	DS4GR7066FVASG×2
	Oil	Type	-	PVE	PVE	PVE	PVE	PVE	PVE	PVE	PVE
		Initial charge	cc x n	900 x 1	900 x 2	900 x 2	900 x 2	1,100 x 2	1,100 x 2	1,100 x 2	1,100 x 2
Fan	Type		-	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller
	Output x n		W	-	-	-	-	-	-	-	-
	Discharge direction		-	Top	Top	Top	Top	Top	Top	Top	Top
	Quantity		-	1	2	2	2	2	2	2	2
	Air Flow Rate		CMM	158	281	281	288	302	364	377	390
			l/s	2633	4683	4683	4800	5033	6067	6283	6500
	External Static Pressure	Max.	mmAq	11	11	11	11	11	8	8	8
			Pa	110	110	110	110	110	80	80	80
Fan Motor	Type		-	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor
	Output x n		W x n	630 x 1	630 x 2	630 x 2	630 x 2	630 x 2	630 x 2	630 x 2	630 x 2

■ VRF High Efficiency HR (575V) (cont.)

Type				VRF HR ~575V							
											
Model CODE				VRC072S4M-4J	VRC096S4M-4J	VRC120S4M-4J	VRC144S4M-4J	VRC168S4M-4J	VRC192S4M-4J	VRC216S4M-4J	VRC240S4M-4J
Piping Connections	Liquid Pipe		Φ, mm(inch)	9.52 (3/8")	9.52 (3/8")	12.7 (1/2")	12.7 (1/2")	15.88 (5/8")	15.88 (5/8")	15.88 (5/8")	15.88 (5/8")
			Type	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection
	Gas Pipe		Φ, mm(inch)	19.05 (3/4")	22.22 (7/8")	28.58 (11/8")	28.58 (11/8")	28.58 (11/8")	28.58 (11/8")	28.58 (11/8")	34.92 (1 3/8")
			Type	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection
	Discharge Gas Pipe		Φ, mm(inch)	15.88 (5/8")	19.05 (3/4")	19.05 (3/4")	22.22 (7/8")	22.22 (7/8")	28.58 (11/8")	28.58 (11/8")	28.58 (11/8")
			Type	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection
	Heat Insulation		-	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
	Installation Limitation	Max. Length	m	220	220	220	220	220	220	220	220
		Max. Height	m	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)
	Piping length (ODU-IDU)	Max. [Equiv.]	m	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]
	Piping length (1st Branch-IDU)	Max.	m	90	90	90	90	90	90	90	90
	Total piping length (System)	Max.	m	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	Level difference (ODU in highest position)	Max.	m	110	110	110	110	110	110	110	110
	Level difference (IDU in highest position)	Max.	m	110	110	110	110	110	110	110	110
	Level difference (IDU-IDU)	Max.	m	40	40	40	40	40	40	40	40
Field Wiring	Power Source Wire		mm2	-	-	-	-	-	-	-	-
	Transmission Cable	Min.	mm2	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
	Transmission Cable	Remark	-	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2
	Power supply intake			Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU
Refrigerant	Type		-	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
	Factory Charging		kg	6.2	8.0	8.0	10.5	10.5	12.5	15.5	15.5
			lbs	13.7	17.6	17.6	23.1	23.1	27.6	34.2	34.2
External Dimension	Net Weight		kg	194	280.0	280.0	299.0	322	393	402	402
			lbs	428.0	617.0	617.0	659.0	710	866	886	886
	Shipping Weight		kg	208	297.0	297.0	316.0	339	419	428	428
			lbs	459	655.0	655.0	697.0	747	924	944	944
	Net Dimensions (WxHxD)		mm	930x1695x765	1295x1695x765	1295x1695x765	1295x1695x765	1295x1695x765	1860x1695x765	1860x1695x765	1860x1695x765
			inch	36-5/8 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	73-1/4 x 66-3/4 x 30-1/8	73-1/4 x 66-3/4 x 30-1/8	73-1/4 x 66-3/4 x 30-1/8
	Shipping Dimensions (WxHxD)		mm	998x1887x829	1363x1887x829	1363x1887x829	1363x1887x829	1363x1887x829	1928x1887x829	1928x1887x829	1928x1887x829
			inch	39-5/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	75-7/8 x 74-5/16 x 32-5/8	75-7/8 x 74-5/16 x 32-5/8	75-7/8 x 74-5/16 x 32-5/8
Operating Temp. Range	Cooling		℃	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1
			℉	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1
	Heating		℃	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24
			℉	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0

※1: In order to operate cooling under the installation conditions specified in the installation manual (outdoor temperature below minus 5 degrees Celsius), a separate windproof guard must be installed on the suction side of the heat exchanger and at least 50% of the installed indoor units must be operated. However, if the outdoor unit is installed below the indoor unit, cooling operation is possible only at 5 degrees or higher.) It is a possible condition when satisfied, and if the condition is not satisfied, the temperature range is -5°C to 50°C.

■ VRF High Efficiency HR (460V)

Type				VRF HR - 460V							
											
Model CODE				VRC072S4M-4G	VRC096S4M-4G	VRC120S4M-4G	VRC144S4M-4G	VRC168S4M-4G	VRC192S4M-4G	VRC216S4M-4G	VRC240S4M-4G
Power Supply			Φ, #, V, Hz	3,3,460,60	3,3,460,60	3,3,460,60	3,3,460,60	3,3,460,60	3,3,460,60	3,3,460,60	3,3,460,60
Mode			-	HEAT RECOVERY	HEAT RECOVERY	HEAT RECOVERY	HEAT RECOVERY	HEAT RECOVERY	HEAT RECOVERY	HEAT RECOVERY	HEAT RECOVERY
Performance	Ton		TON	6	8	10	12	14	16	18	20
	Capacity (Nominal)	Cooling	Btu/h	72,000	96,000	120,000	144,000	168,000	192,000	216,000	240000
		Heating	Btu/h	81,000	108,000	135,000	162,000	189,000	216,000	243,000	270000
	Capacity (Rated)	Cooling	Btu/h	69000	92000	114000	138000	160000	184000	206000	228000
		Heating	Btu/h	77000	103000	129000	154000	180000	206000	232000	258000
Maximum number of connectable indoor units			EA	12	16	20	25	29	33	37	41
Total capacity of the connected indoor units		Min.	Btu/h	36000	48000	60000	72000	84000	96000	108000	120000
		Max.	Btu/h	93600	124800	156000	187200	218400	249600	280800	312000
Power	Power Input	Cooling	kW	5.80	7.10	9.20	11.10	13.80	15.20	18.50	20.90
		Heating		5.80	7.60	9.70	11.90	14.40	16.40	19.00	22.50
	Current Input	Cooling	A	7.8	9.7	12.4	15.0	18.6	20.5	25.0	28.2
		Heating		7.8	10.4	13.1	16.1	19.4	22.1	25.6	30.4
	MCA		A	15.0	18.0	19.4	26.2	29.0	34.0	38.0	40.0
	MFA (MOP)		A	20.0	20.0	25.0	35.0	35.0	40.0	50.0	50.0
COP	Cooling		(Btu/h)/W	11.9	13.0	12.4	12.4	11.6	12.1	11.1	10.9
	Heating		(Btu/h)/W	13.3	13.6	13.3	12.9	12.5	12.6	12.2	11.5
Efficiency	IEER (AHRI)		W/W	24.20	25.10	24.60	25.70	24.83	26.00	23.70	23.30
Casing	Material	Body	-	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate
		Base	-	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate
Heat ex-changer	Type		-	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube
	Material	Fin	-	Al	Al	Al	Al	Al	Al	Al	Al
		Tube	-	Cu	Cu	Cu	Cu	Cu	Cu	Cu	Cu
	Fin Treatment		-	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion
Compressor	Type		-	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll	Inverter Scroll
	Output		kW x n	4.39x1	4.39x2	4.39x2	4.39x2	6.67 x 2	6.67 x 2	6.67 x 2	6.67 x 2
	Model Name		-	DS2GR7046FVASG×1	DS2GR7046FVASG×2	DS2GR7046FVASG×2	DS2GR7046FVASG×2	DS4GR7066FVASG×2	DS4GR7066FVASG×2	DS4GR7066FVASG×2	DS4GR7066FVASG×2
	Oil	Type	-	PVE	PVE	PVE	PVE	PVE	PVE	PVE	PVE
		Initial charge	cc x n	900 x 1	900 x 2	900 x 2	900 x 2	1,100 x 2	1,100 x 2	1,100 x 2	1,100 x 2
Fan	Type		-	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller
	Output x n		W	-	-	-	-	-	-	-	-
	Discharge direction		-	Top	Top	Top	Top	Top	Top	Top	Top
	Quantity		-	1	2	2	2	2	2	2	2
	Air Flow Rate		CMM	158	281	281	288	302	364	377	390
			l/s	2633	4683	4683	4800	5033	6067	6283	6500
	External Static Pressure	Max	mmAq	11	11	11	11	11	8	8	8
			Pa	110	110	110	110	110	80	80	80
Fan Motor	Type		-	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor
	Output x n		W x n	630 x 1	620 x 2	620 x 2	620 x 2	620 x 2	630 x 2	630 x 2	630 x 2

■ VRF High Efficiency HR (460V) (cont.)

Type				VRF HR - 460V							
											
Model CODE				VRC072S4M-4G	VRC096S4M-4G	VRC120S4M-4G	VRC144S4M-4G	VRC168S4M-4G	VRC192S4M-4G	VRC216S4M-4G	VRC240S4M-4G
Piping Connections	Liquid Pipe		Φ, mm(inch)	9.52 (3/8")	9.52 (3/8")	12.7 (1/2")	12.7 (1/2")	15.88 (5/8")	15.88 (5/8")	15.88 (5/8")	15.88 (5/8")
			Type	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection
	Gas Pipe		Φ, mm(inch)	19.05 (3/4")	22.22 (7/8")	28.58 (1 1/8")	28.58 (1 1/8")	28.58 (1 1/8")	28.58 (1 1/8")	28.58 (1 1/8")	34.92 (1 3/8")
			Type	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection
	Discharge Gas Pipe		Φ, mm(inch)	15.88 (5/8")	19.05 (3/4")	19.05 (3/4")	22.22 (7/8")	22.22 (7/8")	28.58 (1 1/8")	28.58 (1 1/8")	28.58 (1 1/8")
			Type	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection
	Heat Insulation		-	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
	Installation Limitation	Max. Length	m	220	220	220	220	220	220	220	220
		Max. Height	m	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)
	Piping length (ODU-IDU)	Max. [Equiv.]	m	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]
	Piping length (1st Branch-IDU)	Max.	m	90	90	90	90	90	90	90	90
	Total piping length (System)	Max.	m	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	Level difference (ODU in highest position)	Max.	m	110	110	110	110	110	110	110	110
	Level difference (IDU in highest position)	Max.	m	110	110	110	110	110	110	110	110
	Level difference (IDU-IDU)	Max.	m	40	40	40	40	40	40	40	40
Field Wiring	Power Source Wire		mm2	-	-	-	-	-	-	-	-
	Transmission Cable	Min.	mm2	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
	Transmission Cable	Remark	-	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2
	Power supply intake			Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU
Refrigerant	Type		-	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
	Factory Charging		kg	6.2	8.0	8.0	10.5	10.5	12.5	15.5	15.5
			lbs	13.7	17.6	17.6	23.1	23.1	27.6	34.2	34.2
External Dimension	Net Weight		kg	186	265	265	284	307	385	394	394
			lbs	410	584	584	626	677	849	869	869
	Shipping Weight		kg	200	282	282	301	324	411	420	420
			lbs	441	622	622	664	714	907	926	926
	Net Dimensions (WxHxD)		mm	930x1695x765	1295x1695x765	1295x1695x765	1295x1695x765	1295x1695x765	1860x1695x765	1860x1695x765	1860x1695x765
			inch	36-5/8 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	73-1/4 x 66-3/4 x 30-1/8	73-1/4 x 66-3/4 x 30-1/8	73-1/4 x 66-3/4 x 30-1/8
	Shipping Dimensions (WxHxD)		mm	998x1887x829	1363x1887x829	1363x1887x829	1363x1887x829	1363x1887x829	1928x1887x829	1928x1887x829	1928x1887x829
			inch	39-5/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	75-7/8 x 74-5/16 x 32-5/8	75-7/8 x 74-5/16 x 32-5/8	75-7/8 x 74-5/16 x 32-5/8
Operating Temp. Range	Cooling		℃	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1
			℉	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1
	Heating		℃	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24
			℉	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0

※1: In order to operate cooling under the installation conditions specified in the installation manual (outdoor temperature below minus 5 degrees Celsius), a separate windproof guard must be installed on the suction side of the heat exchanger and at least 50% of the installed indoor units must be operated. However, if the outdoor unit is installed below the indoor unit, cooling operation is possible only at 5 degrees or higher.) It is a possible condition when satisfied, and if the condition is not satisfied, the temperature range is -5°C to 50°C.

■ VRF Max Heat HP/HR (208~230V)

Type				VRF HP/HR - 208~230V					
									
Model Code				VPC072L4M-4Y	VPC096L4M-4Y	VPC120L4M-4Y	VRC072L4M-4Y	VRC096L4M-4Y	VRC120L4M-4Y
Power Supply			Φ, #, V, Hz	3,3,208~230,60	3,3,208~230,60	3,3,208~230,60	3,3,208~230,60	3,3,208~230,60	3,3,208~230,60
Mode			-	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT RECOVERY	HEAT RECOVERY	HEAT RECOVERY
Performance	Ton		TON	6	8	10	6	8	10
	Capacity (Nominal)	Cooling	Btu/h	72,000	96,000	120,000	72,000	96,000	120,000
		Heating	Btu/h	81,000	108,000	135,000	81,000	108,000	135,000
	Capacity (Rated)	Cooling	Btu/h	69000	92000	114000	69000	92000	114000
		Heating	Btu/h	77000	103000	129000	77000	103000	129000
Maximum number of connectable indoor units			EA	12	16	20	12	16	20
Total capacity of the connected indoor units		Min.	Btu/h	36000	48000	60000	36000	48000	60000
		Max.	Btu/h	93600	124800	156000	93600	124800	156000
Power	Power Input	Cooling	kW	5.40	7.20	9.00	5.40	7.20	9.00
		Heating		5.40	7.70	9.40	5.40	7.70	9.40
	Current Input	Cooling	A	14.7	19.6	24.6	14.7	19.6	24.6
		Heating		14.7	21.0	25.6	14.7	21.0	25.6
	MCA		A	50.0	62.0	76.0	50.0	62.0	76.0
	MFA (MOP)		A	60.0	70.0	90.0	60.0	70.0	90.0
COP	Cooling		(Btu/h)/W	12.8	12.8	12.7	12.8	12.8	12.7
	Heating		(Btu/h)/W	14.3	13.4	13.7	14.3	13.4	13.7
Efficiency	IEER (AHRI)		W/W	24.30	25.61	25.70	24.30	25.61	25.70
Casing	Material	Body	-	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate
		Base	-	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate
Heat exchanger	Type		-	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube
	Material	Fin	-	Al	Al	Al	Al	Al	Al
		Tube	-	Cu	Cu	Cu	Cu	Cu	Cu
	Fin Treatment		-	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion
Compressor	Type		-	자작 Scroll Inverter	자작 Scroll Inverter	자작 Scroll Inverter	자작 Scroll Inverter	자작 Scroll Inverter	자작 Scroll Inverter
	Output		kW × n	4.39x2	6.45 x 2	6.45 x 2	4.6 x 2	6.45 x 2	6.45 x 2
	Model Name		-	DS2GT7046EVASG×2	DS4GT5066EVASG×2	DS4GT5066EVASG×2	DS2GT7046EVASG×2	DS4GT5066EVASG×2	DS4GT5066EVASG×2
	Oil	Type	-	PVE	PVE	PVE	PVE	PVE	PVE
		Initial charge	cc x n	900 x 2	1,100 x 2	1,100 x 2	900 x 2	1,100 x 2	1,100 x 2
Fan	Type		-	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller
	Output x n		W	-	-	-	-	-	-
	Discharge direction		-	Top	Top	Top	Top	Top	Top
	Quantity		-	2	2	2	2	2	2
	Air Flow Rate		CMM	281	271	288	281	271	288
			l/s	4683	4517	4800	4683	4517	4800
	External Static Pressure	Max.	mmAq	11	11	11	11	11	11
			Pa	110	110	110	110	110	110
Fan Motor	Type		-	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor
	Output x n		W x n	620 x 2	620 x 2	620 x 2	620 x 2	620 x 2	620 x 2

■ **VRF Max Heat HP/HR (208~230V) (cont.)**

Type				VRF HP/HR - 208~230V					
									
Model Code				VPC072L4M-4Y	VPC096L4M-4Y	VPC120L4M-4Y	VRC072L4M-4Y	VRC096L4M-4Y	VRC120L4M-4Y
Piping Connections	Liquid Pipe		Φ, mm	9.52	9.52	12.7	9.52	9.52	12.7
			Φ, inch	3/8"	3/8"	1/2"	3/8"	3/8"	1/2"
			Type	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection
			Φ, mm(inch)	9.52 (3/8")	9.52 (3/8")	12.7 (1/2")	9.52 (3/8")	9.52 (3/8")	12.7 (1/2")
	Gas Pipe		Φ, mm	19.05	22.22	28.58	19.05	22.22	28.58
			Φ, inch	3/4"	7/8"	11/8"	3/4"	7/8"	11/8"
			Type	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection
			Φ, mm(inch)	19.05 (3/4")	22.22 (7/8")	28.58 (11/8")	19.05 (3/4")	22.22 (7/8")	28.58 (11/8")
	Discharge Gas Pipe		Φ, mm	-	-	-	15.88	19.05	19.05
			Φ, inch	-	-	-	5/8"	3/4"	3/4"
			Type	-	-	-	Braze Connection	Braze Connection	Braze Connection
			Φ, mm(inch)	- (-)	- (-)	- (-)	15.88 (5/8")	19.05 (3/4")	19.05 (3/4")
	Heat Insulation		-	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
	Installation Limitation	Max. Length	m	220	220	220	220	220	220
		Max. Height	m	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)
	Piping length (ODU-IDU)	Max. [Equiv.]	m	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]
	Piping length (1st Branch-IDU)	Max.	m	90	90	90	90	90	90
	Total piping length (System)	Max.	m	1,000	1,000	1,000	1,000	1,000	1,000
	Level difference (ODU in highest position)	Max.	m	110	110	110	110	110	110
	Level difference (IDU in highest position)	Max.	m	110	110	110	110	110	110
	Level difference (IDU-IDU)	Max.	m	50	50	50	40	40	40
Field Wiring	Power Source Wire		mm2	-	-	-	-	-	-
	Transmission Cable	Min.	mm2	0.75	0.75	0.75	0.75	0.75	0.75
	Transmission Cable	Remark	-	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2
	Power supply intake			Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU
Refrigerant	Type		-	R410A	R410A	R410A	R410A	R410A	R410A
	Factory Charging		kg	8.0	10.5	10.5	8.0	10.5	10.5
			lbs	17.6	23.1	23.1	17.6	23.1	23.1
Sound	Sound Pressure		dB(A)	57.0	60.0	60.0	57.0	60.0	60.0
	Sound Power			79.0	81.0	83.0	79.0	81.0	83.0
External Dimension	Net Weight		kg	251	292	292	257	299	299
			lbs	553	644	644	567	659	659
	Shipping Weight		kg	268	309	309	274	316	316
			lbs	591	681	681	604	697	697
	Net Dimensions (WxHxD)		mm	1295 x 1695 x 765	1295 x 1695 x 765	1295 x 1695 x 765	1295 x 1695 x 765	1295 x 1695 x 765	1295 x 1695 x 765
			inch	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8
	Shipping Dimensions (WxHxD)		mm	1363 x 1887 x 829	1363 x 1887 x 829	1363 x 1887 x 829	1363 x 1887 x 829	1363 x 1887 x 829	1363 x 1887 x 829
			inch	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8
Operating Temp. Range	Cooling		℃	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1
			℉	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1
	Heating		℃	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24
			℉	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0

■ **VRF Max Heat HP/HR (460V)**

Type				VRF HP/HR - 460V					
									
Model CODE				VPC072L4M-4G	VPC096L4M-4G	VPC120L4M-4G	VRC072L4M-4G	VRC096L4M-4G	VRC120L4M-4G
Power Supply			Φ, #, V, Hz	3,3,460,60	3,3,460,60	3,3,460,60	3,3,460,60	3,3,460,60	3,3,460,60
Mode			-	HEAT PUMP	HEAT PUMP	HEAT PUMP	HEAT RECOVERY	HEAT RECOVERY	HEAT RECOVERY
Performance	Ton		TON	6	8	10	6	8	10
	Capacity (Nominal)	Cooling	Btu/h	72,000	96,000	120,000	72,000	96,000	120,000
		Heating	Btu/h	81,000	108,000	135,000	81,000	108,000	135,000
	Capacity (Rated)	Cooling	Btu/h	69000	92000	114000	69000	92000	114000
		Heating	Btu/h	77000	103000	129000	77000	103000	129000
Maximum number of connectable indoor units			EA	12	16	20	12	16	20
Total capacity of the connected indoor units		Min.	Btu/h	36000	48000	60000	36000	48000	60000
		Max.	Btu/h	93600	124800	156000	93600	124800	156000
Power	Power Input	Cooling	kW	5.40	7.20	9.00	5.40	7.20	9.00
		Heating		5.40	7.70	9.40	5.40	7.70	9.40
	Current Input	Cooling	A	7.4	9.8	12.3	7.4	9.8	12.3
		Heating		7.4	10.5	12.8	7.4	10.5	12.8
	MCA		A	25.0	31.0	38.0	25.0	31.0	38.0
	MFA (MOP)		A	30.0	35.0	45.0	30.0	35.0	45.0
COP	Cooling		(Btu/h)/W	12.8	12.8	12.7	12.8	12.8	12.7
	Heating		(Btu/h)/W	14.3	13.4	13.7	14.3	13.4	13.7
Efficiency	IEER (AHRI)		W/W	24.30	25.61	25.70	24.30	25.61	25.70
Casing	Material	Body	-	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate
		Base	-	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate	GI Steel Plate
Heat exchanger	Type		-	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube	Fin & Tube
	Material	Fin	-	Al	Al	Al	Al	Al	Al
		Tube	-	Cu	Cu	Cu	Cu	Cu	Cu
	Fin Treatment		-	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion	Anti-corrosion
Compressor	Type		-	자작 Scroll Inverter	자작 Scroll Inverter	자작 Scroll Inverter	자작 Scroll Inverter	자작 Scroll Inverter	자작 Scroll Inverter
	Output		kW × n	4.39x2	6.67 x 2	6.67 x 2	4.6 x 2	6.67 x 2	6.67 x 2
	Model Name		-	DS2GR7046FVASG×2	DS4GR7066FVASG×2	DS4GR7066FVASG×2	DS2GR7046FVASG×2	DS4GR7066FVASG×2	DS4GR7066FVASG×2
	Oil	Type	-	PVE	PVE	PVE	PVE	PVE	PVE
		Initial charge	cc x n	900 x 2	1,100 x 2	1,100 x 2	900 x 2	1,100 x 2	1,100 x 2
Fan	Type		-	Propeller	Propeller	Propeller	Propeller	Propeller	Propeller
	Output x n		W	-	-	-	-	-	-
	Discharge direction		-	Top	Top	Top	Top	Top	Top
	Quantity		-	2	2	2	2	2	2
	Air Flow Rate		CMM	281	271	288	281	271	288
			l/s	4683	4517	4800	4683	4517	4800
	External Static Pressure	Max.	mmAq	11	11	11	11	11	11
			Pa	110	110	110	110	110	110
Fan Motor	Type		-	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor	BLDC Motor
	Output x n		W x n	620 x 2	620 x 2	620 x 2	620 x 2	620 x 2	620 x 2

■ **VRF Max Heat HP/HR (460V) (cont.)**

Type				VRF HP/HR - 460V					
									
Model CODE				VPC072L4M-4G	VPC096L4M-4G	VPC120L4M-4G	VRC072L4M-4G	VRC096L4M-4G	VRC120L4M-4G
Piping Connections	Liquid Pipe		Φ, mm	9.52	9.52	12.7	9.52	9.52	12.7
			Φ, inch	3/8"	3/8"	1/2"	3/8"	3/8"	1/2"
			Type	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection
			Φ, mm(inch)	9.52 (3/8")	9.52 (3/8")	12.7 (1/2")	9.52 (3/8")	9.52 (3/8")	12.7 (1/2")
	Gas Pipe		Φ, mm	19.05	22.22	28.58	19.05	22.22	28.58
			Φ, inch	3/4"	7/8"	11/8"	3/4"	7/8"	11/8"
			Type	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection	Braze Connection
			Φ, mm(inch)	19.05 (3/4")	22.22 (7/8")	28.58 (11/8")	19.05 (3/4")	22.22 (7/8")	28.58 (11/8")
	Discharge Gas Pipe		Φ, mm	-	-	-	15.88	19.05	19.05
			Φ, inch	-	-	-	5/8"	3/4"	3/4"
			Type	-	-	-	Braze Connection	Braze Connection	Braze Connection
			Φ, mm(inch)	- (-)	- (-)	- (-)	15.88 (5/8")	19.05 (3/4")	19.05 (3/4")
	Heat Insulation		-	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
	Installation Limitation	Max. Length	m	220	220	220	220	220	220
		Max. Height	m	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)	50(110)/40(110)
	Piping length (ODU-IDU)	Max. [Equiv.]	m	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]	200 [220]
	Piping length (1st Branch-IDU)	Max.	m	90	90	90	90	90	90
	Total piping length (System)	Max.	m	1,000	1,000	1,000	1,000	1,000	1,000
	Level difference (ODU in highest position)	Max.	m	110	110	110	110	110	110
	Level difference (IDU in highest position)	Max.	m	110	110	110	110	110	110
	Level difference (IDU-IDU)	Max.	m	50	50	50	40	40	40
Field Wiring	Power Source Wire		mm2	-	-	-	-	-	-
	Transmission Cable	Min.	mm2	0.75	0.75	0.75	0.75	0.75	0.75
	Transmission Cable	Remark	-	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2	F1, F2
	Power supply intake		-	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU	Both IDU&ODU
Refrigerant	Type		-	R410A	R410A	R410A	R410A	R410A	R410A
	Factory Charging		kg	8.0	10.5	10.5	8.0	10.5	10.5
			lbs	17.6	23.1	23.1	17.6	23.1	23.1
Sound	Sound Pressure		dB(A)	57.0	60.0	60.0	57.0	60.0	60.0
	Sound Power			79.0	81.0	83.0	79.0	81.0	83.0
External Dimension	Net Weight		kg	259	300	300	265	307	307
			lbs	571	661	661	584	677	677
	Shipping Weight		kg	276	317	317	282	324	324
			lbs	608	699	699	622	714	714
	Net Dimensions (WxHxD)		mm	1295 x 1695 x 765	1295 x 1695 x 765	1295 x 1695 x 765	1295 x 1695 x 765	1295 x 1695 x 765	1295 x 1695 x 765
			inch	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8	51 x 66-3/4 x 30-1/8
	Shipping Dimensions (WxHxD)		mm	1363 x 1887 x 829	1363 x 1887 x 829	1363 x 1887 x 829	1363 x 1887 x 829	1363 x 1887 x 829	1363 x 1887 x 829
			inch	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8	53-11/16 x 74-5/16 x 32-5/8
Operating Temp. Range	Cooling		℃	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1	-15 ~ 50 ※1
			℉	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1	5.0 ~ 122.0 ※1
	Heating		℃	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24	-30 ~ 24
			℉	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0	-22.0 ~ 75.0

2-5 Accessory and Option Specifications

2-5-1 Controller

Classification	Product	Model	Image	Remark	Using
Individual Control System	Wireless Remote Control	VSTAT01P-1			VRF
	Programmable Wired Controller	VSTAT04P-1			VRF
	Wired Controller	VSTAT02P-1			VRF
	Hydro Unit Wired Controller	VSTAT05P-1			VRF
	Receiver & Display Unit	VCTRL10P-1			VRF
Centralized Control System	Centralized Touch Controller	VCTRL01P-1			VRF
	Multi Wi-Fi Kit	VSTAT07P-1			VRF
Integrated management System	Data Management Server or DMS	VCTRL09P-1			VRF
Interface & Gateway	BACnet Gateway	VCTRL02P-1			VRF
	Pulse Input Module or PIM	VCTRL08P-1			VRF
	External Control Module	VSTAT10P-1			VRF
	Thermostat Adapter	VSTAT09P-1			VRF

2-5 Accessory and Option Specifications (cont.)

2-5-1 Controller (cont.)

Classification	Product	Model	Image	Remark	Using
Installation /Test run Solution	Converter Module	VCTRL12P-1			VRF
Others	External Room Sensor	VCTRL11P-1			VRF
	MTFC (Multi Tenant Function Controller)	VCTRL07P-1			VRF

2-5 Accessory and Option Specifications (cont.)

2-5-2 Piping

Product	Image	Model	Remark
Y-Joint		V1IDBP01PR	15.0 kW and below
		V1IDBP02PR	Over15.0 kW~40.0 kW and below
		V1IDBP03PR	Over 40.0 kW~45.0 kW and below
		V1IDBP04PR	Over 45.0 kW~70.3 kW and below
		V1IDBP05PR	Over 70.3 kW~98.4 kW and below
		V1IDBP06PR	Over 98.4 kW~135.2 kW and below
		V1IDBP07PR	Over135.2 kW
Y-Joint (Only H/R)		V1IDBP08HR	22.4 kW and below
		V1IDBP09HR	Over 22.4 kW~70.3 kW and below
		V1IDBP10HR	Over 70.3 kW~135.2 kW and below
		V1IDBP07HR	Over135.2 kW
Y-Joint Outdoor unit		V1ODBP16HR	135.2 kW and below
		V1ODBP17HR	140.2 kW and Over
Y-Joint (Only H/R) Outdoor unit		V1ODBP14HR	135.2 kW and below
		V1ODBP15PR	140.2 kW and Over
Distribution Header		V1HDRK11PR	45.0 kW and below (for 4 rooms)
		V1HDRK12PR	70.3 kW and below (for 8 rooms)
		V1HDRK13PR	Over 70.3 kW~135.2 kW and below(for 8 rooms)
MSB		V1MSBB06HR	below 61.6kW (216MBH)
		V1MSBB04HR	below 61.6kW (216MBH)
		V1MSBB02HR	below 32kW (108MBH)
		V1MSBB01HR	below 16kW (54MBH)
		V1MSBB12HR	below 85.0kW (290MBH)
		V1MSBB08HR	below 85.0kW (290MBH)
PDM KIT		V1PDMK01PR	VPC/VRC072~120*
		V1PDMK03PR	VPC/VRC144*
		V1PDMK02PR	VPC/VRC168~216*
		V1PDMK04PR	VPC/VRC240*

2-5 Accessory and Option Specifications (cont.)

2-5-3 Controller & control Accessory Compatibility

Item		NASA (VRF)	Remark
Individual Control System	Wireless Remote Control	VSTAT01P-1	VRF
	Programmable Wired Controller	VSTAT04P-1	VRF
	Wired Controller	VSTAT02P-1	VRF
	Hydro Unit Wired Controller	VSTAT05P-1	Hydro Unit
	Receiver & Display Unit	VCTRL10P-1	VRF
Centralized Control System	Centralized Touch Controller	VCTRL01P-1	VRF
	Multi Wi-Fi Kit	VSTAT07P-1	VRF
Integrated management System	Data Management Server or DMS	VCTRL09P-1	VRF
Gate Way	BACnet Gateway	VCTRL02P-1	VRF
	External Control Module	VSTAT10P-1	VRF
	Multi Tenant Function controller	VCTRL07P-1	VRF
	Pulse Input Module or PIM	VCTRL08P-1	VRF
	Chiller Module Controller	VCTRL03P-1	CHILLER ONLY
	Chiller Fan Coil Control Kit	VCTRL04P-1	CHILLER ONLY
	Central Control Interface Module	VCTRL05P-1	CHILLER ONLY
Installation/ Test run Solution	Converter Module	VCTRL12P-1	VRF
Others	External Temperature Sensor	VCTRL11P-1	VRF

3. Disassembly and Reassembly

3-1 Necessary Tools

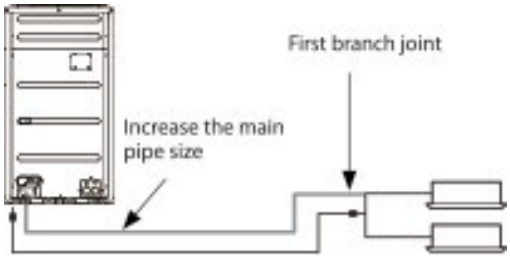
■ Refrigerant pipe installation

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.

<table>
<tr><th>Tool</th><th colspan="2">Installation process/purpose</th><th>Compatibility with conventional tool</th></tr>
<tr><td>Pipe cutter</td><td rowspan="5">Refrigerant pipe installation</td><td>Pipe cutting</td><td rowspan="2">Compatible</td></tr>
<tr><td>Flaring tool</td><td>Pipe flaring</td></tr>
<tr><td>Refrigerant machine oil</td><td>Apply refrigerant oil on flared part</td><td>Exclusive ether oil, ester oil, alkali benzene oil or synthetic oil</td></tr>
<tr><td>Torque wrench</td><td>Connect flare nut with pipe</td><td rowspan="4">Compatible</td></tr>
<tr><td>Pipe bender</td><td>Pipe bending</td></tr>
<tr><td>Nitrogen gas</td><td rowspan="2">Air tightness test</td><td>Prevent oxidation within the pipe</td></tr>
<tr><td>Welder</td><td>Pipe welding</td></tr>
<tr><td>Manifold gage</td><td rowspan="2">Air tightness test ~ additional refrigerant charging</td><td rowspan="2">Vacuuming, charging refrigerant and checking operation</td><td>Need exclusive one to prevent mixture of R-22 refrigerant oil use and also the measurement is not available due to high pressure.</td></tr>
<tr><td>Refrigerant charging hose</td><td>Need exclusive one since there is risk of refrigerant leakage or inflow of impurities</td></tr>
<tr><td>Vacuum pump</td><td colspan="2">Pipe drying</td><td>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).</td></tr>
<tr><td>Scale for refrigerant charging</td><td colspan="2">Refrigerant charging</td><td>Compatible</td></tr>
<tr><td>Gas leak detector</td><td colspan="2">Gas leak test</td><td>Need exclusive one. (Ones used for R-134a is compatible)</td></tr>
<tr><td>Flare nut</td><td colspan="3">Must use the flare nut equipped with the product.
Refrigerant leakage may occur when the conventional flare nut for R-22 is used.</td></tr>
</table>

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 pope (main pipe) by one grade which connects betwen 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.

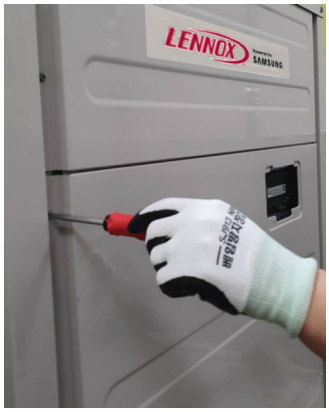
3-2 Disassembly and Reassembly

3-2-1 Checking the Device Condition

No.	Work Procedure	Remark
1	Unfasten the two screws on the inspection window of the Panel Front.	 
	Slightly pull the lower part of the inspection window cover towards you and then pull it down to remove the cover.	
	Open the rain cover.	 
	The rain cover is connected via a ring to the device in order to prevent loss. - Operating the device with the rain cover opened may cause rainwater to enter the C-BOX and damage the PBA.	
	Use the inspection window on the Main PBA to check the following. - Error code - Operation status (Key Switch K1- K4) - Trial operation - Pump down operation - S-NET connection (Specific operation information and the cycle-related status value can be viewed.)	

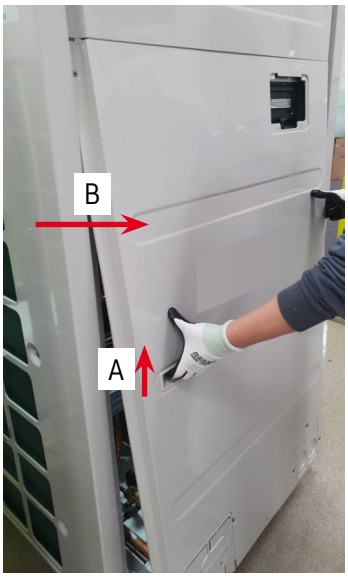
3-2 Disassembly and Reassembly (cont.)

3-2-1 Checking the Device Condition (cont.)

No.	Work Procedure	Remark
1	1) Removing the Cabinet Front Low.	
	- Unfasten the 10 scerws on the Cabinet Front low.	

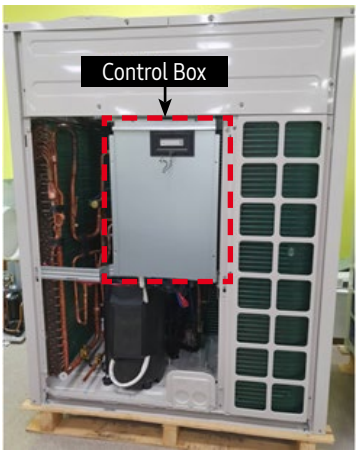
3-2 Disassembly and Reassembly (cont.)

3-2-2 Removal Instructions for Cabinet

No.	Work Procedure	Remark
2	1) Removing the Cabinet Front Low. - The Cabinet Front Low, is hung on the side frame, using supportive tabs. - Hold the handle press right side of cabinet and push up. ('A' direction) - Carefully remove the Cabinet. ('B' direction)	
	2) The Cabinet has been removed.	

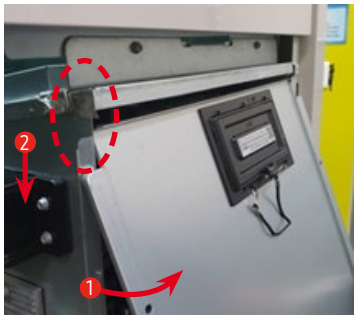
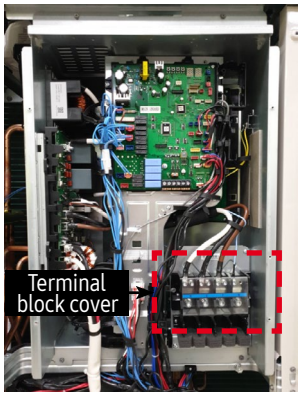
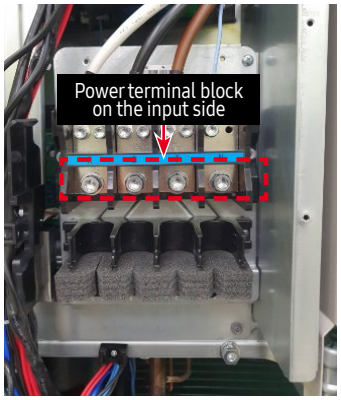
3-2 Disassembly and Reassembly (cont.)

3-2-3 Disconnecting the Power Supply

No.	Work Procedure	Remark
3	⚠ **Caution** To perform additional internal repair service after removing the Cabinet, be sure to cut off the powersupply first.	
	- To disconnect the power supply, remove the Cabinet Front Low and then remove the Control Box cover.	
	Unfasten the four screws on the Control Box cover.	

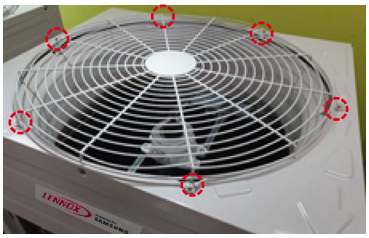
3-2 Disassembly and Reassembly (cont.)

3-2-3 Disconnecting the Power Supply (cont.)

No.	Work Procedure	Remark
3	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 upper part of the cover while holding the lower part and remove the cover from the supportive tab. Then pull down the cover to remove it.	
	Remove the (transparent) cover on the terminal block.	
	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.	
	The front view of the device when it is ready for internal repair after the power supply has been disconnected is shown below.	

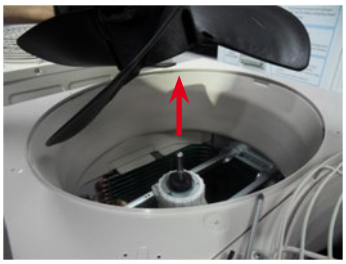
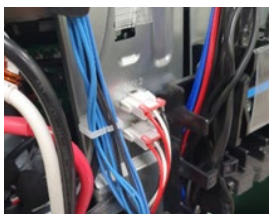
3-2 Disassembly and Reassembly (cont.)

3-2-4 Removal Instructions for Guard Fan

No.	Work Procedure	Remark
4	VRF is equipped with Guard fans. - Small model has one, Large model has two. - Each Guard Fan is fixed with six screws on the cabinet top	 
	Unfasten the six screws on each of the Guard Fans.	
	Lift and separate the Guard Fans.	

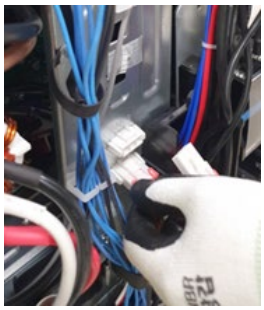
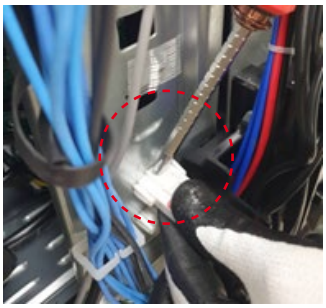
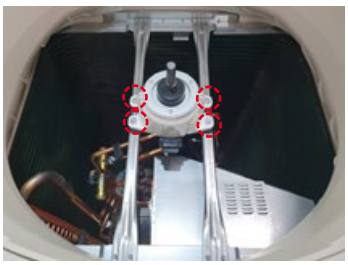
3-2 Disassembly and Reassembly (cont.)

3-2-5 Removal Instructions for Fan and Motor

No.	Work Procedure	Remark
5	1) Disassembling a fan. - A Guard Fan has been removed as shown.	
	- Use a 5mm hex wrench to unfasten the single screw on the Fan Propeller.	
	- Lift and separate the Fan Propeller.	
	2) Removing a motor. - A fan has been removed as shown.	
	- To remove a motor, first remove moter cables. ※ After inspection, be sure to place the connectors inside the C-BOX to prevent rainwater damage.	 

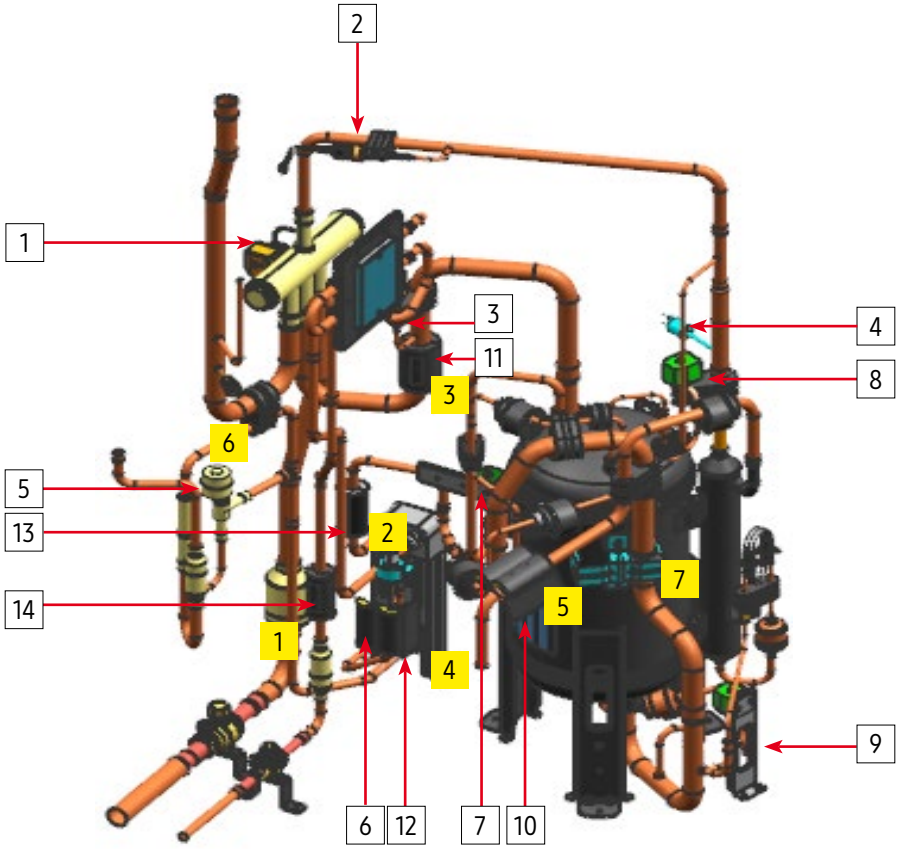
3-2 Disassembly and Reassembly (cont.)

3-2-5 Removal Instructions for Fan and Motor (cont.)

No.	Work Procedure	Remark
5	2) Removing a motor - Remove the motor cable connectors. ※ If there is a difficulty removing a connector pull the connector while pressing down the hook with a tool.	 
	- Remove the holders fixing the wires.	
	- Cut out the cable tie fixing the wires.	
	- Unfasten the four screws on the motor. - Lift and separate the motor.	

[Reference Sheet]

Position of Valve, Sensor, Insulation, Rubber



Valve & Sensor

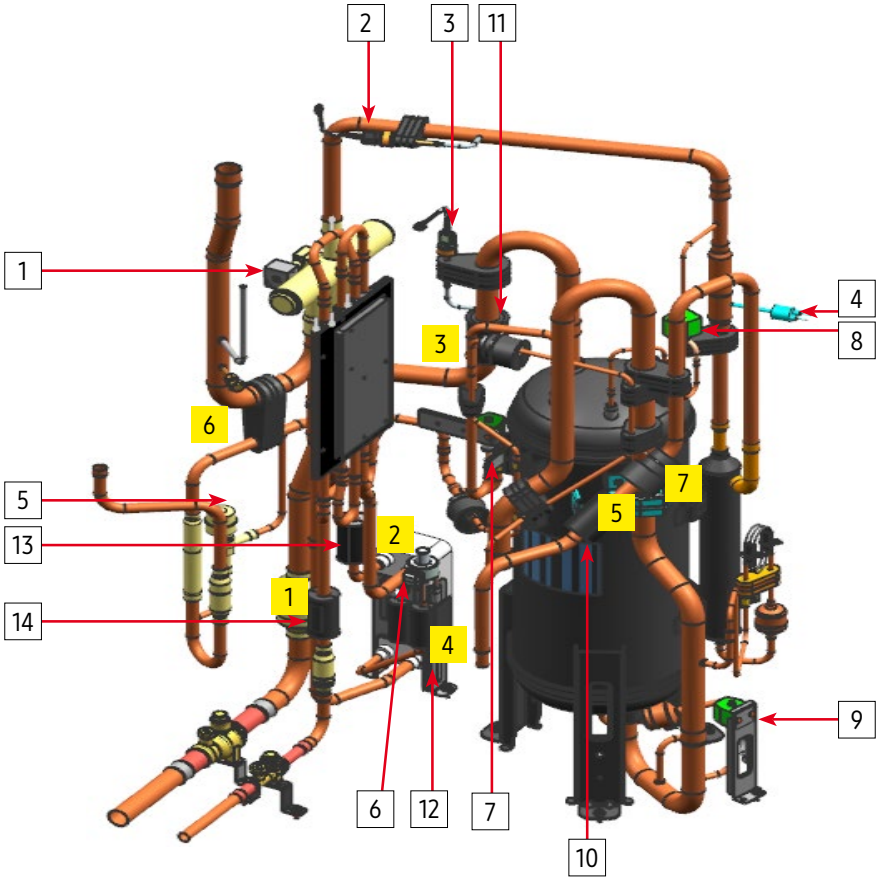
No.	Valve & Sensor
1	4way valve
2	High pressure sensor
3	Low pressure sensor
4	High pressure switch
5	Main EEV
6	EVI EEV
7	EVI bypass valve
8	Hot gas valve
9	Accum oil return valve
10	Discharge temp. sensor
11	Suction temp. sensor
12	EVI in temp. sensor
13	EVI out temp. sensor
14	Liquid temp. sensor

Insulation & Rubber

INSULATION & RUBBER			
No.	Model	NAME	CODE
1	VPC/VCR072/096*	INSULATION	DB62-08751E
	VPC/VCR120/144*		DB62-08751C
2	VPC/VCR072/096/120/144*		DB62-08751C
3	VPC/VCR072/096*		DB62-08751B
	VPC/VCR120/144*		DB62-08751G
4	VPC/VCR072/096/120/144*		DB62-08751E
5	VPC/VCR072/096/120/144*		DB62-08751D
6	VPC/VCR120/144*	RUBBER	DB73-00264A
7	VPC/VCR072/096*		DB67-01527B
	VPC/VCR120/144*		DB67-01527A

[Reference Sheet]

Position of Valve, Sensor, Insulation, Rubber(cont.)



Valve & Sensor

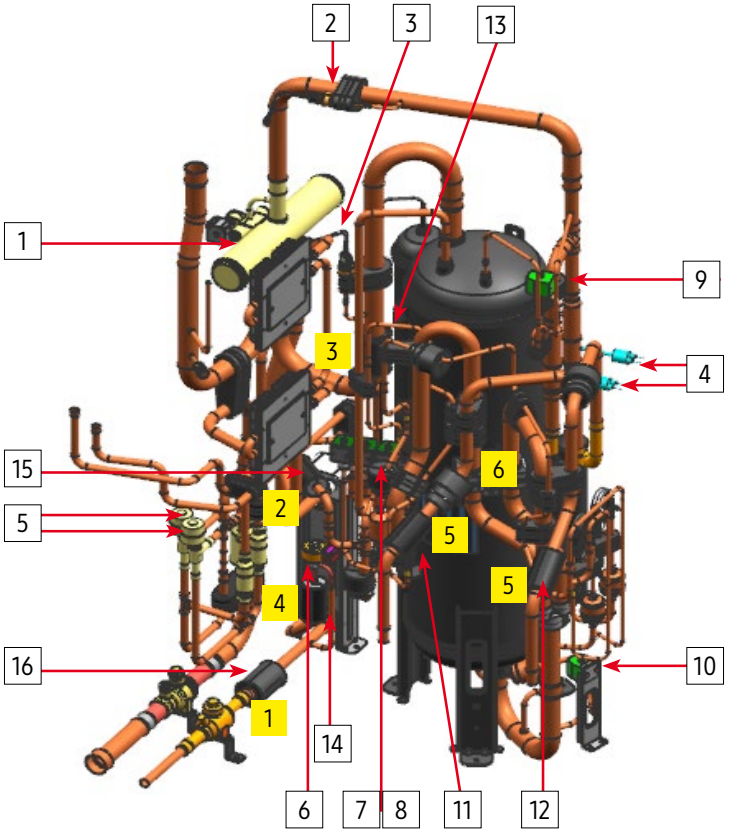
No.	Valve & Sensor
1	4 way valve
2	High pressure sensor
3	Low pressure sensor
4	High pressure switch
5	Main EEV
6	EVI EEV
7	EVI bypass valve
8	Hot gas valve
9	Accum oil return valve
10	Discharge temp. sensor
11	Suction temp. sensor
12	EVI in temp. sensor
13	EVI out temp. sensor
14	Liquid temp. sensor

Insulation & Rubber

INSULATION & RUBBER			
No.	Model	NAME	CODE
1	VPC/VCR168	INSULATION	DB62-08751C
	VPC/VCR216		DB62-08751D
2	VPC/VCR168/216		DB62-08751C
3	VPC/VCR168/216		DB62-08751A
4	VPC/VCR168/216		DB62-08751E
5	VPC/VCR168/216		DB62-03808F
6	VPC/VCR168	RUBBER	DB73-00323A
	VPC/VCR216		DB61-05177A
7	VPC/VCR168/216		DB67-01527C

[Reference Sheet]

Position of Valve, Sensor, Insulation, Rubber(cont.)



Valve & Sensor

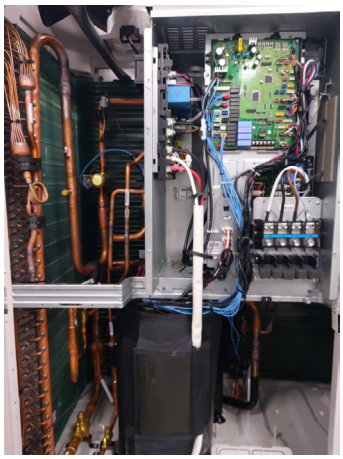
No.	Valve & Sensor
1	4 way valve
2	High pressure sensor
3	Low pressure sensor
4	High pressure switch
5	Main EEV
6	EVI EEV
7	EVI bypass valve
8	EVI valve
9	Hot gas valve
10	Accum oil return valve
11	Discharge1 temp. sensor
12	Discharge2 temp. sensor
13	Suction temp. sensor
14	EVI in temp. sensor
15	EVI out temp. sensor
16	Liquid temp. sensor

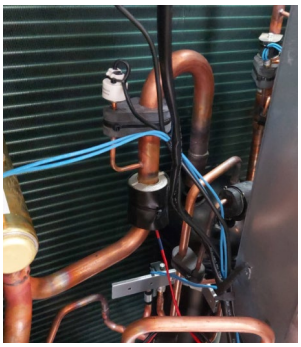
Insulation & Rubber

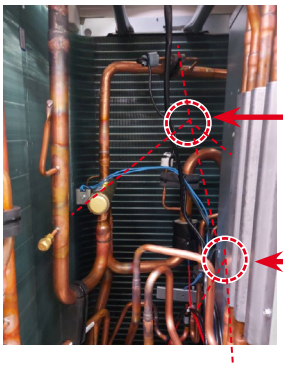
INSULATION & RUBBER			
No.	Model	NAME	CODE
1	VPC/VCR216	INSULATION	DB62-08751D
	VPC/VCR240		DB62-03808F
2	VPC/VCR168/216		DB62-08751C
3	VPC/VCR216		DB62-08751A
	VPC/VCR240		DB62-08751F
4	VPC/VCR216		DB62-08751E
	VPC/VCR240		DB62-08751C
5	VPC/VCR216		DB62-08751D
	VPC/VCR240		DB62-03808F
6	VPC/VCR216	RUBBER	DB67-01527B
	VPC/VCR240		DB67-01527A

[Instructions for wire binding]

■ 1 COMP Models

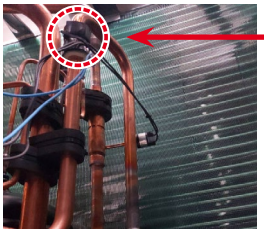


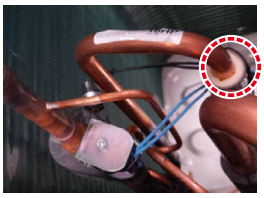




Tie with cable tie
- 4WAY VALVE COIL
- HIGH PRESSURE SENSOR
- LOW PRESSURE SENSOR

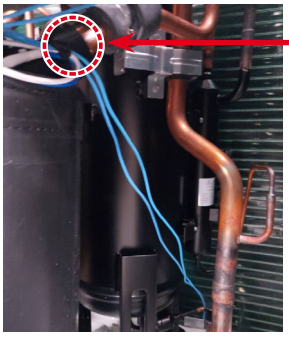
Tie with C/BOX WIRE HOLDER
- EVI BYPASS VALVE COIL





Add INSU HOLDER WIRE on ASSY TUBE DISCHARGE.

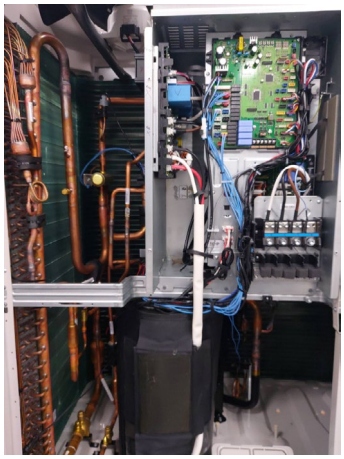
Tie on INSU with cable tie.
- HIGH PRESSURE SWITCH
- HOT GAS VALVE COIL

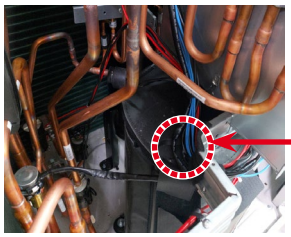


Tie on INSU HOLDER SENSOR on ASSY TUBE DISCHARGE with cable tie.
- ACCUM OIL RETURN VALVE COIL

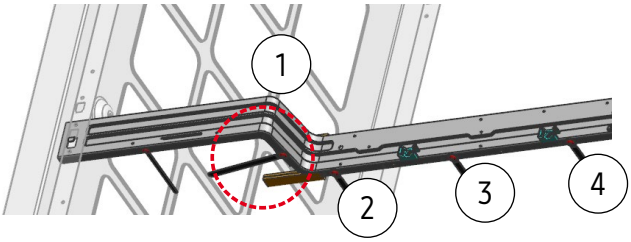
[Instructions for wire binding]

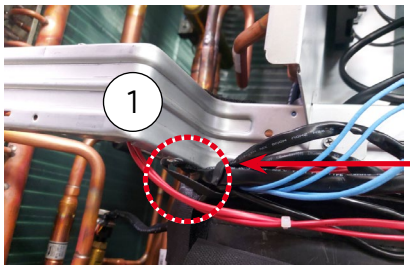
■ 1 COMP Models(cont.)



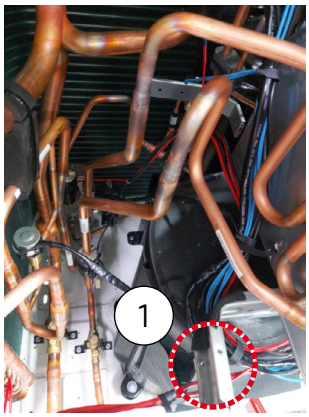


Fix on SOUNDPROOFING FELT with velcro.
- MAIN EEV
- EVI EEV



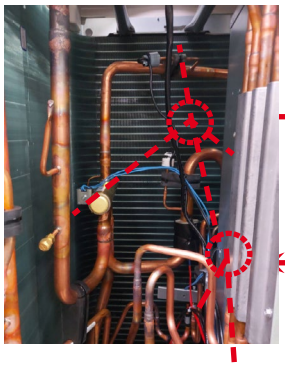


Tie them in order with HOLDER WIRE.



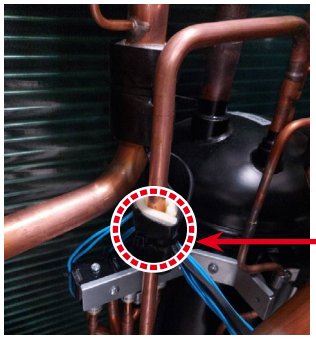
[Instructions for wire binding]

■ 2 COMP Models

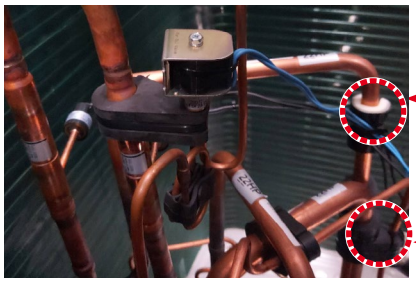


Tie with cable tie
- 4WAY VALVE COIL
- HIGH PRESSURE SENSOR
- LOW PRESSURE SENSOR

Tie with C/BOX WIRE HOLDER
- EVI VALVE COIL/ EVI BYPASS COIL

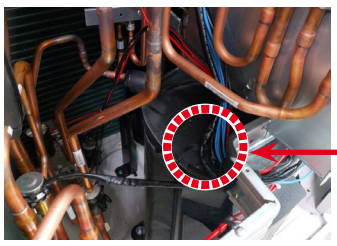


Add INSU HOLDER WIRE on ASSY TUBE BYPASS VALVE
Tie on INSU with cable tie.
- EVI VALVE COIL/ EVI BYPASSY VALVE COIL



Add INSU HOLDER WIRE on ASSY TUBE DISCHARGE
- HIGH PRESSURE SWITCH * 2EA
- HOT GAS VALVE COIL

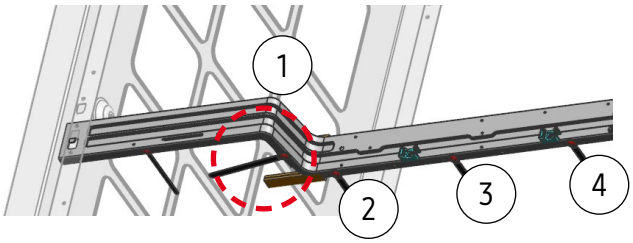
Tie on HOLDER SENSOR on ASSY TUBE DISCHARGE
- HIGH PRESSURE SWITCH * 2EA
- HOT GAS VALVE COIL
- ACCUM OIL RETURN VALVE COIL

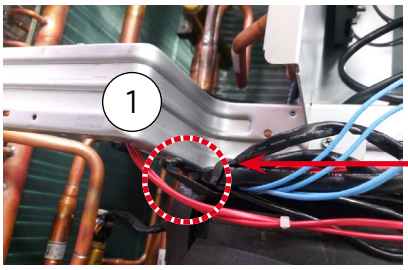


Fix on SOUNDPROOFING FELT with velcro.
- MAIN EEV
- EVI EEV

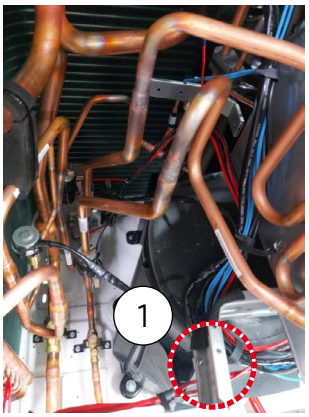
[Instructions for wire binding]

■ 2 COMP Models(cont.)





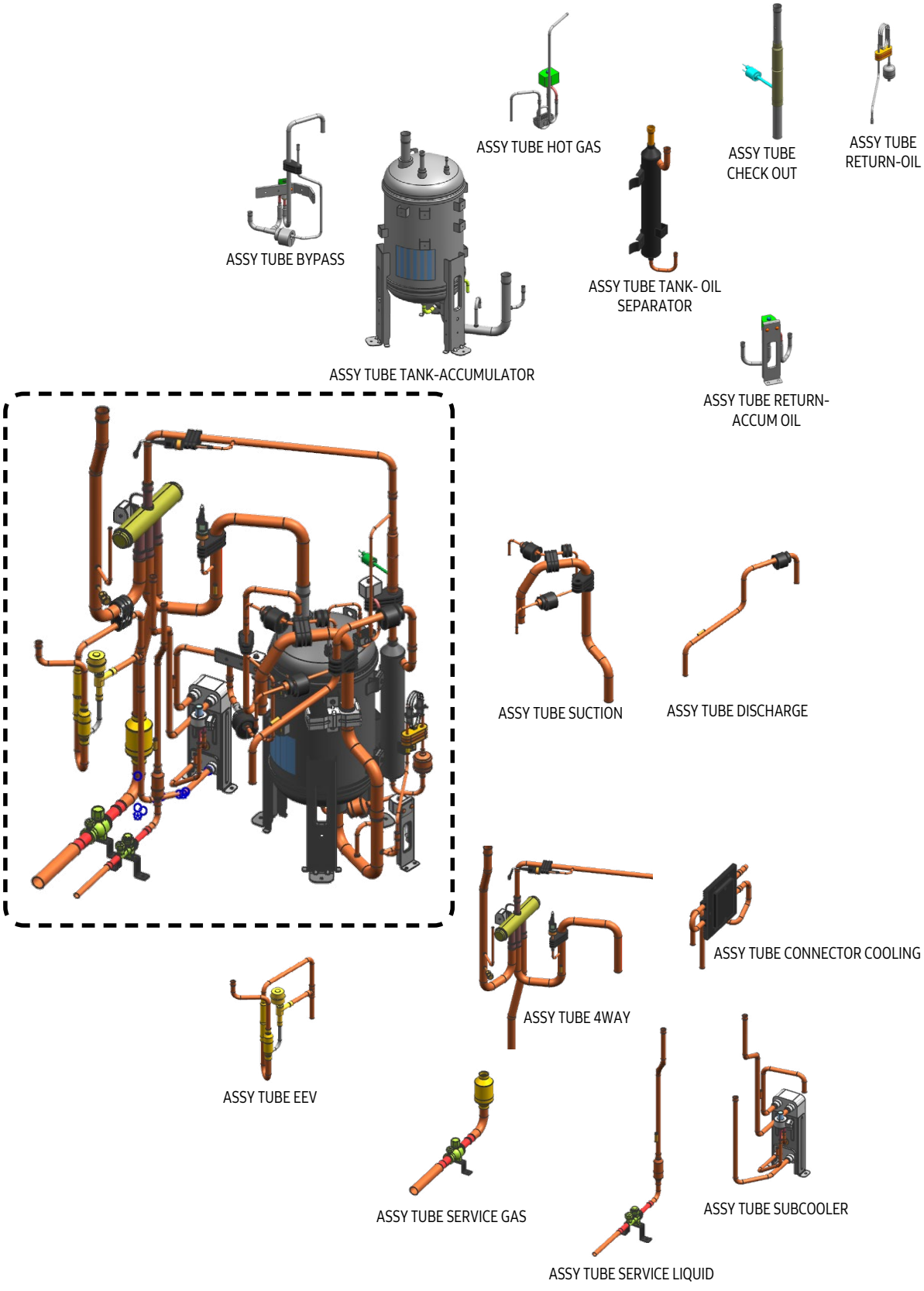
Tie them in order with HOLDER WIRE.



[Reference sheet]

ASSY TUBE PARTS & WELDING POINT

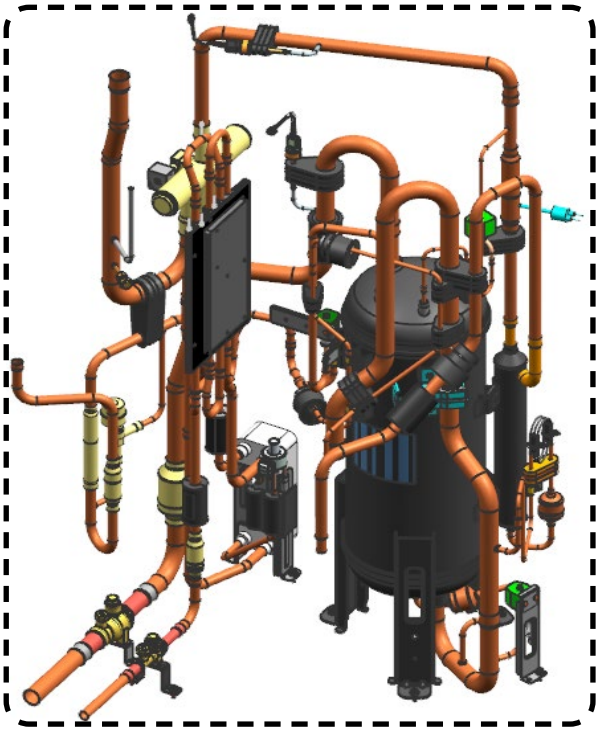
- VPC/VRC072S4M-4*, VPC/VRC072S4M-4J



[Reference sheet]

ASSY TUBE PARTS & WELDING POINT (cont.)

- VPC/VRC096/120/144/168S4M-4*, VPC/VRC096/120/144/168S4M-4J



ASSY TUBE BYPASS

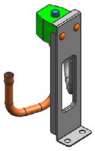
ASSY TUBE TANK-ACCUMULATOR

ASSY TUBE HOT GAS

ASSY TUBE TANK- OIL SEPARATOR

ASSY TUBE CHECK OUT

ASSY TUBE RETURN-OIL



ASSY TUBE RETURN-ACCUM OIL

ASSY TUBE SUCTION

ASSY TUBE DISCHARGE

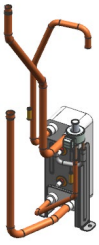
ASSY TUBE 4WAY

ASSY TUBE CONNECTOR COOLING

ASSY TUBE EEV

ASSY TUBE SERVICE GAS

ASSY TUBE SERVICE LIQUID



ASSY TUBE SUBCOOLER

[Reference sheet]

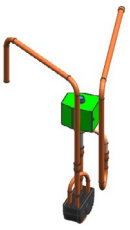
ASSY TUBE PARTS & WELDING POINT (cont.)

- VPC/VRC192/216/240S4M-4*, VPC/VRC192/216/240S4M-4J

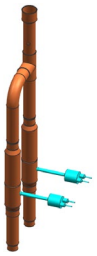
ASSY TUBE TANK-RECEIVER

ASSY TUBE BYPASS

ASSY TUBE TANK-ACCUMULATOR



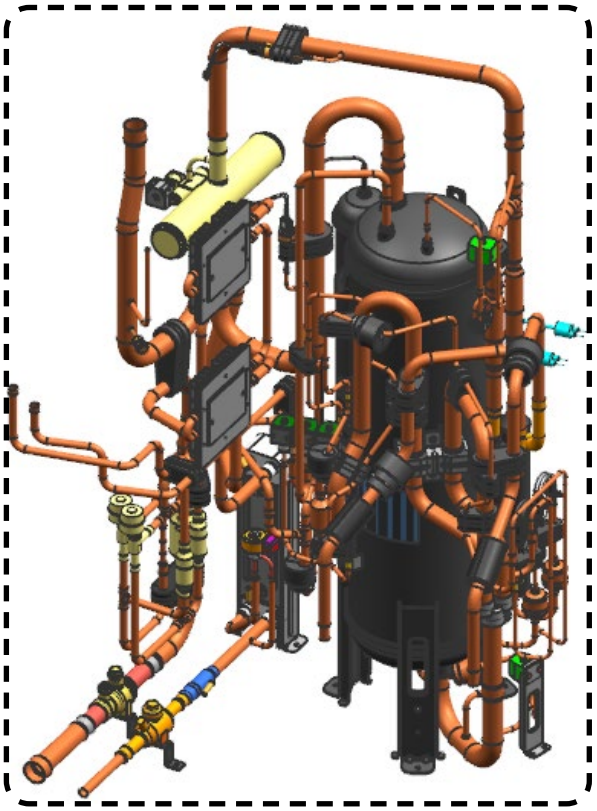
ASSY TUBE HOT GAS

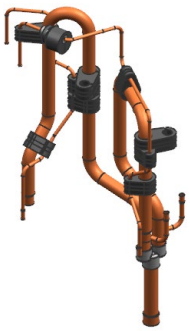


ASSY TUBE CHECK OUT

ASSY TUBE TANK- OIL SEPARATOR

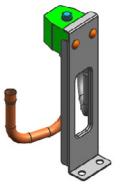
ASSY TUBE RETURN-OIL





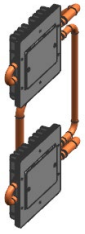
ASSY TUBE SUCTION

ASSY TUBE DISCHARGE



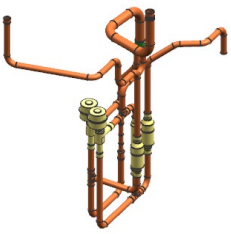
ASSY TUBE RETURN-ACCUM OIL

ASSY TUBE 4WAY



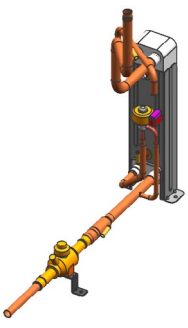
ASSY TUBE CONNECTOR COOLING

ASSY TUBE CONNECTOR



ASSY TUBE EEV

ASSY TUBE SERVICE GAS

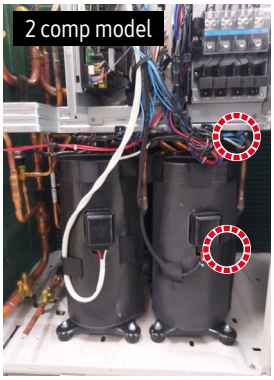


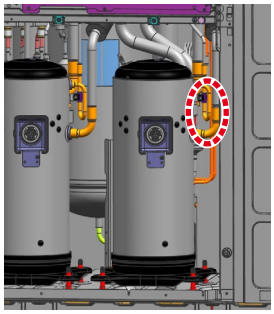
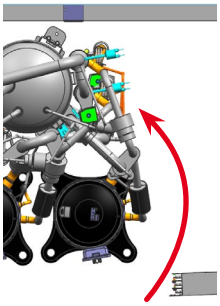
ASSY TUBE SUBCOOLER

3-2 Disassembly and Reassembly (cont.)

3-2-6 Removal Instructions for Compressor

<table>
<tr><th>No.</th><th>Work Procedure</th><th>Remark</th></tr>
<tr><td rowspan="2">6</td><td>Before replacing the compressor, check Accum oil return and Oil return for blockage. Temperature detection can be performed through gaps in the front. You can check if the pipe is blocked or not by checking the temperature</td><td> 

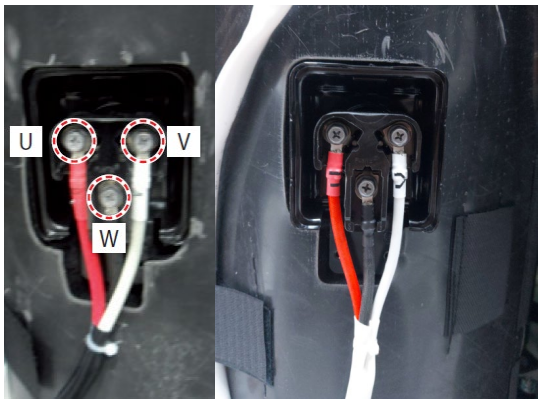
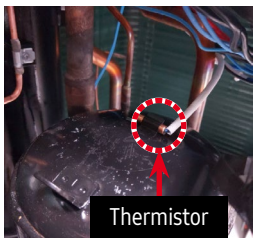
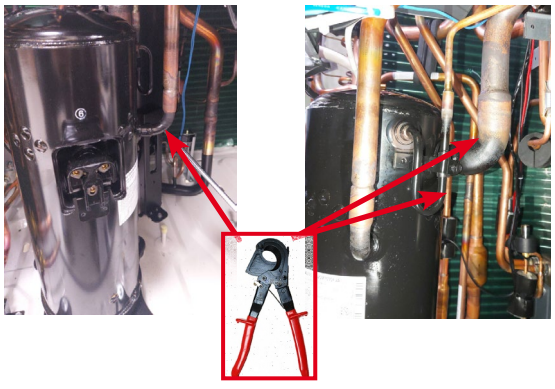


 </td></tr>
<tr><td>1) Removing the compressors.
- Remove the cover of the power terminal block for the compressor.
(90cc compressor has additional soundproofing felt on terminal block, so remove this first and then you can take out the cover.)
- Use a screwdriver to pull the upper part of the cover towards you and remove the cover, as shown in the image.</td><td> 
46cc, 66cc compressor</td></tr>
</table>

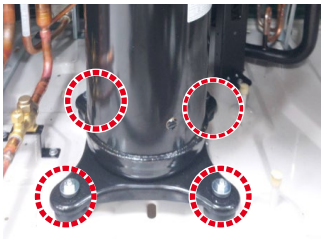
3-2 Disassembly and Reassembly (cont.)

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

No.	Work Procedure	Remark
6	- 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. Exercise caution. ※ Terminal fastened with a torque 0f 25 ~ 35 kgf·m.	 
	- Separate the velcro on the soundproofing felt coveringthe compressor and remove the felt from the compressor. - Remove the thermistor on top of the compressor.	 
	- Cut the compressor side port (discharge, VI, suction) using a ratchet cutter.Check the cutting point shown in the images. * Do not use saws or grinders. Copper chips may go into the set and cause failure.	

3-2 Disassembly and Reassembly (cont.)

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

No.	Work Procedure	Remark
6	- Use a torch to heat and separate the three welded joints connecting the compressor to the pipes. ※ Caution: Taping the cutting surface to prevent oil overflow and foreign matter inflow into the compressor. - After removing compressor, Heat and separate the remaining pipe using a torch.	

3-2 Disassembly and Reassembly (cont.)

3-2-7 Compressor exchange order

STEP	Occasion that compressor is 1 inside outdoor unit	Occasion that compressor is 2 inside outdoor unit
1	Set the compressor to be replaced 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.	

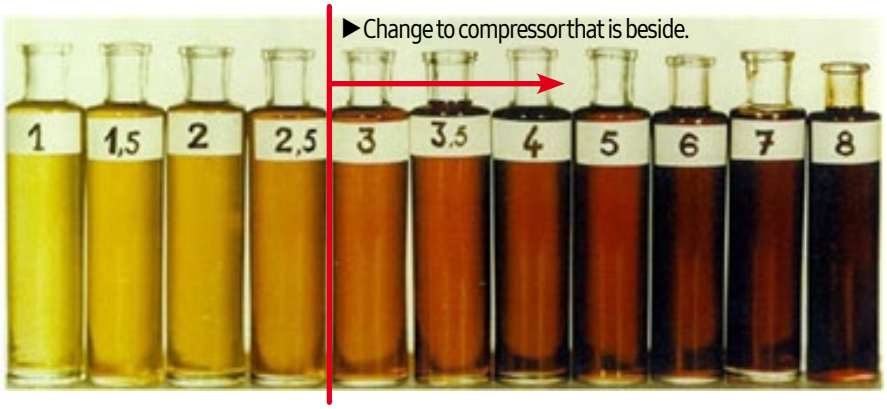
3-2 Disassembly and Reassembly (cont.)

3-2-7 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.



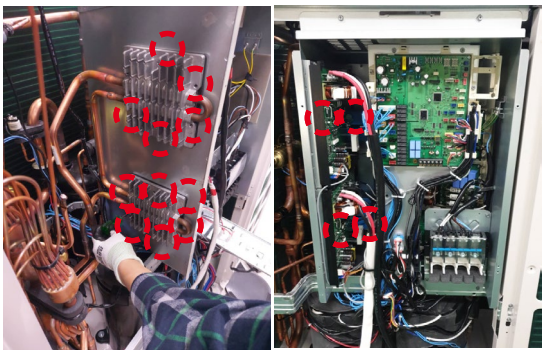
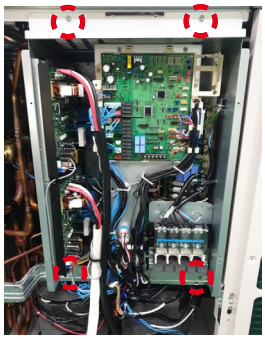
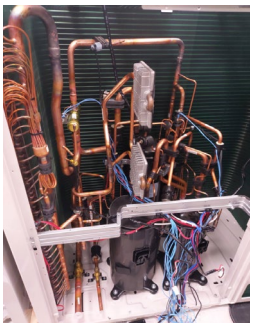
2) Weight of compressor and quantity of oil

- Compressor contains the oil at factory shipment as follow(compressor single item standards).
  DS2GR7046F: 53.1lb (24.1kg), DS4GR7066F: 77.2lb (35.0kg), DS2GT7046E: 53.1lb (24.1kg), DS4GT5066E: 78.3lb (35.5kg)
- Weight of compressor including oil:
  DS2GR7046F: 53.1lb (24.1kg), DS4GR7066F: 77.2lb (35.0kg), DS2GT7046E: 53.1lb (24.1kg), DS4GT5066E: 78.3lb (35.5kg)
- 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[lb(kg)] of added oil = Weight[lb(kg)] of compressor that broke down - Weight[lb(kg)] of newly change compressor
- If quantity of calculated addition oil passes over 2.2lb(1kg), quantity of add oil does by 2.2lb(1kg).
- Problem of that is blocked in oil circulation of [remaining oil of compressor that broke down below o.7lb(0.3kg)] compressor if is light more than 1.8lb(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.)

3-2-8 Removal Instructions for the Accumulator

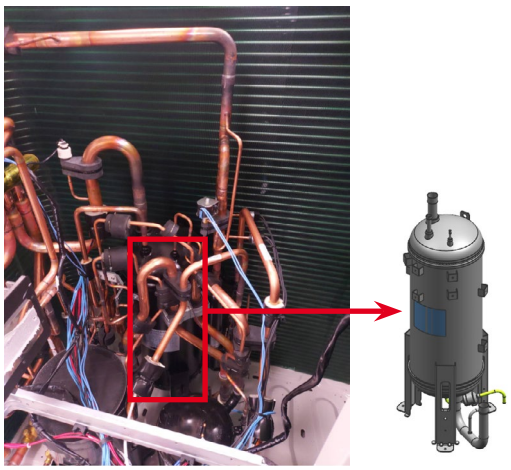
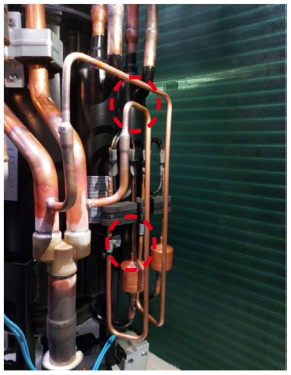
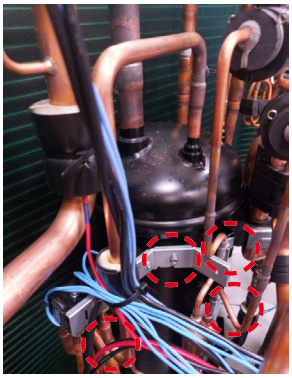
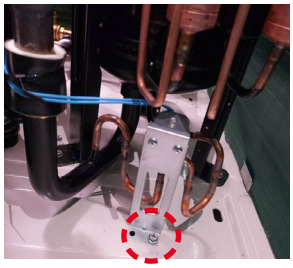
- Replacement instructions for the Accumulator, Parts behind the C/BOX

No.	Work Procedure	Remark
8	To replace the accumulator or the parts behind the C/BOX, first make sure that all parts in front of the parts to be replaced have been removed to avoid interference. The parts that need to be removed are C/BOX and parts that are assembled replacement such as 4way, Bypass valve, suction pipe, etc. For C/BOX disassembly, separate the refrigerant cooling pipe with torch or remove the screw on the Heat-sink on Inverter PCB.	 Welding points for Cooling pipe disassembly  Screw points for Cooling pipe disassembly  Screw points for C/BOX disassembly  Ready to replace parts behind C/BOX

3-2 Disassembly and Reassembly (cont.)

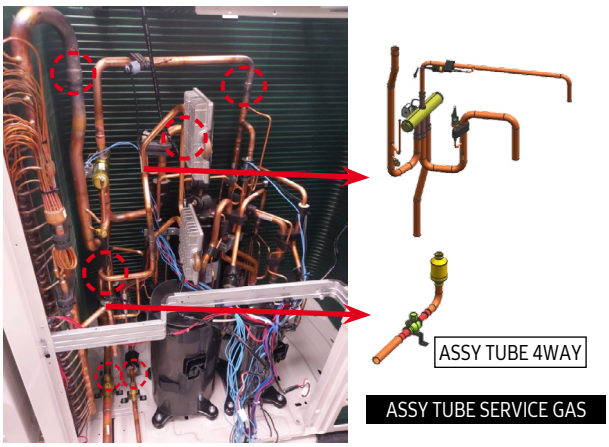
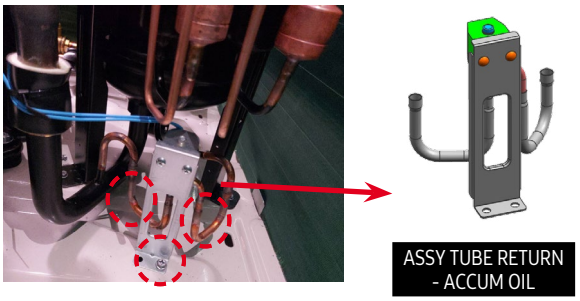
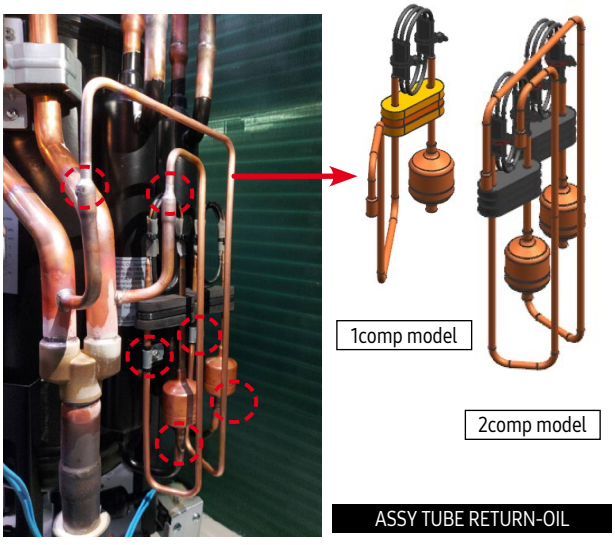
3-2-8 Removal Instructions for the Accumulator (cont.)

- Replacement instructions for the Accumulator, Parts behind the C/BOX

No.	Work Procedure	Remark
8	Before using the torch, remove the screws from the brackets connected to the accumulator. After removing the screw, use a welding torch to separate the pipe parts. - Refer to the reference sheet for the shape of the pipe parts and welding points.	    

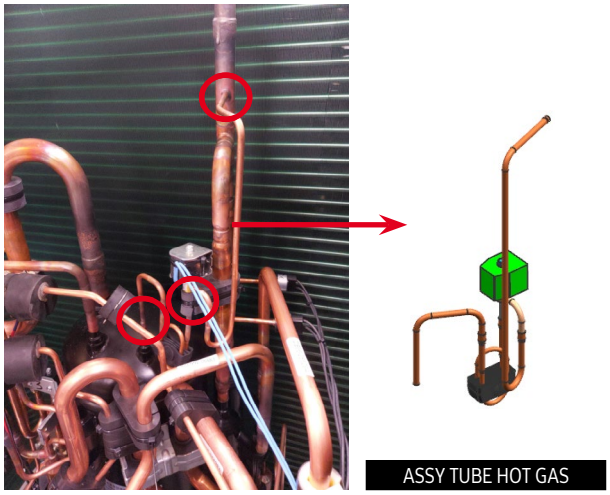
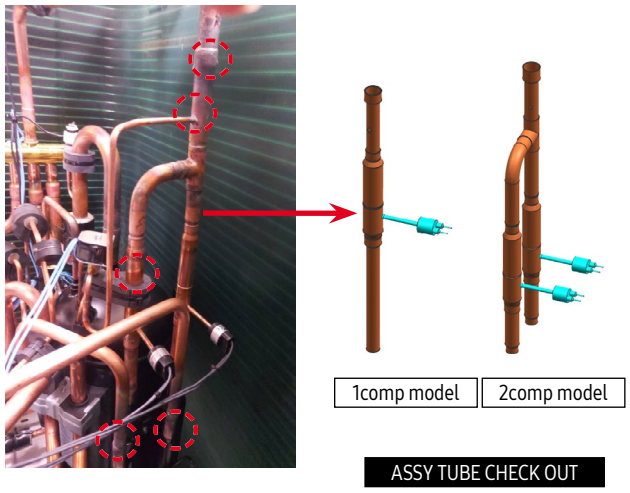
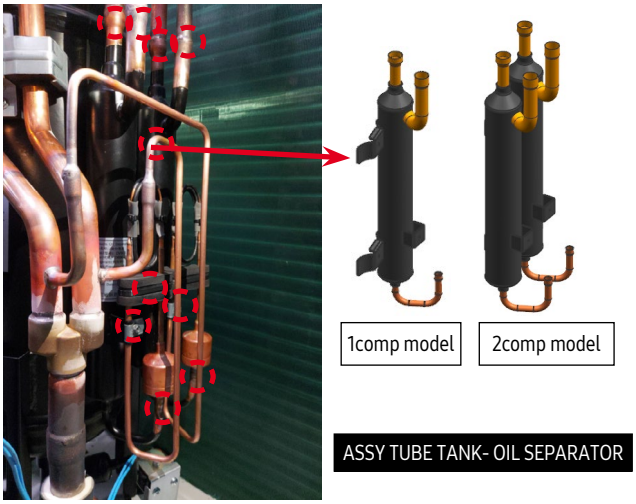
3-2 Disassembly and Reassembly (cont.)

3-2-8 Removal Instructions for the Accumulator (cont.)

No.	Work Procedure	Remark
8	ASSY TUBE 4WAY VALVE - Disconnect the 4way valve coil, low pressure sensor, and suction temp. sensor wires. - Separate 2 screws and 4 welds for ASSY TUBE 4WAY VALVE replacement.	
	ASSY TUBE ACCUM OIL RETURN - Disconnect the solenoid valve coil wires. - Separate 1 screws and 2 welds for ASSY TUBE ACCUM OIL RETURN replacement.	
	ASSY TUBE OIL RETURN - Separate 2 screws and 4 welds for ASSY TUBE OIL RETURN replacement.	

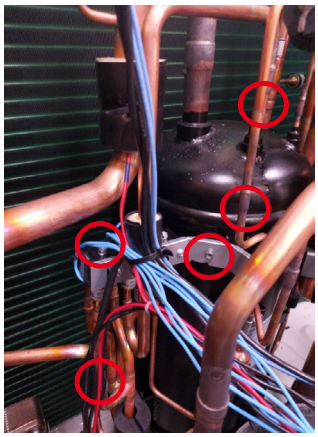
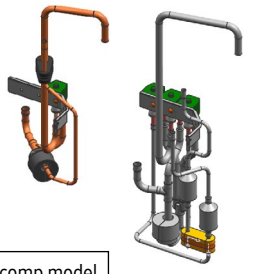
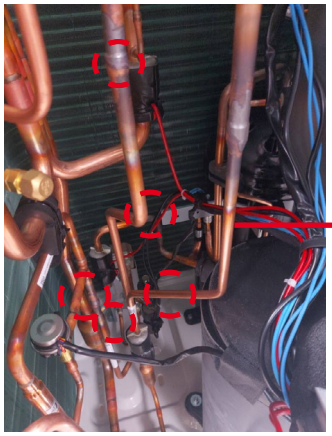
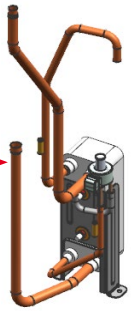
3-2 Disassembly and Reassembly (cont.)

3-2-8 Removal Instructions for the Accumulator (cont.)

No.	Work Procedure	Remark
8	ASSY TUBE HOT GAS - Separate 1 RUBBER SUPPORT and 2 welds for ASSY TUBE HOT GAS replacement.	
	ASSY TUBE CHECK OUT - Disconnect the High pressure switch wires. - Separate 1 RUBBER SUPPORT and 3 welds for ASSY TUBE CHECK OUT replacement.	
	ASSY TUBE OIL SEPARATOR - Separate 4 screws and 6 welds for ASSY TUBE OIL SEPARATOR replacement.	

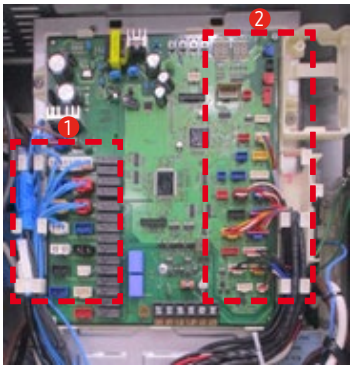
3-2 Disassembly and Reassembly (cont.)

3-2-8 Removal Instructions for the Accumulator (cont.)

No.	Work Procedure	Remark
8	ASSY TUBE BYPASS - Disconnect the EVI valve, EVI bypass valve coil wires. - Separate 1 screw and 4 welds.	  1comp model 2comp model ASSY TUBE BYPASS
	ASSY TUBE SUBCOOLER - Disconnect Main EEV coil wire & EVI in/out temp. sensor wires. - Separate 2 screws and 3 welds.	  ASSY TUBE SUBCOOLER

3-2 Disassembly and Reassembly (cont.)

3-2-9 Removal Instructions for the Control PBA

No.	Work Procedure	Remark
9	- The device control PBA is located in the upper part of the Control Box.	
	- 1, 2 points remove the connectors from the control PBA	

3-2 Disassembly and Reassembly (cont.)

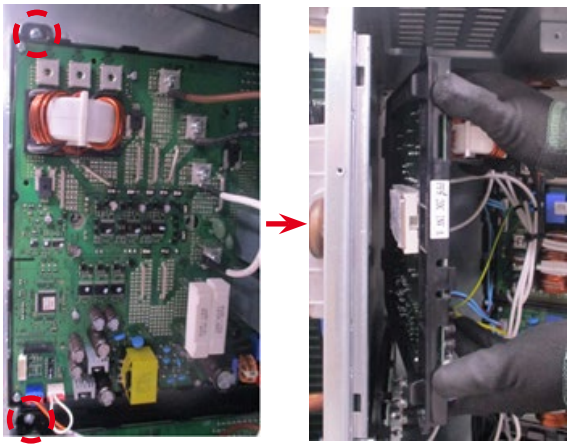
3-2-10 Removal Instructions for the Control Panel Assy

No.	Work Procedure	Remark
10	- The Control Box consists of a control unit on the front and a power module inside the Box. - To perform power supply-related repair service for the PBA, you must detach the Control Panel Assy on the front.	

3-2 Disassembly and Reassembly (cont.)

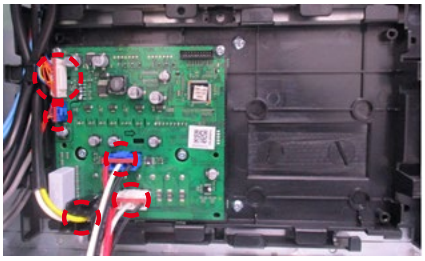
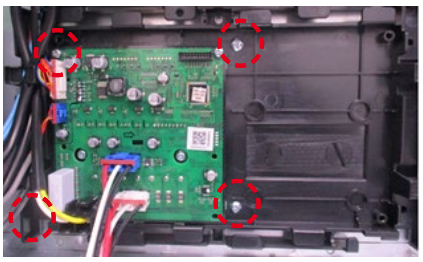
3-2-11 Removal Instructions for the Inverter PBA

<table>
<tr><th>No.</th><th>Work Procedure</th><th>Remark</th></tr>
<tr><td>11</td><td>- Separate the Inverter PBA Case from the front while holding the hook.

※ After inspection, check the condition of grease pplied.</td><td>

Unfasten the two screws on the case
<table>
<tr><th>Good</th><th>No Good</th></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td colspan="2">⚠ If Thermal Grease is not applied evenly IMP due to the cooling performance may cause malfunction of the product.</td></tr>
</table>
</td></tr>
</table>

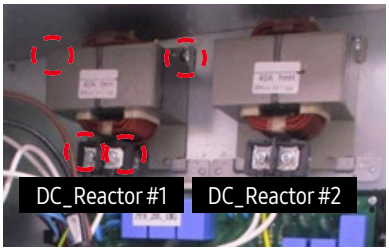
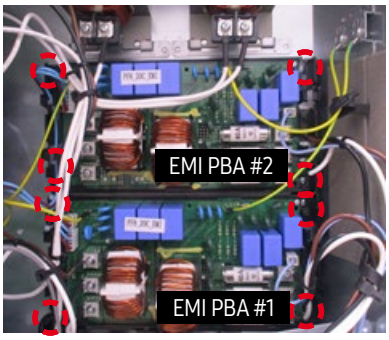
3-2 Disassembly and Reassembly (cont.)

3-2-12 Removal Instructions for the Fan PBA

No.	Work Procedure	Remark
12	- Remove the power and control wires and connectors from the Fan PBA.	
	- To replace with a module assembled with the case, heat sink and PBA, unfasten the four screws on the case.	

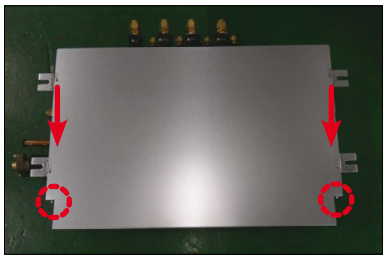
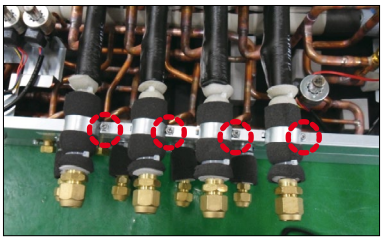
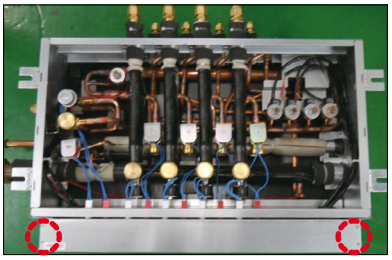
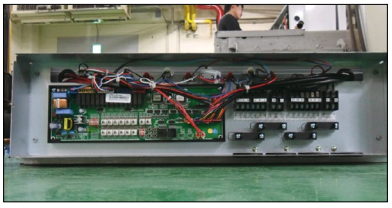
3-2 Disassembly and Reassembly (cont.)

3-2-13 Removal Instructions for the DC Reactors and EMI PBA

No.	Work Procedure	Remark
13	- Unfasten the DC Reactor wire screws, and then lift and separate the Reactors. (applicable to both Reactors #1 and #2).	
	- Remove the connectors inside the EMI PBA, and then unfasten the four screws fixing the case on the PBA.	

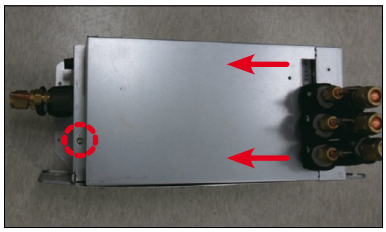
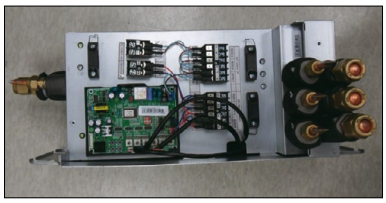
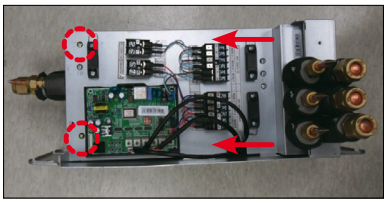
3-2 Disassembly and Reassembly (cont.)

3-2-14 MSB

No.	Work Procedure	Work Procedure	Remark
1	Cabinet upper	1) Separate 2 fixing screws from the cabinet. (Use + Serew Driver) 2) Separate cabinet from MSB.	
2	Cabinet front	1) Separate 4 fixing screws from the cabinet. (Use + Serew Driver)	
		2) Separate 4 fixing screws from the brackets. (Use + Serew Driver)	
3	Cabinet front	1) Separate front cabinet from MSB.	
4	Control box cover	1) Separate 2 fixing screws from the control box cover. (Use + Serew Driver)	
		2) Separate control box cover from MSB.	

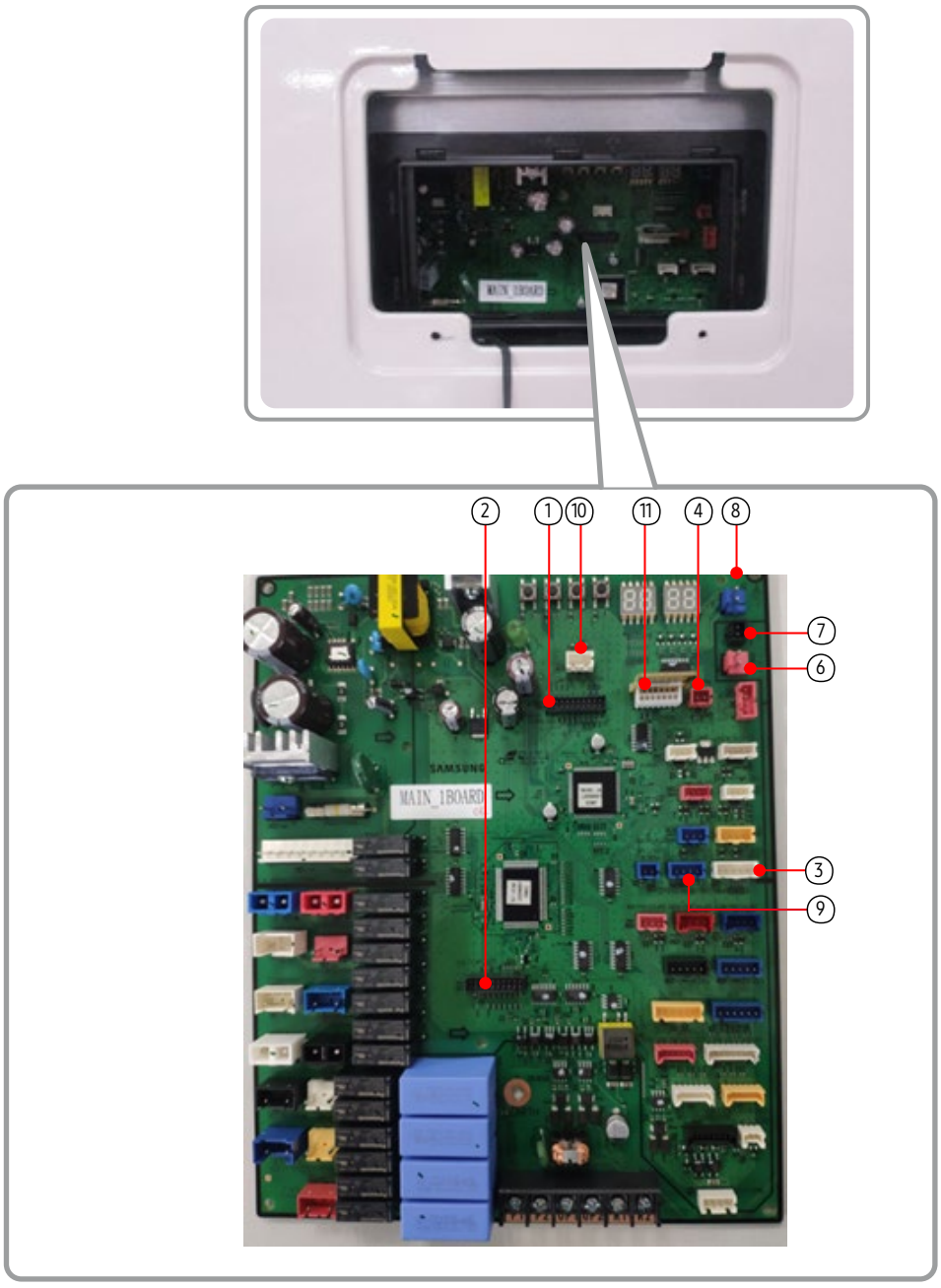
3-2 Disassembly and Reassembly (cont.)

3-2-15 EEV kit

No.	Work Procedure	Work Procedure	Remark
1	Cabinet front	1) Separate 1 fixing screw from EEV kit. (Use + Serew Driver)	
		2) Separate cabinet from EEV kit.	
2	Control parts	1) Separate 2 fixing screws from EEV kit. (Use + Serew Driver)	
		2) Separate control part from EEV kit.	

4. Troubleshooting

4-1 Check-up Window Description

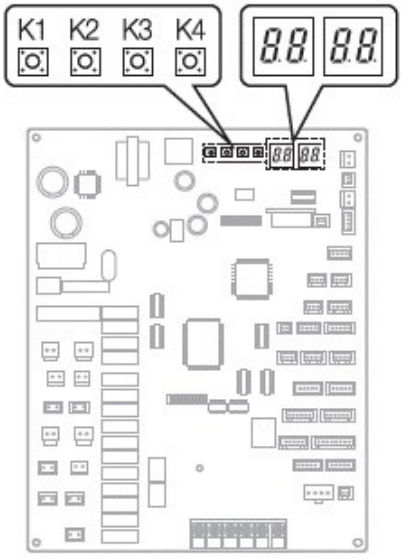


No.	Specific functions	No.	Specific functions
1	S/W download for MIC201	7	Supplying DC 5V to other component
2	S/W download for MIC202	8	Supplying DC 12V to other component
3	DRED PBA connecting	9	Gas leak detection using MIM-B14
4	External control using MIM-B14	10	Option switch
5	F1/F2/OF1/OF2/R1/R2 Wire connecting	11	EEPROM PBA connecting
6	Central controller connecting(F1/F2)		

4-2 Service Operation

4-2-1 Special Operation

► **Setting key operation and checking the view mode with tact switch**



► **Key input of the outdoor unit when the service enters the operation mode.**

K1 control	KEY operation	Display on segment
Press and hold 1 time	Auto trial operation	“K”“K”“BLANK”“BLANK”

K1 (Number of press)	KEY operation	Display on segment
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	Vaccuming (Outdoor unit address 1)	“K”“4”“BLANK”“1”
8 times	Vaccuming (Outdoor unit address 2)	“K”“4”“BLANK”“2”
9 times	Vaccuming (Outdoor unit address 3)	“K”“4”“BLANK “ “3”
10 times	Vaccuming (Outdoor unit address 4)	“K”“4”“BLANK”“4”
11 times	Vaccuming (All outdoor units)	“K”“4”“BLANK”“A”
12 times	Inverter Fault Detection(Comp#1)	“K”“5”“I”“1”
13 times	Inverter Fault Detection(Comp#2)	“K”“5”“I”“1”
14 times	Inverter Fault Detection(Fan#1)	“K”“5”“F”“1”
15 times	Inverter Fault Detection(Fan#2)	“K”“5”“F”“2”
16 times	End Key operation	-

⚠WARNING

- After installing the product, be sure to perform leak tests on the piping connections. After pumping down refrigerant to inspect or relocate the outdoor unit, be sure to stop the compressor and then remove the connected pipes.
  - Do not operate the compressor while a valve is open due to refrigerant leakage from a pipe or an unconnected or incorrectly connected pipe. Failure to do so may cause air to flow into the compressor and too a high pressure to develop inside the refrigerant circuit, leading to an explosion or product malfunction.

4-2 Service Operation

4-2-1 Special Operation (cont.)

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	H/R: Checking the pipe connection H/P: Automatic setting of operation mode (Cooling/ Heating) for trial operation	"K""8""BLANK""BLANK"
5 times	Checking the amount of refrigerant	"K""9" X X (Display of last two digits may differdepending on the progress)
6 times	Discharge mode of DC link voltage	"K""A""BLANK""BLANK"
7 times	Forced defrost operation	"K""B""BLANK""BLANK"
8 times	Forced oil collection	"K""C""BLANK""BLANK"
9 times	Inverter compressor 1 check	"K""D""BLANK""BLANK"
10 times	Inverter compressor 2 check	"K""E""BLANK""BLANK"
11 times	Fan 1 check	"K""F""BLANK""BLANK"
12 times	Fan 2 check	"K""G""BLANK""BLANK"
13 times	H/R: Auto pipe paring H/P:Unused	"K""H" X X (Display of last two digits may differ depending on the progress)
14 times	Baseheater testing mode	"K""I""BLANK""BLANK"
15 times	Unused	"K""J""BLANK""BLANK"
16 times	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'.

※ In case of capless inverter do not use the Discharge mode of DC Link voltage.

※ If the 1st-generation MSB is installed, the Auto pipe pairing operation can not be used. If the 2nd-generation MSB is installed, the Checking the pipe connection can not be used.
- MSB: MSB-S*NEK2N,MSB-S4NEK3N,MSB-S1NEK1N

※ If error have been occurred, do not use the key operation.

K3 (Number of press)	KEY operation	Display on segment
1 time	Initialize (Reset) setting	Same as initial state

K4 (Number of press)	KEY operation	Display on segment	
		SEG1	SEG2, 3, 4
1 time	Capacity of Outdoor unit model	1	VPC/VRC160S4M**** → Off, 1, 6
2 times	Order frequency of the compressor 1	2	120 Hz → 1, 2, 0
3 times	Order frequency of the compressor 2	3	120 Hz → 1, 2, 0
4 times	High pressure (MPa)	4	1 52 MPa → 1, 5, 2
5 times	Low pressure (MPa)	5	0 43 MPa → 0, 4, 3
6 times	Discharge temperature (Compressor 1)	6	87 °C → 0, 8, 7
7 times	Discharge temperature (Compressor 2)	7	87 °C → 0, 8, 7
8 times	IPM temperature (Compressor 1)	8	87 °C → 0, 8, 7

4-2 Service Operation

4-2-1 Special Operation (cont.)

K4 (Number of press)	KEY operation	Display on segment	
		SEG1	SEG2, 3, 4
9 times	IPM temperature (Compressor 2)	9	87 °C → 0, 8, 7
10 times	CT sensor value (Compressor 1)	A	2 A → 0, 2, 0
11 times	CT sensor value (Compressor 2)	B	2 A → 0, 2, 0
12 times	Suction temperature	C	-42 °C → -, 4, 2
13 times	COND OUT temperature	D	-42 °C → -, 4, 2
14 times	Temperature of liquid pipe	E	-42 °C → -, 4, 2
15 times	TOP temperature (Compressor 1)	F	-42 °C → -, 4, 2
16 times	TOP temperature (Compressor 2)	G	-42 °C → -, 4, 2
17 times	Outdoor temperature	H	-42 °C → -, 4, 2
18 times	EVI inlet temperature	I	-42 °C → -, 4, 2
19 times	EVI outlet temperature	J	-42 °C → -, 4, 2
20 times	Main EEV1 step	K	2000 steps → 2, 0, 0
21 times	Main EEV2 step	L	2000 steps → 2, 0, 0
22 times	EVI EEV step	M	300 steps → 3, 0, 0
23 times	HR EEV step	N	300 steps → 3, 0, 0
24 times	Fan step (SSR or BLDC)	O	13 steps → 0, 1, 3
25 times	Current frequency (Compressor 1)	P	120 Hz → 1,2,0
26 times	Current frequency (Compressor 2)	Q	120 Hz → 1,2,0
27 times	Suction 2 temperature (HR Only)	R	-42 °C → -, 4, 2
28 times	Master indoor unit address	S	Main indoor unit not selected → BLANK, N, D If indoor unit No 1 is selected as the main unit → 0, 0, 1
29 times	Suction 3 temperature	U	-42°C→ -,4,2
30 times	COND OUT2 temperature	V	-42°C→ -,4,2

K4 (Number of press) Press and hold the K4 to enter the setting	Displayed content	Display on segment			
		PAGE1	PAGE2		
1 time	Main version	MAIN	Version (ex. 1412)		
2 times	Hub version	HUB	Version (ex. 1412)		
3 times	Inverter 1 version	INV1	Version (ex. 1412)		
4 times	Inverter 2 version	INV2	Version (ex. 1412)		
5 times	Fan 1 version	FAN1	Version (ex. 1412)		
6 times	Fan 2 version	FAN2	Version (ex. 1412)		
7 times	EEP version	EEP	Version (ex. 1412)		
8 times	Automatically assigned address of the units	AUTO	SEG1	SEG2	SEG3,4
			Indoor unit: “A” MSB: “C”	Indoor unit: “0” MSB: “1”	Address (ex: 07)
9 times	Manually assigned address of the units	MANU	SEG1	SEG2	SEG3,4
			Indoor unit: “A”	Indoor unit: “0”	Address (ex: 15)

※ I/U: Indoor unit

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℃)	Whole operation (The set temperature=40℃)
Outdoor fan and valves	Normally control conduct	
Operation time	Min: 60 minutes, Max: 10 hours	
Etc.	• 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℃)	Whole operation (The set temperature=40℃)
Outdoor fan and valves	Normally control conduct	
Operation time	60 minutes	
Etc.	During the filling operation does not enter the special operation, such as oil recovery, defrost.	

■ 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℃)
4Way Valve	ON (Heating Mode)
Outdoor Fan	Maximum airflow
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.

4-2 Service Operation (cont.)

4-2-1 Special Operation (cont.)

■ 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)
Outdoor Fan	Maximum air flow
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.

■ Vacuum Operation

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

How to Initiate	K1 Tact Switch 7 times~10 times	K1 Tact Switch 11 times
Compressor	OFF	
Indoor Unit/Outdoor Fan	OFF	
4Way Valve	OFF	
Valves	Open all valves of the outdoor unit	Open all valves of the system (Including indoor unit and MSB)
Etc.	If not turn off the vacuum mode, the start of normal operation is prohibited.	

4-2 Service Operation (cont.)

4-2-1 Special Operation (cont.)

■ Piping Inspection Operation

► Operation mode to check the status of the piping between the MSB and the indoor unit.

► MSB pipe connection check

- How to start: Press K2 4time (Heat Recovery only)

※ In heat pump model: select trial operation mode in cooling or heating mode automatically

- Operation sequence

	OUD	IDU for checking	Other IDUs	Check point
Cooling	Normal operation	Fan on/ EEV open	Fan on/ EEV close	Evap in temp-lowest
Heating	Normal operation	Fan on/ EEV close	Fan on/ EEV open	Evap out temp-lowest

- Display

1. Starting | P | i | P | E | ↔ | C | o | o | L | or | P | i | P | E | ↔ | H | E | A | T |

2. Starting | A | B | C | D | ↔ | E | F | G | H |

A , B: Checking IDU address
C , D: IDU which evap in temp changed, "--" means none
E , F: no display
G , H: IDU which evap out temp changed, "--" means none

3. Finishing | H | O | L | D |

4. Result- Normal communication or | E | r | r | P |

※ When we have | E | r | r | P | press K2 to see more information Error code(E190) → MSB address & port (C00A) → IDU address checked & IDU address temp changed(00--)

※ E190- No or wrong IDU's Evap in temp changed

※ E191- No or wrong IDU's Evap out temp changed

► Heat Pump Model: Outdoor temperature is more than 15°C/ Cooling Auto Trial Operation start
Outdoor temperature is less than 15°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.

■ Forced defrost operation

► Forced defrost operation: Is operation when Frost Formation occurs in the outdoor. (When carried out the service)

Method of Entry	K2 Tact Switch 7 times
Start pattern	Heating Trial Operation pattern
Defrost start	Defrost start: It is after10 minutes which Safety Start finishes.
Defrost off	General defrost operation conditions are the same as.
Etc.	Defrost shut down and stop the normal pattern of the outdoor unit stop.

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 8 times
Start pattern	Outdoor temperature is more than 10°C: Cooling Auto Trial Operation Outdoor 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 VRF Models EEPROM Code Table

No.	Project name	Model name	Inverter PBA	EEP Code
1	High Efficiency HP (208~230V)	VPC072S4M-4Y	DB92-05092C	DB82-06781A
2		VPC096S4M-4Y	DB92-05092C	DB82-06782A
3		VPC120S4M-4Y	DB92-05092C	DB82-06783A
4		VPC144S4M-4Y	DB92-05092C	DB82-06784A
5		VPC168S4M-4Y	DB92-05092C	DB82-06785A
6		VPC192S4M-4Y	DB92-05092C	DB82-06786A
7		VPC216S4M-4Y	DB92-05092C	DB82-06787A
8		VPC240S4M-4Y	DB92-05092C	DB82-06788A
9	High Efficiency HP (460V)	VPC072S4M-4G	DB92-05092C	DB82-06789A
10		VPC096S4M-4G	DB92-05092C	DB82-06790A
11		VPC120S4M-4G	DB92-05092C	DB82-06791A
12		VPC144S4M-4G	DB92-05092C	DB82-06792A
13		VPC168S4M-4G	DB92-05092C	DB82-06793A
14		VPC192S4M-4G	DB92-05092C	DB82-06794A
15		VPC216S4M-4G	DB92-05092C	DB82-06795A
16		VPC240S4M-4G	DB92-05092C	DB82-06796A
17	High Efficiency HR (208~230V)	VRC072S4M-4Y	DB92-05092C	DB82-06798A
18		VRC096S4M-4Y	DB92-05092C	DB82-06799A
19		VRC120S4M-4Y	DB92-05092C	DB82-06800A
20		VRC144S4M-4Y	DB92-05092C	DB82-06801A
21		VRC168S4M-4Y	DB92-05092C	DB82-06802A
22		VRC192S4M-4Y	DB92-05092C	DB82-06803A
23		VRC216S4M-4Y	DB92-05092C	DB82-06804A
24		VRC240S4M-4Y	DB92-05092C	DB82-06805A
25	High Efficiency HR (460V)	VRC072S4M-4G	DB92-05092C	DB82-06806A
26		VRC096S4M-4G	DB92-05092C	DB82-06807A
27		VRC120S4M-4G	DB92-05092C	DB82-06808A
28		VRC144S4M-4G	DB92-05092C	DB82-06809A
29		VRC168S4M-4G	DB92-05092C	DB82-06810A
30		VRC192S4M-4G	DB92-05092C	DB82-06811A
31		VRC216S4M-4G	DB92-05092C	DB82-06812A
32		VRC240S4M-4G	DB92-05092C	DB82-06813A

4-2 Service Operation (cont.)

4-2-2 VRF Models EEPROM Code Table (Cont.)

No.	Project name	Model name	Inverter PBA	EEP Code
33	High Efficiency HP (575V)	VPC072S4M-4J	DB92-05092C	DB82-08619A
34		VPC096S4M-4J	DB92-05092C	DB82-08620A
35		VPC120S4M-4J	DB92-05092C	DB82-08621A
36		VPC144S4M-4J	DB92-05092C	DB82-08622A
37		VPC168S4M-4J	DB92-05092C	DB82-08623A
38		VPC192S4M-4J	DB92-05092C	DB82-08624A
39		VPC216S4M-4J	DB92-05092C	DB82-08625A
40		VPC240S4M-4J	DB92-05092C	DB82-08626A
41	High Efficiency HR (575V)	VRC072S4M-4J	DB92-05092C	DB82-08627A
42		VRC096S4M-4J	DB92-05092C	DB82-08628A
43		VRC120S4M-4J	DB92-05092C	DB82-08629A
44		VRC144S4M-4J	DB92-05092C	DB82-08630A
45		VRC168S4M-4J	DB92-05092C	DB82-08631A
46		VRC192S4M-4J	DB92-05092C	DB82-08632A
47		VRC216S4M-4J	DB92-05092C	DB82-08633A
48		VRC240S4M-4J	DB92-05092C	DB82-08634A
49	Max Heat HP (208~230V)	VPC072L4M-4Y	DB92-05092C	DB82-07335A
50		VPC096L4M-4Y	DB92-05092C	DB82-07336A
51		VPC120L4M-4Y	DB92-05092C	DB82-07337A
52	Max Heat HP (460V)	VPC072L4M-4G	DB92-05092C	DB82-07338A
53		VPC096L4M-4G	DB92-05092C	DB82-07339A
54		VPC120L4M-4G	DB92-05092C	DB82-07340A
55	Max Heat HR (208~230V)	VRC072L4M-4Y	DB92-05092C	DB82-07341A
56		VRC096L4M-4Y	DB92-05092C	DB82-07342A
57		VRC120L4M-4Y	DB92-05092C	DB82-07343A
58	Max Heat HR (460V)	VRC072L4M-4G	DB92-05092C	DB82-07344A
59		VRC096L4M-4G	DB92-05092C	DB82-07345A
60		VRC120L4M-4G	DB92-05092C	DB82-07346A

4-2 Service Operation (cont.)

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

■ How to Display Integrated Error Code

► Meanings of First Alphabetical Character/ Number of Error Code

Displayed alphabet	Explanation	
E	When displaying Error 101~700	
P	When displaying Error 701~800	
C	When E206 error occurs	Displays address of subordinate within the set C001: HUB, C002: FAN, C003: INV1, C004: INV2
	When MSB error occurs	Displays address of MSB Ex) C100: MSB address 0, C101: MSB address 1, C102: MSB address 2
P	When displaying outdoor unit address Ex) U200~203 main, Sub 1, 2, 3	
U	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
A		J		S	
B		K		T	
C		L		U	
D		M		V	
E		N		W	
F		O		X	
G		P		Y	
H		Q		Z	
I		R		bar	

Number	7-SEG display	Number	7-SEG display
0		5	
1		6	
2		7	
3		8	
4		9	

4-2 Service Operation (cont.)

4-2-3 Number Display Method (Outdoor Unit, MSB, 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-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 MSB SOL V/V (1st detection)
E-181	Simultaneous opening of cooling/heating MSB 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 (Temperature increase of the therminal block)
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, MSB, 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 MSB ports that are not in series.
E-212	If the rotary switch (on the MSB) 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 MSB is same as actual number of installed indoor units but there is indoor unit that is not installed even though it is assigned on MSB Not set MSB port address in indoor unit Incompatibility between indoor unit and MSB
E-214	When number of MSB is not set correctly on the outdoor unit or when two or more MSB was installed some of them have the same address
E-215	When two different MSB's have same address value on the rotary switch
E-216	When indoor unit is not installed to a MSB port but the switch on the port is set to On.
E-217	hen indoor unit is connected to a MSB port but indoor unit is assigned to a MSB 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 unit assigned to MSB Connect more than 9 indoor unit in one MSB port
E-219	Error on temperature sensor located on MSB intercooler inlet (Short or Open)
E-220	Error on temperature sensor located on MSB intercooler outlet (Short or Open)
E-221	Error on outdoor temperature sensor of outdoor unit (Short or open)
E-231	Error on COND OUT2 temperature sensor of 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
E-353	Error due to overheated motor of outdoor unit's Fan2

4-2 Service Operation (cont.)

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

■ Diagnosis and Adjustment (Error Code)

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

Error mode	Cause
E-236	Error on COND OUT2 temperature sensor of outdoor unit (Short or Open)
E-246	COND OUT2 sensor is detached
E-327	Error on suction sensor 3 (Short or Open)
E-272	Suction3 temperature sensor is detached from the sensor holder on the pipe
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	Overload error of inverter compressor2
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 an abnormal EEPROM of inverter2
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	Overload error of Fan2
E-391	Error due to an abnormal EEPROM of Fan2
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
E-441	Cooling mode restriction due to low air temperature
E-442	Refrigerant charing 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

4-2 Service Operation (cont.)

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

■ Diagnosis and Adjustment (Error Code)

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

Error mode	Cause
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
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
E-464	Error due to over-current of inverter compressor 1
E-465	Overload 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 an abnormal EEPROM of inverter 1
E-474	Heat sink temperature sensor error of inverter PBA1
E-478	Error due to overcurrent 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 connection error of Fan1/Two motor parameter difference error
E-489	Overload error of Fan1
E-491	Error due to an abnormal EEPROM of Fan1
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-554	Leakage of refrigerant (In case the refrigerant is leaked)
E-560	Outdoor unit's option switch setting error (Using E2P option of other models or emergency operation for compressor malfunction option setting was enabled on all compressors of corresponding outdoor unit)
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-574	Leakage of refrigerant(In case the amount of refrigerant charge is insufficient or the refrigerant is leaked)
E-702	Error due to closed EEV of indoor unit (1st detection)
E-703	Error due to opened EEV of indoor unit (1st detection)
E-901	EHS water in sensor(Short or Open)
E-902	EHS water out sensor(Short or Open)

4-2 Service Operation (cont.)

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

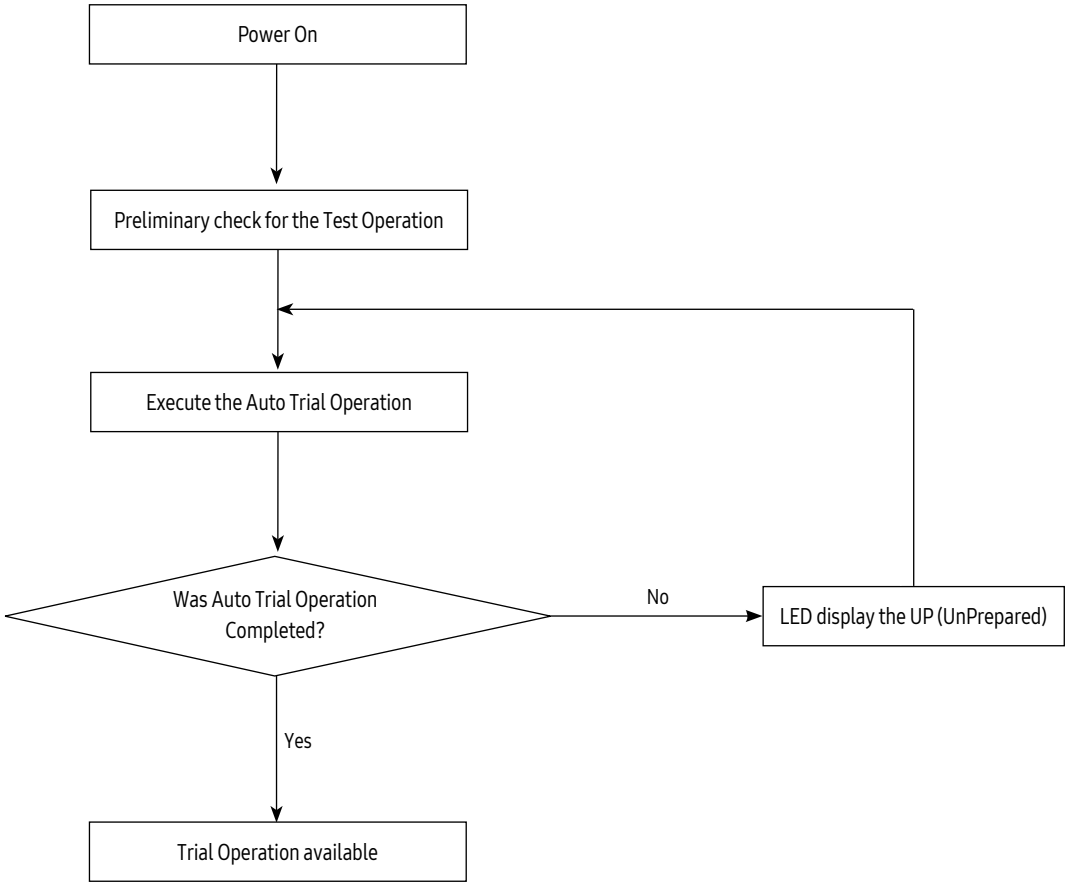
■ Diagnosis and Adjustment (Error Code)

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

Error mode	Cause
E-904	EHS water tank sensor(Short or Open)
E-907	EHS freezing protection error
E-908	EHS freezing protection error (EHS reoperatable)
E-909	EHS freezing protection error (EHS not reoperatable)
E-910	EHS water out sensor detached
E-911	EHS flow switch error
E-913	EHS flow switch error(6th detection)(EHS not resperatable)
E-914	EHS thermostat detached
E-915	EHS radiating fan unoperate error
UP	Trial operation incomplete (UnPrepared) - It will be cleared when trial operation was executed for 1 hour or when automatic inspection is completed.

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 displyed (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.

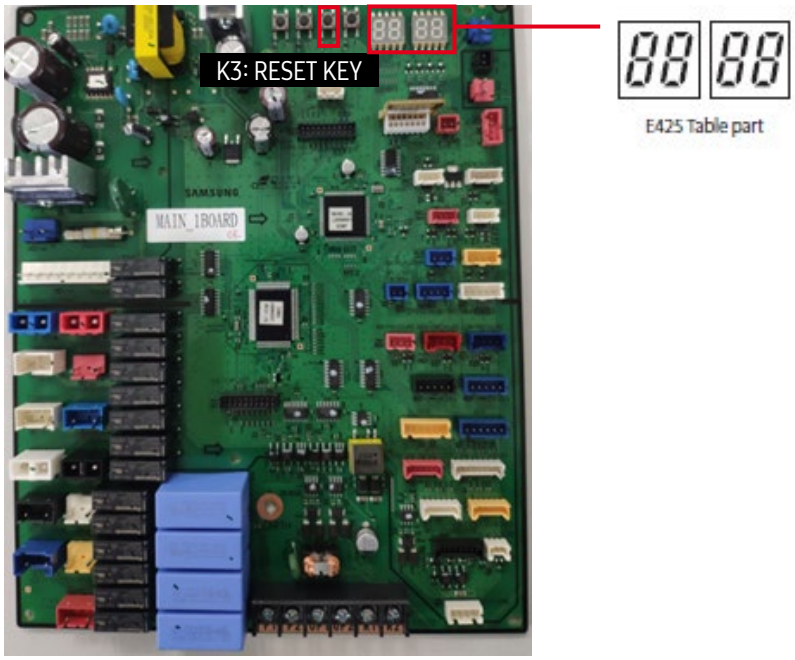
1. Tracking is complete and after the initial installation, if you do not have a history of Auto Trial Operation is completed, UP will be displayed.
2. Execute the Auto Trial Operation by Tact Switch.
3. UP display disappears after Auto Trial Operation is complete, normal operation is possible.
4. Auto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

⚠ CAUTION	▪ 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

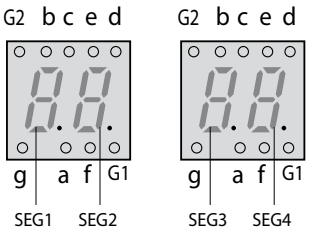
4-3-1 Outdoor Unit Test Operation Flow (cont.)

■ 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			
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" MSB: "C"	I/U: "0" MSB: "1"	Reception address (in decimal number)	

※ I/U: Indoor unit



Outdoor Unit Display Parts

      - 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

■ Quantity of indoor unit [Push Button Type]

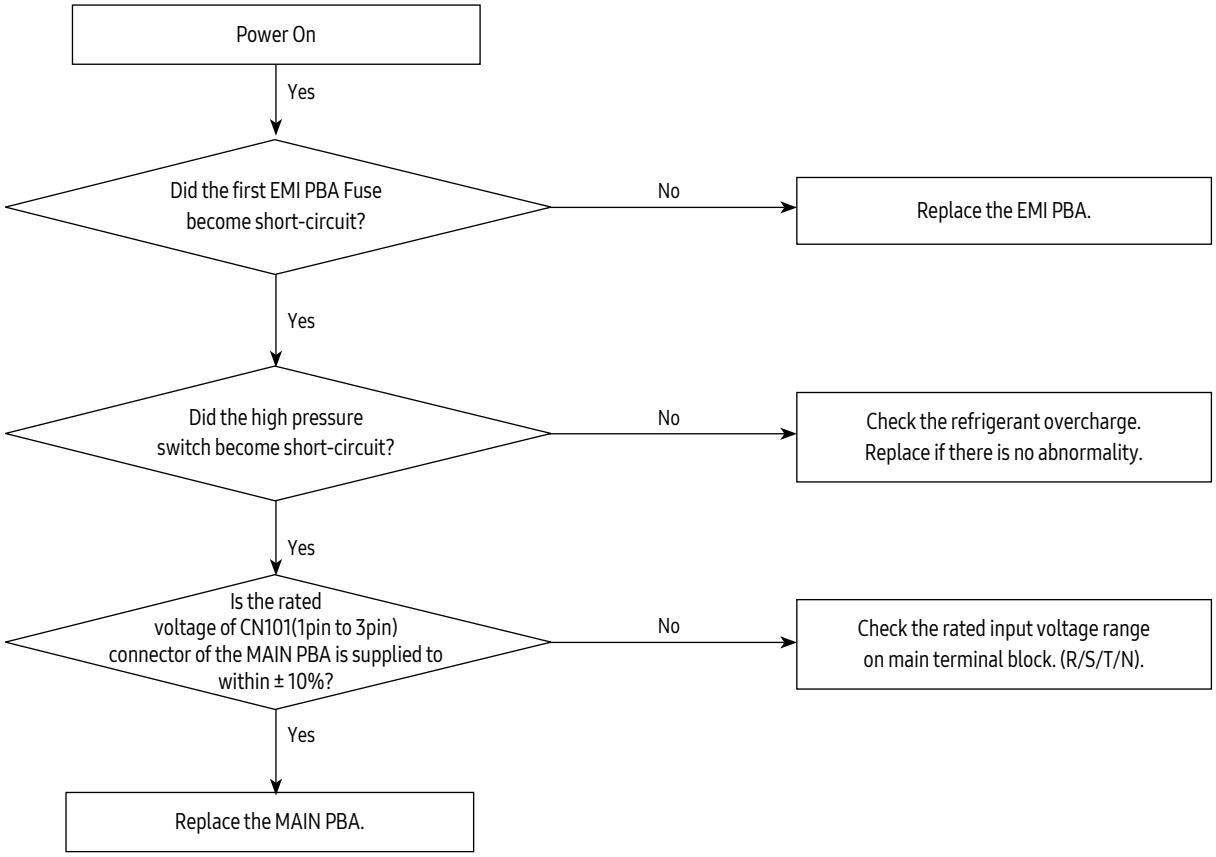
Display	Description
	• Manual setting mode (Default). - Press the K2 button shortly: Setting a 10-digit - Press the K4 button shortly: Setting a 1-digit • Automatic settings mode (Option) Press and hold the K4 button: It is changed to the automatic setting mode, and displays the number of the connected indoor unit. (Ex. 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

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	Main PBA power and connection wire to defect
Connector check Method	CN101(AC 220V) on EMI PBA
Cause of problem	• MAIN PBA connector wire defects and the connection is not. • EMI PBA defective. • High pressure switch operation.

1. Cause of problem



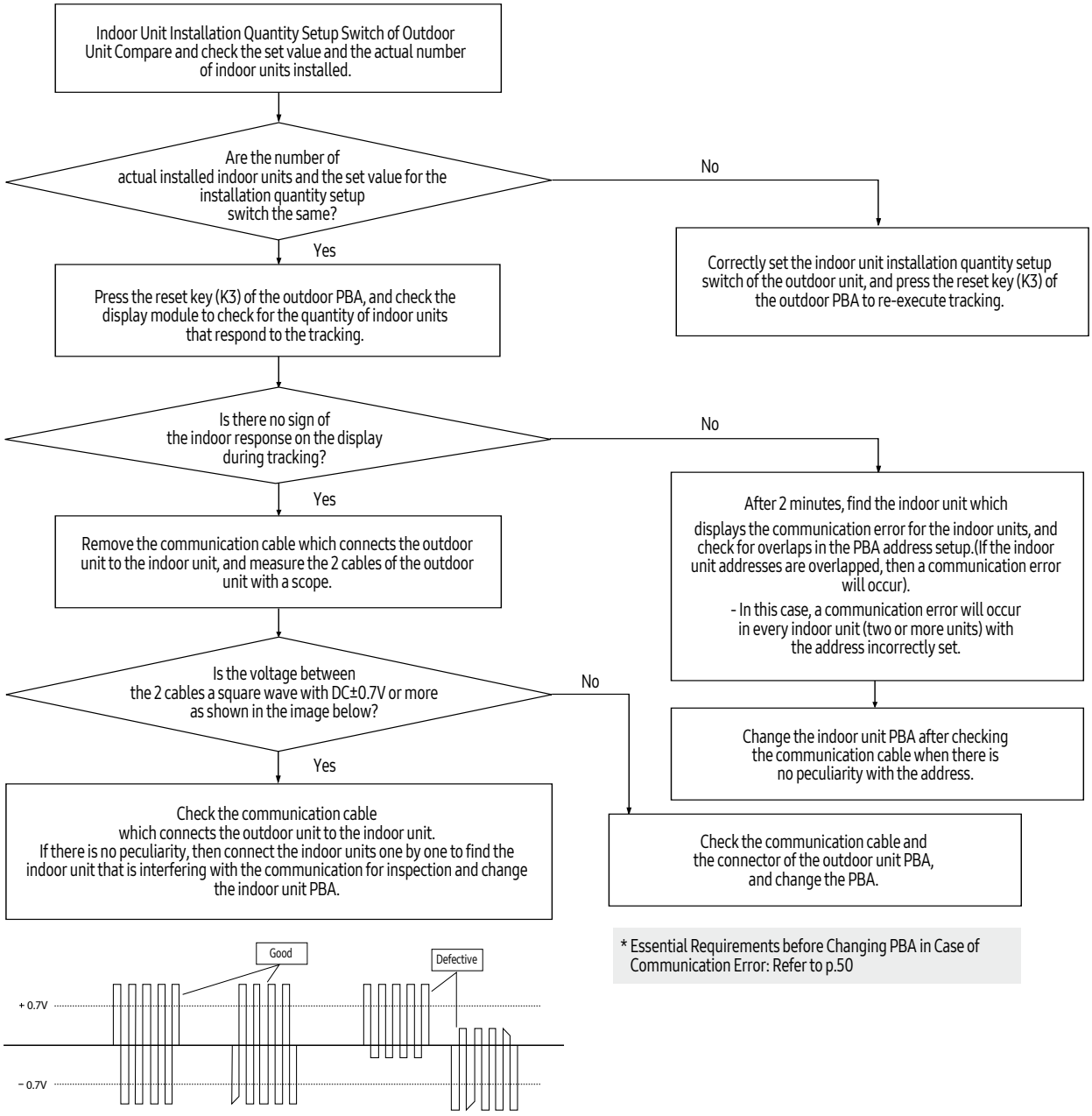
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-3 E201 Communication Error between Indoor and Outdoor Units during Tracking

Outdoor unit display	E201
Indoorunit display	※ ● : ON ◑ : Flash ×: OFF
Judgment Method	• Communication error between indoor and outdoor units.
Cause of problem	• Refer to the judgment method below.

Duct, Cassette (1/2 Way),Console, Celing					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)				
Operation	Defrost	Timer	Fan	Filter/ MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24℃	27℃
×	×	◑	◑	×	×	◑	◑	×	×	×	◑	◑	×

1. Cause of problem



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

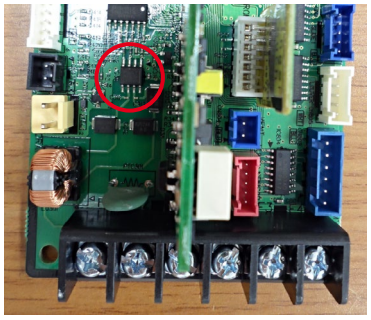
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-3 E201 Communication Error between Indoor and Outdoor Units during Tracking (cont.)

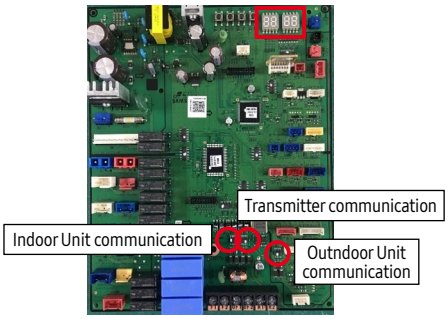
※ Essential Requirements before PBA Changes in Case of Communication Error Occurrence

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 VRF
    Above Red Connector of Main Unit: Communication IC between indoor and outdoor units.
  - When there is no module communication as in VRF
    Above Yellow Connector of Each Unit: Communication IC between outdoor units.
  - Other Outdoor Unit- Above Communication Connector: Communication IC between indoor and outdoor unit.



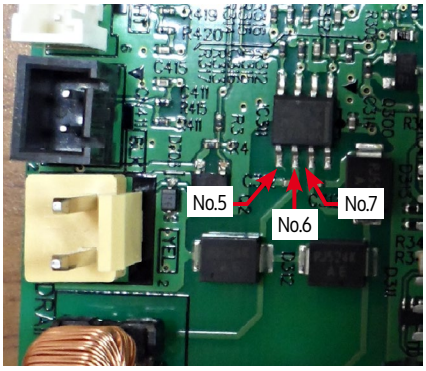
Indoor Unit



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.

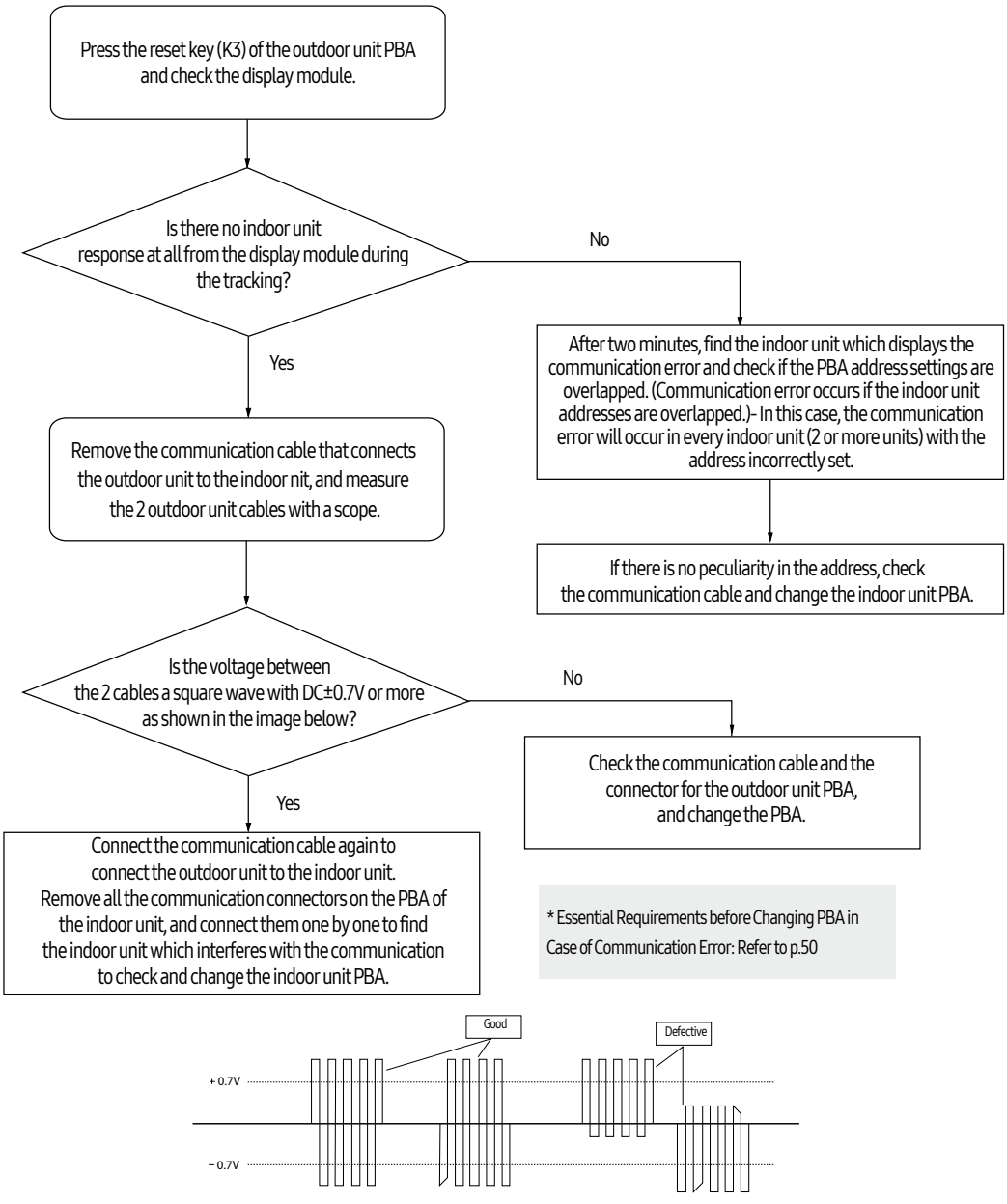
- **Judging as Normal**
  - Each resistance value should be measured in tens of kΩ~to hundreds of kΩ.
  - Difference between the two resistance values should be of some number of kΩ.
- **Judging as defective**
  - One or both are low with tens of Ω
  - One or both of them is open

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

4-3-4 E202 Communication Error between Indoor and Outdoor Units after Tracking

<table>
<tr><td>Outdoor unit display</td><td>E202</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><td colspan="5">Duct, Cassette (1/2 Way),Console, Celing</td><td colspan="4">Cassette (4/Mini4 Way)</td><td colspan="5">Wall-mounted (NeoForte)</td></tr>
<tr><td>Operation</td><td>Defrost</td><td>Timer</td><td>Fan</td><td>Filter/ MPI</td><td>Operation</td><td>Defrost</td><td>Timer</td><td>Filter</td><td>Operation</td><td>Timer</td><td>Turbo</td><td>24℃</td><td>27℃</td></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td></tr>
</table>
※ ● : ON ◑ : Flash ×: OFF
</td></tr>
<tr><td>Judgment Method</td><td>• Outdoor unit is unable to communicate for two minutes during operation. (no reception of relocation)</td></tr>
<tr><td>Cause of problem</td><td>• Communication error between indoor and outdoor units and setup error of indoor unit installation quantity setup switch.</td></tr>
</table>

1. Cause of problem



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

4-3-5 E203 Communication error between main and sub Unit of outdoor unit or between outdoor units

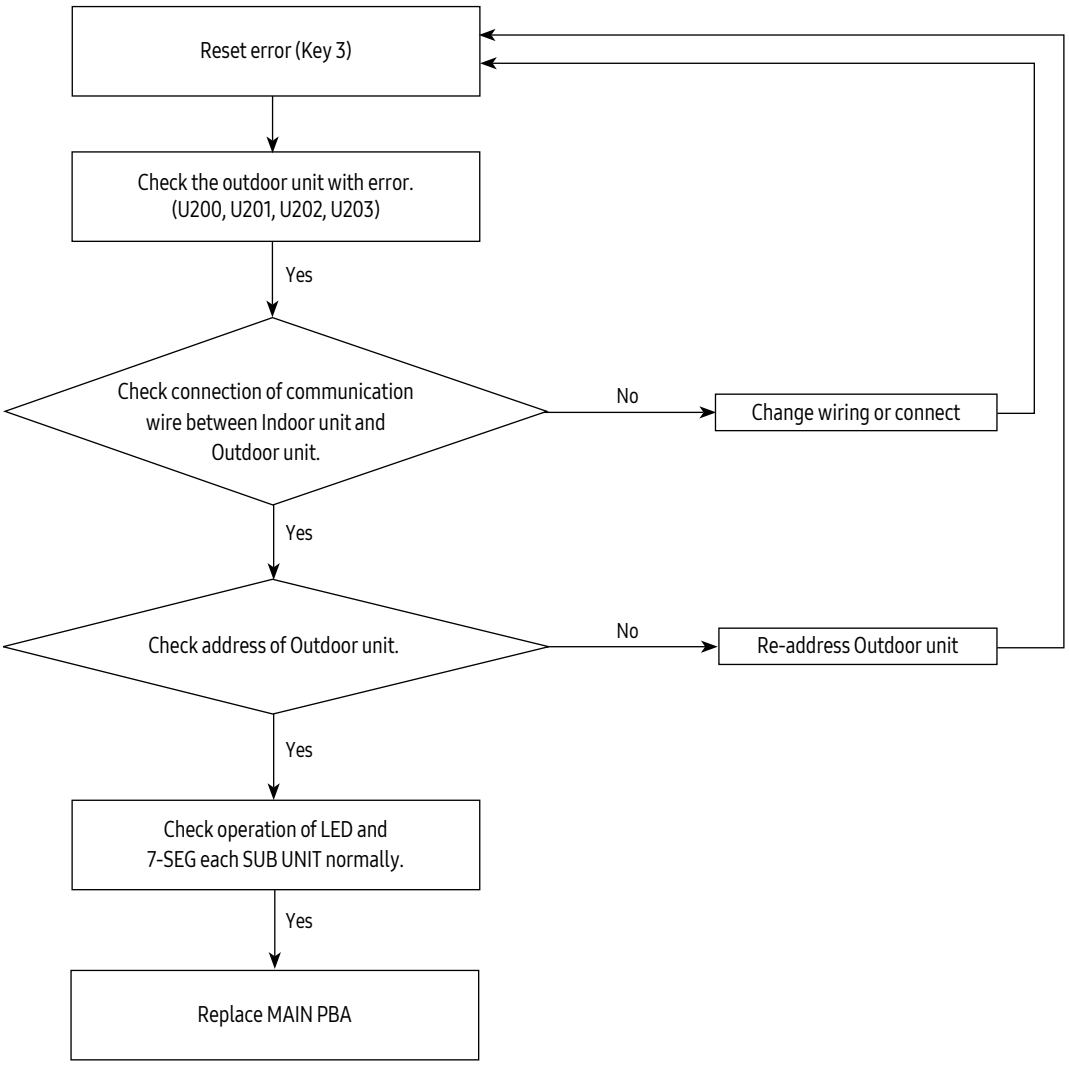
Outdoor unit display	E203
Indoorunit display	Duct, Cassette (1/2 Way),Console, Celing / Cassette (4/Mini4 Way) / Wall-mounted (NeoForte)

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	• Communication error between outdoor units.

1. Cause of problem



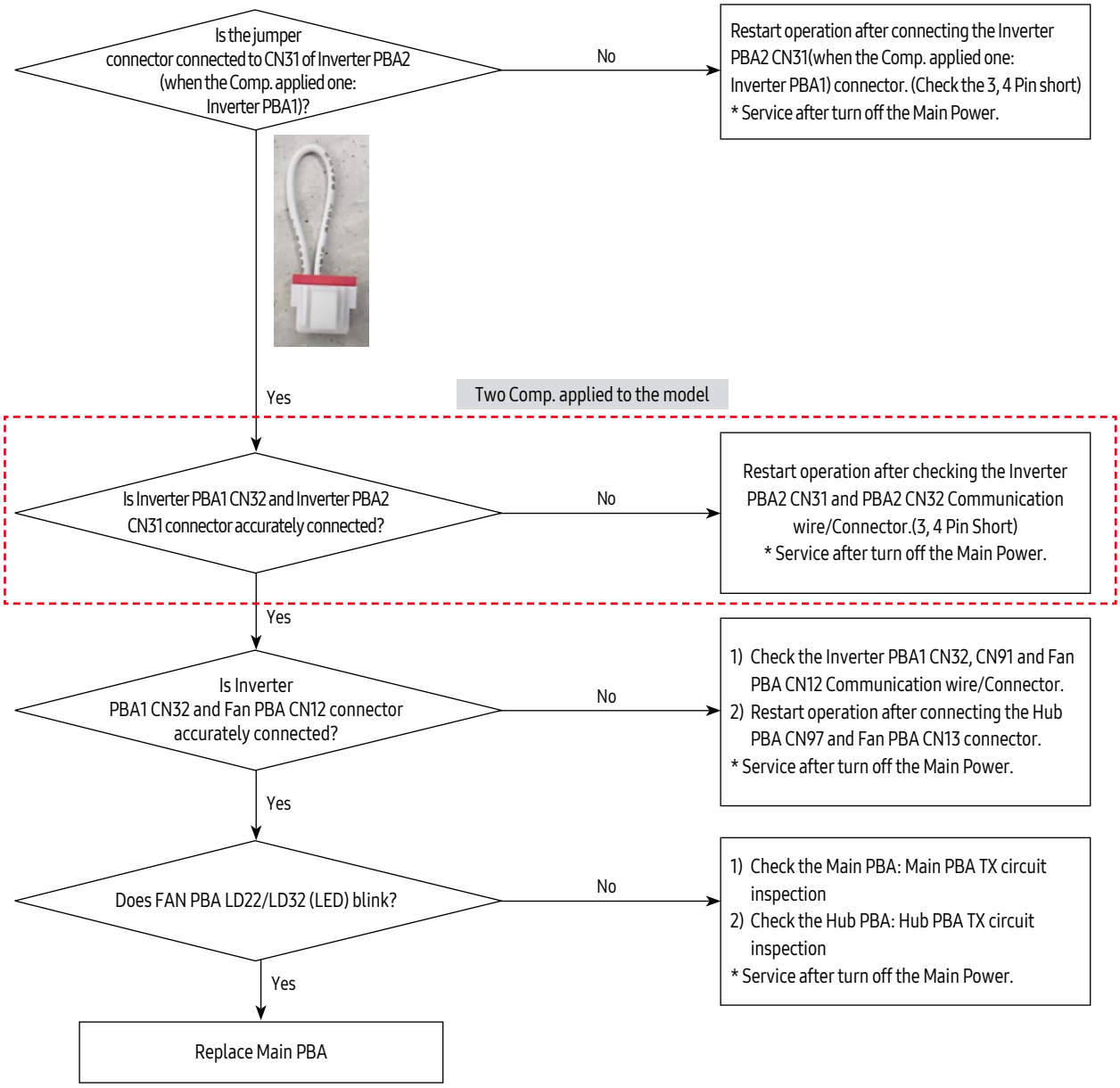
Essential Requirements before Changing PBA in Case of Communication Error: Refer to p.59

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

4-3-6 E205 Internal Communication error of the Outdoor Unit C-Box

<table>
<tr><td>Outdoor unit display</td><td>E205 - All boards of outdoor unit are not communicating</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><td colspan="5">Duct, Cassette (1/2 Way),Console, Celing</td><td colspan="5">Cassette (4/Mini4 Way)</td><td colspan="3">Wall-mounted (NeoForte)</td></tr>
<tr><td>Operation</td><td>Defrost</td><td>Timer</td><td>Fan</td><td>Filter/MPI</td><td>Operation</td><td>Defrost</td><td>Timer</td><td>Filter</td><td>Operation</td><td>Timer</td><td>Turbo</td></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>◑</td><td>◑</td></tr>
</table>
※ ● : ON ◑ : Flash ×: OFF
</td></tr>
<tr><td>Judgment Method</td><td>• Main PBA detecting uART communication other PBA. (Hub, Inverter, Fan)</td></tr>
<tr><td>Cause of problem</td><td>• Communication wire inside the C-Box is unconnected
• Main PBA defective</td></tr>
</table>

1. Cause of problem



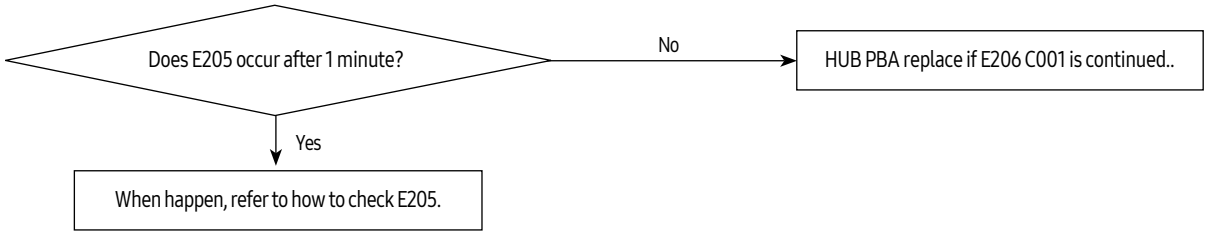
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-7 E206 Internal PBA Communication error of the Outdoor Unit C-Box

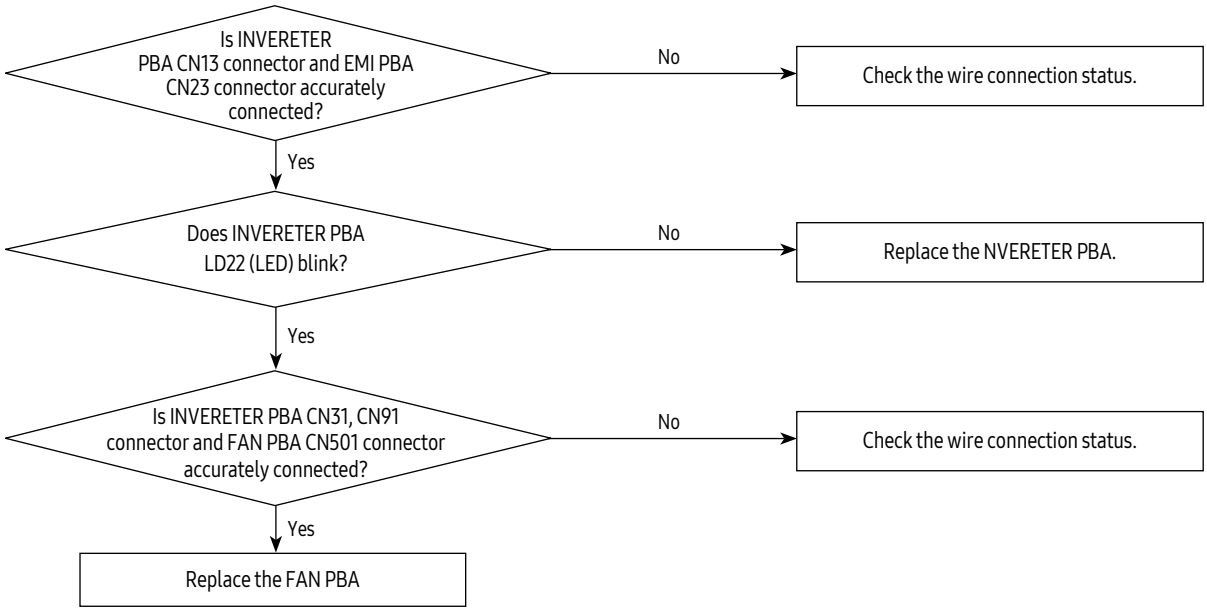
<table>
<tr><td>Outdoor unit display</td><td colspan="12">E206 (C001 ~ C005) - some boards of outdoor unit are not communicating</td></tr>
<tr><td rowspan="4">Indoorunit display</td><td colspan="5">Duct, Cassette (1/2 Way),Console, Celing</td><td colspan="5">Cassette (4/Mini4 Way)</td><td colspan="3">Wall-mounted (NeoForte)</td></tr>
<tr><td>Operation</td><td>Defrost</td><td>Timer</td><td>Fan</td><td>Filter/MPI</td><td>Operation</td><td>Defrost</td><td>Timer</td><td>Filter</td><td>Operation</td><td>Timer</td><td>Turbo</td></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>◑</td><td>◑</td></tr>
<tr><td colspan="12">※ ● : ON ◑ : Flash ×: OFF</td></tr>
<tr><td>Judgment Method</td><td colspan="12">• PBA does not respond to the invoked Main PBA</td></tr>
<tr><td>Cause of problem</td><td colspan="12">• C-Box internal Inverter PBA, Fan PBA, Hub PBA, Water Hub PBA defective.</td></tr>
</table>

1. Cause of problem

E206 C001



E206 C002



E206 C003/C004

C003: Replace the INVERTER PBA 1
C004: Replace the INVERTER PBA 2
C005: Replace the Water Hub PBA

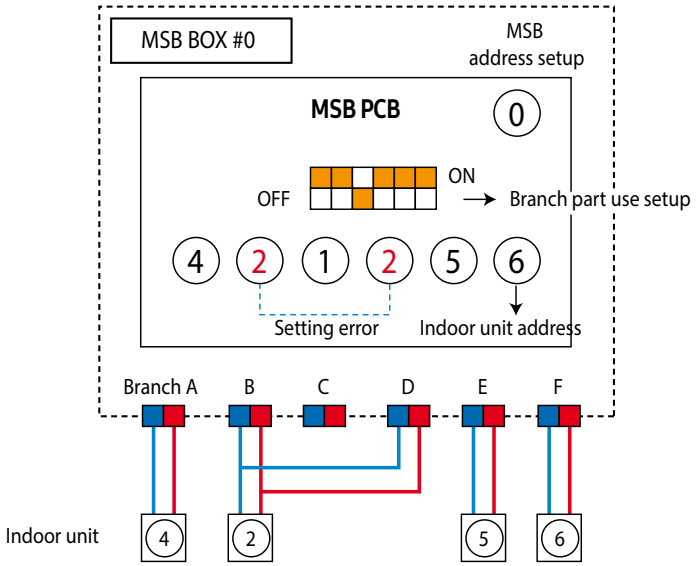
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-8 E211 MSB branch part setup error – inconsecutive connection with the use of 2 branch parts

<table>
<tr><td>Outdoor unit display</td><td>E211</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><td colspan="5">Duct, Cassette (1/2 Way),Console, Celing</td><td colspan="4">Cassette (4/Mini4 Way)</td><td colspan="5">Wall-mounted (NeoForte)</td></tr>
<tr><td>Operation</td><td>Defrost</td><td>Timer</td><td>Fan</td><td>Filter/ MPI</td><td>Operation</td><td>Defrost</td><td>Timer</td><td>Filter</td><td>Operation</td><td>Timer</td><td>Turbo</td><td>24℃</td><td>27℃</td></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td></tr>
</table>
※ ●: ON ◑: Flash ×: OFF
</td></tr>
<tr><td>Judgment Method</td><td>• When 2 branch parts are used for one indoor unit without connecting them consecutively.</td></tr>
<tr><td>Cause of problem</td><td>• Branch part assembly error</td></tr>
</table>

1. How to check

Find an MSB 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.



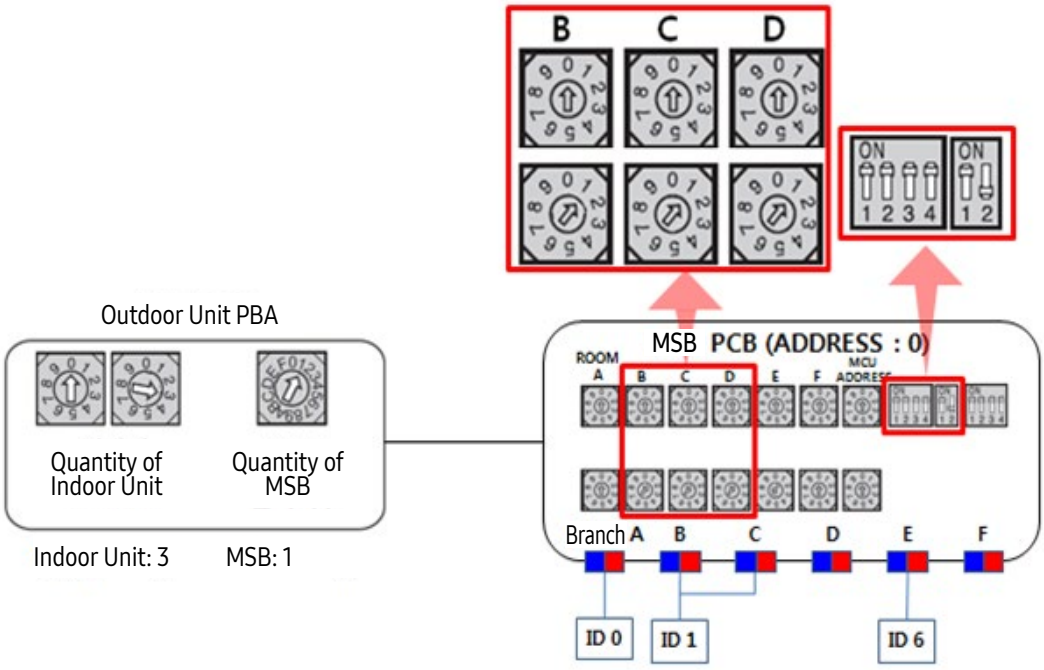
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-9 E2 12 MSB branch part setup error – Repeated setup for the same address over 3 times

<table>
<tr><td>Outdoor unit display</td><td colspan="14">E2 12</td></tr>
<tr><td rowspan="3">Indoorunit display</td><td colspan="5">Duct, Cassette (1/2 Way),Console, Celing</td><td colspan="4">Cassette (4/Mini4 Way)</td><td colspan="5">Wall-mounted (NeoForte)</td></tr>
<tr><td>Operation</td><td>Defrost</td><td>Timer</td><td>Fan</td><td>Filter/ MPI</td><td>Operation</td><td>Defrost</td><td>Timer</td><td>Filter</td><td>Operation</td><td>Timer</td><td>Turbo</td><td>24℃</td><td>27℃</td></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td></tr>
<tr><td colspan="15">※ ●: ON ◑: Flash ×: OFF</td></tr>
<tr><td>Judgment Method</td><td colspan="14">• The same indoor unit address was setup more than 3 times in MSB</td></tr>
<tr><td>Cause of problem</td><td colspan="14">• MSB indoor unit address setting error</td></tr>
</table>

1. How to check

Find an MSB 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.



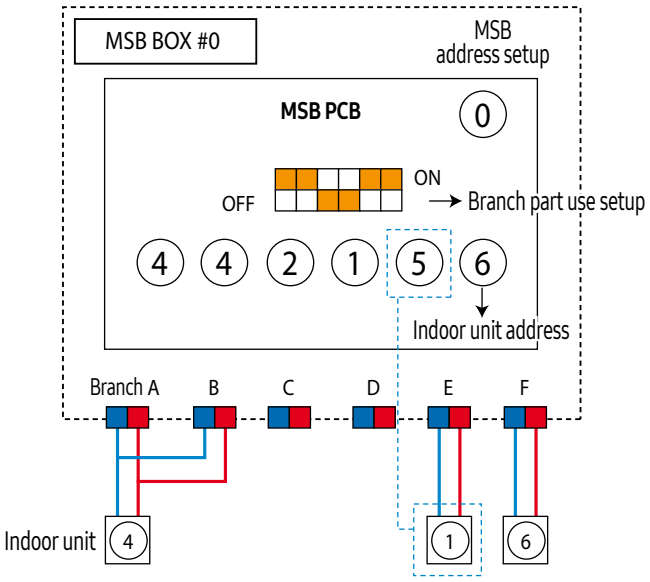
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-10 E2 13 MSB branch part setup error – non-installed address setup

<table>
<tr><td>Outdoor unit display</td><td>E2 13</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><td colspan="5">Duct, Cassette (1/2 Way),Console, Celing</td><td colspan="4">Cassette (4/Mini4 Way)</td><td colspan="5">Wall-mounted (NeoForte)</td></tr>
<tr><td>Operation</td><td>Defrost</td><td>Timer</td><td>Fan</td><td>Filter/ MPI</td><td>Operation</td><td>Defrost</td><td>Timer</td><td>Filter</td><td>Operation</td><td>Timer</td><td>Turbo</td><td>24℃</td><td>27℃</td></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td></tr>
</table>
※ ●: ON ◑: Flash ×: OFF</td></tr>
<tr><td>Judgment Method</td><td>• If there is an indoor unit that is not installed among MSB registered indoor units</td></tr>
<tr><td>Cause of problem</td><td>• Indoor unit, with the assigned address on MSB, not installed.</td></tr>
</table>

1. How to check

Find an MSB 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.)

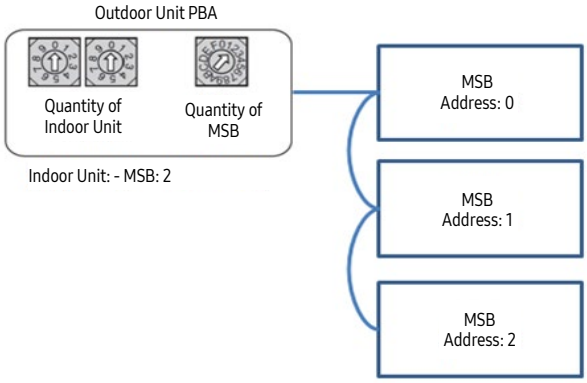
4-3-11 E2 14 Setup Error for MSB Branch part – Setup Error for MSB Quantity Used

<table>
<tr><td>Outdoor unit display</td><td>E2 14</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><th colspan="5">Duct, Cassette (1/2 Way),Console, Celing</th><th colspan="4">Cassette (4/Mini4 Way)</th><th colspan="5">Wall-mounted (NeoForte)</th></tr>
<tr><th>Operation</th><th>Defrost</th><th>Timer</th><th>Fan</th><th>Filter/ MPI</th><th>Operation</th><th>Defrost</th><th>Timer</th><th>Filter</th><th>Operation</th><th>Timer</th><th>Turbo</th><th>24℃</th><th>27℃</th></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td></tr>
</table>
※ ●: ON ◑: Flash ×: OFF</td></tr>
<tr><td>Judgment Method</td><td>• Occurs when the quantity of MSB is incorrectly set by the outdoor unit.
• Occurs when same addresses are found when two or more MSB are connected.</td></tr>
<tr><td>Cause of problem</td><td>• Outdoor unit MSB setup and same address errors when connecting two or more MSB.</td></tr>
</table>

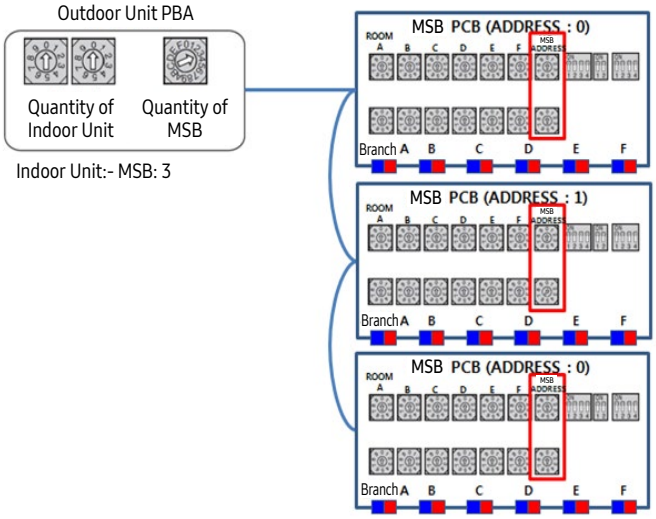
1. Inspection Method

Check the Main PBA MSB quantity setting switch of the outdoor unit and check the installed MSB quantity matches.
Check whether each MSB 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 MSB quantity setting error
ex) PBA MSB setting quantity of outdoor unit = 2/ MSB installed Quantity = 3



• Example of MSB address setting error
ex) Two among three of MSB address was set to 0



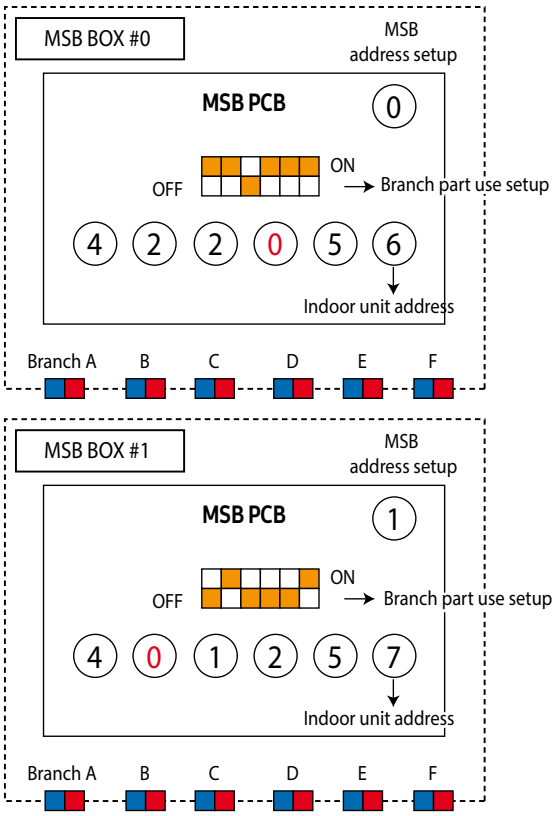
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-12 E2 15 MSB branch part setup error – Overlapping Indoor unit Address setup

<table>
<tr><td>Outdoor unit display</td><td>E2 15</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><td colspan="5">Duct, Cassette (1/2 Way),Console, Celing</td><td colspan="4">Cassette (4/Mini4 Way)</td><td colspan="5">Wall-mounted (NeoForte)</td></tr>
<tr><td>Operation</td><td>Defrost</td><td>Timer</td><td>Fan</td><td>Filter/ MPI</td><td>Operation</td><td>Defrost</td><td>Timer</td><td>Filter</td><td>Operation</td><td>Timer</td><td>Turbo</td><td>24℃</td><td>27℃</td></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td></tr>
</table>
※ ●: ON ◑: Flash ×: OFF
</td></tr>
<tr><td>Judgment Method</td><td>• Occurs when an indoor unit address setup switch in MSB has been overlapped</td></tr>
<tr><td>Cause of problem</td><td>• Repeated indoor unit address</td></tr>
</table>

1. How to check

Check the setup switch for the number of indoor units in MSB.
After completing resetting, press the outdoor unit's K3 button to reset or turn off to restart.



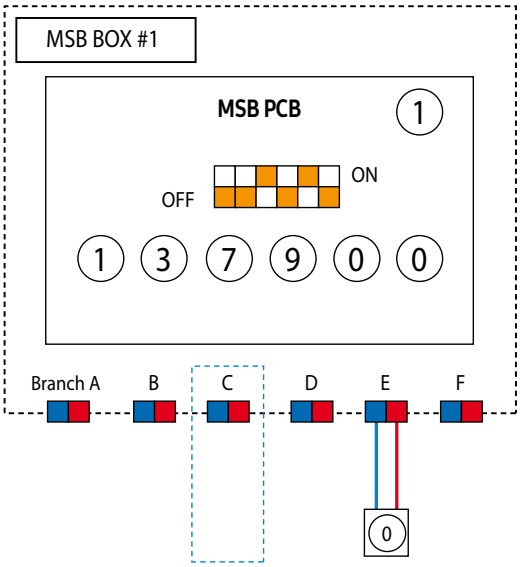
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-13 E2 16 MSB branch part setup error – Set as being used without connection to an Indoor unit

<table>
<tr><td>Outdoor unit display</td><td>E2 16</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><th colspan="5">Duct, Cassette (1/2 Way),Console, Celing</th><th colspan="4">Cassette (4/Mini4 Way)</th><th colspan="5">Wall-mounted (NeoForte)</th></tr>
<tr><th>Operation</th><th>Defrost</th><th>Timer</th><th>Fan</th><th>Filter/ MPI</th><th>Operation</th><th>Defrost</th><th>Timer</th><th>Filter</th><th>Operation</th><th>Timer</th><th>Turbo</th><th>24℃</th><th>27℃</th></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td></tr>
</table>
※ ●: ON ◑: Flash ×: OFF
</td></tr>
<tr><td>Judgment Method</td><td>• Occurs when MSB PIPE is set as being used, yet not connected to an indoor unit</td></tr>
<tr><td>Cause of problem</td><td>• Pipe is not installed to the indoor unit with assigned address on MSB</td></tr>
</table>

1. How to check

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



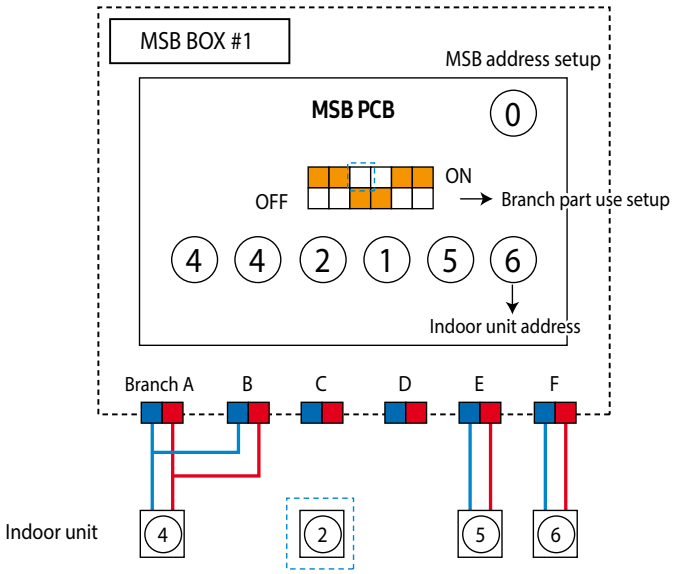
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-14 E2 17 MSB branch part setup error – Connect an Indoor unit to a branch part not being used

<table>
<tr><td>Outdoor unit display</td><td>E2 17</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><th colspan="5">Duct, Cassette (1/2 Way),Console, Celing</th><th colspan="4">Cassette (4/Mini4 Way)</th><th colspan="5">Wall-mounted (NeoForte)</th></tr>
<tr><th>Operation</th><th>Defrost</th><th>Timer</th><th>Fan</th><th>Filter/ MPI</th><th>Operation</th><th>Defrost</th><th>Timer</th><th>Filter</th><th>Operation</th><th>Timer</th><th>Turbo</th><th>24℃</th><th>27℃</th></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td></tr>
</table>
※ ●: ON ◑: Flash ×: OFF
</td></tr>
<tr><td>Judgment Method</td><td>• Occurs when MSB PIPE is turned off, yet an indoor unit is registered</td></tr>
<tr><td>Cause of problem</td><td>• Indoor unit connection to the unused branch part</td></tr>
</table>

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.)

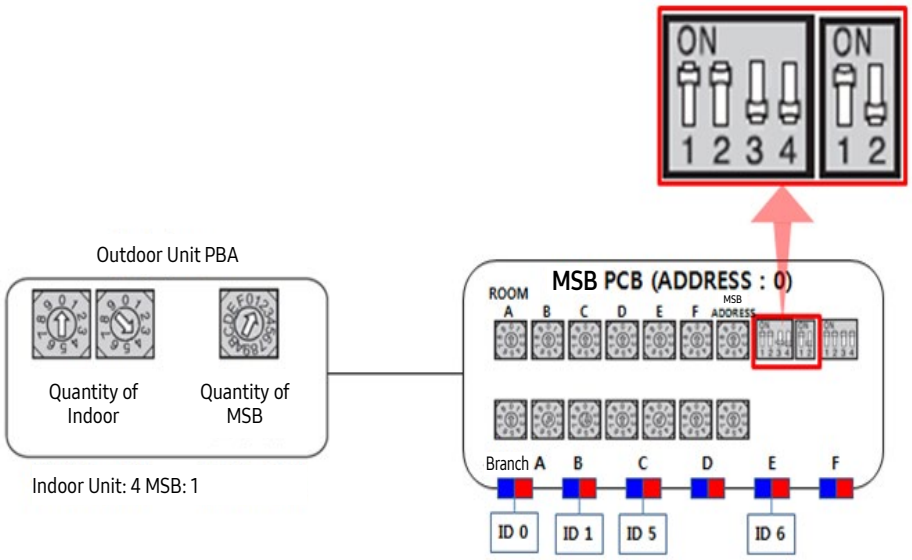
4-3-15 E2 18 MSB branch part setup error – Connect more Indoor units than what is actually set up in MSB

<table>
<tr><td>Outdoor unit display</td><td>E2 18</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><th colspan="5">Duct, Cassette (1/2 Way),Console, Celing</th><th colspan="4">Cassette (4/Mini4 Way)</th><th colspan="5">Wall-mounted (NeoForte)</th></tr>
<tr><th>Operation</th><th>Defrost</th><th>Timer</th><th>Fan</th><th>Filter/ MPI</th><th>Operation</th><th>Defrost</th><th>Timer</th><th>Filter</th><th>Operation</th><th>Timer</th><th>Turbo</th><th>24℃</th><th>27℃</th></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td></tr>
</table>
※ ●: ON ◑: Flash ×: OFF
</td></tr>
<tr><td>Judgment Method</td><td>• Occurs when the number of indoor unit installed exceeds that setting in MSB</td></tr>
<tr><td>Cause of problem</td><td>• Number of indoor units exceeds number of indoor units entered on MSB setting</td></tr>
</table>

1. How to check

Check the number of indoor units connected to MSB 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 MSB 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.

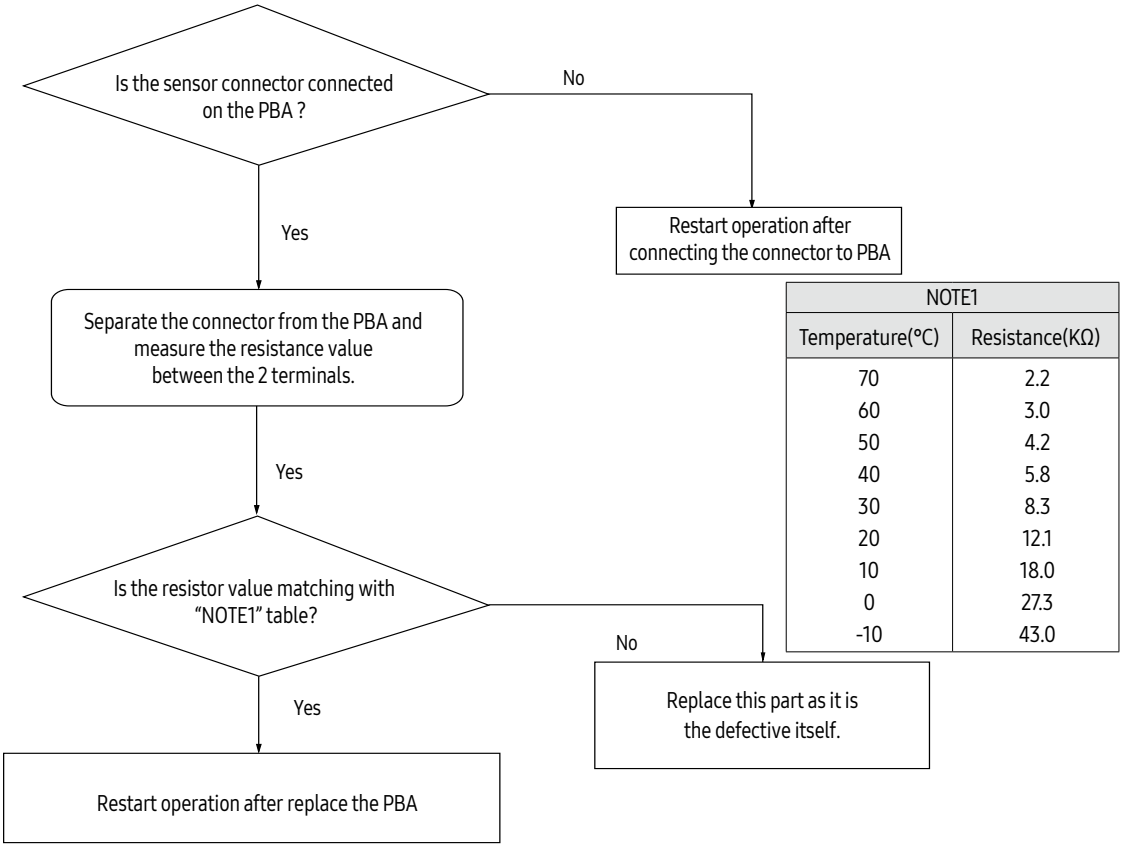


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-16 E219 / E220 MSB/MSB subcooler entrance/exit sensor error (Open/Short)

<table>
<tr><td>Outdoor unit display</td><td>E219 (MSB subcooler)
E220 (MSB)</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><td colspan="5">Duct, Cassette (1/2 Way),Console, Celing</td><td colspan="4">Cassette (4/Mini4 Way)</td><td colspan="3">Wall-mounted (NeoForte)</td></tr>
<tr><td>Operation</td><td>Defrost</td><td>Timer</td><td>Fan</td><td>Filter/MPI</td><td>Operation</td><td>Defrost</td><td>Timer</td><td>Filter</td><td>Operation</td><td>Timer</td><td>Turbo</td></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>●</td><td>◑</td><td>◑</td></tr>
</table>
※ ● : ON ◑ : Flash ×: OFF
</td></tr>
<tr><td>Judgment Method</td><td>- Detect according to temperature detected with the MSB subcooler entrance/exit pipe temperature thermistor.</td></tr>
<tr><td>Cause of problem</td><td>- MSB subcooler pipe entrance/ exit sensor is defective. (open/short)</td></tr>
</table>

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

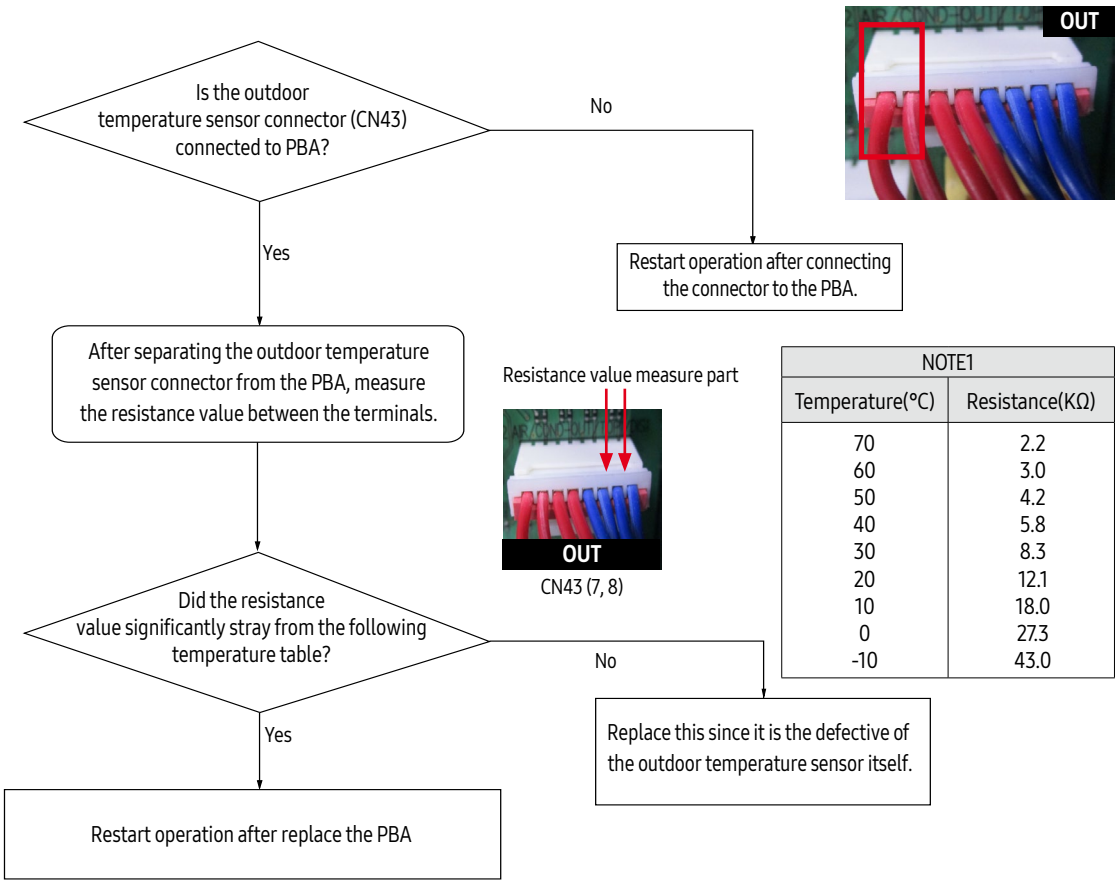
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-17 E221 Outdoor Temperature Sensor Error

Outdoor unit display	E221
Indoorunit display	※ ●: 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)

Duct, Cassette (1/2 Way),Console, Celing					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)				
Operation	Defrost	Timer	Fan	Filter/ MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24℃	27℃
◑	×	×	◑	×	◑	×	◑	×	◑	×	×	◑	×

1. Cause of problem



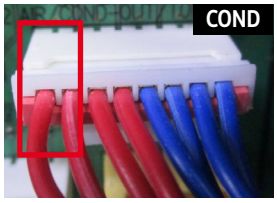
NOTE1	
Temperature(°C)	Resistance(KΩ)
70	2.2
60	3.0
50	4.2
40	5.8
30	8.3
20	12.1
10	18.0
0	27.3
-10	43.0

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

4-3-18 E231 Cond Out Temperature Sensor Error (Open/Short)

<table>
<tr><td>Outdoor unit display</td><td>E231</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><td colspan="5">Duct, Cassette (1/2 Way),Console, Celing</td><td colspan="4">Cassette (4/Mini4 Way)</td><td colspan="5">Wall-mounted (NeoForte)</td></tr>
<tr><td>Operation</td><td>Defrost</td><td>Timer</td><td>Fan</td><td>Filter/ MPI</td><td>Operation</td><td>Defrost</td><td>Timer</td><td>Filter</td><td>Operation</td><td>Timer</td><td>Turbo</td><td>24℃</td><td>27℃</td></tr>
<tr><td>◑</td><td>×</td><td>×</td><td>◑</td><td>×</td><td>◑</td><td>×</td><td>◑</td><td>×</td><td>◑</td><td>×</td><td>×</td><td>◑</td><td>×</td></tr>
</table>
※ ●: ON ◑: Flash ×: OFF
</td></tr>
<tr><td>Judgment Method</td><td>- Detect according to temperature detected with the cond-out temperature thermistor.</td></tr>
<tr><td>Cause of problem</td><td>- Cond-out temperature sensor is defective. (open/short)</td></tr>
</table>

1. Cause of problem



Is the COND OUT sensor connector (CN43) connected to PBA?

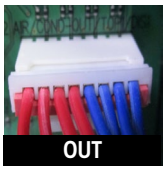
No

Restart operation after connecting the connector to the PBA.

Yes

After separating the outdoor Cond Out sensor connector from the PBA, measure the resistance value between the two terminals.

Resistance value measure part



CN43(5.6)

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

Did the resistance value significantly stray from the following temperature table?

No

Replace this part as it is the defective of the outdoor Cond Out sensor itself.

Yes

Restart operation after replace the PBA.

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

4-3-19 E241 Outdoor Cond Out sensor breakaway error

<table>
<tr><td>Outdoor unit display</td><td colspan="12">E241 (Air Cooled)</td></tr>
<tr><td rowspan="3">Indoorunit display</td><td colspan="5">Duct, Cassette (1/2 Way),Console, Celing</td><td colspan="5">Cassette (4/Mini4 Way)</td><td colspan="3">Wall-mounted (NeoForte)</td></tr>
<tr><td>Operation</td><td>Defrost</td><td>Timer</td><td>Fan</td><td>Filter/MPI</td><td>Operation</td><td>Defrost</td><td>Timer</td><td>Filter</td><td>Operation</td><td>Timer</td><td>Turbo</td></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>●</td><td>◑</td><td>◑</td></tr>
<tr><td colspan="12">※ ● : ON ◑ : Flash ×: OFF</td></tr>
<tr><td>Judgment Method</td><td colspan="12">- Detect according to temperature detected with the cond-out temperature thermistor</td></tr>
<tr><td>Cause of problem</td><td colspan="12">• Outdoor Cond Out sensor breakaway/defective/ relevant path blocked.</td></tr>
</table>

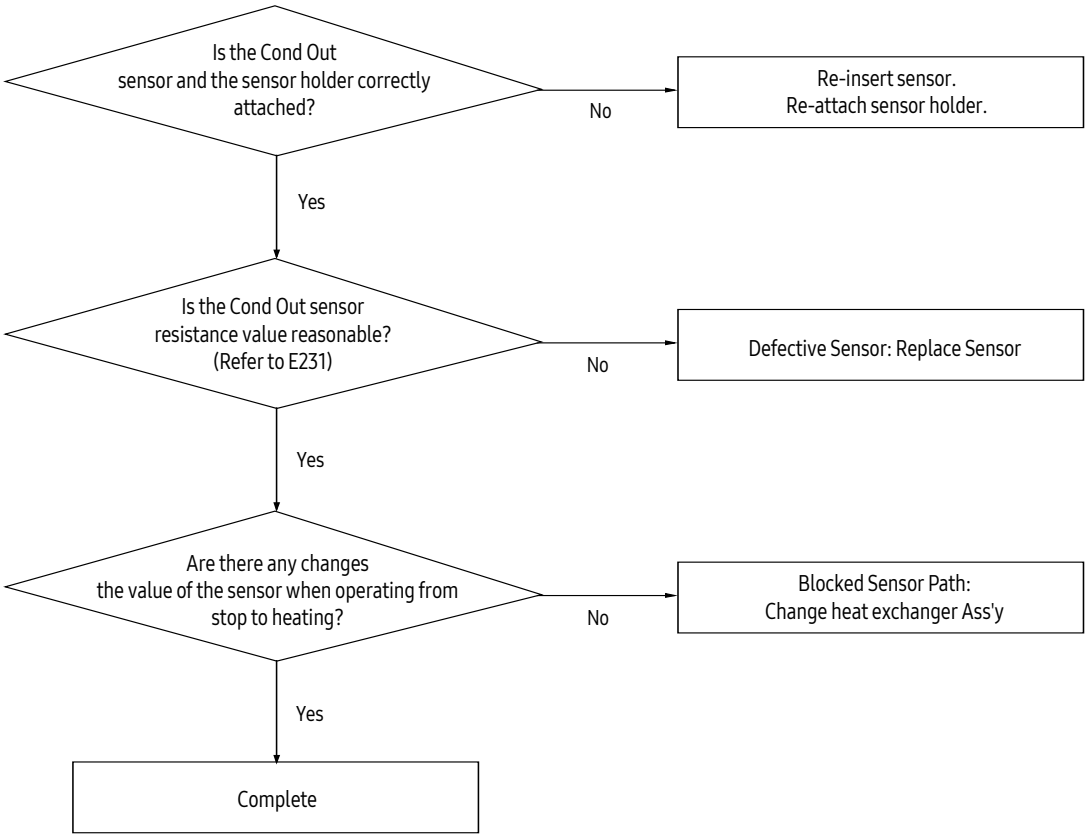
1. Judgment Method

   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/cm²	Yes
Low pressure average < 8.5kg/cm²	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 E241 Outdoor Cond Out sensor breakaway error (cont.)

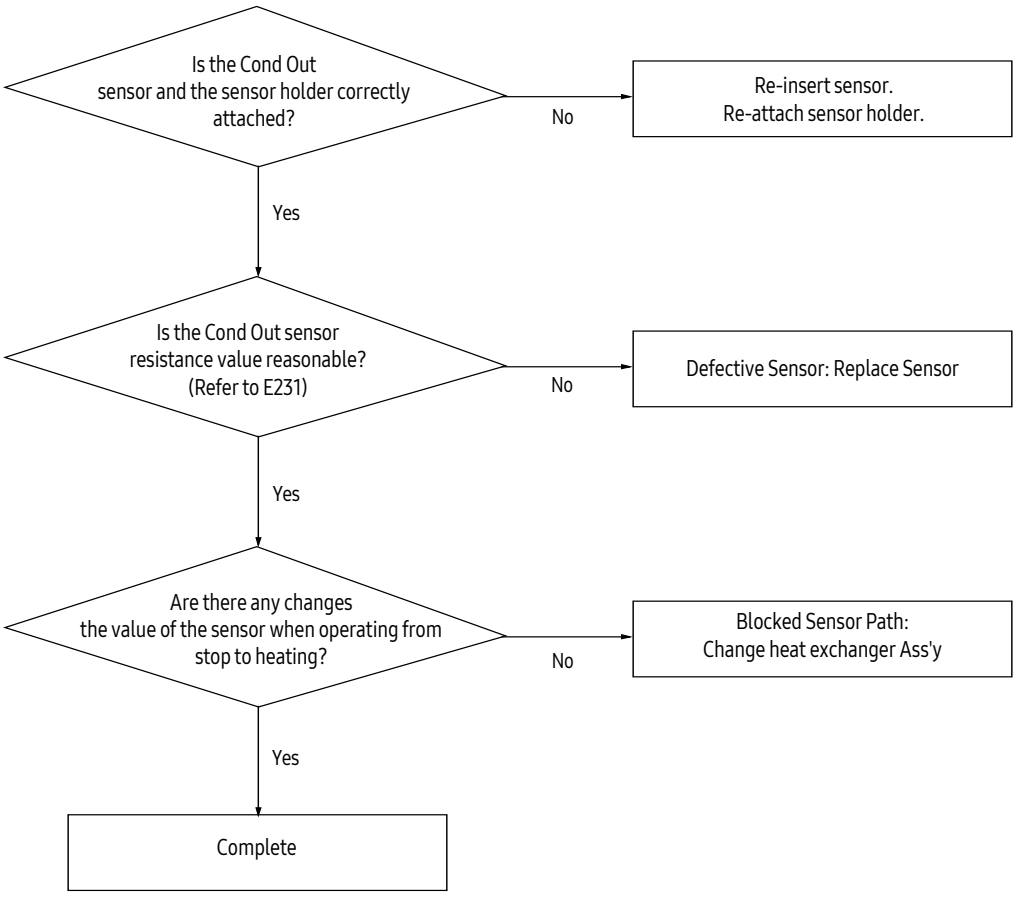
<table>
<tr><td>Outdoor unit display</td><td colspan="12">E241 (Water Cooled)</td></tr>
<tr><td rowspan="3">Indoorunit display</td><td colspan="5">Duct, Cassette (1/2 Way),Console, Celing</td><td colspan="5">Cassette (4/Mini4 Way)</td><td colspan="3">Wall-mounted (NeoForte)</td></tr>
<tr><td>Operation</td><td>Defrost</td><td>Timer</td><td>Fan</td><td>Filter/MPI</td><td>Operation</td><td>Defrost</td><td>Timer</td><td>Filter</td><td>Operation</td><td>Timer</td><td>Turbo</td></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>●</td><td>◑</td><td>◑</td></tr>
<tr><td colspan="12">※ ● : ON ◑ : Flash ×: OFF</td></tr>
<tr><td>Judgment Method</td><td colspan="12">• Refer to the judgment method below.</td></tr>
<tr><td>Cause of problem</td><td colspan="12">• Outdoor Cond Out sensor breakaway/defective/ relevant path blocked.</td></tr>
</table>

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 l Tcondout_real-Tcondout_ini l < 2℃ maintain conditions during 40 minutes.

      ※ Tcondout_ini: Condout out temperature just before the compressor operating starts.
      Tcondout_real: Condout temperature of the current compressor.

2. Cause of problem

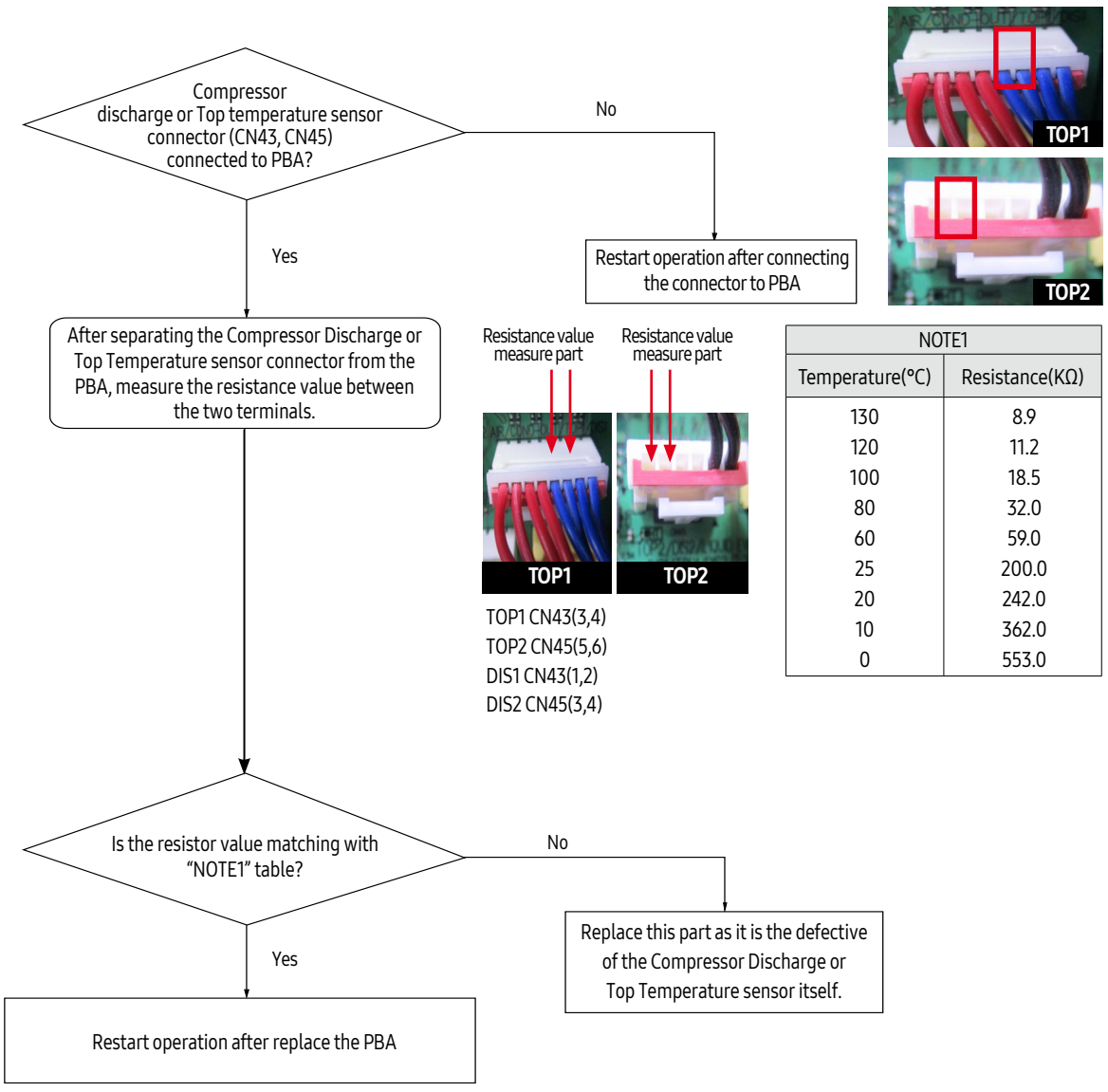


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-20 E251/E257/E276/E277 Compressor Discharge or Top 1/2 Temperature sensor error

<table>
<tr><td>Outdoor unit display</td><td>E251 (Compressor1 Discharge) E257 (Compressor 2 Discharge)
E276 (Compressor1 Top) E277 (Compressor 2 Top)</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><th colspan="5">Duct, Cassette (1/2 Way),Console, Celing</th><th colspan="5">Cassette (4/Mini4 Way)</th><th colspan="3">Wall-mounted (NeoForte)</th></tr>
<tr><th>Operation</th><th>Defrost</th><th>Timer</th><th>Fan</th><th>Filter/MPI</th><th>Operation</th><th>Defrost</th><th>Timer</th><th>Filter</th><th>Operation</th><th>Timer</th><th>Turbo</th></tr>
<tr><td>◑</td><td>×</td><td>×</td><td>◑</td><td>×</td><td>◑</td><td>×</td><td>◑</td><td>×</td><td>◑</td><td>×</td><td>◑</td></tr>
</table>
※ ● : ON ◑ : Flash ×: OFF
</td></tr>
<tr><td>Judgment Method</td><td>• Detect according to temperature detected with the compressor discharge pipe temperature thermistor.</td></tr>
<tr><td>Cause of problem</td><td>• Compressor Discharge or Top Temperature sensor defective. (Open/Short)</td></tr>
</table>

1. Cause of problem



NOTE1

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

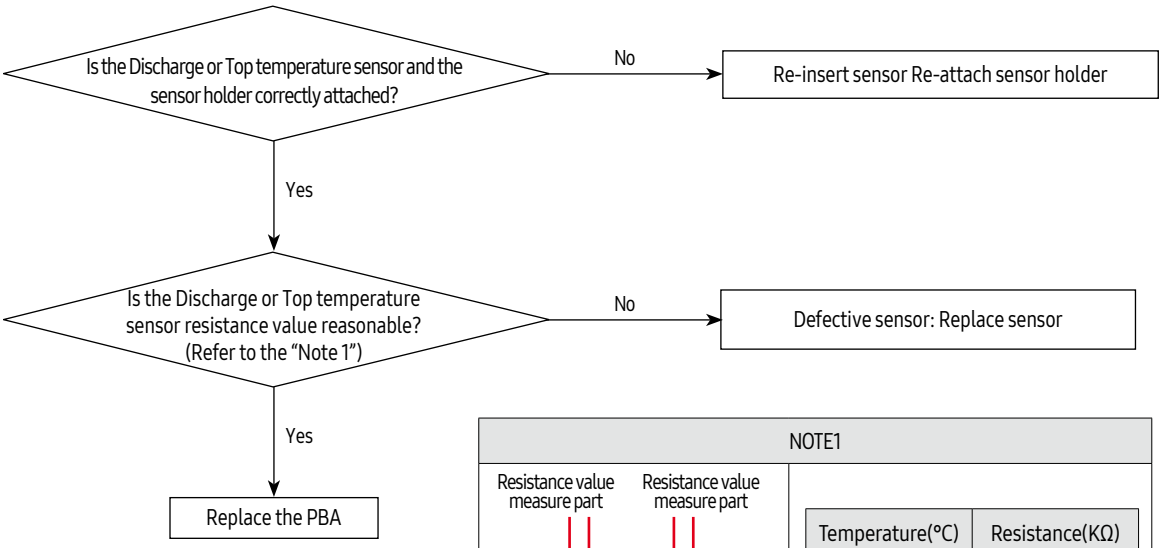
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-21 E262 / E263 / E266 / E267 Compressor Discharge or Top temperature sensor break-away error

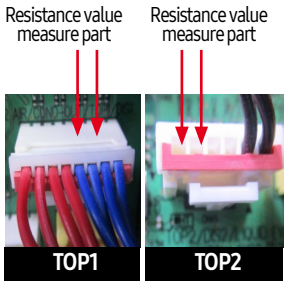
Outdoor unit display	E262 (Compressor1 Discharge) E263 (Compressor 2 Discharge) E266 (Compressor1 Top) E267 (Compressor 2 Top)
Indoorunit display	※ ● : ON ◑ : Flash ×: OFF
Judgment Method	1) Faulty compressor frequency of 60Hz or higher. 2) Suction temperature > Low pressure saturation temperature +10 ℃ 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

Duct, Cassette (1/2 Way),Console, Celing					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)				
Operation	Defrost	Timer	Fan	Filter/ MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24℃	27℃
×	×	◑	◑	◑	×	◑	◑	◑	×	×	◑	◑	◑

1. Cause of problem



NOTE1



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

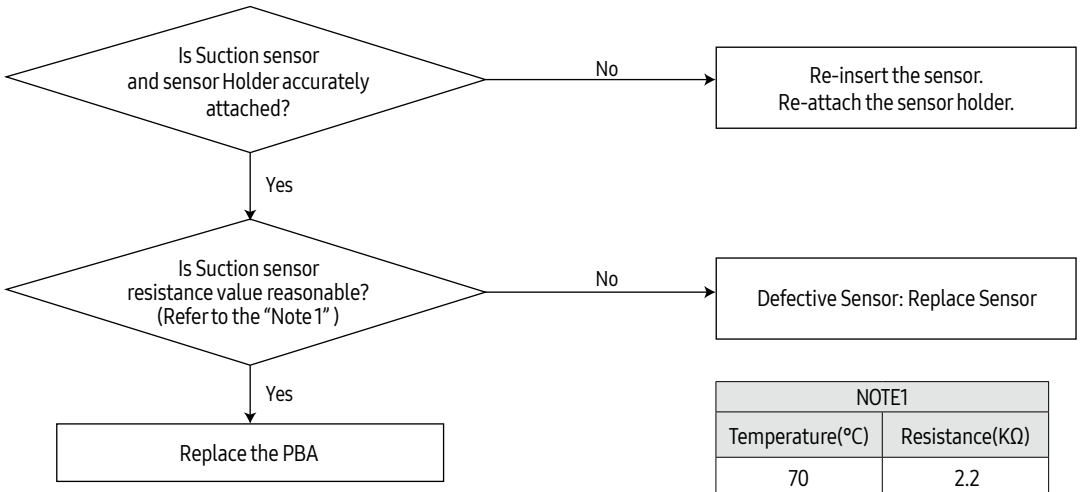
Temperature(°C)	Resistance(KΩ)
130	8.9
120	11.2
100	18.5
80	32.0
60	59.0
25	200.0
20	242.0
10	362.0
0	553.0

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

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

<table>
<tr><td>Outdoor unit display</td><td>E269</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><td colspan="5">Duct, Cassette (1/2 Way),Console, Celing</td><td colspan="5">Cassette (4/Mini4 Way)</td><td colspan="3">Wall-mounted (NeoForte)</td></tr>
<tr><td>Operation</td><td>Defrost</td><td>Timer</td><td>Fan</td><td>Filter/MPI</td><td>Operation</td><td>Defrost</td><td>Timer</td><td>Filter</td><td>Operation</td><td>Timer</td><td>Turbo</td></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>●</td><td>◑</td><td>◑</td></tr>
</table>
※ ● : ON ◑ : Flash ×: OFF
</td></tr>
<tr><td>Judgment Method</td><td>• Judgment Method: Difference of suction temperature of compressor starting verge and suction temperature that is on present operation: If less than 2 ℃ for 30 minutes to keep.(Judgment at heating operation only)</td></tr>
<tr><td>Cause of problem</td><td>• Suction temperature sensor breakaway/defective.</td></tr>
</table>

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

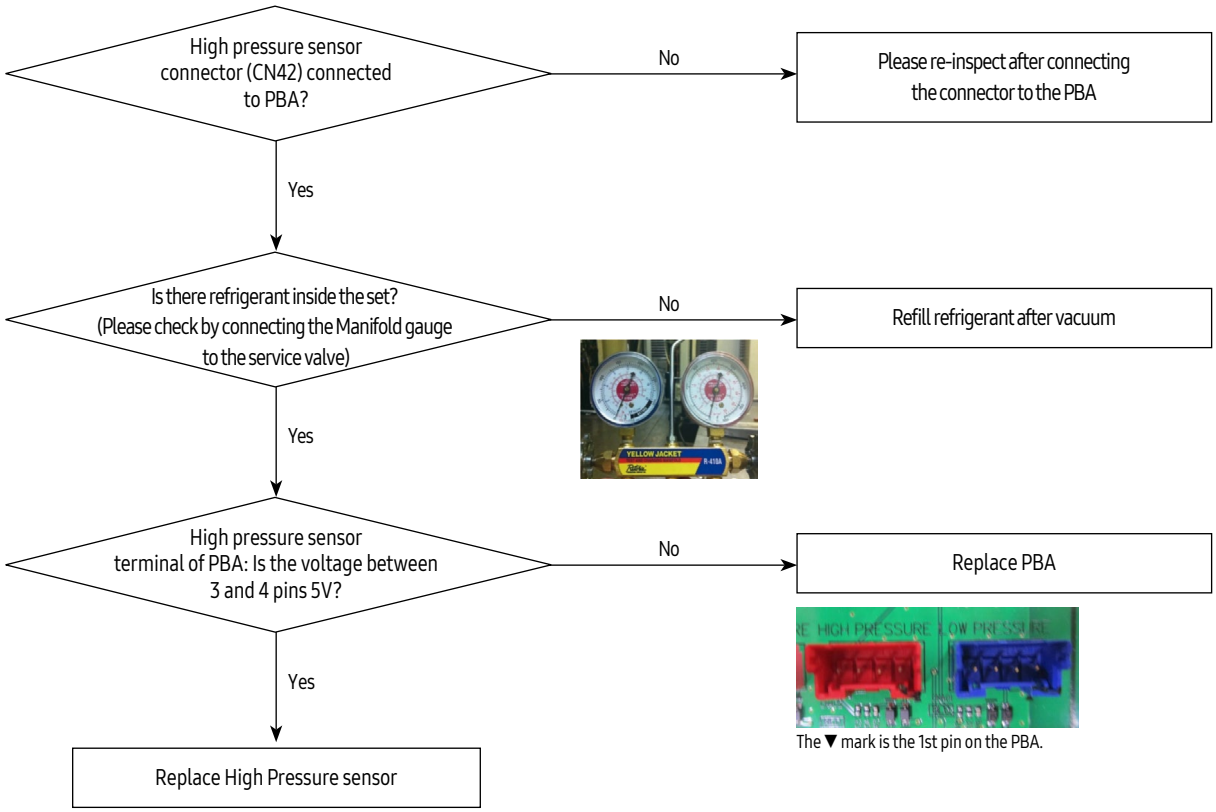
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-23 E291 High Pressure sensor error (Open/Short)

<table>
<tr><td>Outdoor unit display</td><td>E291</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><td colspan="5">Duct, Cassette (1/2 Way),Console, Celing</td><td colspan="5">Cassette (4/Mini4 Way)</td><td colspan="3">Wall-mounted (NeoForte)</td></tr>
<tr><td>Operation</td><td>Defrost</td><td>Timer</td><td>Fan</td><td>Filter/MPI</td><td>Operation</td><td>Defrost</td><td>Timer</td><td>Filter</td><td>Operation</td><td>Timer</td><td>Turbo</td></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>●</td><td>◑</td><td>◑</td></tr>
</table>
※ ● : ON ◑ : Flash ×: OFF
</td></tr>
<tr><td>Judgment Method</td><td>• Detect according to temperature detected with the high pressure sensor.</td></tr>
<tr><td>Cause of problem</td><td>• Disconnection or breakdown of relevant sensor.</td></tr>
</table>

1. High 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



The ▼ mark is the 1st pin on the PBA.

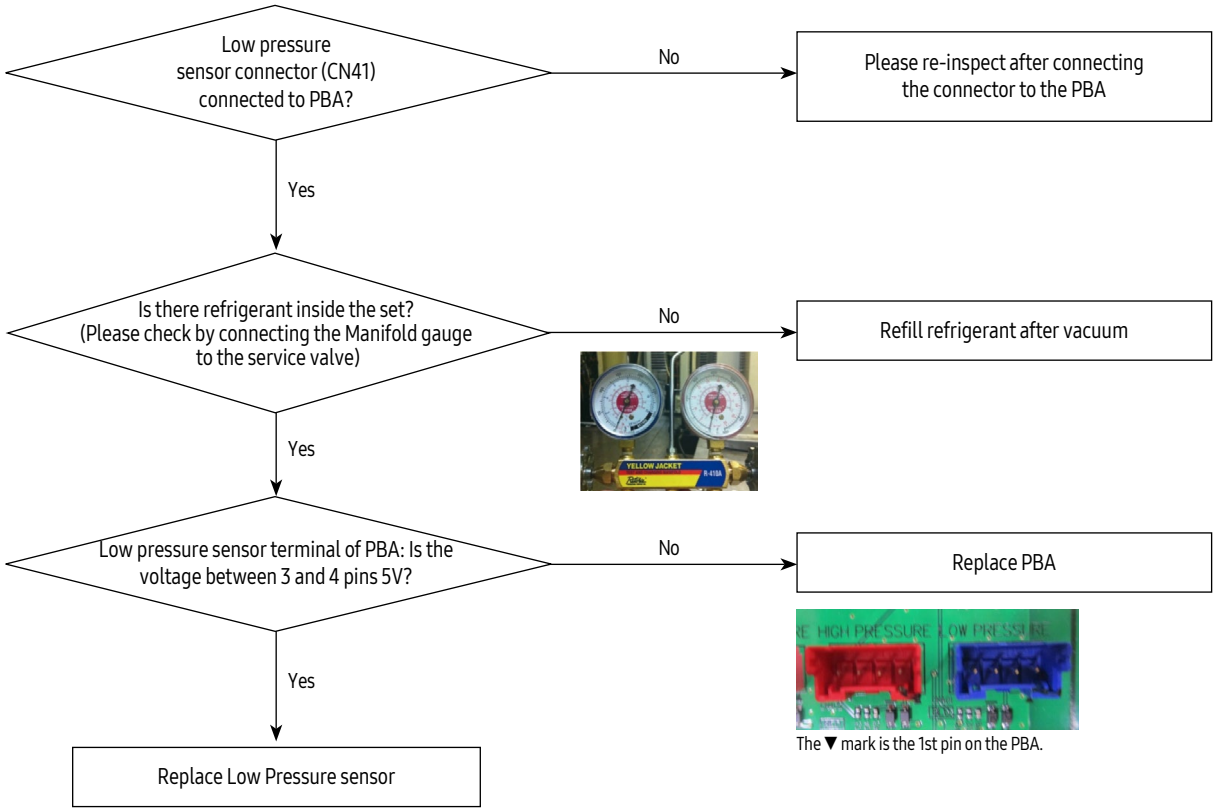
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-24 E296 Low Pressure sensor error (Open/Short)

<table>
<tr><td>Outdoor unit display</td><td>E296</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><td colspan="5">Duct, Cassette (1/2 Way),Console, Celing</td><td colspan="5">Cassette (4/Mini4 Way)</td><td colspan="3">Wall-mounted (NeoForte)</td></tr>
<tr><td>Operation</td><td>Defrost</td><td>Timer</td><td>Fan</td><td>Filter/MPI</td><td>Operation</td><td>Defrost</td><td>Timer</td><td>Filter</td><td>Operation</td><td>Timer</td><td>Turbo</td></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>●</td><td>◑</td><td>◑</td></tr>
</table>
※ ● : ON ◑ : Flash ×: OFF
</td></tr>
<tr><td>Judgment Method</td><td>• Detect according to temperature detected with the low pressure sensor.</td></tr>
<tr><td>Cause of problem</td><td>• Disconnection or breakdown of relevant sensor.</td></tr>
</table>

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



The ▼ mark is the 1st pin on the PBA.

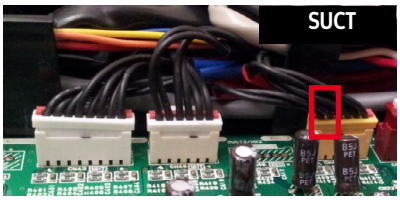
4-3 Appropriate Measures for Different Symptom (cont.)

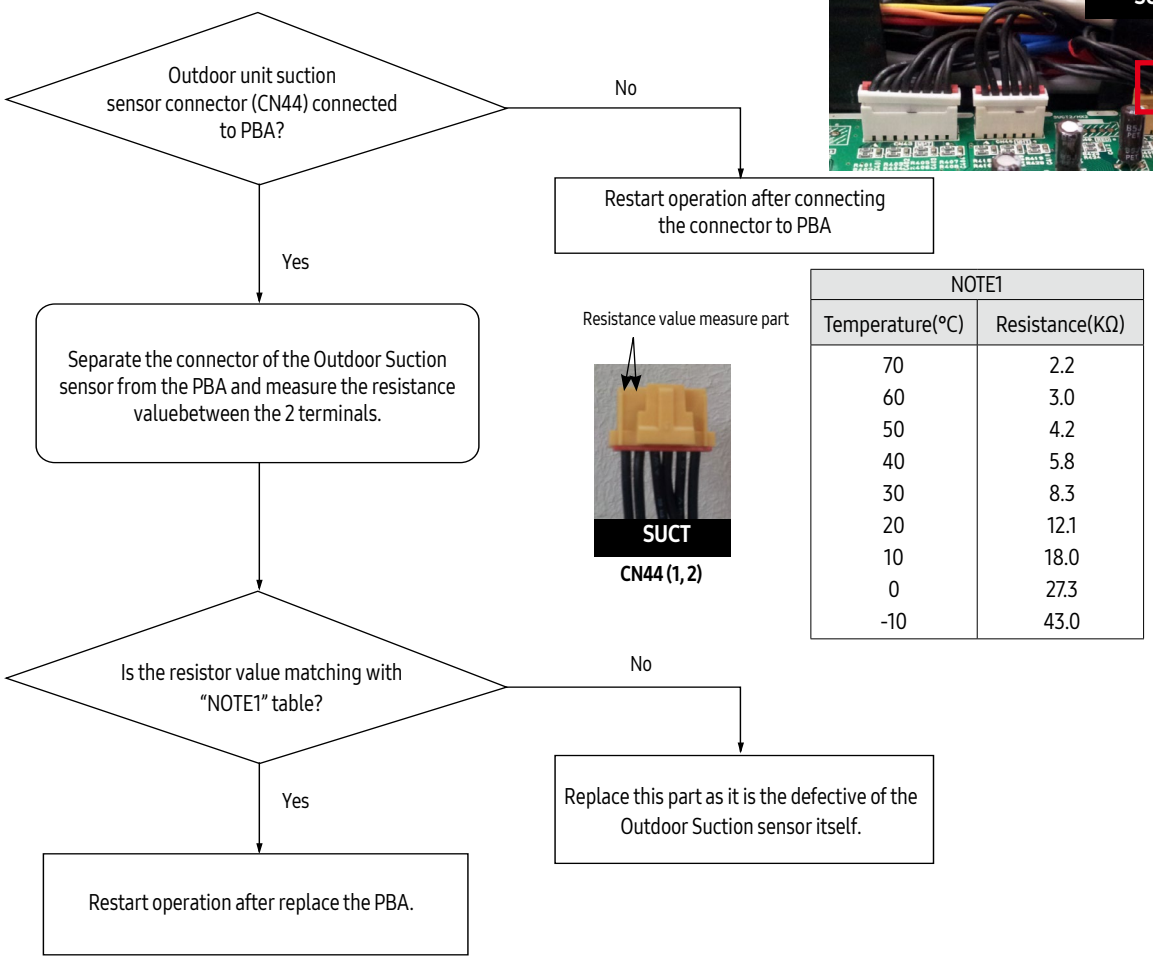
4-3-25 E308 Suction Temperature sensor error (Open/Short)

Outdoor unit display	E308
Indoorunit display	※ ● : 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)

Duct, Cassette (1/2 Way),Console, Celing					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)		
Operation	Defrost	Timer	Fan	Filter/MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo
×	×	◑	◑	◑	×	◑	◑	◑	●	◑	◑

1. Cause of problem





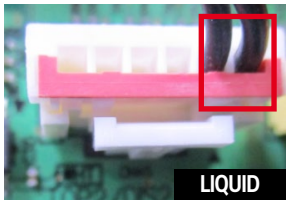
NOTE1	
Temperature(°C)	Resistance(KΩ)
70	2.2
60	3.0
50	4.2
40	5.8
30	8.3
20	12.1
10	18.0
0	27.3
-10	43.0

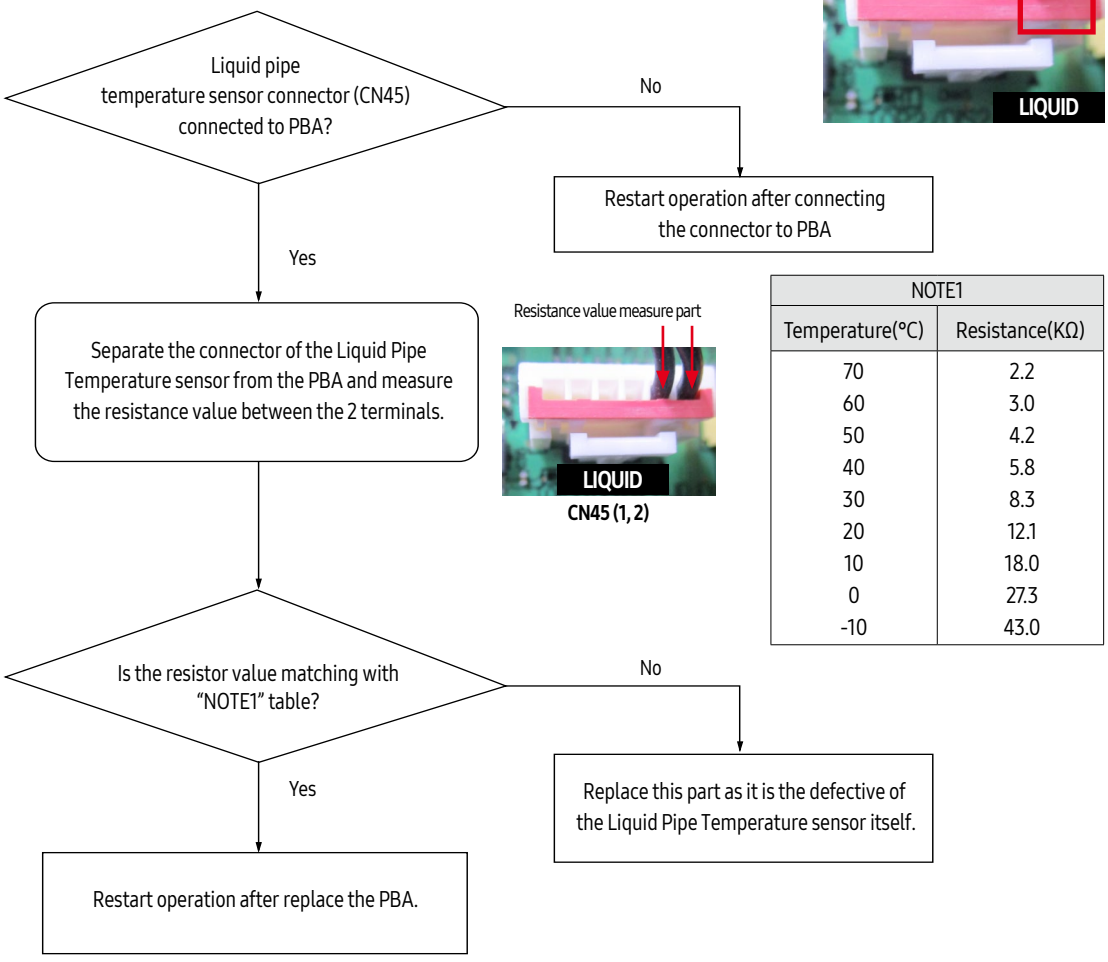
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-26 E311 Liquid Pipe Temperature sensor error (Open/Short)

Outdoor unit display	E311
Indoorunit display	Duct, Cassette (1/2 Way),Console, Celing: Operation × / Defrost × / Timer ◑ / Fan ◑ / Filter/MPI ◑ Cassette (4/Mini4 Way): Operation × / Defrost ◑ / Timer ◑ / Filter ◑ Wall-mounted (NeoForte): 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





Resistance value measure part

CN45 (1, 2)

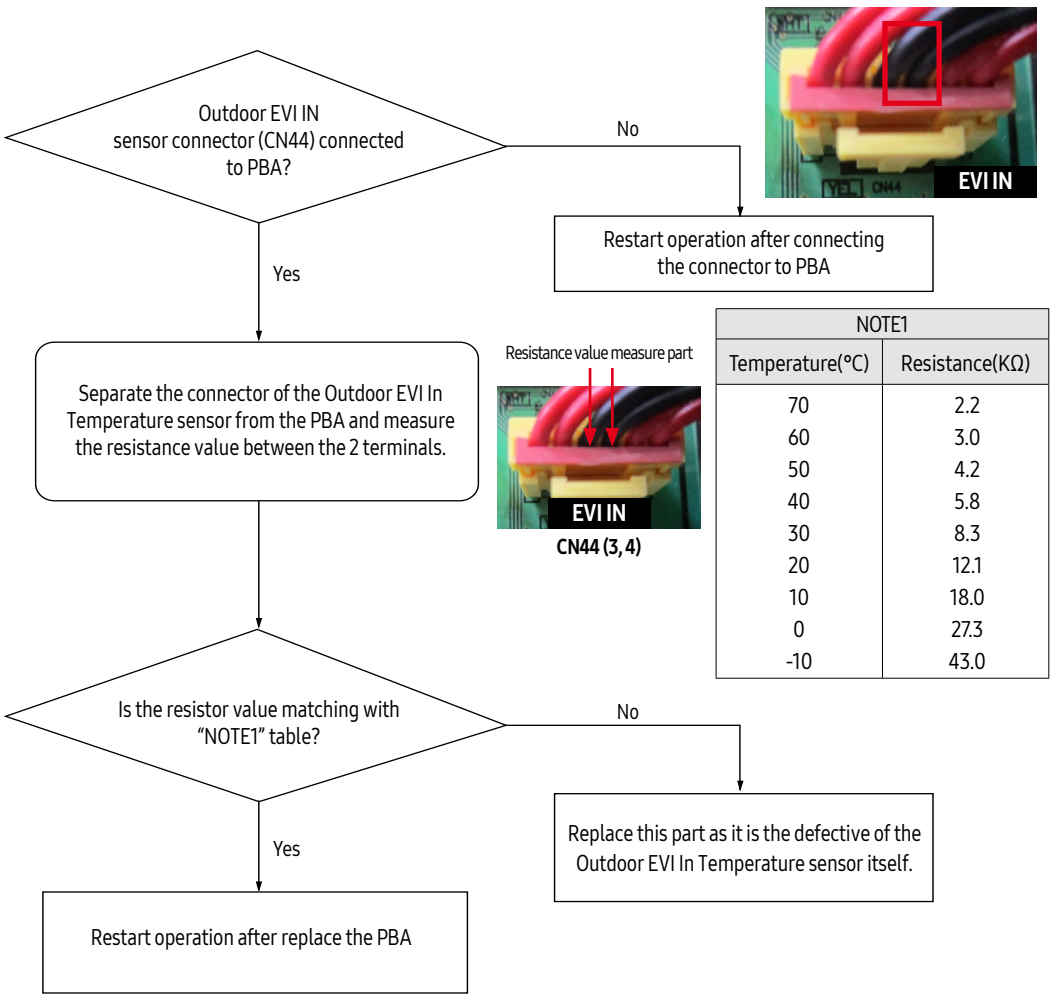
NOTE1	
Temperature(°C)	Resistance(KΩ)
70	2.2
60	3.0
50	4.2
40	5.8
30	8.3
20	12.1
10	18.0
0	27.3
-10	43.0

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

4-3-27 E321 EVI In Temperature sensor error (Open/Short)

Outdoor unit display	E321
Indoorunit display	Duct, Cassette (1/2 Way),Console, Celing: Operation × / Defrost × / Timer ◑ / Fan ◑ / Filter/MPI ◑ Cassette (4/Mini4 Way): Operation × / Defrost ◑ / Timer ◑ / Filter ◑ Wall-mounted (NeoForte): 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

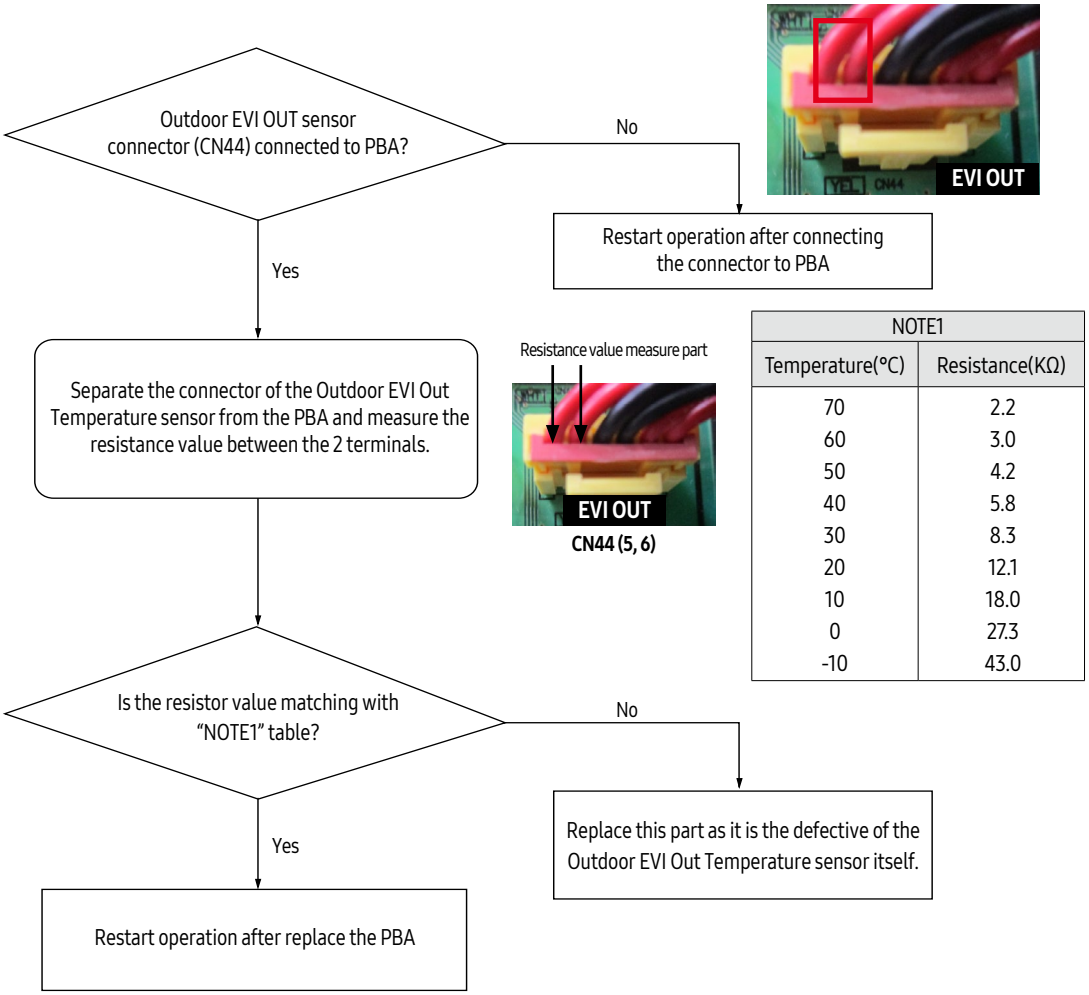


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-28 E322 EVI Out Temperature sensor error (Open/Short)

<table>
<tr><td>Outdoor unit display</td><td>E322</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><th colspan="5">Duct, Cassette (1/2 Way),Console, Celing</th><th colspan="5">Cassette (4/Mini4 Way)</th><th colspan="3">Wall-mounted (NeoForte)</th></tr>
<tr><th>Operation</th><th>Defrost</th><th>Timer</th><th>Fan</th><th>Filter/MPI</th><th>Operation</th><th>Defrost</th><th>Timer</th><th>Filter</th><th>Operation</th><th>Timer</th><th>Turbo</th></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>●</td><td>◑</td><td>◑</td></tr>
</table>
※ ● : ON ◑ : Flash ×: OFF</td></tr>
<tr><td>Judgment Method</td><td>• Detect according to temperature detected with the EVI-Out pipe temperature thermistor.</td></tr>
<tr><td>Cause of problem</td><td>• EVI-Out temperature sensor is defective. (open/short)</td></tr>
</table>

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.)

4-3-29 E323 Suction-2 Temperature Sensor Error (OPEN/SHORT)

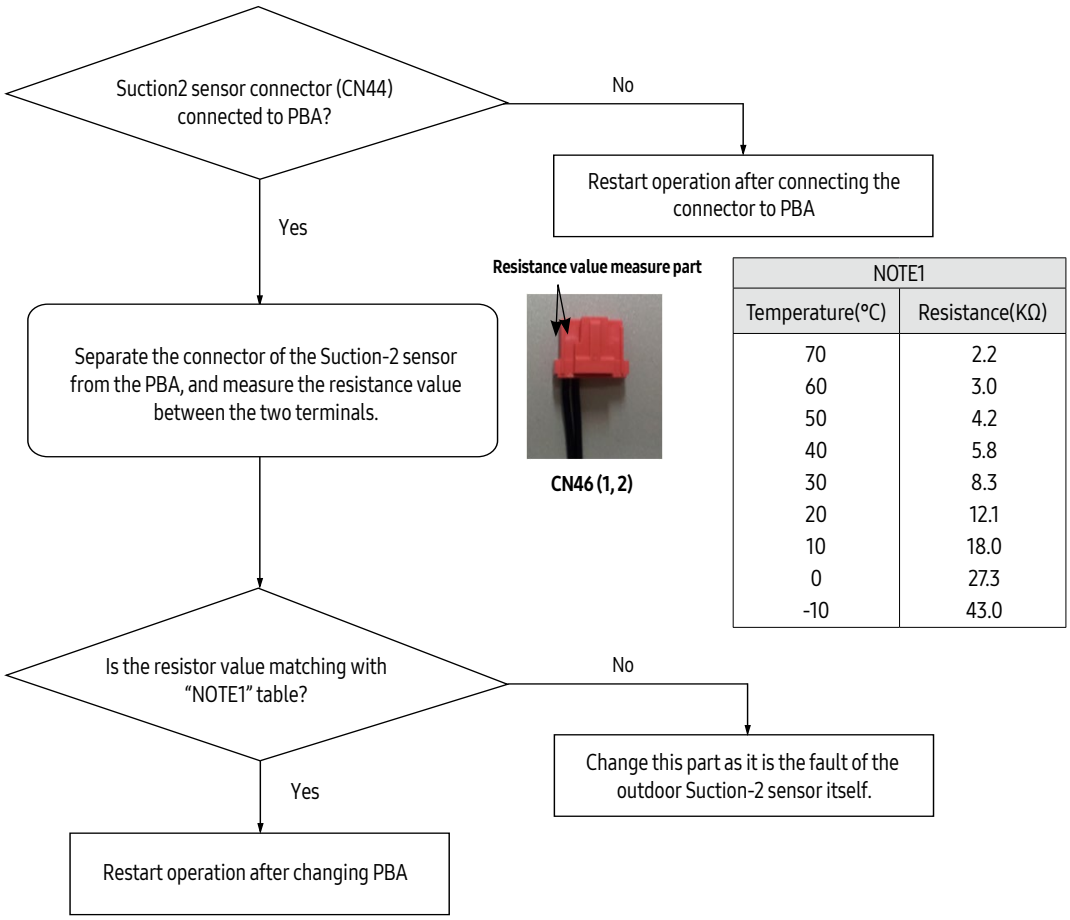
Outdoor unit display	E323
Indoorunit display	Duct, Cassette (1/2 Way),Console, Celing / Cassette (4/Mini4 Way) / Wall-mounted (NeoForte)

Duct, Cassette (1/2 Way),Console, Celing					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



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.)

4-3-30 E347 Measures of other outdoor unit error

<table>
<tr><td>Outdoor unit display</td><td>
E347 FAN2 wire unconnected error
E447 FAN1 wire unconnected error
E367 COMP.2 wire unconnected error
E467 COMP.1 wire unconnected error
E399 FAN2 PBA IPM temperature sensor error
E499 FAN1 PBA IPM temperature sensor error
E374 Inverter PBA2 IGBT temperature sensor error
E474 Inverter PBA1 IGBT or PFCM temperature sensor error
</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><th colspan="5">Duct, Cassette (1/2 Way),Console, Celing</th><th colspan="4">Cassette (4/Mini4 Way)</th><th colspan="3">Wall-mounted (NeoForte)</th></tr>
<tr><td>Operation</td><td>Defrost</td><td>Timer</td><td>Fan</td><td>Filter/MPI</td><td>Operation</td><td>Defrost</td><td>Timer</td><td>Filter</td><td>Operation</td><td>Timer</td><td>Turbo</td></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>●</td><td>◑</td><td>◑</td></tr>
</table>
※ ● : ON ◑ : Flash ×: OFF
</td></tr>
<tr><td>Judgment Method</td><td>• Refer to the measures code below.</td></tr>
<tr><td>Cause of problem</td><td>• Refer to the measures code below.</td></tr>
</table>

1. Judgement by code

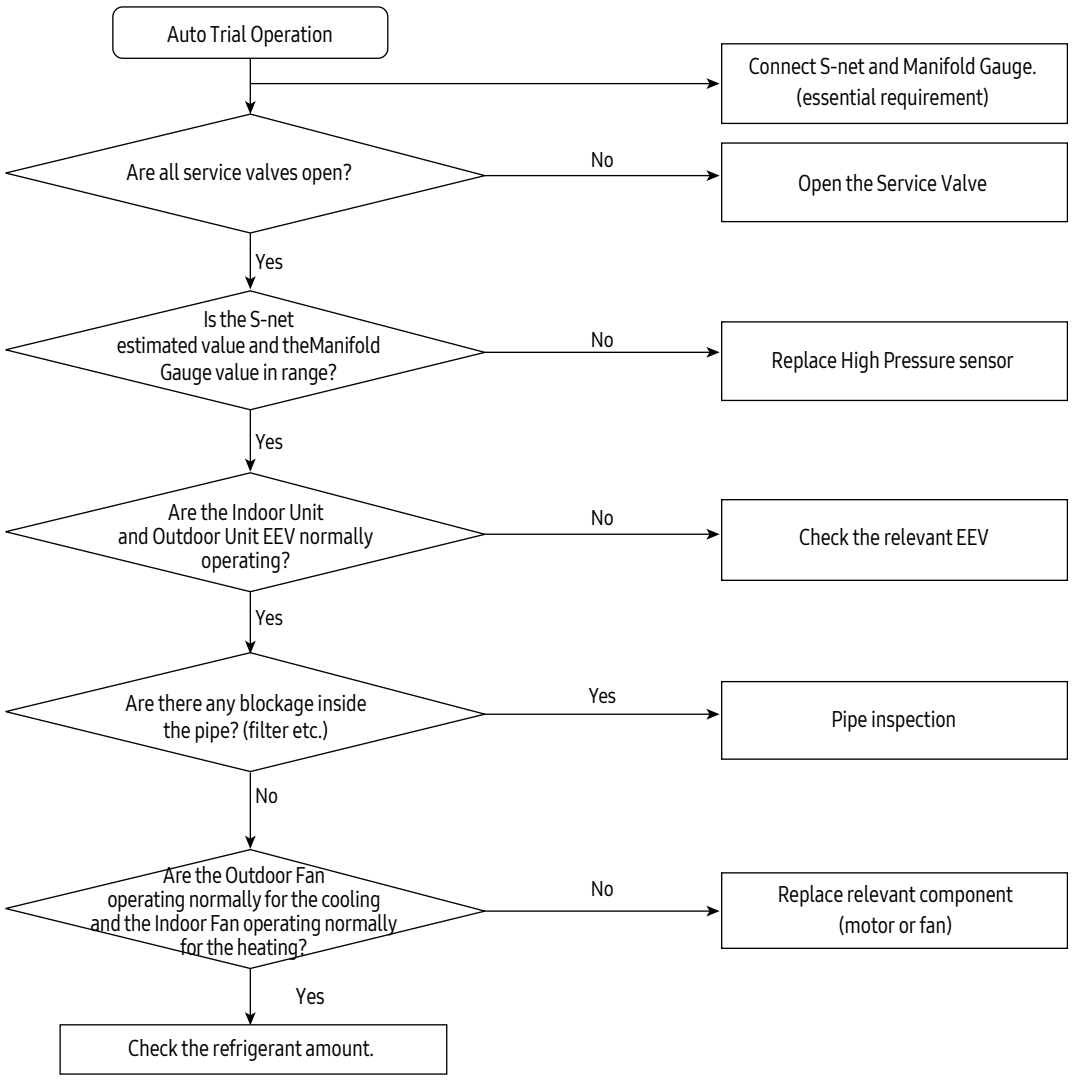
Code	Error	Measures
E347	FAN2 wire unconnected error	1. Check the FAN motor and PBA connection. 2. When connected Inverterr checker, if LED operates in the normality: External factors or when LED operates by abnormality, replace the FAN PBA.
E447	FAN1 wire unconnected error	1. Check the FAN motor and PBA connection. 2. When connected Inverterr checker, if LED operates in the normality: External factors or when LED operates by abnormality, replace the FAN PBA.
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.
E399	FAN2 PBA IPM temperature sensor error	Replace FAN PBA
E499	FAN1 PBA IPM temperature sensor error	Replace FAN PBA
E374	Inverter PBA2 IGBT temperature sensor error	Replace Inverter PBA
E474	Inverter PBA1 IGBT and PFCM 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

<table>
<tr><td>Outdoor unit display</td><td>E407 (Air Cooled)</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><th colspan="5">Duct, Cassette (1/2 Way),Console, Celing</th><th colspan="5">Cassette (4/Mini4 Way)</th><th colspan="3">Wall-mounted (NeoForte)</th></tr>
<tr><th>Operation</th><th>Defrost</th><th>Timer</th><th>Fan</th><th>Filter/MPI</th><th>Operation</th><th>Defrost</th><th>Timer</th><th>Filter</th><th>Operation</th><th>Timer</th><th>Turbo</th></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>●</td><td>◑</td><td>◑</td></tr>
</table>
※ ● : ON ◑ : Flash ×: OFF
</td></tr>
<tr><td>Judgment Method</td><td>• Value of the high pressure sensor is detected at 40kg/cm² or more</td></tr>
<tr><td>Cause of problem</td><td>‹Cooling Operation›
• Outdoor unit fan motor problem (constrained, defective)
• Outdoor heat exchanger is contaminated.
• Service valve locked/Fill refrigerant
‹Heating Operation›
• Service valve locked/Excessive refrigerant</td></tr>
</table>

1. Cause of problem

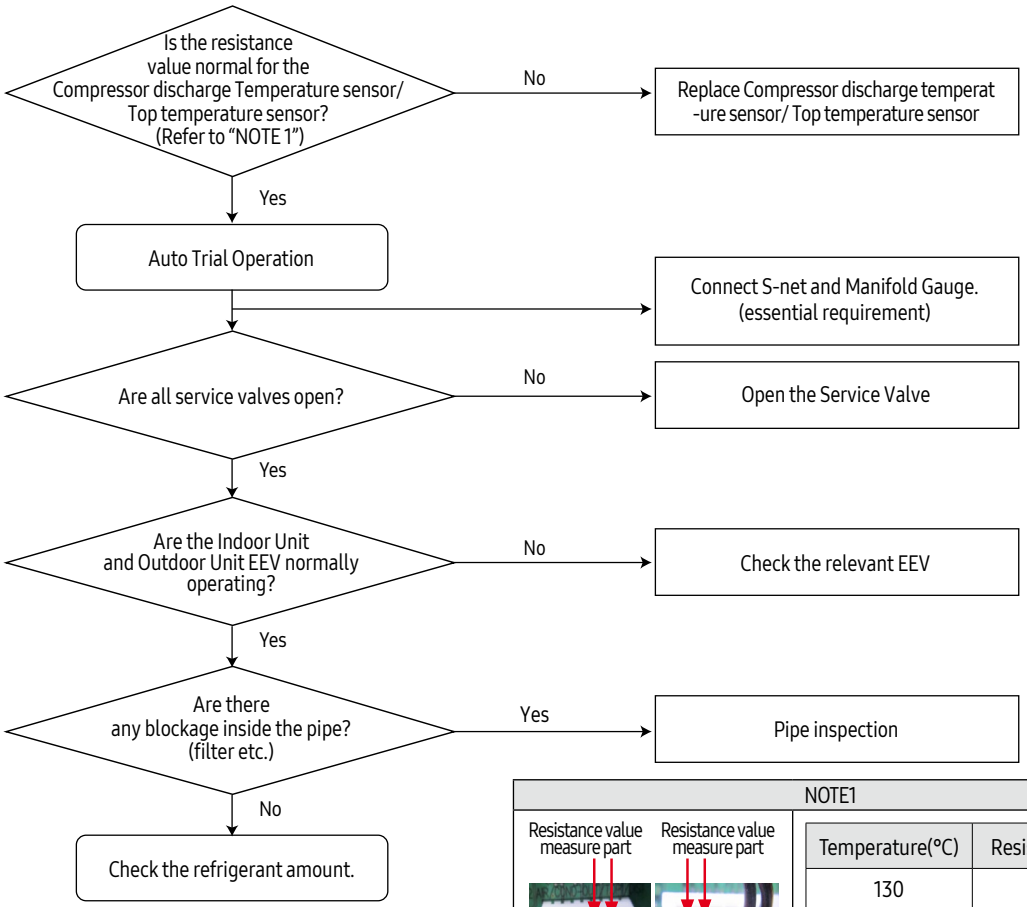


4-3 Appropriate Measures for Different Symptom (cont.)

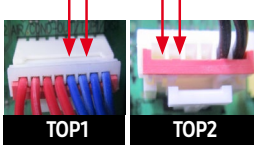
4-3-32 E416 : Suspension of starting due to Compressor discharge temperature sensor/ Top temperature sensor

Outdoor unit display	E416
Indoorunit display	Duct, Cassette (1/2 Way),Console, Celing: Operation × / Defrost × / Timer ◑ / Fan ◑ / Filter/MPI ◑ Cassette (4/Mini4 Way): Operation × / Defrost ◑ / Timer ◑ / Filter ◑ Wall-mounted (NeoForte): Operation ● / Timer ◑ / Turbo ◑ ※ ● : ON ◑ : Flash ×: OFF
Judgment Method	• When value of Compressor discharge temperature sensor/ Top temperature sensor is checked at 120℃ or more
Cause of problem	• 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



NOTE1



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

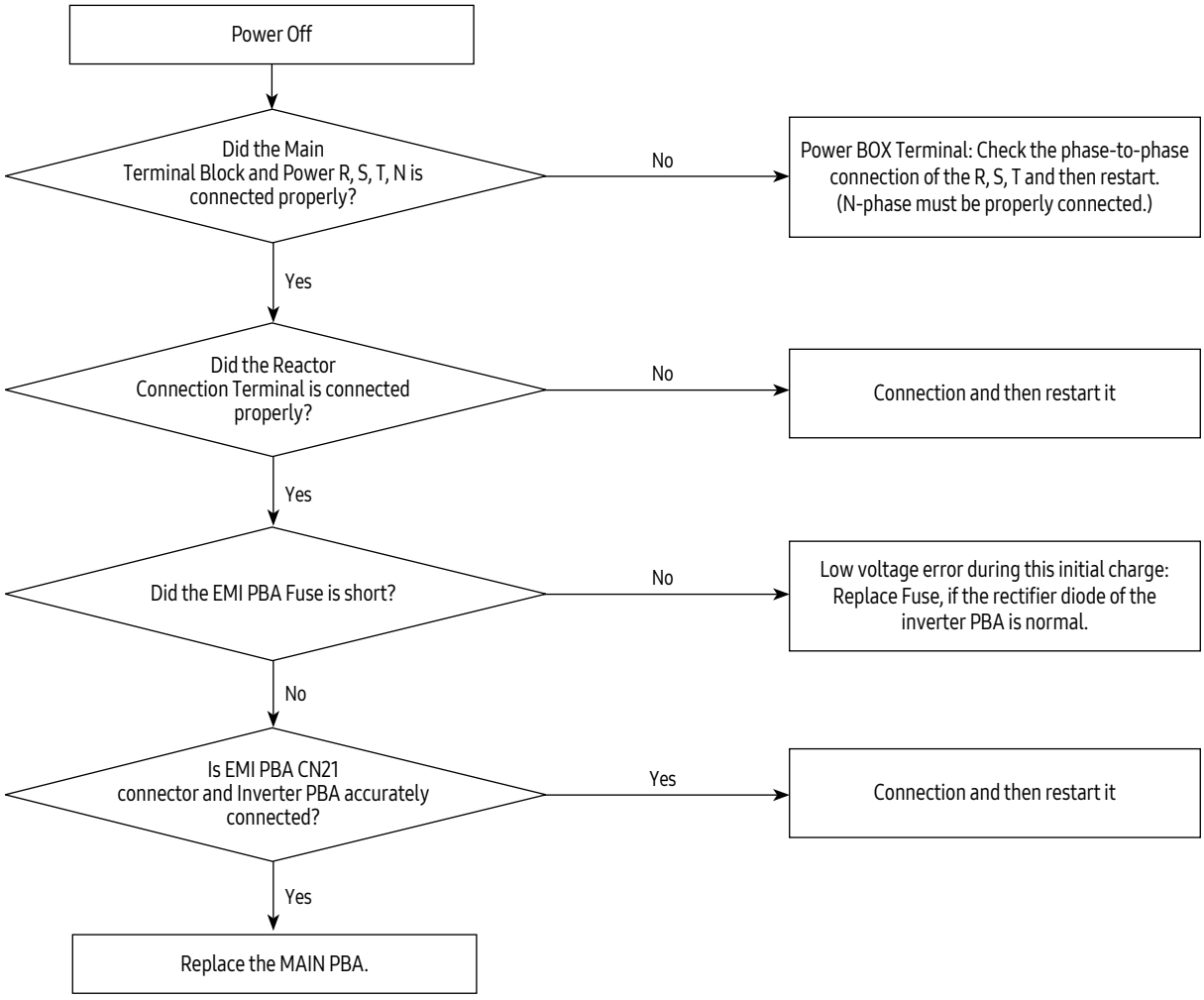
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-33 E425 3-phase Input Wiring error

<table>
<tr><td>Outdoor unit display</td><td>E425</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><td colspan="5">Duct, Cassette (1/2 Way),Console, Celing</td><td colspan="5">Cassette (4/Mini4 Way)</td><td colspan="3">Wall-mounted (NeoForte)</td></tr>
<tr><td>Operation</td><td>Defrost</td><td>Timer</td><td>Fan</td><td>Filter/MPI</td><td>Operation</td><td>Defrost</td><td>Timer</td><td>Filter</td><td>Operation</td><td>Timer</td><td>Turbo</td></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>●</td><td>◑</td><td>◑</td></tr>
</table>
※ ● : ON ◑ : Flash ×: OFF
</td></tr>
<tr><td>Judgment Method</td><td>• 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.</td></tr>
<tr><td>Cause of problem</td><td>• Check the input wiring
• EMI Fuse short</td></tr>
</table>

1. Cause of problem

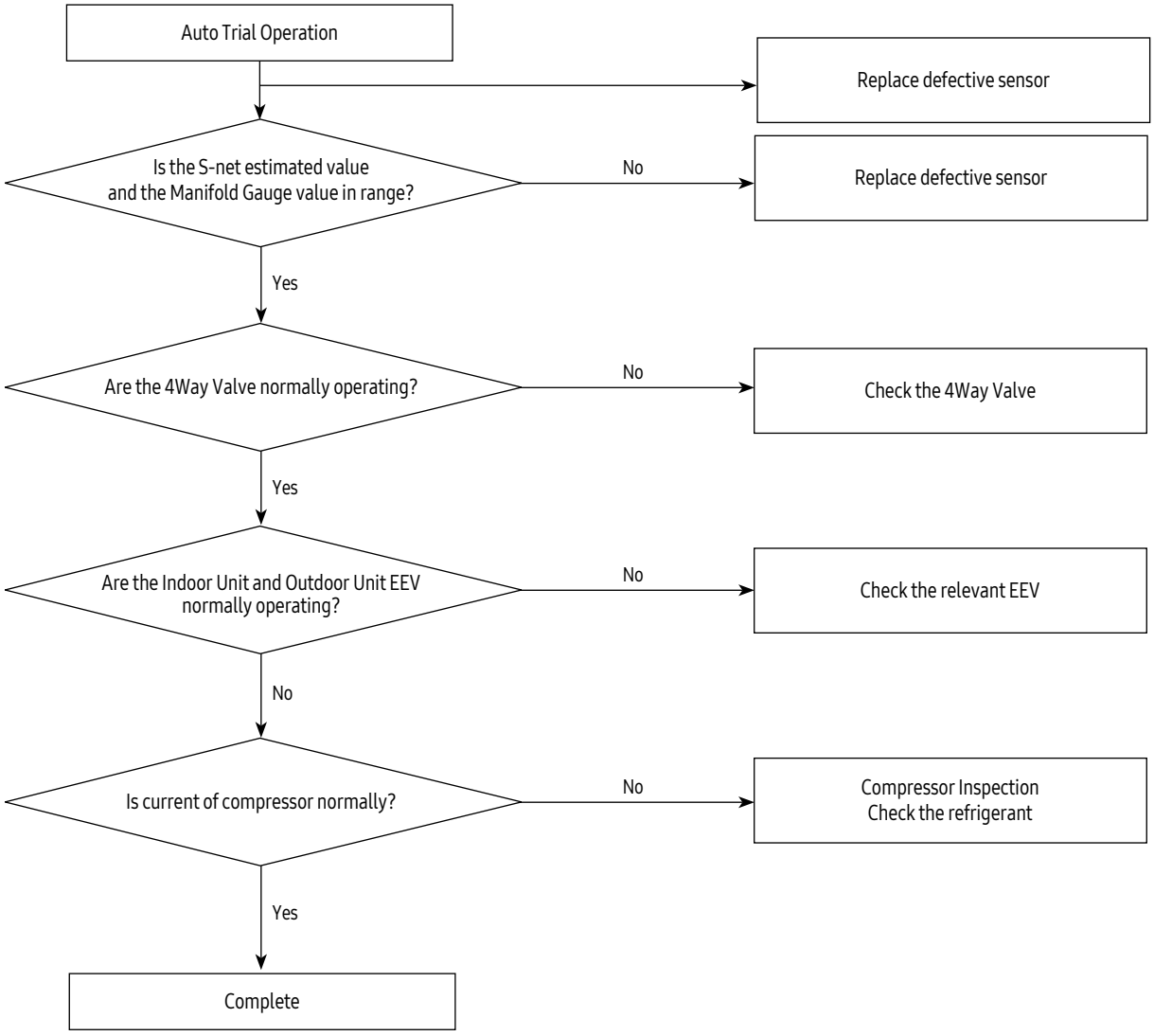


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-34 E428 : Suspension of starting by abnormal compression ratio

<table>
<tr><td>Outdoor unit display</td><td>E428</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><td colspan="5">Duct, Cassette (1/2 Way),Console, Celing</td><td colspan="5">Cassette (4/Mini4 Way)</td><td colspan="3">Wall-mounted (NeoForte)</td></tr>
<tr><td>Operation</td><td>Defrost</td><td>Timer</td><td>Fan</td><td>Filter/MPI</td><td>Operation</td><td>Defrost</td><td>Timer</td><td>Filter</td><td>Operation</td><td>Timer</td><td>Turbo</td></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>●</td><td>◑</td><td>◑</td></tr>
</table>
※ ● : ON ◑ : Flash ×: OFF
</td></tr>
<tr><td>Judgment Method</td><td>• 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</td></tr>
<tr><td>Cause of problem</td><td>• Indoor and Outdoor EEV breakdown
• 4Way Valve breakdown
• High and Low pressure sensor defective
• Refrigerant shortage</td></tr>
</table>

1. Cause of problem



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

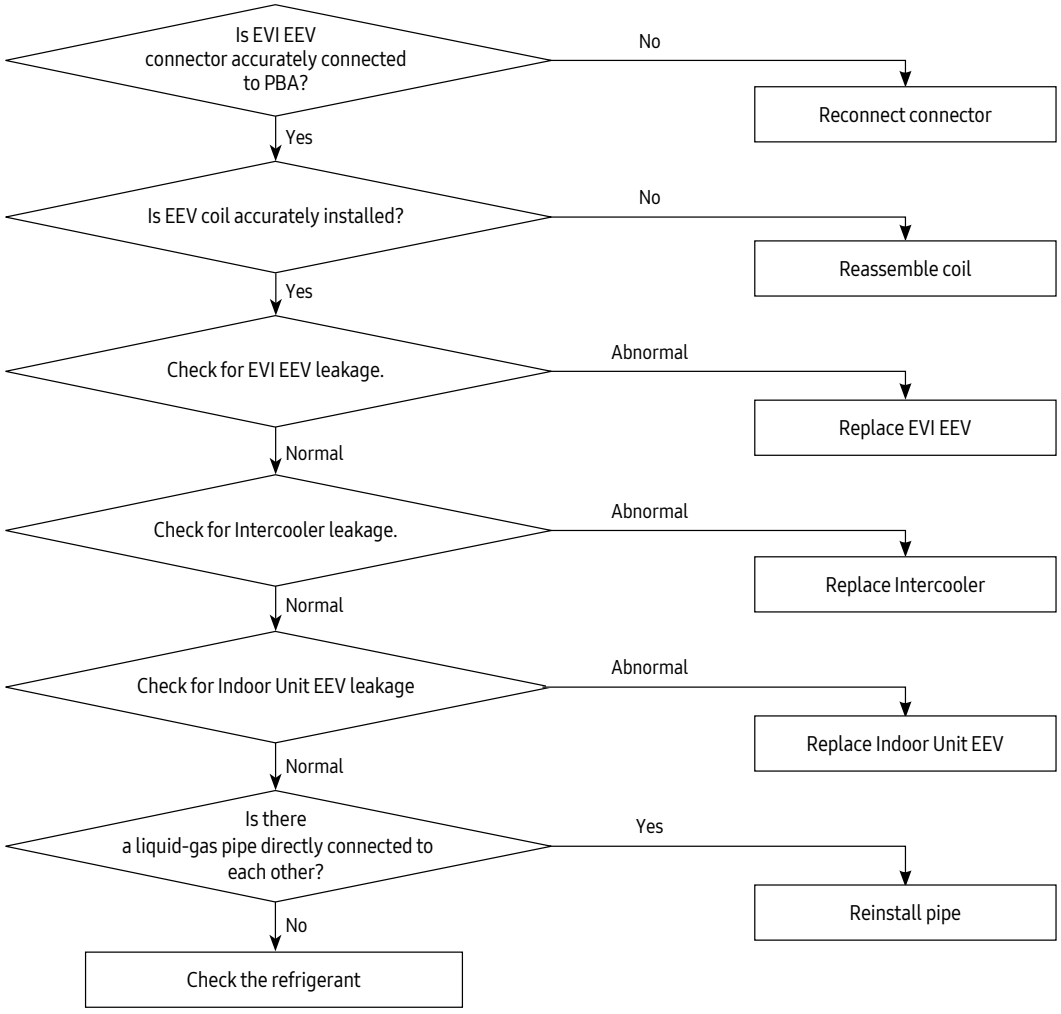
4-3-35 E438 EVI EEV Open error

<table>
<tr><td>Outdoor unit display</td><td colspan="14">E438</td></tr>
<tr><td rowspan="3">Indoorunit display</td><td colspan="5">Duct, Cassette (1/2 Way),Console, Celing</td><td colspan="5">Cassette (4/Mini4 Way)</td><td colspan="5">Wall-mounted (NeoForte)</td></tr>
<tr><td>Operation</td><td>Defrost</td><td>Timer</td><td>Fan</td><td>Filter/ MPI</td><td>Operation</td><td>Defrost</td><td>Timer</td><td>Filter</td><td>Operation</td><td>Timer</td><td>Turbo</td><td>24℃</td><td>27℃</td></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>●</td><td>◑</td><td>◑</td><td>◑</td><td>×</td></tr>
<tr><td colspan="15">※ ● : ON ◑ : Flash ×: OFF</td></tr>
<tr><td>Judgment Method</td><td colspan="14">• DSH<5℃ , EVI Out-EVI In<0℃ & frequency> 65Hz 40 minutes maintaining</td></tr>
<tr><td>Cause of problem</td><td colspan="14">• 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.</td></tr>
</table>

※ 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



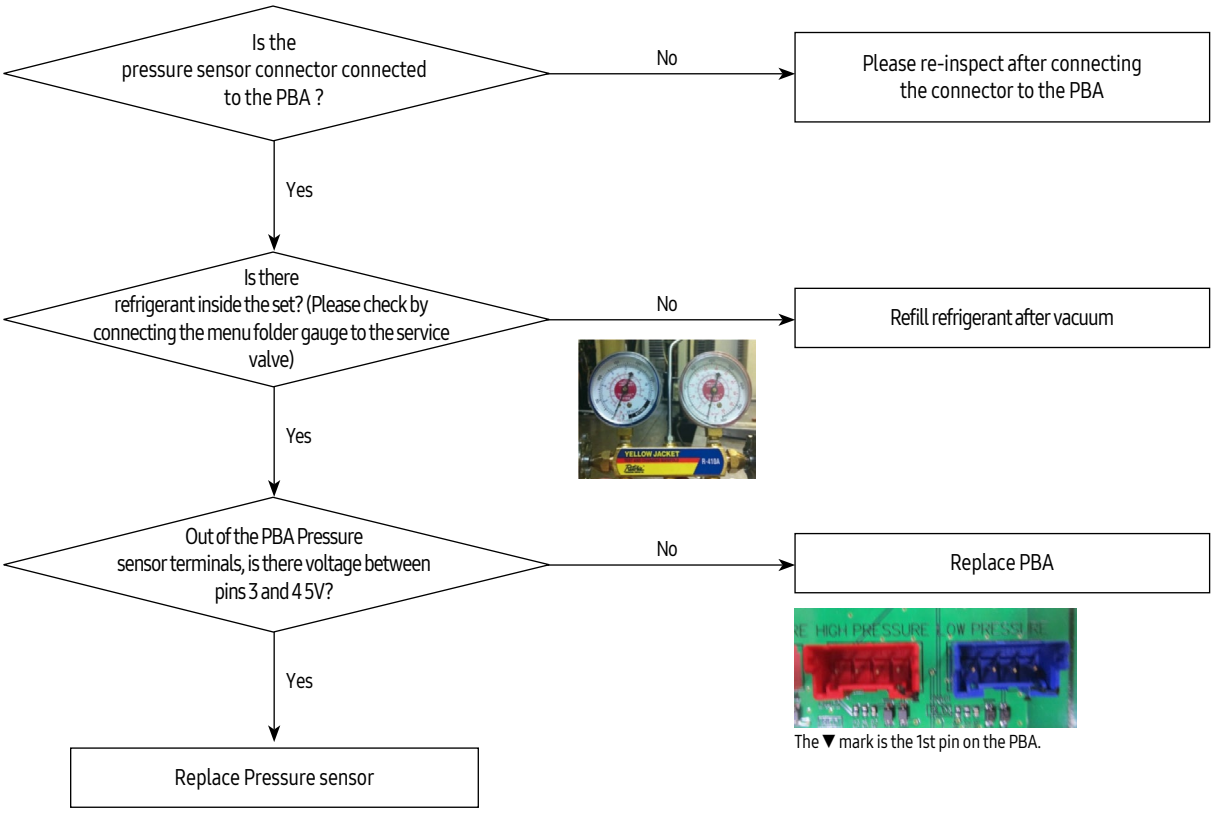
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-36 E439 / E443 Refrigerant leakage error

Outdoor unit display	E439 (Refrigerant leakage judgment before starting) E443 (When start, refrigerant leakage judgment)
Judgment Method	• 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/ ㎠ , heating 2.2kg/ ㎠) is detection continuously for 3 seconds
Cause of problem	• 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



The ▼ mark is the 1st pin on the PBA.

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

4-3-37 E440 / E441 Prevention of heating/ cooling operation due to outdoor temperature

<table>
<tr><td>Outdoor unit display</td><td>E440 (Prevention of heating operation due to high temperature of outdoor)
E441 (Prevention of cooling operation due to low temperature of outdoor)</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><th colspan="5">Duct, Cassette (1/2 Way),Console, Celing</th><th colspan="4">Cassette (4/Mini4 Way)</th><th colspan="5">Wall-mounted (NeoForte)</th></tr>
<tr><th>Operation</th><th>Defrost</th><th>Timer</th><th>Fan</th><th>Filter/ MPI</th><th>Operation</th><th>Defrost</th><th>Timer</th><th>Filter</th><th>Operation</th><th>Timer</th><th>Turbo</th><th>24℃</th><th>27℃</th></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>●</td><td>◑</td><td>◑</td><td>◑</td><td>×</td></tr>
</table>
※ ● : ON ◑ : Flash ×: OFF
</td></tr>
<tr><td>Judgment Method</td><td>• Heating operation: When the outdoor temperature is more than 30℃
• Cooling operation: When the outdoor temperature is less than -25℃</td></tr>
<tr><td>Cause of problem</td><td>• System protection operation status (Is not breakdown)
• If the outdoor temperature is satisfied the operating range, it will clear the error and start the operation automatically.</td></tr>
</table>

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

4-3-38 E442 Prevention of heating refrigerant charge due to outdoor temperature

<table>
<tr><td>Outdoor unit display</td><td>E442</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><td colspan="5">Duct, Cassette (1/2 Way),Console, Celing</td><td colspan="4">Cassette (4/Mini4 Way)</td><td colspan="5">Wall-mounted (NeoForte)</td></tr>
<tr><td>Operation</td><td>Defrost</td><td>Timer</td><td>Fan</td><td>Filter/ MPI</td><td>Operation</td><td>Defrost</td><td>Timer</td><td>Filter</td><td>Operation</td><td>Timer</td><td>Turbo</td><td>24℃</td><td>27℃</td></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>●</td><td>◑</td><td>◑</td><td>◑</td><td>×</td></tr>
</table>
※ ● : ON ◑ : Flash ×: OFF
</td></tr>
<tr><td>Judgment Method</td><td>• When the heating refrigerant charge: If the outdoor temperature is more than 15℃</td></tr>
<tr><td>Cause of problem</td><td>• System protection operation status (Is not breakdown)</td></tr>
</table>

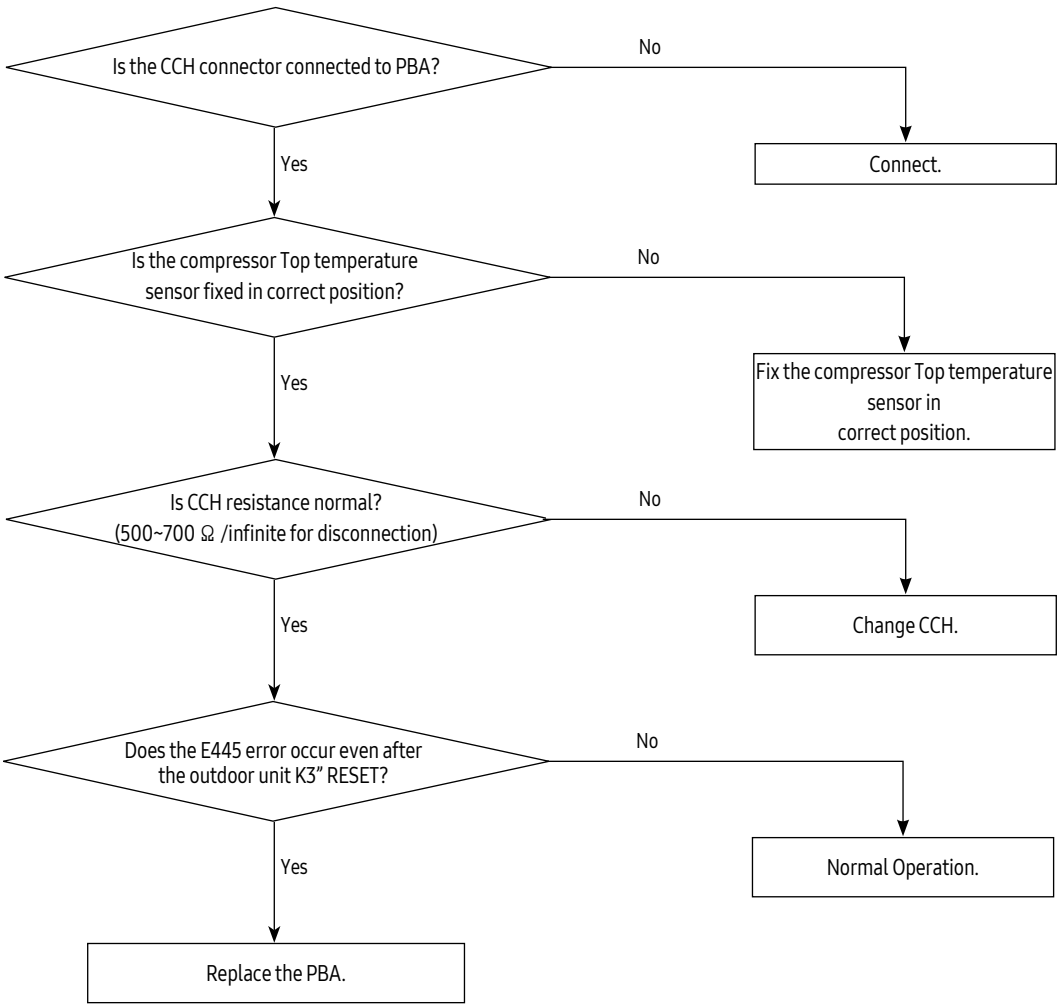
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-39 E445 CCH wire breaking error

<table>
<tr><td>Outdoor unit display</td><td colspan="14">E445 (Air Cooled)</td></tr>
<tr><td rowspan="3">Indoorunit display</td><td colspan="5">Duct, Cassette (1/2 Way),Console, Celing</td><td colspan="4">Cassette (4/Mini4 Way)</td><td colspan="5">Wall-mounted (NeoForte)</td></tr>
<tr><td>Operation</td><td>Defrost</td><td>Timer</td><td>Fan</td><td>Filter/ MPI</td><td>Operation</td><td>Defrost</td><td>Timer</td><td>Filter</td><td>Operation</td><td>Timer</td><td>Turbo</td><td>24℃</td><td>27℃</td></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>●</td><td>◑</td><td>◑</td><td>◑</td><td>×</td></tr>
<tr><td colspan="15">※ ● : ON ◑ : Flash ×: OFF</td></tr>
<tr><td>Judgment Method</td><td colspan="14">• Refer to the judgment method below.</td></tr>
<tr><td>Cause of problem</td><td colspan="14">• CCH connector on Hub PBA is not connected/ compressor top sensor breakaway/ own problem of CCH</td></tr>
</table>

1. Judgment Method (2hours after reset or power on, It will be judged once.)
   ① Compressor Top temperature at the time of judgment- Tini < 2℃ .
   (※ Tini: Power on or temperature of initial compressor Top after reset)
   ② Compressor Top temperature at the time of judgment- Suction1 temperature < 2℃
   ③ Suction1 temperature < 30℃
   ④ UP state

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



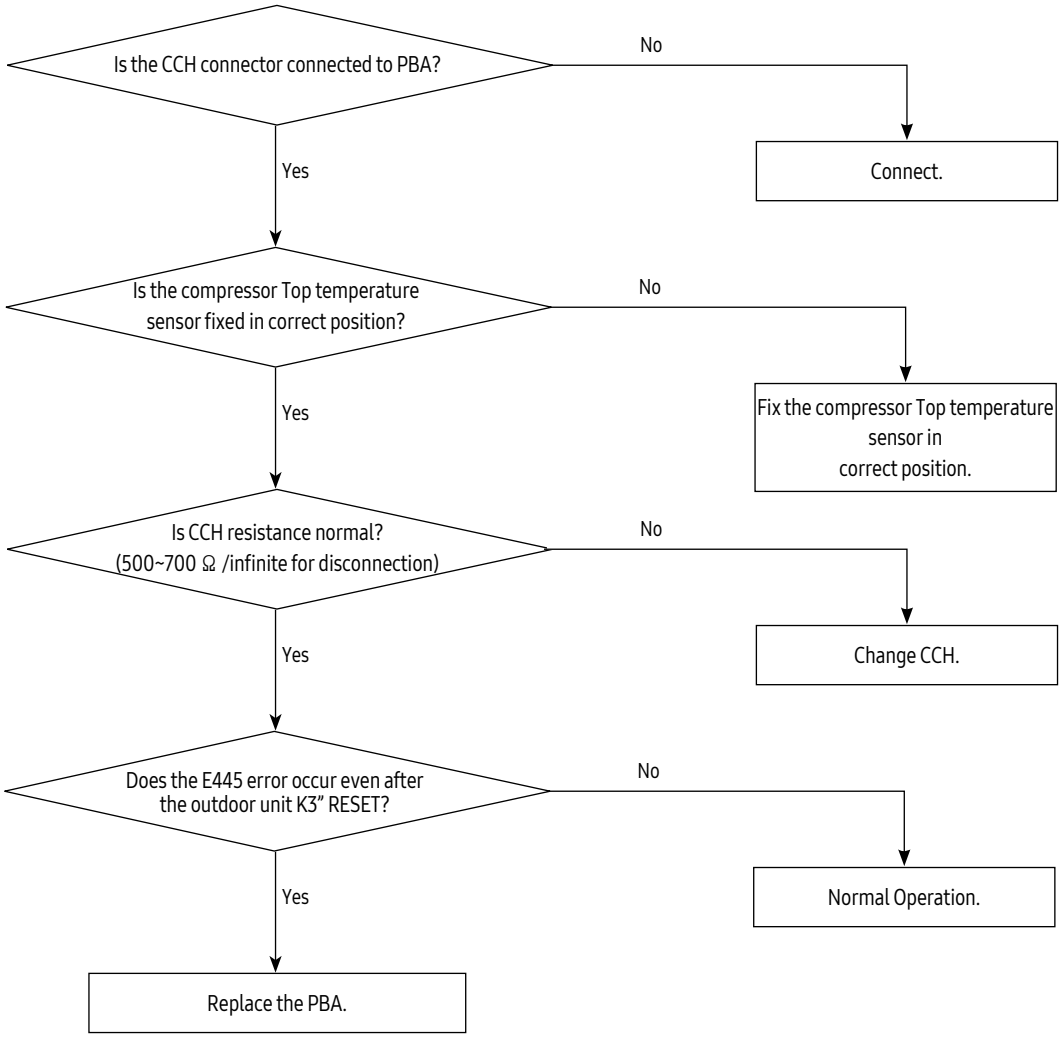
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-39 E445 CCH wire breaking error (cont.)

<table>
<tr><td>Outdoor unit display</td><td colspan="14">E445 (Water Cooled)</td></tr>
<tr><td rowspan="3">Indoorunit display</td><td colspan="5">Duct, Cassette (1/2 Way),Console, Celing</td><td colspan="4">Cassette (4/Mini4 Way)</td><td colspan="5">Wall-mounted (NeoForte)</td></tr>
<tr><td>Operation</td><td>Defrost</td><td>Timer</td><td>Fan</td><td>Filter/ MPI</td><td>Operation</td><td>Defrost</td><td>Timer</td><td>Filter</td><td>Operation</td><td>Timer</td><td>Turbo</td><td>24℃</td><td>27℃</td></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>●</td><td>◑</td><td>◑</td><td>◑</td><td>×</td></tr>
<tr><td colspan="15">※ ● : ON ◑ : Flash ×: OFF</td></tr>
<tr><td>Judgment Method</td><td colspan="14">• Refer to the judgment method below.</td></tr>
<tr><td>Cause of problem</td><td colspan="14">• CCH Connector PBA is not connected/ Compressor Top sensor breakaway/ Own problem of CCH</td></tr>
</table>

1. Judgment Method (2hours after reset or power on, It will be judged once.)
   ① Compressor Top temperature at the time of judgment- Tini < 2℃ (※ Tini: Power on or temperature of initial compressor Top after reset)
   ② Compressor Top temperature at the time of judgment- suction1 temp. sensor < 30℃
   ③ Outdoor temperature < 30℃
   ④ UP state

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

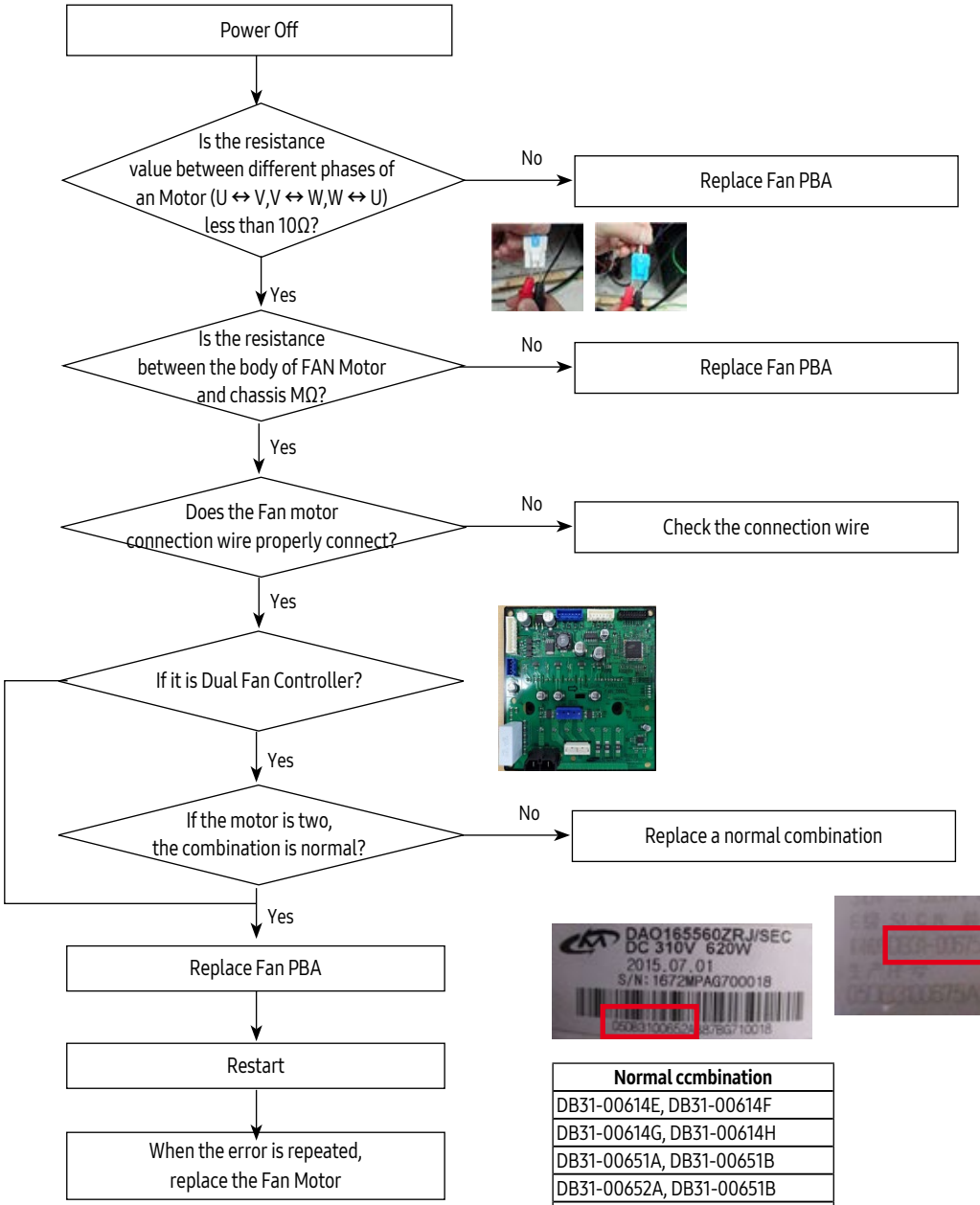


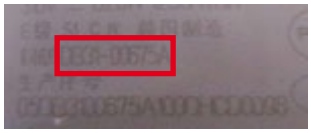
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-40 E446 / E346 Fan motor starting error

Outdoor unit display	E446 (FAN PBA(FAN1)) E346 (FAN PBA(FAN2))
Judgment Method	• Startup, and then if the speed increase is not normally. • Detected by H/W or S/W
Cause of problem	• FAN motor connection error. • Defective FAN motor. • Defective PBA.

1. Cause of problem





Normal ccmbination
DB31-00614E, DB31-00614F
DB31-00614G, DB31-00614H
DB31-00651A, DB31-00651B
DB31-00652A, DB31-00651B
DB31-00675A, DB31-00675B
DB31-00675E, DB31-00675F

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

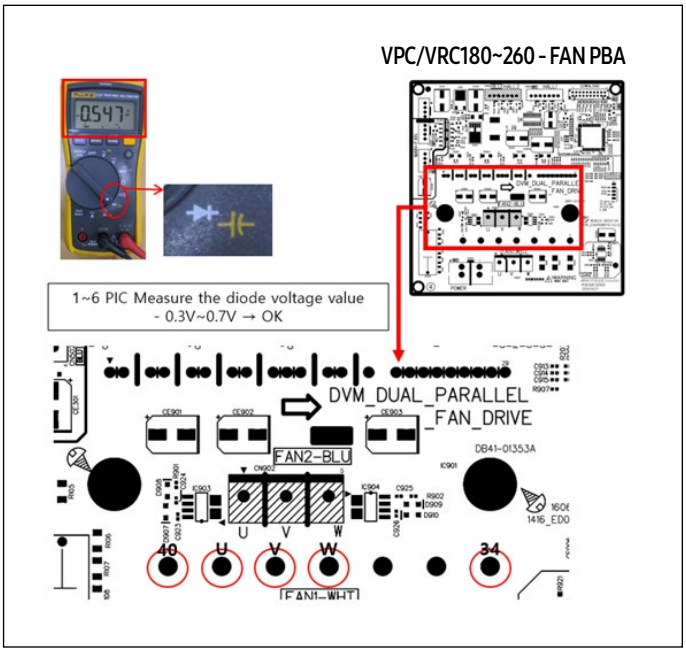
■ IPM breakdown diagnostics (FAN PBA)

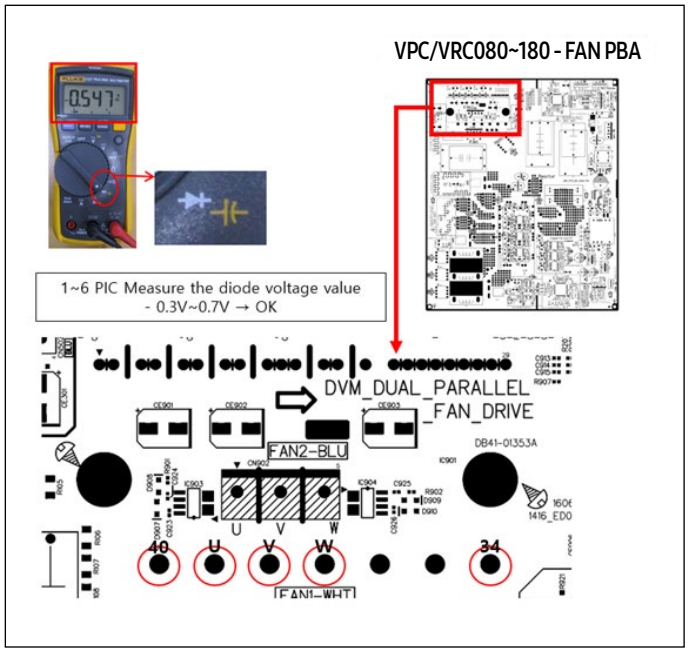
1. Preparations before checking
   1) Power Off
   2) IPM failure, discharge mode may not work properly. Therefore, wait more than 15 minutes after the Power Off.
   3) Remove all of the Fan PBA connectors. (FAN motor connector included.)
   4) Prepare the digital multi tester.

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	40	U	More than 500	Measurement error can occur for reasons such as the initial measurement condenser discharge. Measured over at least three times.
	40	V		
	40	W		
	U	34		
	V	34		
	W	34		
Measure the diode voltage values	U	40	0.3~0.7V	
	V	40		
	W	40		
	34	U		
	34	V		
	34	W		

‹ Table 1 ›



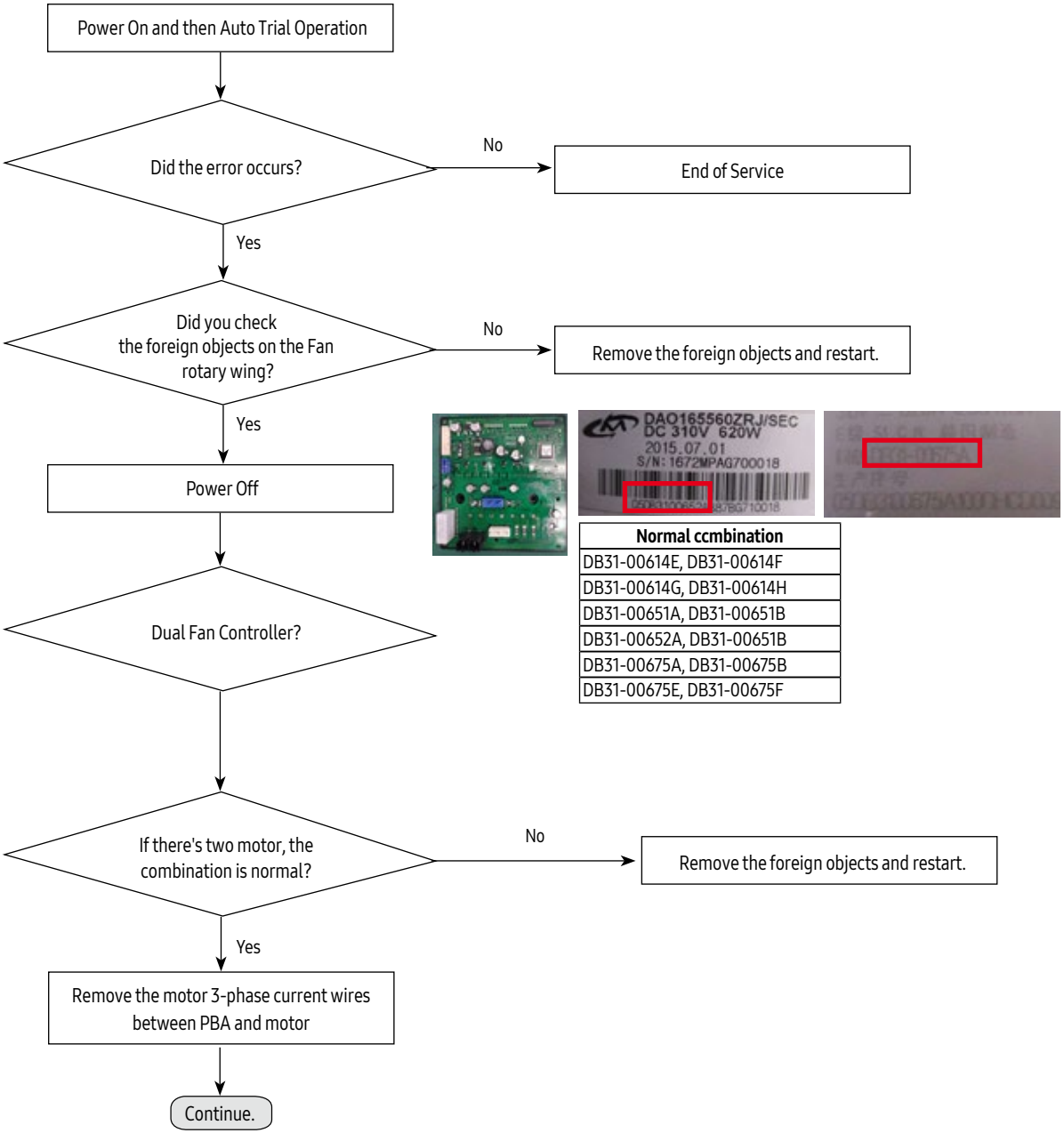


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-41 E448 / E348 Fan motor locking error

Outdoor unit display	E448 (FAN PBA(FAN1)) E348 (FAN PBA(FAN2))
Judgment Method	- Detect according to the value of current flowing through the Fan PBA. - Detect malfunction of the fan motor system according to the fan revolutions detected by the hall IC during the fan motor runs.
Cause of problem	• Fan Motor connection error. • Defective Fan • Defective PBA

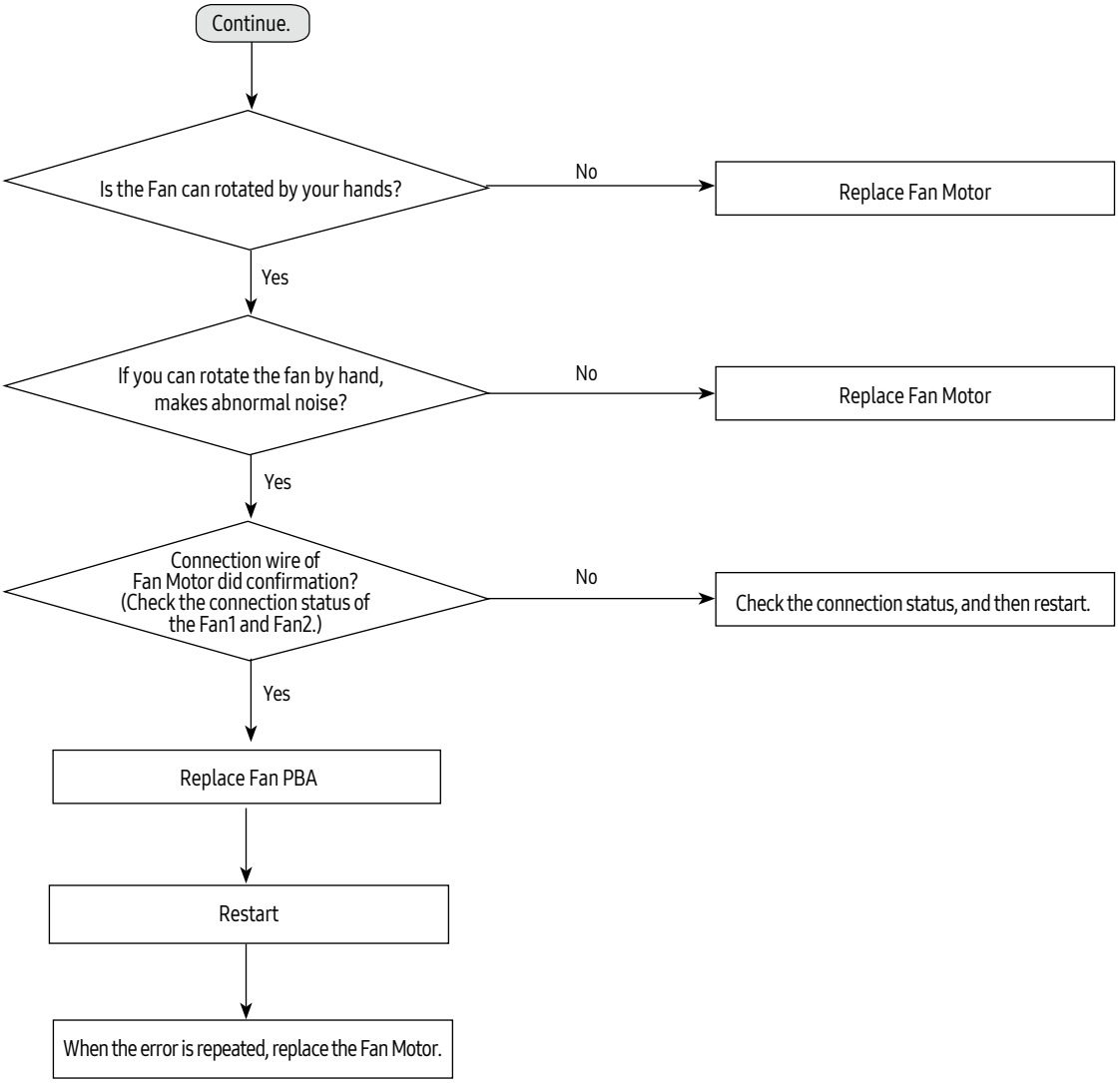
1. Cause of problem



Normal ccmbination
DB31-00614E, DB31-00614F
DB31-00614G, DB31-00614H
DB31-00651A, DB31-00651B
DB31-00652A, DB31-00651B
DB31-00675A, DB31-00675B
DB31-00675E, DB31-00675F

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

4-3-41 Fan motor locking error



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

4-3-42 E452 Momentary Blackout error

<table>
<tr><td>Outdoor unit display</td><td>E452</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><td colspan="5">Duct, Cassette (1/2 Way),Console, Celing</td><td colspan="4">Cassette (4/Mini4 Way)</td><td colspan="5">Wall-mounted (NeoForte)</td></tr>
<tr><td>Operation</td><td>Defrost</td><td>Timer</td><td>Fan</td><td>Filter/ MPI</td><td>Operation</td><td>Defrost</td><td>Timer</td><td>Filter</td><td>Operation</td><td>Timer</td><td>Turbo</td><td>24℃</td><td>27℃</td></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>×</td><td>◑</td><td>◑</td><td>◑</td><td>●</td><td>◑</td><td>◑</td><td>◑</td><td>×</td></tr>
</table>
※ ● : ON ◑ : Flash ×: OFF
</td></tr>
<tr><td>Judgment Method</td><td>• Momentary stop of compressor due to momentary blackout.</td></tr>
<tr><td>Cause of problem</td><td>• Momentary stop of compressor due to momentary blackout.</td></tr>
</table>

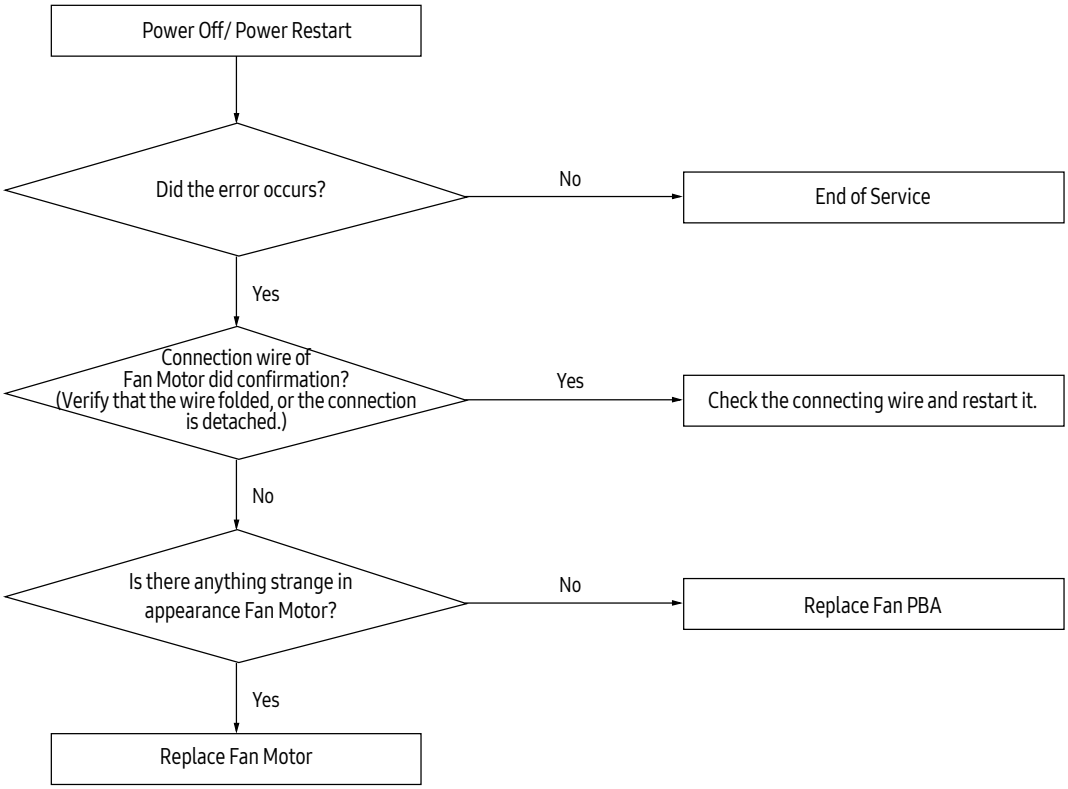
1. Precautions: Replace Hub PBA or Main PBA.

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

4-3-43 E453 / E353 Outdoor Fan Motor overheating

Outdoor unit display	E453 (FAN PBA(FAN1)) E353 (FAN PBA(FAN2))
Judgment Method	• Overheating due to the internal sensor of the Fan Motor.
Cause of problem	• Defective connection wire • Defective Fan Motor • Defective PBA • Defective installation conditions

1. Cause of problem

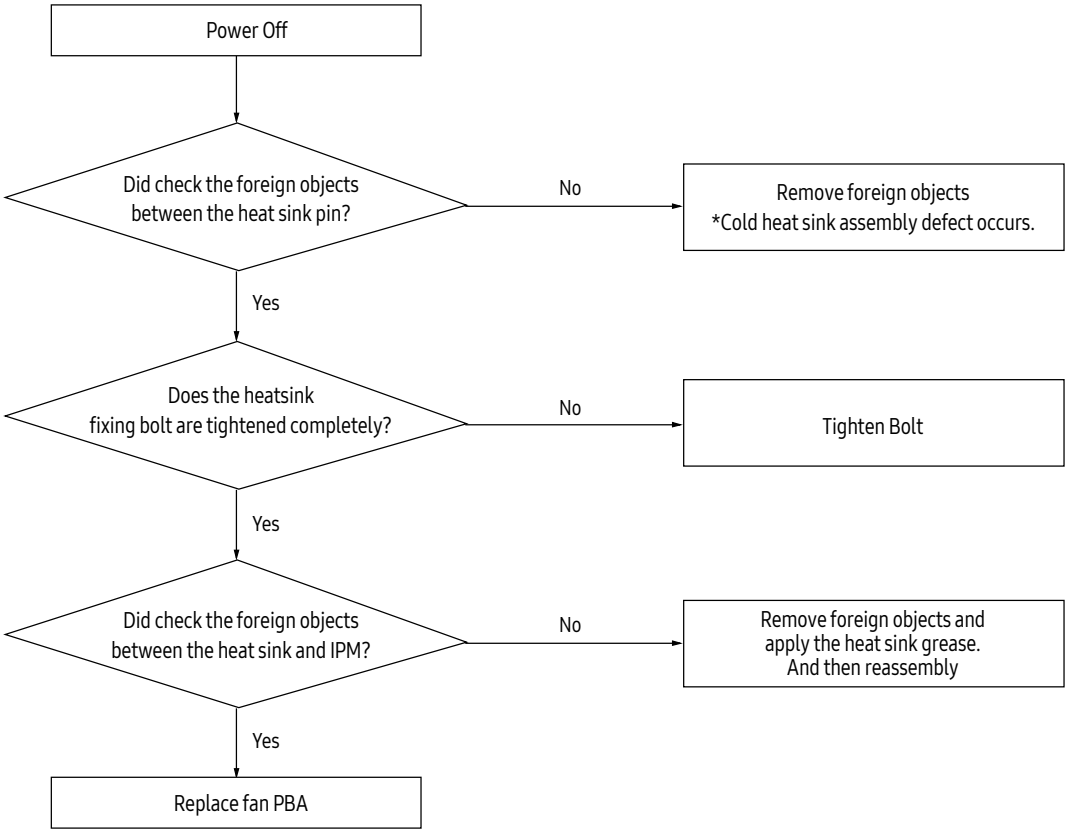


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-44 E455 / E355 Fan PBA IPM overheating error

Outdoor unit display	E455 (FAN1 PBA) E355 (FAN2 PBA)
Judgment Method	• IPM internal temperature more than 90℃
Cause of problem	• Heat sink and IPM assembly defective. • Defective heat sink cooling

1. Cause of problem

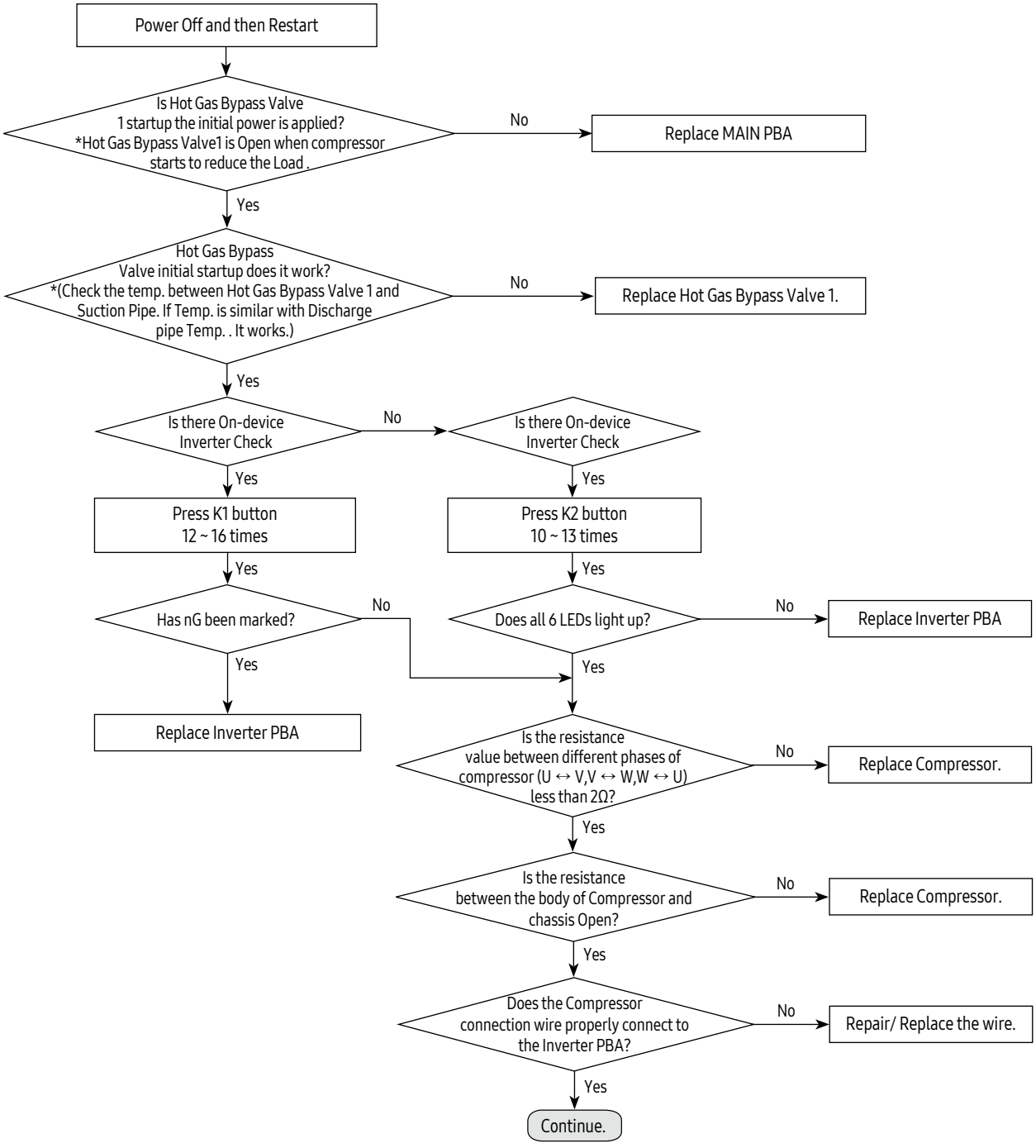


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-45 E461 / E361 Compressor starting error

Outdoor unit display	E461 (INVERTER1 PBA) E361 (INVERTER2 PBA)
Judgment Method	• Startup, and then if the speed increase is not normally. • Detected by H/W or S/W.
Cause of problem	• Compressor connection error • Defective Compressor

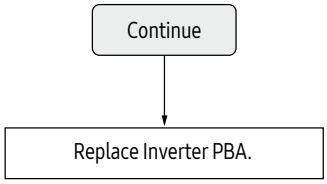
1. Cause of problem



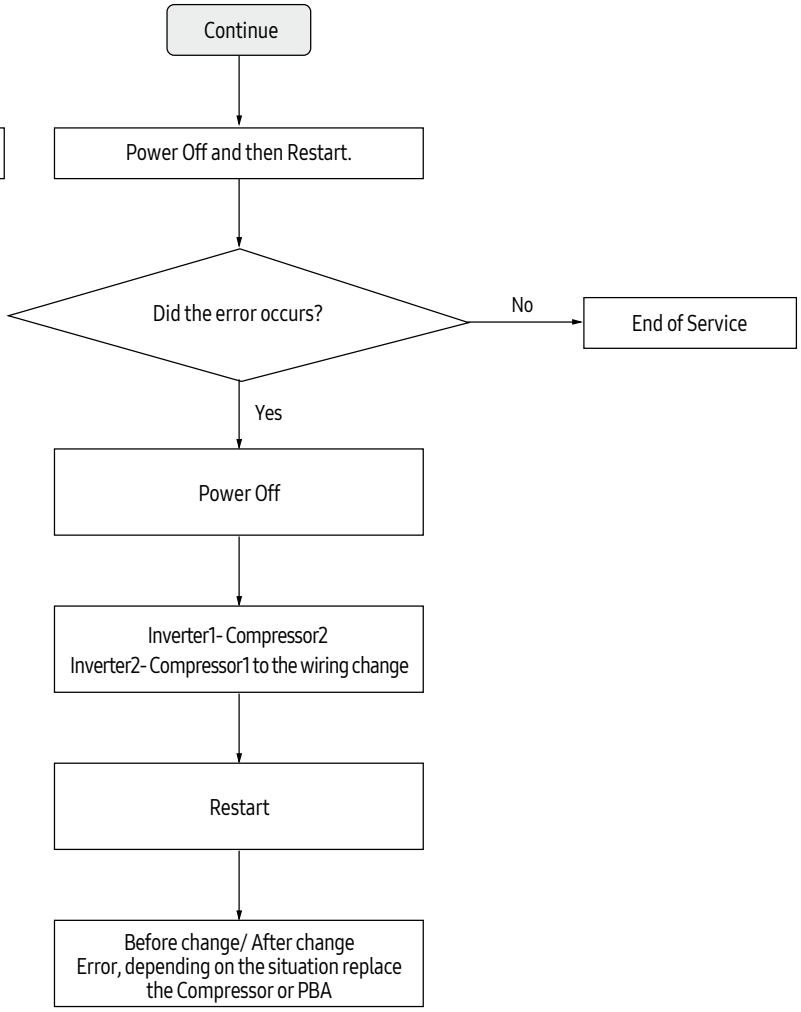
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-45 E461/E361 Compressor starting error (cont.)

■ **Compressor applied one**



■ **Compressor applied two**



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

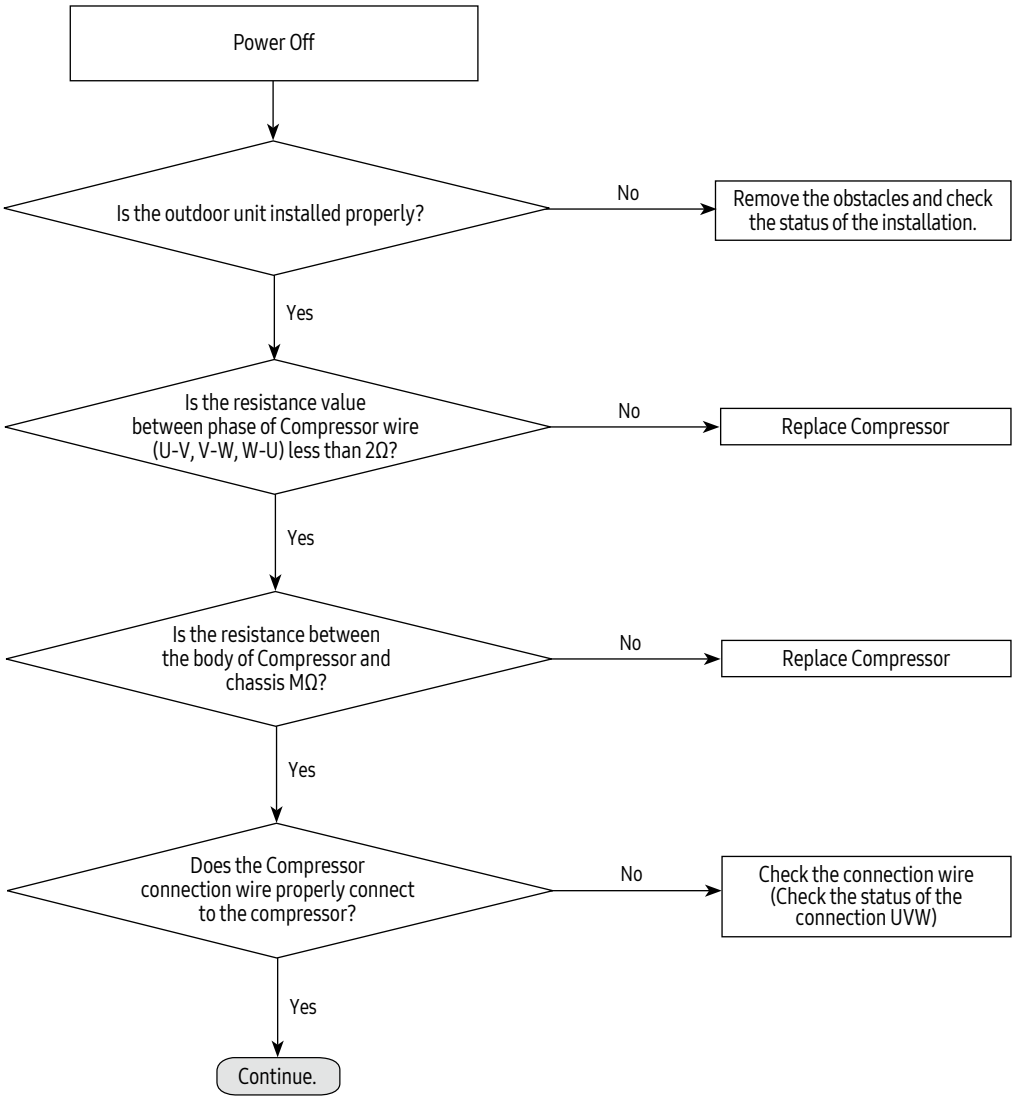
See the "Contain of compressor Exchange (3-XX)" in service manual when you replace the compressor.

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

4-3-46 E464/E465 / E364/E365 COMP Overcurrent error

Outdoor unit display	E464/E465 (INVERTER1 PBA) E364/E365 (INVERTER2 PBA)
Judgment Method	• Will occur if the overcurrent flowing in the IPM. • Detected by H/W or S/W
Cause of problem	• COMP. defective. • Inverter PBA Defective.

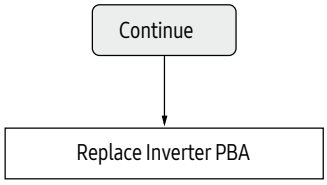
1. Cause of problem



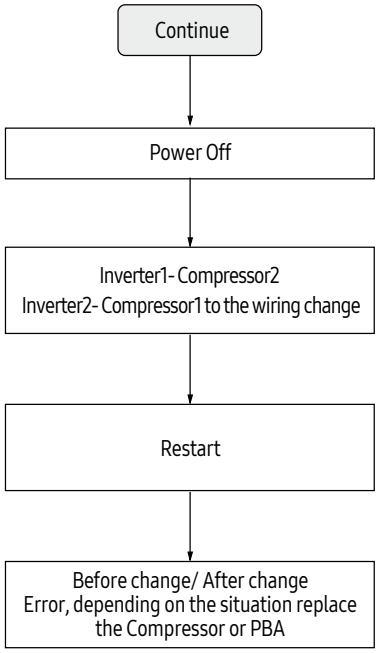
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-46 E464/E465 / E364/E365 COMP Overcurrent error (cont.)

■ **Compressor applied one**



■ **Compressor applied two**



Before change	After change	Measure
E464	E464	Replace No.1Inverter 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.)

4-3-46 COMP Overcurrent error

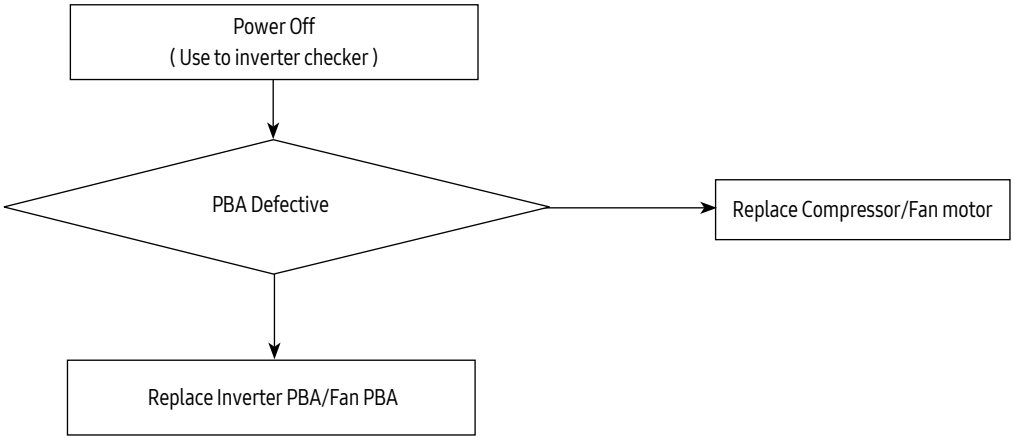
■ How to use inverter checker (Warning for high pressure)

► 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
COMP1	9times (KD__)	8times (KD__)
COMP2	10times (KE__)	9times (KE__)
MOTOR1	11times (KF__)	
MOTOR 2	12times (KG__)	



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

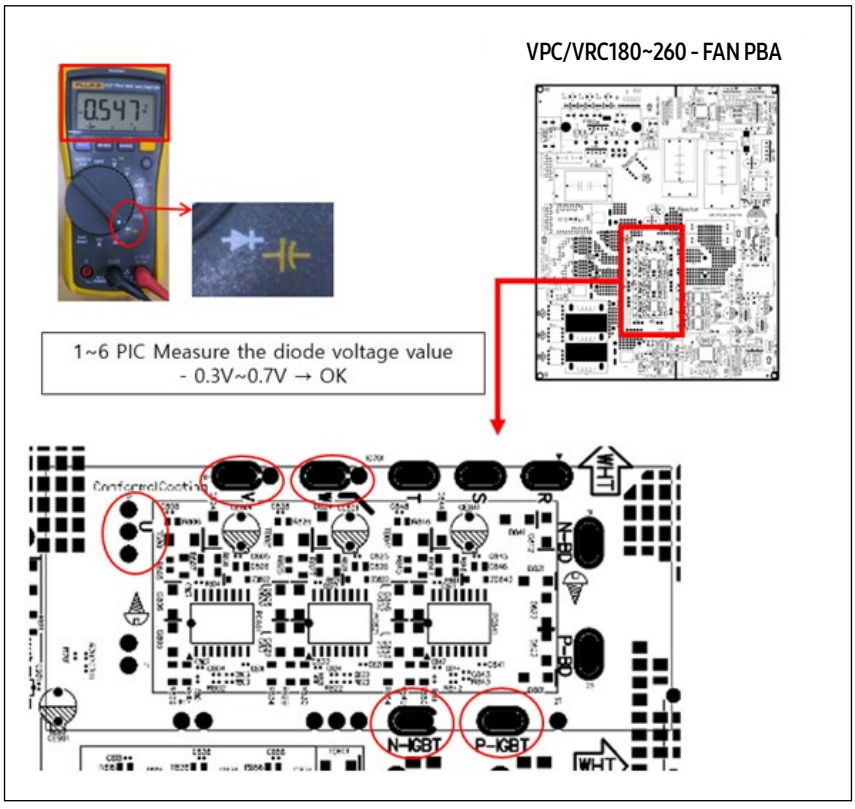
■ IPM [IGBT] breakdown diagnostics (Inverter PBA)

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.

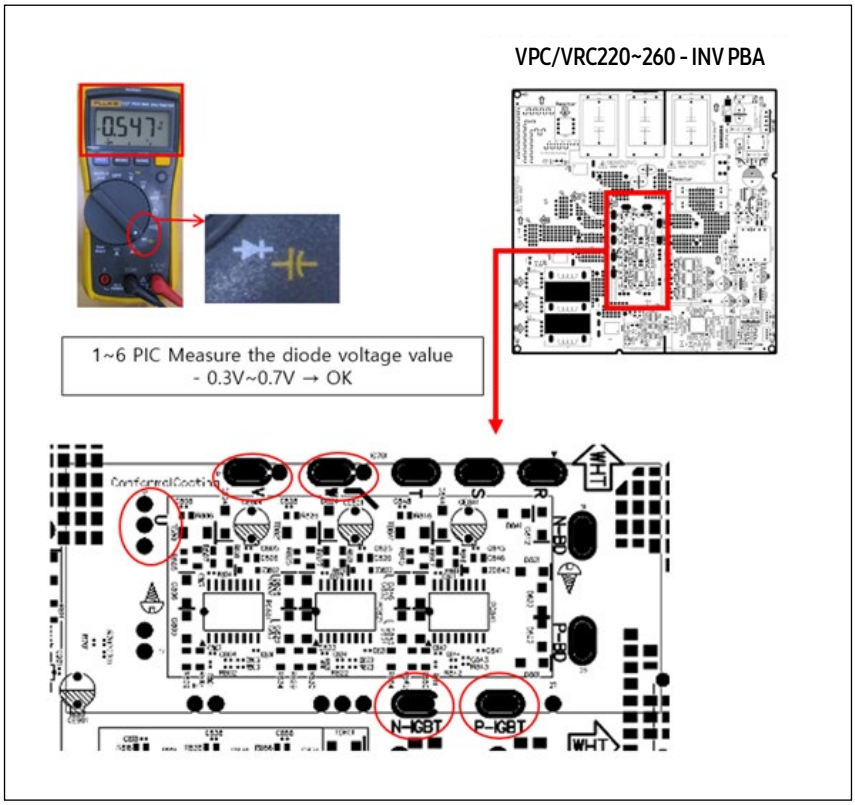
2. Inspection Method
   1) Refer to Figure1 and Table1, respectively the resistance value and diode voltage value measure.
   2) According to the criterion in Table 1 to determine whether the failure of IPM.

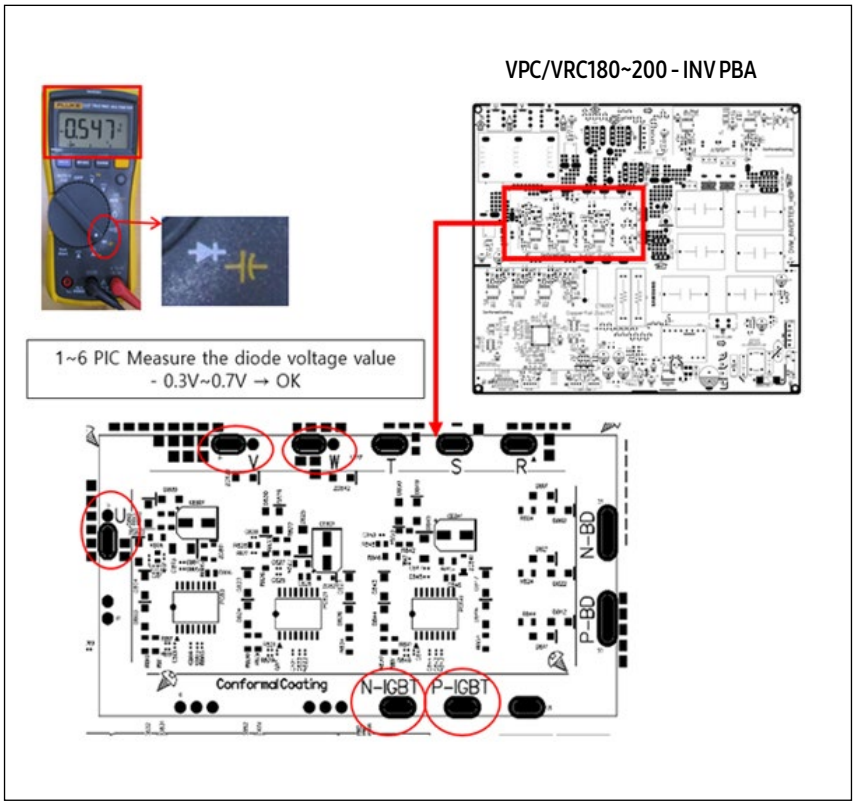
Division	Measured Point		Criterion	Remark
	+	-		
Measure the resistance values	P-IGBT	U	More than 500 kΩ	Measurement error can occur for reasons such as the initial measurement condenser discharge. Measured over at least three times.
	P-IGBT	V		
	P-IGBT	W		
	U	N-IGBT		
	V	N-IGBT		
	W	N-IGBT		
Measure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

‹Table1›



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



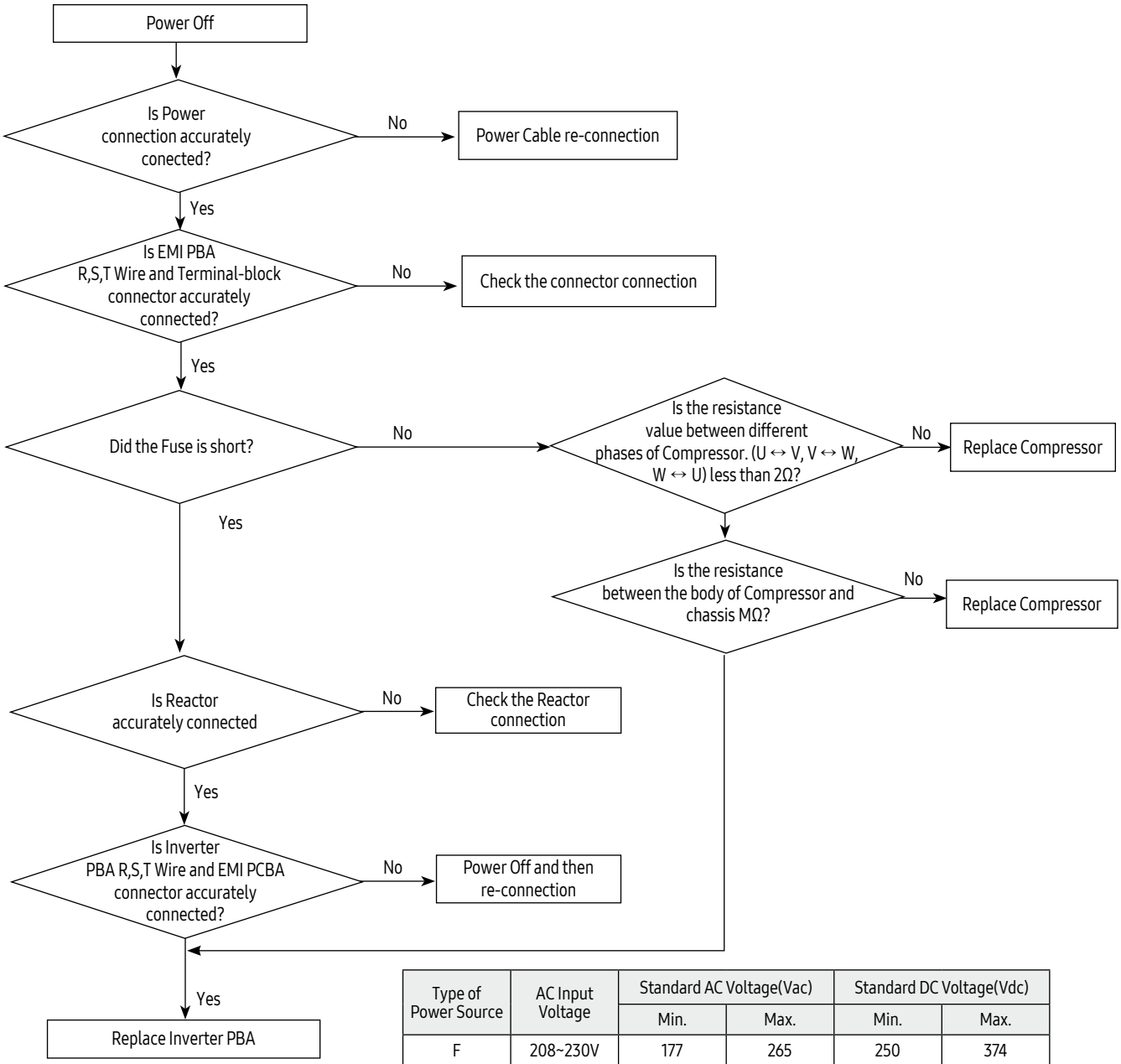


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-47 E466 / E366 Overvoltage/ Low voltage error

Outdoor unit display	E466 (INVERTER1 PBA) E366 (INVERTER2 PBA)
Judgment Method	• Input wiring error EMI fuse open. • DC-Link Overvoltage/ Low voltage occurs.
Cause of problem	- Check the power source wiring. (R/S/T/N wire crossed or not connected) - Check the power source voltage. (Rated voltage ±10%) - Check the fuses on EMI PBA. (fuse is normally short)

1. Cause of problem



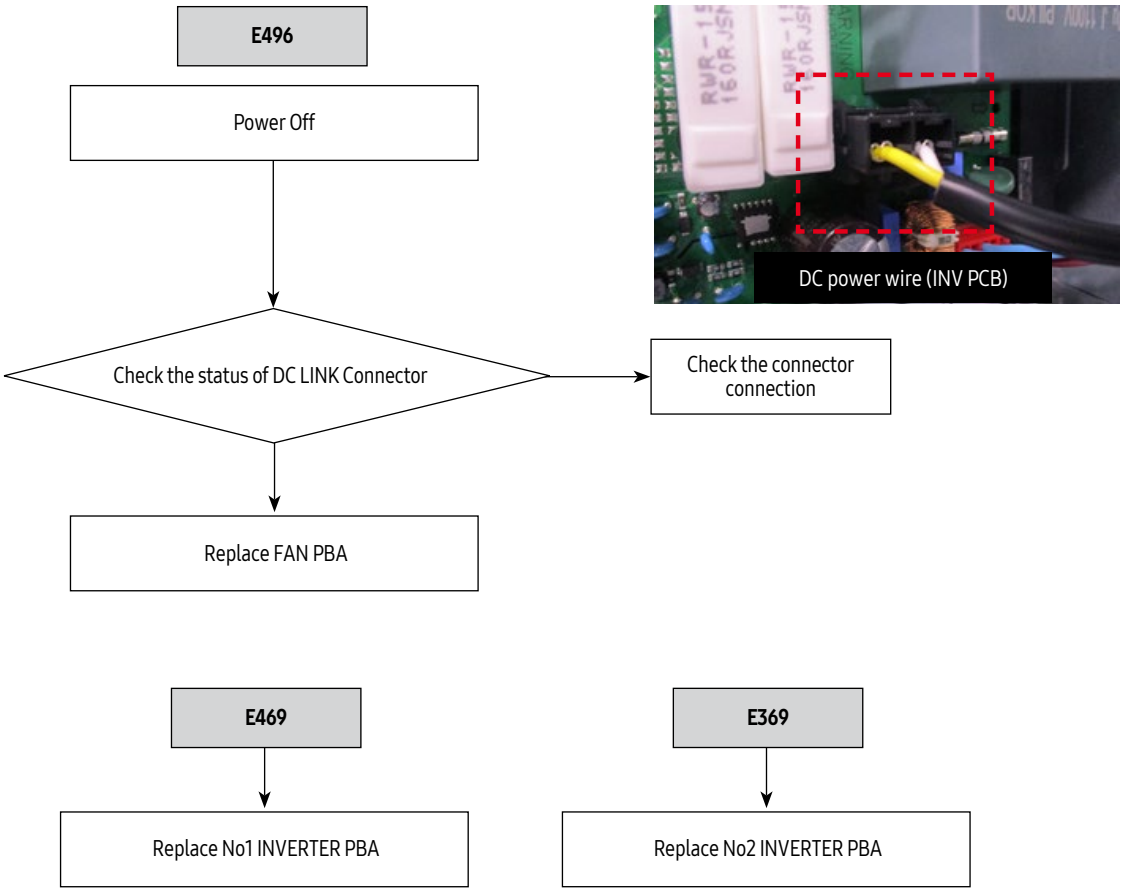
Type of Power Source	AC Input Voltage	Standard AC Voltage(Vac)		Standard DC Voltage(Vdc)	
		Min.	Max.	Min.	Max.
F	208~230V	177	265	250	374
J	460V	391	552	553	781
Q	575V	518	633	732	894

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

4-3-48 E469 / E369 / E496 DC Link voltage sensor error

Outdoor unit display	E469 (INVERTER1 PBA) E369 (INVERTER2 PBA) E496 (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

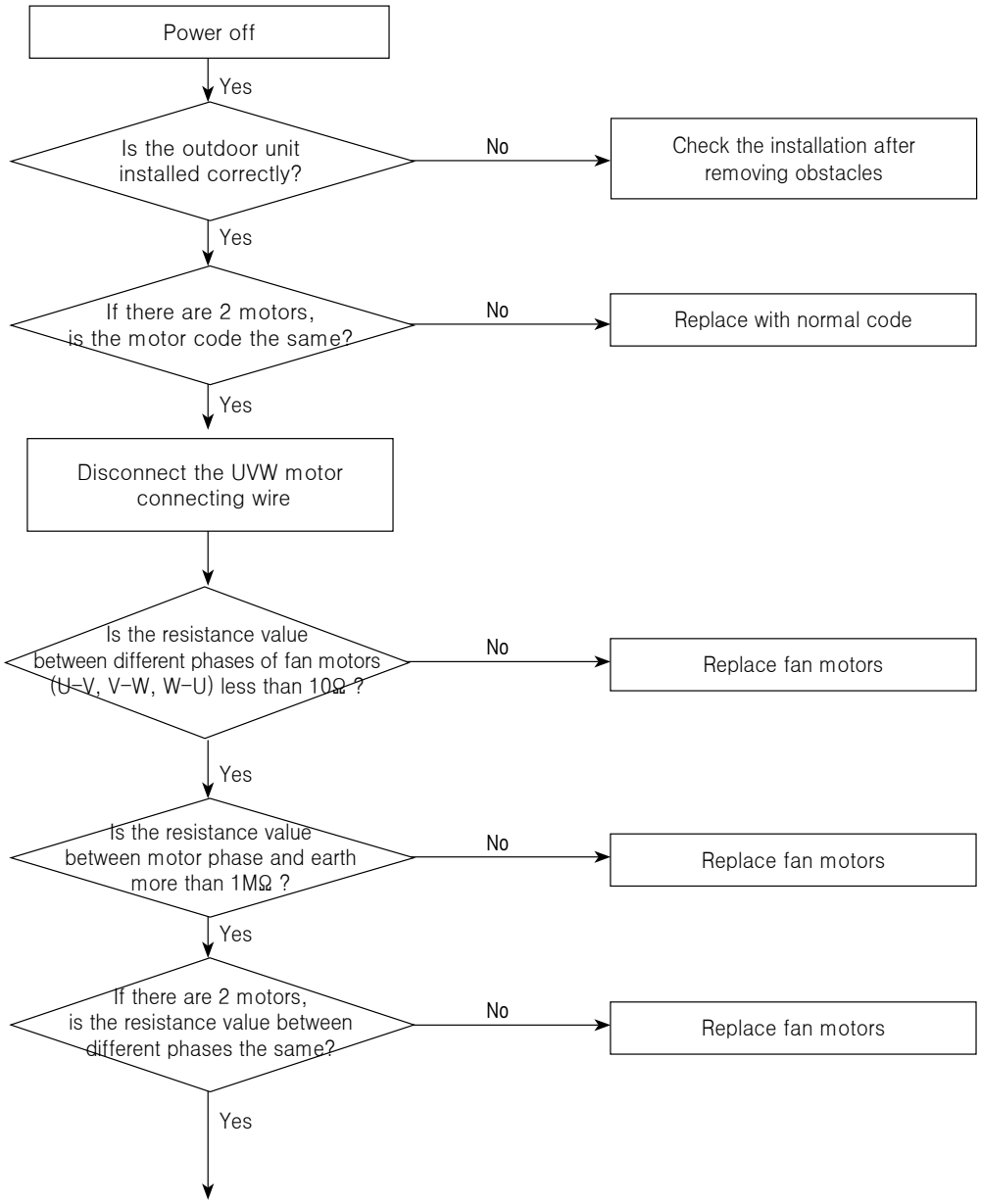


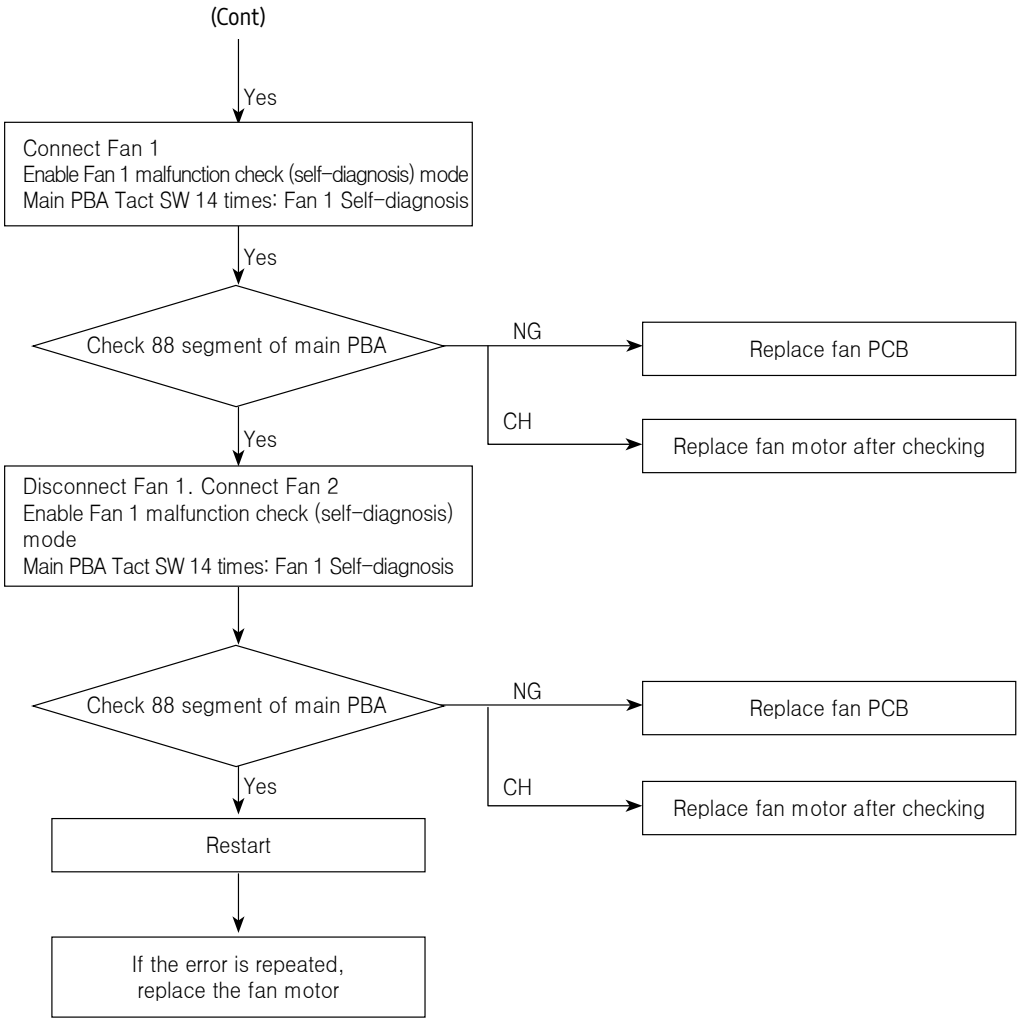
4-3 Appropriate Measures for Different Symptom (cont.)

4-3-49 E478/E489/E378/E389 Fan Motor Overcurrent error

Outdoor unit display	E478/E489 (FAN PBA(FAN1)) E378/E389 (FAN PBA(FAN2))
Judgment Method	• Occurs when overcurrent flows in the IPM. • Detected by H/W or S/W
Cause of problem	- Defective Motor - Fan motor U/V/W connection error. - Fan motor hall IC connection error. - Wire connection is crossed #1 & #2. - Defective Fan PBA

1. Cause of problem



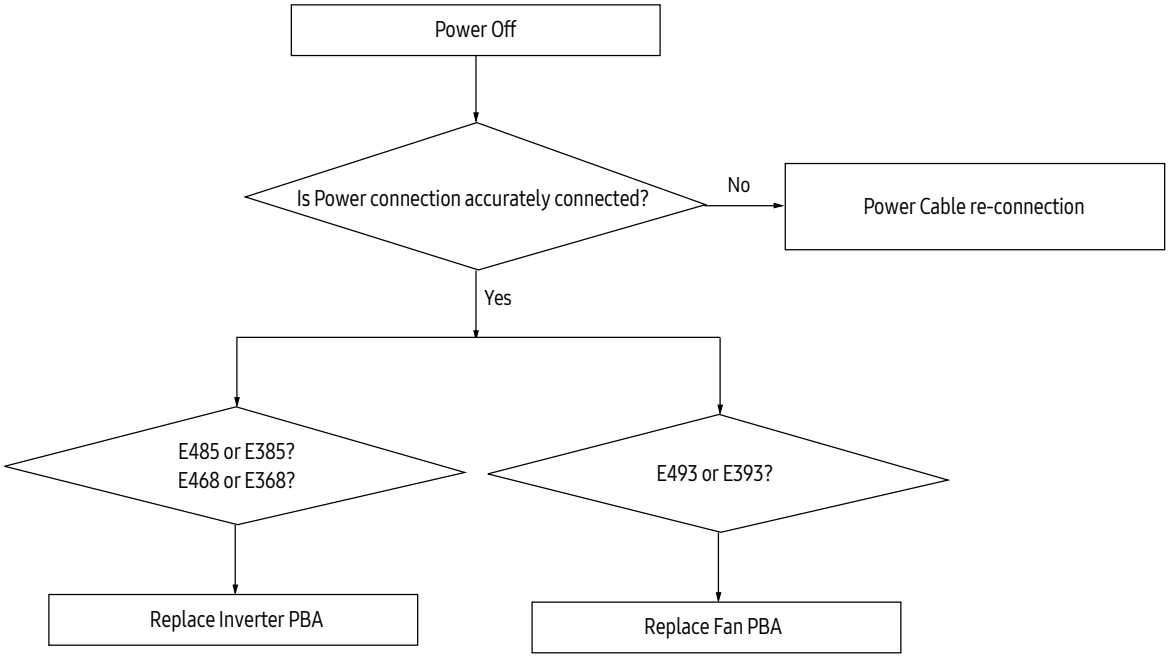

(Cont)
Yes
Connect Fan 1
Enable Fan 1 malfunction check (self-diagnosis) mode
Main PBA Tact SW 14 times: Fan 1 Self-diagnosis
Yes
Check 88 segment of main PBA
NG
Replace fan PCB
CH
Replace fan motor after checking
Yes
Disconnect Fan 1. Connect Fan 2
Enable Fan 1 malfunction check (self-diagnosis) mode
Main PBA Tact SW 14 times: Fan 1 Self-diagnosis
Check 88 segment of main PBA
NG
Replace fan PCB
CH
Replace fan motor after checking
Yes
Restart
If the error is repeated,
replace the fan motor

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

4-3-50 E485 Input/ Output Current sensor error

Outdoor unit display	E485 INVERTER1 PBA(Input Current sensor) E385 INVERTER2 PBA(Input Current sensor) E468 INVERTER1 PBA(Output Current sensor) E368 INVERTER 2 PBA(Output Current sensor) E493 OUTDOOR FAN PBA (FAN1 Output Current sensor) E393 OUTDOOR FAN PBA (FAN2 Output Current sensor)
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	• Input voltage defective • PBA voltage sensing circuit defective

1. Cause of problem



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

4-3-51 E486 Outdoor Fan PBA Overvoltage/ Low voltage error

Outdoor unit display	E486
Judgment Method	• DC-Link Overvoltage/ Low voltage occurs.
Cause of problem	• Check the status of DC LINK Connector

1. Cause of problem

• Be careful when you check DC voltage.(600Vdc ↑)

How to check voltage from DC LINK connector disconnect from FAN PBA.

→ ⓐ Turn off the MAIN Power

→ ⓑ Disconnect the DC LINK connector from FAN PBA

→ ⓒ Turn on the MAIN Power

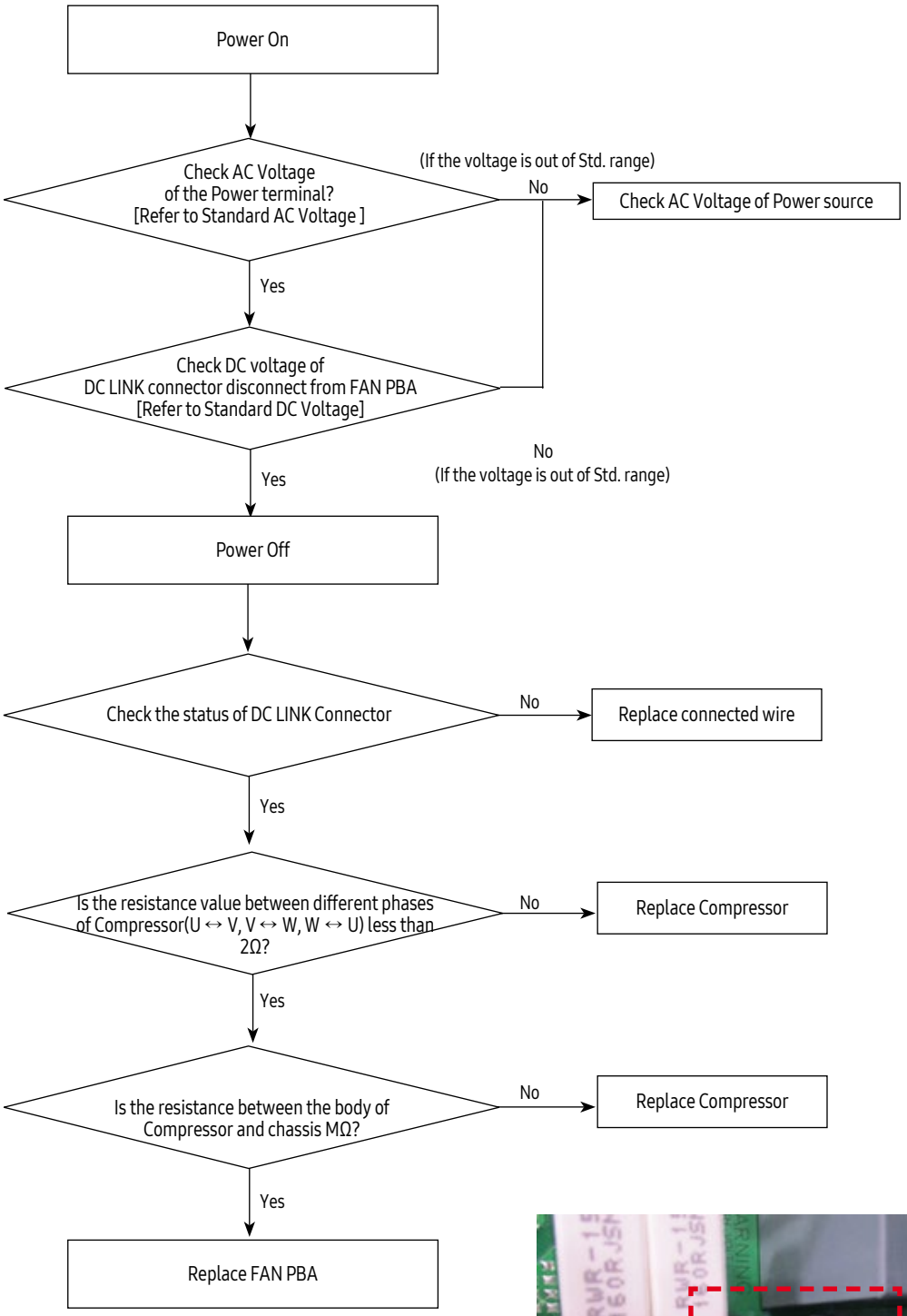
→ ⓓ Check voltage of connector

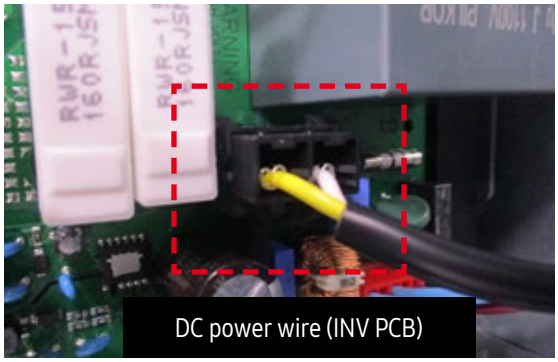
Standard voltage range of DC and AC

AC Input Voltage	Standard AC Voltage(Vac)		Standard DC Voltage(Vdc)	
	Min.	Max.	Min.	Max.
208~230V	187	253	265	358
460V	414	506	585	715
380~415V	342	457	484	646
575V	518	633	732	894

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

4-3-51 E486 Outdoor Fan PBA Overvoltage/ Low voltage error (cont.)





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

4-3-52 E487 / E387 Hall IC connection/Two motor parameter difference error

Outdoor unit display	E487 (FAN PBA(FAN1)) E387 (FAN PBA(FAN2))
Judgment Method	• Fan rotation defective or vibration and noise of the defective operation. • Hall IC there is no signal input. • Detected by SW while starting.
Cause of problem	• Hall IC wire disconnection. • Defective circuit parts and defective manufacturing. • Fan Motor defective. • Motor parameters are completely different

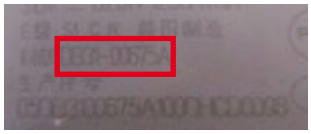
1. Cause of problem

Power Off/ Power Restart

Dual Fan Controller? — No → Did the error occurs? — No → End of Service

Yes

If there's two motor, the combination is nomal? — No → Replace it normal combination



Normal ccmbination
DB31-00614E, DB31-00614F
DB31-00614G, DB31-00614H
DB31-00651A, DB31-00651B
DB31-00652A, DB31-00651B
DB31-00675A, DB31-00675B
DB31-00675E, DB31-00675F

Yes

Yes

Connection wire of HALL IC did confirmation? (Verify that the wire folded, or the connection is detached.) — No → Check the connecting wire and restart.

Yes

HALL IC on the PBA is correctly connected ? — No → Check the connecting wire and restart.

Yes

Replace Fan PBA

Restart

When the error is repeated, replace the Fan Motor.

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

4-3-53 E500 / E400 Inverter PBA IPM overheating error

Outdoor unit display	E500 (INVERTER1 PBA) E400 (INVERTER2 PBA)
Judgment Method	- Inverter PBA IGBT/PFCM module temperature is more than 105℃
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

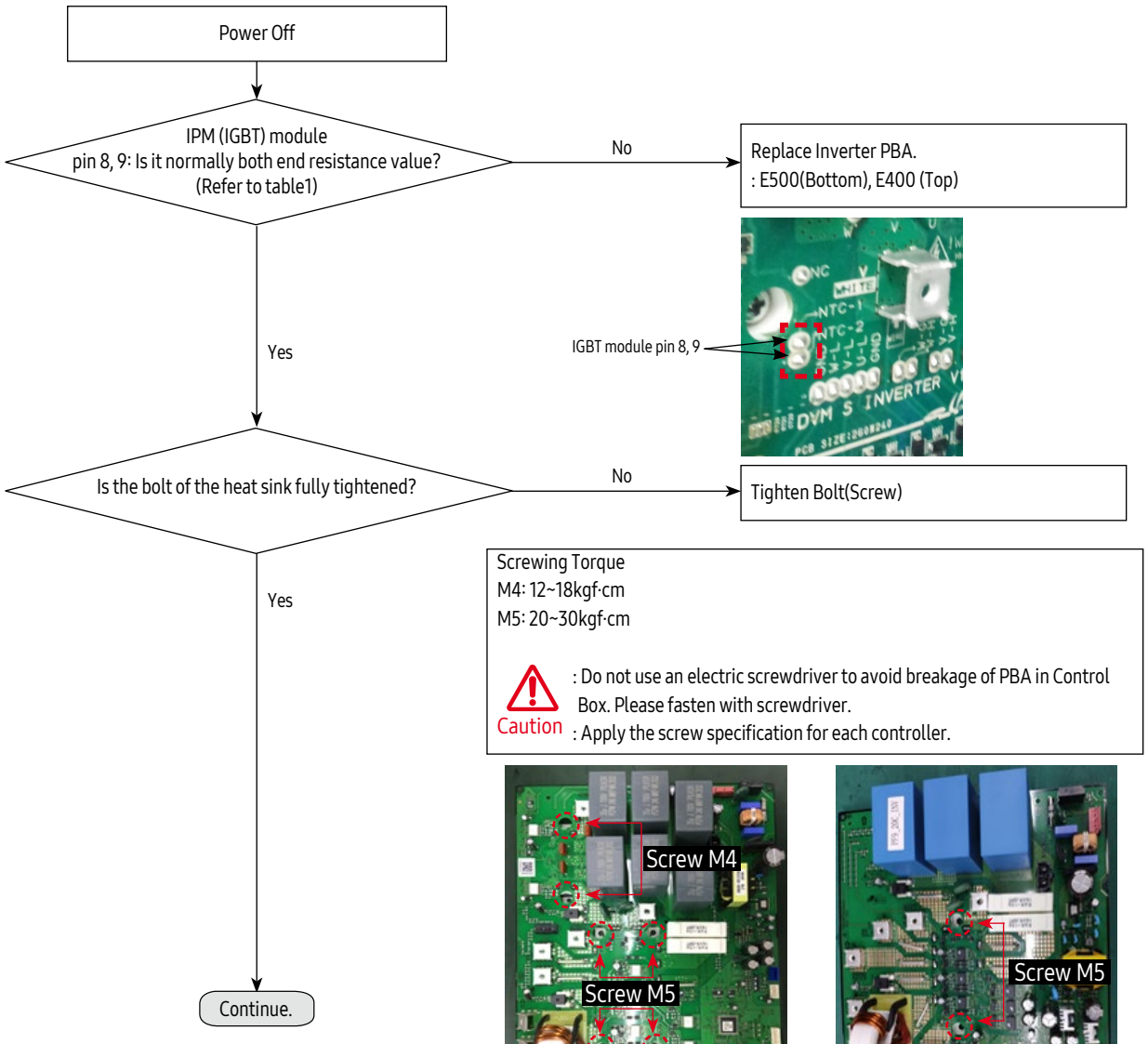
Both end resistance values of IGBT module pin(8, 9 pin)

Temperature [℃]	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.

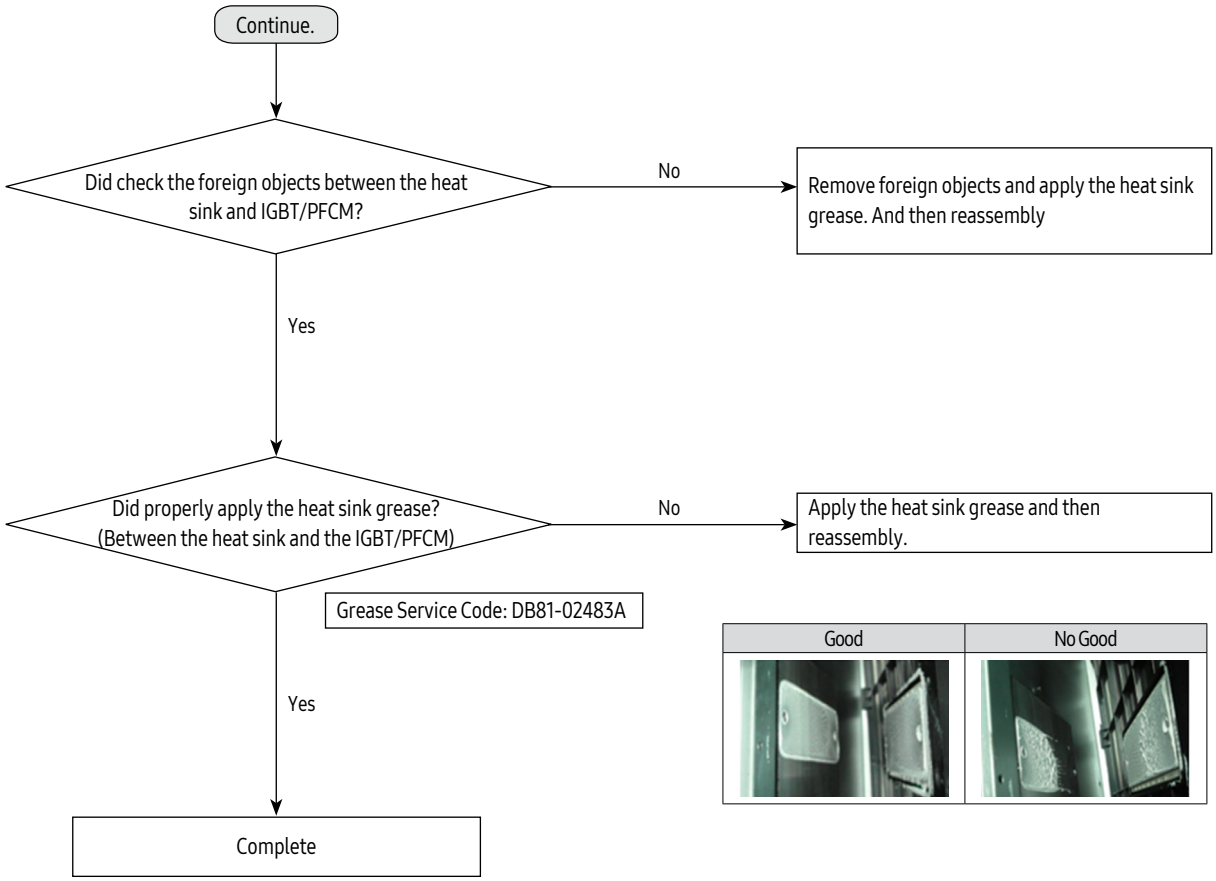
*Wait at least one minute after Power Off.

1. Cause of problem



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

4-3-53 E500 / E400 Inverter PBA IPM overheating error

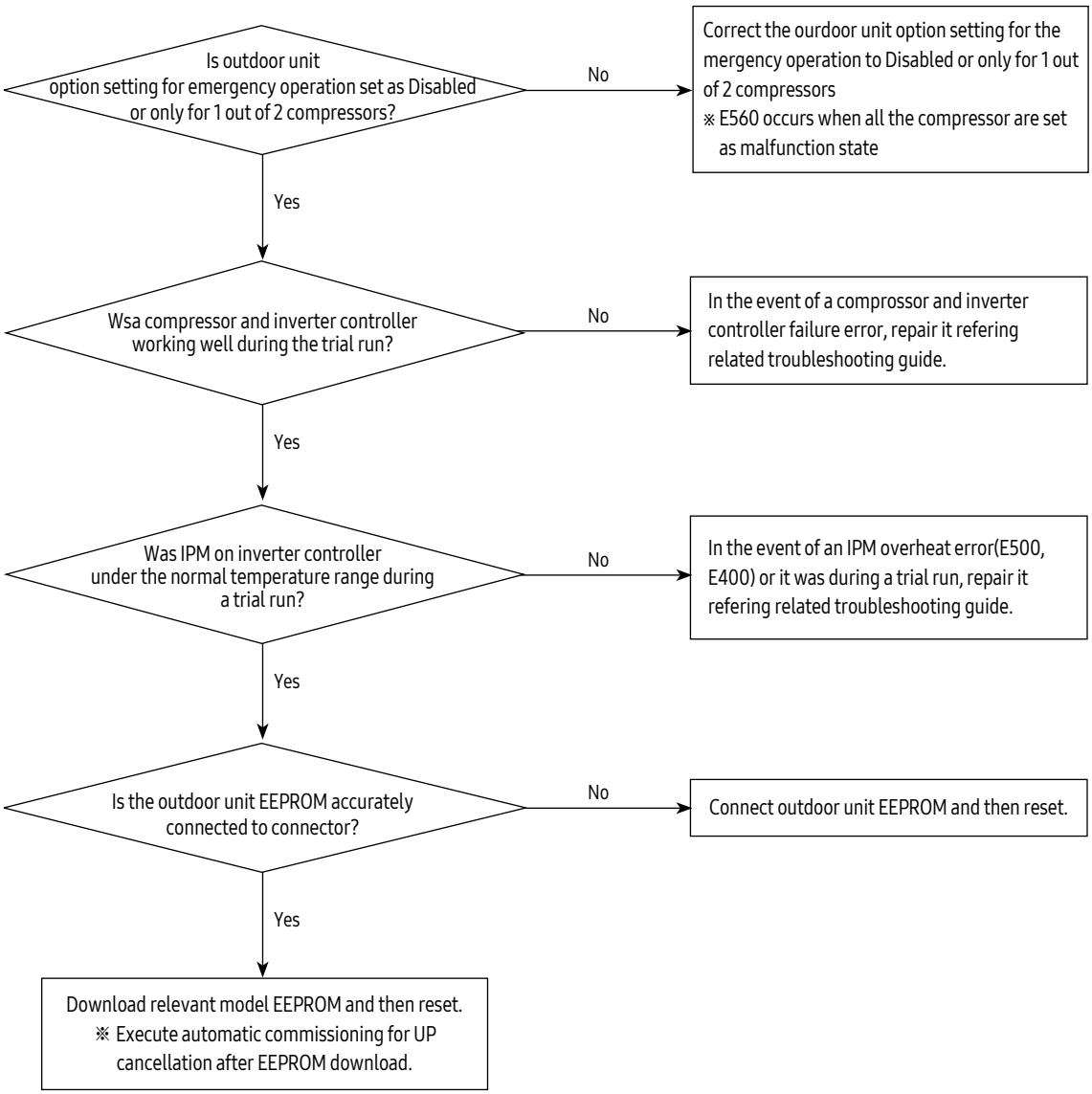


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-54 E560 Option setting error of outdoor unit

Outdoor unit display	E560
Indoorunit display	◑(Operation) ×(Reservation) ◑(Blast) ×(Filter) ×(Defrost)
Judgment Method	• Refer to the judgment method below.
Special Cause	• Option setting error of outdoor unit 1. If all compressors in the entire system are set as malfunction state on the outdoor unit option setting for emergency operation. 2. If all compressors in the entire system fail 3. If the E2P option of other models is used

1. Cause of problem

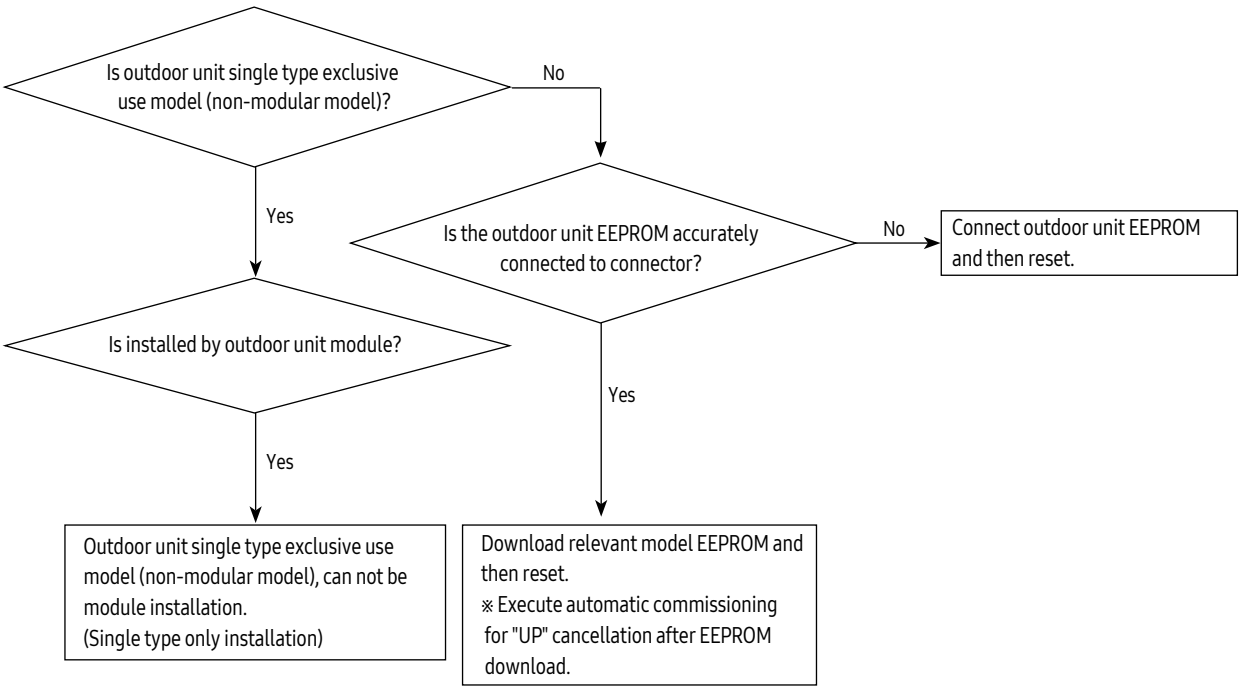


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-55 E573 Error due to using single type outdoor unit in a module installation

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

1. Cause of problem

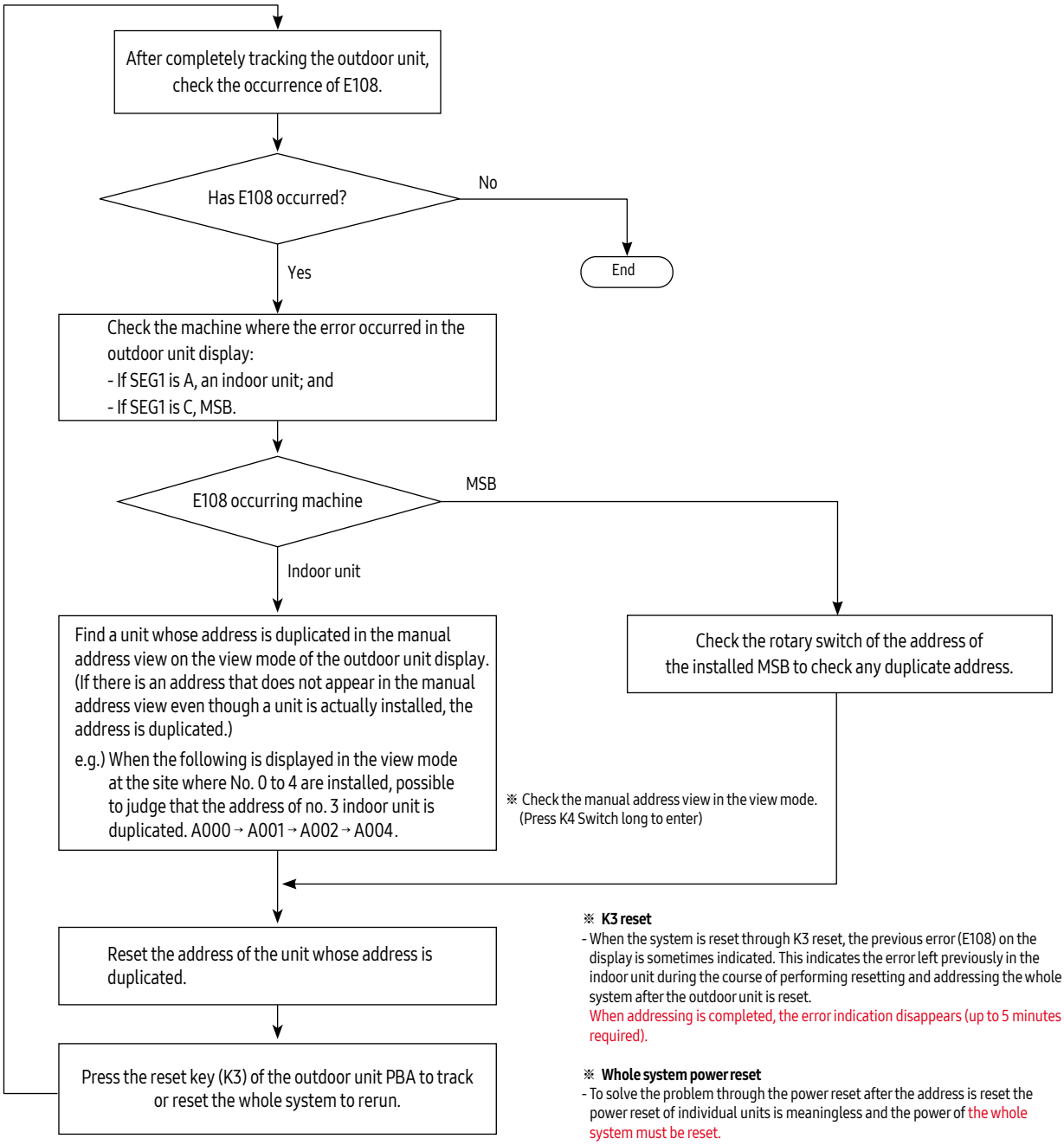


4-3 Appropriate Measures for Different Symptom (cont.)

4-3-56 E 108 Indoor unit and MSB 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 MSB address duplication.

1. Cause of problem



※ **K3 reset**
- When the system is reset through K3 reset, the previous error (E108) on the display is sometimes indicated. This indicates the error left previously in the indoor unit during the course of performing resetting and addressing the whole system after the outdoor unit is reset.
When addressing is completed, the error indication disappears (up to 5 minutes required).

※ **Whole system power reset**
- To solve the problem through the power reset after the address is reset the power reset of individual units is meaningless and the power of the whole system must be reset.

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

4-3-57 E554 Refrigerant leakage check alarm in operaiton

Outdoor unit display	E554 - (Refrigerant leakage judgment in operation)
Judgment Method	Refrigerant leakage is judged through pressure and temperature sensor values in normal operation
Cause of problem	• Refrigerant leakage and shortage.

It is not an inoperable failure situation.
It is an alarm function to inform the possibility of refrigerant leakage.

If there is E554 in the history, check the refrigerant leak.
If you can not find any leak, refer to the installation manual to perform the automatic refrigerant amount detection operation (K2 switch 5 times push) and charge the refrigerant.

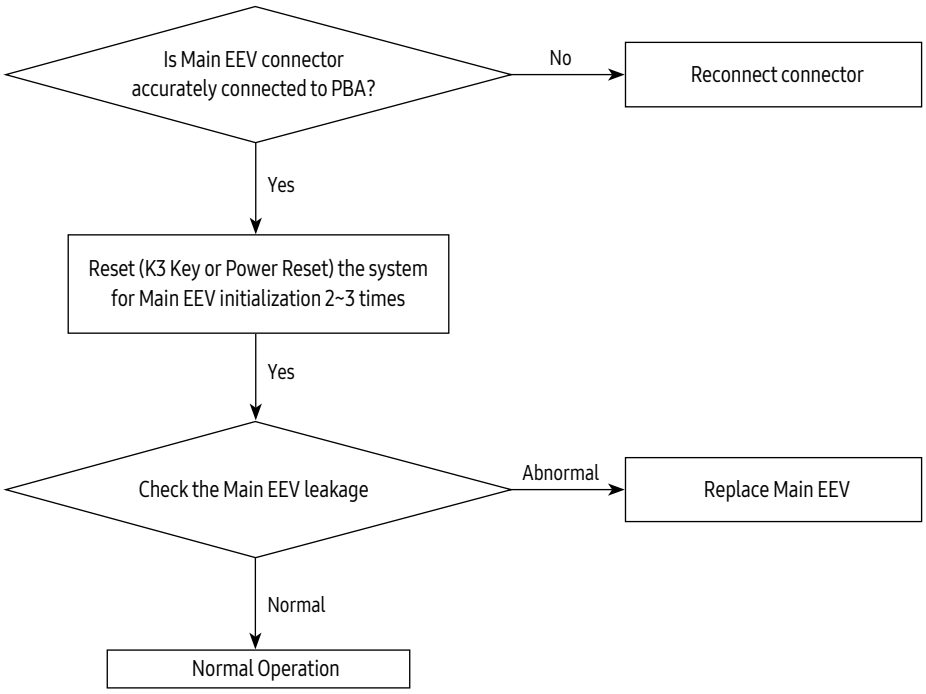
※ The refrigerant leakage check function is activated under the following conditions.
Ambient temperature within 25 ~ 40 °C
All outdoor units are operating
In case of the indoor unit is operating at least 65%.

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

4-3-58 E477 Main EEV leakage Error

Outdoor unit display	E477
Judgment Method	It is detected through the temperature and pressure of the stopped outdoor unit during heating operation in the module combination
Cause of problem	Main EEV leakage

1. Cause of problem

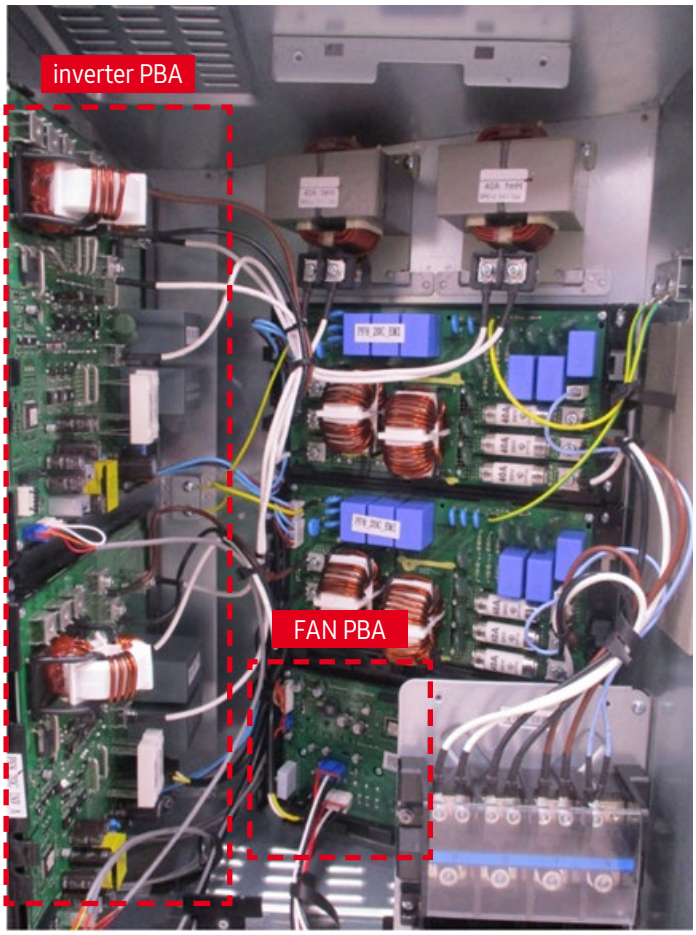


4-4 Case study for trouble shoots

4-4-1 Electric discharge mode

■ Warning of Electrical Shock from DC Power

- Capless Inverter does not support "Electric discharge mode"!
- Cut-off the power and wait for more than 2 minute allow it to discharge naturally.



‹ 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
1 times	Refrigerant charging in Cooling mode	"H" "5" "0" "0"
2 times	Trial operation in Cooling mode	"H" "6" "0" "0"
3 times	Pump down all units in Cooling mode	"H" "7" "0" "0"
4 times	Auto trial operation	"H" "8" "0" "0"
5 times	Checking the amount of refrigerant	"H" "9" "X" "X" (Display of last two digits may differ depending on the progress)
6 times	Discharge mode of DC link voltage	"H" "A" "0" "0"
7 times	Forced defrost operation	"H" "b" "0" "0"
8 times	Forced oil collection	"H" "C" "0" "0"
9 times	Inverter compressor1 check	"H" "d" "0" "0"
10 times	Inverter compressor 2 check	"H" "E" "0" "0"
11 times	Fan 1 check	"H" "F" "0" "0"
12 times	Fan 2 check	"H" "O" "0" "0"
13 times	H/R Auto pipe pairing H/P Unused	"H" "H" "0" "0" (Display of last two digits may differ depending on the progress)
14 times	Baseheater testing mode	"H" "J" "0" "0"
15 times	Unused	"H" "y" "0" "0"
16 times	End KEY operation	–

- ▶ 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.

Caution

- 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.
- In case of capless inverter 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		"H" "A" Inv. 2 DC voltage "H" "A" Inv. 1 DC volt Ex) 445V → 0445  ※ Below 30 Volt, "H" "A" "0" "H" displays.

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

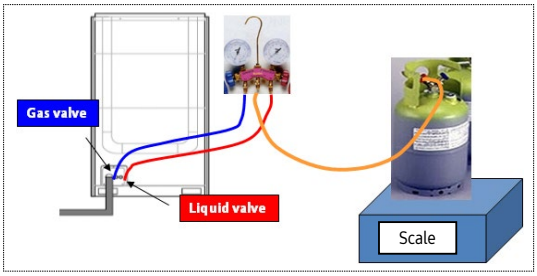
1. If the installation of the long pipe: Any refrigerant into the outdoor unit can not be recovered, therefore should use a separate container
2. Observe low pressure using View Mode of K4 button if compressor operate.
   - If low pressure goes down below about 0.2MPa.g
     : Immediately close the gas 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 Swithc 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)
Outdoor Fan	Maximum air flow
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.

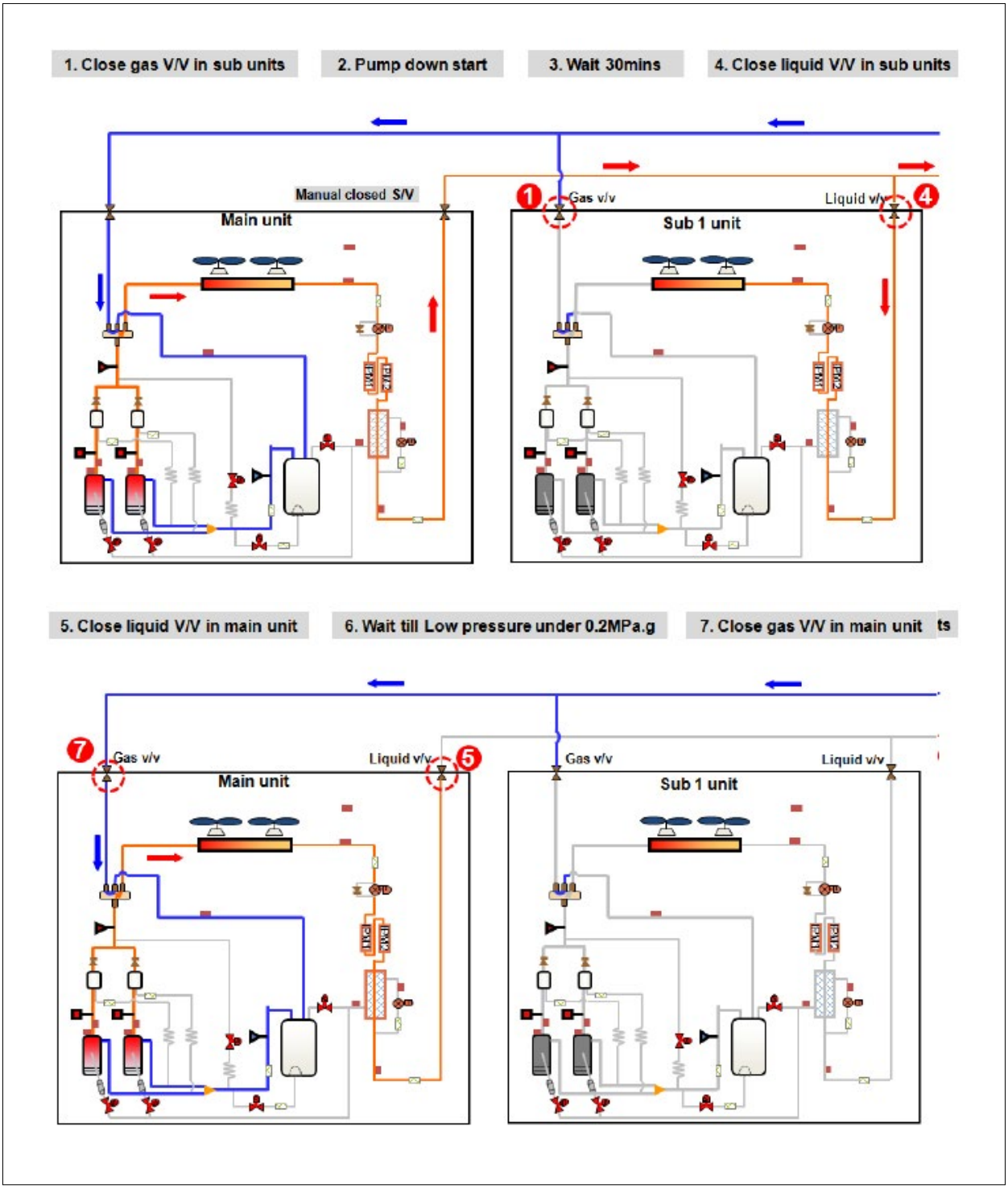
1. Prepare manifold gage, container, scale.
2. Check total refrigerant in the system.
3. Connect manifold gage hose & Turn on 50% IDUs in cooling mode
4. 10mins later if the high pressure is over 30kg/cm2.g, turn off some indoor unit till high pressure is same or lower than 30kg/cm2.g
5. If high pressure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

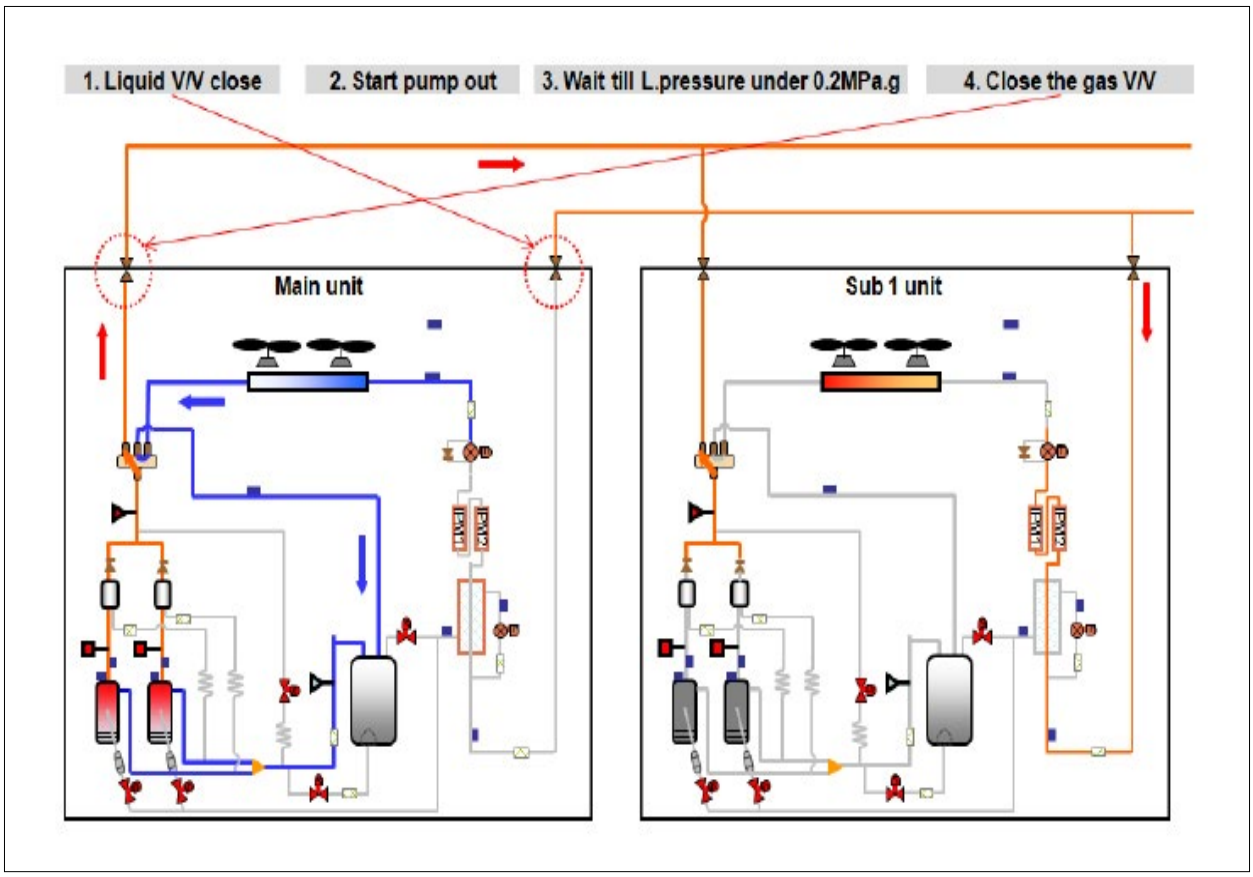
2. After pump out about 1kg of refrigerant will be remained in the pipe so use pipe cutter to detach the pipe.
(Do not use flame to detach the pipe)

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

How to lnitiate	K1 Tact Swithc 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	"F" "4" "0" "1"	Vacuuming(Outdoor unit address 1)
8times	"F" "4" "0" "2"	Vacuuming(Outdoor unit address 2)
9times	"F" "4" "0" "3"	Vacuuming(Outdoor unit address 3)
10times	"F" "4" "0" "4"	Vacuuming(Outdoor unit address 4)
11times	"F" "4" "0" "A"	Vacuuming(All outdoor units)

How to lnitiate	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)

<table>
<tr><td>Outdoor unit display</td><td>E201</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><th colspan="5">Duct, Cassette (1/2 Way),Console, Celing</th><th colspan="4">Cassette (4/Mini4 Way)</th><th colspan="5">Wall-mounted (NeoForte)</th></tr>
<tr><th>Operation</th><th>Defrost</th><th>Timer</th><th>Fan</th><th>Filter/ MPI</th><th>Operation</th><th>Defrost</th><th>Timer</th><th>Filter</th><th>Operation</th><th>Timer</th><th>Turbo</th><th>24℃</th><th>27℃</th></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td></tr>
</table>
※ ● : ON ◑ : Flash ×: OFF
</td></tr>
<tr><td>Judgment Method</td><td>• Communication error between indoor and outdoor units.</td></tr>
<tr><td>Cause of problem</td><td>• Refer to the judgment method below.</td></tr>
</table>

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.)

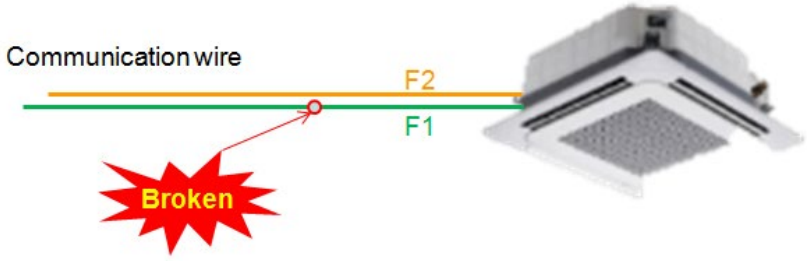
4-4-5 Case study – E201 (Communication error between indoor & outdoor unit) (cont.)

■ Action

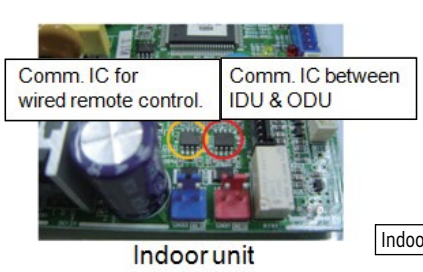
Action	Result
Check wiring to F1,F2 terminal block	OK
Comm. IC check	OK
Check ODU PBA setting	OK
Check Other error occurrence	OK
Wiring broken check	NG – middle of the F1 wire was broken

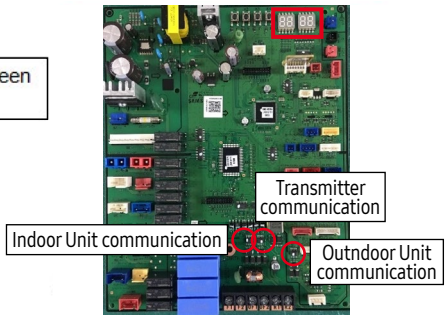
■ Solution

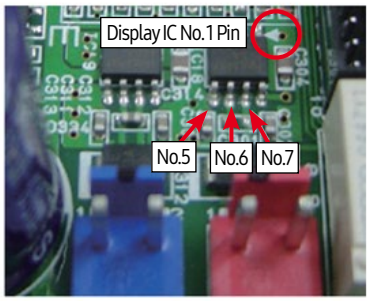
- Change the wire to new one



• How to check the Comm. IC



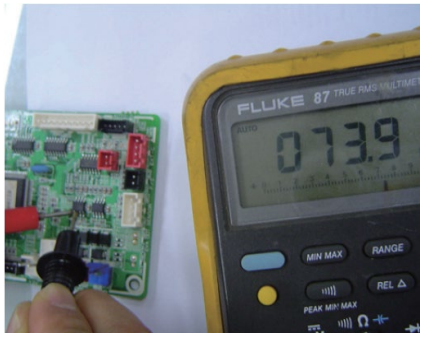




Outdoor Unit

■ 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 kΩ.
- Defective: One or both are low with tens of Ω
  One or both of them is open

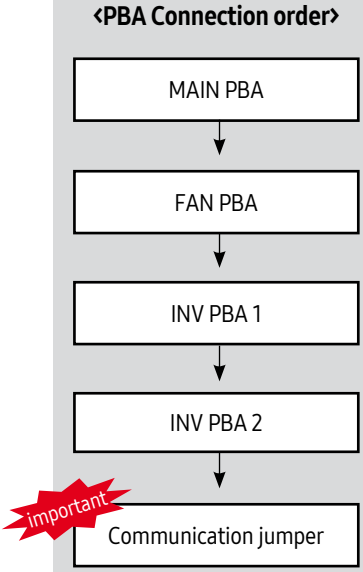
4-4 Case study for trouble shoots (cont.)

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

Outdoor unit display	E205
Indoorunit display	※ ● : 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.

Duct, Cassette (1/2 Way),Console, Celing					Cassette (4/Mini4 Way)				Wall-mounted (NeoForte)				
Operation	Defrost	Timer	Fan	Filter/ MPI	Operation	Defrost	Timer	Filter	Operation	Timer	Turbo	24℃	27℃
×	×	◑	◑	×	×	◑	◑	×	×	×	◑	◑	×

Possibility	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.



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

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

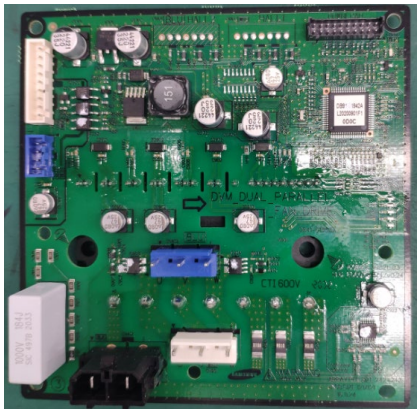
<table>
<tr><td>Outdoor unit display</td><td>E206</td></tr>
<tr><td>Indoorunit display</td><td>
<table>
<tr><td colspan="5">Duct, Cassette (1/2 Way),Console, Celing</td><td colspan="4">Cassette (4/Mini4 Way)</td><td colspan="5">Wall-mounted (NeoForte)</td></tr>
<tr><td>Operation</td><td>Defrost</td><td>Timer</td><td>Fan</td><td>Filter/ MPI</td><td>Operation</td><td>Defrost</td><td>Timer</td><td>Filter</td><td>Operation</td><td>Timer</td><td>Turbo</td><td>24℃</td><td>27℃</td></tr>
<tr><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td><td>×</td><td>×</td><td>◑</td><td>◑</td><td>×</td></tr>
</table>
※ ● : ON ◑ : Flash ×: OFF
</td></tr>
<tr><td>Judgment Method</td><td>• PBA does not respond to the invoked Main PBA</td></tr>
<tr><td>Cause of problem</td><td>• C-Box internal Inverter PBA, Fan PBA, Hub PBA defective</td></tr>
</table>

Possibility	1) Poor connection of communication wiring and connector 2) Defect of related electric component

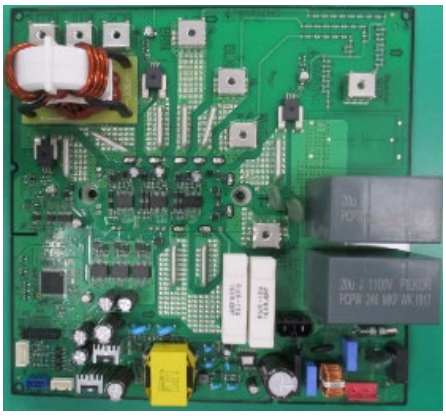
*** Reference**

E206-C001: MAIN PBA communication error/ E206-C002: FAN PBA communication error
E206-C003: INV1 PBA communication error/ E206-C004: INV2 PBA communication error

Main PBA



FAN PBA



Inverter PBA

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

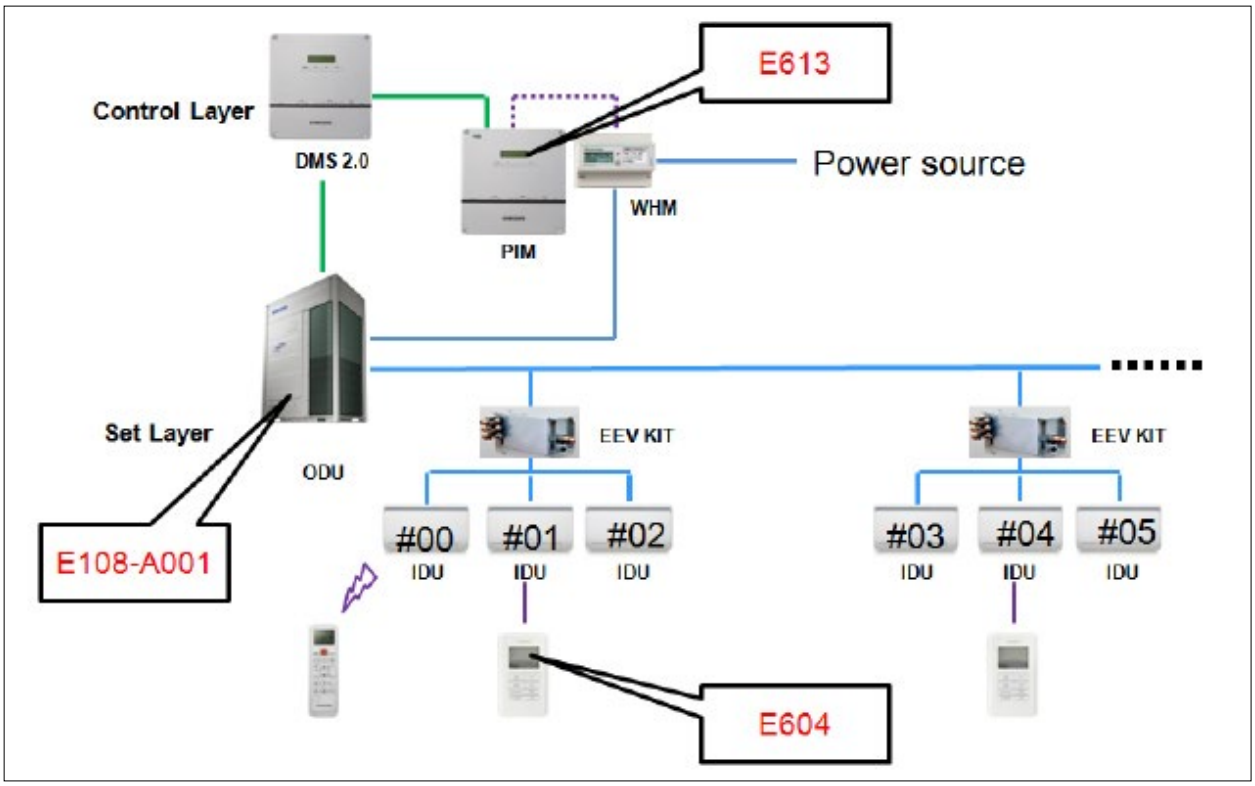
4-4-8 Case study – E108 (Error due to repeated address setting)

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

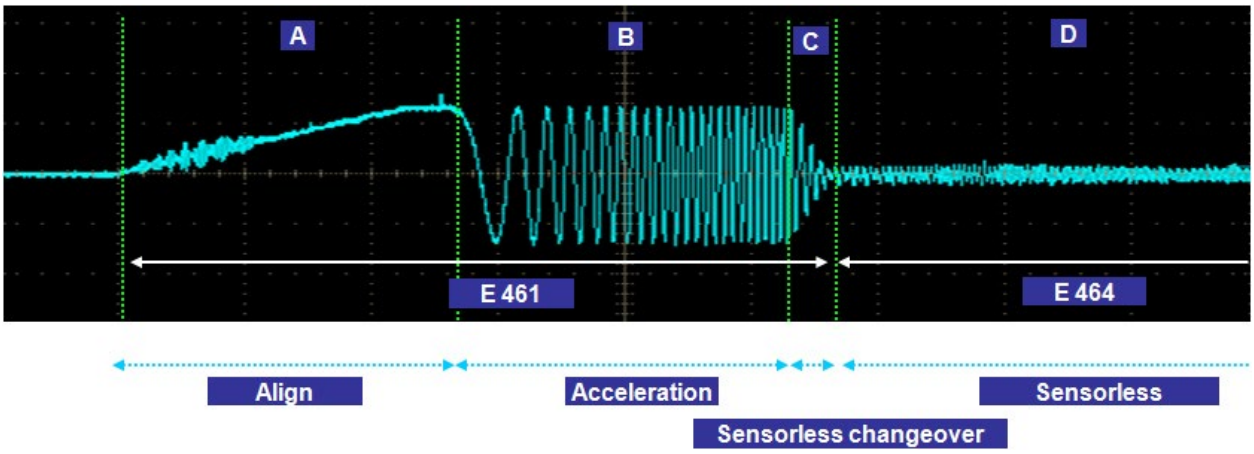
PIM display	E613
Contents	Error which occurs when there is no communication between DMS and PIM/SIM for 15 minutes
Error result	PIM stop
Cause	- System communication error like E201, E108... - Wired disconnection
Treatment	- System communication error fix - Check the wire

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/MSB/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	E461 (INVERTER1 PBA) E361 (INVERTER2 PBA)
Judgment Method	• Startup, and then if the speed increase is not normally. • Detected by H/W or S/W.
Cause of problem	• Compressor connection error • Defective Compressor • Defective PBA



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

4-4-11 Case study – Inverter PBA error

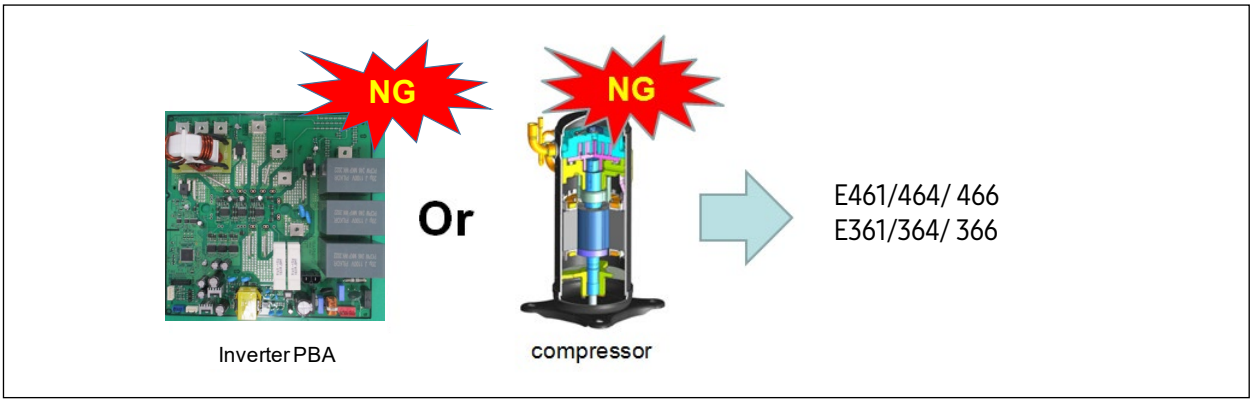
Outdoor unit display	E464/E465 (INVERTER1 PBA) E364/E365 (INVERTER2 PBA)	
Judgment Method	• Will occur if the overcurrent flowing in the IPM. • Detected by H/W or S/W	
Cause of problem	• Installation defective • Comp. defective • PBA defective	• Connection wire error • Motor defective

Outdoor unit display	E466 (INVERTER1 PBA) E366 (INVERTER2 PBA)
Judgment Method	• N-phase wiring error and EMI Fuse short. • DC-Link Overvoltage/ Low voltage occurs.
Cause of problem	• Check the input wiring • EMI Fuse short

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

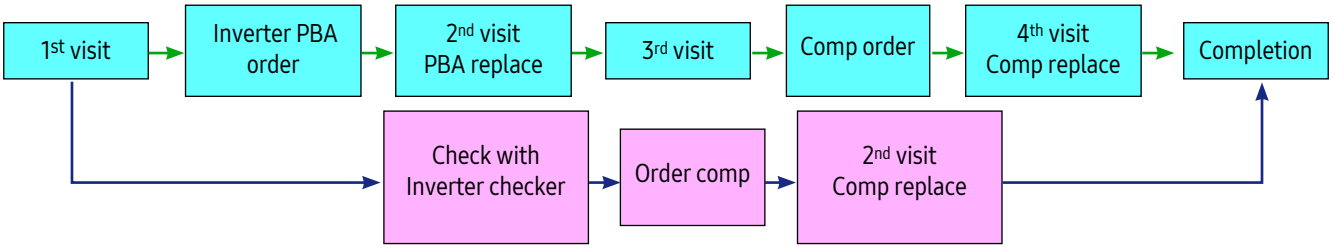
4-4-12 Case study – E461/361 & E464/364 & E466/366

▪ 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



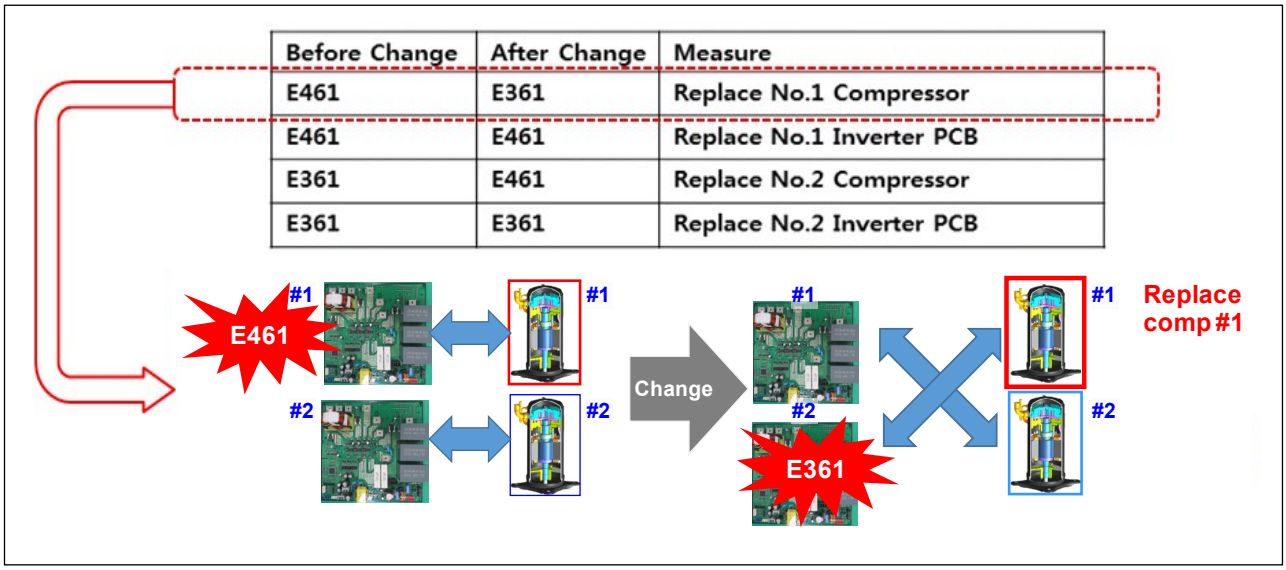
4-4 Case study for trouble shoots (cont.)

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

Before Change	After Change	Measure
E461	E361	Replace No.1 Compressor
E461	E461	Replace No.1 Inverter PCB
E361	E461	Replace No.2 Compressor
E361	E361	Replace No.2 Inverter PCB

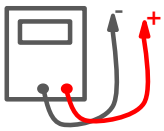


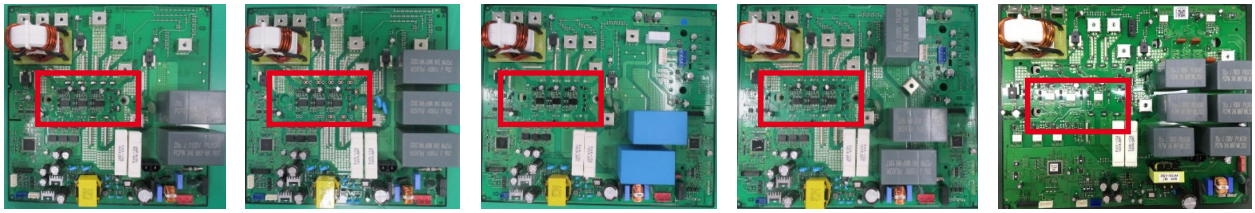
4-4 Case study for trouble shoots (cont.)

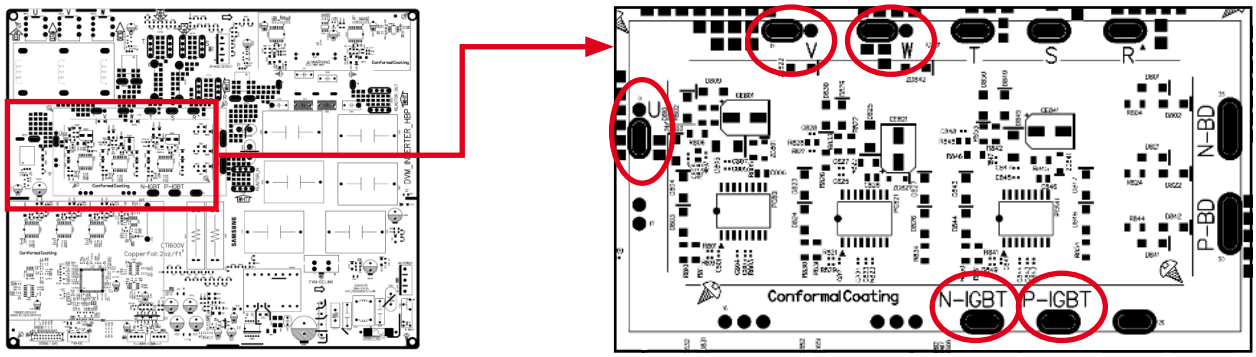
4-4-12 Case study – E461/361 & E464/364 & E466/366 (cont.)

▪ 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.

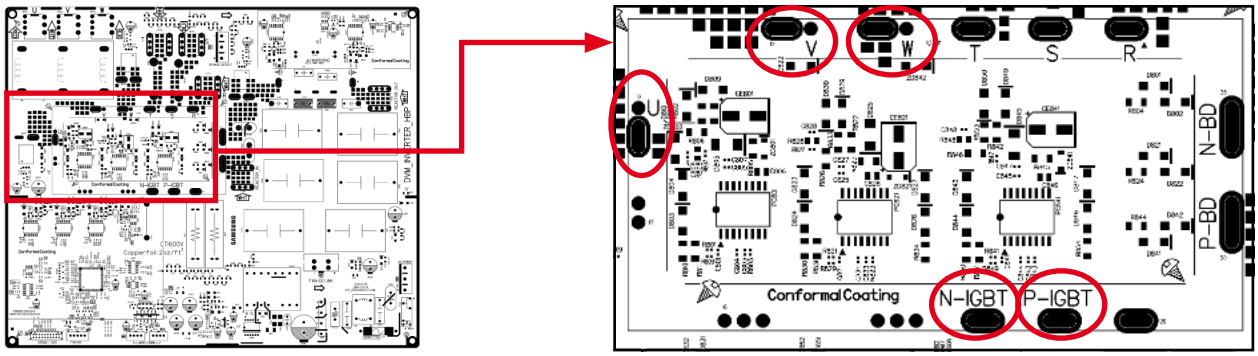
Division	Measured Point		Criterion	Remark
	+	-		
Measure the resistance values	P-IGBT	U	More than 500KΩ	Measurement error can occur for reasons such as the initial measurement condenser discharge. Measured over at least three times. 
	P-IGBT	V		
	P-IGBT	W		
	U	N-IGBT		
	V	N-IGBT		
	W	N-IGBT		
Measure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

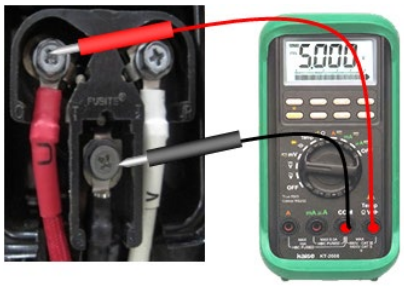
4-4-12 Case study – E461/361 & E464/364 & E466/366 (cont.)



▪ 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



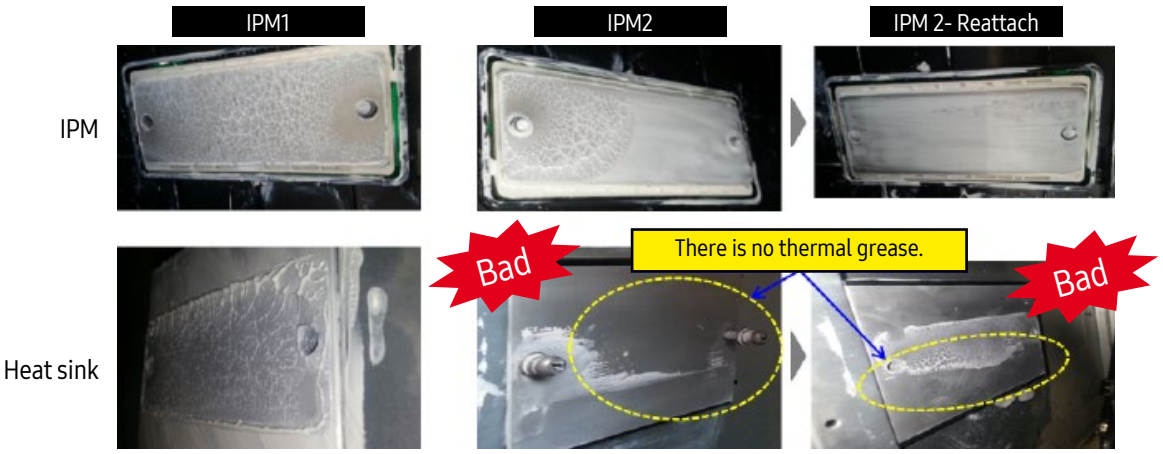
4-4 Case study for trouble shoots (cont.)

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.



- 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℃
- Hz Down: 93℃

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/㎠
- Hz Down: 37 kgf/㎠

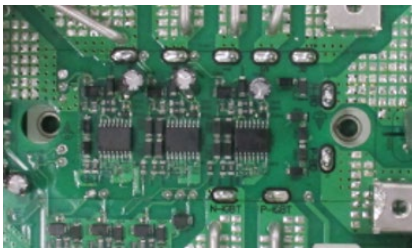
4-4 Case study for trouble shoots (cont.)

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

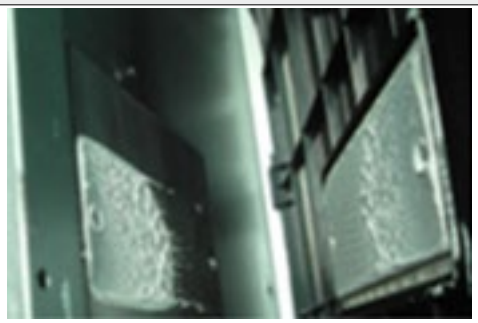
Error code	E500 (INV1)/ E400 (INV 2)
Contents	IGBT module over heated error
Error result	
Possibility	1) Loose screw connection between IGBT module and heat sink 2) No thermal grease on Heat sink 3) Defect of related electronic component
Treatment	1) Check status of screws on IGBT module 2) Plastering thermal grease to IGBT module or heat sink 3) Change INV PBA

Heat sink

IGBT(IPM) module



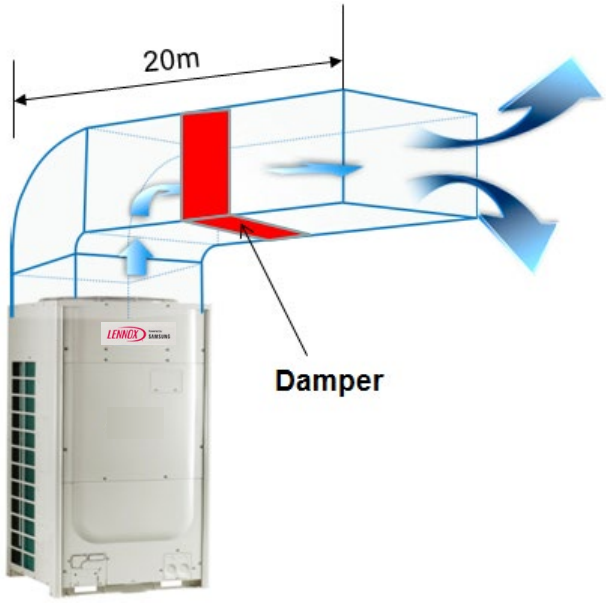
Inv. PBA

Good	No Good
	

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

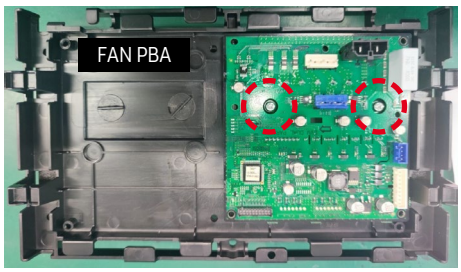
4-4-15 Case study – E455 (Fan IPM overheat error)

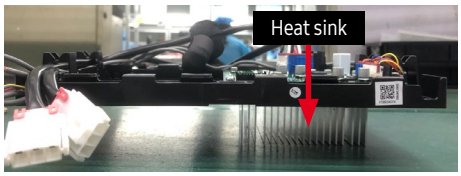
- Problem: system failure by E455
- Condition: Discharge guide duct 20m with motorized damper



- Trouble shooting

Outdoor unit display	E455 (FAN1 PBA) E355 (FAN2 PBA)
Judgment Method	• IPM internal temperature more than 85°C (E455, E355)
Cause of problem	• Heat sink and IPM assembly defective. • Defective heat sink cooling





- Action: S-net pro data check & back up

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

4-4-15 Case study – E455 (Fan IPM overheat error) (cont.)

- Analysis result: Cond out temperature is too high & Outdoor temperature is too high
  → Suspect insufficient air flow rate

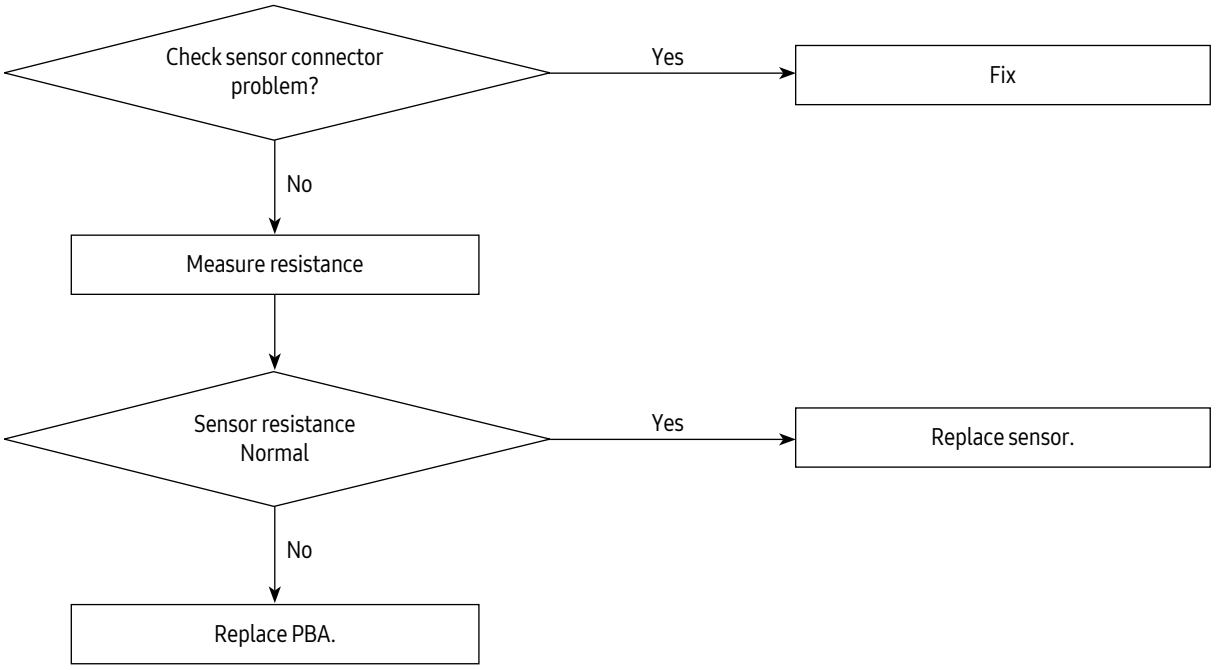
Address	10,00,00	Address	10,00,00
Serial Number	-	TestOperation(UP)	Completed
Operation Mode	CompDown	Comp Top1	50,1℃
Operation Status	Cool	Comp Top2	89,8℃
Error Code	455	Outdoor Temp.	47,1℃
Capacity	16HP	Compressor Current	0
Target Frequency1	0	Compressor Current	0
Order Frequency1	0	IPM1 Temp	53℃
Current Frequency1	0	IPM2 Temp	76℃
Target Frequency2	0	CondOut Temp.	54,8℃
Order Frequency2	0	Liquid Tube Temp.	53,7℃
Current Frequency2	0	Suction1 Temp.	12,2℃
High Pressure	34	Suction2 Temp.	12,6℃
Saturated T_Pd	56℃	Main EEV	0
Low Pressure	11,3	EVI EEV	0
Saturated T_Ps	14℃	EVI IN	17,5℃
Discharge1	55℃	EVI OUT	50,6℃
Discharge2	88,5℃	Outdoor Fan	35

Address	10,00,00	Address	10,00,00
Serial Number	-	TestOperation(UP)	Completed
Operation Mode	AutoInspect	Comp Top1	64,1℃
Operation Status	Cool	Comp Top2	65,8℃
Error Code	0	Outdoor Temp.	22,2℃
Capacity	16HP	Compressor Current	9,4
Target Frequency1	64	Compressor Current	9,6
Order Frequency1	64	IPM1 Temp	52℃
Current Frequency1	64	IPM2 Temp	51℃
Target Frequency2	67	CondOut Temp.	40,3℃
Order Frequency2	67	Liquid Tube Temp.	39,2℃
Current Frequency2	67	Suction1 Temp.	10,4℃
High Pressure	27,8	Suction2 Temp.	10,3℃
Saturated T_Pd	47℃	Main EEV	2000
Low Pressure	8,9	EVI EEV	0
Saturated T_Ps	7℃	EVI IN	32,6℃
Discharge1	64,8℃	EVI OUT	34,8℃
Discharge2	66,1℃	Outdoor Fan	16

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

4-4-16 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	
Temp. (℃)	Resistance (kΩ)
70	2.2
60	3.0
50	4.2
40	5.8
30	8.3
21	12.1
10	18.0
0	27.3
-10	43.0

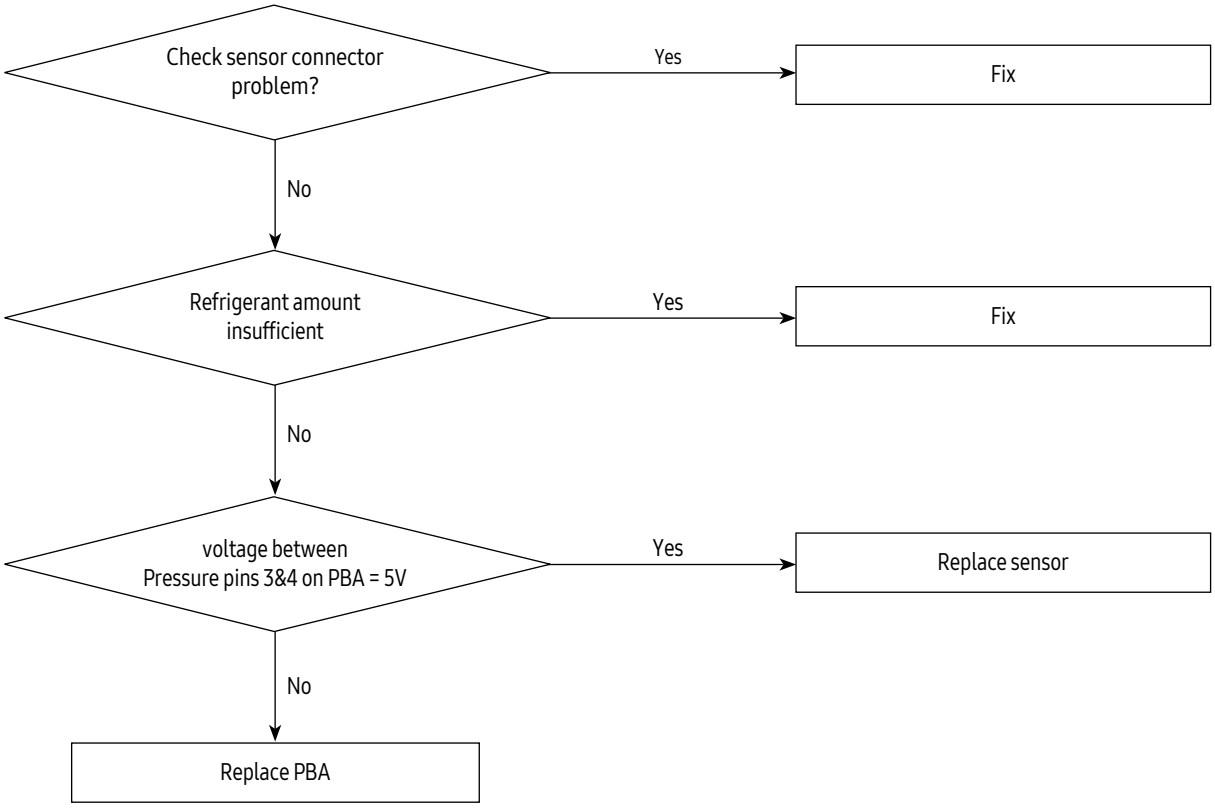
204 CT	
Temp. (℃)	Resistance (kΩ)
130	8.9
120	11.2
100	18.5
80	32
60	59
25	200
20	242
10	362
0	553

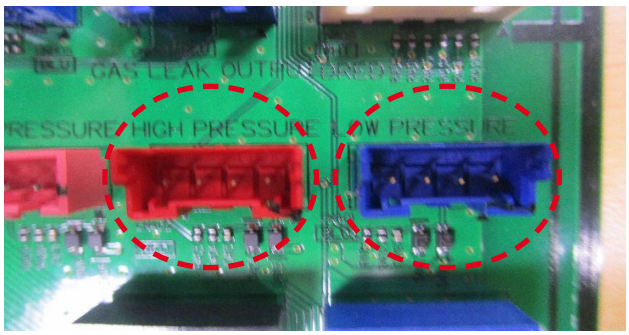
4-4 Case study for trouble shoots (cont.)

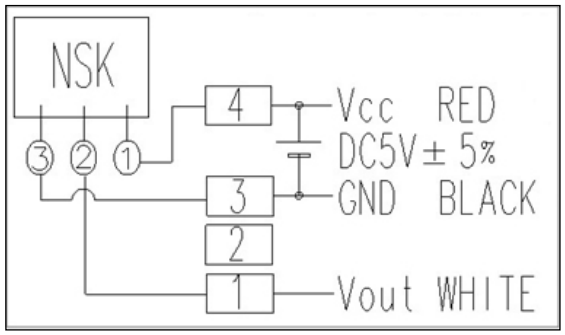
4-4-17 Case study – Pressure sensor open/short

▪ Disconnection or breakdown of relevant sensor.

- E291: High pressure sensor error
- E296: Low pressure sensor error

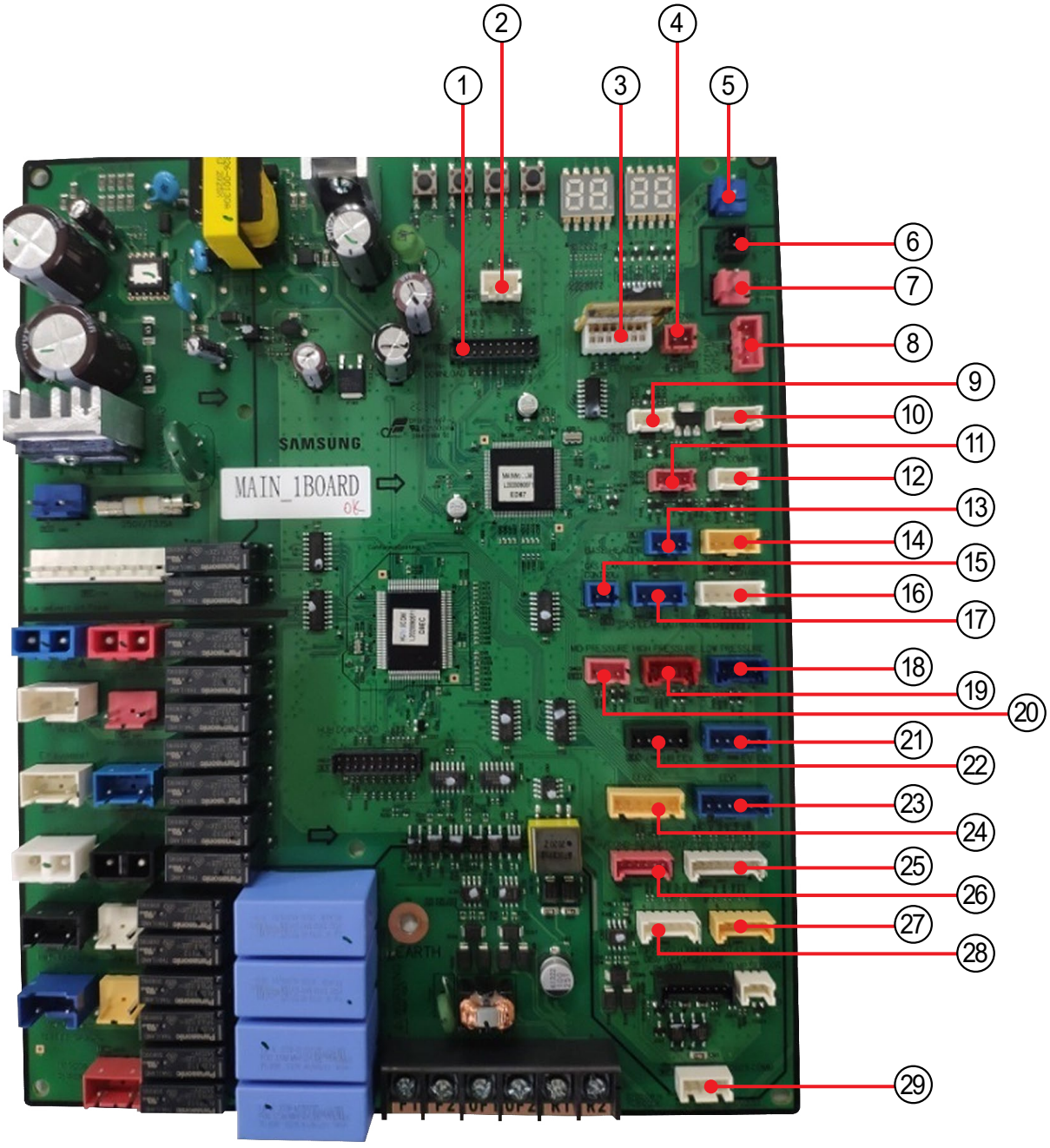






5. PBA Diagram and Parts List

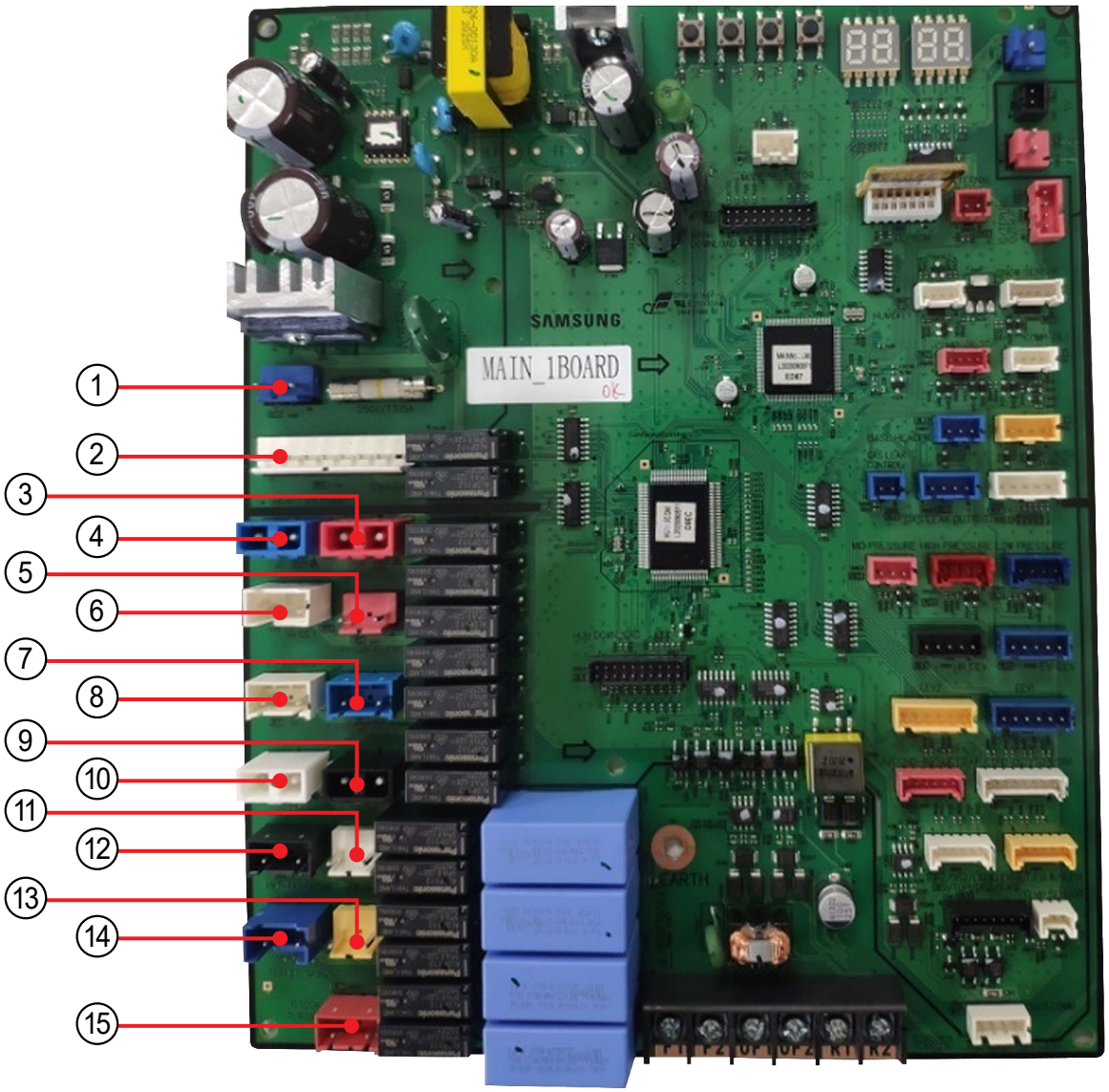
5-1 Main PBA DC



5-1 Main PBA DC (cont.)

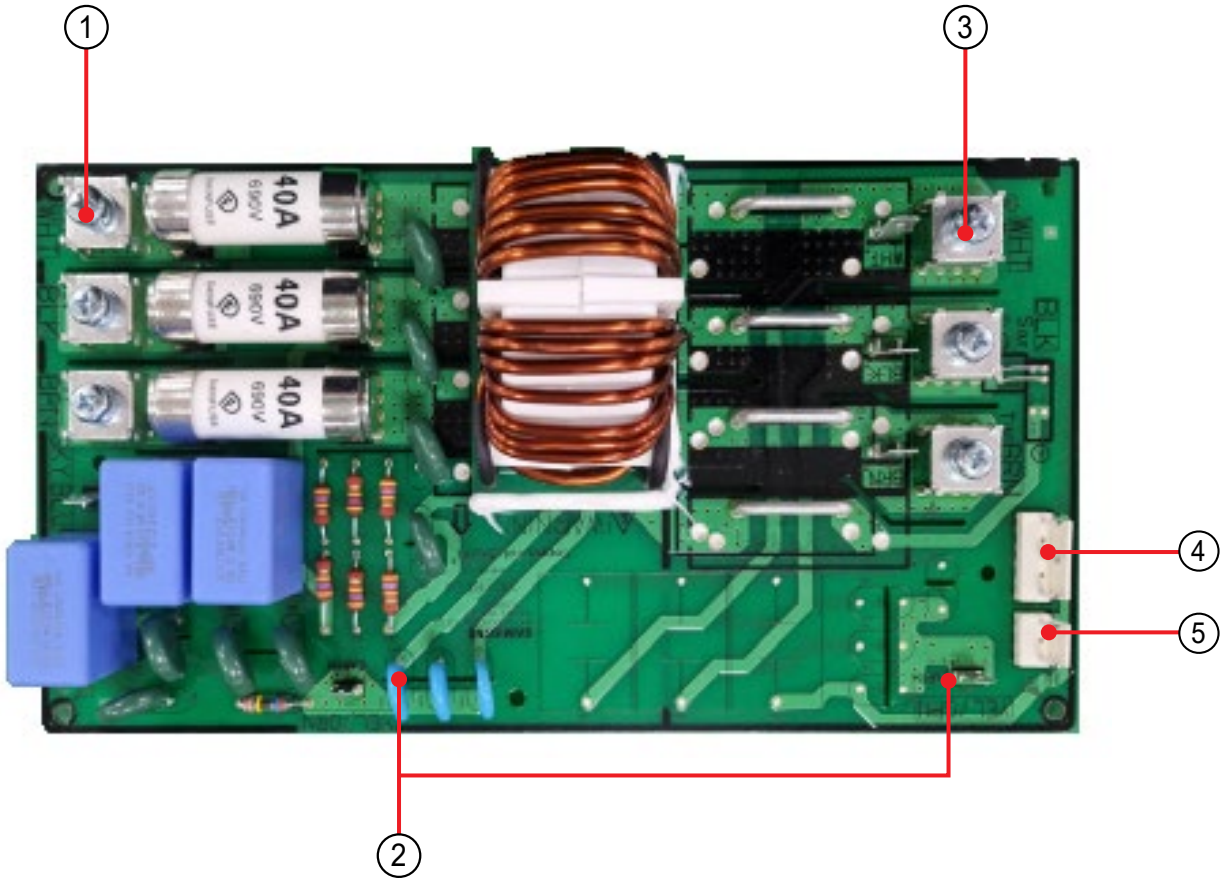
① DOWNLOAD #1 RXD #2 TXD #3 N-TRST #4 TDO #5 TCK #6 TDI #7 TMS #8 #9 GND #10 5V	② MOD SELEECTOR #1 KEY_IN_3 #2 GRID_8 #3 KEY_IN_4	③ EEPROM #1 GND #2 #3 5V #4 EEPROM_SELECT #5 EEPROM_SO #6 EEPROM_SI #7 EEPROM_CLOCK	④ EXTERNAL-CONTROL #1 GND #2 5V
⑤ 12V #1 12V #2 GND	⑥ 5V #1 5V #2 GND	⑦ F1/F2 #1 COM_B #2 COM_A	⑧ EXTERNAL-OUTPUT #1 12V #2 EEPROM CHECK OUT #3 COMP CHECK OUT
⑨ HUMIDITY #1 5V #2 GND #3 ROOM TEMP2 #4 HUMIDITY	⑩ SNOW SENSOR #1 12V #2 #3 GND #4 SNOW SENSOR #5 PSD POWER	⑪ COMP OIL2 #1 5V #2 COMP2 OIL TO #3 COMP2 OIL BOTTOM #4 GND #5 GND	⑫ COMP OIL2 #1 5V #2 COMP1 OIL TO #3 COMP1 OIL BOTTOM #4 GND #5 GND
⑬ BASE HEATER #1 12V #2 #3 BASE HEATER OUT	⑭ GAS AUTO CHARGE #1 12V #2 AUTO CHARGE VALVE OUT #3 12V #4 AUTO CHARGE LIQUID VALVE OUT	⑮ GAS LEAK CONTROL #1 GND #2 5V	⑯ DRED #1 DRED1 #2 DRED2 #3 DRED3 #4 GND #5 5V
⑰ GAS LEAK OUTPUT #1 12V #2 PUMP DOWN START OUT #3 12V #4 PUMP DOWN END OUT	⑱ LOW PRESSURE #1 #2 LOW PRESSURE SENSOR #3 GND #4 5V	⑲ HIGH PRESSURE #1 #2 HIGH PRESSURE SENSOR #3 GND #4 5V	⑳ MID PRESSURE #1 #2 MID PRESSURE SENSOR #3 GND #4 5V
㉔ EVI EEV #1 EEV3 A OUT #2 EEV3 B OUT #3 EEV3 A BAR OUT #4 EEV3 B BAR OUT #5 12V	㉔ HR EEV #1 EEV4 A OUT #2 EEV4 B OUT #3 EEV4 A BAR OUT #4 EEV4 B BAR OUT #5 12V	㉔ EEV1 #1 EEV1 B BAR OUT #2 EEV1 A BAR OUT #3 EEV1 B OUT #4 EEV1 A OUT #5 12V #6 12V	㉔ EEV2 #1 EEV2 B BAR OUT #2 EEV2 A BAR OUT #3 EEV2 B BOUT #4 EEV2 A OUT #5 12V #6 12V
㉔ AIR/COND-OUT/TOP1/DIS1 #1 COMP1 DISCHARGE #2 GND #3 COMP1 TOP #4 GND #5 COND OUT #6 GND #7 AIR #8 GND	㉔ COND-IN/SUCT2 #1 SUCTION2 #2 GND #3 COND IN #4 GN #5 SUCTION3 #6 GND	㉔ EVI-OUT/EVI-IN/SUCT1 #1 SUCTION1 #2 GND #3 EVI IN #4 GND #5 EMI OUT #6 GND	㉔ TOP2/DI2/LIQUID #1 LIQUID #2 GND #3 COMP2 DISCHARGE #4 GND #5 COMP2 TOP #6 GND
㉕ C-BOX COMM #1 12V #2 INVERTER SMPS OUT #3 C-BOX COMM #4 GND			

5-2 Main PBA AC



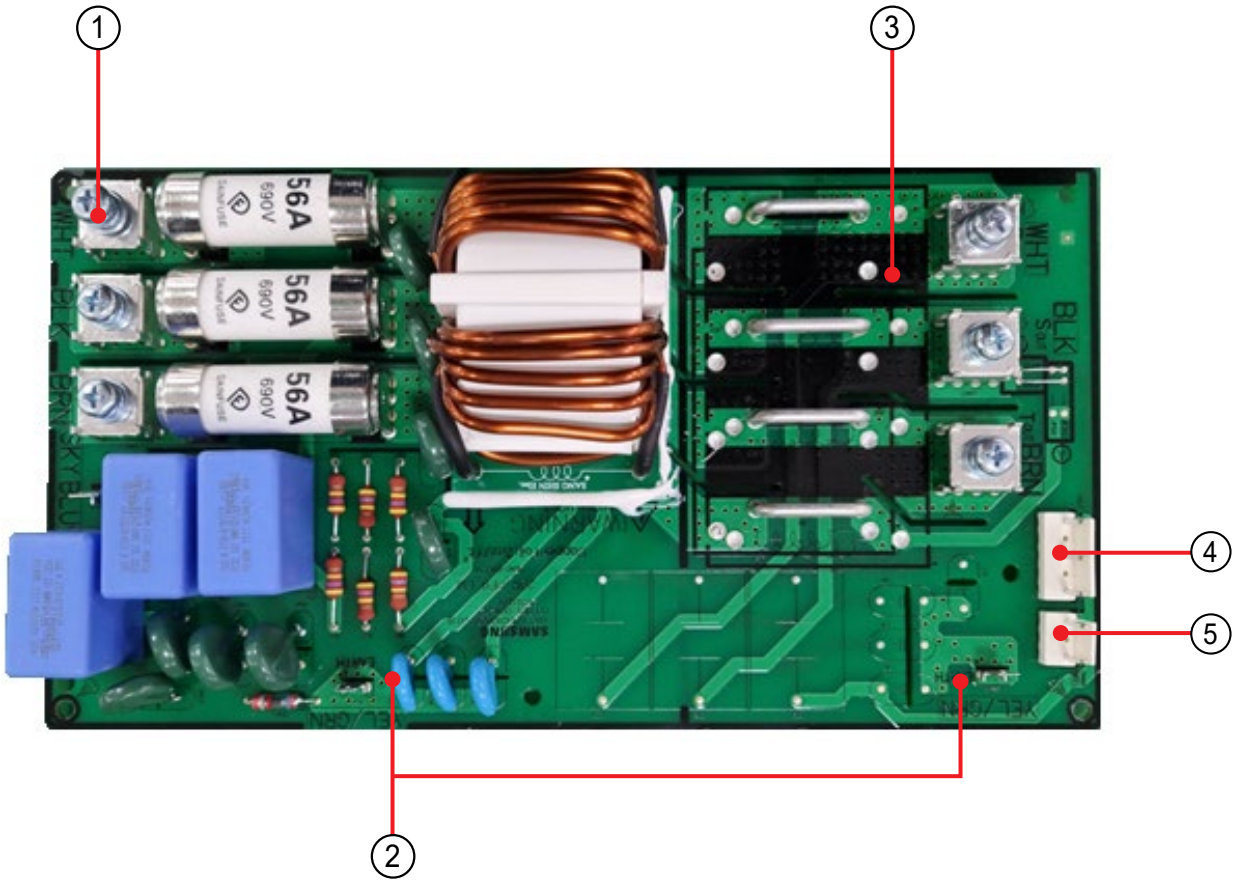
① **AC POWER INPUT** #1 AC LIVE #2 AC NEUTRAL	② **EVI1 EVI2** #1 EVI VALVE1 #3 EVI VALVE2 #7 EMI VALVE1 #8 EMVI VALVE2 #9 AC NEUTRAL	③ **HOTGAS BYPASS** #1 HOTGAS BYPASS1 #2 HOTGAS BYPASS1	④ **LOW AMIBIENT** #1 LOW AMBIENT #2 LOW AMBIENT
⑤ **ACCUM OIL RETURN** #1 ACCUM OIL RETURNVALVE #2 ACCUM OIL RETURNVALVE	⑥ **OD EEV1** #1 OD EEV1 #2 OD EEV1	⑦ **OD EEV2** #1 OD EEV2 #2 OD EEV2	⑧ **EVI BYPASS1** #1 EVI BYPASS1 #2 EVI BYPASS1
⑨ **CCH2** #1 CCH2 #2 CCH2	⑩ **CCH1** #1 CCH1 #2 CCH1	⑪ **4WAY2** #1 4WAY2 #2 4WAY2	⑫ **REF RECHARGE** #1 REF RECHARGE #2 REF RECHARGE
⑬ **4WAY1** #1 4WAY1 #2 4WAY1	⑭ **MAIN COOLING** #1 MAIN COOLING #2 MAIN COOLING	⑮ **EVI BYPASS2** #1 EVI BYPASS2 #2 EVI BYPASS2	

5-3 EMI PF8



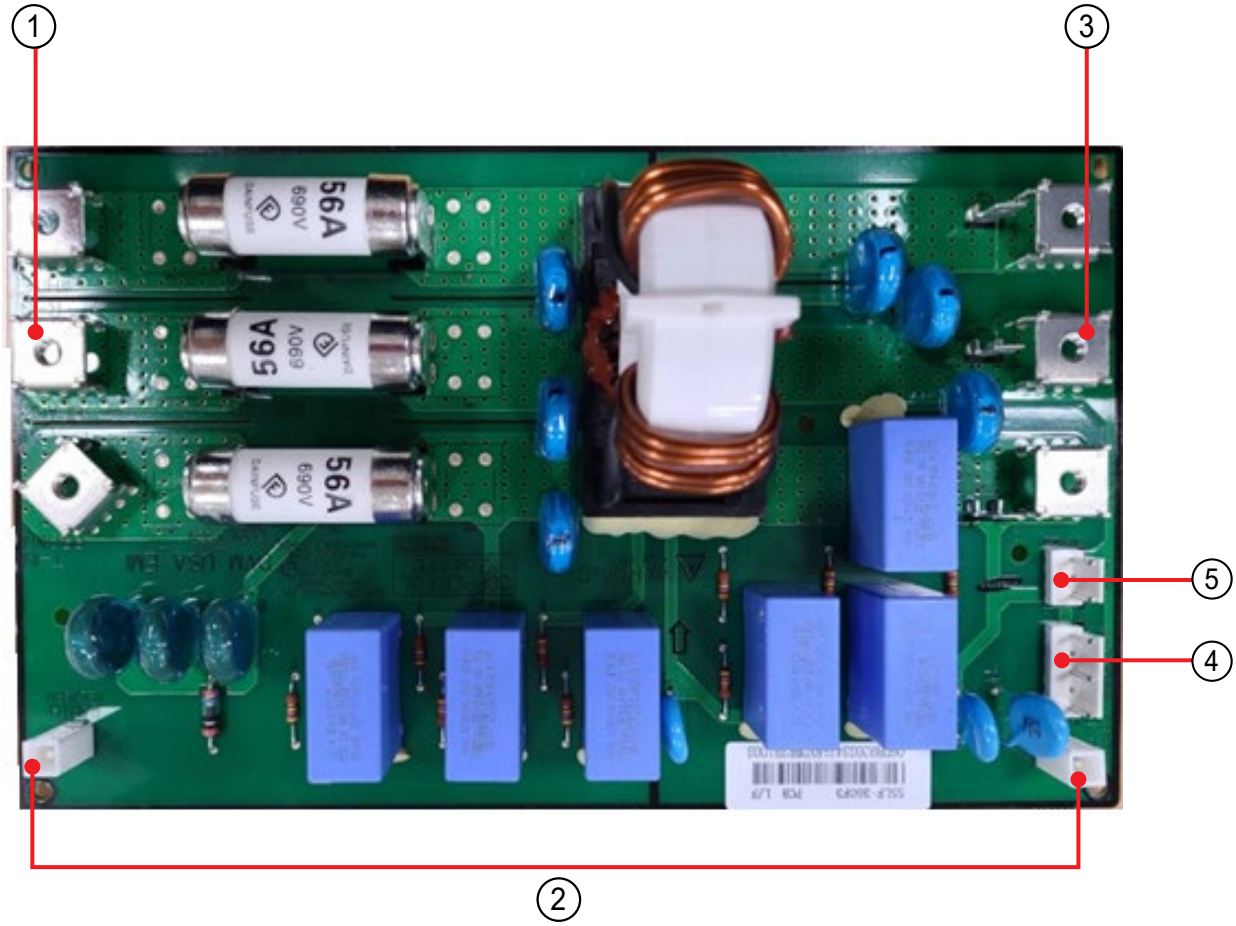
① Input Power	② Earth	③ Output Power	④ Connector to INVERTER PBA - F POWER
#1 R-IN #2 S-IN #3 T-IN #4 N-IN	#1 Earth	#1 R-OUT #2 S-OUT #3 T-OUT	#1 T-OUT #2 - #3 S-OUT #4 - #5 N
⑤ Connector to MAIN BPA #1 T-OUT #2 - #3 N			

5-4 EMI PF9



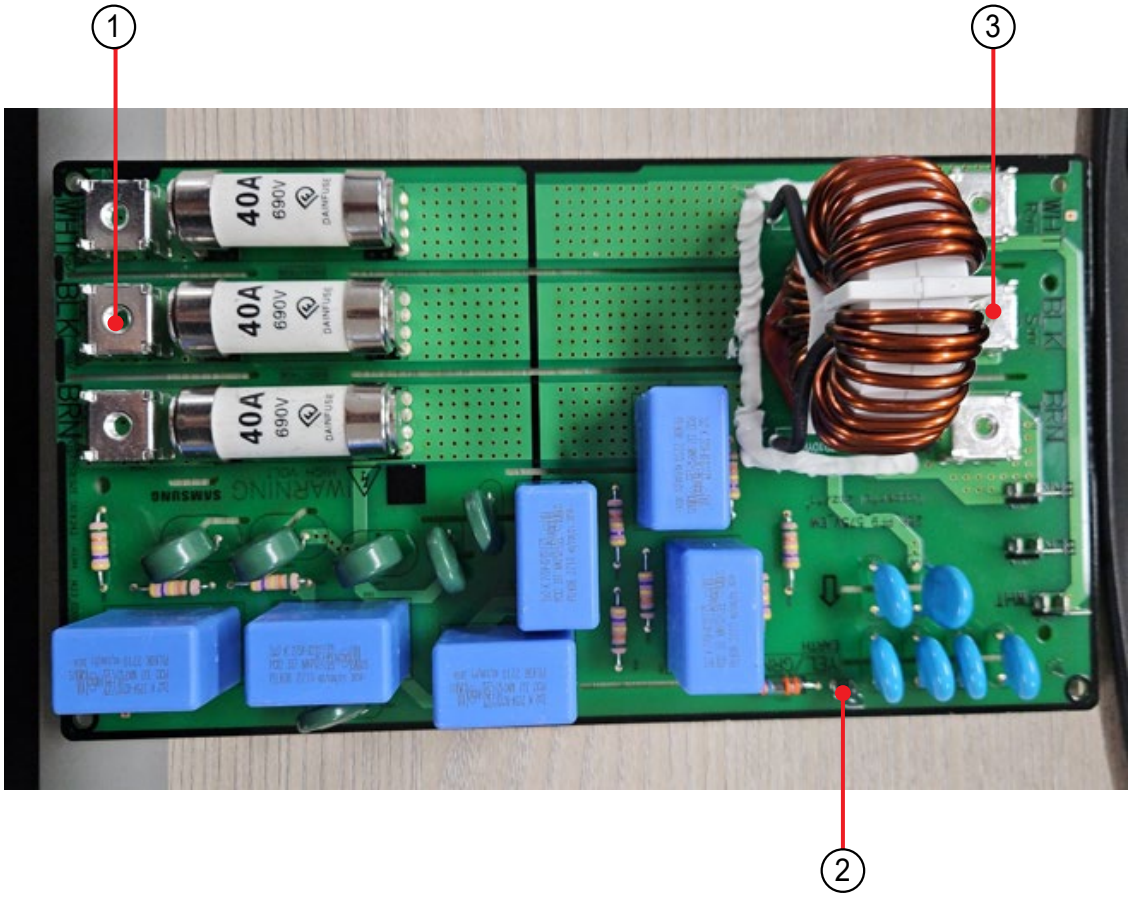
① Input Power	② Earth	③ Output Power	④ Connector to INVERTER PBA - F POWER
#1 R-IN #2 S-IN #3 T-IN #4 N-IN	#1 Earth	#1 R-OUT #2 S-OUT #3 T-OUT	#1 T-OUT #2 - #3 S-OUT #4 - #5 N
⑤ Connector to MAIN BPA			
#1 T-OUT #2 - #3 N			

5-5 EMI PF9 OLD



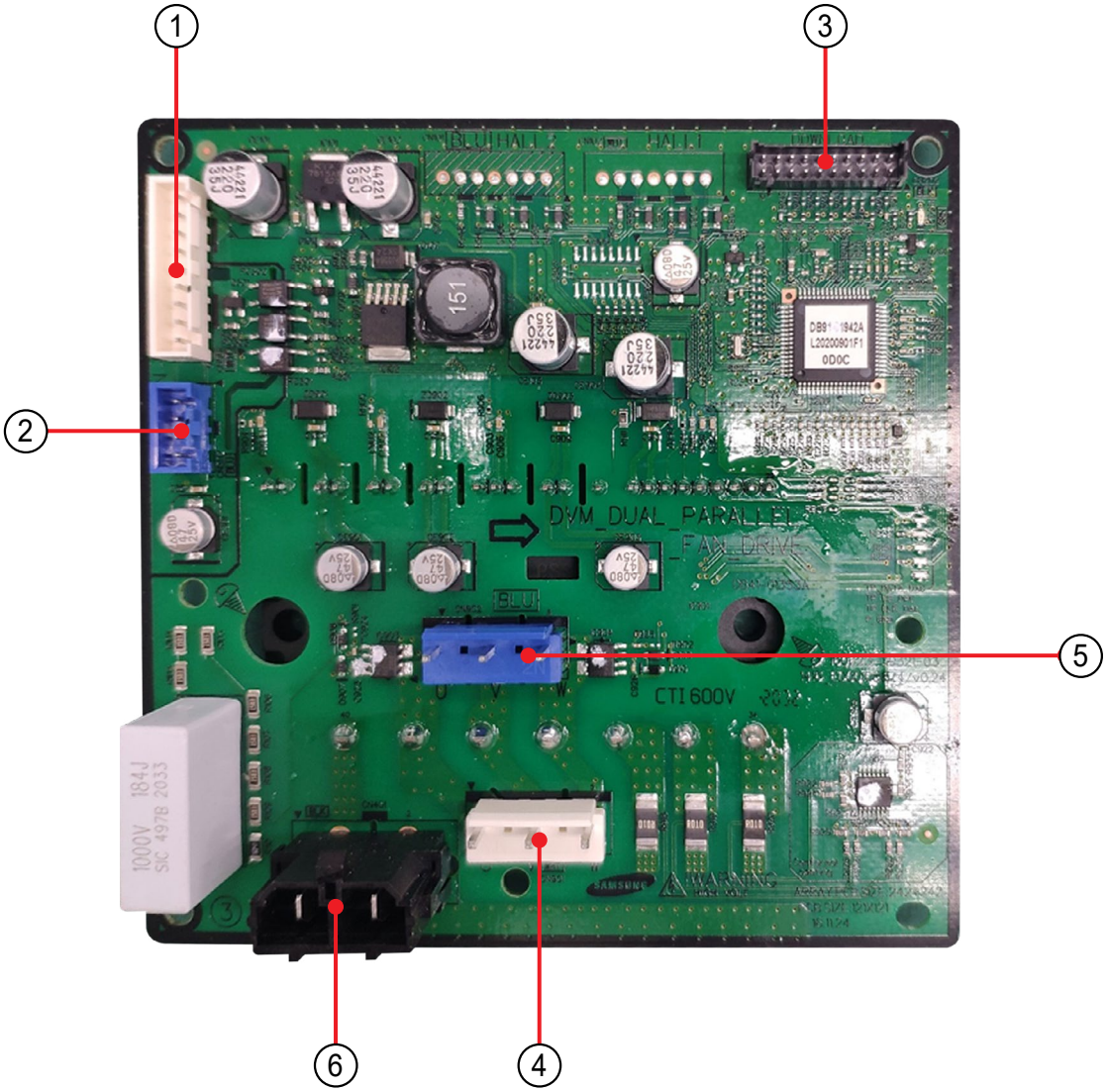
① Input Power	② Earth	③ Output Power	④ Connector to INVERTER PBA - F POWER
#1 R-IN #2 S-IN #3 T-IN #4 N-IN	#1 Earth	#1 R-OUT #2 S-OUT #3 T-OUT	#1 T-OUT #2 - #3 S-OUT #4 - #5 N
⑤ Connector to MAIN BPA			
#1 T-OUT #2 - #3 N			

5-6 EMI PF9_575V



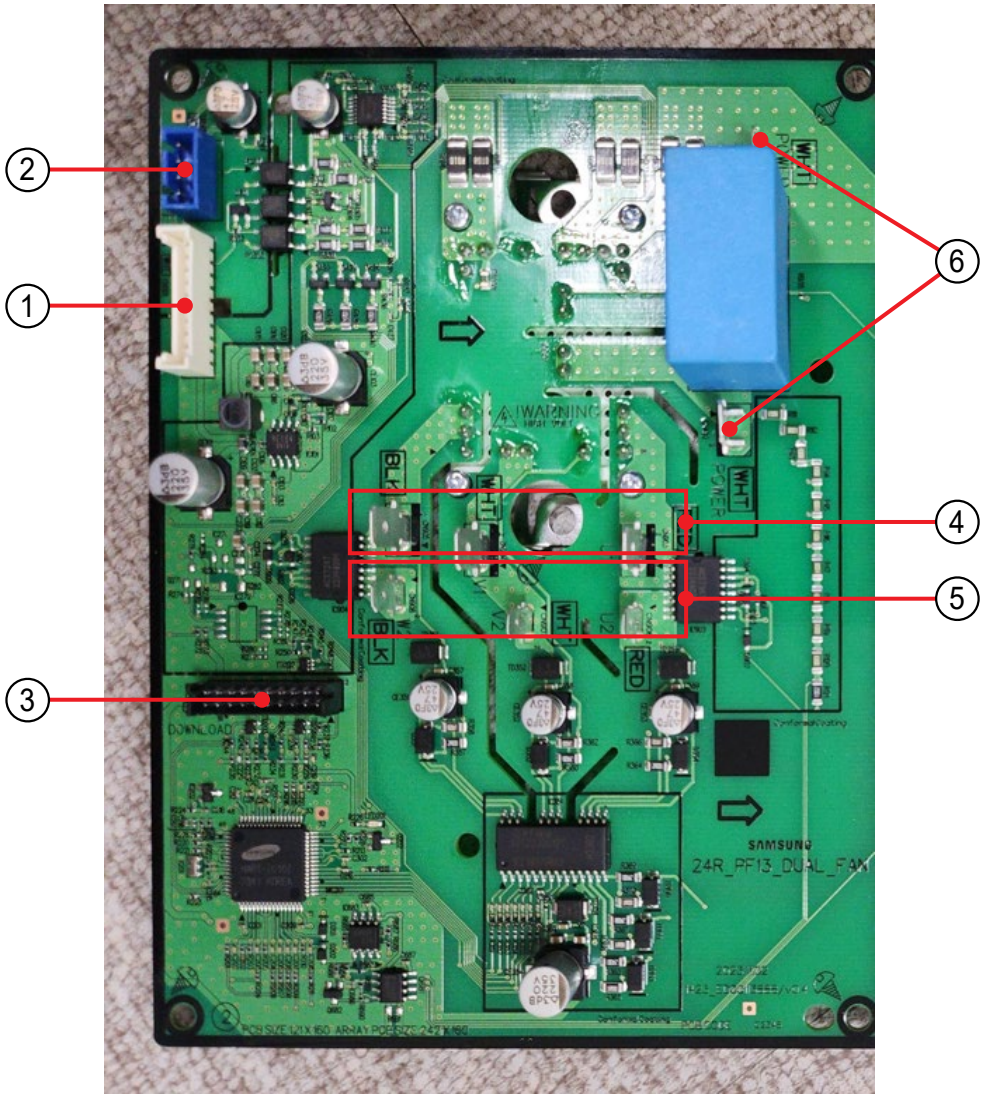
① Input Power	② Earth	③ Output Power	
#1 R-IN #2 S-IN #3 T-IN	#1 Earth	#1 R-OUT #2 S-OUT #3 T-OUT	

5-7 Dual FAN



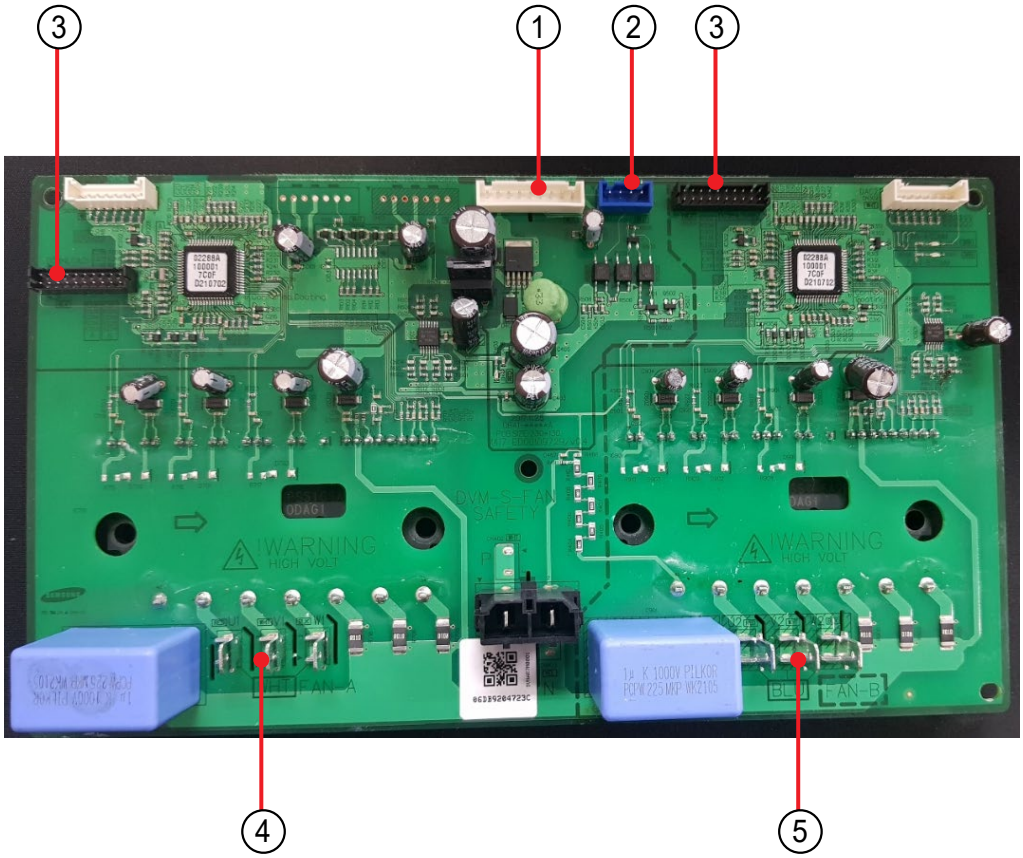
① INVERTER to FAN	② Main to FAN	③ Download Connector	④ IPM to Motor1
#1 INVERTER DC18V #2 INVERTER GND #3 - #4 INVERTER GND #5 - #6 MAIN DC 12V to INV #7 INVERTER SMPS RELAY to INV #8 COMM to INV #9 GND to INV	#1 DC12V #2 INV.SMPS RELAY #3 COMM #4 GND	#1 RXD #2 TXD #3 BOOT #4 TDO #5 TCK #6 TDI #7 TMS #8 NTRST #9 P_GND #10 DC 5V	#1 U1 #2 - #3 V1 #4 - #5 W1
⑤ IPM to Motor2	⑥ DC LINK VOLTAGE SENSING		
#1 U2 #2 - #3 V2 #4 - #5 W2	#1 540Vdc from INV #2 P_GND from INV		

5-8 Dual Fan_575V



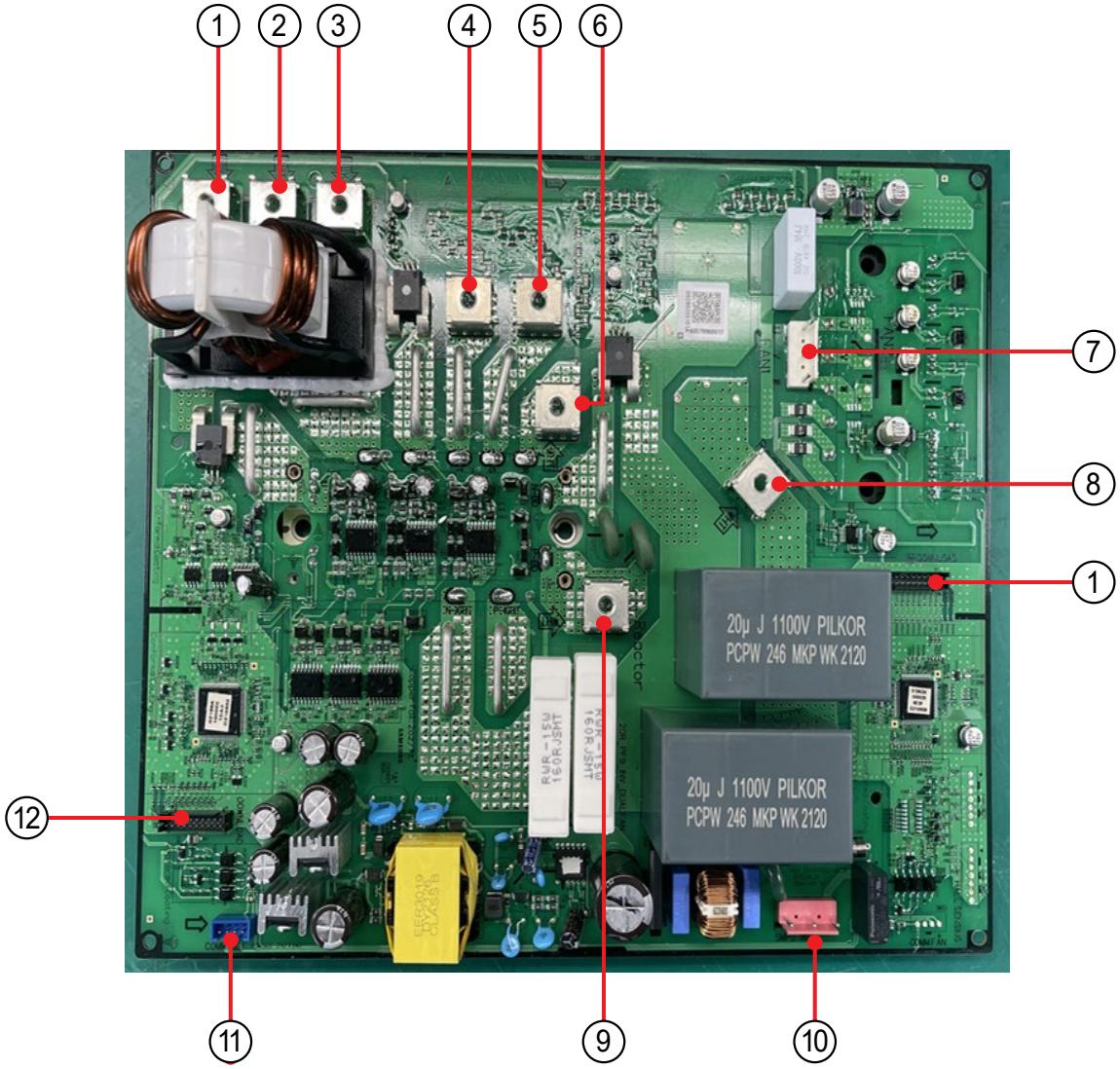
① INVERTER to FAN	② Main to FAN	③ Download Connector	④ IPM to Motor1
#1 INVERTER DC18V #2 INVERTER GND #3 - #4 INVERTER GND #5 - #6 MAIN DC 12V to INV #7 INVERTER SMPS RELAY to INV #8 COMM to INV #9 GND to INV	#1 DC12V #2 INV.SMPS RELAY #3 COMM #4 GND	#1 RXD #2 TXD #3 BOOT #4 TDO #5 TCK #6 TDI #7 TMS #8 NTRST #9 P_GND #10 DC 5V	#1 U1 #2 - #3 V1 #4 - #5 W1
⑤ IPM to Motor2	⑥ DC LINK VOLTAGE SENSING		
#1 U2 #2 - #3 V2 #4 - #5 W2	#1 540Vdc from INV #2 P_GND from INV		

5-9 Safety 2FAN



① INVERTER to FAN	② Main to FAN	③ Download Connector	④ IPM to Motor1
#1 INVERTER DC18V #2 INVERTER GND #3 - #4 INVERTER GND #5 - #6 MAIN DC 12V to INV #7 INVERTER SMPS RELAY to INV #8 COMM to INV #9 GND to INV	#1 DC12V #2 INV.SMPS RELAY #3 COMM #4 GND	#1 RXD #2 TXD #3 BOOT #4 TDO #5 TCK #6 TDI #7 TMS #8 NTRST #9 P_GND #10 DC 5V	#1 U1 #2 - #3 V1 #4 - #5 W1
⑤ IPM to Motor2	⑥ DC LINK VOLTAGE SENSING		
#1 U2 #2 - #3 V2 #4 - #5 W2	#1 540Vdc from INV #2 P_GND from INV		

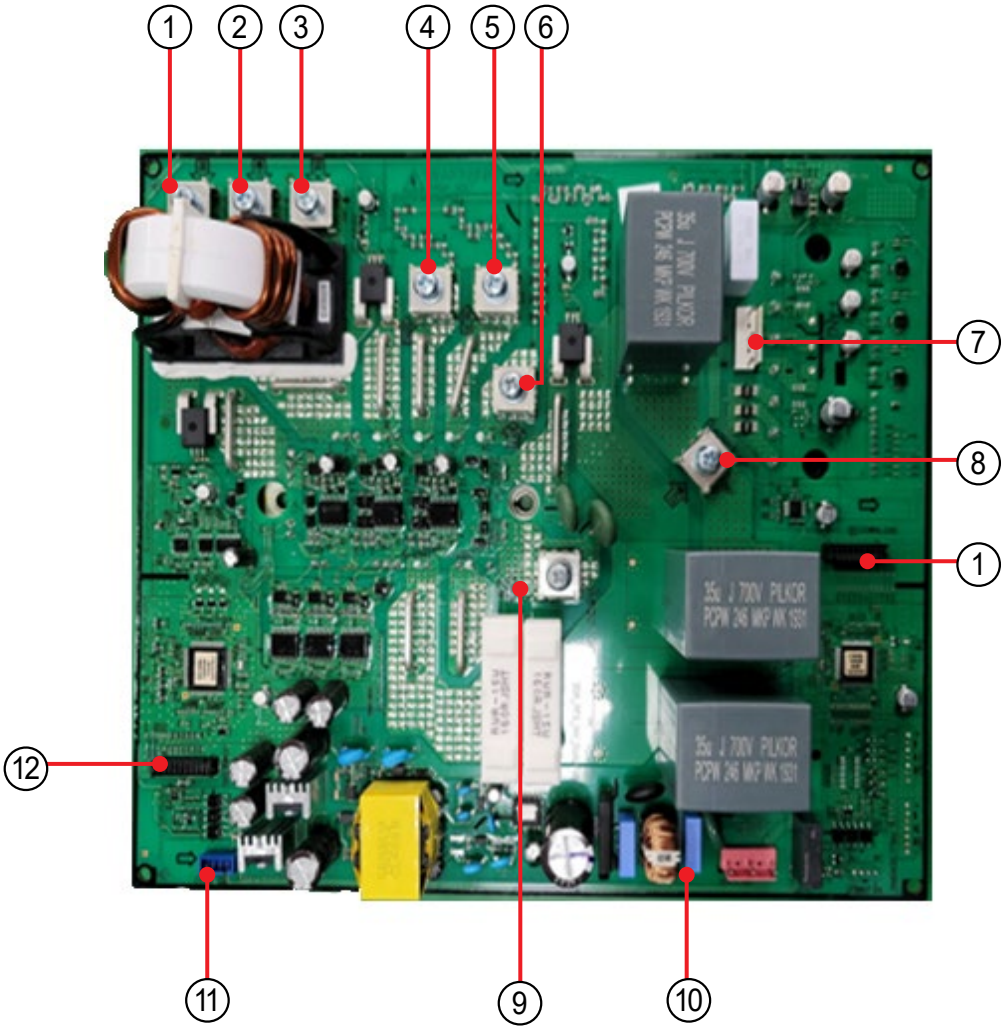
5-10 PF8 Inv.Integration 460V POWER



5-10 PF8 Inv.Integration 460V POWER (cont.)

① **U-COMP U** #1: COMP U	② **V-COMP V** #1: COMP V	③ **W-COMP W** #1: COMP W	④ **T-INPUT TOP** #1: T-IN
⑤ **S-INPUT TOP** #1: S-IN	⑥ **R-INPUT TOP** #1: R-IN	⑦ **CN631-FAN MOTOR** #1: FAN U #3: FAN V #5: FAN W	⑧ **CN705-REACTOR 1** #1: REACTOR 1
⑨ **CN704-REACTOR 2s** #1: REACTOR 2	⑩ **CNP13-AC POWER** #1: AC LIVE #3: AC NEUTRAL	⑪ **CN32-MAIN COMM** #1: 12V-MAIN #2: IN-SMPS-RELAY #3: COMM-IN #4: GND-MAIN	⑫ **CNS22-INV MICOM DOWNLOAD** #1: RX_DEBUG #2: TX_DEBUG #3: BOOT #4: JTAG_TDO #5: JTAG_TCLK #6: JTAG_TDI #7: JTAG_TMS #8: JTAG RESET #9: GND #10: VCC #11: VCC #17: GND #18: DAC_CLK #19: DAC_CS #20: DAC_DATA
⑬ **CN501-FAN MICOM DOWNLOAD** #1: RXD_FAN #2: TXD_FAN #3: BOOT_FAN #4: TDO_FAN #5: TCK_FAN #6: TDI_FAN #7: TMS_FAN #8: NTRST_FAN #9: GND #10: VCC #11: VCC #17: GND #18: CLK_DAC_FAN #19: CS_DAC_FAN #20: DATA_DAC_FAN			

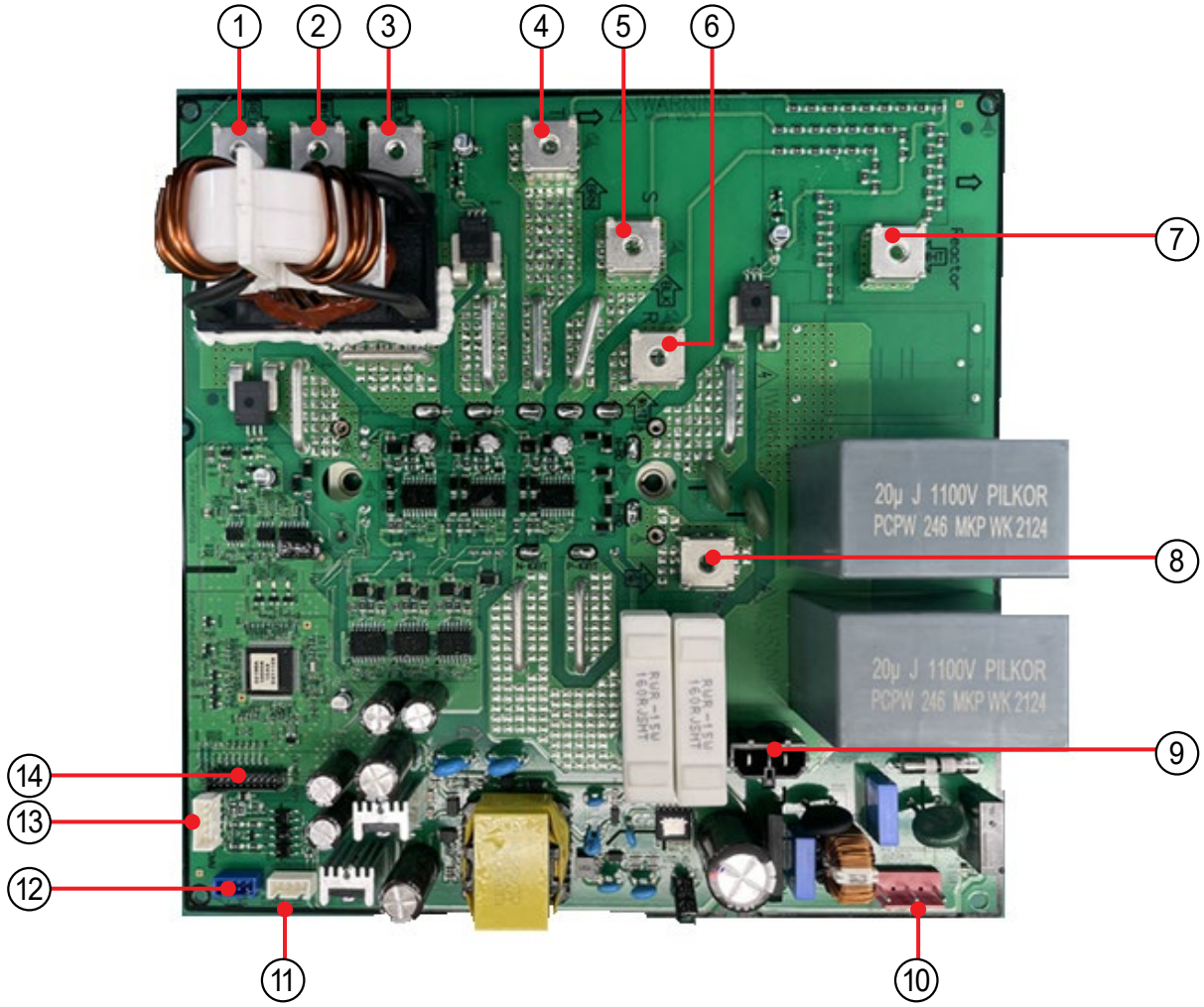
5-11 PF8 Inv.Integration 208~230V POWER



5-11 PF8 Inv.Integration 208~230V POWER (cont.)

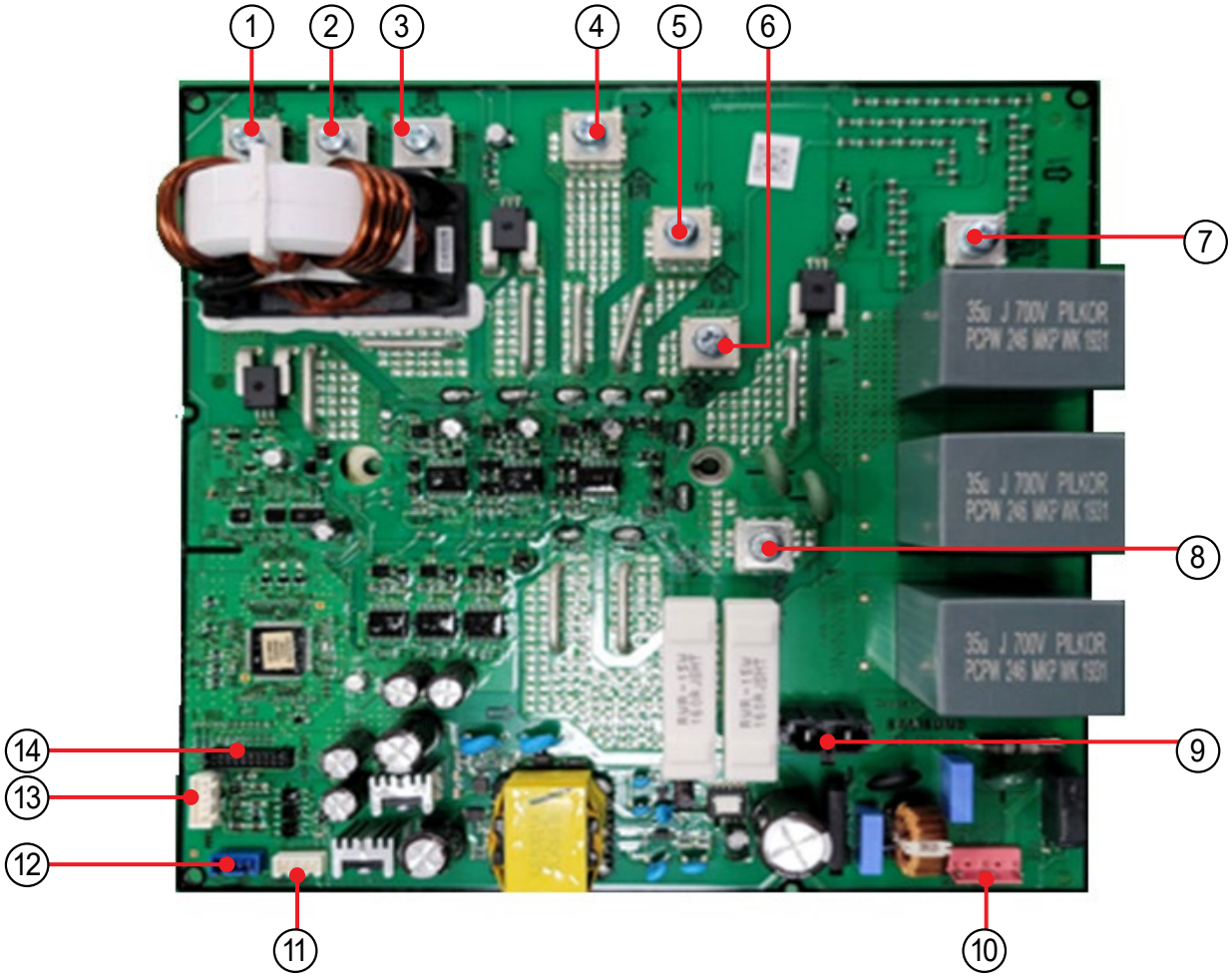
① U-COMP U #1: COMP U	② V-COMP V #1: COMP V	③ W-COMP W #1: COMP W	④ T-INPUT TOP #1: T-IN
⑤ S-INPUT TOP #1: S-IN	⑥ R-INPUT TOP #1: R-IN	⑦ CN631-FAN MOTOR #1: FAN U #3: FAN V #5: FAN W	⑧ CN705-REACTOR 1 #1: REACTOR 1
⑨ CN704-REACTOR 2s #1: REACTOR 2	⑩ CNP13-AC POWER #1: AC LIVE #3: AC NEUTRAL	⑪ CN32-MAIN COMM #1: 12V-MAIN #2: IN-SMPS-RELAY #3: COMM-IN #4: GND-MAIN	⑫ CNS22-INV MICOM DOWNLOAD #1: RX_DEBUG #2: TX_DEBUG #3: BOOT #4: JTAG_TDO #5: JTAG_TCLK #6: JTAG_TDI #7: JTAG_TMS #8: JTAG RESET #9: GND #10: VCC #11: VCC #17: GND #18: DAC_CLK #19: DAC_CS #20: DAC_DATA
⑬ CN501-FAN MICOM DOWNLOAD #1: RXD_FAN #2: TXD_FAN #3: BOOT_FAN #4: TDO_FAN #5: TCK_FAN #6: TDI_FAN #7: TMS_FAN #8: NTRST_FAN #9: GND #10: VCC #11: VCC #17: GND #18: CLK_DAC_FAN #19: CS_DAC_FAN #20: DATA_DAC_FAN			

5-12 PF8_20C INV 460V POWER



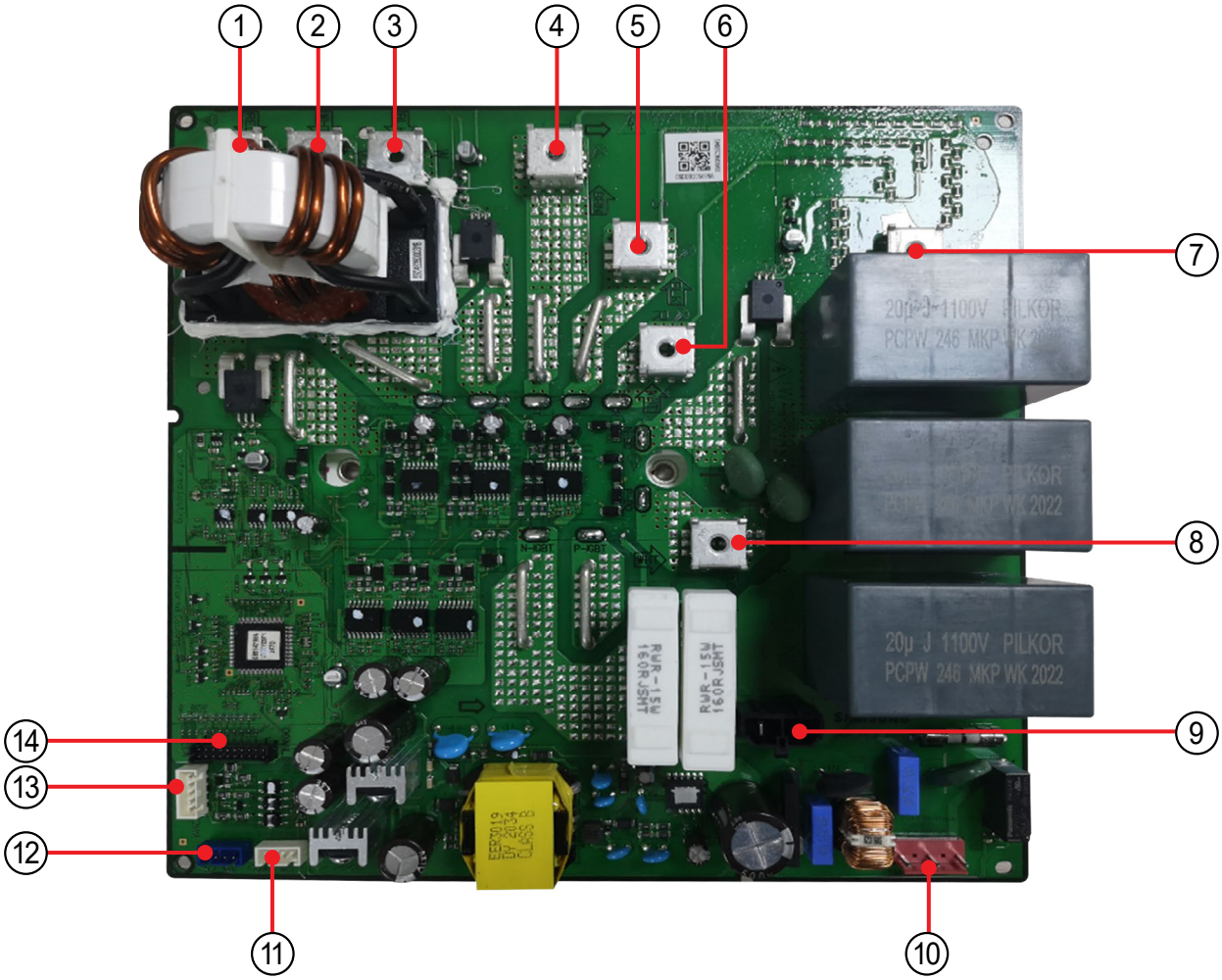
① **U-COMP U** #1: COMP U	② **V-COMP V** #1: COMP V	③ **W-COMP W** #1: COMP W	④ **T-INPUT TOP** #1: T-IN
⑤ **S-INPUT TOP** #1: S-IN	⑥ **R-INPUT TOP** #1: R-IN	⑦ **CN705-REACTOR 1** #1: REACTOR 1	⑧ **CN704-REACTOR 2** #1: REACTOR 2
⑨ **CN15-FAN POWER** #1: DC_LINK #3: GND	⑩ **CNP13-AC POWER** #1: AC LIVE #3: AC NEUTRAL	⑪ **CN31-MAIN COMM 2** #1: 12V-MAIN #2: IN-SMPS-RELAY #3: COMM-IN #4: GND-MAIN	⑫ **CN32-MAIN COMM 1** #1: 12V-MAIN #2: IN-SMPS-RELAY #3: COMM-IN #4: GND-MAIN
⑬ **CN91-FAN DC** #1: 18V #2: GND #3: 5V-FAN #4: AD-SELECT	⑭ **CNS22-INV MICOM DOWNLOAD** #1: RX_DEBUG #2: TX_DEBUG #3: BOOT #4: JTAG_TDO #5: JTAG_TCLK #6: JTAG_TDI #7: JTAG_TMS #8: JTAG RESET #9: GND #10: VCC #11: VCC #17: GND #18: DAC_CLK #19: DAC_CS #20: DAC_DATA		

5-13 PF8_20C INV 208~230V POWER



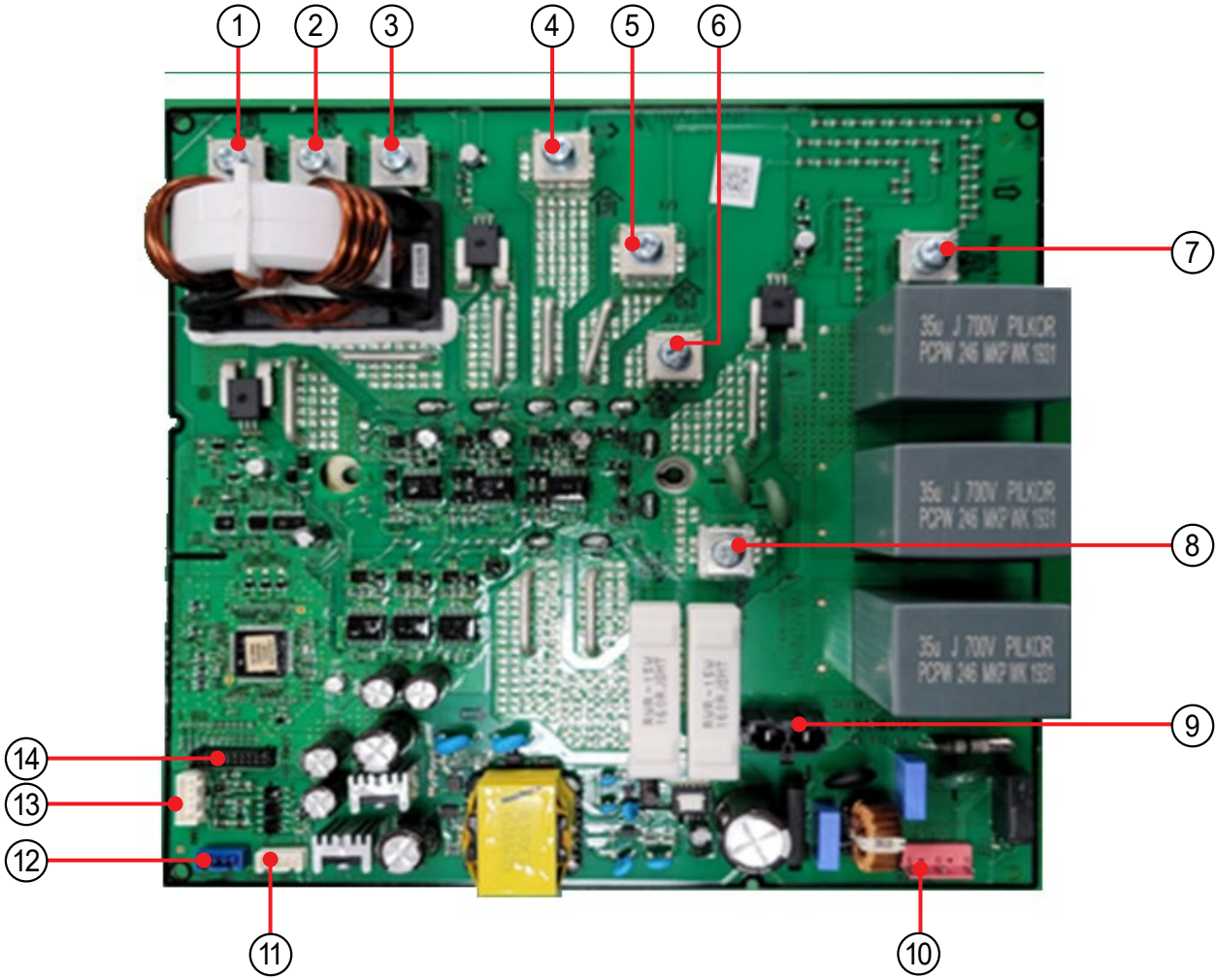
① U-COMP U #1: COMP U	② V-COMP V #1: COMP V	③ W-COMP W #1: COMP W	④ T-INPUT TOP #1: T-IN
⑤ S-INPUT TOP #1: S-IN	⑥ R-INPUT TOP #1: R-IN	⑦ CN705-REACTOR 1 #1: REACTOR 1	⑧ CN704-REACTOR 2 #1: REACTOR 2
⑨ CN15-FAN POWER #1: DC_LINK #3: GND	⑩ CNP13-AC POWER #1: AC LIVE #3: AC NEUTRAL	⑪ CN31-MAIN COMM 2 #1: 12V-MAIN #2: IN-SMPS-RELAY #3: COMM-IN #4: GND-MAIN	⑫ CN32-MAIN COMM 1 #1: 12V-MAIN #2: IN-SMPS-RELAY #3: COMM-IN #4: GND-MAIN
⑬ CN91-FAN DC #1: 18V #2: GND #3: 5V-FAN #4: AD-SELECT	⑭ CNS22-INV MICOM DOWNLOAD #1: RX_DEBUG #2: TX_DEBUG #3: BOOT #4: JTAG_TDO #5: JTAG_TCLK #6: JTAG_TDI #7: JTAG_TMS #8: JTAG RESET #9: GND #10: VCC #11: VCC #17: GND #18: DAC_CLK #19: DAC_CS #20: DAC_DATA		

5-14 PF9_20C INV 460V POWER



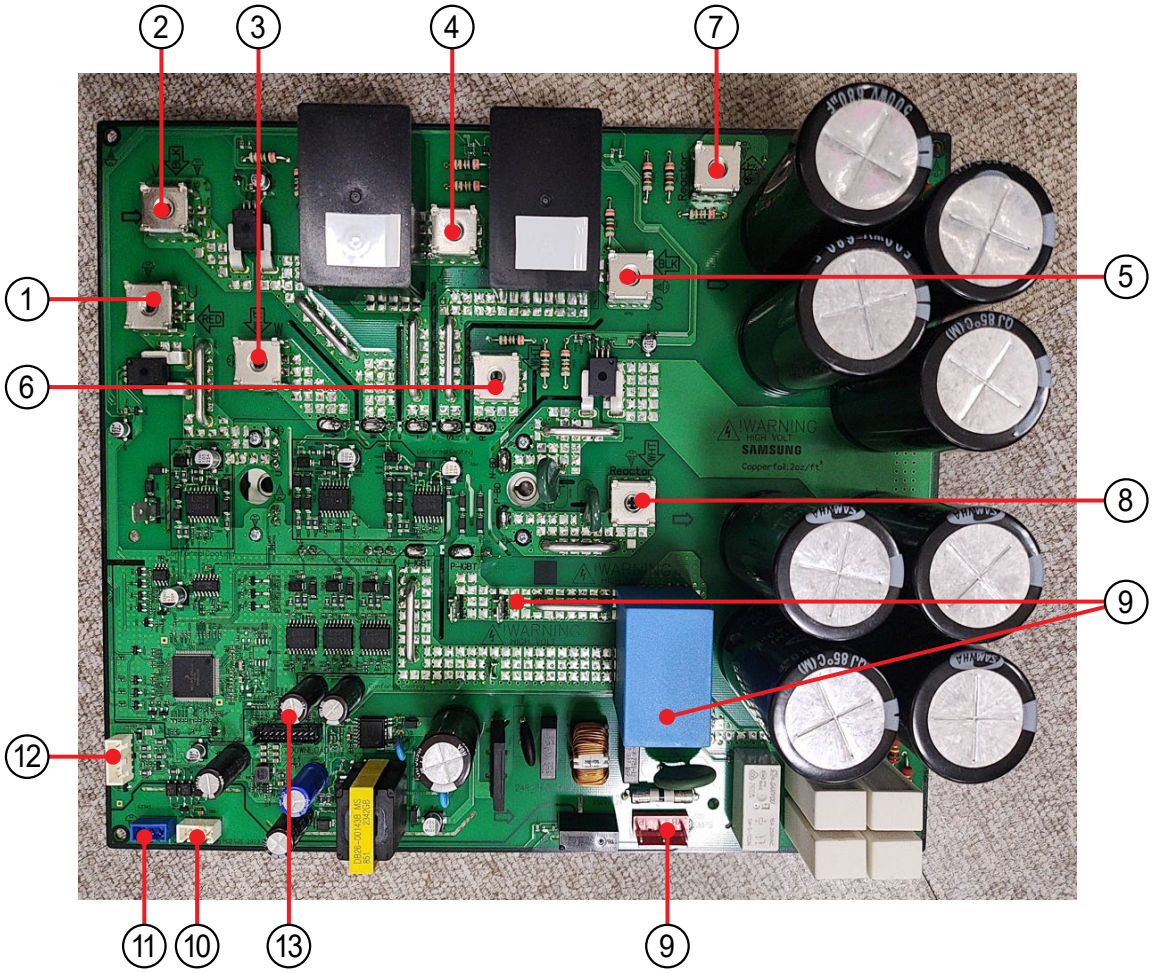
① **U-COMP U** #1: COMP U	② **V-COMP V** #1: COMP V	③ **W-COMP W** #1: COMP W	④ **T-INPUT TOP** #1: T-IN
⑤ **S-INPUT TOP** #1: S-IN	⑥ **R-INPUT TOP** #1: R-IN	⑦ **CN705-REACTOR 1** #1: REACTOR 1	⑧ **CN704-REACTOR 2** #1: REACTOR 2
⑨ **CN15-FAN POWER** #1: DC_LINK #3: GND	⑩ **CNP13-AC POWER** #1: AC LIVE #3: AC NEUTRAL	⑪ **CN31-MAIN COMM 2** #1: 12V-MAIN #2: IN-SMPS-RELAY #3: COMM-IN #4: GND-MAIN	⑫ **CN32-MAIN COMM 1** #1: 12V-MAIN #2: IN-SMPS-RELAY #3: COMM-IN #4: GND-MAIN
⑬ **CN91-FAN DC** #1: 18V #2: GND #3: 5V-FAN #4: AD-SELECT	⑭ **CNS22-INV MICOM DOWNLOAD** #1: RX_DEBUG #2: TX_DEBUG #3: BOOT #4: JTAG_TDO #5: JTAG_TCLK #6: JTAG_TDI #7: JTAG_TMS #8: JTAG RESET #9: GND #10: VCC #11: VCC #17: GND #18: DAC_CLK #19: DAC_CS #20: DAC_DATA		

5-15 PF9_20C INV 208~230V POWER



① U-COMP U #1: COMP U	② V-COMP V #1: COMP V	③ W-COMP W #1: COMP W	④ T-INPUT TOP #1: T-IN
⑤ S-INPUT TOP #1: S-IN	⑥ R-INPUT TOP #1: R-IN	⑦ CN705-REACTOR1 #1: REACTOR1	⑧ CN704-REACTOR 2 #1: REACTOR 2
⑨ CN15-FAN POWER #1: DC_LINK #3: GND	⑩ CNP13-AC POWER #1: AC LIVE #3: AC NEUTRAL	⑪ CN31-MAIN COMM 2 #1: 12V-MAIN #2: IN-SMPS-RELAY #3: COMM-IN #4: GND-MAIN	⑫ CN32-MAIN COMM1 #1: 12V-MAIN #2: IN-SMPS-RELAY #3: COMM-IN #4: GND-MAIN
⑬ CN91-FAN DC #1: 18V #2: GND #3: 5V-FAN #4: AD-SELECT	⑭ CNS22-INV MICOM DOWNLOAD #1: RX_DEBUG #2: TX_DEBUG #3: BOOT #4: JTAG_TDO #5: JTAG_TCLK #6: JTAG_TDI #7: JTAG_TMS #8: JTAG RESET #9: GND #10: VCC #11: VCC #17: GND #18: DAC_CLK #19: DAC_CS #20: DAC_DATA		

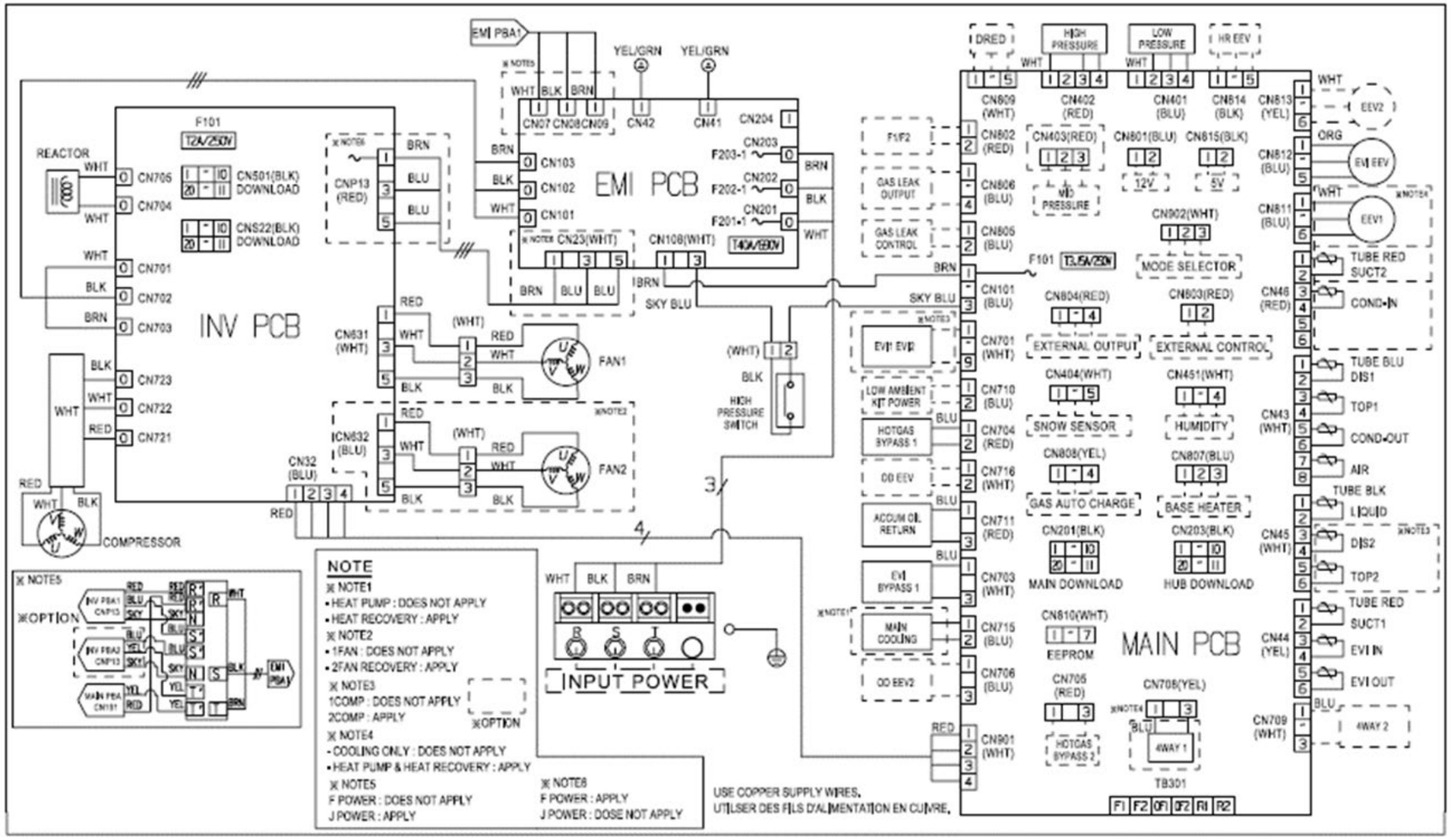
5-16 PF9_INV 575V POWER



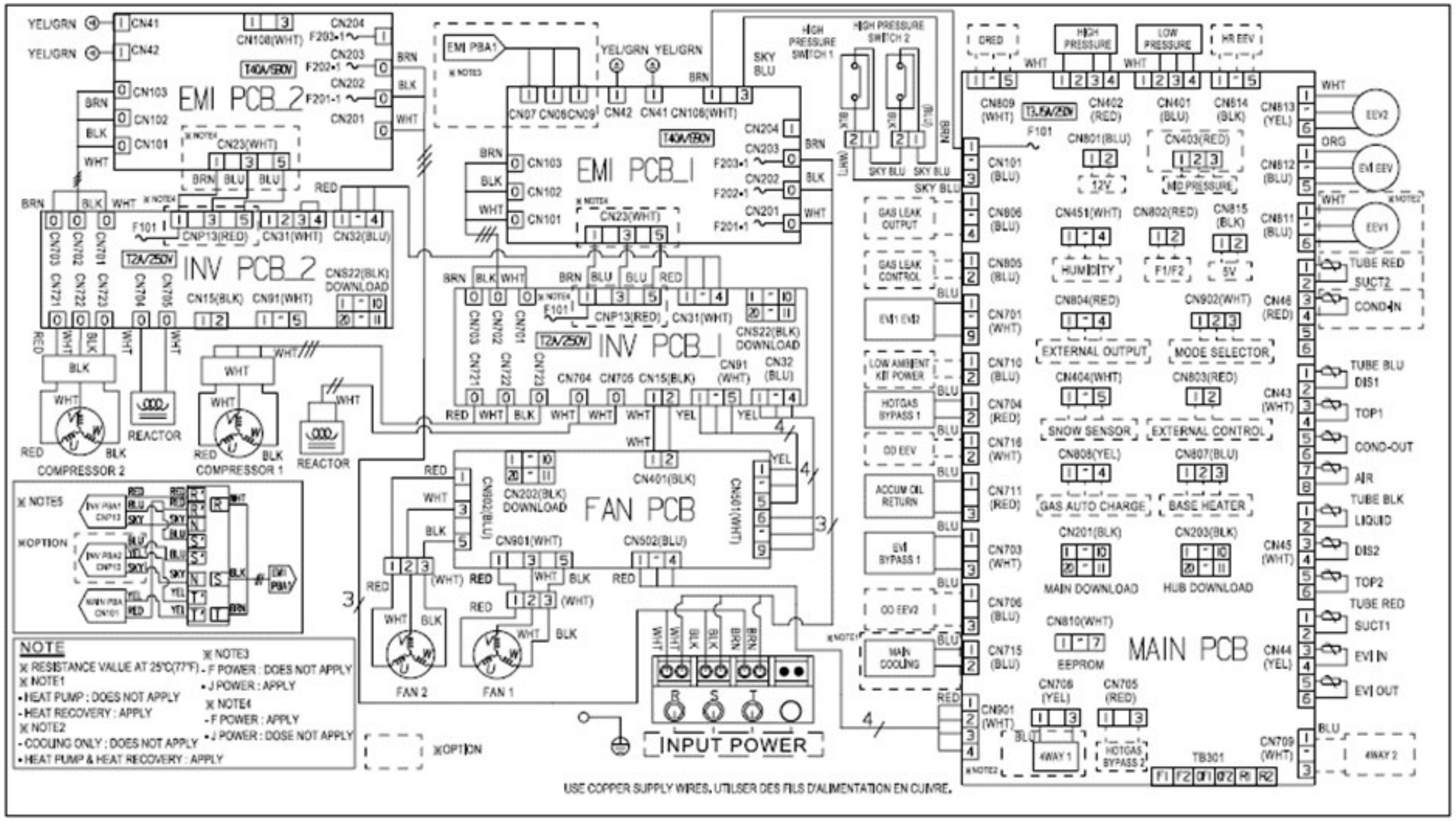
① U-COMP U #1: COMP U	② V-COMP V #1: COMP V	③ W-COMP W #1: COMP W	④ T-INPUT TOP #1: T-IN
⑤ S-INPUT TOP #1: S-IN	⑥ R-INPUT TOP #1: R-IN	⑦ CN705-REACTOR 1 #1: REACTOR 1	⑧ CN704-REACTOR 2 #1: REACTOR 2
⑨ CN15-FAN POWER #1: DC_LINK #3: GND	⑩ CNP13-AC POWER #1: AC LIVE #3: AC NEUTRAL	⑪ CN31-MAIN COMM 2 #1: 12V-MAIN #2: IN-SMPS-RELAY #3: COMM-IN #4: GND-MAIN	⑫ CN32-MAIN COMM 1 #1: 12V-MAIN #2: IN-SMPS-RELAY #3: COMM-IN #4: GND-MAIN
⑬ CN91-FAN DC #1: 18V #2: GND #3: 5V-FAN #4: AD-SELECT	⑭ CNS22-INV MICOM DOWNLOAD #1: RX_DEBUG #2: TX_DEBUG #3: BOOT #4: JTAG_TDO #5: JTAG_TCLK #6: JTAG_TDI #7: JTAG_TMS #8: JTAG RESET #9: GND #10: VCC #11: VCC #17: GND #18: DAC_CLK #19: DAC_CS #20: DAC_DATA		

6. Wiring Diagram

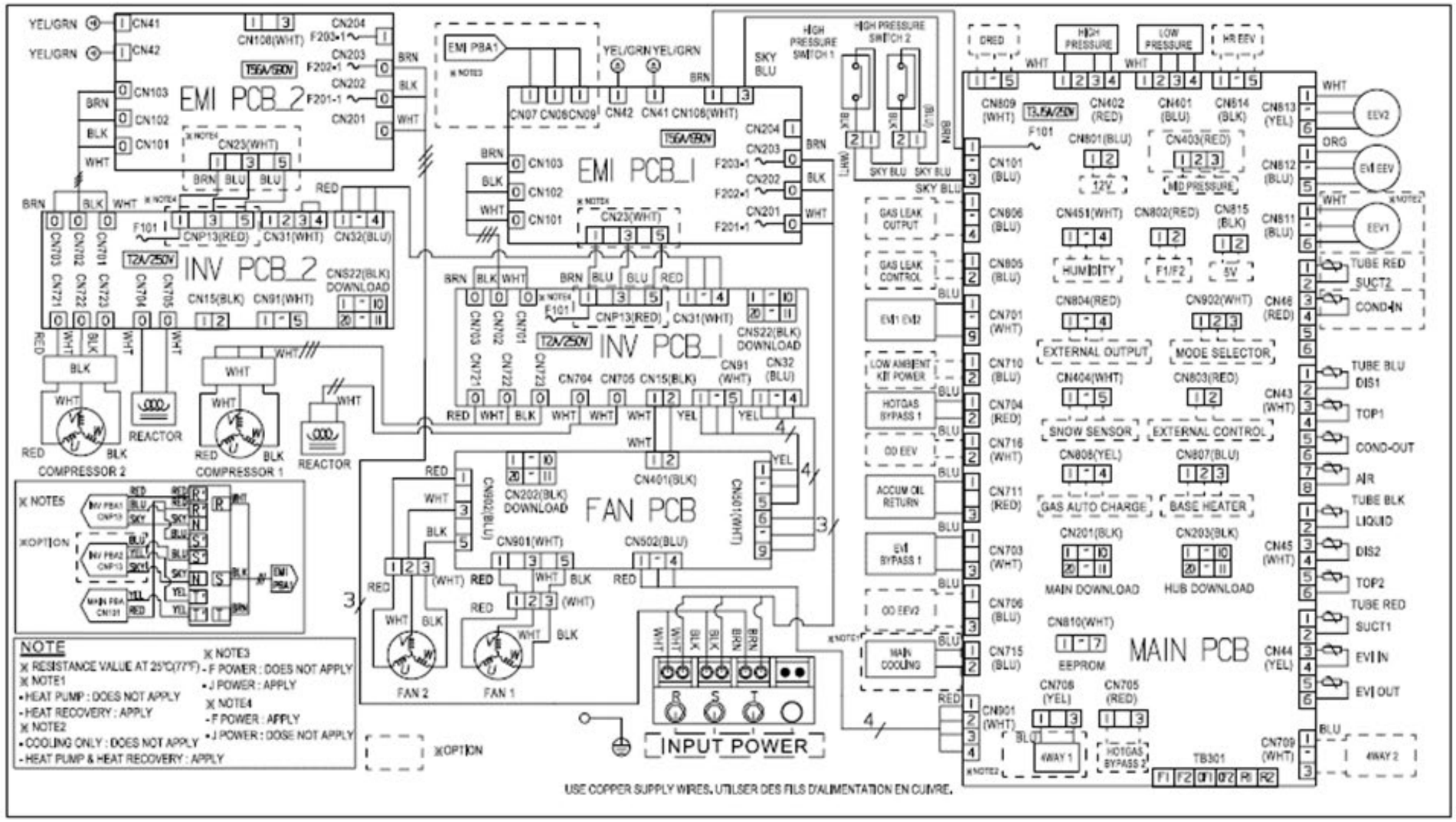
6-1 VPC/VRC072S4M-4*



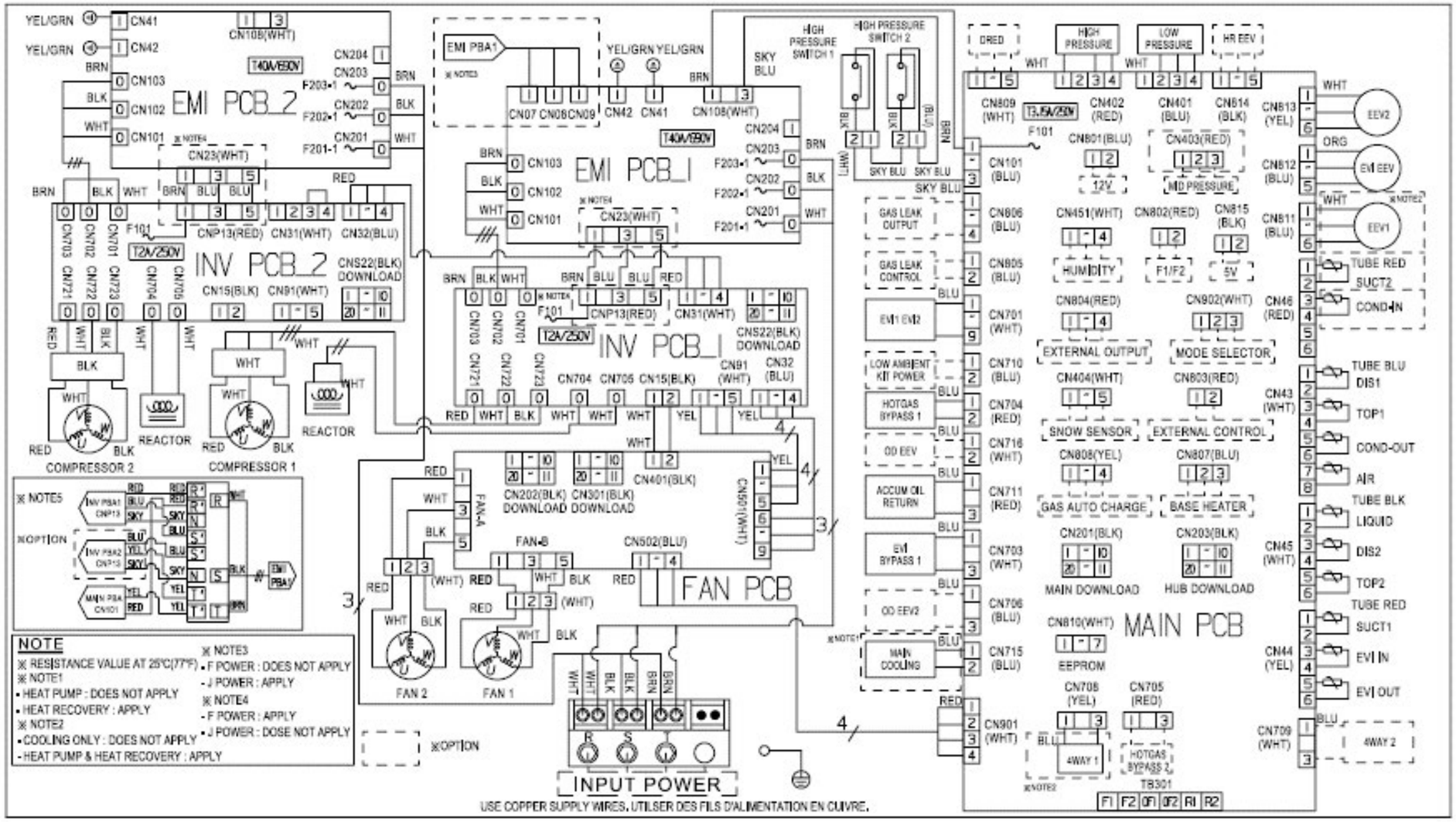
6-2 VPC/VRC096/120/144S4M-4Y, VPC/VRC096/120/144/168S4M-4G, VPC/VRC072L4M-4Y, VPC/VRC072/096/120L4M-4G



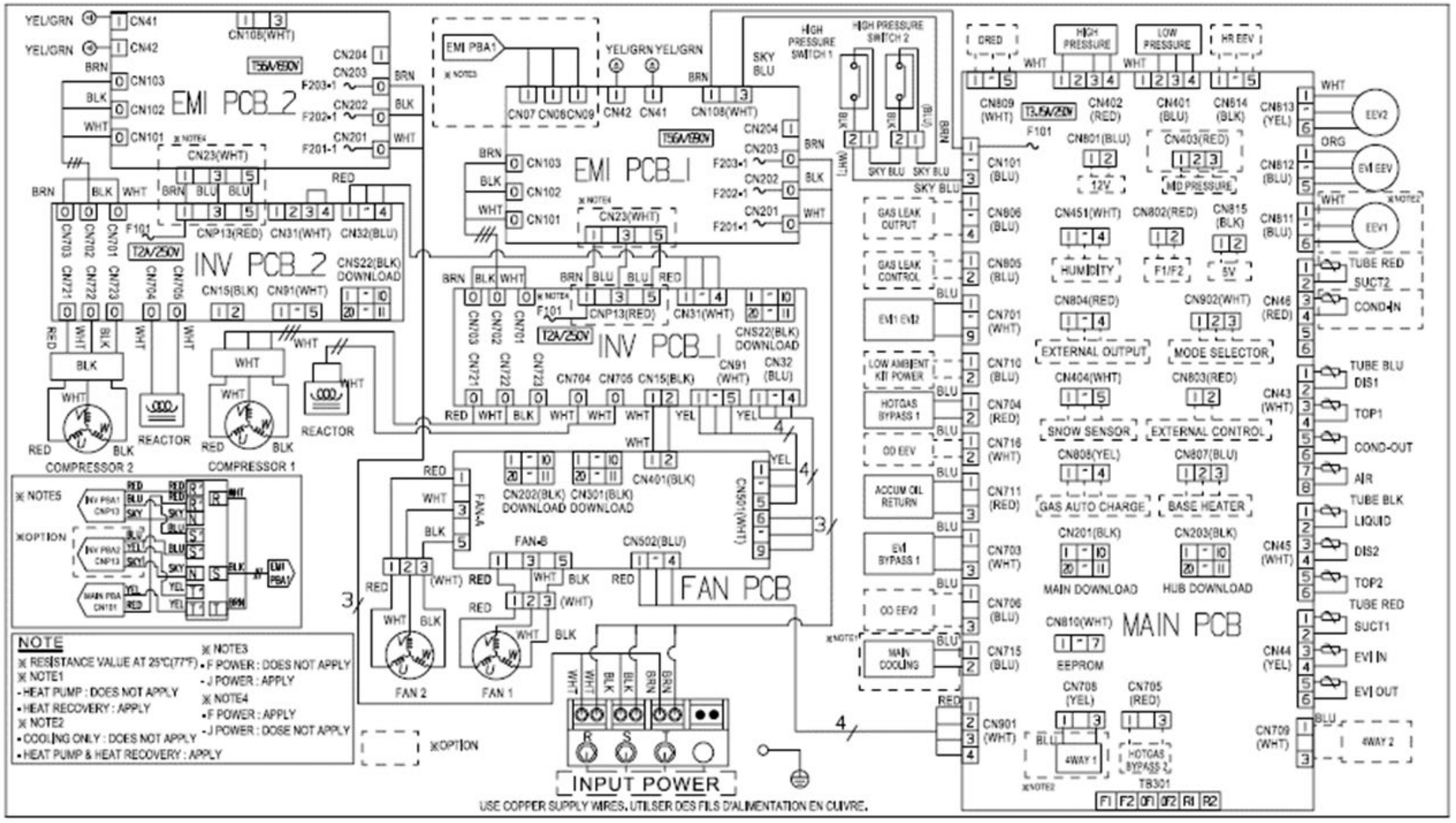
6-3 VPC/VRC168S4M-4Y, VPC/VRC096/120L4M-4Y



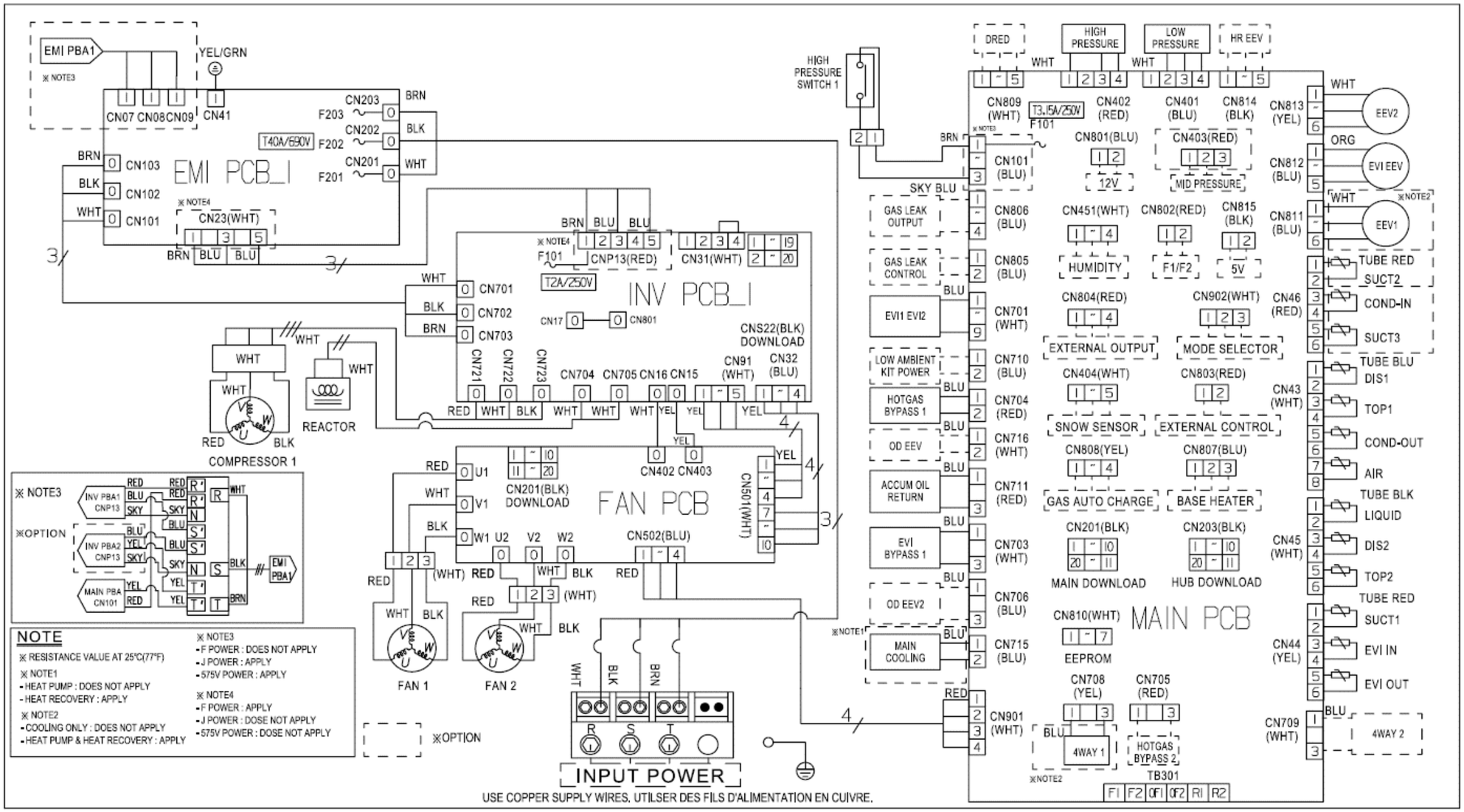
6-4 VPC/VRC192S4M-4G



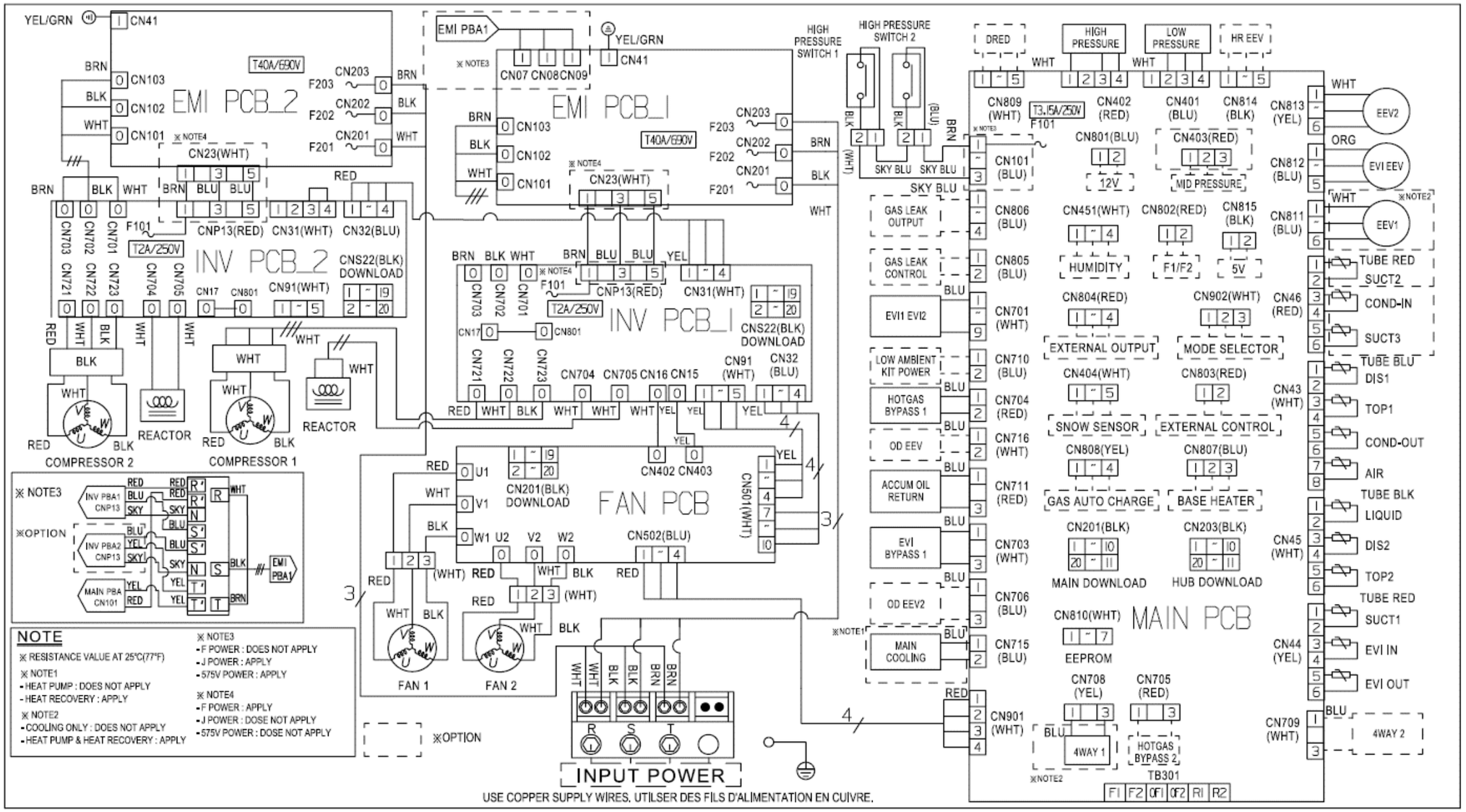
6-5 VPC/VRC216/240S4M-4Y, VPC/VRC216/240S4M-4G



6-6 VPC/VRC072S4M-4J



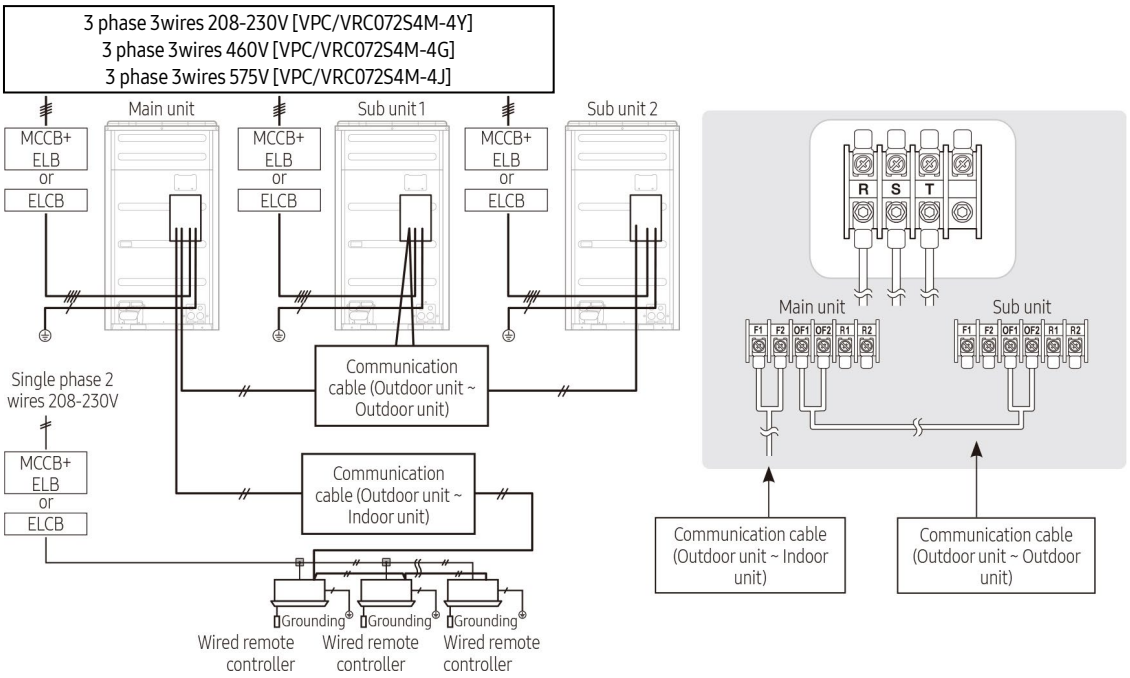
6-7 VPC/VRC096/120/144/168/192/216/240S4M-4J



6-8 Field Wiring

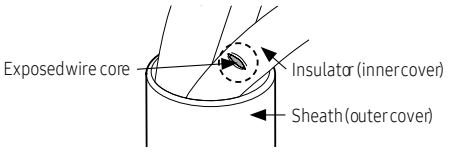
Electrical wiring work

- Connect a power cable of the outdoor unit after checking that R-S-T (3 phase 3 wire) is properly connected.
- Malfunction may occur if one or more of the wires among R-S-T phases (3 Phases-3 Wires) are not connected properly.
  (*Malfunction: Turning on/off, occurrence of error, consecutive reset)
- Communication cable between indoor and outdoor units and communication cable between outdoor units has no polarity.
- Arrange the cables with a cable tie.
  ※ ELCB and ELB must be installed since there is risk of electric shock or fire when they are not installed.



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 (86°F)/ 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 (164.04ft), 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>

6-8 Field Wiring (cont.)

Electric Characteristics

1) VRF High Efficiency Heat Pump/ Heat Recovery (208~230V)

Nom. Ton	Model	Units		Module #1						Module #2						Module #3					
				RLA		FLA		Power Supply		RLA		FLA		Power Supply		RLA		FLA		Power Supply	
		Hz	Volts	Comp1	Comp2	FAN1	FAN2	MCA	MOP	Comp1	Comp2	FAN1	FAN2	MCA	MOP	Comp1	Comp2	FAN1	FAN2	MCA	MOP
6Ton	VPC/VRC072S4M-4Y	60	208~230	18.7	-	4.6	-	28	35	-	-	-	-	-	-	-	-	-	-	-	-
8Ton	VPC/VRC096S4M-4Y	60	208~230	12.2	12.2	4.2	4.2	36	40	-	-	-	-	-	-	-	-	-	-	-	-
10Ton	VPC/VRC120S4M-4Y	60	208~230	14.4	14.4	4.2	4.2	40.8	45	-	-	-	-	-	-	-	-	-	-	-	-
12Ton	VPC/VRC144S4M-4Y	60	208~230	19.6	19.6	4.2	4.2	52.6	60	-	-	-	-	-	-	-	-	-	-	-	-
14Ton	VPC/VRC168S4M-4Y	60	208~230	20.4	20.4	4.2	4.2	54.4	60	-	-	-	-	-	-	-	-	-	-	-	-
16Ton	VPC/VRC192S4M-4Y	60	208~230	22.5	22.5	4.6	4.6	60	70	-	-	-	-	-	-	-	-	-	-	-	-
18Ton	VPC/VRC216S4M-4Y	60	208~230	24.3	24.3	4.6	4.6	64	80	-	-	-	-	-	-	-	-	-	-	-	-
20Ton	VPC/VRC240S4M-4Y	60	208~230	26.1	26.1	4.6	4.6	68	80	-	-	-	-	-	-	-	-	-	-	-	-
22Ton	VPC/VRC264S4M-4Y	60	208~230	12.2	12.2	4.2	4.2	36	40	20.4	20.4	4.2	4.2	54.4	60	-	-	-	-	-	-
24Ton	VPC/VRC288S4M-4Y	60	208~230	12.2	12.2	4.2	4.2	36	40	22.5	22.5	4.6	4.6	60	70	-	-	-	-	-	-
26Ton	VPC/VRC312S4M-4Y	60	208~230	12.2	12.2	4.2	4.2	36	40	24.3	24.3	4.6	4.6	64	80	-	-	-	-	-	-
28Ton	VPC/VRC336S4M-4Y	60	208~230	12.2	12.2	4.2	4.2	36	40	26.1	26.1	4.6	4.6	68	80	-	-	-	-	-	-
30Ton	VPC/VRC360S4M-4Y	60	208~230	14.4	14.4	4.2	4.2	40.8	45	26.1	26.1	4.6	4.6	68	80	-	-	-	-	-	-
32Ton	VPC/VRC384S4M-4Y	60	208~230	22.5	22.5	4.6	4.6	60	70	22.5	22.5	4.6	4.6	60	70	-	-	-	-	-	-
34Ton	VPC/VRC408S4M-4Y	60	208~230	22.5	22.5	4.6	4.6	60	70	24.3	24.3	4.6	4.6	64	80	-	-	-	-	-	-
36Ton	VPC/VRC432S4M-4Y	60	208~230	14.4	14.4	4.2	4.2	40.8	45	14.4	14.4	4.2	4.2	40.8	45	22.5	22.5	4.6	4.6	60	70
38Ton	VPC/VRC456S4M-4Y	60	208~230	14.4	14.4	4.2	4.2	40.8	45	19.6	19.6	4.2	4.2	52.6	60	22.5	22.5	4.6	4.6	60	70

2) VRF High Efficiency Heat Pump/ Heat Recovery (460V)

Nom. Ton	Model	Units		Module #1						Module #2						Module #3					
				RLA		FLA		Power Supply		RLA		FLA		Power Supply		RLA		FLA		Power Supply	
		Hz	Volts	Comp1	Comp2	FAN1	FAN2	MCA	MOP	Comp1	Comp2	FAN1	FAN2	MCA	MOP	Comp1	Comp2	FAN1	FAN2	MCA	MOP
6Ton	VPC/VRC072S4M-4G	60	460	10	-	2.3	-	15	20	-	-	-	-	-	-	-	-	-	-	-	-
8Ton	VPC/VRC096S4M-4G	60	460	6	6	2.1	2.1	18	20	-	-	-	-	-	-	-	-	-	-	-	-
10Ton	VPC/VRC120S4M-4G	60	460	6.6	6.6	2.1	2.1	19.4	25	-	-	-	-	-	-	-	-	-	-	-	-
12Ton	VPC/VRC144S4M-4G	60	460	9.6	9.6	2.1	2.1	26.2	35	-	-	-	-	-	-	-	-	-	-	-	-
14Ton	VPC/VRC168S4M-4G	60	460	11	11	2.1	2.1	29	35	-	-	-	-	-	-	-	-	-	-	-	-
16Ton	VPC/VRC192S4M-4G	60	460	13	13	2.3	2.3	34	40	-	-	-	-	-	-	-	-	-	-	-	-
18Ton	VPC/VRC216S4M-4G	60	460	14.8	14.8	2.3	2.3	38	50	-	-	-	-	-	-	-	-	-	-	-	-
20Ton	VPC/VRC240S4M-4G	60	460	15.6	15.6	2.3	2.3	40	50	-	-	-	-	-	-	-	-	-	-	-	-
22Ton	VPC/VRC264S4M-4G	60	460	6	6	2.1	2.1	18	20	11	11	2.1	2.1	29	35	-	-	-	-	-	-
24Ton	VPC/VRC288S4M-4G	60	460	6	6	2.1	2.1	18	20	13	13	2.3	2.3	34	40	-	-	-	-	-	-
26Ton	VPC/VRC312S4M-4G	60	460	6	6	2.1	2.1	18	20	14.8	14.8	2.3	2.3	38	50	-	-	-	-	-	-
28Ton	VPC/VRC336S4M-4G	60	460	6	6	2.1	2.1	18	20	15.6	15.6	2.3	2.3	40	50	-	-	-	-	-	-
30Ton	VPC/VRC360S4M-4G	60	460	6.6	6.6	2.1	2.1	19.4	25	15.6	15.6	2.3	2.3	40	50	-	-	-	-	-	-
32Ton	VPC/VRC384S4M-4G	60	460	13	13	2.3	2.3	34	40	13	13	2.3	2.3	34	40	-	-	-	-	-	-
34Ton	VPC/VRC408S4M-4G	60	460	13	13	2.3	2.3	34	40	14.8	14.8	2.3	2.3	38	50	-	-	-	-	-	-
36Ton	VPC/VRC432S4M-4G	60	460	6.6	6.6	2.1	2.1	19.4	25	6.6	6.6	2.1	2.1	19.4	25	13	13	2.3	2.3	34	40
38Ton	VPC/VRC456S4M-4G	60	460	6.6	6.6	2.1	2.1	19.4	25	9.6	9.6	2.1	2.1	26.2	35	13	13	2.3	2.3	34	40

6-8 Field Wiring (cont.)

Electric Characteristics (cont.)

3) VRF High Efficiency Heat Pump / Heat Recovery (575V)

Non. Ton	Model	Units		Module #1						Module #2						Module #3					
				RLA		FLA		PowerSupply		RLA		FLA		PowerSupply		RLA		FLA		PowerSupply	
		Hz	Volts	Comp1	Comp2	FAN1	FAN2	MCA	MOP	Comp1	Comp2	FAN1	FAN2	MCA	MOP	Comp1	Comp2	FAN1	FAN2	MCA	MOP
6Ton	VPC/VRC072S4M-4J	60	575	8.5	-	2.3	-	13.4	20	-	-	-	-	-	-	-	-	-	-	-	-
8Ton	VPC/VRC096S4M-4J	60	575	5	5	2.3	2.3	16.1	20	-	-	-	-	-	-	-	-	-	-	-	-
10Ton	VPC/VRC120S4M-4J	60	575	5.5	5.5	2.3	2.3	17.4	20	-	-	-	-	-	-	-	-	-	-	-	-
12Ton	VPC/VRC144S4M-4J	60	575	7.6	7.6	2.3	2.3	22.2	25	-	-	-	-	-	-	-	-	-	-	-	-
14Ton	VPC/VRC168S4M-4J	60	575	8.8	8.8	2.3	2.3	24.8	30	-	-	-	-	-	-	-	-	-	-	-	-
16Ton	VPC/VRC192S4M-4J	60	575	11.2	11.2	2.3	2.3	30.5	40	-	-	-	-	-	-	-	-	-	-	-	-
18Ton	VPC/VRC216S4M-4J	60	575	12.8	12.8	2.3	2.3	34	45	-	-	-	-	-	-	-	-	-	-	-	-
20Ton	VPC/VRC240S4M-4J	60	575	13.5	13.5	2.3	2.3	35.8	45	-	-	-	-	-	-	-	-	-	-	-	-
22Ton	VPC/VRC264S4M-4J	60	575	5	5	2.3	2.3	16.1	20	8.8	8.8	2.3	2.3	24.8	30	-	-	-	-	-	-
24Ton	VPC/VRC288S4M-4J	60	575	5	5	2.3	2.3	16.1	20	11.2	11.2	2.3	2.3	30.5	40	-	-	-	-	-	-
26Ton	VPC/VRC312S4M-4J	60	575	5	5	2.3	2.3	16.1	20	12.8	12.8	2.3	2.3	34	45	-	-	-	-	-	-
28Ton	VPC/VRC336S4M-4J	60	575	5	5	2.3	2.3	16.1	20	13.5	13.5	2.3	2.3	35.8	45	-	-	-	-	-	-
30Ton	VPC/VRC360S4M-4J	60	575	5.5	5.5	2.3	2.3	17.4	20	13.5	13.5	2.3	2.3	35.8	45	-	-	-	-	-	-
32Ton	VPC/VRC384S4M-4J	60	575	11.2	11.2	2.3	2.3	30.5	40	11.2	11.2	2.3	2.3	30.5	40	-	-	-	-	-	-
34Ton	VPC/VRC408S4M-4J	60	575	11.2	11.2	2.3	2.3	30.5	40	12.8	12.8	2.3	2.3	34	45	-	-	-	-	-	-
36Ton	VPC/VRC432S4M-4J	60	575	5.5	5.5	2.3	2.3	17.4	20	5.5	5.5	2.3	2.3	17.4	20	11.2	11.2	2.3	2.3	30.5	40
38Ton	VPC/VRC456S4M-4J	60	575	5.5	5.5	2.3	2.3	17.4	20	7.6	7.6	2.3	2.3	22.2	25	11.2	11.2	2.3	2.3	30.5	40

4) VRF Max Heat Heat Pump / Heat Recovery (208~230V)

Nom. Ton	Model	Units		Module#1						Module#2						Module#3					
				RLA		FLA		PowerSupply		RLA		FLA		PowerSupply		RLA		FLA		PowerSupply	
		Hz	Volts	Comp1	Comp2	FAN1	FAN2	MCA	MOP	Comp1	Comp2	FAN1	FAN2	MCA	MOP	Comp1	Comp2	FAN1	FAN2	MCA	MOP
6Ton	VPC/VRC072L4M-4Y	60	208~230	18	18	4.2	4.2	50	60	-	-	-	-	-	-	-	-	-	-	-	-
8Ton	VPC/VRC096L4M-4Y	60	208~230	22	22	4.2	4.2	62	70	-	-	-	-	-	-	-	-	-	-	-	-
10Ton	VPC/VRC120L4M-4Y	60	208~230	28	28	4.2	4.2	76	90	-	-	-	-	-	-	-	-	-	-	-	-
12Ton	VPC/VRC144L4M-4Y	60	208~230	18	18	4.2	4.2	50	60	18	18	4.2	4.2	50	60	-	-	-	-	-	-
14Ton	VPC/VRC168L4M-4Y	60	208~230	18	18	4.2	4.2	50	60	22	22	4.2	4.2	62	70	-	-	-	-	-	-
16Ton	VPC/VRC192L4M-4Y	60	208~230	18	18	4.2	4.2	50	60	28	28	4.2	4.2	76	90	-	-	-	-	-	-
18Ton	VPC/VRC216L4M-4Y	60	208~230	22	22	4.2	4.2	62	70	28	28	4.2	4.2	76	90	-	-	-	-	-	-
20Ton	VPC/VRC240L4M-4Y	60	208~230	28	28	4.2	4.2	76	90	28	28	4.2	4.2	76	90	-	-	-	-	-	-
22Ton	VPC/VRC264L4M-4Y	60	208~230	18	18	4.2	4.2	50	60	18	18	4.2	4.2	50	60	28	28	4.2	4.2	76	90
24Ton	VPC/VRC288L4M-4Y	60	208~230	18	18	4.2	4.2	50	60	22	22	4.2	4.2	62	70	28	28	4.2	4.2	76	90
26Ton	VPC/VRC312L4M-4Y	60	208~230	18	18	4.2	4.2	50	60	28	28	4.2	4.2	76	90	28	28	4.2	4.2	76	90
28Ton	VPC/VRC336L4M-4Y	60	208~230	22	22	4.2	4.2	62	70	28	28	4.2	4.2	76	90	28	28	4.2	4.2	76	90
30Ton	VPC/VRC360L4M-4Y	60	208~230	28	28	4.2	4.2	76	90	28	28	4.2	4.2	76	90	28	28	4.2	4.2	76	90

6-8 Field Wiring (cont.)

Electric Characteristics (cont.)

5) VRF Max Heat Heat Pump / Heat Recovery (460V)

Nom. Ton	Model	Units		Module#1						Module#2						Module#3					
				RLA		FLA		PowerSupply		RLA		FLA		PowerSupply		RLA		FLA		PowerSupply	
		Hz	Volts	Comp1	Comp2	FAN1	FAN2	MCA	MOP	Comp1	Comp2	FAN1	FAN2	MCA	MOP	Comp1	Comp2	FAN1	FAN2	MCA	MOP
6Ton	VPC/VRC072L4M-4G	60	460	9.2	9.2	2.1	2.1	25	30	-	-	-	-	-	-	-	-	-	-	-	-
8Ton	VPC/VRC096L4M-4G	60	460	11	11	2.1	2.1	31	35	-	-	-	-	-	-	-	-	-	-	-	-
10Ton	VPC/VRC120L4M-4G	60	460	14	14	2.1	2.1	38	45	-	-	-	-	-	-	-	-	-	-	-	-
12Ton	VPC/VRC144L4M-4G	60	460	9.2	9.2	2.1	2.1	25	30	9.2	9.2	2.1	2.1	25	30	-	-	-	-	-	-
14Ton	VPC/VRC168L4M-4G	60	460	9.2	9.2	2.1	2.1	25	30	11	11	2.1	2.1	31	35	-	-	-	-	-	-
16Ton	VPC/VRC192L4M-4G	60	460	9.2	9.2	2.1	2.1	25	30	14	14	2.1	2.1	38	45	-	-	-	-	-	-
18Ton	VPC/VRC216L4M-4G	60	460	11	11	2.1	2.1	31	35	14	14	2.1	2.1	38	45	-	-	-	-	-	-
20Ton	VPC/VRC240L4M-4G	60	460	14	14	2.1	2.1	38	45	14	14	2.1	2.1	38	45	-	-	-	-	-	-
22Ton	VPC/VRC264L4M-4G	60	460	9.2	9.2	2.1	2.1	25	30	9.2	9.2	2.1	2.1	25	30	14	14	2.1	2.1	38	45
24Ton	VPC/VRC288L4M-4G	60	460	9.2	9.2	2.1	2.1	25	30	11	11	2.1	2.1	31	35	14	14	2.1	2.1	38	45
26Ton	VPC/VRC312L4M-4G	60	460	9.2	9.2	2.1	2.1	25	30	14	14	2.1	2.1	38	45	14	14	2.1	2.1	38	45
28Ton	VPC/VRC336L4M-4G	60	460	11	11	2.1	2.1	31	35	14	14	2.1	2.1	38	45	14	14	2.1	2.1	38	45
30Ton	VPC/VRC360L4M-4G	60	460	14	14	2.1	2.1	38	45	14	14	2.1	2.1	38	45	14	14	2.1	2.1	38	45

NOTE

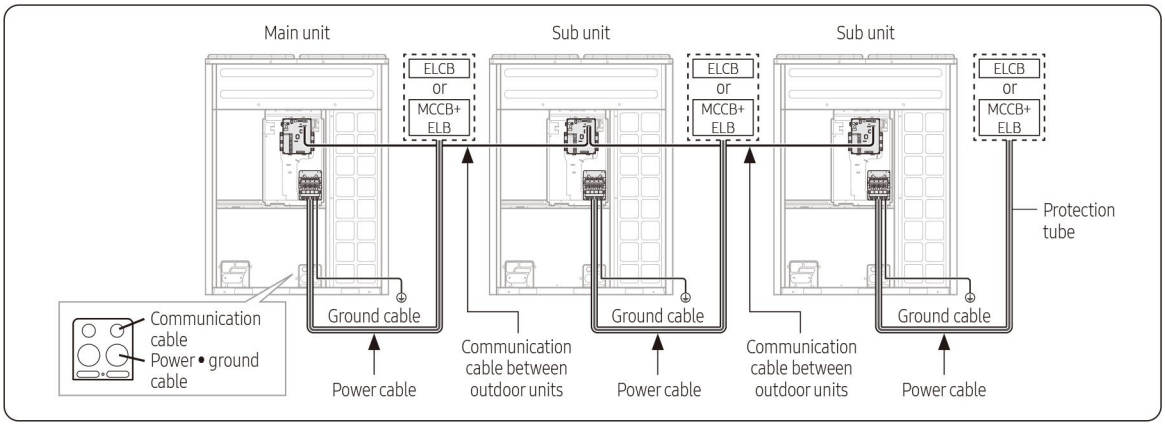
- RLA is based on AHRI 1230 Cooling Standard Condition (Indoor Temp: 26.7ºC/80ºF (DB) / 19.46ºC/67ºF (WB), Outdoor Temp: 35ºC/95ºF (DB))
- Voltage Tolerance is ± 10%
- Maxium allowable voltage between phases is 2%
- Refer to module combination table for independent units information
- Symbols:
  - RLA: Rated Load Ampere
  - FLA: Full Load Ampere
  - MCA: Minimum Circuit Ampere (A)
  - MOP: Maxium Overcurrent Protective Device(A)”

6-8 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.



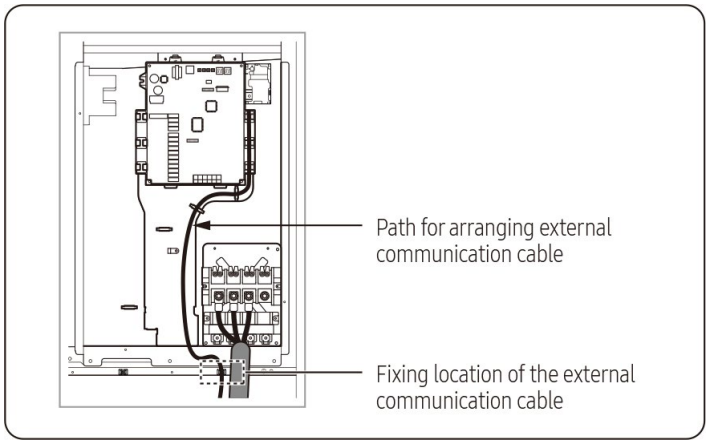
6-8 Field Wiring (cont.)

Specification of the protection tube

Name	Temper grade	Applicable conditions
Flexible PVC conduit	PVC	When thte protection tube is installed indoor and not exposed to outside, because it is embedded in concrete structure
Class 1 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 condui	Galvanized steel sheet and Soft PVC compoun	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

⚠ CAUTION

- Caution for perforating the knock-out hole
- Perforate a knock-out hole by punching it with a hammer.
- After perforating the knock-out hole, apply rust resisting paint around the hole.
- When you need to pass the cables through the knock-out hole, remove burrs on the hole and protection the cable with a protection tape or bushing etc.
- Caution for installing communication cable
- When you connect the cable, it may sag and pressed by other parts. Therefore cables should be fixed to a clamp highlighted with a box on the illustration.

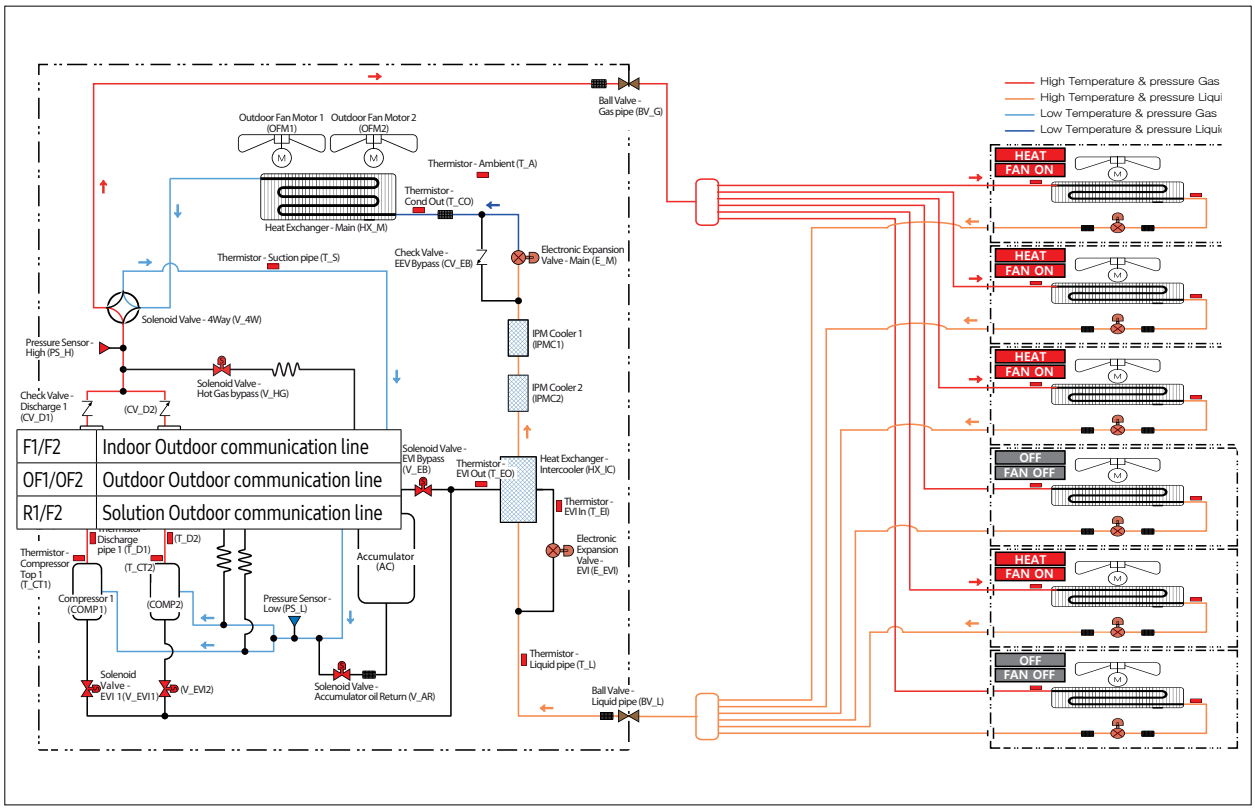


6-8 Field Wiring (cont.)

Electrical wiring work (cont.)

Specification of Cable and Connecting method

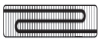
- For communication cable, 2-core sheathed vinyl cable should be used which satisfies nominal area of 0.75~1.25 ㎟ thickness. If 2 or more than 3 communication are connected with one cable which is 4, 6 or more strands, communication malfunction could be caused. Only 2-core sheathed vinyl cable should be used for one communication line.
- Maximum connecting length is limited to 1,000m(3281'), so you should follow this limit not to cause malfunction of communication.
- Maximum number of units that can be connected to the outdoor main unit is 64, so do not exceed this limit.
- Communication cable should be connected in series as in the picture below, and malfunction of communication can be occur if many units are connected to the same terminal.
- Communication cable between indoor and outdoor units and communication cable between outdoor units has no polarity.



7. Piping Diagram

7-1 Piping Diagram

■ Cycle component Symbol and Function

No	Part Name	Abbreviation	Symbol	Function
1	Inveter Compressor	INV		This type of compressor uses a drive to control the compressor motor speed to modulate cooling capacity.
2	Outdoor Fan Motor	OFM		The outdoor air and the refrigerant to heat exchange through the heat exchanger.
3	Outdoor Heat Exchanger (Heat Exchanger - Main (Outdoor unit))	OHX (HX_M)		By heat exchange of the outdoor air and the refrigerant thereby condensing the refrigerant during a cooling operation and evaporating the refrigerant during a heating operation.
4	Accumulator	AC		It prevents liquid compression to separate the liquid refrigerant flowing into the compressor.
5	Oil Separator	OS		Separating the oil from the refrigerant discharged from the compressor, and sends the separated oil to the compressor.
6	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.
7	Intercooler (Heat Exchanger-Intercooler)	IC (HX_IC)		The heat exchange between the refrigerant in the pipe and passing through the EVIEEV.
8	IPM Cooler	IPMC		By heat exchange between the liquid refrigerant and IPM, prevent overheating of IPM and protect the system.
9	High Pressure Sensor (Pressure Sensor-High)	HPS (PS_H)		By measuring the pressure (high pressure) of the compressor discharge, protects the pressure control & system.
10	Low Pressure Sensor (Pressure Sensor-Low)	LPS (PS_L)		By measuring the pressure (low pressure) of the compressor suction, protects the pressure control & system.
11	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.
12	Main EEV (Electronic Expansion Valve-Main)	E_M		By controlling the amount of refrigerant during the heating operation and it controls the superheat.
13	EVI EEV (Electronic Expansion Valve-EVI)	E_EV (E_EVI)		By controlling the amount of refrigerant passing through the intercooler.
14	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."
15	EVI Bypass Valve (Solenoid valve-EVI Bypass)	V_EB		In Vapor/Flash Injection Requires close the valve to flow the refrigerant to the compressor.
16	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.
17	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)
18	Outdoor EEV Valve (Solenoid valve-Main EEV)	V_OE (V_ME)		Close the main valve in the cooling operation and to control the amount of refrigerant in the Main EEV. (HR Only)

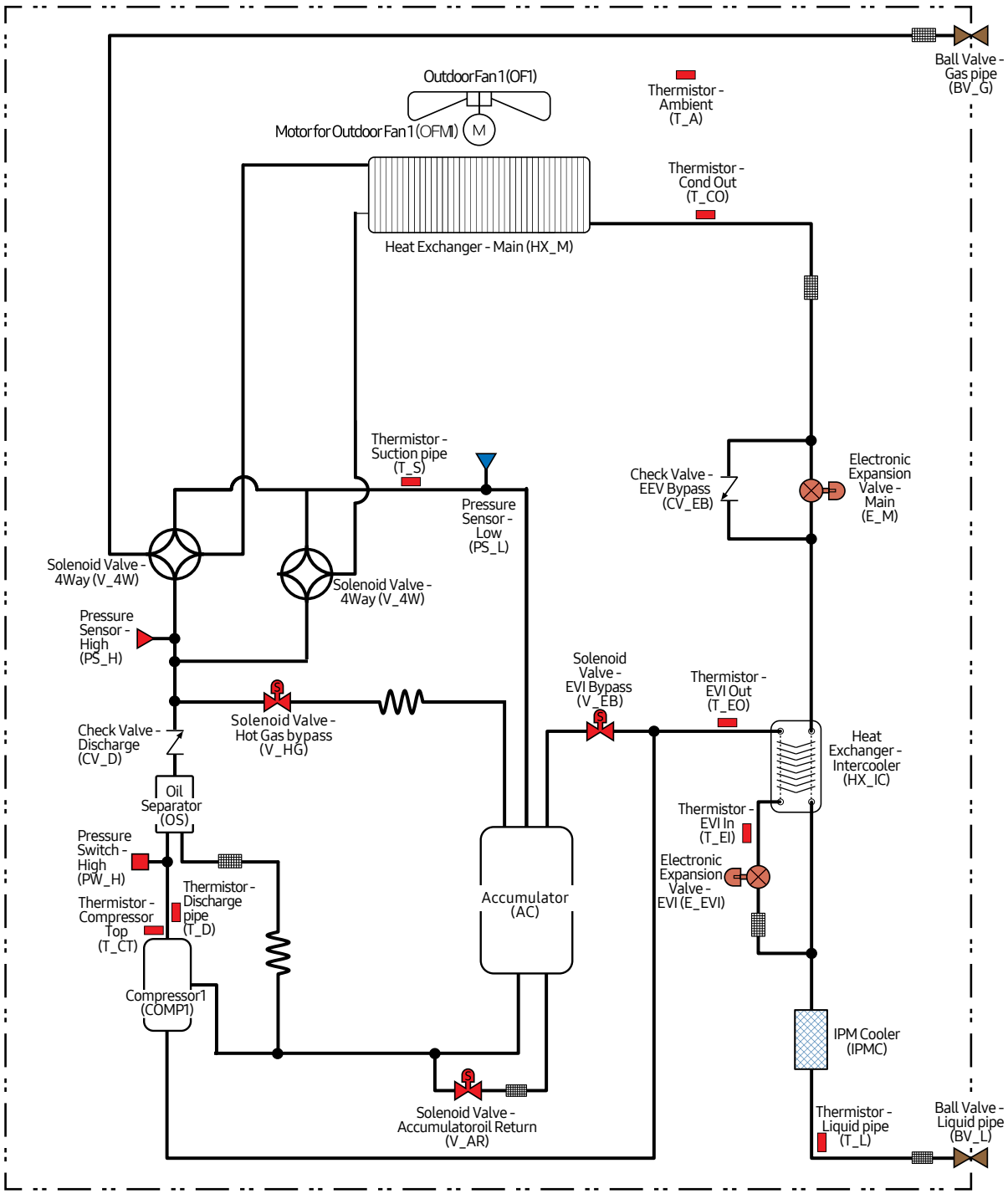
7-1 Piping Diagram (cont.)

■ Cycle component Symbol and Function (cont.)

No	Part Name	Abbreviation	Symbol	Function
19	MainCooling 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)
20	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.
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.

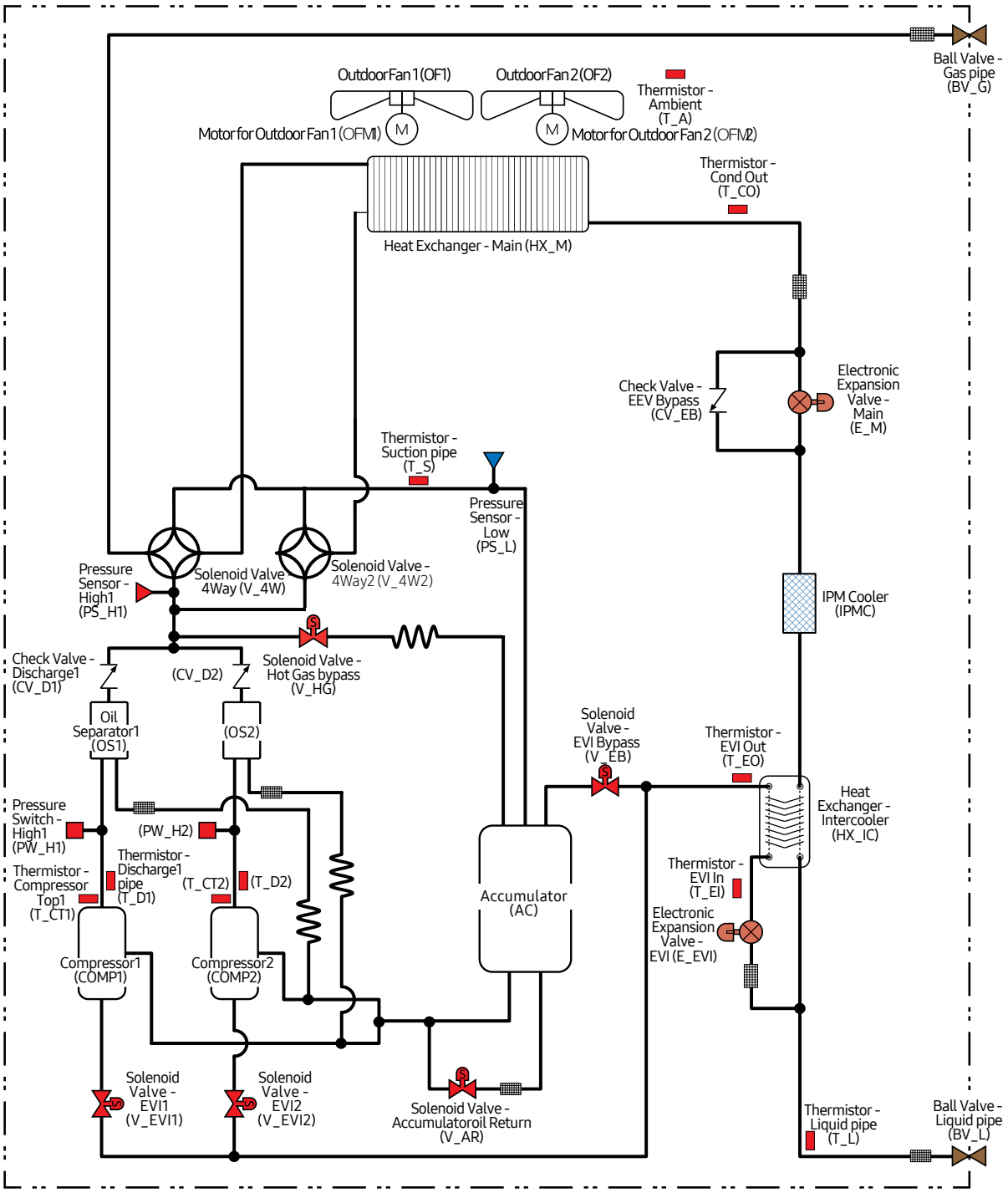
7-1 Piping Diagram (cont.)

7-1-1 VPC072S4M-4Y, VPC072S4M-4G, VPC072S4M-4J



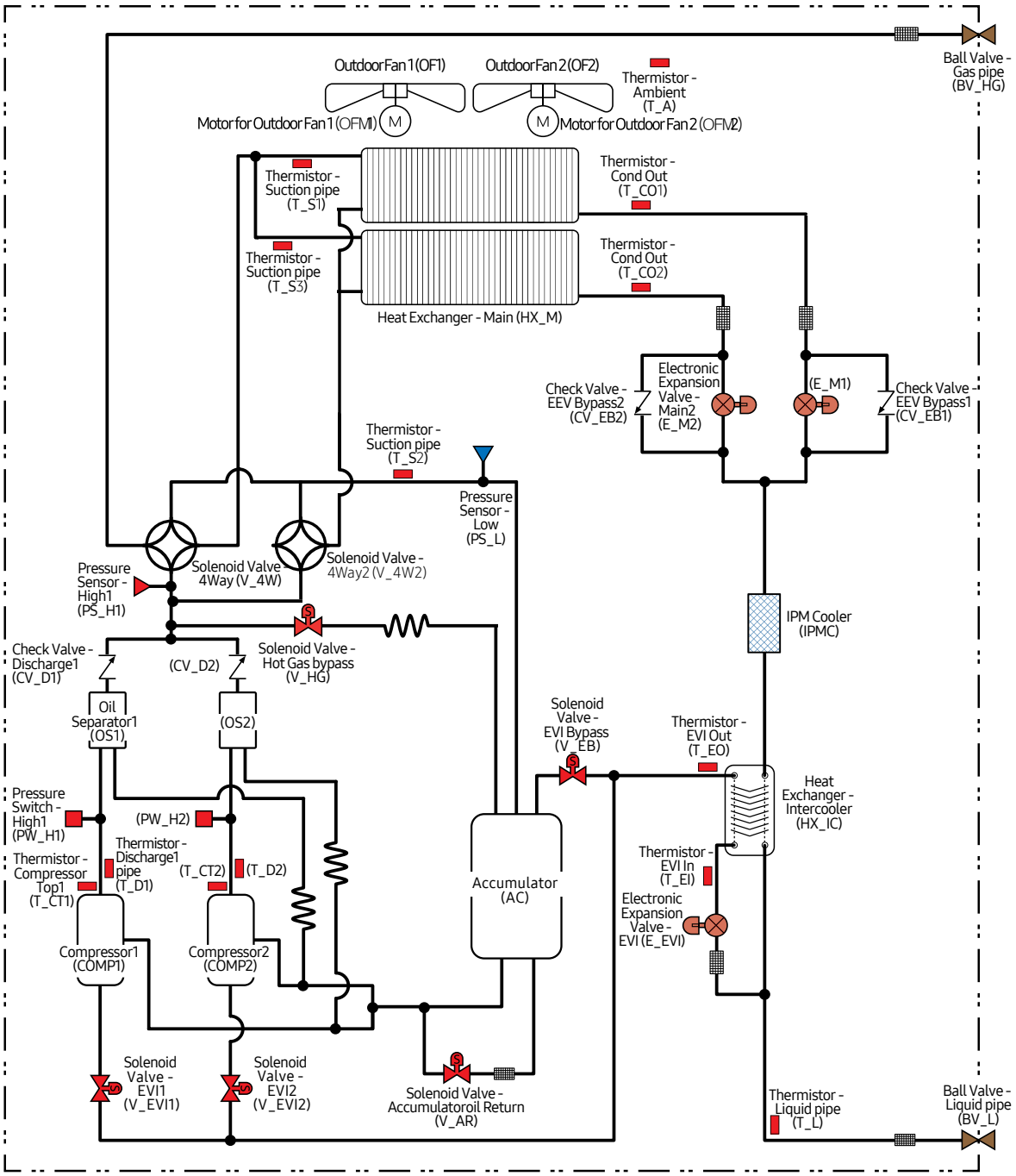
7-1 Piping Diagram (cont.)

7-1-2 VPC096/120/144/168S4M-4Y, VPC096/120/144/168S4M-4G, VPC072/096/120L4M-4Y, VPC072/096/120L4M-4G, VPC096/120/144/168S4M-4J



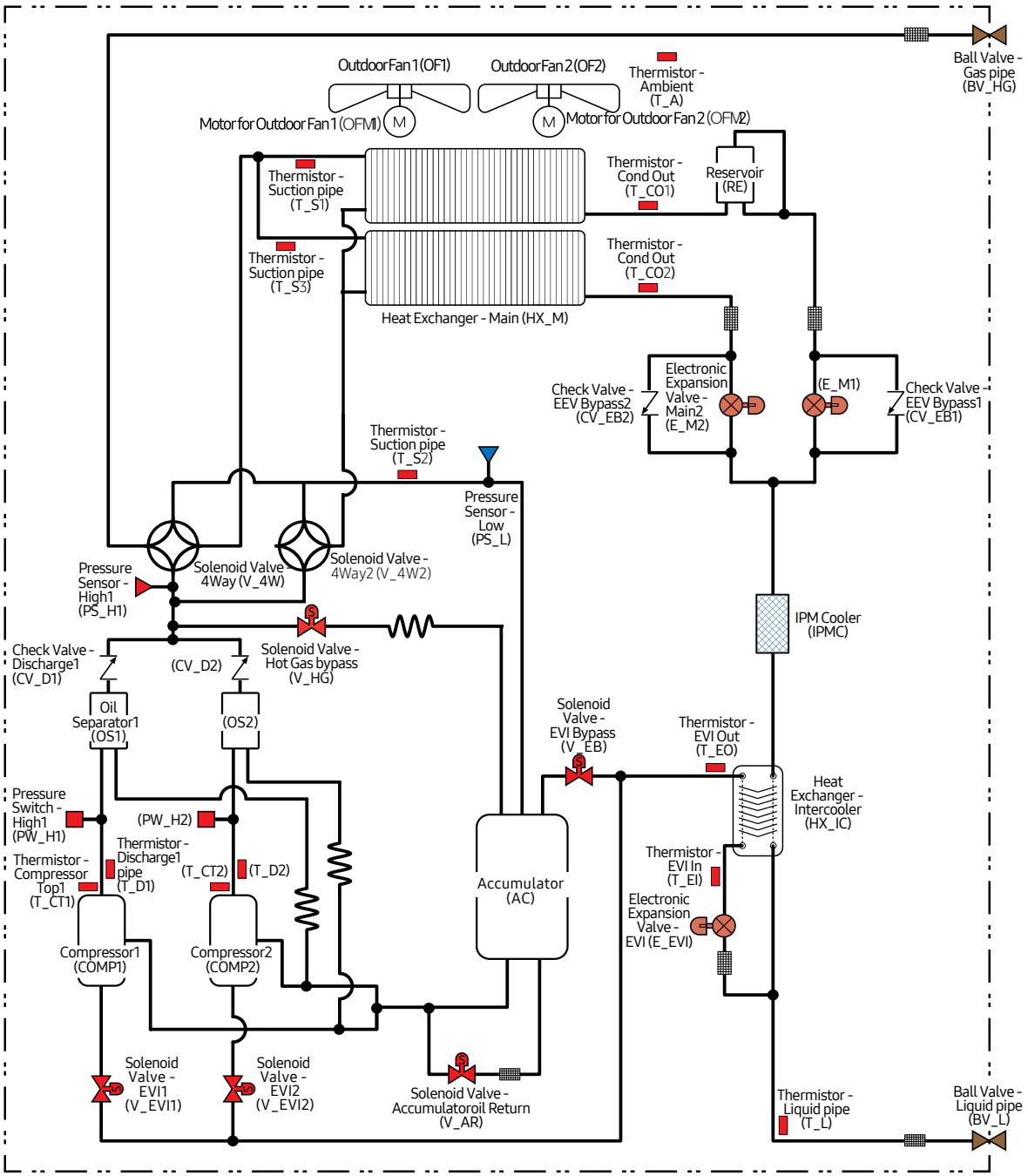
7-1 Piping Diagram (cont.)

7-1-3 VPC192S4M-4Y, VPC192S4M-4G, VPC192S4M-4J



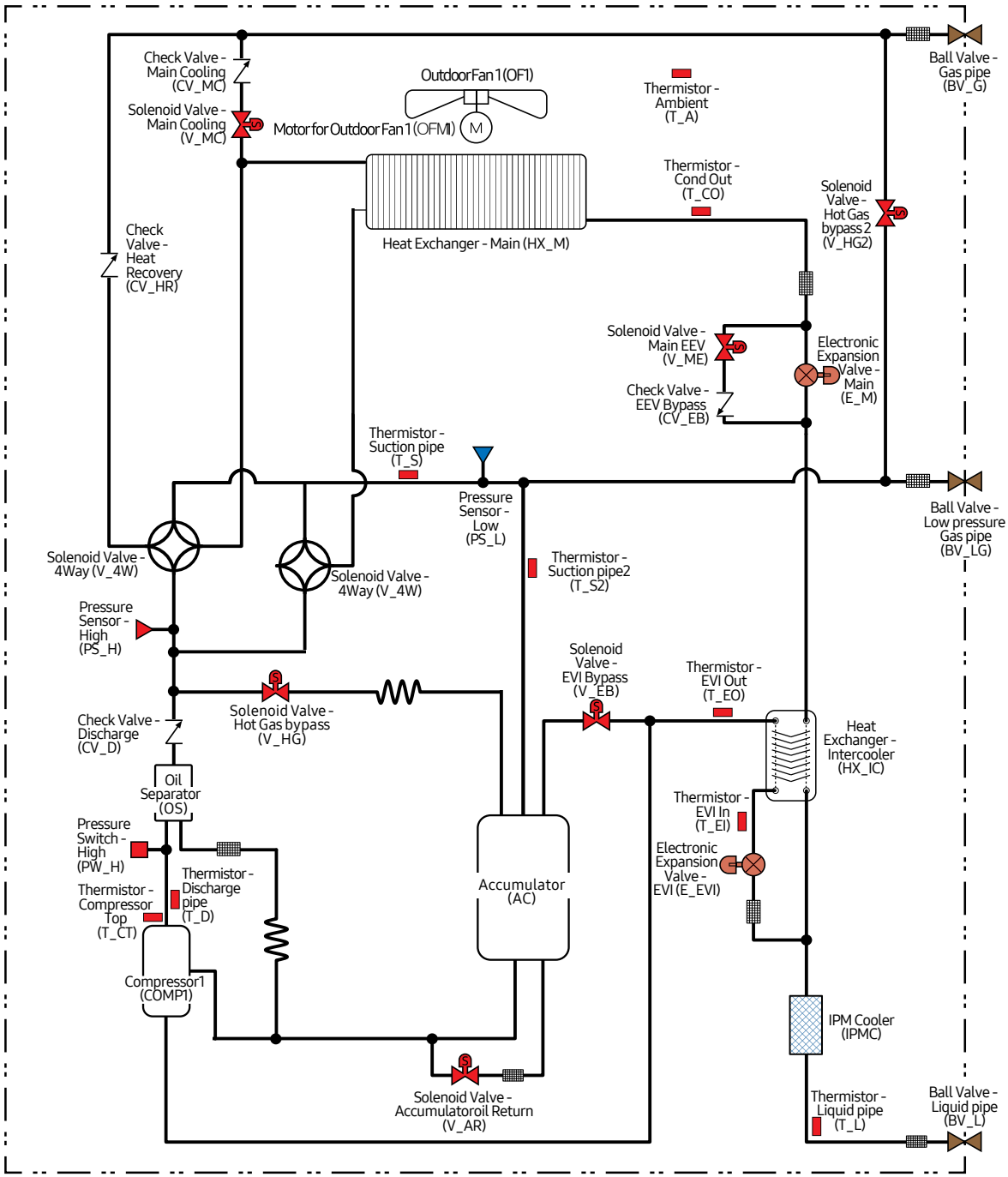
7-1 Piping Diagram (cont.)

7-1-4 VPC216/240S4M-4Y, VPC216/240S4M-4G, VPC216/240S4M-4J



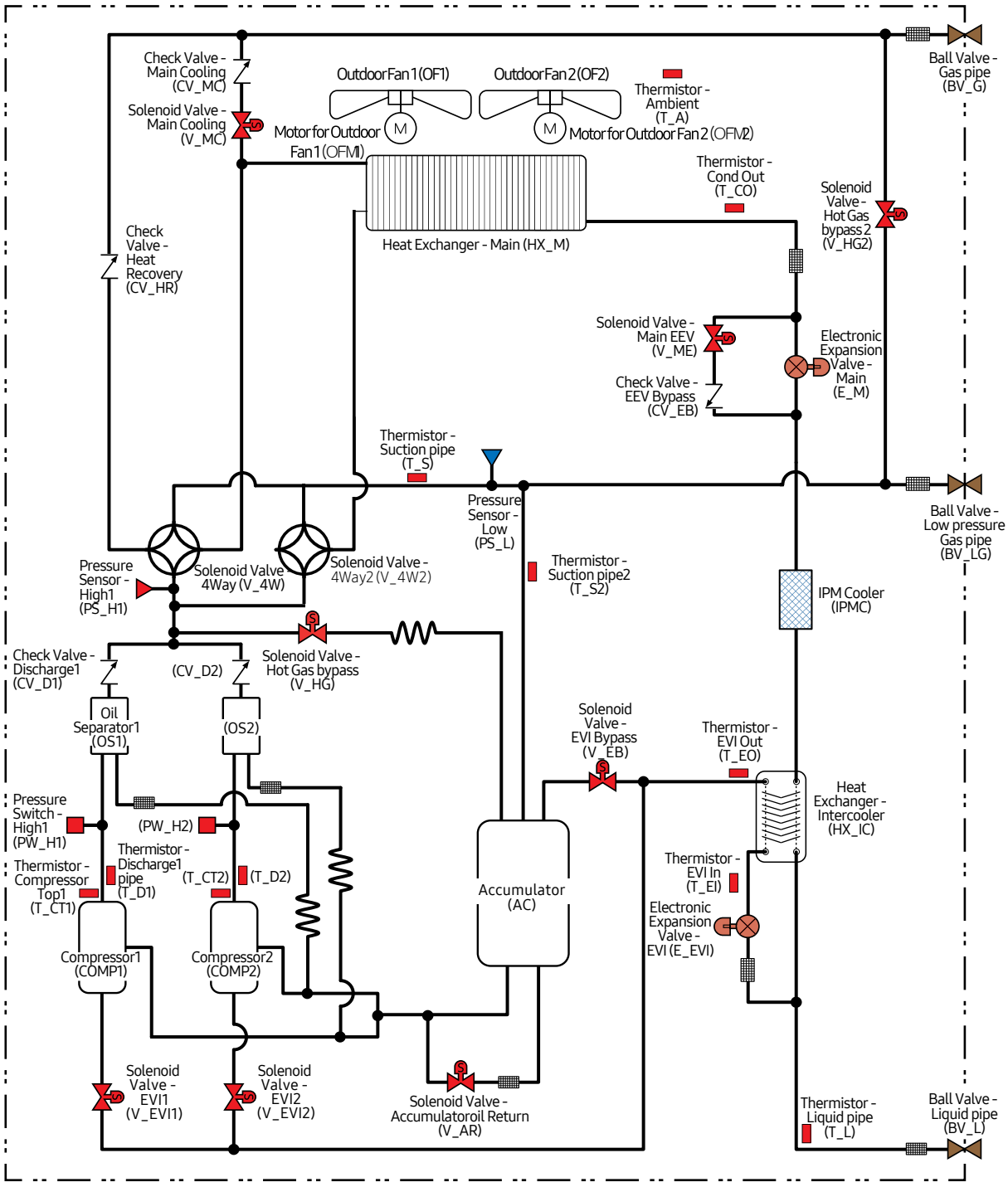
7-1 Piping Diagram (cont.)

7-1-5 VRC072S4M-4Y, VRC072S4M-4G, VRC072S4M-4J



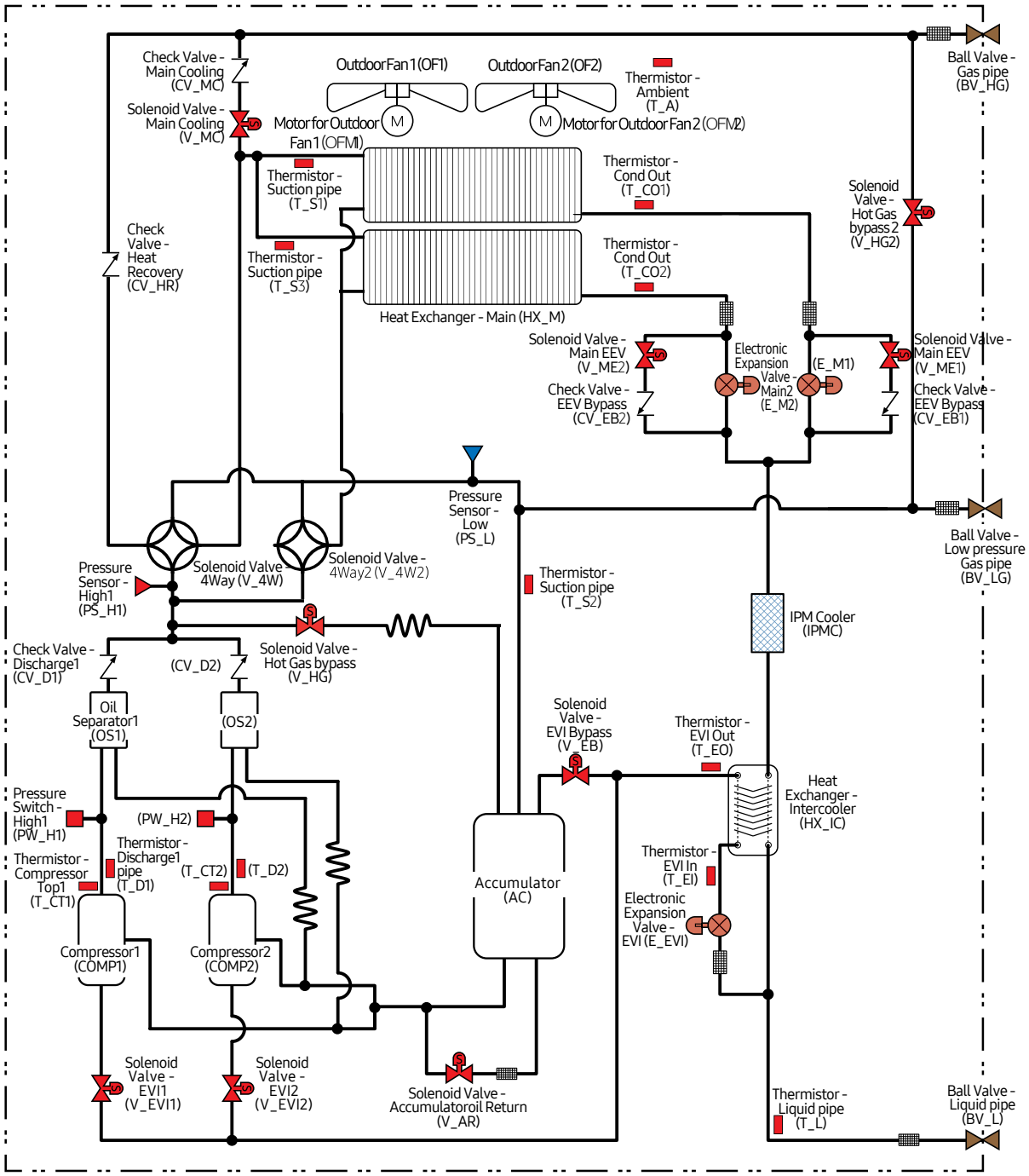
7-1 Piping Diagram (cont.)

7-1-6 VRC096/120/144/168S4M-4Y, VRC096/120/144/168S4M-4G, VRC096/120/144/168S4M-4J



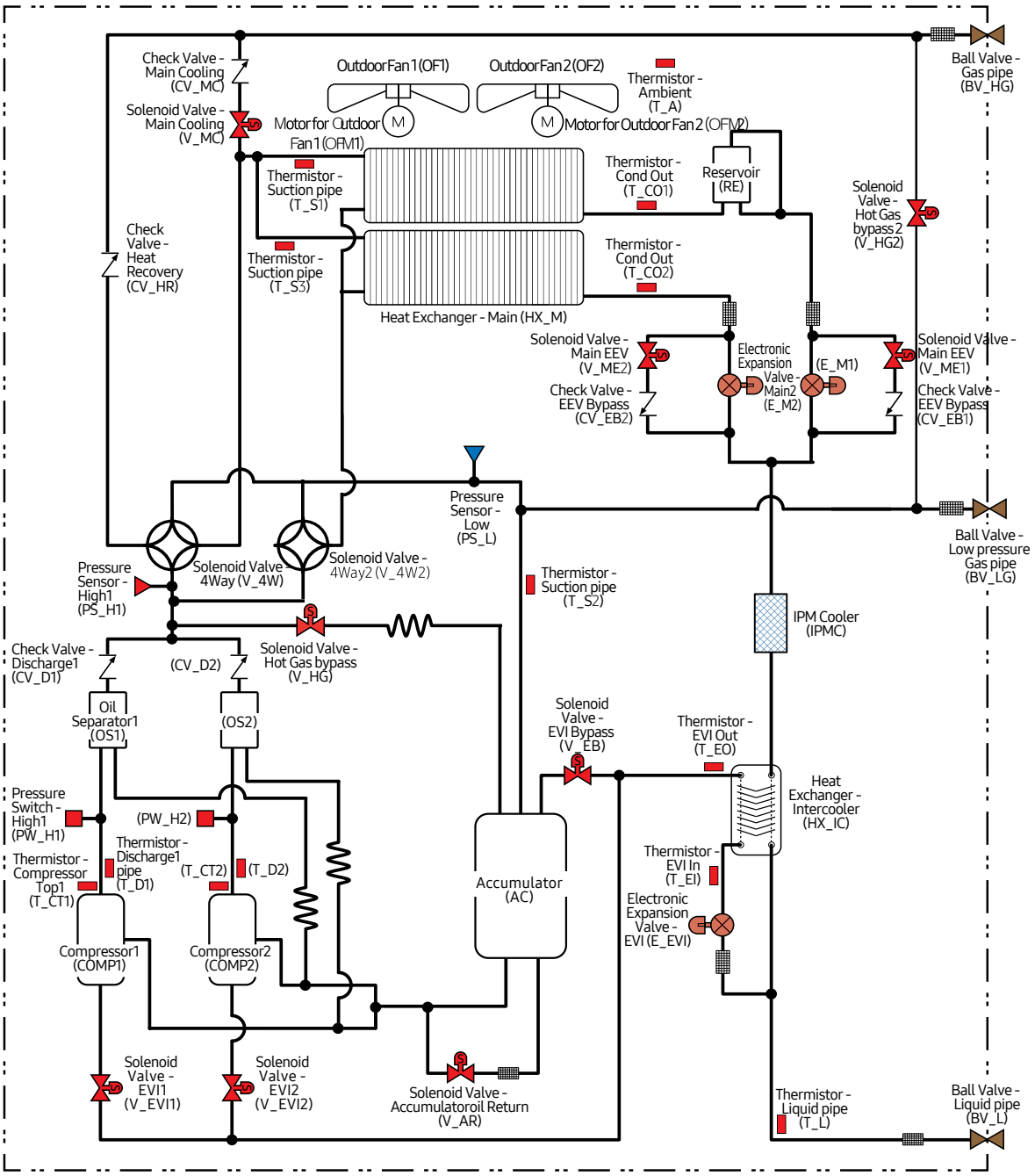
7-1 Piping Diagram (cont.)

7-1-7 VRC192S4M-4Y, VRC192S4M-4G, VRC192S4M-4J



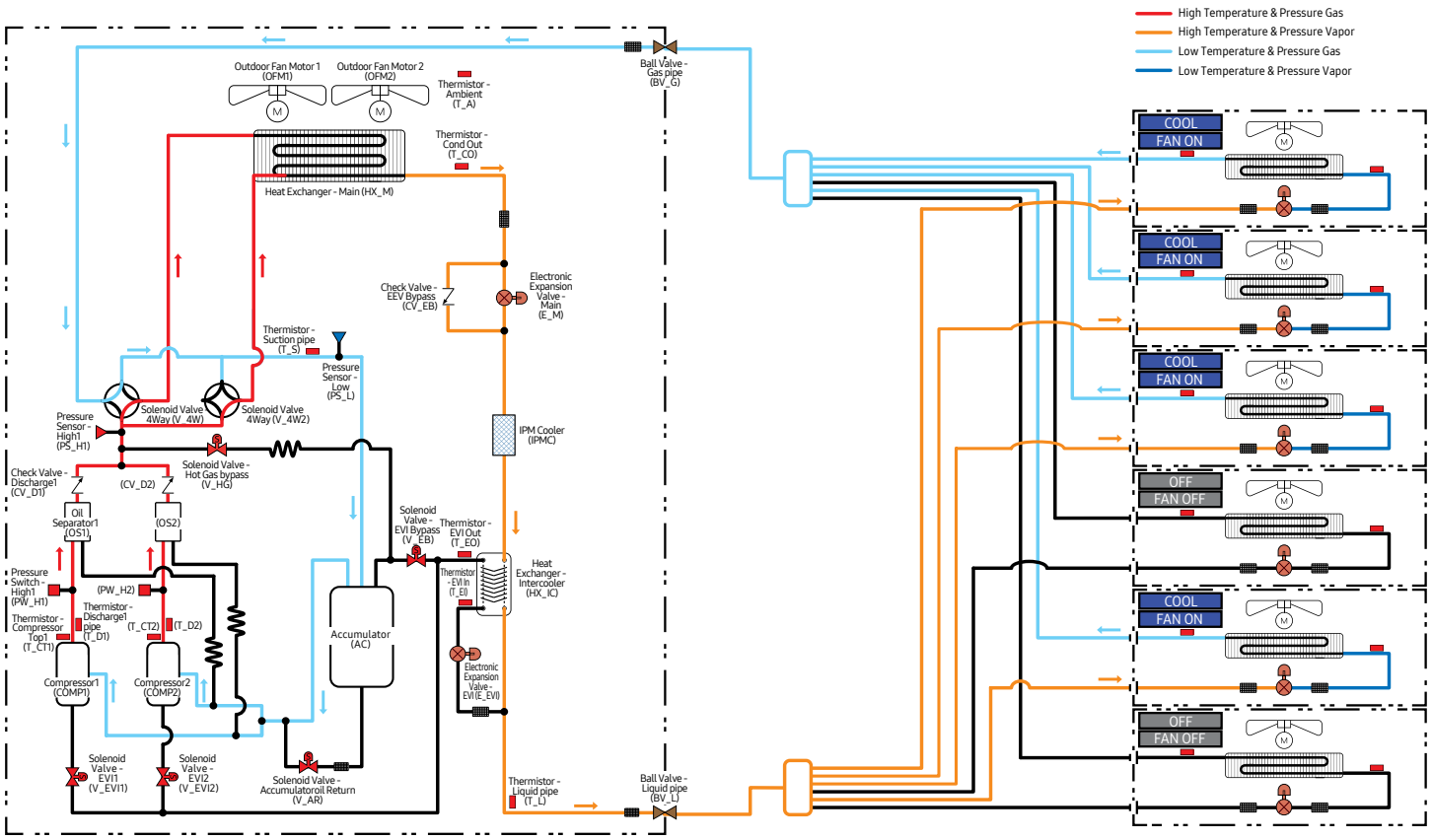
7-1 Piping Diagram (cont.)

7-1-8 VRC216/240S4M-4Y, VRC216/240S4M-4G, VRC216/240S4M-4J



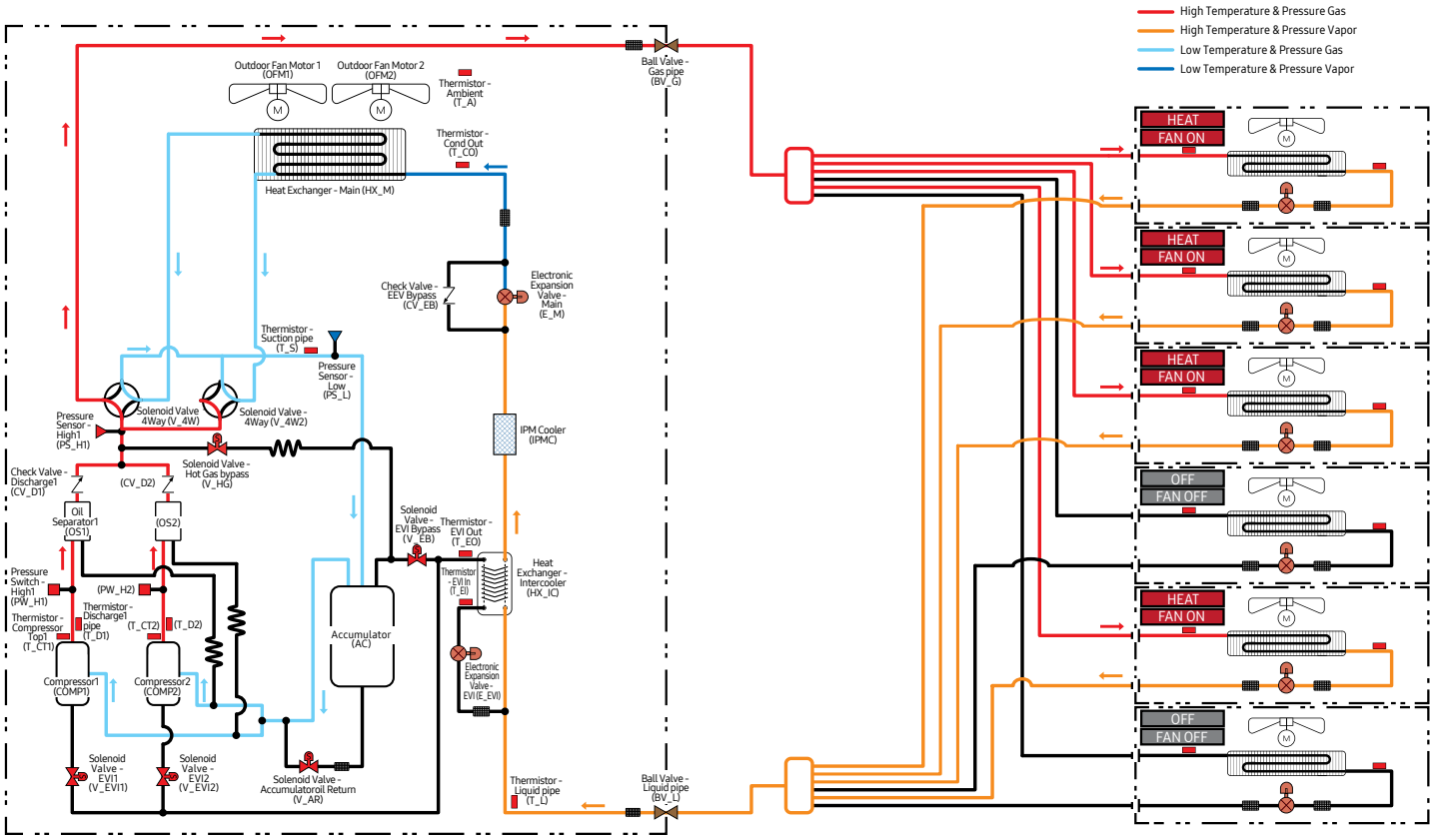
7-2 Refrigerant Flow for Each Operation Mode

7-2-1 VRF Heat Pump – Cooling operation



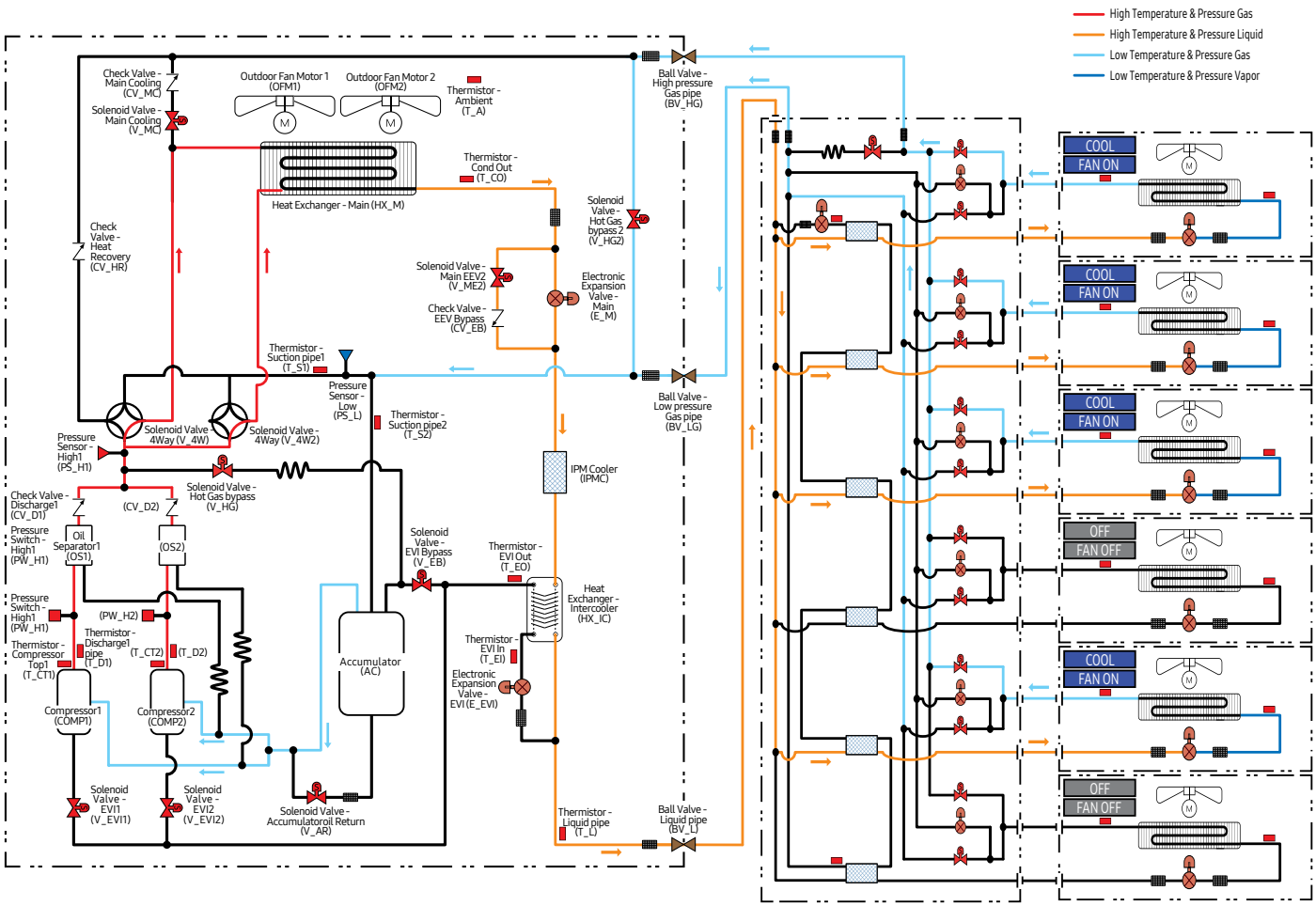
7-2 Refrigerant Flow for Each Operation Mode (cont.)

7-2-2 VRF Heat Pump – Heating operation



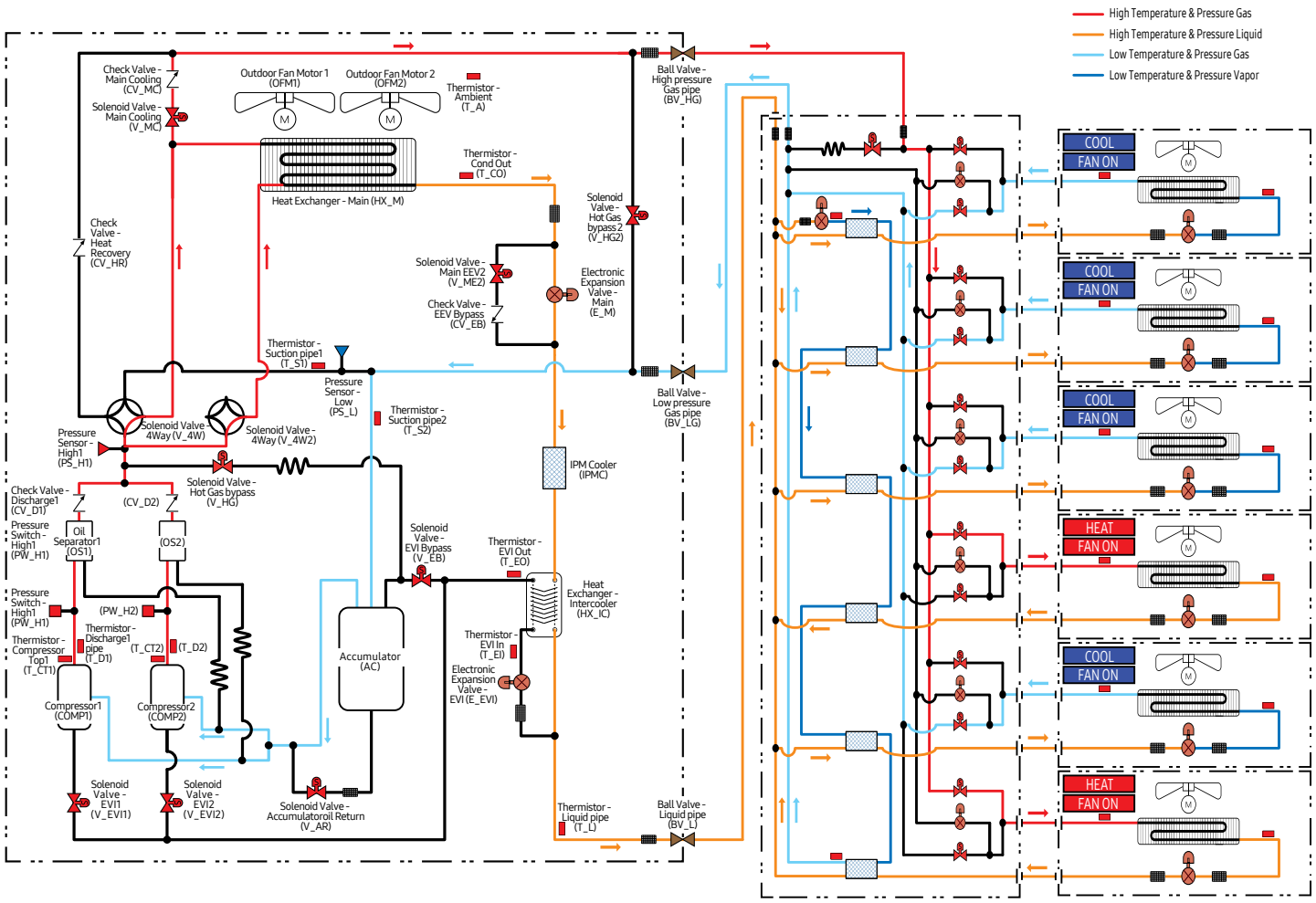
7-2 Refrigerant Flow for Each Operation Mode (cont.)

7-2-3 VRF Heat Recovery – Cooling operation



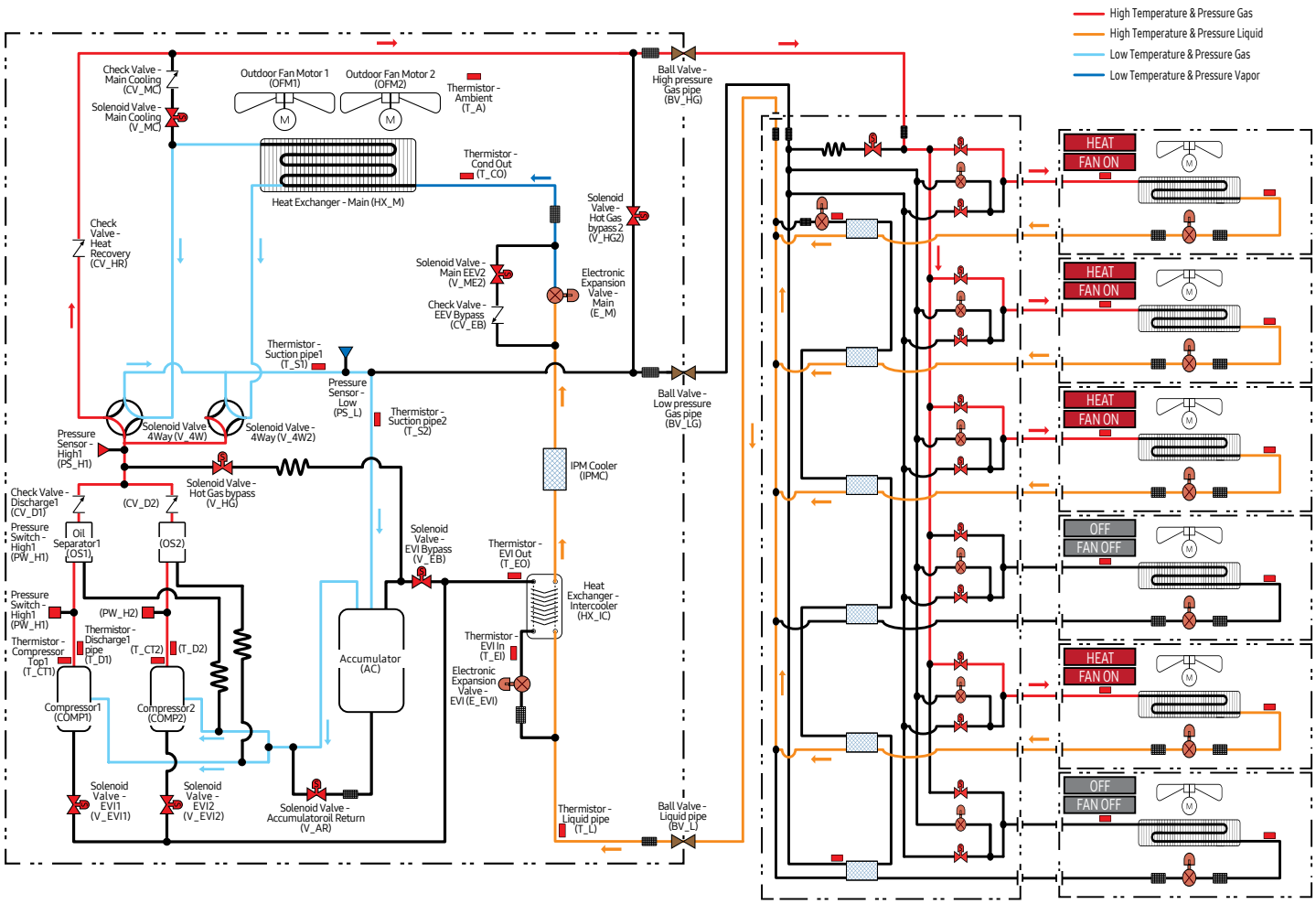
7-2 Refrigerant Flow for Each Operation Mode (cont.)

7-2-4 VRF Heat Recovery – Main cooling operation



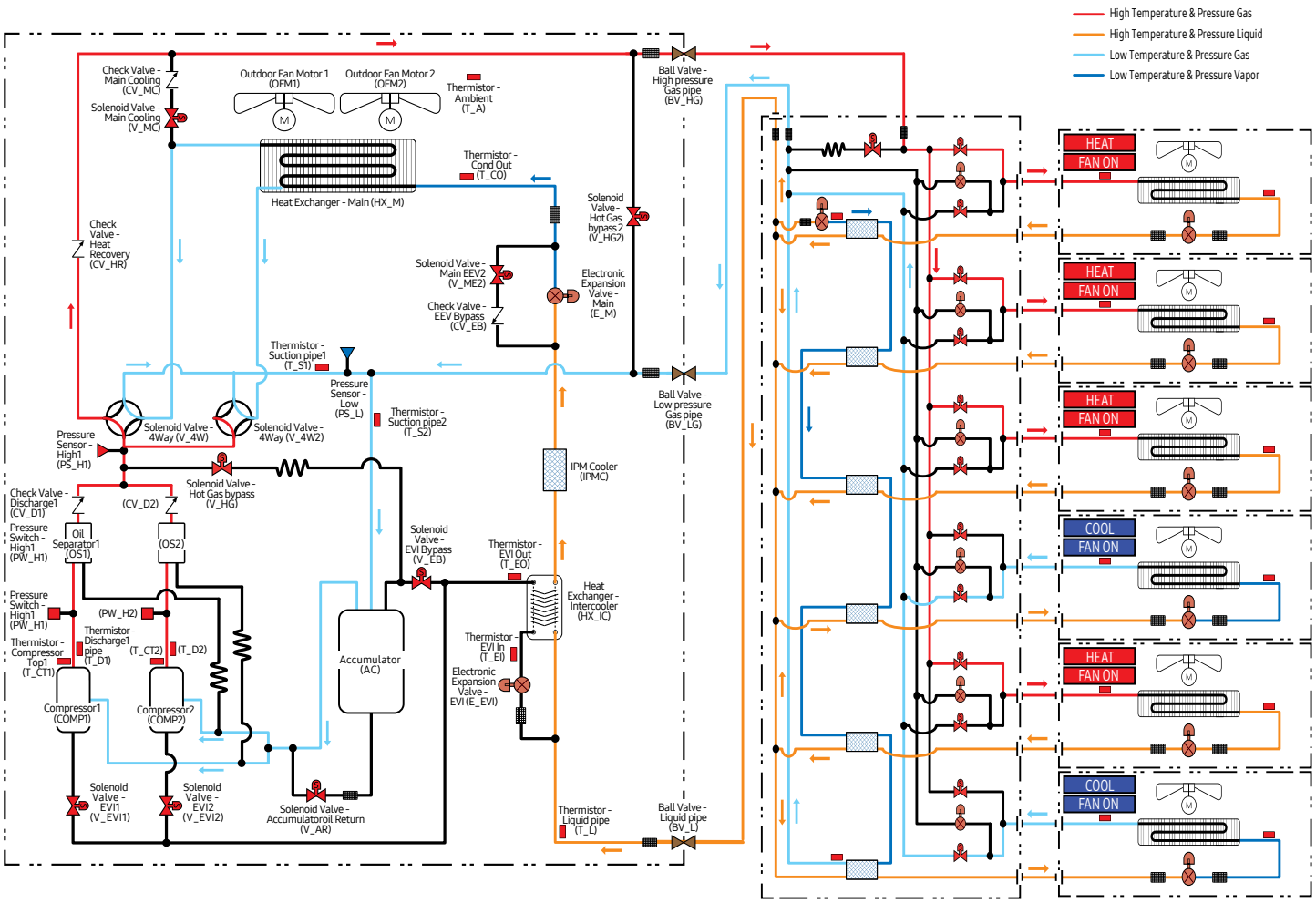
7-2 Refrigerant Flow for Each Operation Mode (cont.)

7-2-5 VRF Heat Recovery – Heating operation



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

7-2-6 VRF Heat Recovery – Main heating operation



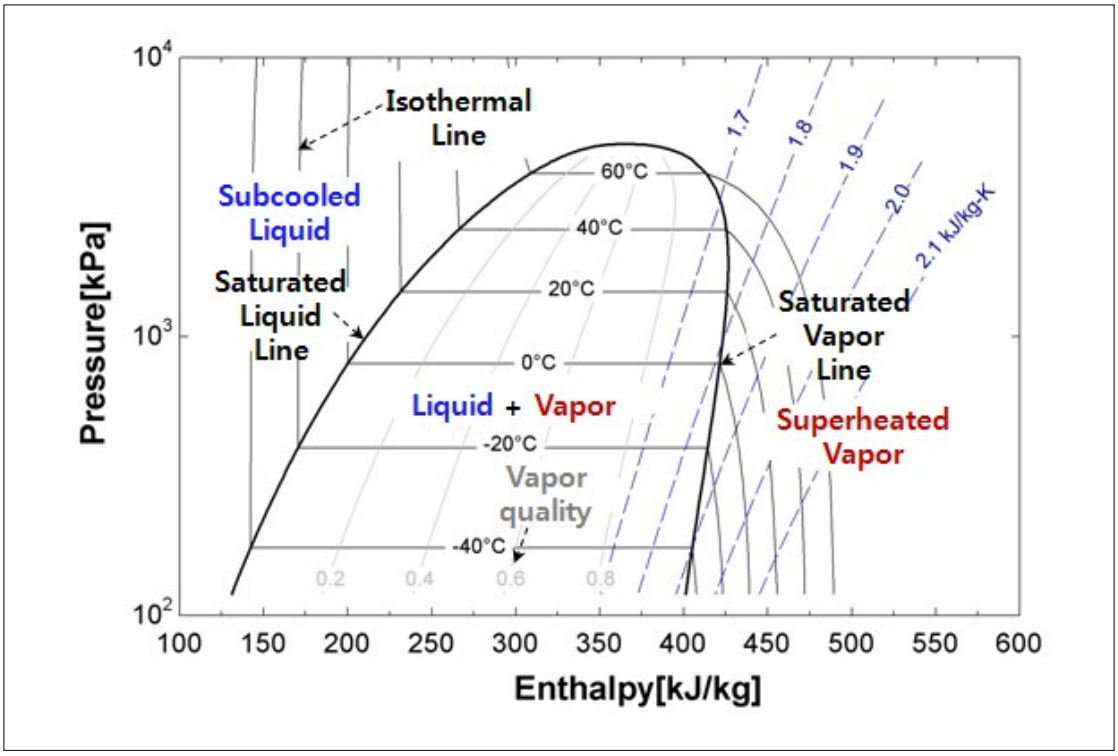
7-3 Functions

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-azeotrpic 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.

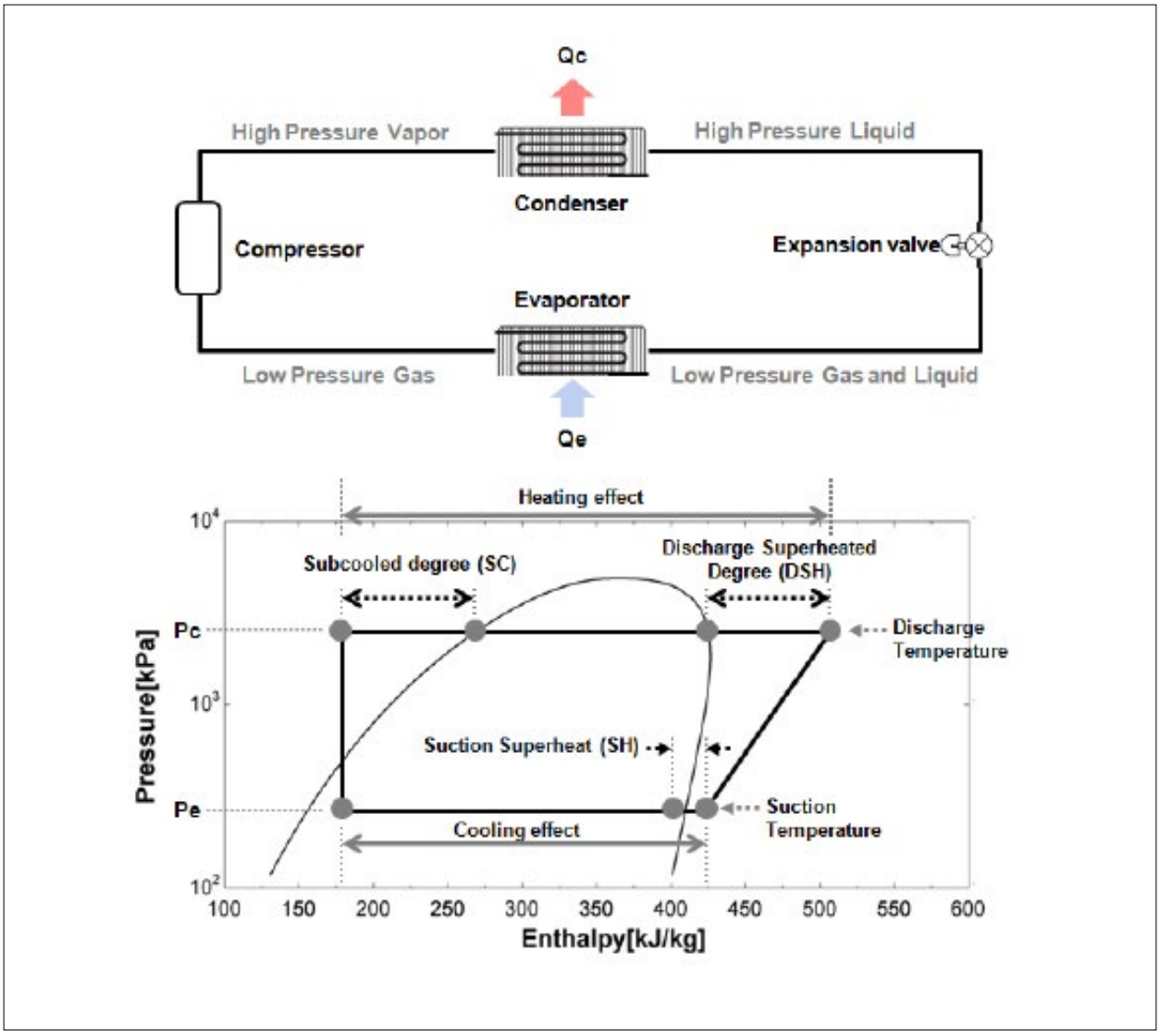
7-3 Functions (cont.)

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.

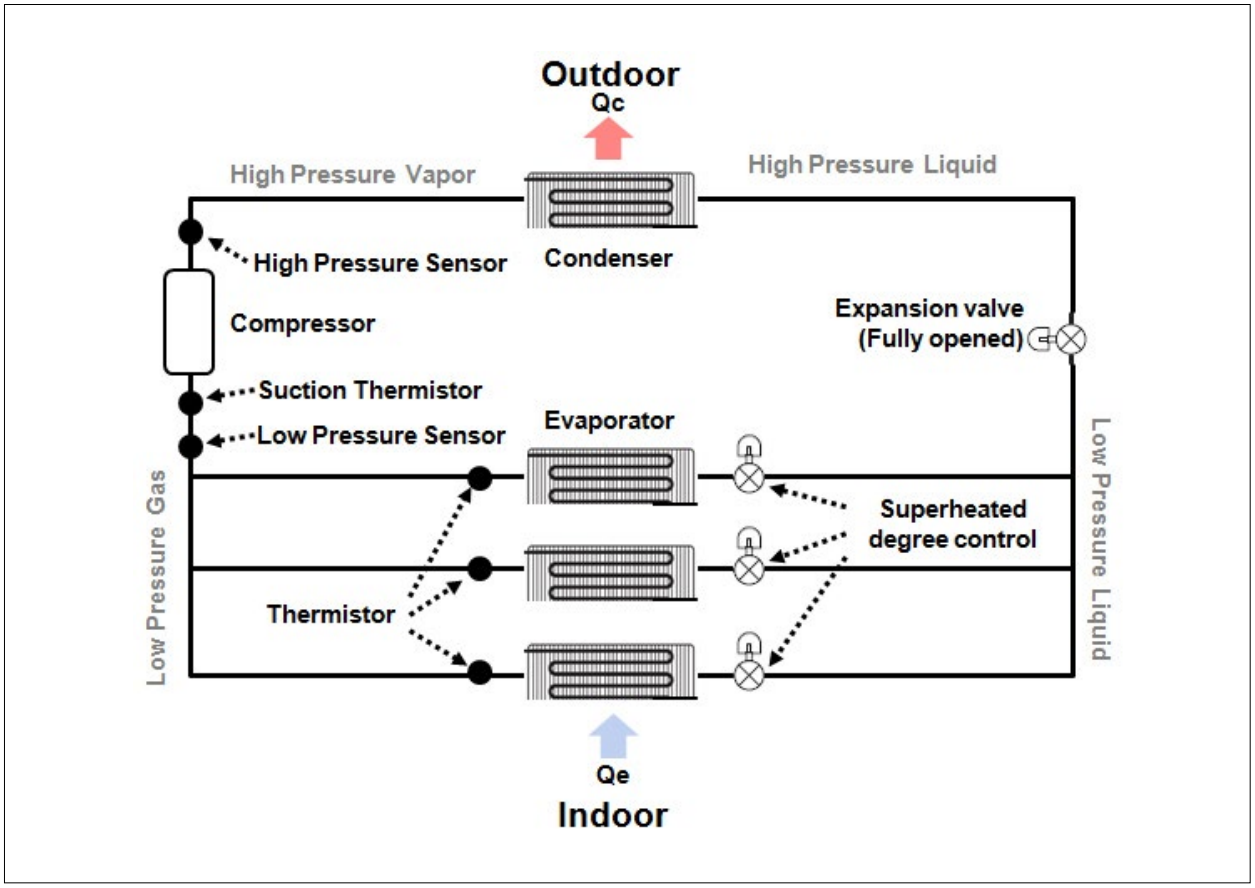
7-3 Functions (cont.)

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.

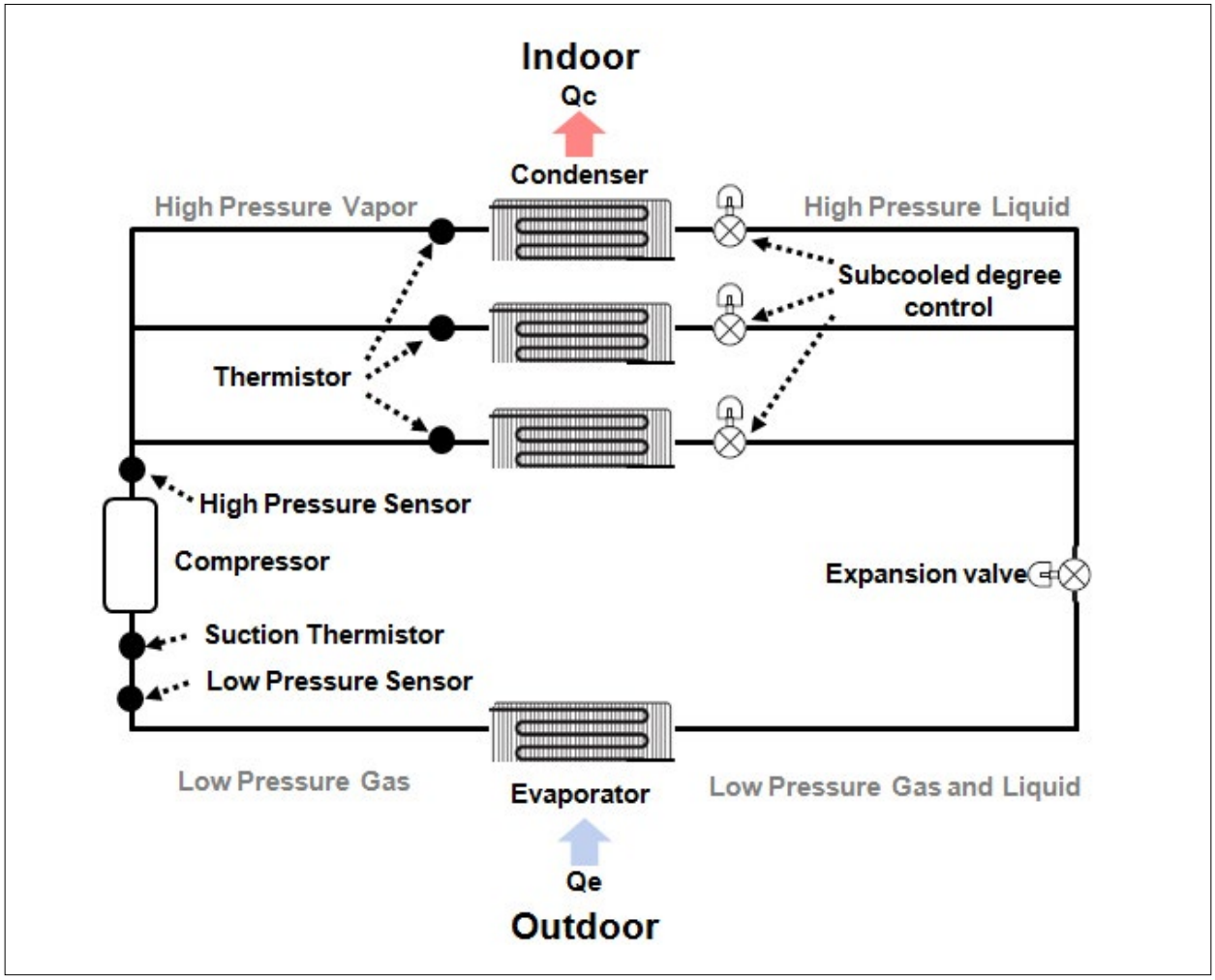
7-3 Functions (cont.)

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

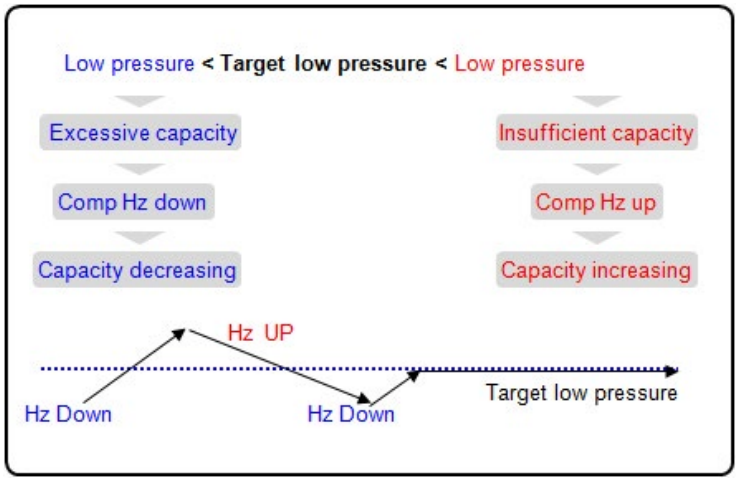
7-3-2-1 Actuator

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.



▪ 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/cm^2,g
- Setting for target avg. evap in = ODU option setting

7-3 Functions (cont.)

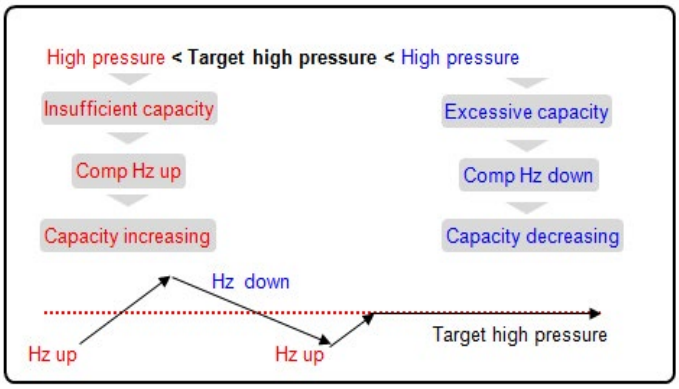
7-3-2 Control (cont.)

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

Compressor – Capacity control

▪ **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 30.0 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/cm²,g)
Main	0	2	0	0	30 (default)
			0	1	25
			0	2	26
			0	3~7	27~32
			0	8	33

7-3 Functions (cont.)

7-3-2 Control (cont.)

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

Compressor – Module capacity control

▪ **Purpose**

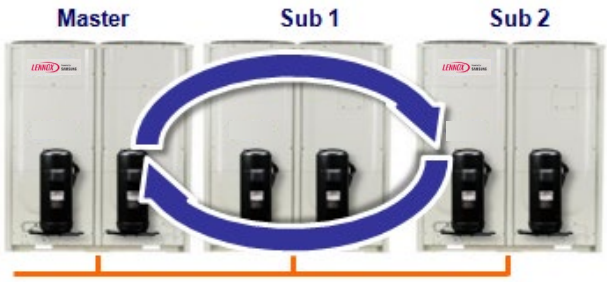
Improve efficiency through appropriate capacity distribution among units.
Maximize the lifespan through equalization of the duration of operation among outdoor units.

▪ **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 defrosting operation, 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.

Example) If required capacity = 80kW

	Master unit		Sub 1 unit	
Compressor	Comp 1(66cc)	Comp 2(66cc)	Comp 1(52cc)	Comp 2(52cc)
Module Capacity[kW]	80*22HP/(22HP+16HP) = 46.32		80*16HP/(22HP+16HP) = 33.68	
Comp Capacity [kW]	23.16	23.16	16.84	16.84
Frequency	67hz	67hz + α	62hz	62hz + α

7-3 Functions (cont.)

7-3-2 Control (cont.)

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

Outdoor Fan Motor

▪ **Purpose**

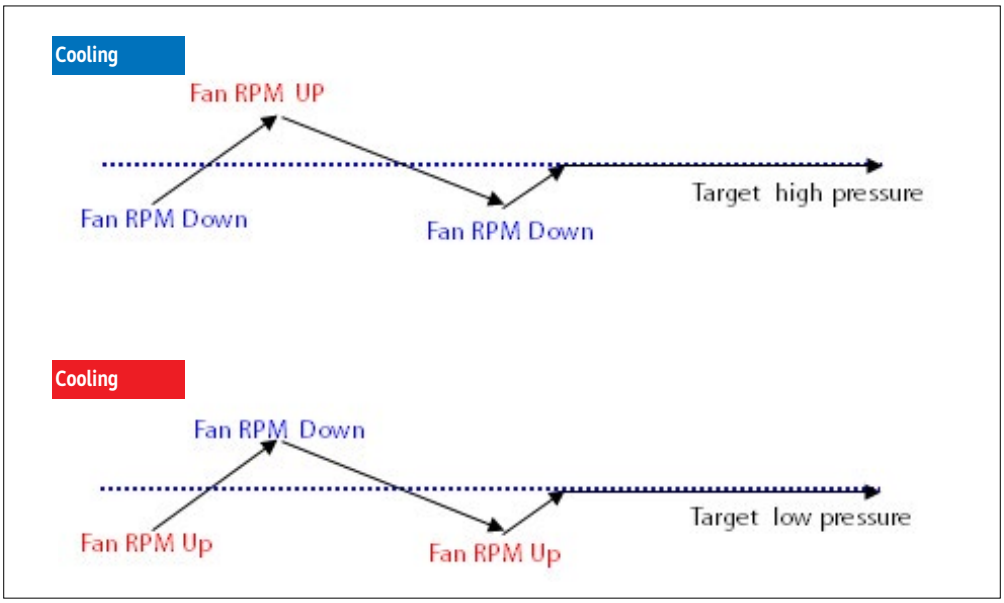
Improve efficiency in cooling mode, facilitate circulation of refrigerant, and minimize frost formation in heating mode by controlling the fan.

▪ **Concept**

The fan RPM is regulated through PD control to enable operation according to the target high pressure in cooling mode.
The fan RPM is regulated through PD control to enable operation according to the target low pressure in heating mode.

▪ **Control specifications in detail**

Control the fan RPM by assuming the target pressure. In case of cooling operation, control RPM by assuming the target high pressure. In case that the high pressure is higher than the target pressure, raise the Fan RPM on the assumption that condensation is not enough. In case that the high pressure is lower that the target pressure, lower the Fan RPM on the assumption that condensation is excessive. The target pressure is as in the table.
In case of heating operation, control RPM by assuming the target low pressure. In case that the low pressure is higher than the target pressure, lower the Fan RPM on the assumption that the evaporating power is excessive. In case that the low pressure is lower than the target pressure, raise the Fan RPM on the assumption that the evaporating power is not enough. The target pressure is as in the table.
The target pressure is changed according to the value optimized to the outdoor temperature.



7-3 Functions (cont.)

7-3-2 Control (cont.)

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

Electronic Expansion Valve – Main (Main EEV)

▪ **Purpose**

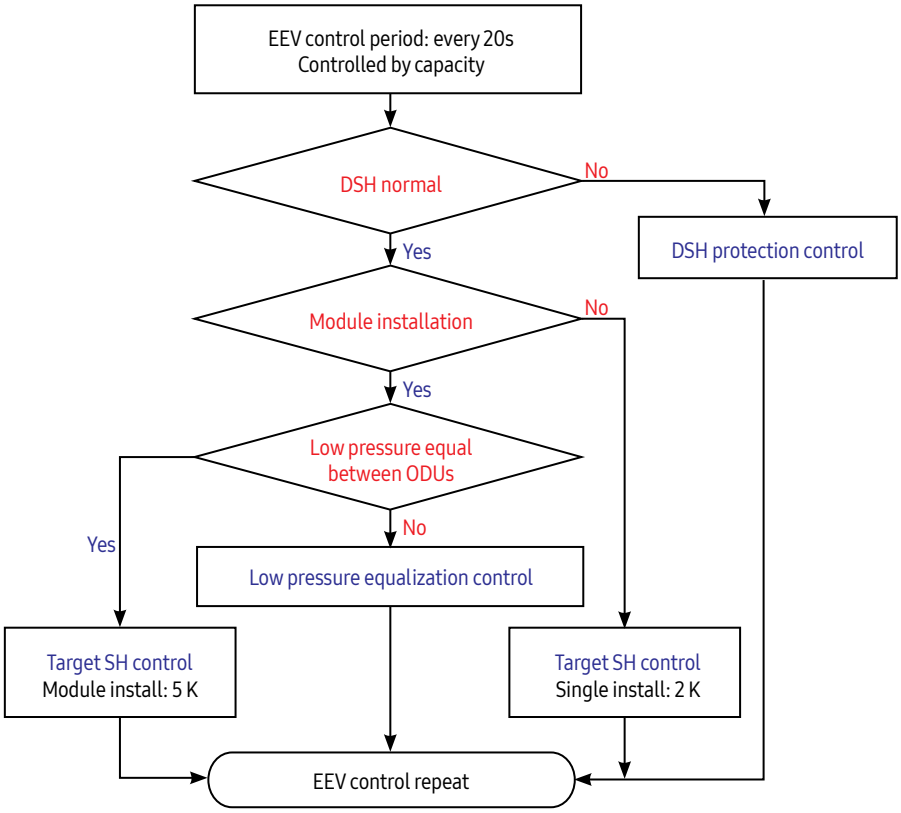
Control the EEV to adjust the refrigerant flow according to the amount of heat exchanged by the outdoor heat exchanger in heating mode.

▪ **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.
In case of installing a module for SH control, control SH at 5 K considering possible unbalance with the excessive state during outdoor period and control it at 2 K in case of installing a unit.



7-3 Functions (cont.)

7-3-2 Control (cont.)

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

Electronic Expansion Valve – EVI (EVI EEV)

▪ **Purpose**

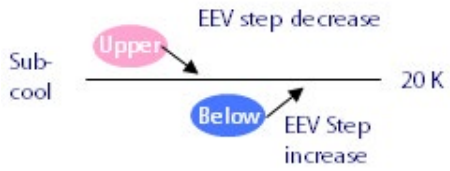
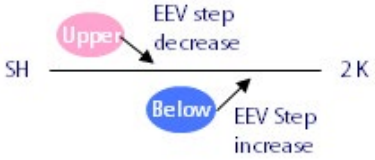
Control the EVI EEV to secure a subcooling degree in cooling mode.
Control the EVI EEV to optimize the performance in heating mode.

▪ **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.

<table>
<tr><th>EVI mode</th><th>Cooling</th><th>Heating</th></tr>
<tr><td>EVI Bypass mode</td><td rowspan="2">▪ Sub-cooling control: 20 K
(High pressure Saturated temp. – Liquid tube temp.)
 
</td><td>▪ SH control
1. EVI Out – EVI In temp. › 10 K (priority)
2. Tdis = 90℃</td></tr>
<tr><td>EVI On mode</td><td>▪ (EVI out temp. – EVI in temp.) control: 2 K
 
</td></tr>
<tr><td>Remark</td><td colspan="2">※ If comp discharge temp. is abnormally high, open EVI EEV to decrease the discharge temperature.</td></tr>
</table>

7-3 Functions (cont.)

7-3-2 Control (cont.)

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

Solenoid Valve – EVI, Solenoid Valve - EVI Bypass

▪ **Purpose**
Switch between EVI Bypass Mode, EVI On Mode, and EVI Off Mode, depending on the EVI EEV status.

▪ **Concept**
- Solenoid valve – EVI: When Vapor/Flash Injection is in use, the valve is closed to let refrigerant flow into the compressor.
- Solenoid valve - EVI Bypass: If a compressor has stopped, the valve is closed to prevent the refrigerant that has passed through the EVIEEV from flowing into the compressor.

▪ **Control specifications in detail**
Control valves according to the EVI Mode, as shown below.

EVI Mode	Electronic Expansion Valve - EVI	Solenoid valve - EVI	Solenoid valve - EVI Bypass	* Condition
EVI Bypass mode	Open	Open	Open	Normal Operation
EVI On mode	Open	Open	Close	- All comp. in unit 70hz ↑ - Ambient Temp. < 36℃ (cool) < 10℃ (heat) - Control by unit
EVI Off mode	Close	Open	Open	- Safety start - Defrost

Solenoid Valve - Hot Gas Bypass

▪ **Purpose**
Protect the system when high pressure is abnormally high or low pressure is abnormally low.

▪ **Concept**
If either pressure is abnormal, the valve is opened to bypass the high-pressure gas to the low pressure pipe.
This will change the pressure.

▪ **Control specifications in detail**
ON if high pressure is above 39.5kgf/cm2,g / OFF if below 38.5kgf/cm2,g
ON if cooling low pressure is below 3.2kgf/cm2,g / OFF if above 4.2kgf/cm2,g (at minimum frequency, OFF if above 6.0kgf/cm2,g)
ON if cooling low pressure is below 0.9kgf/cm2,g / OFF if above 1.7kgf/cm2,g

Solenoid Valve - Hot Gas Bypass 2

▪ **Purpose**
Prevent refrigerant from stagnating in the high pressure gas pipe in cooling-only mode.

▪ **Concept**
- In cooling-only mode, the valve is opened to switch the high pressure gas pipe to the low pressure gas pipe.
- If the valve is closed, refrigerant stagnates in the high pressure gas pipe causing a lack of refrigerant.
- HR Only

▪ **Control specifications in detail**
If using the Heat Recovery device, the valve is opened (ON) after cooling-only mode has been on for more than 20 minutes or when cooling oil return mode is active.

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)

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℃ 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℃ 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

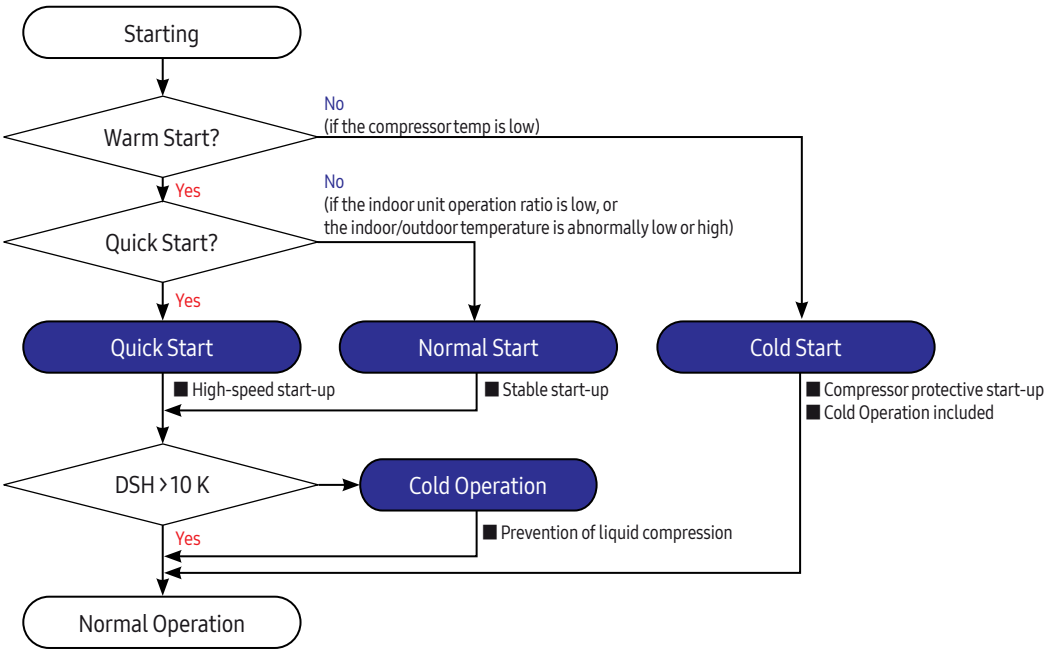
▪ Purpose

- 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:
  Min { Max(Tdis_comp1, Ttop_comp1), Max(Tdis_comp2, Ttop_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**

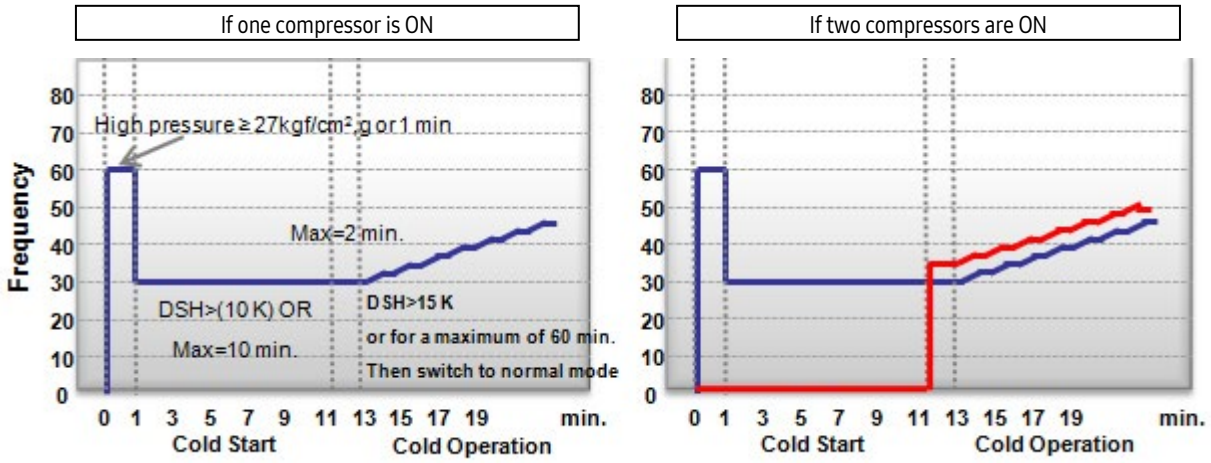
- A low start-up frequency is used to protect the compressors from liquid compression as well as poor lubrication due to oil foaming.
- After the Cold Start process, Cold Operation mode is on for a maximum of 60 minutes to decrease the compressor frequency increase speed until DSH is secured. This prevents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

▪ **Control specifications in detail**

- Condition(s) required to enter Cold Start mode: [(A or B) & C & D]

A. Max (Ttop, Tdis) – Tair < 15 K
B. Max (Ttop, Tdis) < 30℃
C. Less than 12 hours after the power supply
D. Cooling: Ambient temp < 30℃ , Heating: Ambient temp < 20℃

- 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.)

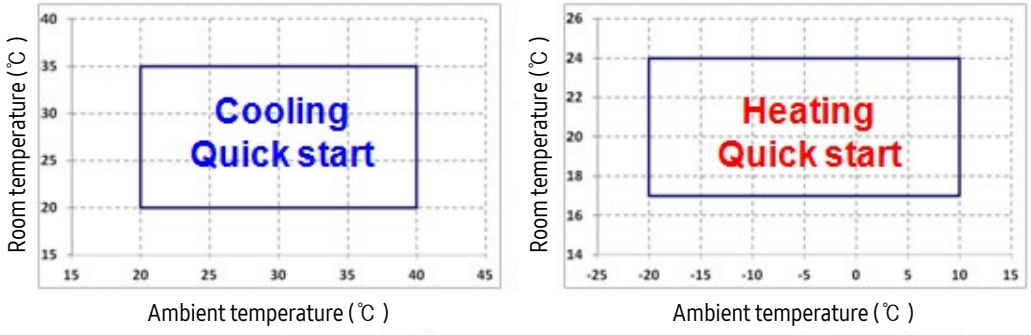
7-3-2-2 Start-up modes (cont.)

Safety Start – Quick Start

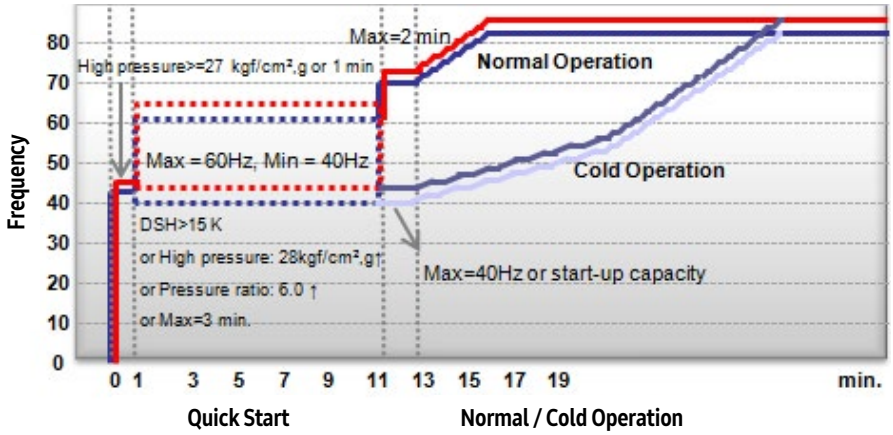
▪ **Purpose**
Enable high-speed cooling and heating through quick start-up

▪ **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℃
- 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.)

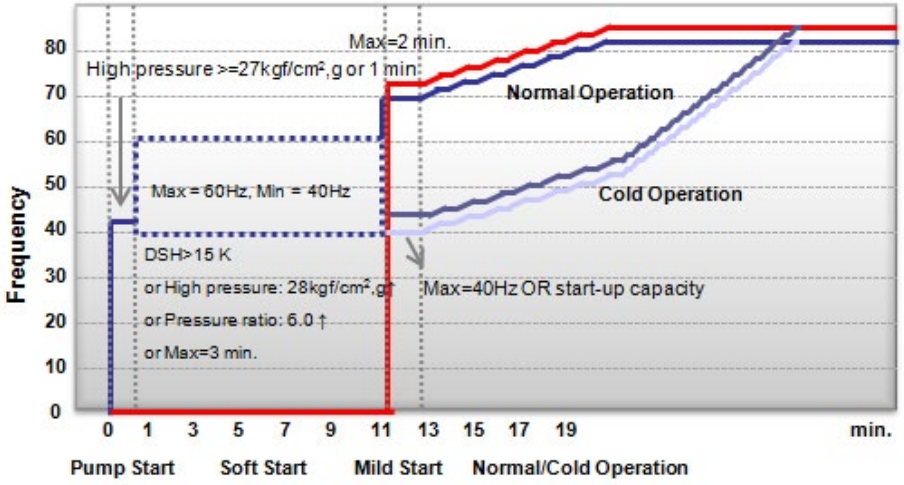
7-3-2-2 Start-up modes (cont.)

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℃
- 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/cm2,g)
		Range	14~140Hz
Outdoor Fan Motor	OFM	Operation	Target high pressure control (default: 25kgf/cm2,g)
		Range	0-39step (0-1300rpm)
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_a > 38℃ or 50Hz ↓ Off (Close): T_a < 36℃ ↓ and 70Hz ↑
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 (HR Only)	V_HG2	Operation	On (Open)
Solenoid Valve – Main EEV (HR Only)	V_ME	Operation	On (Open)
Solenoid Valve – Main Cooling (HR Only)	V_MC	Operation	Off (Close)

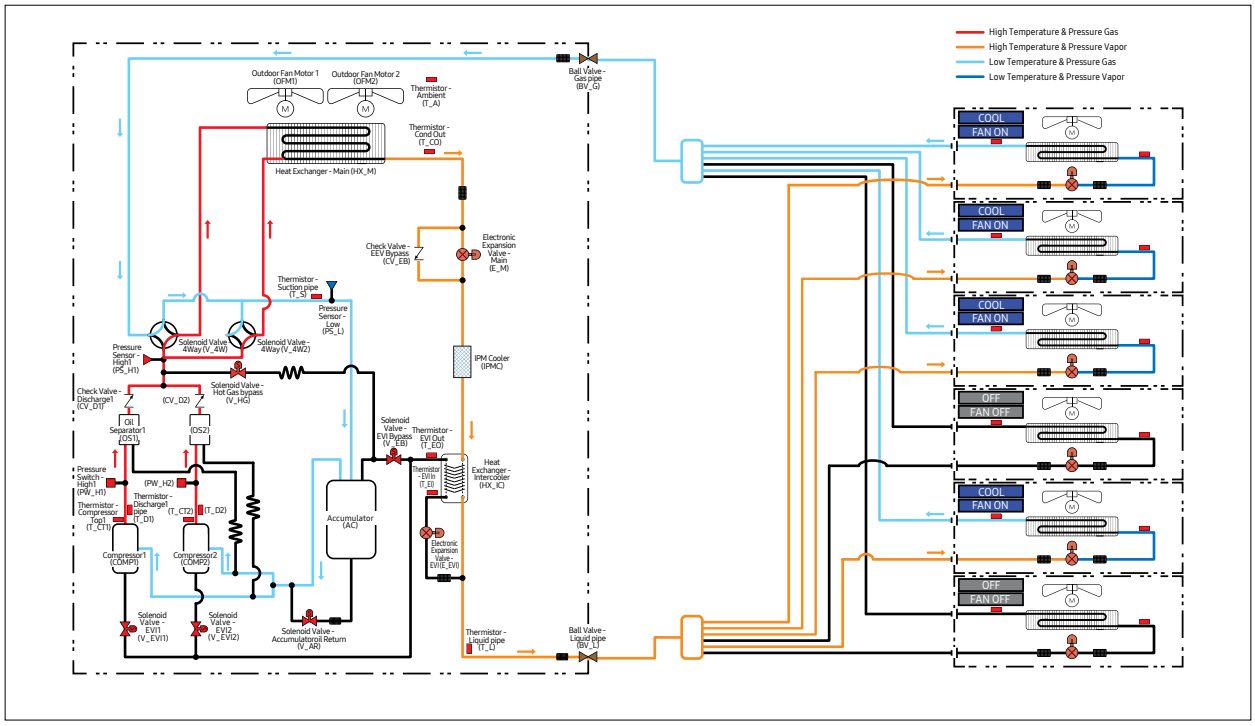
7-3 Functions (cont.)

7-3-2 Control (cont.)

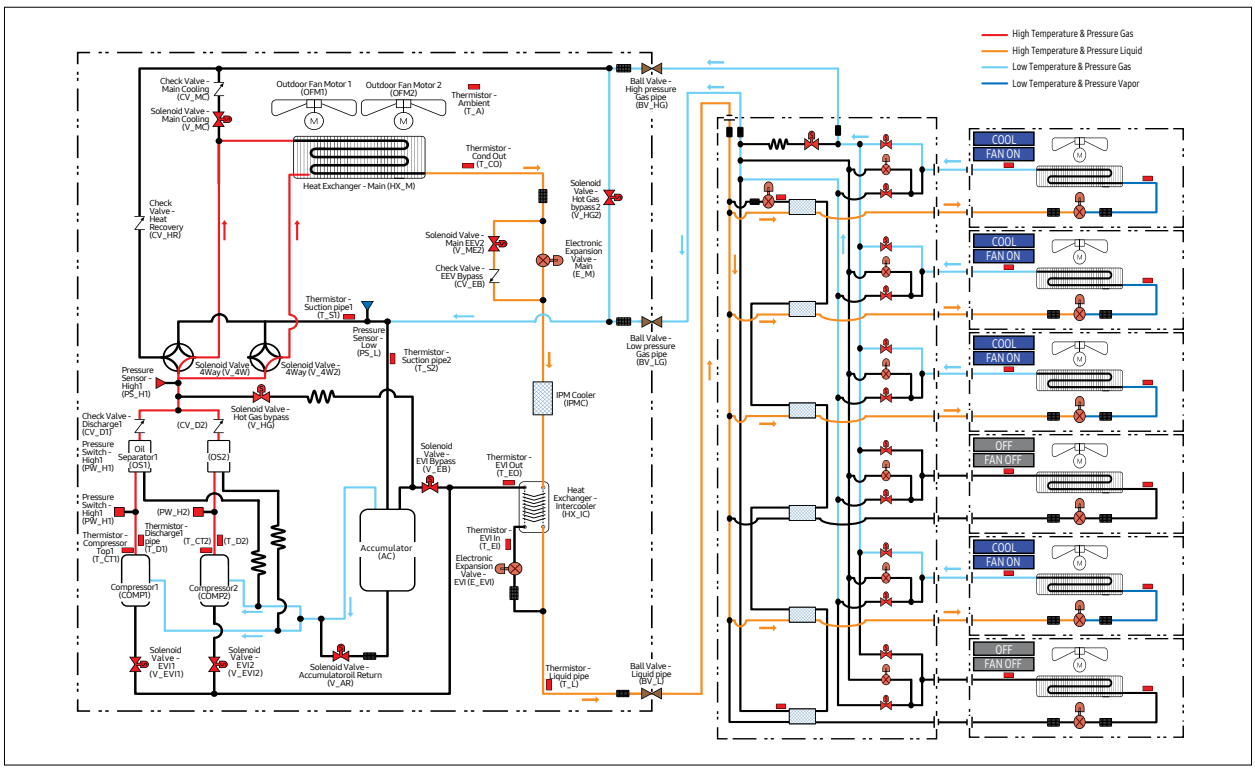
7-3-2-3 Normal operation modes (cont.)

▪ **Refrigerant Flow**

Heat pump



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 low pressure control (default: 8kgf/cm2,g)
		Range	14~140Hz
Outdoor Fan Motor	OFM	Operation	Target high pressure control (default: 25kgf/cm2,g)
		Range	0-39step (0-1300rpm)
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_a > 38℃ or 50Hz ↓ Off (Close): T_a < 36℃ ↓ and 70Hz ↑
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 (HR Only)	V_HG2	Operation	On (Open)
Solenoid Valve – Main EEV (HR Only)	V_ME	Operation	On (Open)
Solenoid Valve – Main Cooling (HR Only)	V_MC	Operation	Off (Close)

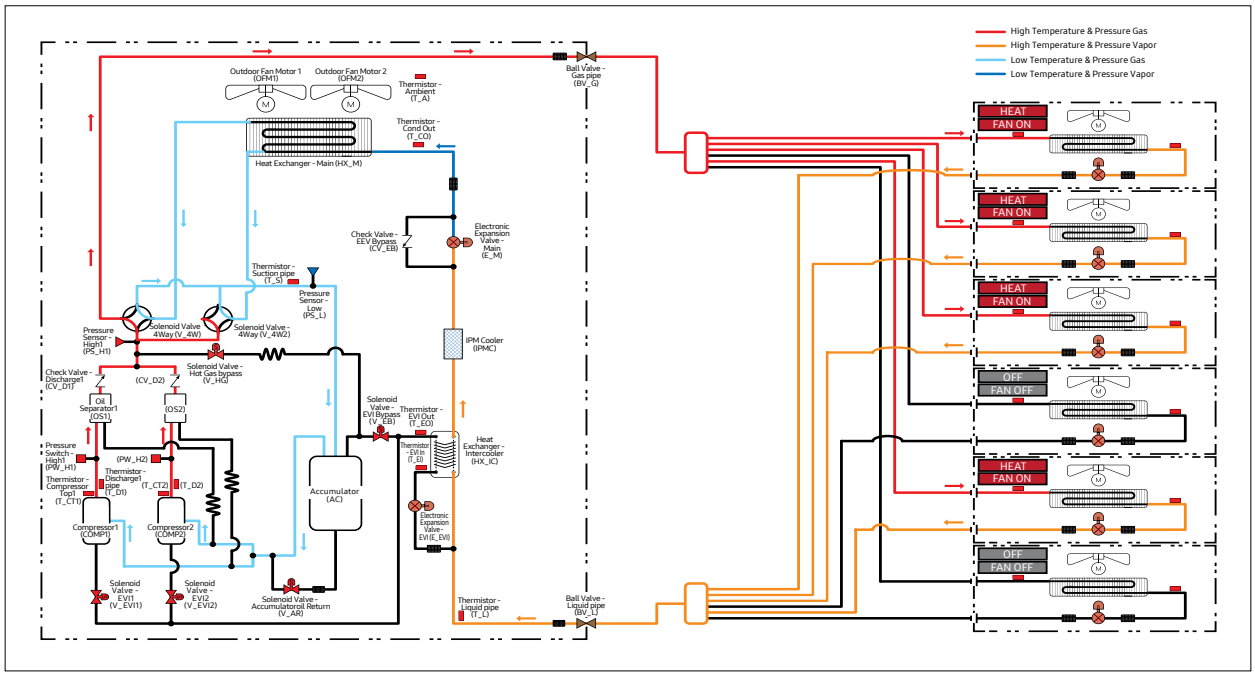
7-3 Functions (cont.)

7-3-2 Control (cont.)

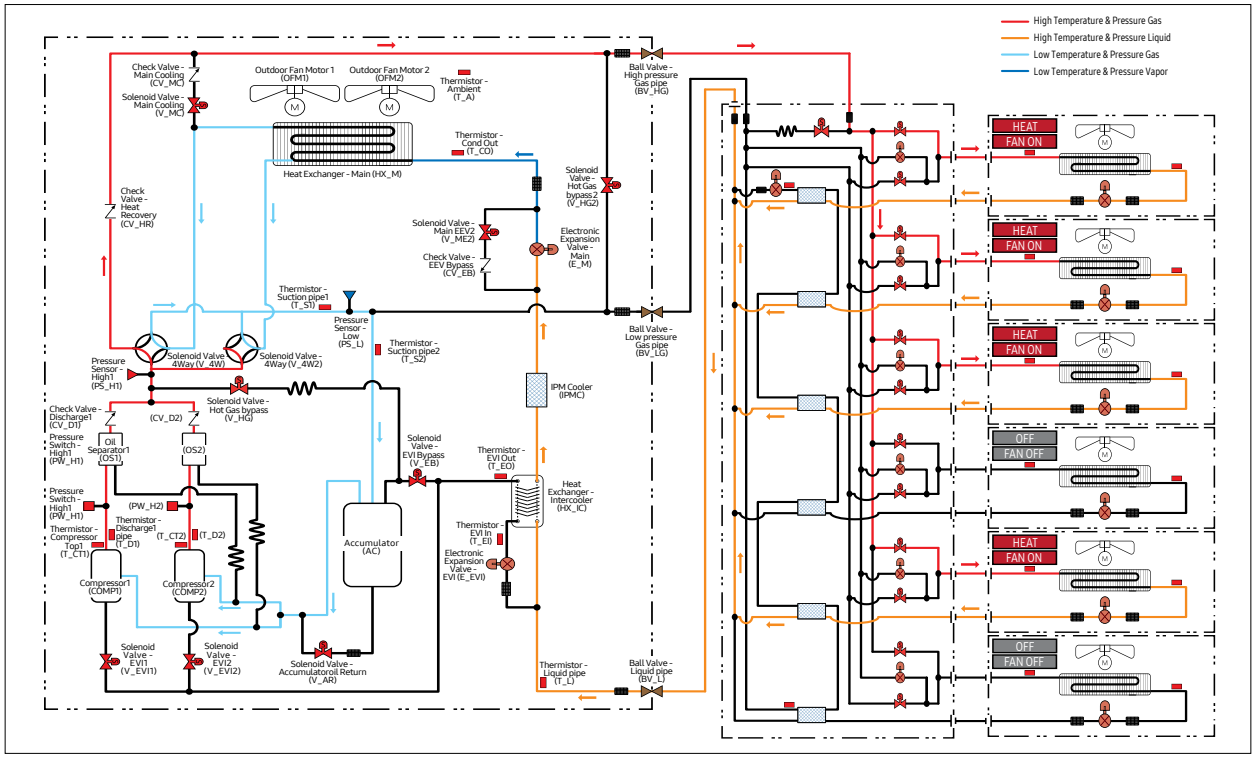
7-3-2-3 Normal operation modes (cont.)

▪ **Refrigerant Flow**

Heat pump



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**

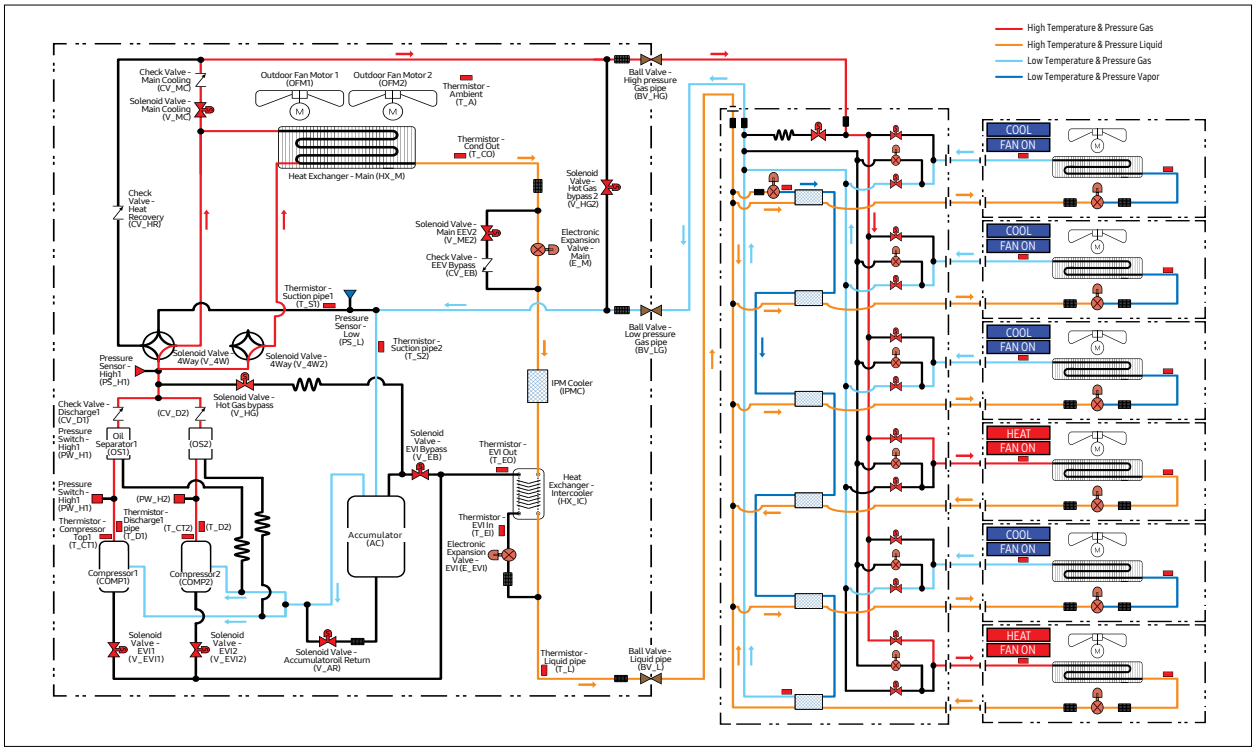
Actuator	-		Main Cooling
Compressor	COMP	Operation	Target low pressure control
			(default: 8kgf/cm2,g)
		Range	14~140Hz
Outdoor Fan Motor	OFM	Operation	Target high pressure control
			(default: 25kgf/cm2,g)
		Range	0-39step (0-1300rpm)
Electronic Expansion Valve – Main (Main EEV)	E_M	Operation	Cooling & Heating
			capacity balance control
		Range	300-2000step
Electronic Expansion Valve – EVI (EVI EEV)	E_EVI	Operation	*Subcooling control
			(default: SC 20 K)
		Range	0-480step
Solenoid Valve - 4way	V_4W	Operation	Off
Solenoid Valve – EVI Bypass	V_EB	Operation	On (Open):
			* T_a > 38℃ or 50Hz ↓
			Off (Close):
			T_a < 36℃ ↓ and 70Hz ↑
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 (HR Only)	V_HG2	Operation	Off (Close)
Solenoid Valve – Main EEV (HR Only)	V_ME	Operation	Off (Close)
Solenoid Valve – Main Cooling (HR Only)	V_MC	Operation	On (Open)

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

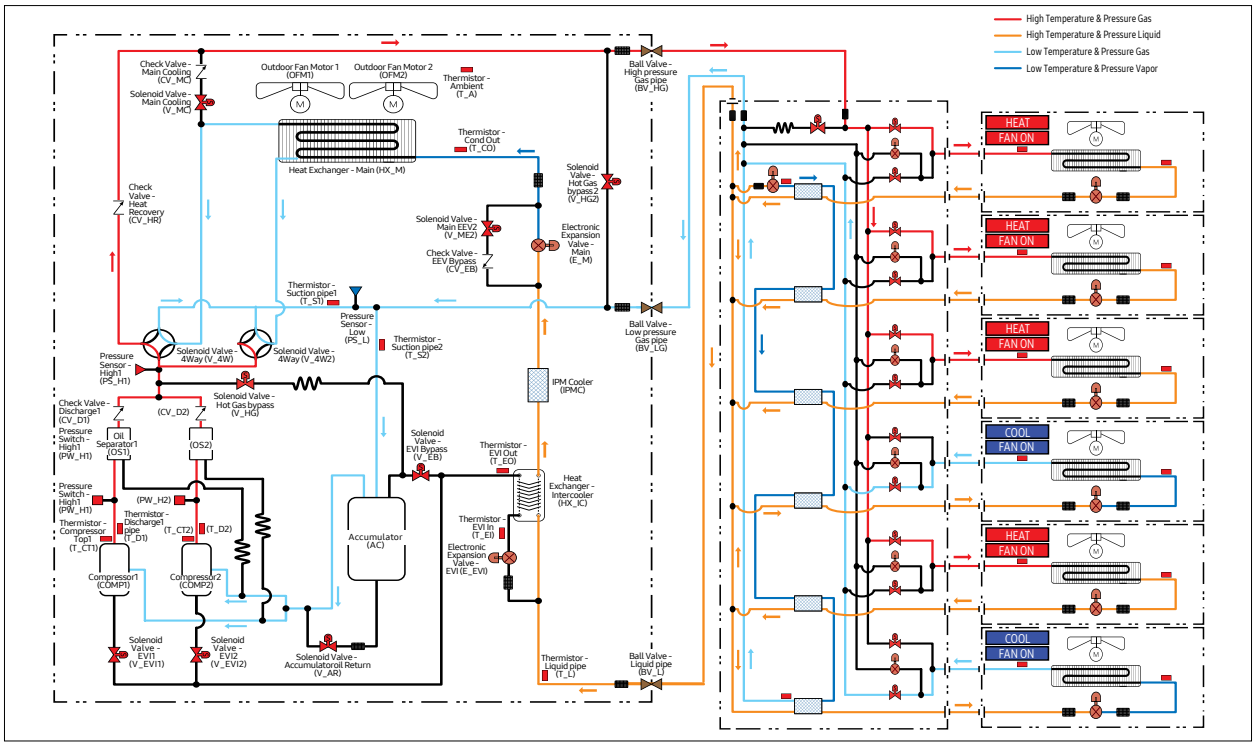
Actuator	-		Main Heating
Compressor	COMP	Operation	Target high pressure control (default: 30kgf/cm2,g)
		Range	20-160Hz
Outdoor Fan Motor	OFM	Operation	Target low pressure control (default: 7.5-8.7kgf/cm2,g)
		Range	0-39step (0-1300rpm)
Electronic Expansion Valve – Main (Main EEV)	E_M	Operation	*Superheat control (default: SH 2 K)
		Range	125-2000step
Electronic Expansion Valve – EVI (EVI EEV)	E_EVI	Operation	* EVI Superheat control (default: SH 2 K)
		Range	0-480step
Solenoid Valve - 4way	V_4W	Operation	On
Solenoid Valve – EVI Bypass	V_EB	Operation	On (Open): T_a > 15℃ or 50Hz ↓ Off (Close): T_a < 10℃ and 70Hz ↑
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 (HR Only)	V_HG2	Operation	Off (Close)
Solenoid Valve – Main EEV (HR Only)	V_ME	Operation	Off (Close)
Solenoid Valve – Main Cooling (HR Only)	V_MC	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

Defrost operation

▪ Purpose

Optimize the heating performance by removing frost from the outdoor heat exchangers in heating mode.

▪ Concept

- Heat exchangers are checked for frost formation based on the heat exchanger temperature (Cond out, Suction) and the heating duration.
- Cooling mode is on until the heat exchanger temperature (Cond out, Suction) reaches a specific level.
- If the heating duration indicates that defrost mode should start, the heat exchangers are checked for frost formation based on the electric current rise of the outdoor fans and then heating mode is on for a maximum of 18 hours (learning-based defrost)

▪ Control specifications in detail

- Criteria used to decide whether to use defrost mode include the heat exchanger temperature (Cond out, Suction) and the heating duration.
- Checking the heat exchanger temperature starts 30 minutes after Safety Start mode turns off. Defrost mode starts if the Cond out or Suction temperature of each outdoor unit is -5℃ or lower and there is a sufficient degree of difference between the outdoor temperature and the Cond out or Suction temperature.
- Checking the duration starts after Safety Start mode turns off. Defrost mode starts if the outdoor temperature is 0℃ or higher and heating mode has been on for 2 hours under the following condition: the Cond out temperature is lower than 2℃ and the low pressure is 6.2kgf/cm2,g or lower. Defrost mode can also start if the outdoor temperature is below 0℃ and heating mode has been on for 2 hours under the following condition: the low pressure is 6.2kgf/cm2,g or lower and there is a sufficient difference between the outdoor temperature and heat exchanger temperature.
- The learning-based defrost feature learns the electric current in the fan when there is no frost formation in 3-cycle heating mode. The feature extends subsequent defrost mode, started based on the heating duration, up to 18 hours if the electric current in the fan does not rise by 8% or more compared to the frost-free state .
- Condition(s) required to turn off defrost mode: Cond out temp ≥ 12℃ OR 15 min after defrost mode has started.

Actuator		Behavior during defrost mode
Compressor	Active unit	Depends on the outdoor unit capacity (86-110Hz)
	Inactive unit	Depends on the outdoor unit capacity (50-60Hz)
Outdoor EEV		Full open
Outdoor Fan		Starts with 0 step and controls cooling fans
Indoor EEV	Active unit	800 step
	Inactive unit	400 step
Indoor Fan		OFF (if using the HR device, model-based control is performed on cooling indoor units while in main heating mode)
Time		Maximum of 15 min

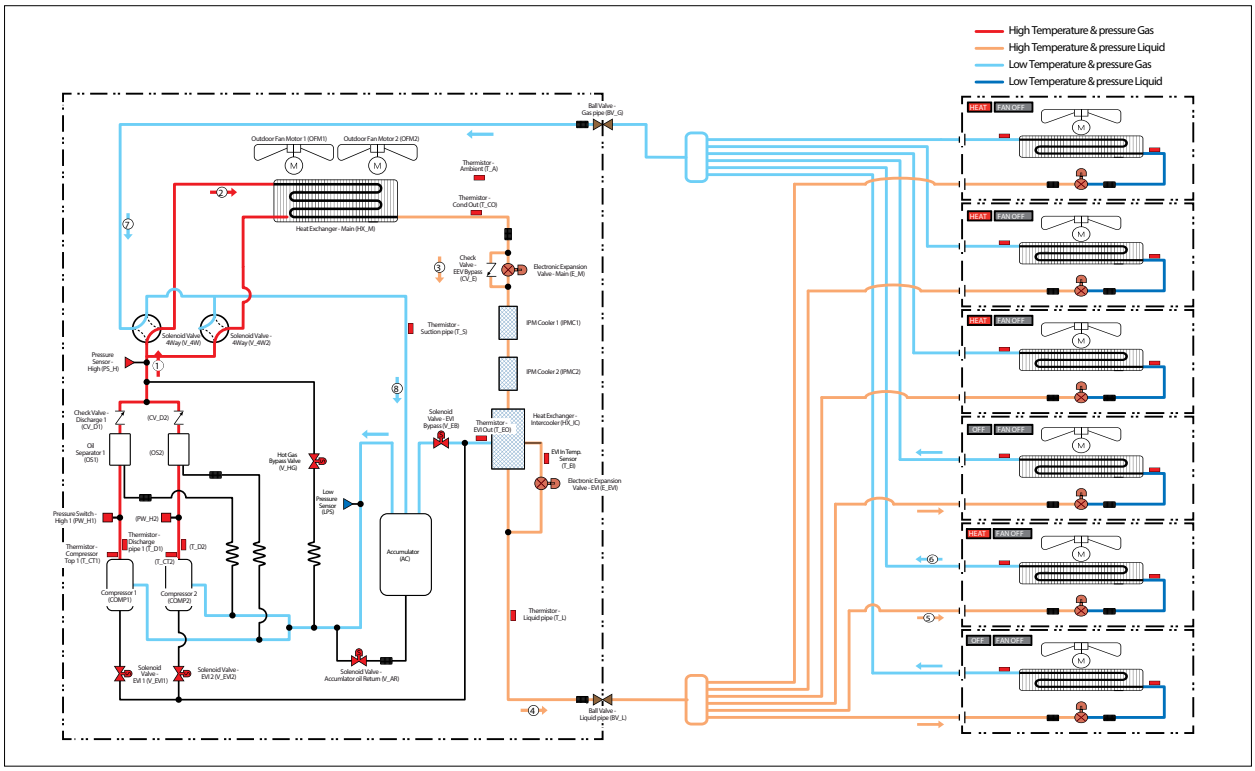
7-3 Functions (cont.)

7-3-2 Control (cont.)

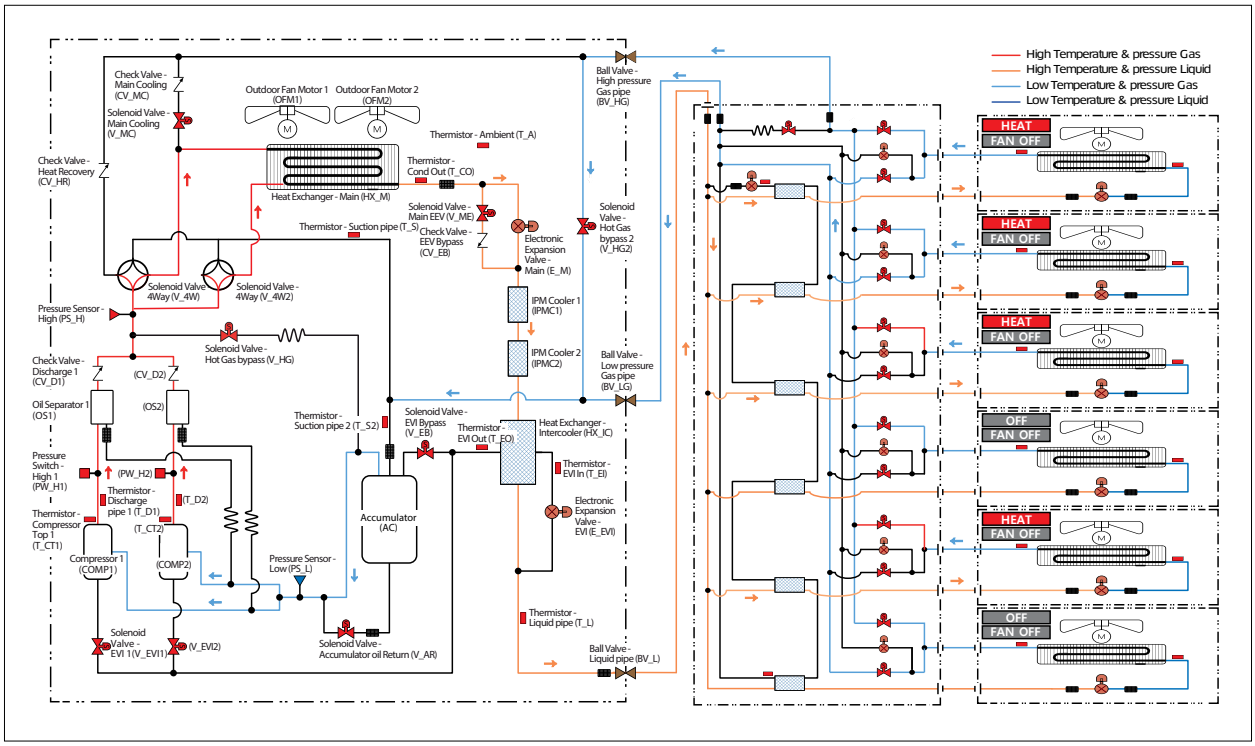
7-3-2-4 Special operation modes (cont.)

▪ Refrigerant Flow

Heat pump



Heat Recovery



7-3 Functions (cont.)

7-3-2 Control (cont.)

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

Rotation defrost operation

▪ Purpose

Activate defrost mode on module-installed HR outdoor units in sequential order to improve heating efficiency.

▪ Concept

- Defrost operation is performed on outdoor units in sequential order when main heating mode is active on HR outdoor units.
- If rotational defrost mode is used 3 times consecutively, defrost operation will be performed on all the outdoor units when defrost mode is turned on again.

▪ Control specifications in detail

- Enabled only when rotational defrost mode has been enabled by the Key option.
- Rotational defrost operation is performed in the following cases: two or more outdoor units are installed, the outdoor temperature is -5℃ or higher, rotational defrost has not been performed 3 times consecutively, the previous defrost mode was a general defrost, or the duration of rotational defrost < the quantity of indoor units x 10 min.
- For the sequence of rotational defrost, the order of priority for outdoor units is followed.
- For the temperature and time conditions required to enter defrost mode, the same conditions as general defrost mode are applied.
- Condition(s) required to turn off defrost mode: Cond out temp ≥ 15℃ OR 12 min after defrost mode has started.

Actuator			Outdoor units in defrost mode	Units not being in defrost mode
Compressor			Depends on the outdoor unit capacity (86-110Hz)	General control
Outdoor EEV			Full close	General control
Outdoor Fan			0 step	General control
HR EEV			Off	General control
Main cooling valve			ON	General control
Indoor EEV	Cooling indoor unit	Active unit	General control	
		Inactive unit	Required step for control of the superheat degree	
	Heating	Active unit	General control	
	Indoor unit	Inactive unit	General control on inactive units	
Indoor Fan	Cooling indoor unit	Active unit	General control	
		Inactive unit	Set fan speed	
	Heating	Active unit	Mid fan speed	
	Indoor unit	Inactive unit	Off	
Time			Maximum of 12 min	-

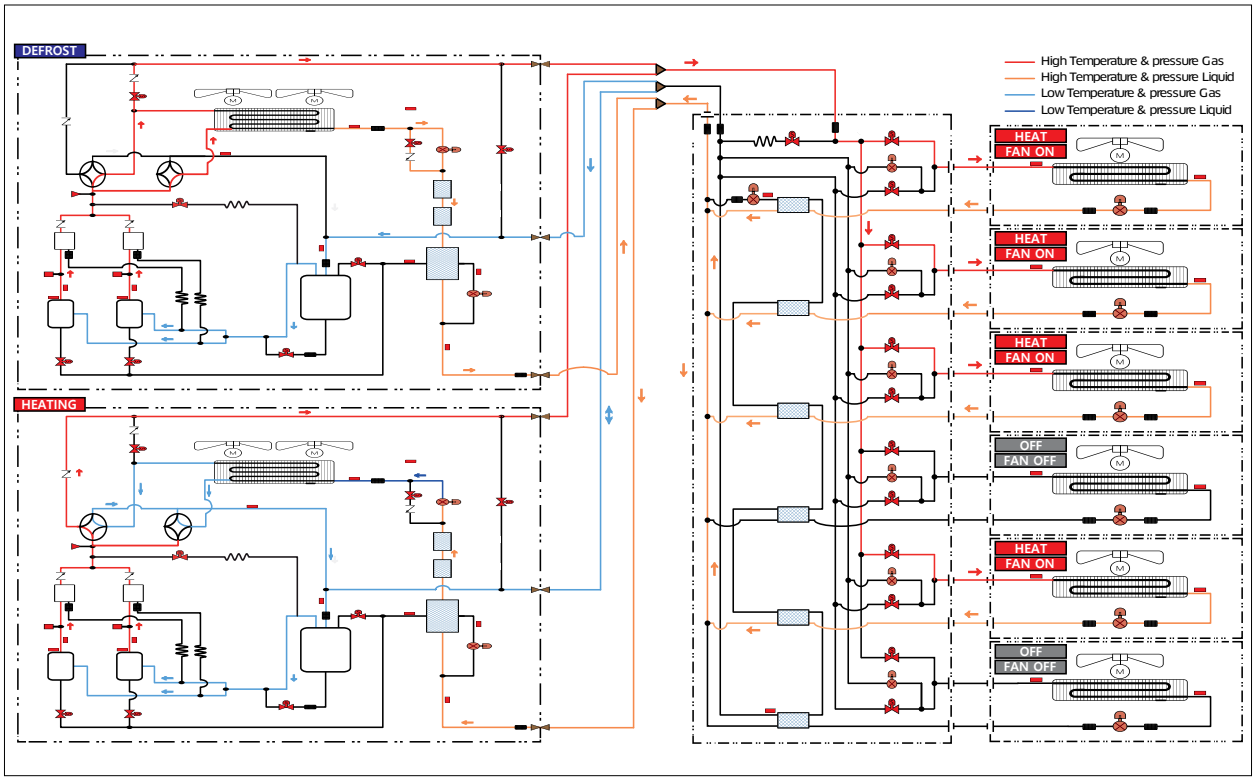
7-3 Functions (cont.)

7-3-2 Control (cont.)

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

▪ **Refrigerant Flow**

Heat pump



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). Once defrosting operation operate for more than 3 minutes during heating operation, it will be considered to have done oil collecting operation.
- 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
Outdoor Fan		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.

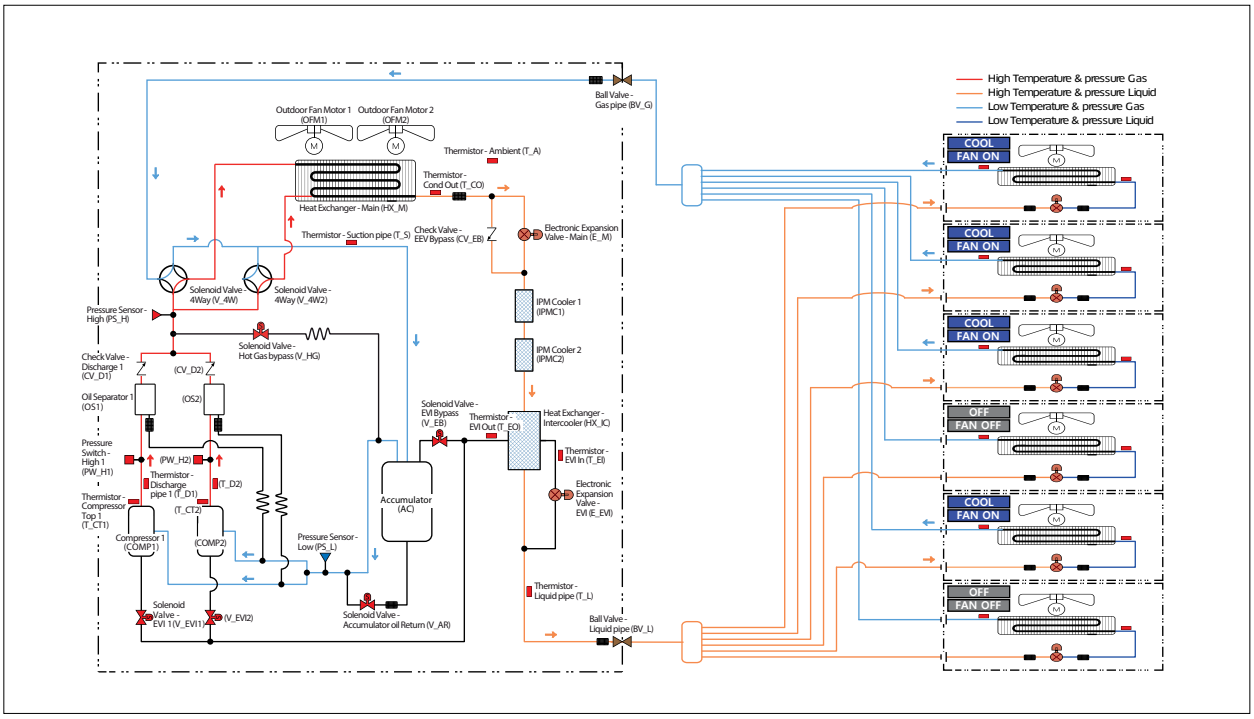
7-3 Functions (cont.)

7-3-2 Control (cont.)

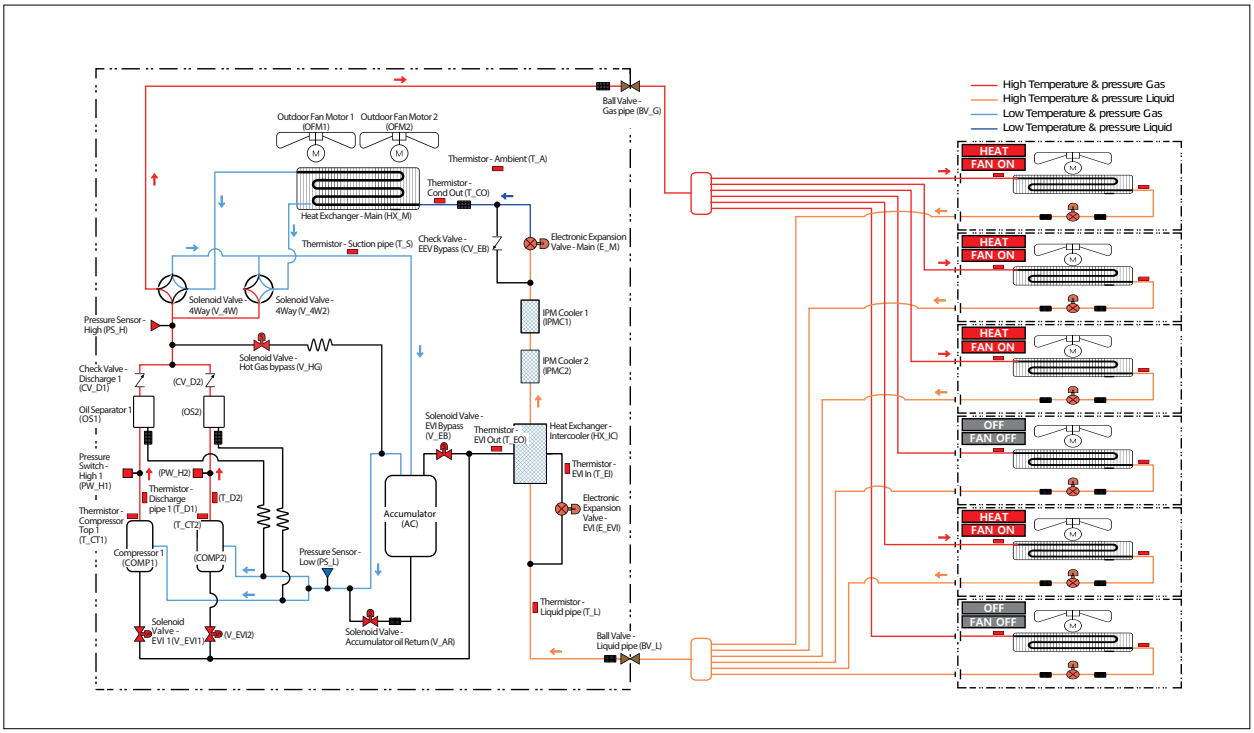
7-3-2-4 Special operation modes (cont.)

- **Refrigerant Flow**

Heat Pump - Cooling



Heat Pump - Heating



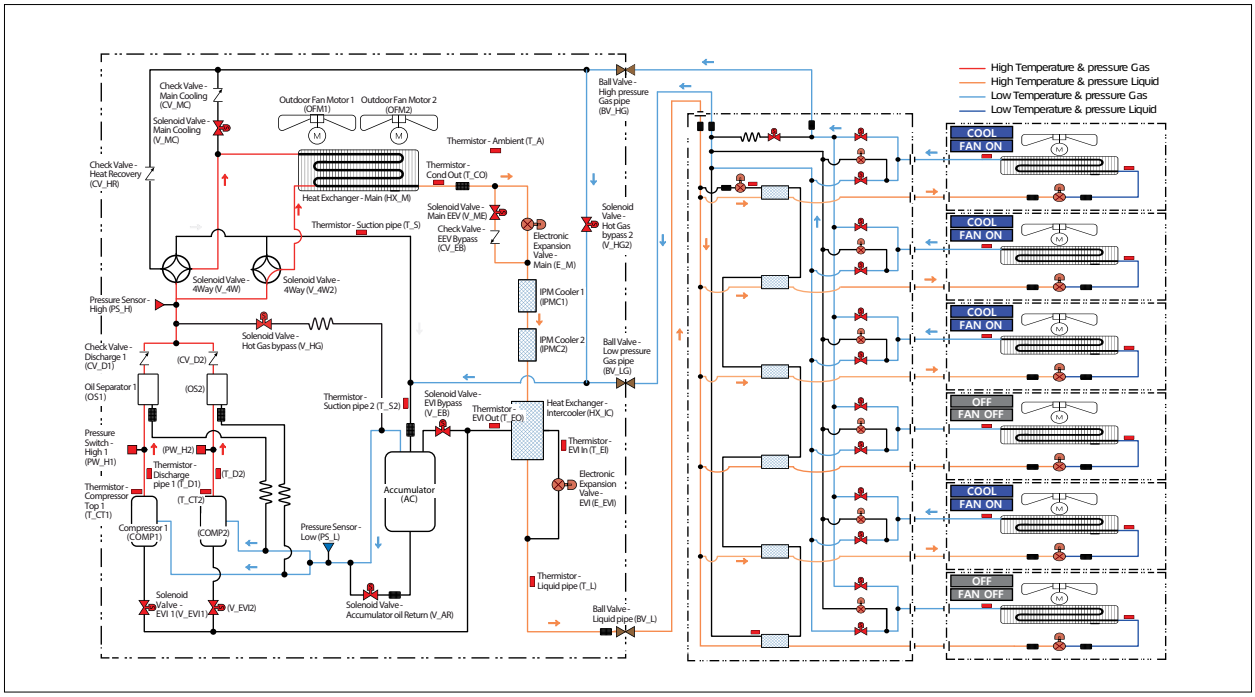
7-3 Functions (cont.)

7-3-2 Control (cont.)

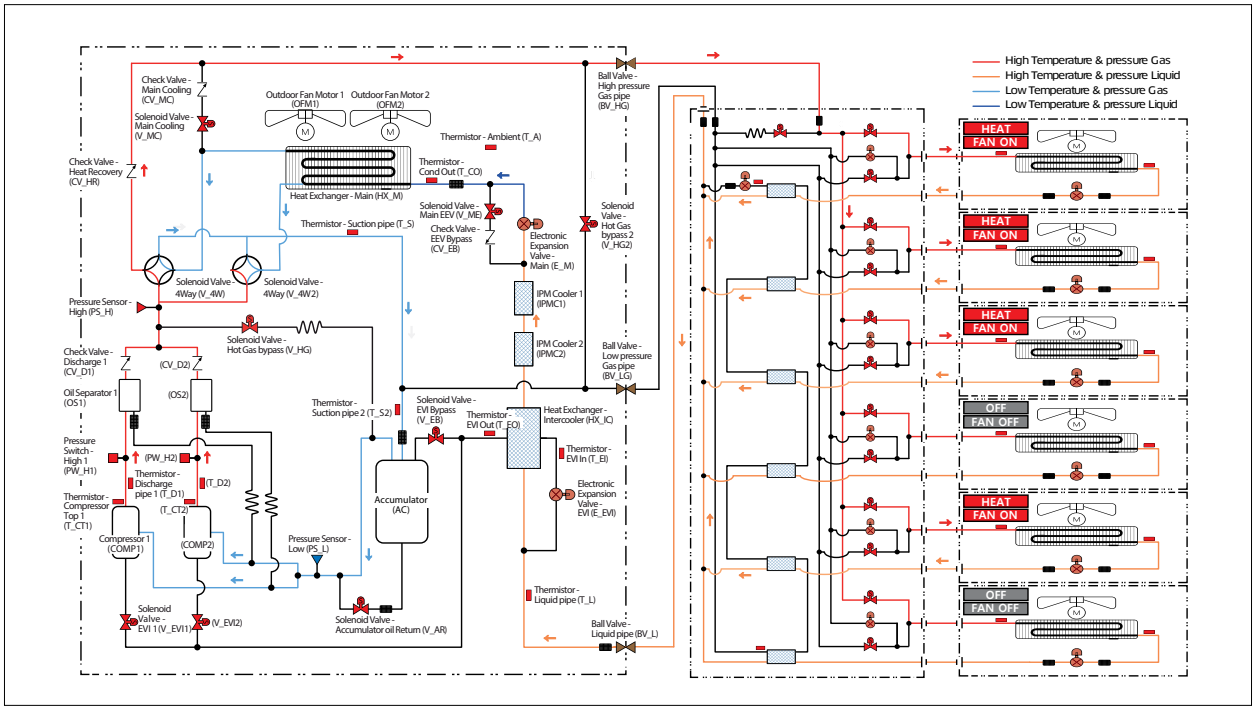
7-3-2-4 Special operation modes (cont.)

- **Refrigerant Flow**

Heat Recovery - Cooling



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**

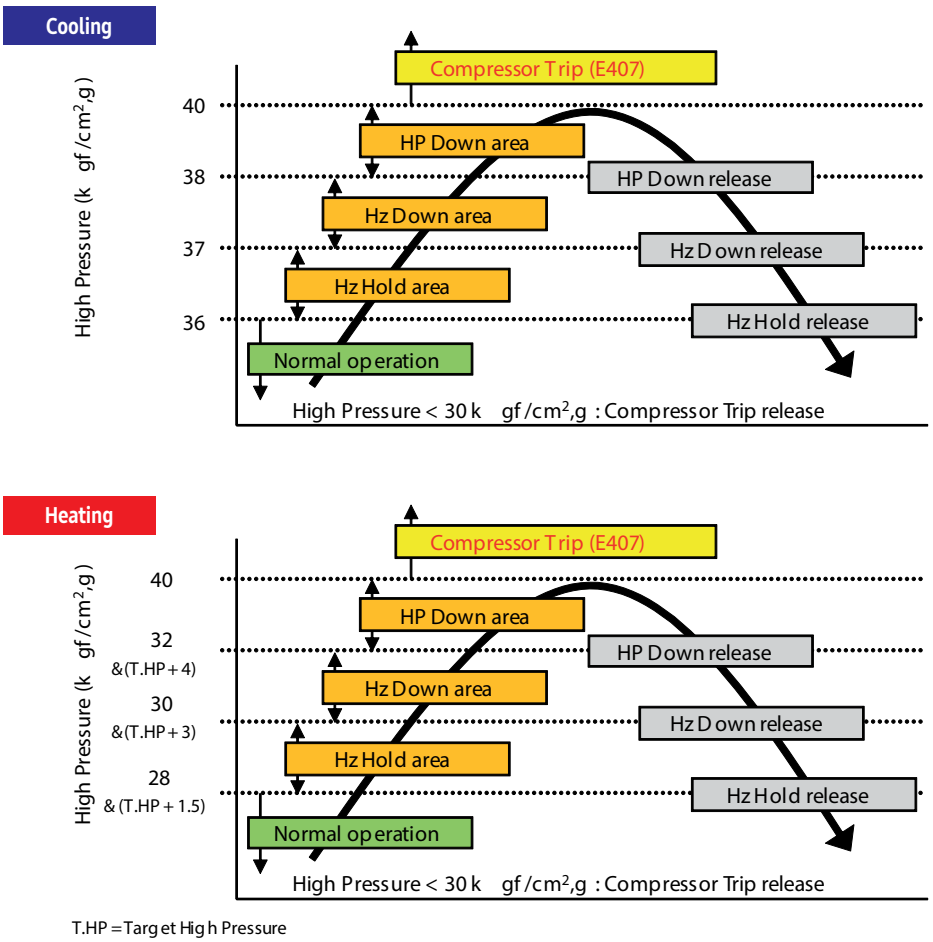
- The compressor operation frequency is controlled according to the high pressure, as shown below.

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).



T.HP = Target High Pressure

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.

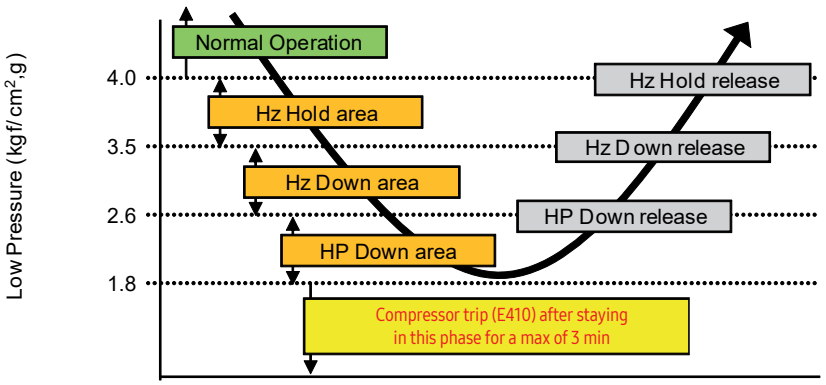
▪ Concept

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 high pressure.

▪ Control specifications in detail

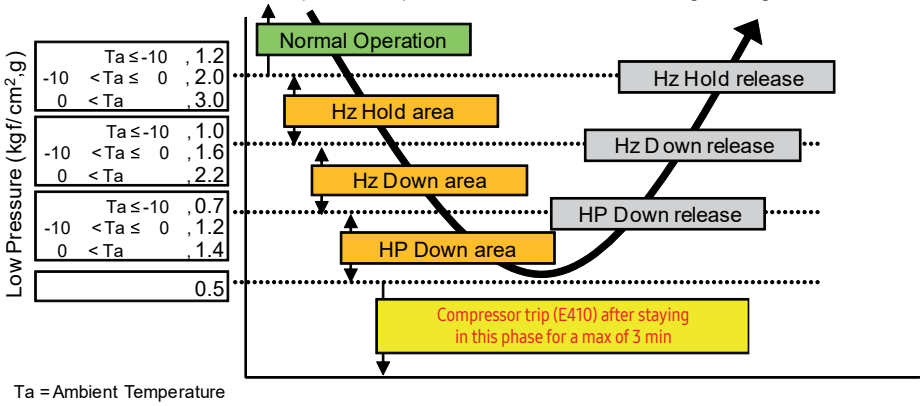
- Control of the operation frequency (see the chart in the previous page for pressure conditions.)
  - 1st step Hz hold: Fix the current frequency if the discharge temperature is higher than 70℃.
    (It is possible to lower the frequency)
  - 2nd step Hz down: Automatically lower the frequency by 5Hz at specified intervals if the discharge temperature is higher than 70℃.
  - 3rd step HP down: Automatically lower the frequency by 1Hz every second if the discharge temperature is higher than 70℃.
  - 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 or lower in cooling mode OR below 0.9kgf/cm2,g in heating mode.
  Close the valve if low pressure is 4.2kgf/cm2,g or higher in cooling mode OR if low pressure is 1.7kgf/cm2,g or higher in heating mode.
- Others
  If the outdoor 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 ambient temperature is 15℃ or lower, one of the Hz Hold through HP Down steps is activated if the low pressure is -1kgf/cm2,g.

Cooling



Heating

Compressor Trip release : Low Pressure > 3 kgf/cm²,g for 3 min



Ta = Ambient Temperature

7-3 Functions (cont.)

7-3-2 Control (cont.)

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

Compression ratio protection

▪ **Purpose**

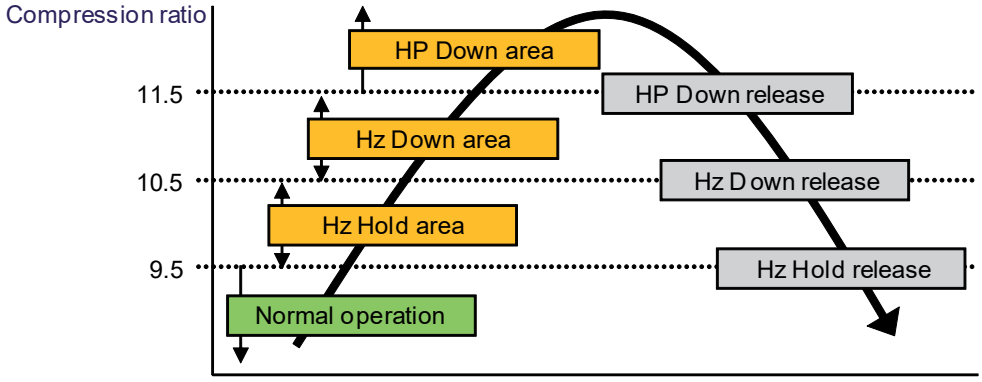
Prevent compressor damage due to abnormal operation.
Failure may occur due to an overload of compressors if the compression ratio is high.
Compressor failure may occur due to poor lubrication if the compression ratio is low.

▪ **Concept**

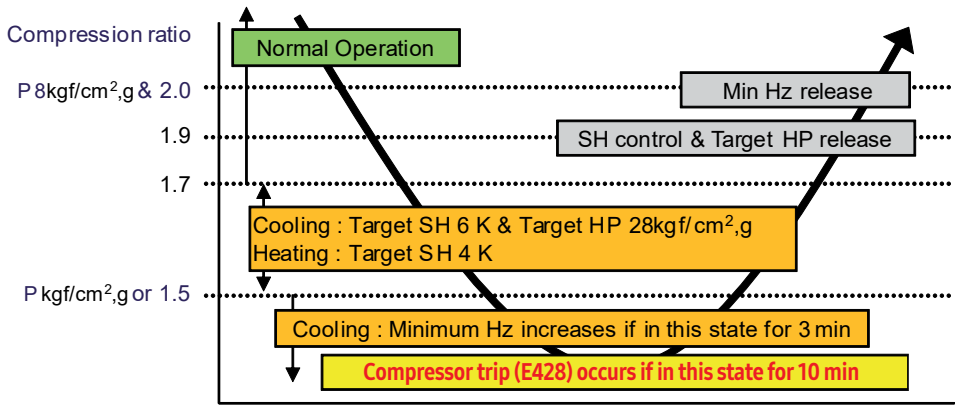
If the compression ratio is high, the compressor frequency is lowered to decrease the ratio.
If the compression ratio is low, the superheat degree for compressor suction is raised and the compressor frequency is increased. This will increase the compression ratio.
Compression ratio = (High Pressure(kgf/cm2,g) + 1.03) / (Low Pressure(kgf/cm2,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.



- 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).



P =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.

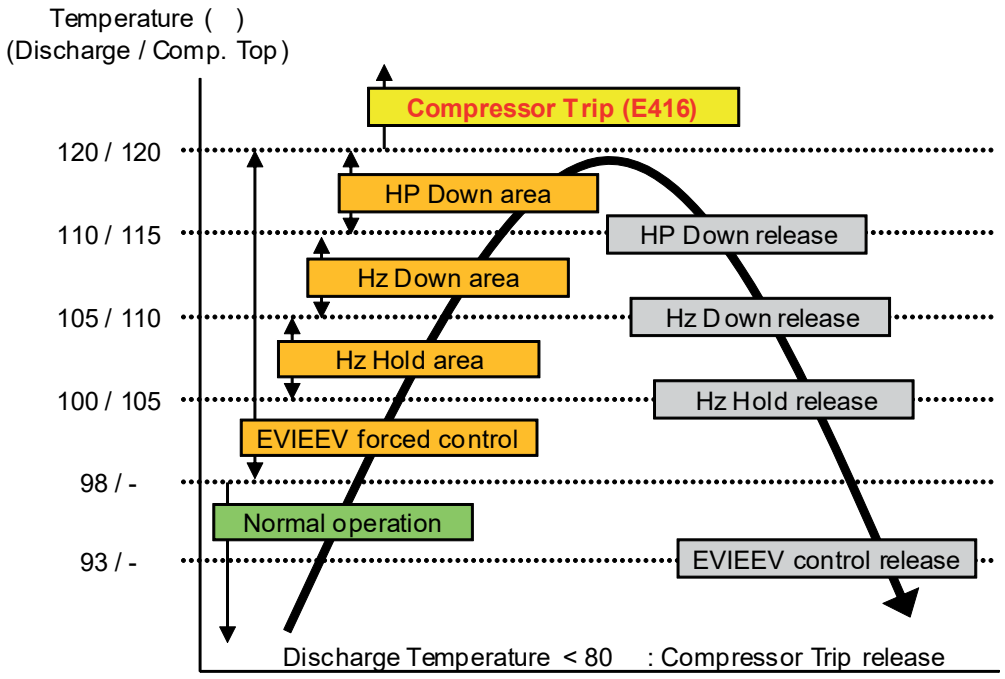
1st step EVIEEV Open: EVIEEV is forcibly opened.

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).

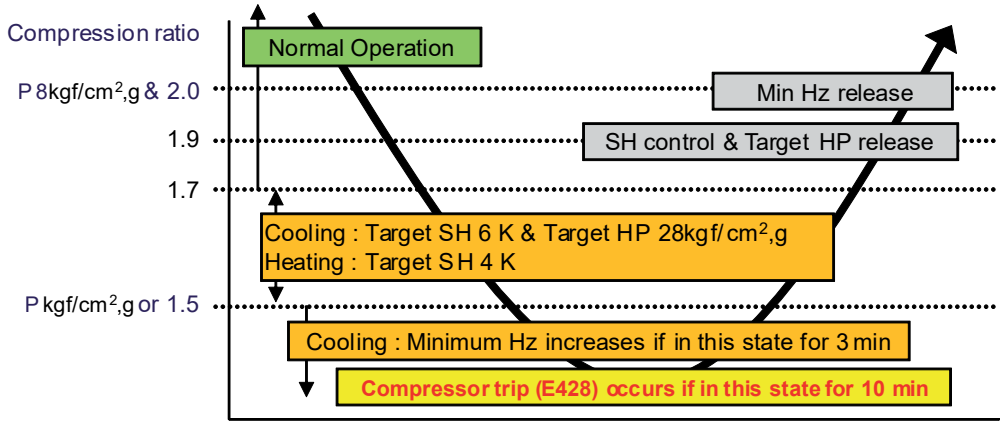


7-3 Functions (cont.)

7-3-2 Control (cont.)

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

- 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).



P =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.

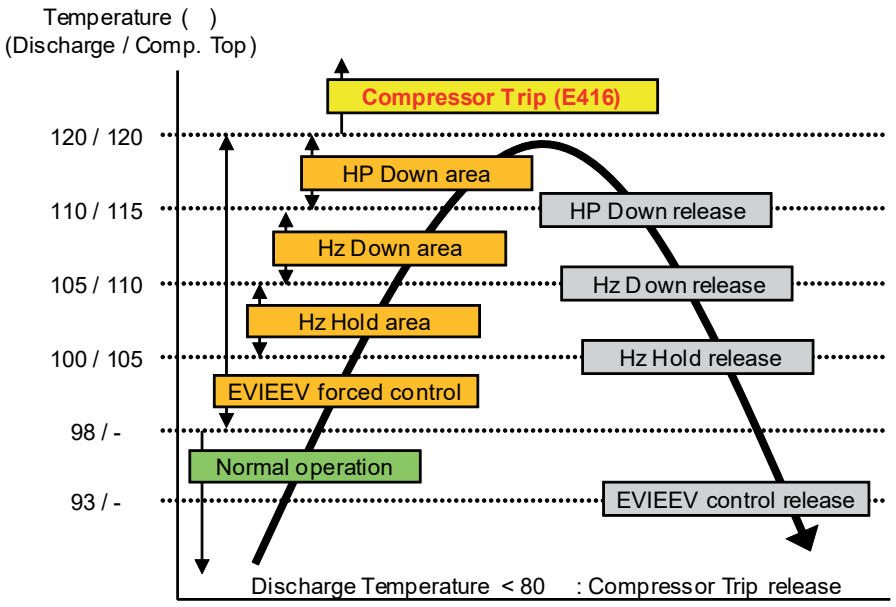
▪ **Concept**

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.)

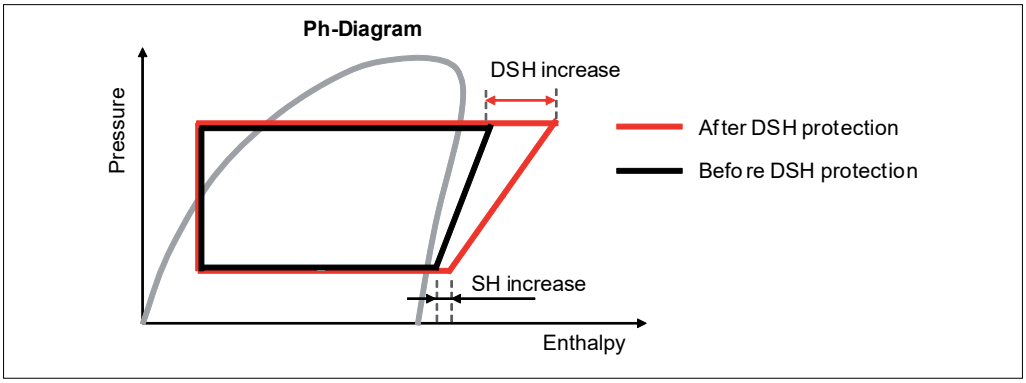
DSH (Discharge Super Heat) protection

▪ **Purpose**

Prevent liquid compression to protect the system and compressors.

▪ **Concept**

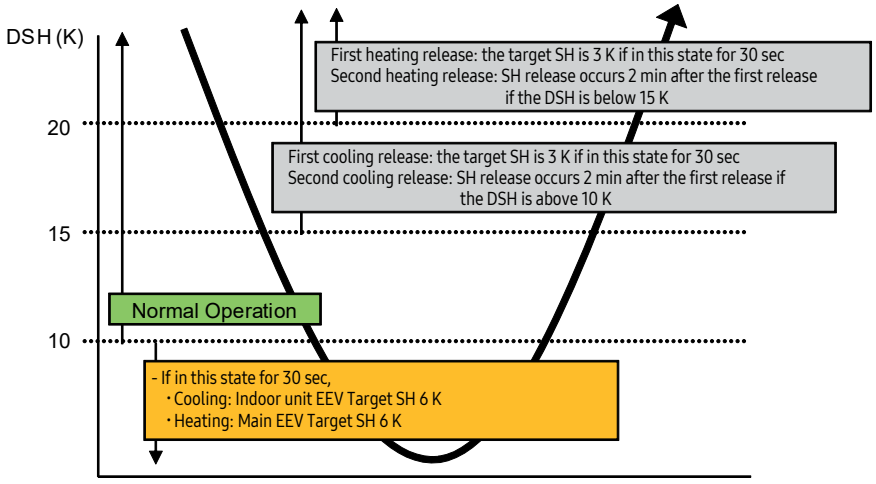
The compressor Suction Super Heat (SH) is raised to increase the DSH.



- 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**

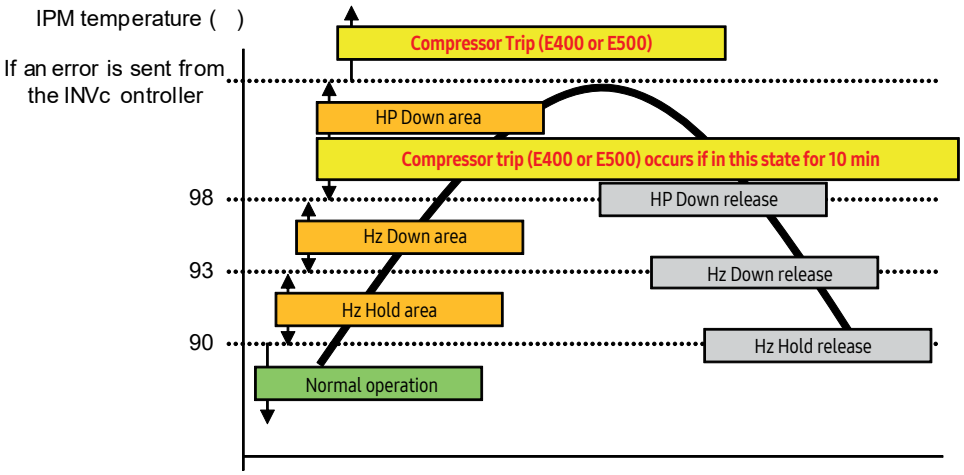
Prevent IGBT module damage due to overheating.

▪ **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 is triggered (E400 or E500).
  4th step Comp trip: Compressors stop and an error is triggered (E407).
  If restarting the compressor, -10℃ 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**

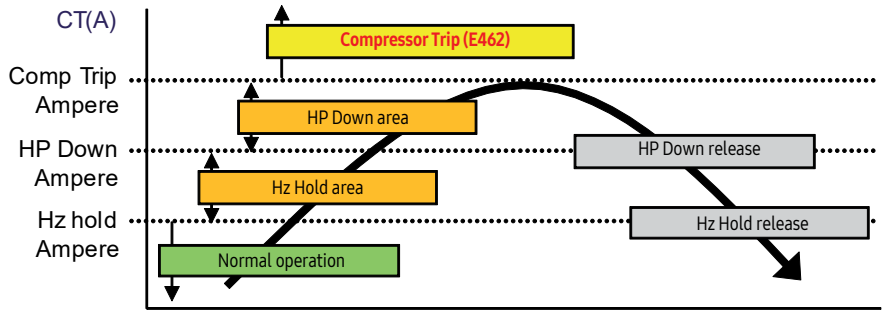
Prevent device damage due to excess current in circuit components or overheating of the IPM module.

▪ **Concept**

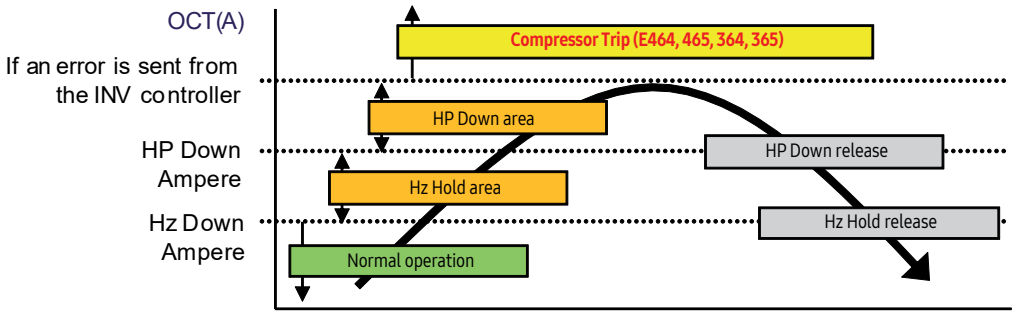
- The compressor operation frequency is controlled to prevent each INV PBA input current (CT) from exceeding the designed current limit.
- The compressor operation temperature is controlled to prevent each INV PBA output current (OCT) from exceeding the designed current limit.

▪ **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**

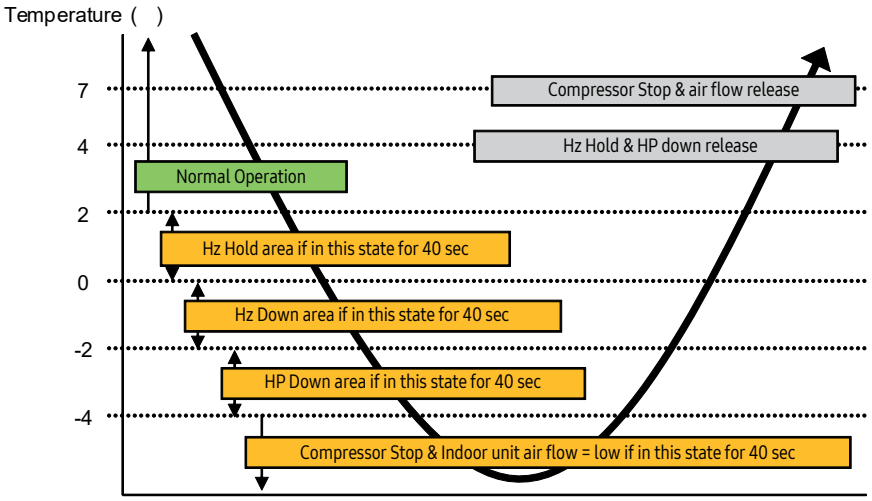
Prevent frost in indoor units to protect compressors. Prevent other accidents.
If there is frost in indoor units, refrigerant will not evaporate. As a result, compressor failure will occur due to liquid compression.
If there is frost in indoor units, ice may form and fall causing an accident.

▪ **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℃	User selection
Cooling	User input Low, Mid, High, Auto	Control	18-30℃	User selection Min.16℃ for RAC
Dry	Fixed Auto2)	Control	18-30℃	User selection Min.16℃ for RAC
Heating	User input Low, Mid, High, Auto	Control	16-30℃	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 (Ts) and indoor temperature (Ti).

$\|Ts - Ti\| \leq 1$ K	1 K < $\|Ts - Ti\| \leq 3$ K	3 K < $\|Ts - Ti\|$
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 ≥ Ts - A + 1 K	If Tr < Ts – A + 1 K
Auto Cooling	Auto Heating
2. Mode change	
Cooling → Heating	Heating → Cooling
Thermo off for T & Tr < Ts - D	Thermo off for T & Tr ≥ Ts + C
3. Thermo On/Off	
In cooling mode	In heating mode
Thermo on: Tr ≥ Ts + B + 1 K Thermo off: Tr < Ts + B – 1 K	Thermo on: Tr < Ts - A – 1 K Thermo off: Tr ≥ Ts - A + 1 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

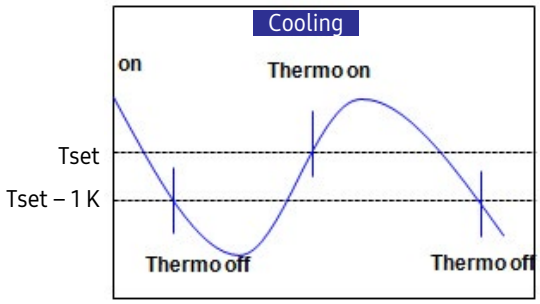
▪ **Purpose**
Maintain the custom indoor temperature.

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

▪ **Control specifications in detail**

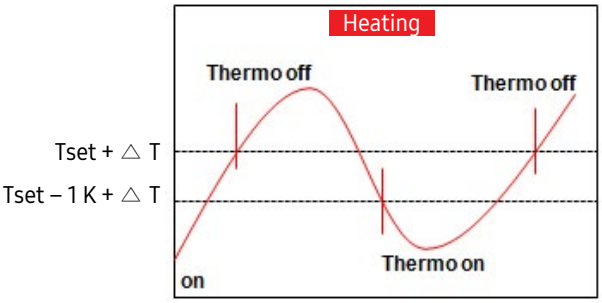
Cooling mode

- Thermo on:
Room temp. ≥ Set temp.
Room temp. ≥ Set temp.+1 K (RAC only)
- Thermo off:
Room temp. ≤ Set temp. -1 K
Room temp. ≤ Set temp (RAC only)



Heating mode

- Thermo on:
Room temp. ≤ Set temp. -1 K+ △ T*
- Thermo off:
Room temp. ≥ Set temp. + △ T



▪ **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)

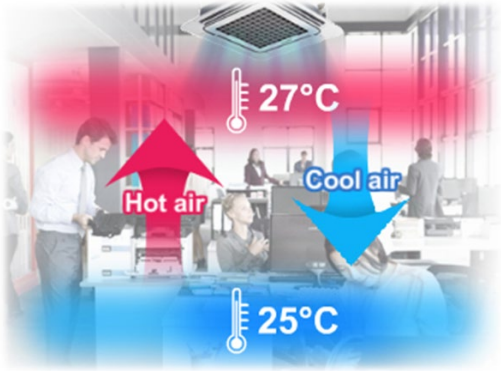
- 4way type: △ T* = 5 K
- others: △ T* = 2 K

· Installation setting(installation option code SEG21)

SEG21 Setting	△ T*
0	**Factory default**
1	2 K
2	5 K

* △ T: Heating compensation temperature

· In case of using external room temp. sensor
(Installation option SEG4 = 1): △ 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	0,1,2,3
			Off	4,5,6,7
Heating	ON	Open	On	all
	OFF	Open in 120step	Off & On (20℃↑)	0,4
			Off & On (20℃↑, 20 sec on every 5 min)	2,6
			Off	1,3,5,7

"2" 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℃ .

7-3 Functions (cont.)

7-3-2 Control (cont.)

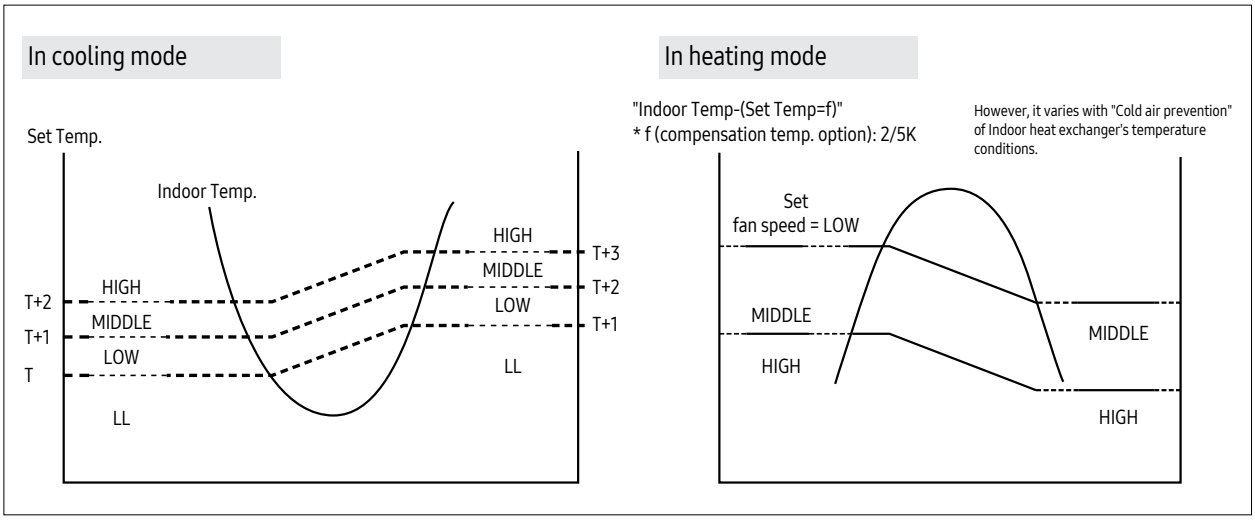
7-3-2-6 Indoor unit control (cont.)

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	(Auto) ▶ (Low) ▶ (Med) ▶ (High) ▶ (Auto)
System control	- 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

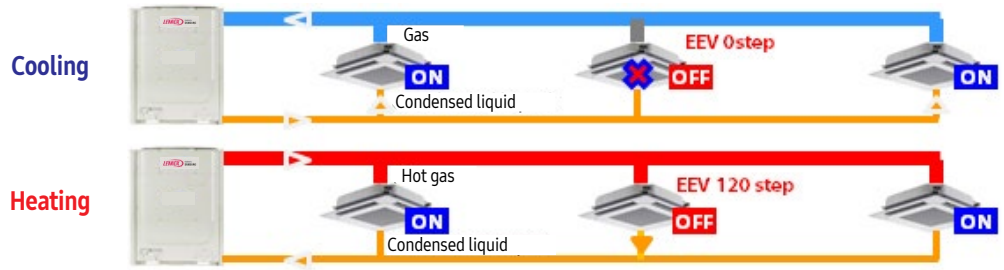
· Condition(s) required to use modes
- General control: Thermos on indoor units are on
- Inactive indoor unit EEV control: (Comp OFF) or (Comp ON and Indoor unit Thermo-OFF)

· 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℃ or lower	80	130	200
Above 0℃	80	120	180



7-3 Functions (cont.)

7-3-2 Control (cont.)

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

Drain Pump Control

▪ **Purpose**

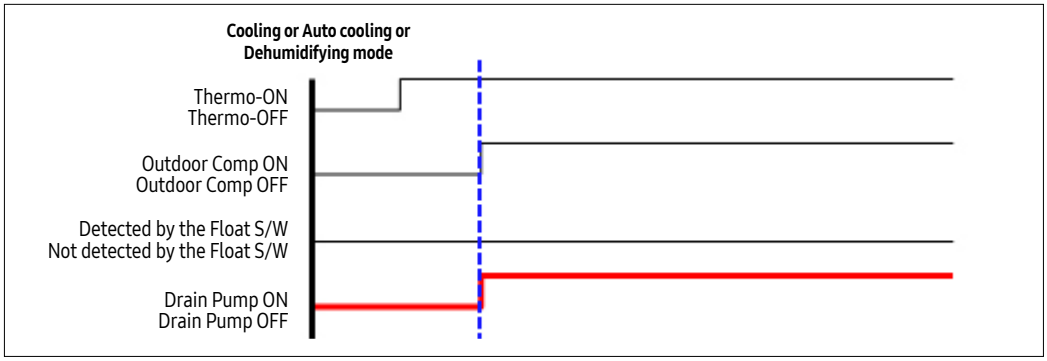
Discharge the condensate stagnating in the indoor unit's drainage plate to prevent the condensate from overflowing indoor units.

▪ **Concept**

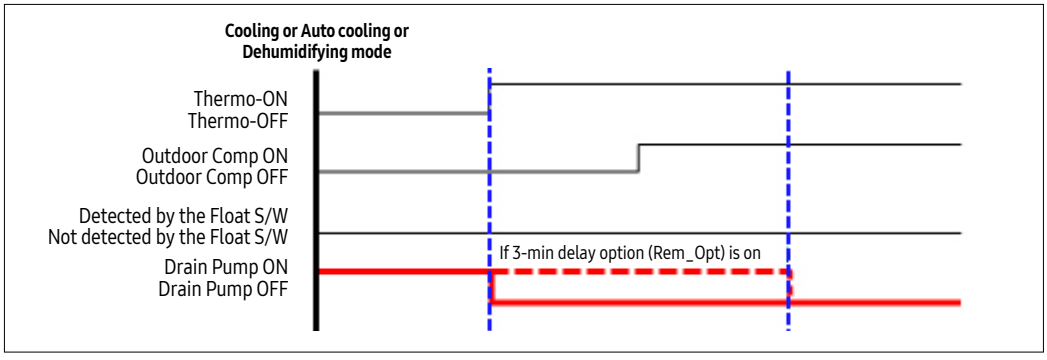
If the amount of condensate stagnating in the drainage plate reaches a certain level where it may overflow, the Float software detects this and activates the drain pump to discharge the condensate to the outside via the hose.

▪ **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)

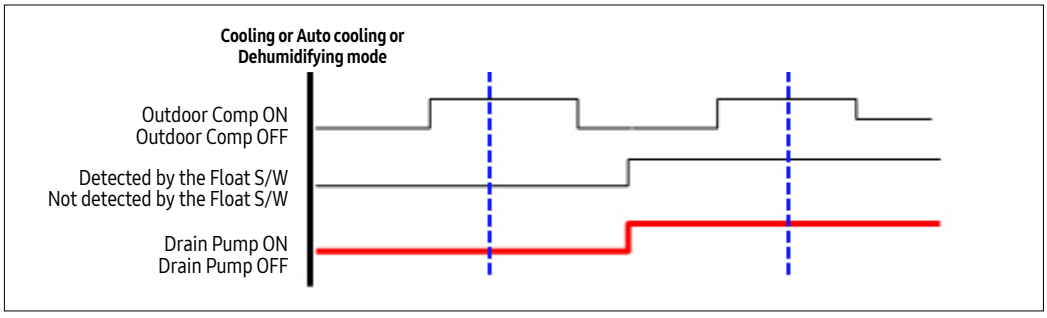


- Drain Pump OFF: (Operation OFF) or (Indoor unit Thermo OFF)



▪ **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**

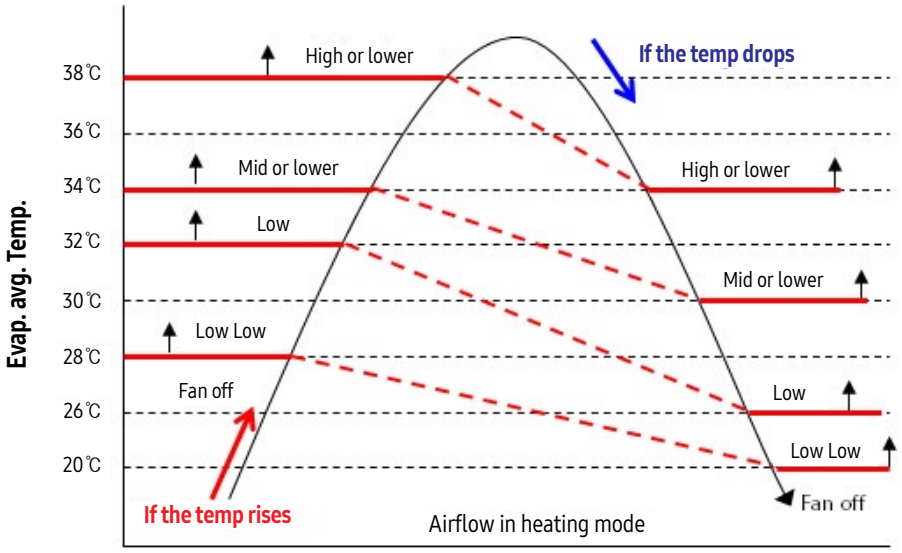
Control the fan speed to avoid discomfort of people in the room due to cold air in cooling mode or during the initial start-up of heating.

▪ **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(℃)
Main	0	1	0	0	7-9
			0	1	5 - 7 (default)
			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/cm2,g)
Main	0	2	0	0	**30 (default)**
			0	1	25
			0	2	26
			0	3	27
			0	4	28
			0	5	29
			0	6	31
			0	7	32
			0	8	33

▪ **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	3	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.)

Temperature to trigger defrost operatio

▪ **Purpose**

Prevent excessive frost formation in a high-humidity condition.
(Apply setting when the product is being installed in a humid area such as near a river or lake.)

▪ **Concept**

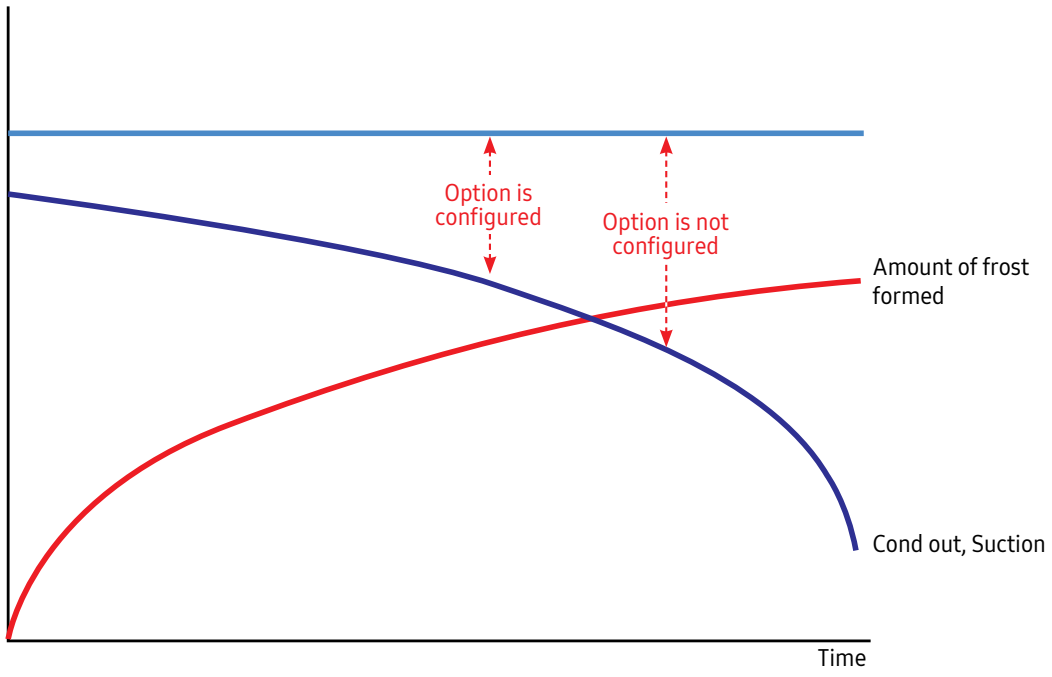
Defrost operation is performed frequently if there is frost formation on heat exchangers in heating mode.

▪ **Control specifications in detail**

- Defrost operation is performed if the amount of frost that formed is smaller than the option setting when the heat exchangers are checked for frost formation based on the difference between the outdoor temperature and heat exchanger temperature (Cond out, Suction)

- See "Defrost control" for details on defrost operation specifications.

Input unit	Seg1	Seg2	Seg3	Seg4	Temperature to trigger defrost operation
Main	0	5	0	0	**Standard (default)**
			0	1	Apply setting when the product is installed in a humid area such as near river or lake



▪ **Notes**

- If this option is configured and the units are in a very humid location, heating performance may degrade due to frequent defrost operation.

7-3 Functions (cont.)

7-3-3 Others (cont.)

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

Fan speed correction for outdoor unit

▪ **Purpose**

Improve performance in cooling mode when the outdoor temperature is high or in heating mode when the outdoor temperature is low.

▪ **Concept**

The maximum fan RPM rises to the limit if this option is configured. (The RPM does not change on some models.)

▪ **Control specifications in detail**

- High pressure is controlled taking into account the maximum fan RPM.
- See "Fan control" for details on outdoor fan operation specifications.

Input unit	Seg1	Seg2	Seg3	Seg4	Temperature to trigger defrost operation
Individual	0	6	0	0	**Standard (default)**
			0	1	Increase fan speed

▪ **Notes**

- Noise level may increase as the maximum RPM rises.
- Do not configure this option if using units in a location that is outside the recommended operation temperature (48℃) or permitted external static pressure

7-3 Functions (cont.)

7-3-3 Others (cont.)

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

Silent mode for night-time

▪ Purpose

Reduce the maximum operation noise when using units in an area sensitive to noise, such as a residential area.

▪ Concept

- The maximum compressor frequency and the outdoor fan RPM are lowered.
  (Noise level: Level 1 > Level 2 > Level 3)
- Auto mode: General and silent modes switch to each other automatically for day and night.
- External contact: Configure this option if using an interface module (MIM-B14).
  Silent mode turns on if the external contact is on.

▪ Control specifications in detail

- The maximum compressor frequency and outdoor fan RPM decrease according to the specified level.
- Silent mode automatically turns on according to the day/night temperature pattern if Auto mode is on.
  If External contact is configured, silent mode turns on when the contact is on.

Input unit	Seg1	Seg2	Seg3	Seg4	Silent mode for night - time
Main	0	7	0	0	**Disabled (default)**
			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
			0	7	LEVEL 1
			0	8	LEVEL 2
			0	9	LEVEL 3

▪ Notes

- If the silent mode option is configured, the noise level decreases. However, performance may degrade.
- Noise level according to the specified silent mode LEVEL.

Silent mode	Noise level (dB)
Disabled	SPEC
LEVEL 1	SPEC – 1/3*(SPEC-49)
LEVEL 2	SPEC – 2/3*(SPEC-49)
LEVEL 3	49

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.

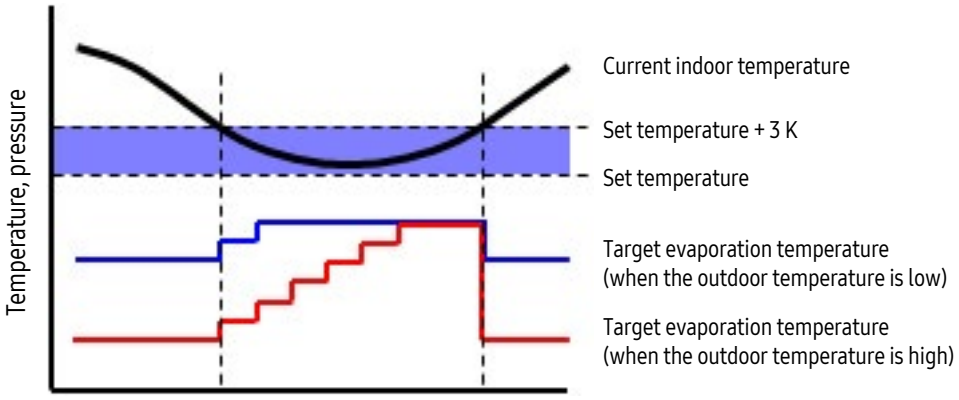
▪ **Control specifications in detail**

- Energy saving mode:

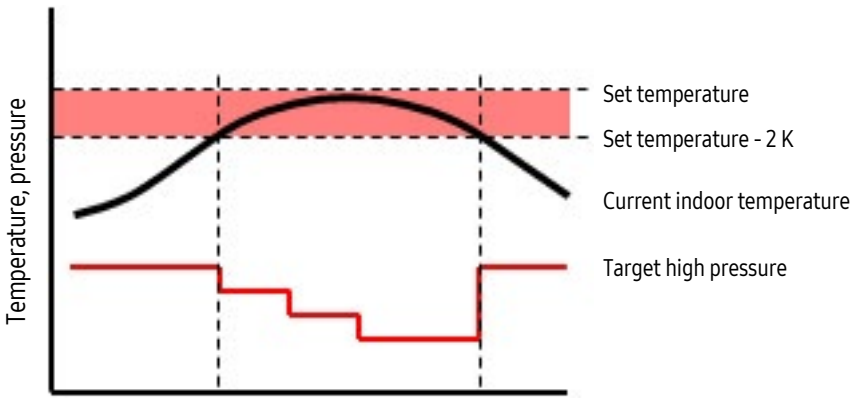
  The compressor frequency is lowered by increasing the target evaporation temperature if the maximum difference between the indoor temperature and set temperature among active cooling indoor units is 3 K or lower.
  (see " Compressor capacity control" for details on controlling the compressor frequency).

  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

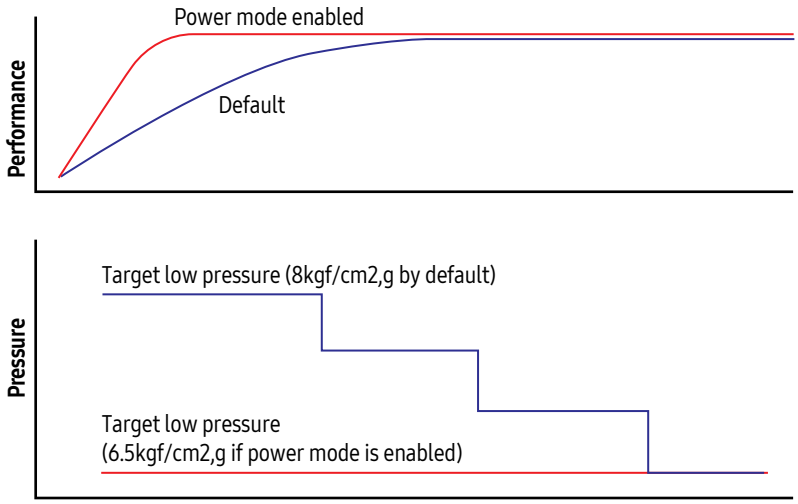


7-3 Functions (cont.)

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.)

Rotation defrost

- **Purpose**
  Enable continuous heating when HR modules are used.
- **Concept**
  - Continuous heating is provided by performing defrost operation for each unit if HR modules are used.
  - HR Only
- **Control specifications in detail**
  - In heating mode, defrost operation is performed on each unit one after another according to the order of rotation priority. (see "Rotation defrost control" for details).

Input unit	Seg1	Seg2	Seg3	Seg4	Rotation defrost
Main	1	1	0	0	**Disabled (default)**
			0	1	Enabled

- **Notes**
  - Incorrect settings may seriously damage the system.
  - Setting is unnecessary if high-head condition is set.

Expand operational temperature range for cooling

- **Purpose**
  Extend the low temperature operation range for HR units to -15°C .
- **Concept**
  - The cooling operation range is extended by controlling purpose-specific valves on HR units.
  - HR Only
- **Control specifications in detail**
  - If it is difficult to secure outdoor high pressure while in cooling mode in an outdoor location with a low temperature, formation of high pressure is facilitated by controlling the low pressure decrease, Solenoid valve.
  - Main EEV, and Solenoid valve.
  - Hot gas bypass.

Input unit	Seg1	Seg2	Seg3	Seg4	Expand operational temperature range for cooling operation (HR only)
Main	1	2	0	0	**Disabled (default)**
			0	1	Enabled

- **Notes**
  - Continuous cooling operation is possible even in low temperature condition up to -15°C , but noise of the MSB will increase.
  - This option is only for HR unit.

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 MSBs 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.)

Snow accumulation prevention control

- **Purpose**
  - Prevent snow accumulation on inactive outdoor units to ensure normal operation (default option).
- **Concept**
  - Snow on top of outdoor units is removed by turning on outdoor fans if snow accumulation is detected by the snow sensor or via the outdoor temperature.
- **Control specifications in detail**
  - If a snow sensor is not installed, the outdoor fans operate in 3step mode for one min every 30 min if operation stops at an outdoor temperature of 5°C or lower.
  - If a snow sensor is installed and the sensor detects when operation stops at an outdoor temperature of 5°C or lower, the outdoor fans operate in 3 step for 10 sec and then continue operation in a higher step for 50 sec.

Input unit	Seg1	Seg2	Seg3	Seg4	Snow accumulation prevention control
Main	1	4	0	0	**Enabled (default)**
			0	1	Disabled

- **Notes**
  - During snow accumulation, the fan may spin even when the unit is not in operation.
  - Outdoor fans may be turned on by this feature during servicing. Careful attention is required.

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

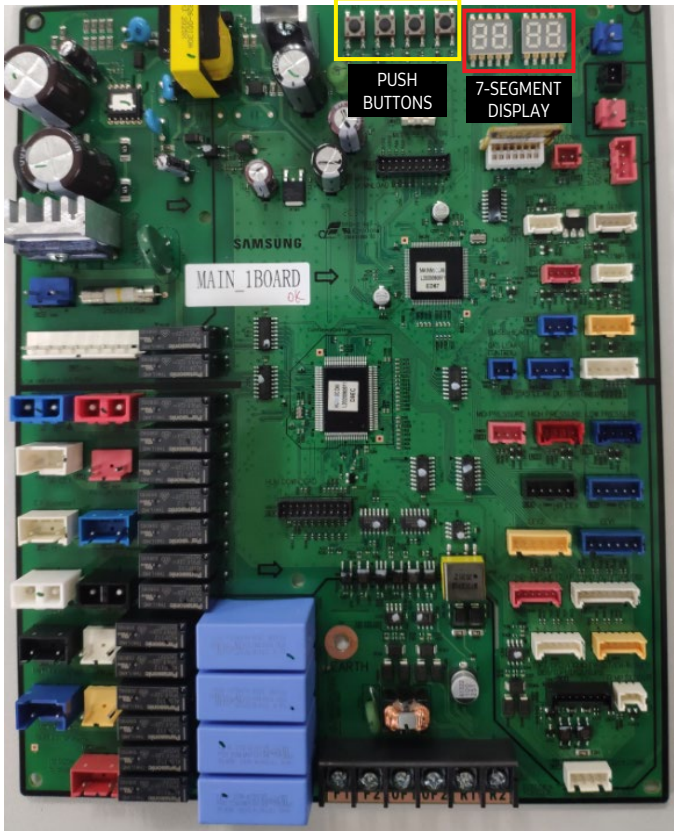


Table A. 7-segment display

The 7-segment display indicates system power and communication status.

Step	Display content	Display			
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)	MSB, Indoor unit address	SEG 1	SEG 2	SEG 3	SEG 4
		I/U: "A" MSB: "C"	I/U: "0" MSB: "1"	Reception address (in decimal number)	

※ I/U: Indoor unit

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.
06	Fan speed correction	Increase maximum fan rpm range to secure enough airflow when discharge guide duct for outdoor unit is adapted.
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
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.
12	Expand operational temperature range for cooling	To expand cooling operation range up to -15℃. (HR model only, Default: -5℃)
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.
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.

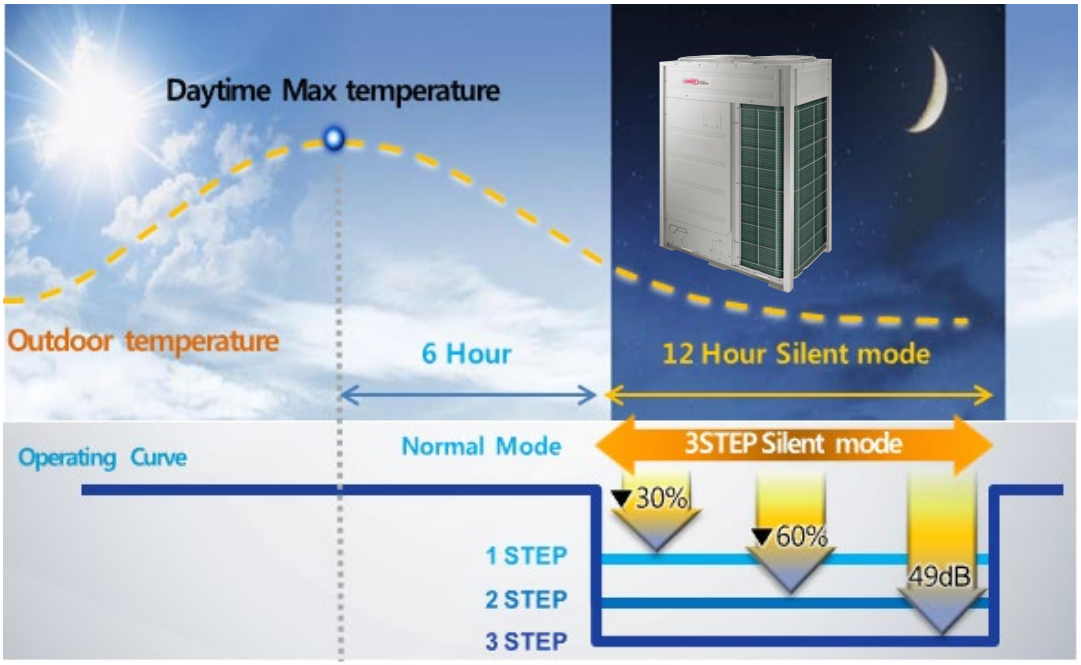
8-3 Applications

8-3-1 Application of Night Silent

■ Introduction of Night silent mode

Purpose: To prevent neighbor's noise complaint that is caused by user's outdoor unit in summer night time.
How to Operate: After setting silent mode option.

1) Auto mode: Outdoor unit operates selected silent step automatically in night-time when depending on.
2) External contact mode: Operated by User's on/off signal.



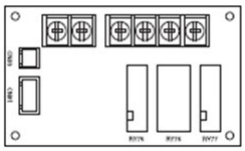
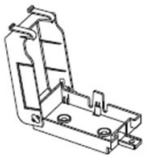
Optional item	Input unit	SEG1	SEG2	SEG3	SEG4	Function of the option	Remarks
Silent mode	Main	0	7	0	0	Disabled (Factory default)	Enables the silent mode for night-time in cooling mode (it operates automatically depending on the temperature.) However, if the external contact interface module (VSTAT10P-1) is used, entering the dilent mode is available with contact signal in cooling and heating mode.
				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	
				0	7	LEVEL 1	
				0	8	LEVEL 2	
				0	9	LEVEL 3	

8-3 Applications (cont.)

8-3-2 Application of External Contact Interface Module

■ VSTAT10P-1 Installation Instructions (External Contact Interface Module or Auxiliary Heat Module)

Components
The module is shipped with the following components:

Circuit board	Circuit board case	Wiring harness (1 each)	Wiring harness screws (2)
			

Mounting
1. Mount the circuit board case with screws (provided) inside the indoor unit control box or at another appropriate location (Figure 1).
2. Align the circuit board with the case and lock it into place using the locking tab (see Figure 2).

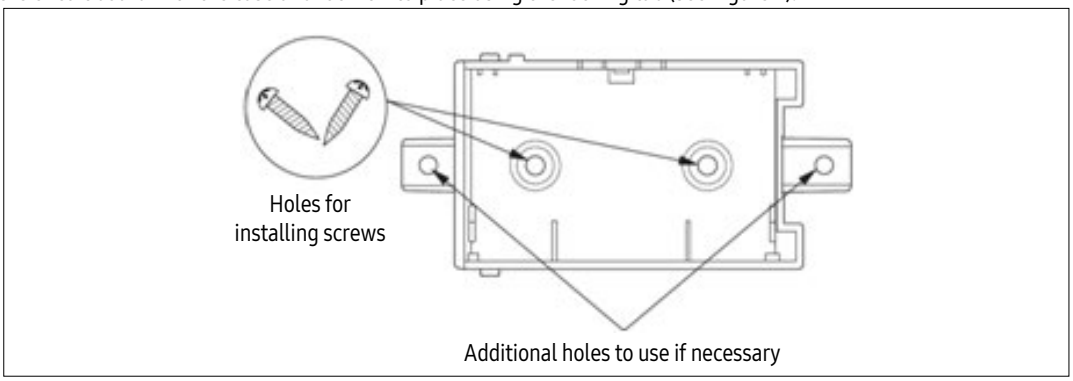


Figure1. Mounting the circuit board case

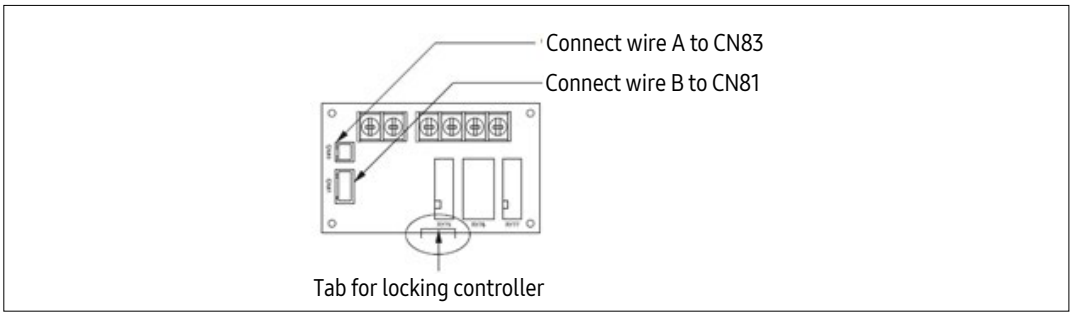


Figure 2. Wiring the module

⚠WARNING

1. Shut off power to the indoor unit before wiring the module.

> **⚠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.

2. Connect the 2-pin wiring harness to the interface module at CN83 (Figure 2) and to the indoor unit at CN83.
3. Connect the 4-pin wiring harness to the interface module at CN81(Figure 2) and to the indoor unit at CN81.
4. Restore power to the indoor unit.

8-3 Applications (cont.)

8-3-2 Application of External Contact Interface Module (cont.)

■ Introduction of External Contact Interface Module

External Contact Interface Configuration
Using the Technician Utilities Tool (TUT) or the remote control, configure indoor unit options as required by customer application. Refer to Table 1, Figure 3, and the configuration section of the indoor unit installation manual.

Table 1. Option settings for the module as an external contact interface
Using the Technician Utilities Tool (TUT) or the remote control, configure indoor unit options as required by customer application.

Refer to Table 1, Figure 3, and the configurat.

Option setting mode: Digit 2=2[(a)]	Option setting	Terminals 5,6[(b)]	Terminals 3,4	Terminals 1,2
Digit 14	"0"	No function		
	"1"	On/Off control	-	
	"2"	Off control		
Digit 15	"0"	-	Thermo On/Off status (On=closed)	Error status (normally closed)
	"1"		Operation On/Off status (On=closed)	

1. If Digit 14 terminals 5, 6
- Option setting 0 has no function.
- Option setting 1 will enable an auxiliary contact to enable the indoor unit on or off.
- Option 2 will enable an auxiliary contact to enable the indoor unit off.
  The indoor unit will require reset to release and re-enable the connected indoor unit.

2. If Digit 15 terminals 3, 4
- If option setting 0, then the auxiliary device shall enable upon call for thermal heating (or cooling) to the indoor unit. Unit shall disable when indoor unit ceases thermal operation and returns to standby mode.
- If option 1, then the auxiliary device shall enable upon application of power to the indoor unit, and shall remain enabled until power is removed.

3. If Digit 15 terminals 1, 2
- If option setting 0 or 1, when power is applied, contacts are normally closed. If error code occurs, contacts open, breaking the circuit for the external device.

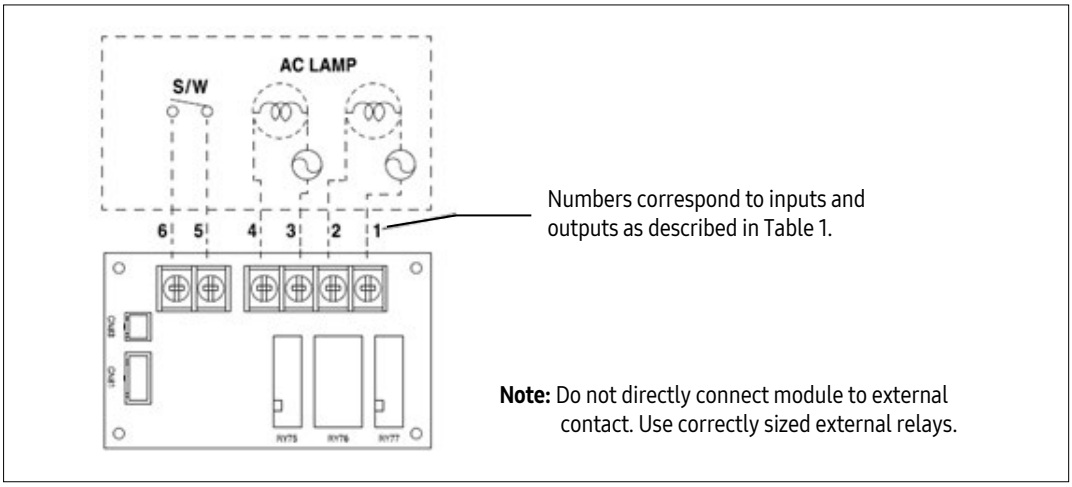


Figure 3. External contact interface module wiring diagram

8-3 Applications (cont.)

8-3-3 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 installations 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 installations 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.

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.

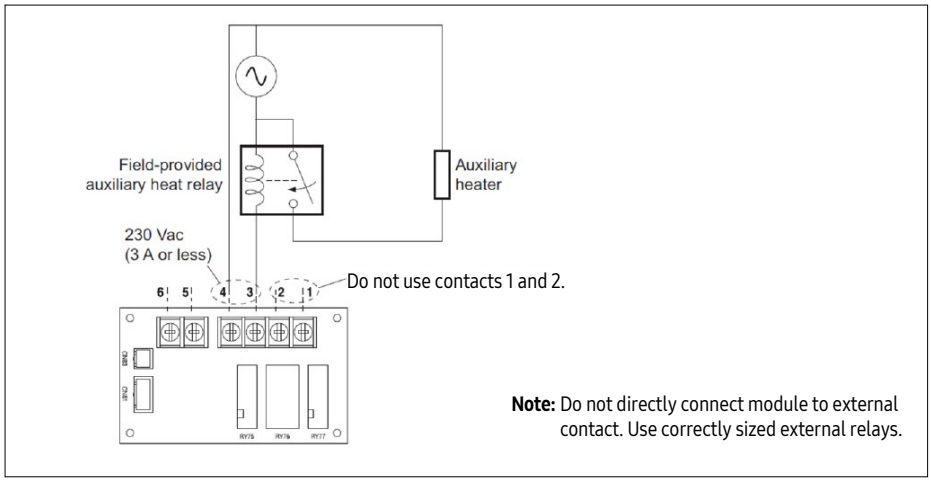


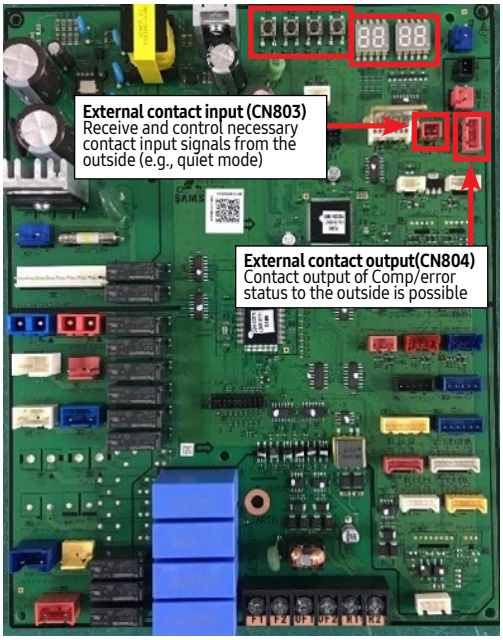
Figure 4. External contact interface module: wiring diagram for auxiliary heat

8-3 Applications (cont.)

8-3-3 Application of Auxiliary Heat Module (cont.)

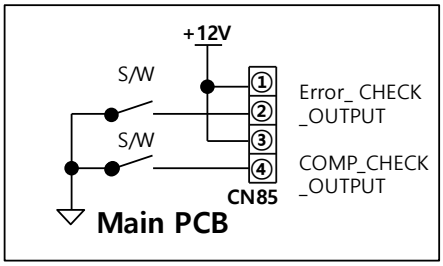
■ Connecting the external contact software to the outdoor unit's Main PBA

Outdoor unit's Main PBA

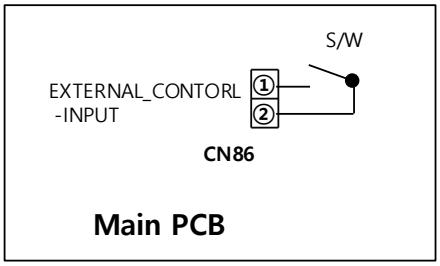


How to use external contacts

External contact output connection(CN804)



External contact input connection(CN803)



Setting outdoor unit option switch and key function

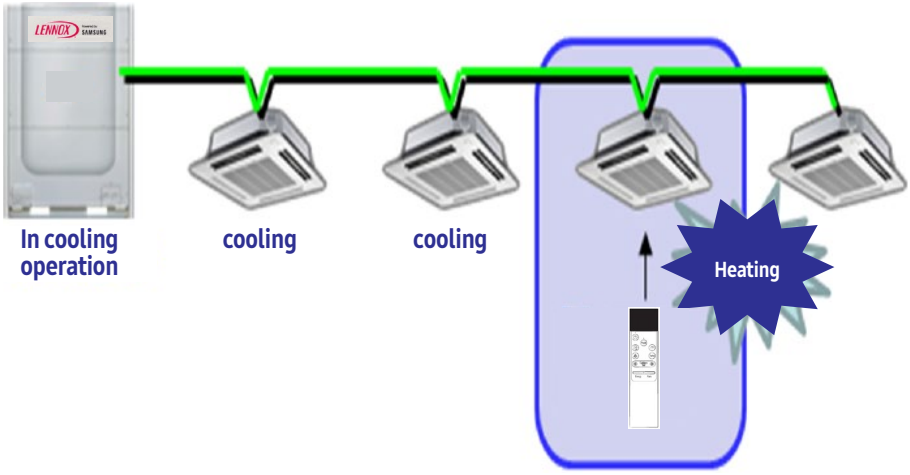
Optional item	Input unit	SEG1	SEG2	SEG3	SEG4	Function of the option	Remarks
Silent mode for night-time	Main	0	7	0	0	Disabled (Factory default)	Enables the silent mode for night-time (It operates automatically depending on the temperature.) However, if the external contact interface module (MIM-B14) is 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	

8-3 Applications (cont.)

8-3-4 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 ›

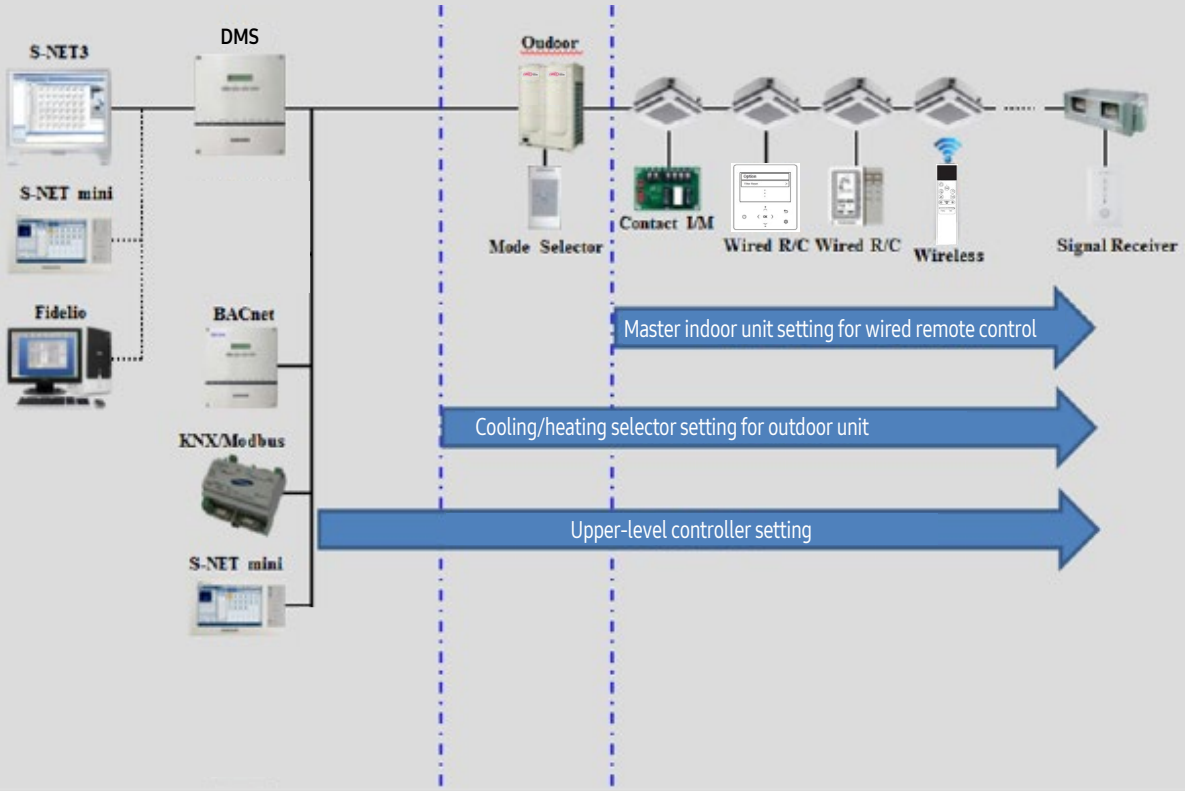
HP (common in the SAC market)

- 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)

8-3 Applications (cont.)

8-3-4 Application of Mode select Switch (cont.)

Setting the dedicated mode according to the installation environment



Item	Function
Indoor unit	Set dedicated mode using the master indoor unit → Available operation modes are limited
Upper-level controller	Set dedicated mode → Available operation modes are limited
Outdoor unit	Use the cooling/heating selector (hardware): Set dedicated mode - Use the upper-level controller (software): Set dedicated mode → Available operation modes are limited
Automatic detection of cooling-only outdoor unit	Information on the cooling-only outdoor unit is shared with all the other units → Available operation modes are limited

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

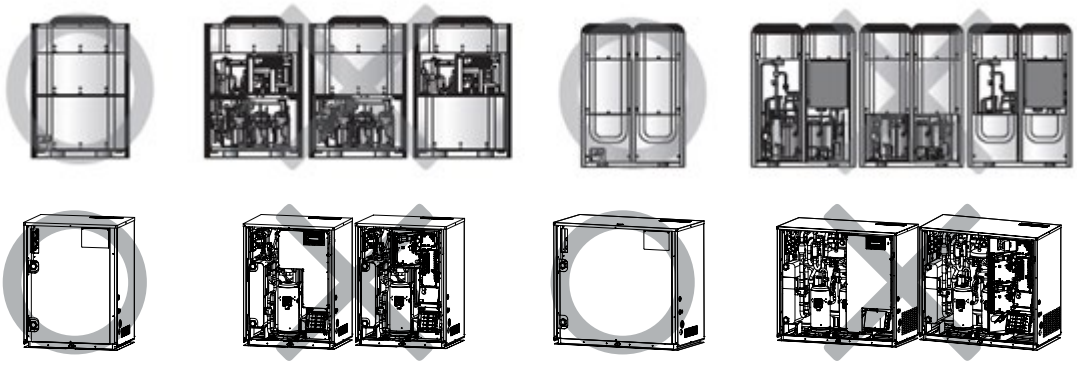
(1) Preliminary inspection before Auto Trial Operation (service valve) on the outdoor unit is opened.
(2) Indoor: Check the communication and power lines related to the outdoor air.
(3) Turn on the system 6 hours before Auto Trial Operation to sufficiently preheat the compressor.
(4) Before connecting 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 MSBs 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).

※ Display: 

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)

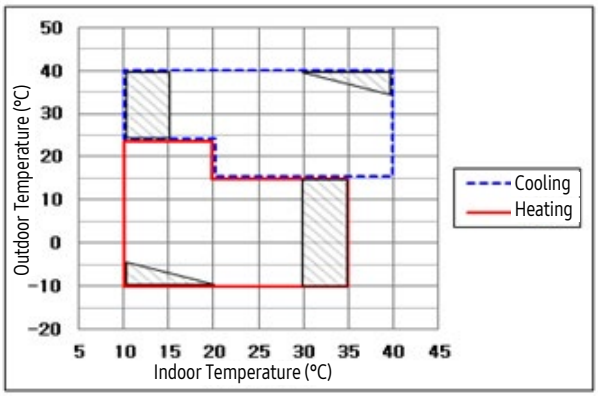
9-1 Auto Trial Operation (cont.)

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.



<AM072-240*XV***>

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.
E505	Faulty high pressure sensor	To resolve NG items, see the troubleshooting instructions on the pressure sensor. (applicable when the outdoor unit is installed with two or more modules)
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.

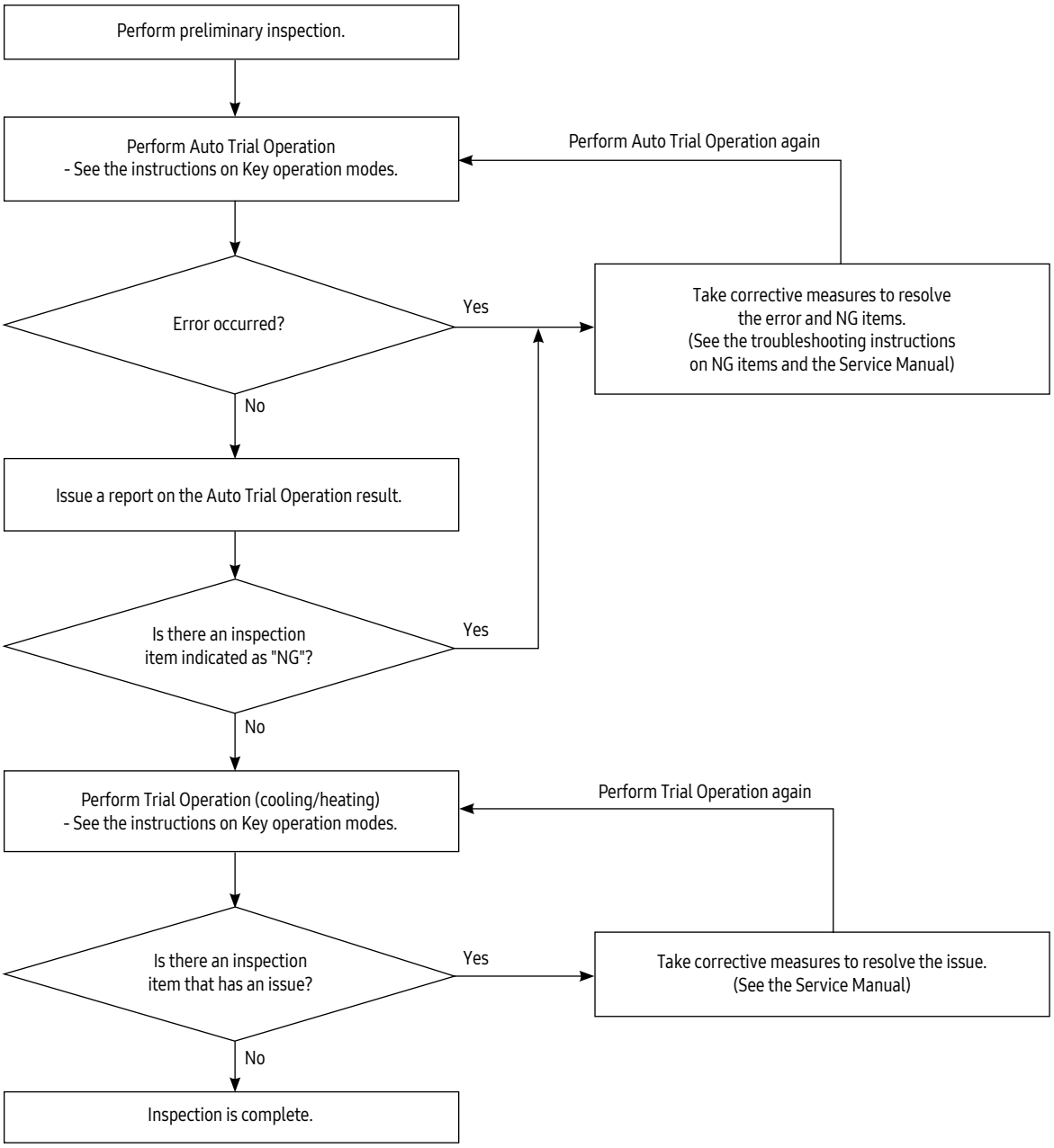
- Check to make sure that heating and cooling are properly performed.
- Check to make sure that each indoor unit is properly controlled by configuring settings, such as operation mode, air flow direction, and fan speed.
- Check the active outdoor and indoor units for the presence of noise.
- Check the 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

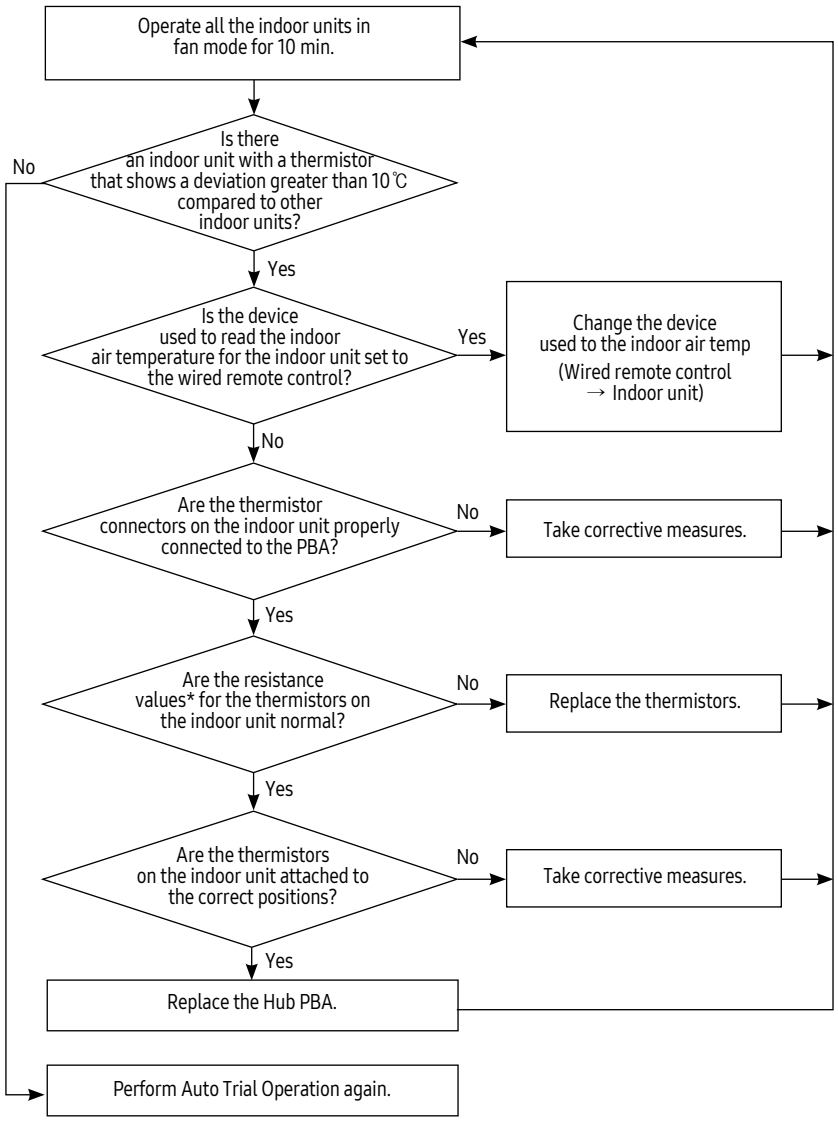
- If issues occur on multiple components at the same time, the inspection accuracy may degrade.
- Items indicated as "Unidentified" in the result report are not items that have issues.
  Some items are not inspected, depending on the installation environment and operation condition.
  These items are 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.



* How to measure resistance Disconnect the thermistor connectors from the PBA and then measure the resistance between the terminals of the connectors.

Temperature (℃)	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

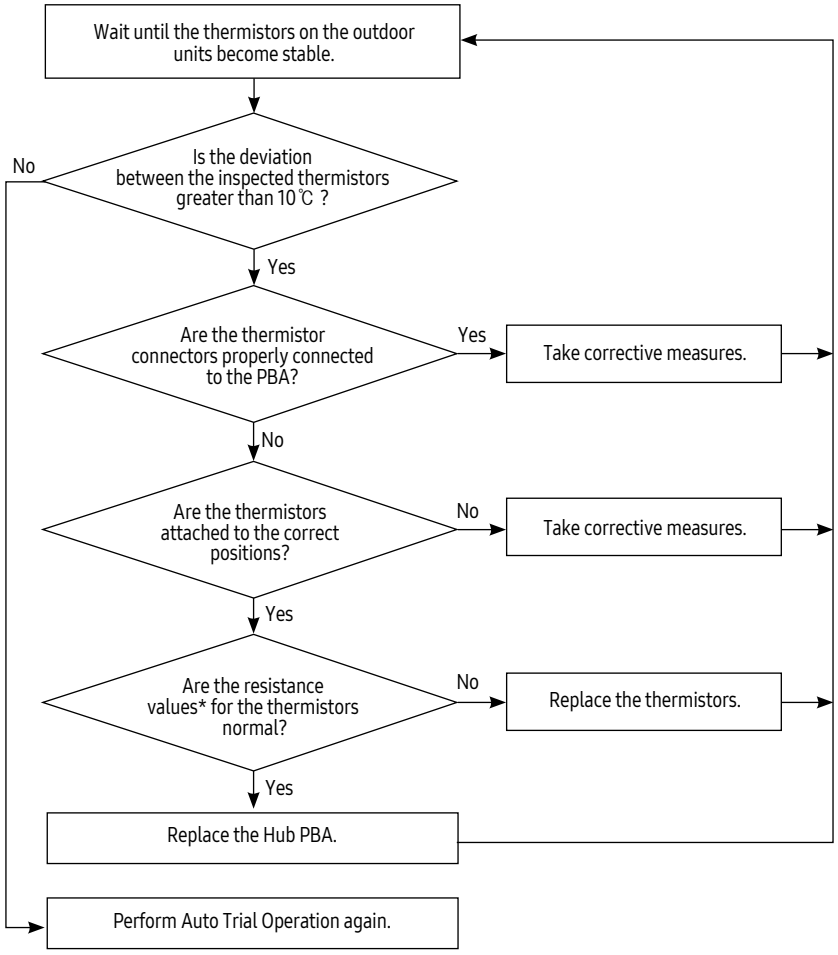
- If issues occur on multiple components at the same time, the inspection accuracy may degrade.
- If the device used to read the indoor temperature is set to the wired remote control, change the device to the indoor unit's thermistors and then perform Auto Trial Operation.
  Presence of an "NG" item 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 (℃)	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

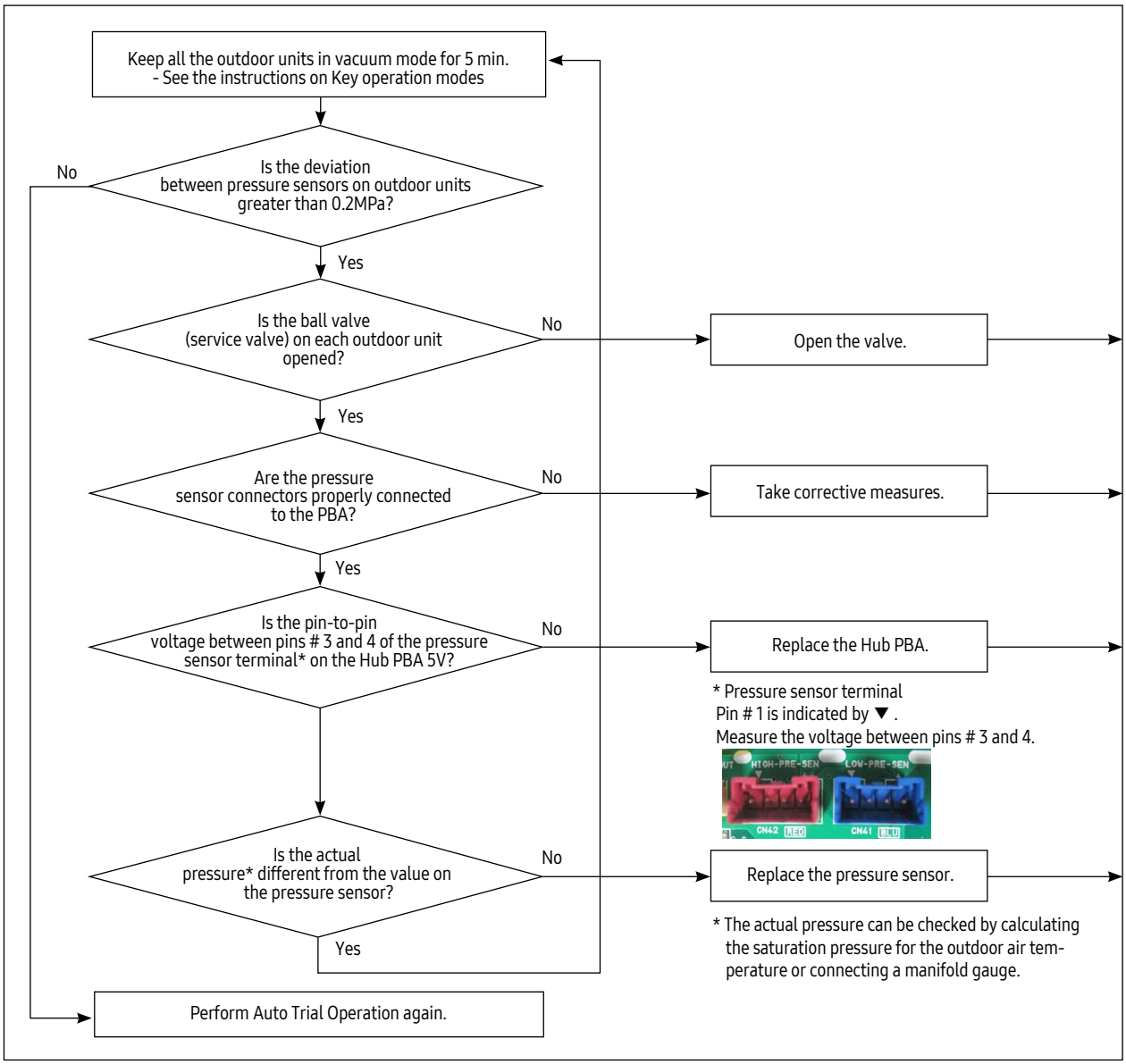
- Start inspection after the outdoor unit's thermistors become stable (generally, leave idle for at least one hour).
  If you start inspection immediately after operation, the temperature is not stable and this can degrade the inspection accuracy.
- To replace a component or inspect the PBA, be sure to cut off the power supply first.A
  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

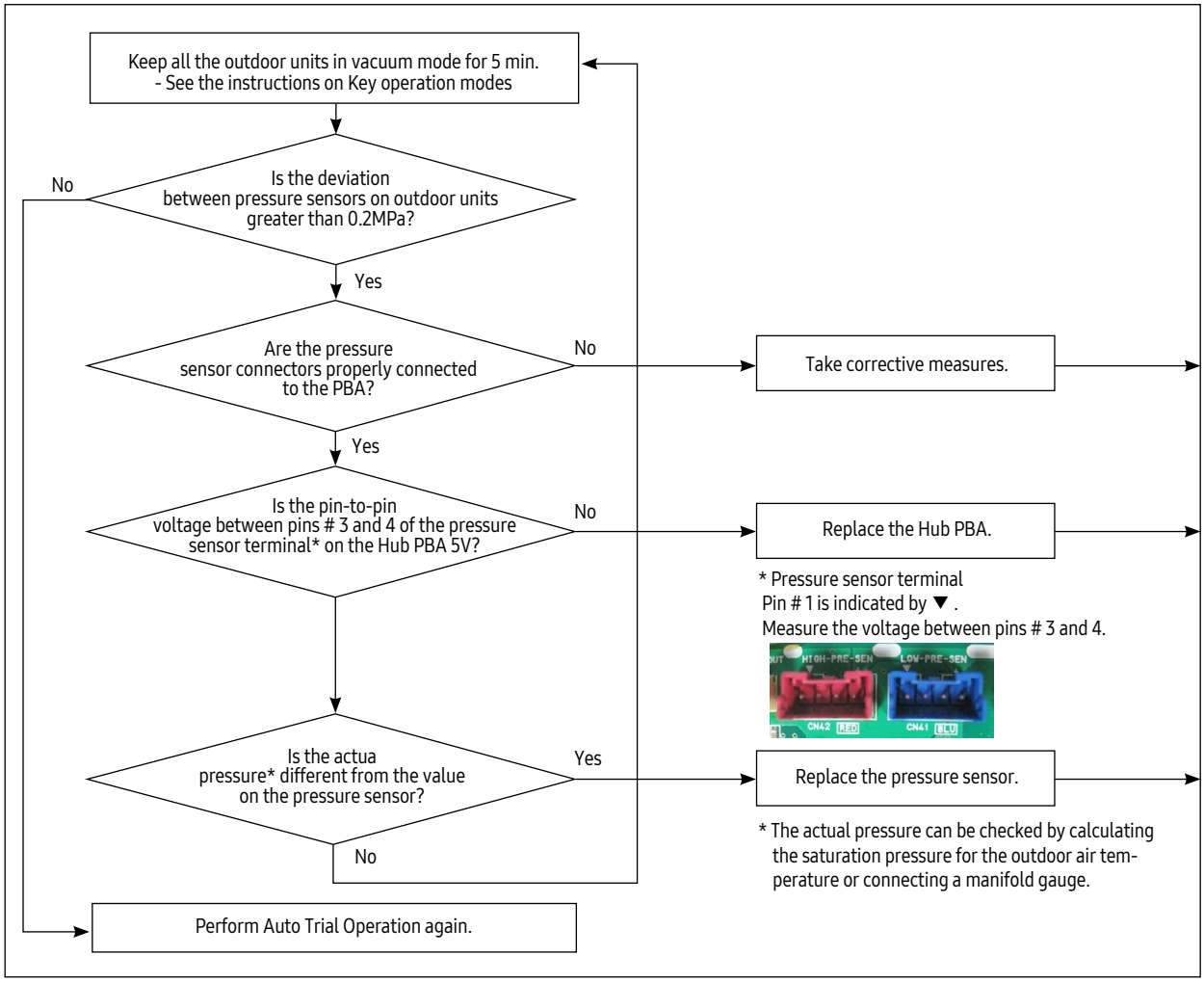
- If an error occurs, Auto Trial Operation stops immediately.
  An error may occur if there is an air temperature difference between the areas where outdoor units are installed.
  Use the blower to regulate the air temperature to a similar level.
- To replace a component or inspect the PBA, be sure to 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

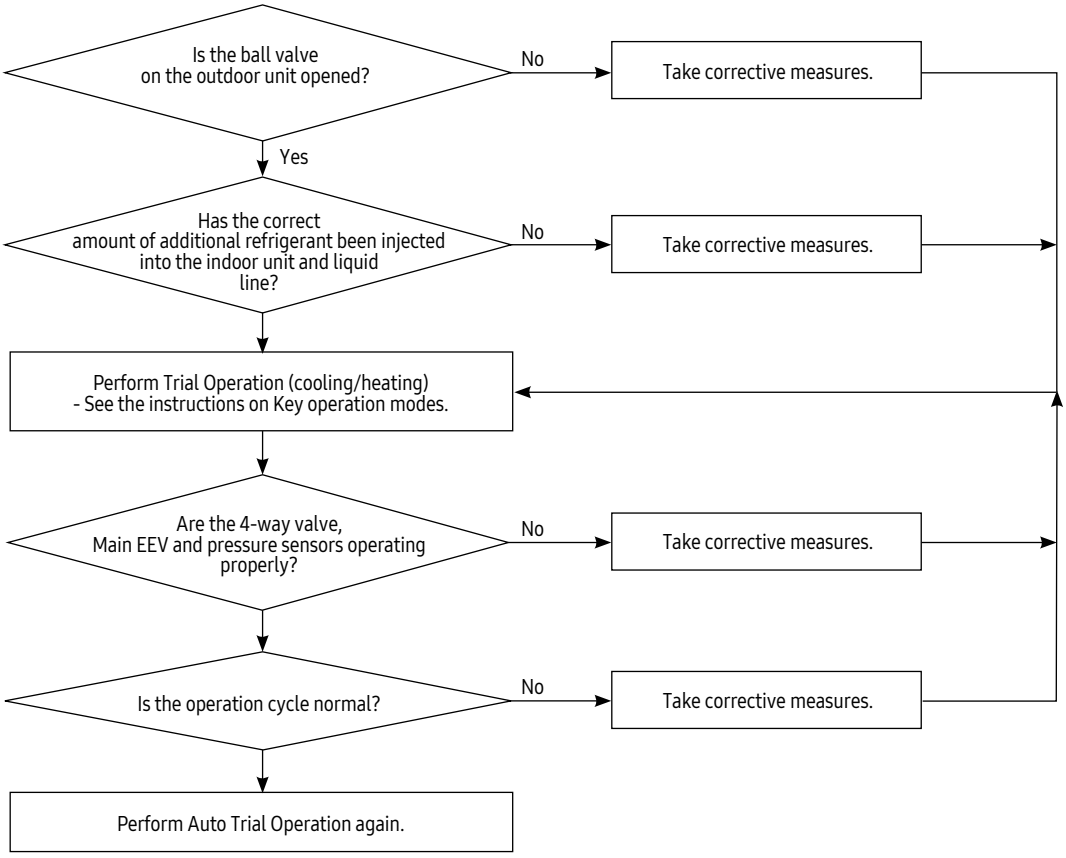
- To replace a component or inspect the PBA, be sure to cut off the power supply first.
  If inspection must be performed with the power supply on, exercise extra care to prevent electric shock.

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

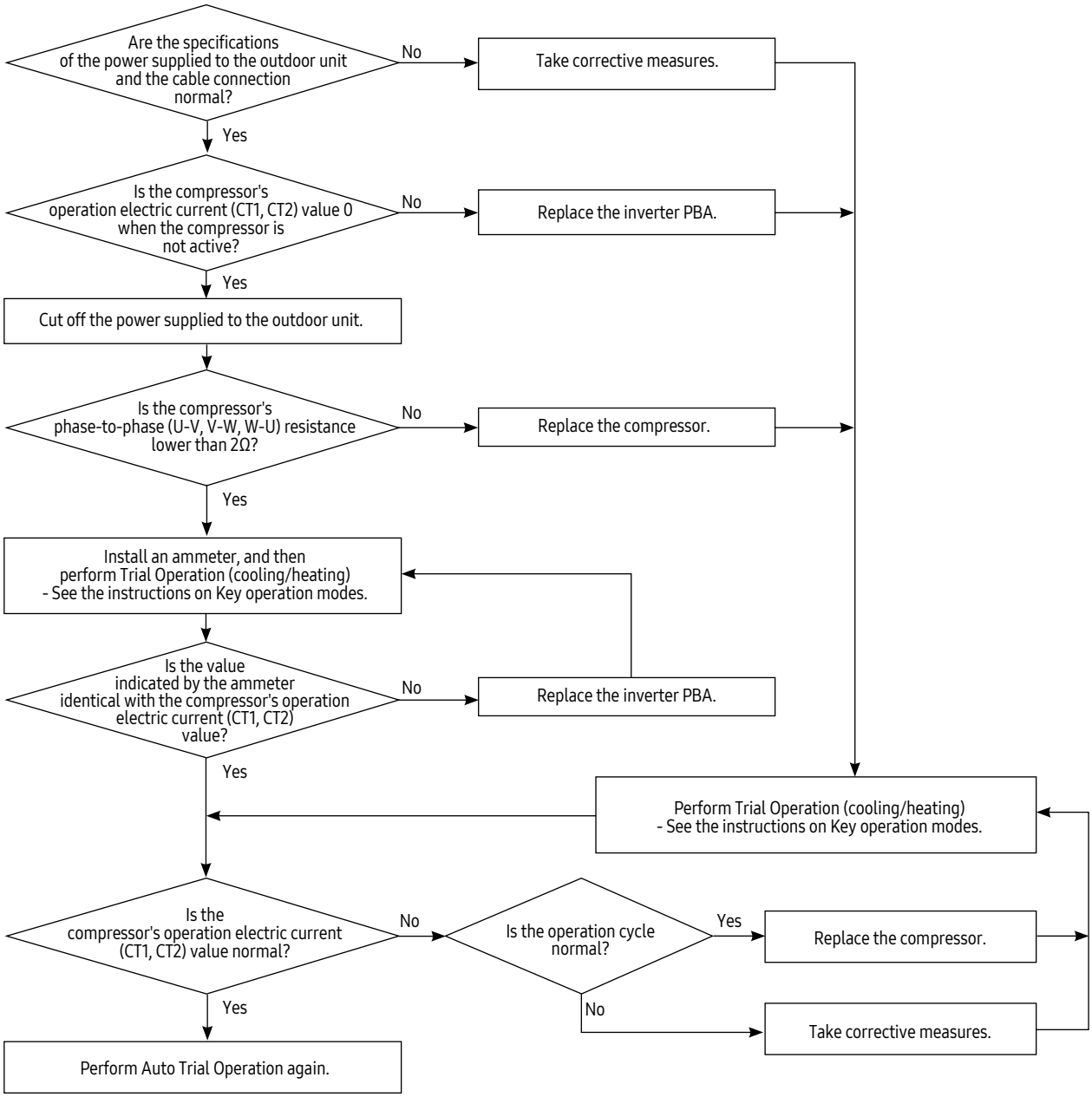
- If an error occurs, Auto Trial Operation stops immediately.
- When inspecting the ball valve, inspect the liquid line, gas line, and high pressure line (HR only) together.
- Symptoms in the event of an issue on the 4-way valve
  A. Abnormal noise during compressor operation
  B. Increase in the suction temperature
  C. See the troubleshooting instructions on NG items related to the 4-way valve
- Symptoms in the event of an issue on the Main EEV
  A. It is not possible to control the superheat (SH)
  B. It is not possible to secure a DSH of higher than 20K
  C. 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

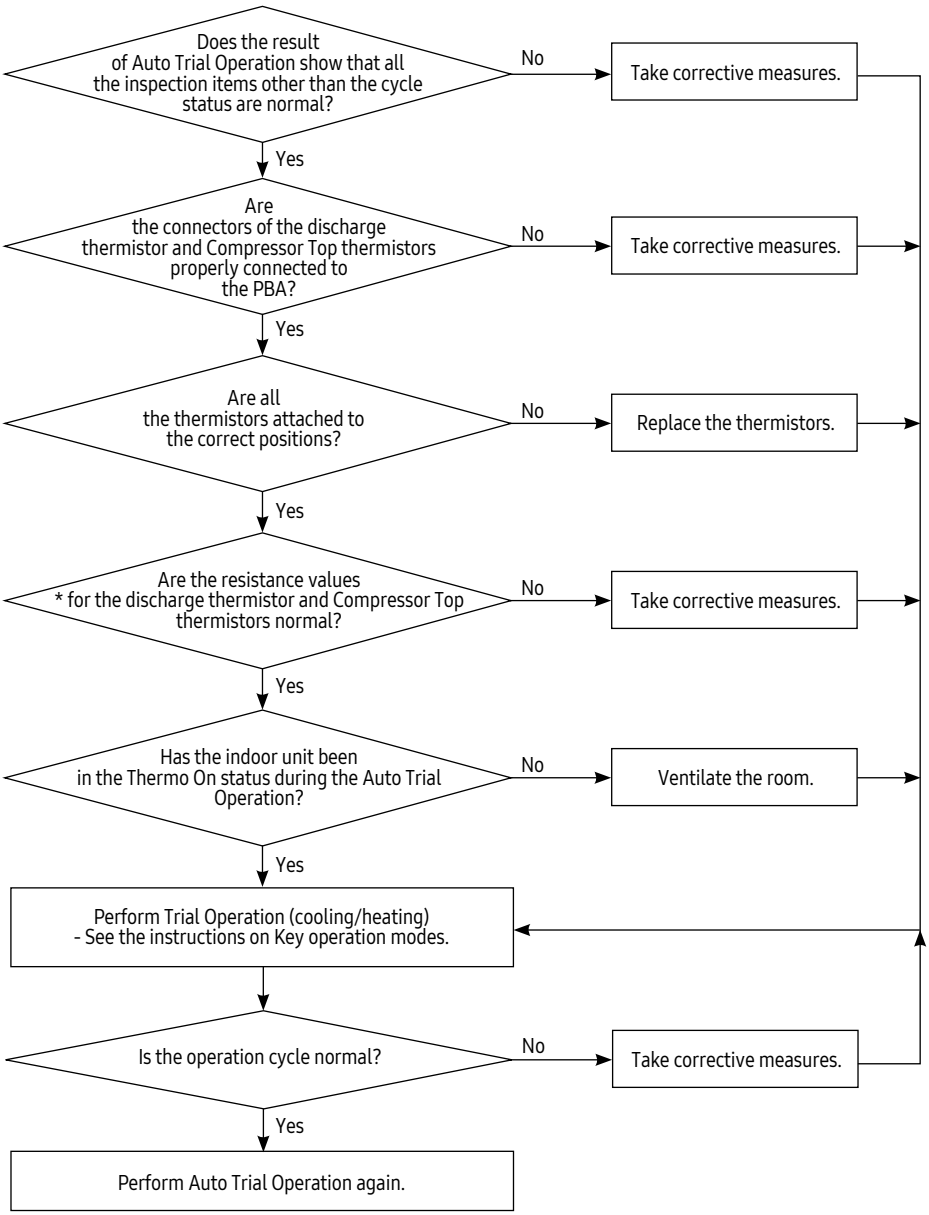
- To replace a component or inspect the PBA, be sure to cut off the power supply first.
  If inspection must be performed with the power supply on, exercise extra care to prevent electric shock.

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.



* How to measure

Resistance Disconnect the thermistor connectors from the PBA and then measure the resistance between the terminals of the connectors.

Temperature (℃)	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

[Resistance values for the discharge thermistor and the Top thermistors]

■ Precautions

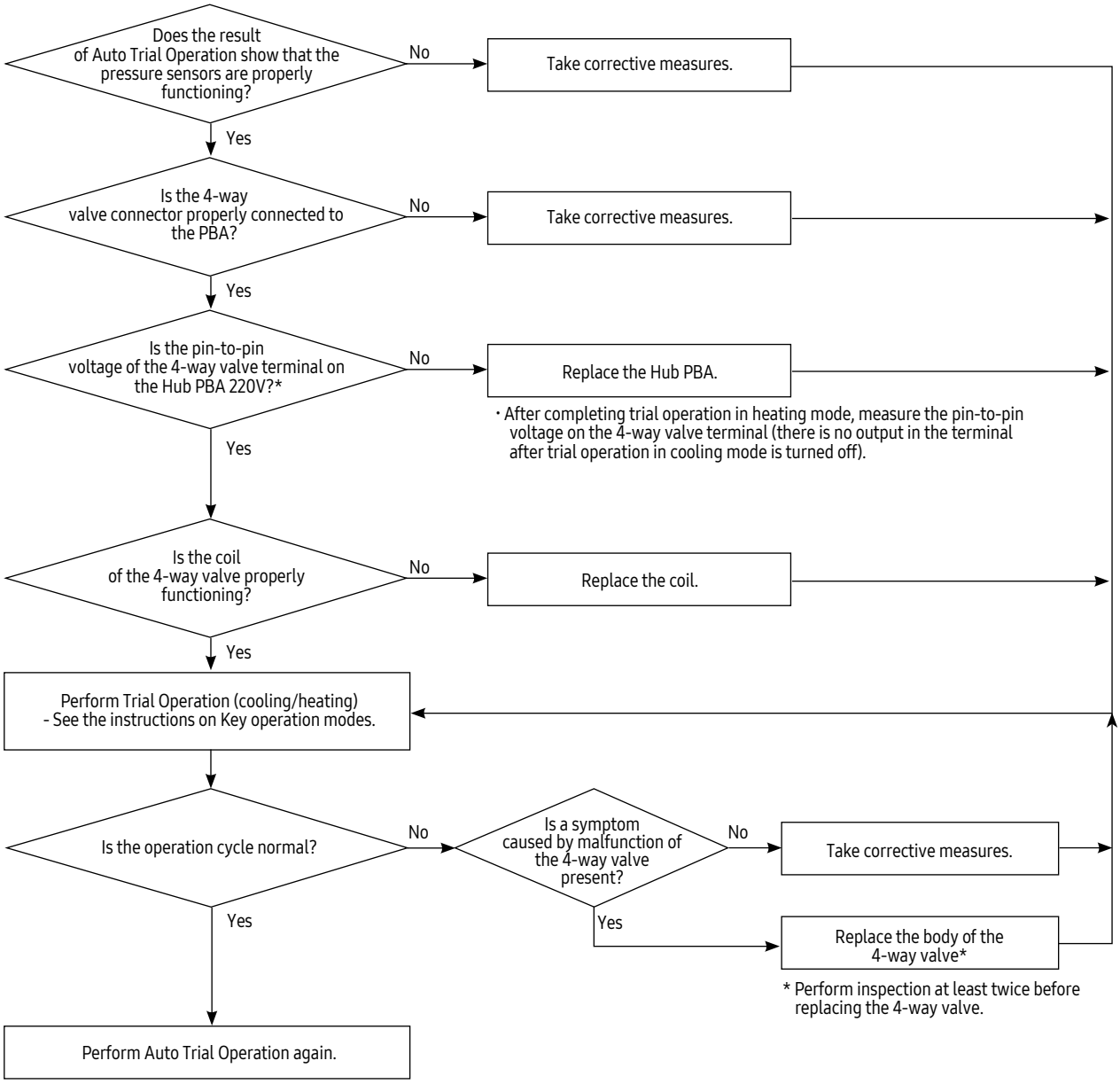
- To replace a component or inspect the PBA, be sure to cut off the power supply first.
  If inspection must be performed with the power supply on, exercise extra care to prevent electric shock.

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

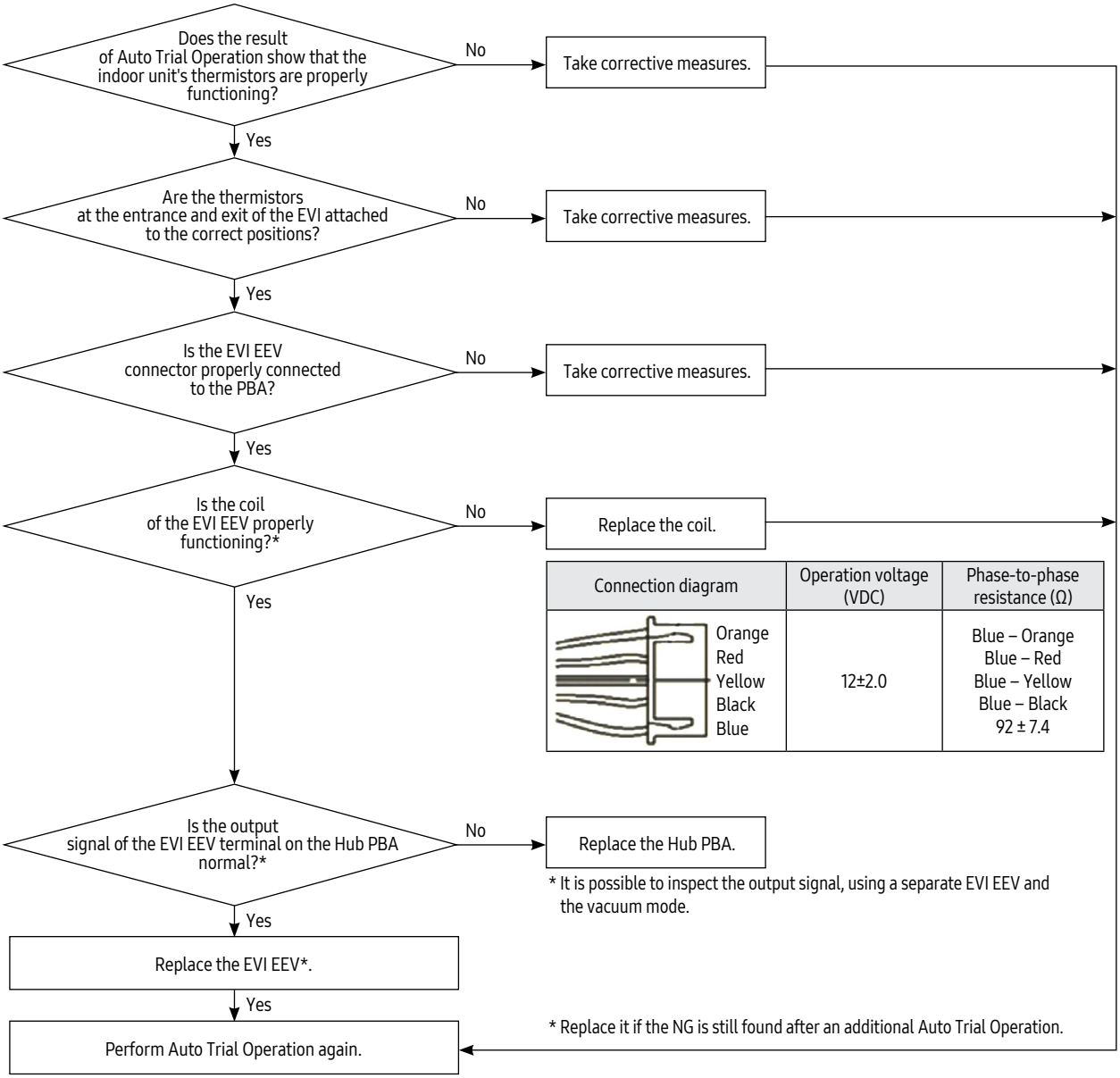
- To replace a component or inspect the PBA, be sure to cut off the power supply first.
  If inspection must be performed with the power supply on, exercise extra care to prevent electric shock.

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.



Connection diagram	Operation voltage (VDC)	Phase-to-phase resistance (Ω)
Orange Red Yellow Black Blue	12±2.0	Blue – Orange Blue – Red Blue – Yellow Blue – Black 92 ± 7.4

* It is possible to inspect the output signal, using a separate EVI EEV and the vacuum mode.

* Replace it if the NG is still found after an additional Auto Trial Operation.

■ Precautions

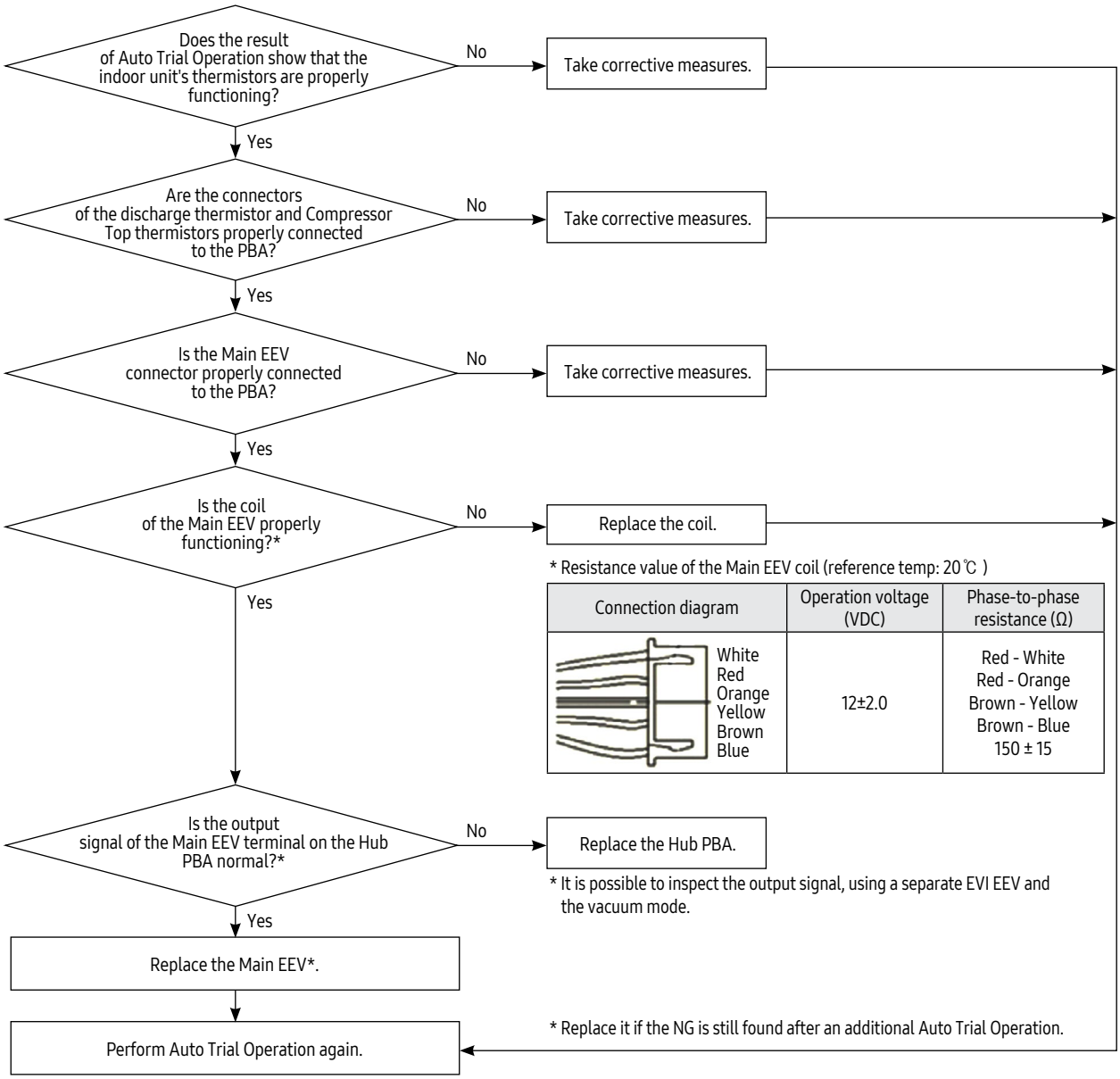
- To replace a component or inspect the PBA, be sure to cut off the power supply first.
  If inspection must be performed with the power supply on, exercise extra care to prevent electric shock.

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.



* Resistance value of the Main EEV coil (reference temp: 20℃)

Connection diagram	Operation voltage (VDC)	Phase-to-phase resistance (Ω)
White Red Orange Yellow Brown Blue	12±2.0	Red - White Red - Orange Brown - Yellow Brown - Blue 150 ± 15

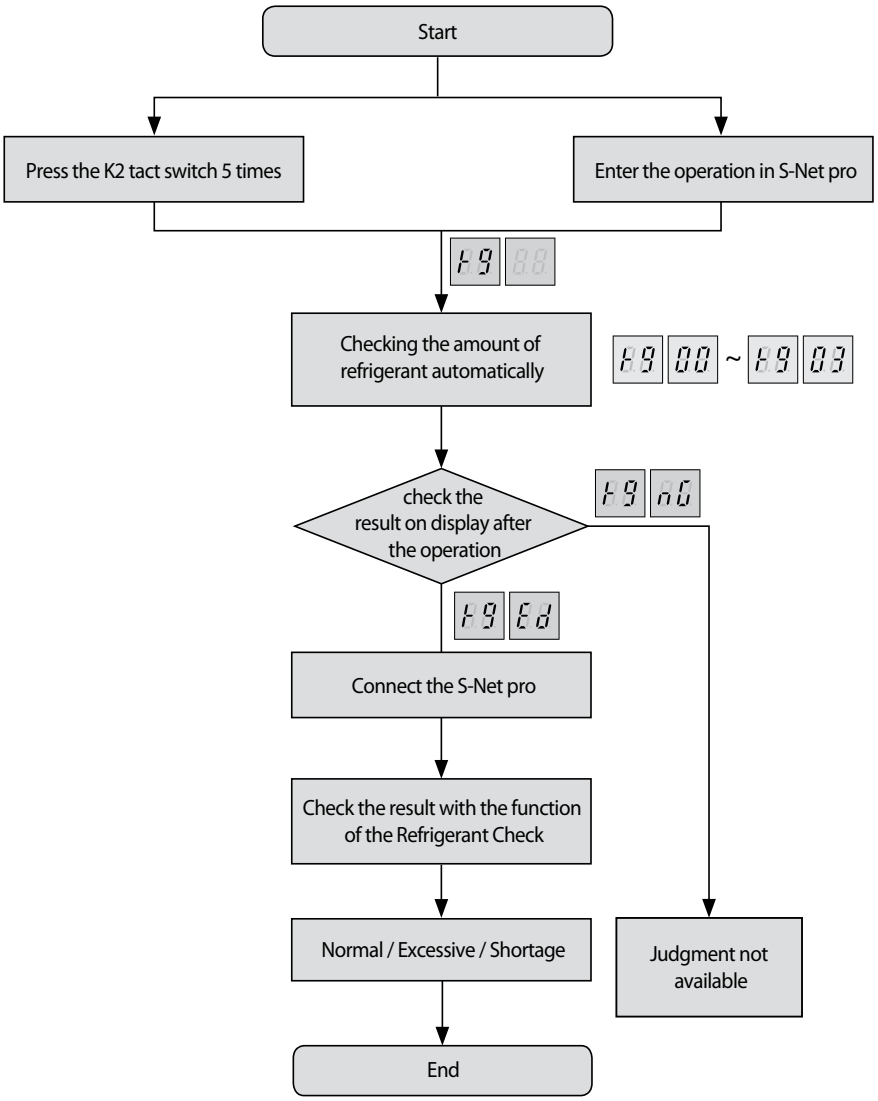
* It is possible to inspect the output signal, using a separate EVI EEV and the vacuum mode.

■ 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

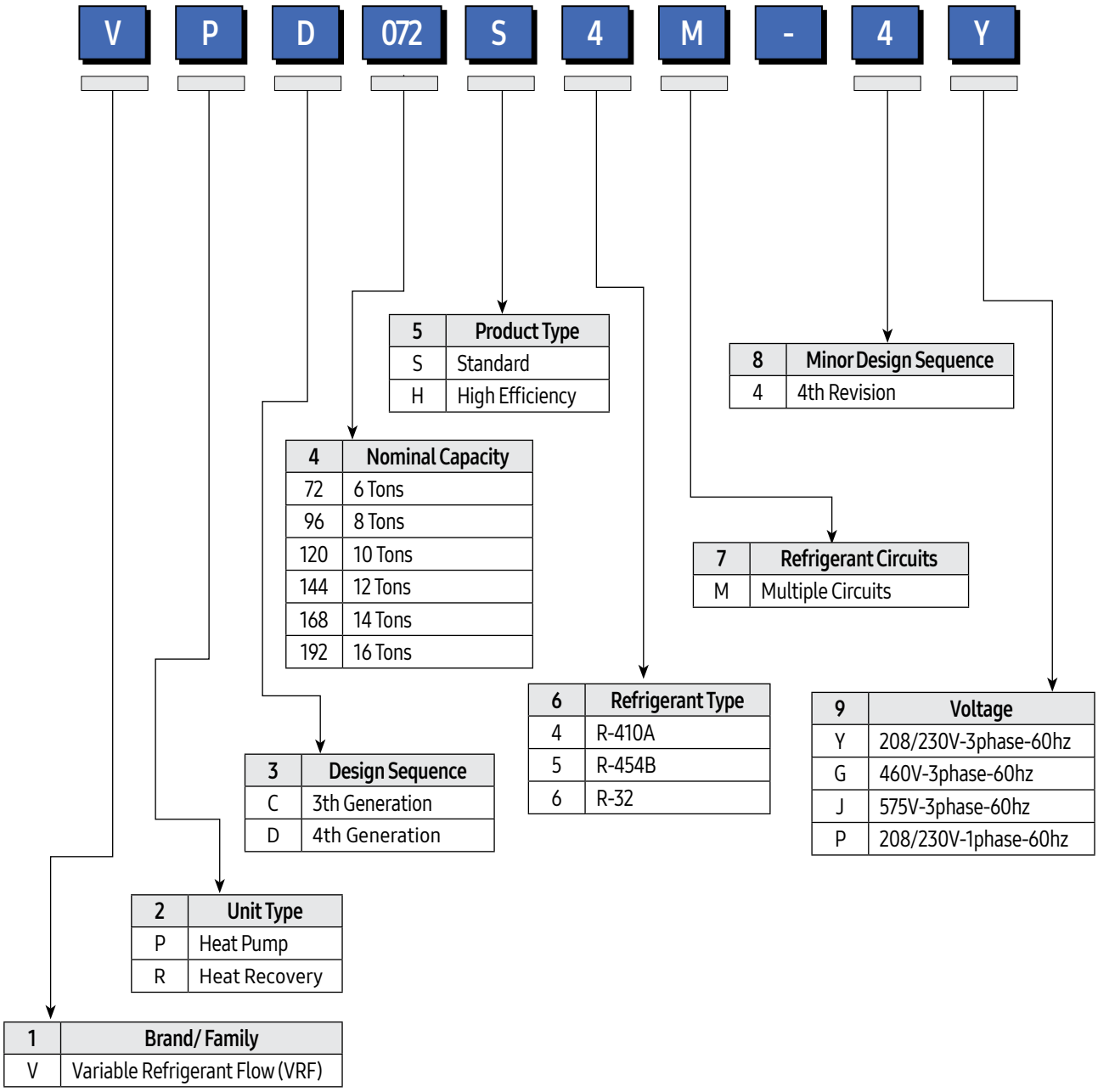
- If the temperature is out of the guaranteed range below, exact will not be obtained.
  - Indoor: 20~32°C
  - Outdoor: 5~43°C
- If the operation cycle is not stable, the operation of refrigerant amount check may be forcibly finished.
- Accuarcy of the rsult may decrease if the product has not been operated for a long period of time or Heat mode has beem operated before running the funtion of refrigerant amount check. Therefore, use for the function of refrigerant amount check after operating the product in Cool mode for at least 30 minutes.
- Product may trigger system protection operaion depending on the installation environment. In this case, the result of refrigerant amount check may not be accurate.

Actionto take for the check result

- Excessive amount of refrigerant
  - Discharge 10% of total amount of refrigerant and restart the refrigerant amount check.
- Insufficient amount of refrigerant
  - Add 10% of total amount of refrigerant and restart the refrigerant amount check.
- Judgment not available
  - Check if the function of refrigerant amount check id executed within the guaranteed temperature range. Run trial operation to check if there are other problems on system.

10. Nomenclature

10-1 OUTDOOR UNIT



1	Brand/ Family
V	Variable Refrigerant Flow (VRF)

2	Unit Type
P	Heat Pump
R	Heat Recovery

3	Design Sequence
C	3th Generation
D	4th Generation

4	Nominal Capacity
72	6 Tons
96	8 Tons
120	10 Tons
144	12 Tons
168	14 Tons
192	16 Tons

5	Product Type
S	Standard
H	High Efficiency

6	Refrigerant Type
4	R-410A
5	R-454B
6	R-32

7	Refrigerant Circuits
M	Multiple Circuits

8	Minor Design Sequence
4	4th Revision

9	Voltage
Y	208/230V-3phase-60hz
G	460V-3phase-60hz
J	575V-3phase-60hz
P	208/230V-1phase-60hz

LENNOX

Powered by SAMSUNG

CODE NO. AC-00356E_1