VRV Inverter K Series
VRV™ PLUS Series

1. Introduction

1.1 Safety Cautions

Cautions and Warnings

- Be sure to read the following safety cautions before conducting repair work.
- The caution items are classified into " ⚠ **Warning**" and " ⚠ **Caution**". The " ⚠ **Warning**" items are especially important since they can lead to death or serious injury if they are not followed closely. The " ⚠ **Caution**" items can also lead to serious accidents under some conditions if they are not followed. Therefore, be sure to observe all the safety caution items described below.
- About the pictograms
  - △ This symbol indicates an item for which caution must be exercised. The pictogram shows the item to which attention must be paid.
  - ◯ This symbol indicates a prohibited action. The prohibited item or action is shown inside or near the symbol.
  - ● This symbol indicates an action that must be taken, or an instruction. The instruction is shown inside or near the symbol.
- After the repair work is complete, be sure to conduct a test operation to ensure that the equipment operates normally, and explain the cautions for operating the product to the customer

1.1.1 Caution in Repair.

⚠ Warning	
Be sure to disconnect the power cable plug from the plug socket before disassembling the equipment for a repair. Working on the equipment that is connected to a power supply can cause an electrical shook. If it is necessary to supply power to the equipment to conduct the repair or inspecting the circuits, do not touch any electrically charged sections of the equipment.	
If the refrigerant gas discharges during the repair work, do not touch the discharging refrigerant gas. The refrigerant gas can cause frostbite.	
When disconnecting the suction or discharge pipe of the compressor at the welded section, release the refrigerant gas completely at a well-ventilated place first. If there is a gas remaining inside the compressor, the refrigerant gas or refrigerating machine oil discharges when the pipe is disconnected, and it can cause injury.	
If the refrigerant gas leaks during the repair work, ventilate the area. The refrigerant gas can generate toxic gases when it contacts flames.	
The step-up capacitor supplies high-voltage electricity to the electrical components of the outdoor unit. Be sure to discharge the capacitor completely before conducting repair work. A charged capacitor can cause an electrical shock.	
Do not start or stop the air conditioner operation by plugging or unplugging the power cable plug. Plugging or unplugging the power cable plug to operate the equipment can cause an electrical shock or fire.	

⚠ Caution	
Do not repair the electrical components with wet hands. Working on the equipment with wet hands can cause an electrical shock.	
Do not clean the air conditioner by splashing water. Washing the unit with water can cause an electrical shock.	
Be sure to provide the grounding when repairing the equipment in a humid or wet place, to avoid electrical shocks.	
Be sure to turn off the power switch and unplug the power cable when cleaning the equipment. The internal fan rotates at a high speed, and cause injury.	
Do not tilt the unit when removing it. The water inside the unit can spill and wet the furniture and floor.	
Be sure to check that the refrigerating cycle section has cooled down sufficiently before conducting repair work. Working on the unit when the refrigerating cycle section is hot can cause burns.	
Use the welder in a well-ventilated place. Using the welder in an enclosed room can cause oxygen deficiency.	

1.1.2 Cautions Regarding Products after Repair

⚠ Warning	
Be sure to use parts listed in the service parts list of the applicable model and appropriate tools to conduct repair work. Never attempt to modify the equipment. The use of inappropriate parts or tools can cause an electrical shock, excessive heat generation or fire.	
When relocating the equipment, make sure that the new installation site has sufficient strength to withstand the weight of the equipment. If the installation site does not have sufficient strength and if the installation work is not conducted securely, the equipment can fall and cause injury.	
Be sure to install the product correctly be using the provided standard installation frame. Incorrect use of the installation frame and improper installation can cause the equipment to fall, resulting in injury.	For integral units only
Be sure to install the product securely in the installation frame mounted on a window frame. If the unit is not securely mounted, it can fall and cause injury.	For integral units only
Be sure to use an exclusive power circuit for the equipment, and follow the technical standards related to the electrical equipment, the internal wiring regulations and the instruction manual for installation when conducting electrical work. Insufficient power circuit capacity and improper electrical work can cause an electrical shock on fire.	
Be sure to use the specified cable to connect between the indoor and outdoor units. Make the connections securely and route the cable properly so that there is no force pulling the cable at the connection terminals. Improper connections can cause excessive heat generation or fire.	

⚠ Warning	
When connecting the cable between the indoor and outdoor units, make sure that the terminal cover does not lift off or dismount because of the cable. If the cover is not mounted properly, the terminal connection section can cause an electrical shock, excessive heat generation or fire.	
Do not damage or modify the power cable. Damaged or modified power cable can cause an electrical shock or fire. Placing heavy items on the power cable, and heating or pulling the power cable can damage the cable.	
Do not mix air or gas other than the specified refrigerant (R22) in the refrigerant system. If air enters the refrigerating system, an excessively high pressure results, causing equipment damage and injury.	
If the refrigerant gas leaks, be sure to locate the leak and repair it before charging the refrigerant. After charging refrigerant, make sure that there is no refrigerant leak. If the leak cannot be located and the repair work must be stopped, be sure to perform pump-down and close the service valve, to prevent the refrigerant gas from leaking into the room. The refrigerant gas itself is harmless, but it can generate toxic gases when it contacts flames, such as fan and other heaters, stoves and ranges.	
When replacing the coin battery in the remote controller, be sure to disposed of the old battery to prevent children from swallowing it. If a child swallows the coin battery, see a doctor immediately.	

⚠ Caution	
Installation of a leakage breaker is necessary in some cases depending on the conditions of the installation site, to prevent electrical shocks.	
Do not install the equipment in a place where there is a possibility of combustible gas leaks. If a combustible gas leaks and remains around the unit, it can cause a fire.	
Be sure to install the packing and seal on the installation frame properly. If the packing and seal are not installed properly, water can enter the room and wet the furniture and floor.	For integral units only

1.1.3 Inspection after Repair

⚠ Warning	
Check to make sure that the power cable plug is not dirty or loose, then insert the plug into a power outlet all the way. If the plug has dust or loose connection, it can cause an electrical shock or fire.	
If the power cable and lead wires have scratches or deteriorated, be sure to replace them. Damaged cable and wires can cause an electrical shock, excessive heat generation or fire.	
Do not use a joined power cable or extension cable, or share the same power outlet with other electrical appliances, since it can cause an electrical shock, excessive heat generation or fire.	

⚠ Caution	
Check to see if the parts and wires are mounted and connected properly, and if the connections at the soldered or crimped terminals are secure. Improper installation and connections can cause excessive heat generation, fire or an electrical shock.	

Caution	
If the installation platform or frame has corroded, replace it. Corroded installation platform or frame can cause the unit to fall, resulting in injury.	
Check the grounding, and repair it if the equipment is not properly grounded. Improper grounding can cause an electrical shock.	
Be sure to measure the unsulation resistance after the repair, and make sure that the resistance is 1 Mohm or higher. Faulty insulation can cause an electrical shock.	
Be sure to check the drainage of the indoor unit after the repair. Faulty drainage can cause the water to enter the room and wet the furniture and floor.	

1.1.4 Using Icons

Icons are used to attract the attention of the reader to specific information. The meaning of each icon is described in the table below:

1.1.5 Using Icons List

Icon	Type of Information	Description
 Note:	Note	A “note” provides information that is not indispensable, but may nevertheless be valuable to the reader, such as tips and tricks.
 Caution	Caution	A “caution” is used when there is danger that the reader, through incorrect manipulation, may damage equipment, loose data, get an unexpected result or has to restart (part of) a procedure.
 Warning	Warning	A “warning” is used when there is danger of personal injury.
	Reference	A “reference” guides the reader to other places in this binder or in this manual, where he/she will find additional information on a specific topic.

1.2 PREFACE

The VRV System Inverter K Series is designed for easy installation and maintenance. Although it has all the features of the previous VRV System Inverter Series, the equipment has been modified so the same wiring is used for transmission between indoor/outdoor units and centralized control, and can now be connected with a central remote controller.

This maintenance manual was published in order to help you get a solid understanding of these functions, and so you can provide fast and reliable after sales service. Although the contents of the manual may be insufficient in some areas, we hope that you will use it to the best of your ability.

The service manual for the VRV K Series Heat Recovery System (with scroll type compressor) explains the new methods (super piping and super wiring) featured by the system in four sections: Outline, Functions, Test Operation and Troubleshooting.

If you find the manual to be insufficient in any of its explanations, please let us know so we can improve on later editions.

Oct. 1999

After Sales Service Division

This service manual explains the outdoor unit base.

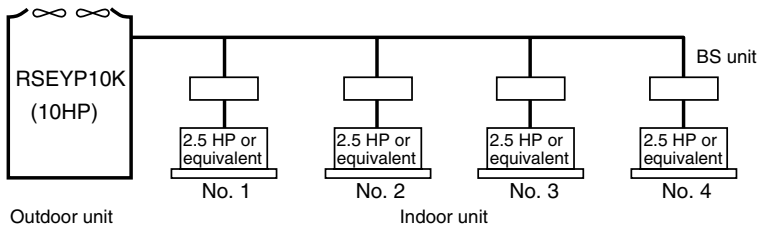
Part1
General Information
Inverter K Series

1. Outline

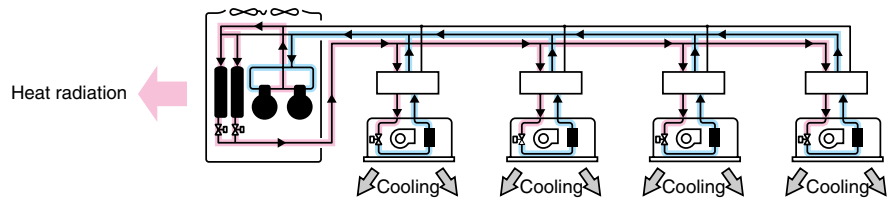
1.1 System Outline

- Allows individual control of different types of indoor units with varying capacities totaling 50 to 130% of the outdoor unit capacity.
  * When total indoor capacity exceeds 100%, indoor unit operating capacity may decrease slightly if all indoor units are operated at the same time.
- Indoor units ranging from the smallest 20 type (0.8 HP).
- Flexible refrigerant piping: equivalent length of 125 m, actual length of 100 m, outdoor unit height difference of 50 m, and height difference of 15 m between indoor units.

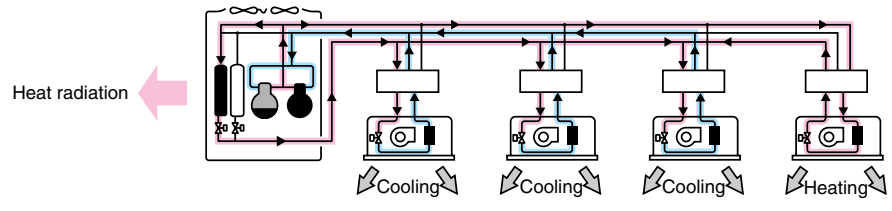
System outline & operation mode



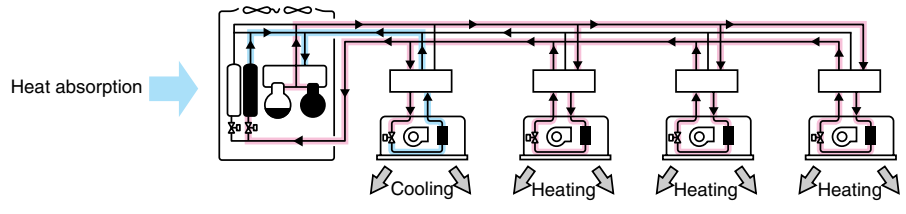
(A) All units in cooling operation



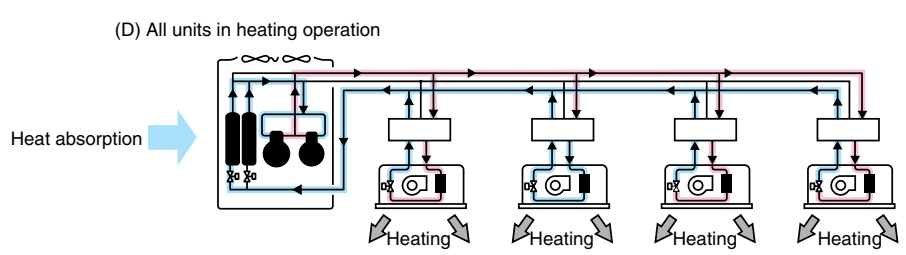
(B) Most units in cooling operation. and a few units in heating operation



(C) Most units in heating operation, and a few units in cooling operation

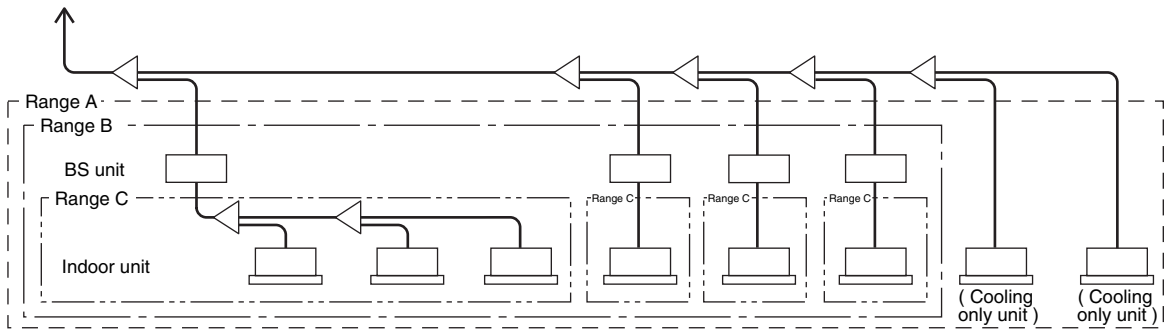


(D) All units in heating operation



* Outside temperature of 35˚C for operation mode (A), 0˚C for operation mode (D), and typical seasonal outside temperatures for others.

1.2 Allowed Range of Indoor Unit and BS Unit Connection



■ Arrange systems to conform below conditions referring to above diagram.

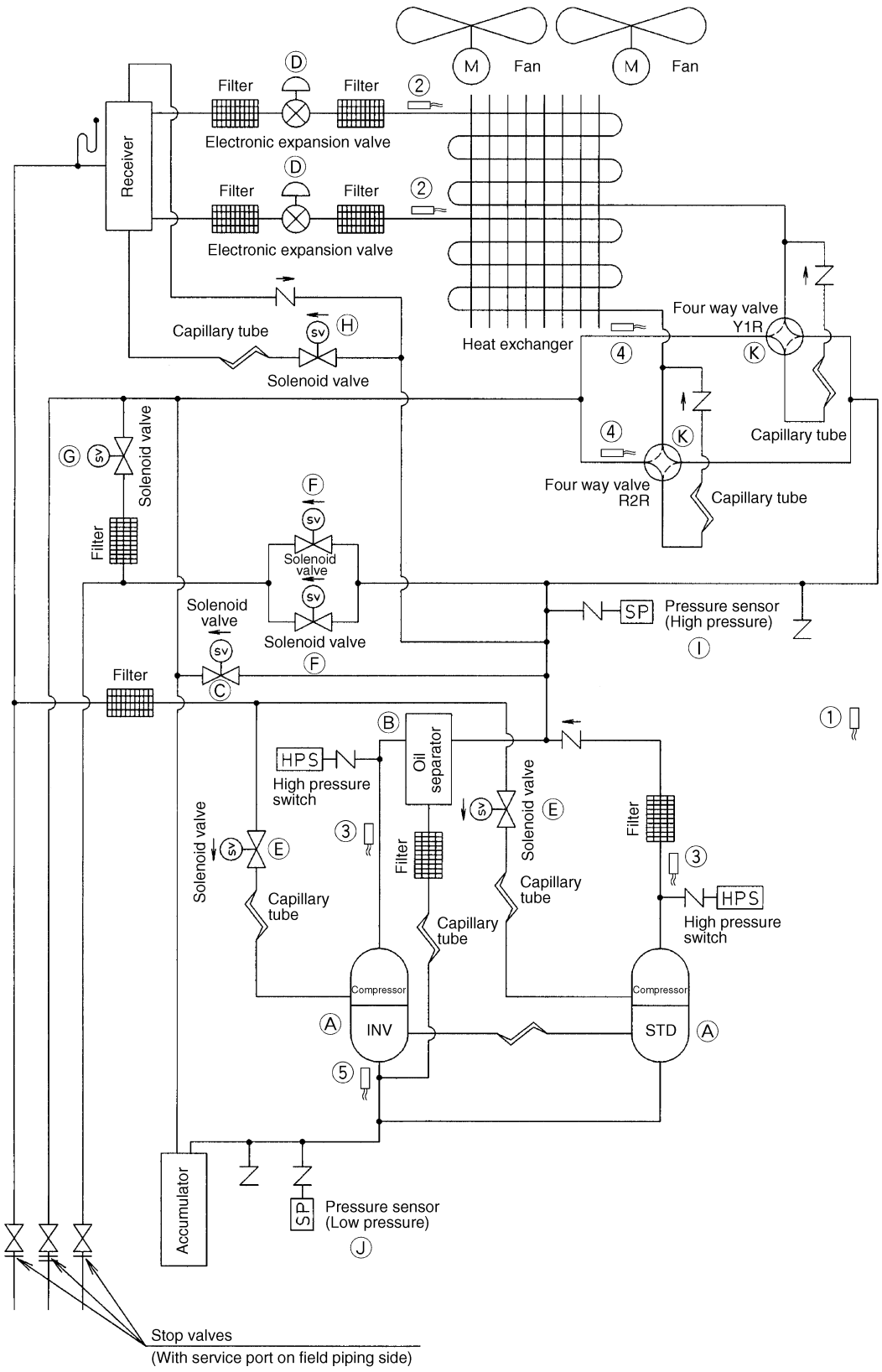
Range	Item	Model of outdoor unit and BS unit	Total capacity of connectable indoor units	Max. number of connectable indoor units
Range A	Total indoor unit capacity	RSEY8KLY1	11.2 to 29.1kW	13 units
		RSEY10KLY1	14 to 36.4kW	16 units
Range B	Total indoor unit capacity allowed for simultaneous cooling/heating operations	RSEY8KLY1	11.2kW or more	13 units
		RSEY10KLY1	14kW or more	16 units
Range C	Total indoor unit capacity allowed for connection to BS unit	BSV100KLV1	less than 11.2kW	5 units or less
		BSV160KLV1	11.2 to 18kW	6 units or less
		BSV250KLV1	18 to 28kW	16 units or less

Part2
Functions
Inverter K Series

1. Functions

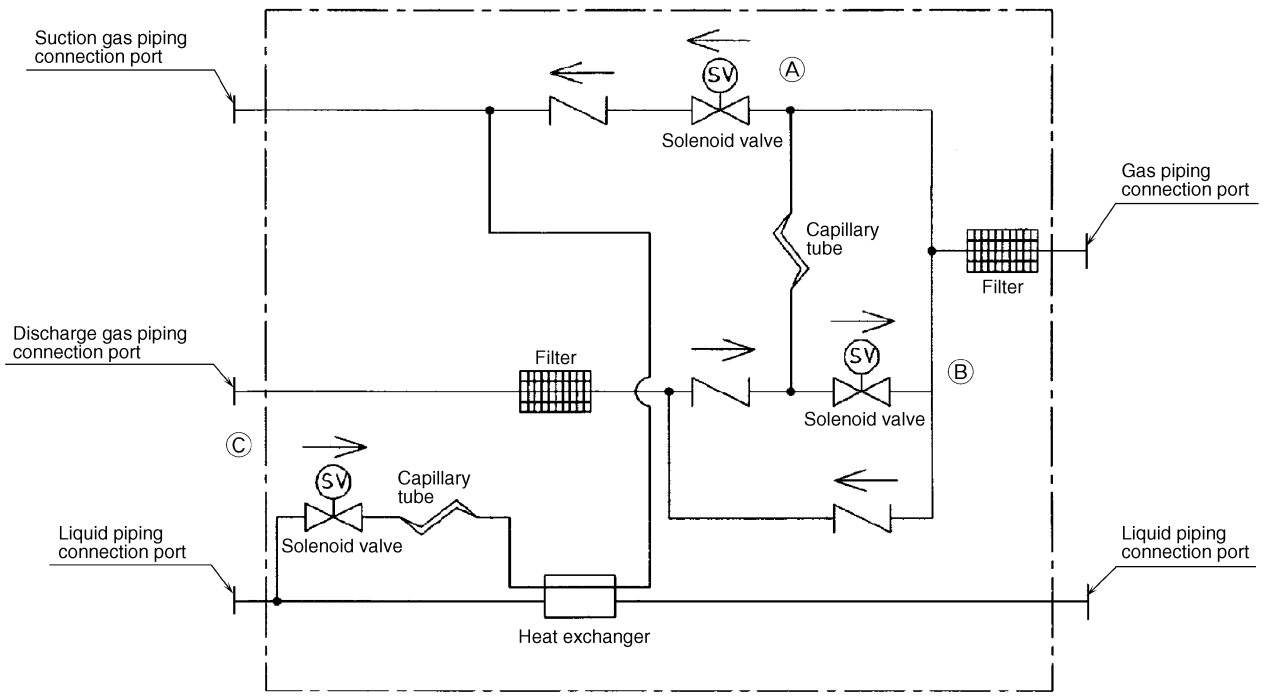
1.1 Outdoor Unit Refrigerant Diagrams

RSEY8K, 10KLY1



A. Compressor
The 20-step capacity control is achieved by the inverter scroll compressor that uses an inverter for frequency control in a range of 30 to 116 Hz and the standard scroll compressor that uses commercial power supply. The compressors allow individual control of indoor units and linear control.
(M1C : inverter compressor, M2C : standard compressor)
B. Oil separator
This device collects oil discharged from the compressors. The device receives oil and sends recovered oil to the compressors through the capillary tube.
C. Solenoid valve (for hot gas bypass) Y2S
This valve maintains balance between the high and low pressure sides when the equipment stops, thus reducing compressor load in the next startup.
This valve is activated by a low-pressure protection control function and opens when the low-pressure side decreases in pressure.
D. Outdoor unit electronic expansion valves Y1E, Y2E
These expansion valves are activated during heating operation.
They detect the compressor suction pipe temperature and low pressure equivalent saturation temperature and control superheat.
(Y1E : for primary-side heat exchanger, Y2E : for secondary-side heat exchanger)
E. Solenoid valve (injection) Y3S, Y4S
Controls injection solenoid valve ON-OFF in order to prevent overheating.
Y3S : for inverter side compressor
Y4S : for standard side compressor
F. Solenoid valve (discharge gas) Y5S, Y7S
Valve is opened during heating and simultaneous cooling and heating operations.
G. Solenoid valve (for pressure equalization) Y1S
This valve maintains pressure balance before and after the BS unit solenoid valve during cooling and heating operation mode change.
H. Solenoid valve (for liquid pressure) Y6S
This valve opens a bypass to send hot gas to the receiver and controls the liquid pressure.
I. Pressure sensor (high pressure ··· red) SENPH
This semiconductor pressure sensor detects discharge pressure. The detected refrigerant pressure is used to evaluate the operation conditions of indoor units.
Heating operation ··· The sensor detects high pressure and controls the compressor capacity.
J. Pressure sensor (low pressure ··· blue) SENPL
This semiconductor pressure sensor detects suction pressure. The detected refrigerant pressure is used to evaluate the operation conditions of indoor units.
Cooling operation ··· The sensor detects low pressure and controls the compressor capacity.
Heating operation ··· The sensor provides superheat control.
K. 4-way valves Y1R, Y2R
(Y1R : for primary-side heat exchanger, Y2R: for secondary-side heat exchanger)
1. Outside temperature thermistor R1T
Heating operation ··· Used as a function of defrost IN condition.
The thermostat turns off when the temperature exceeds 23˚C.
2. Coil temperature thermistors R2-1T, R2-2T
(R2-1T : for primary-side heat exchanger, R2-2T : for secondary-side heat exchanger)
Cooling operation ··· Not used.
Heating operation ··· Used as a function of defrost IN condition, in combination with the outside temperature data.
3. Discharge temperature thermistors R3-1T, R3-2T
These thermistors are used for compressor discharge temperature protection.
(R3-1T : inverter compressor, R3-2T : standard compressor)
4. Suction pipe temperature thermistors R4-1T, R4-2T
These thermistors are used for compressor discharge temperature protection.
(R4-1T : for primary-side heat exchanger, R4-2T : for secondary-side heat exchanger)
5. Oil temperature thermistor R5T
During defrost and oil return operation, provides upper-limit frequency control to improve oil diluting condition.

BSV100KLV1



A. Solenoid valve (suction side) Y2S
This solenoid valve turns ON when normal cooling operation and discharge/suction oil return operation. (Connect indoor unit gas pipe and outdoor unit suction pipe.)

B. Solenoid valve (discharge side) Y3S
Turn ON this valve to operate of discharge oil return when indoor unit is set for heating. (Connect indoor unit gas pipe and outdoor unit discharge pipe.)

C. Solenoid valve (Drift prevention injection) Y1S
The only valve in BS unit of which indoor unit is in heating operation when simultaneous cooling/heating operation is applied in the same system

∗ **Impossible to replace solenoid valve main body.**

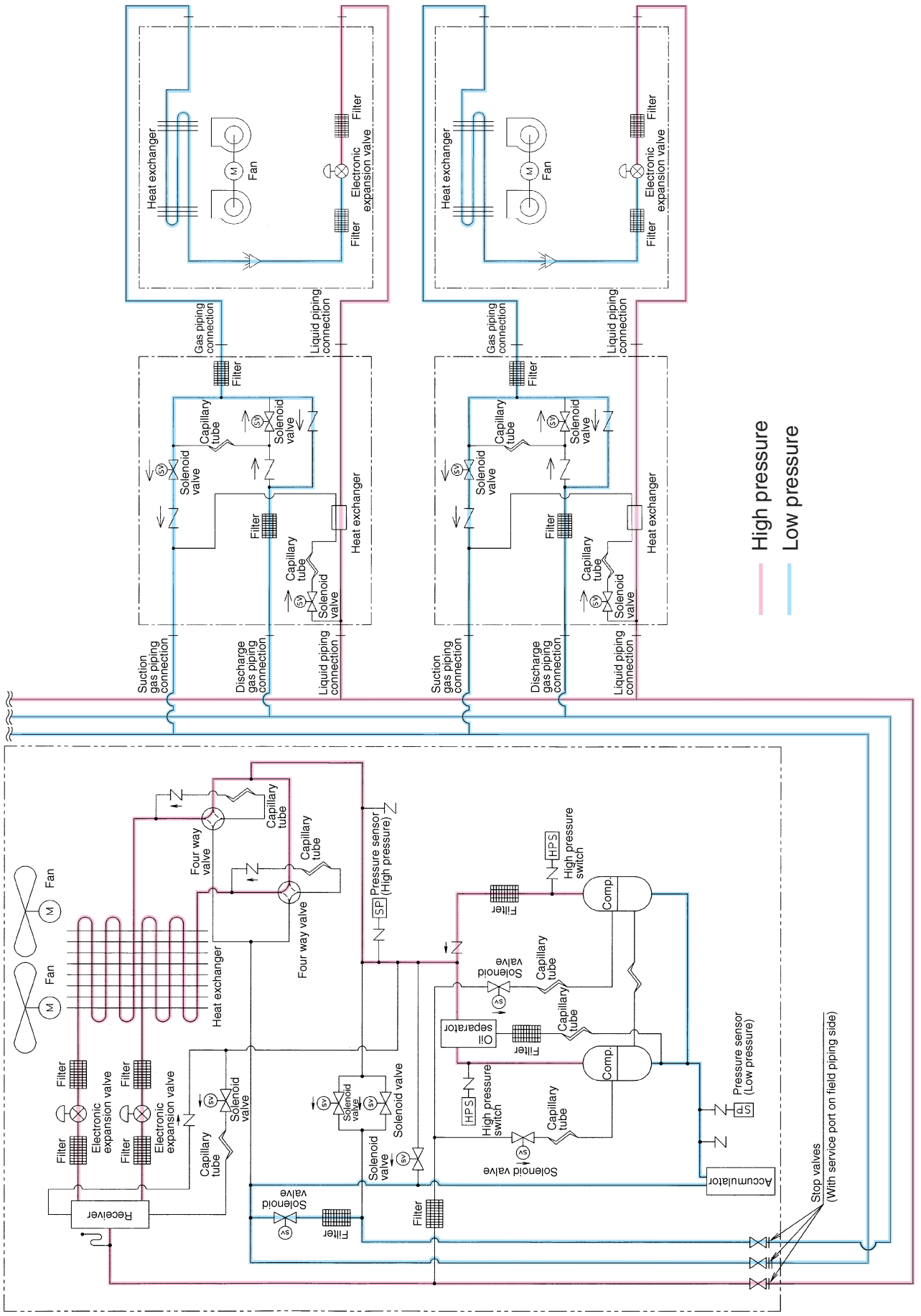
1.2 List of Safety Devices and Functional Parts Setting Values

1.2.1 Outdoor Unit RSEY8·10KLY1(E) (8 · 10HP)

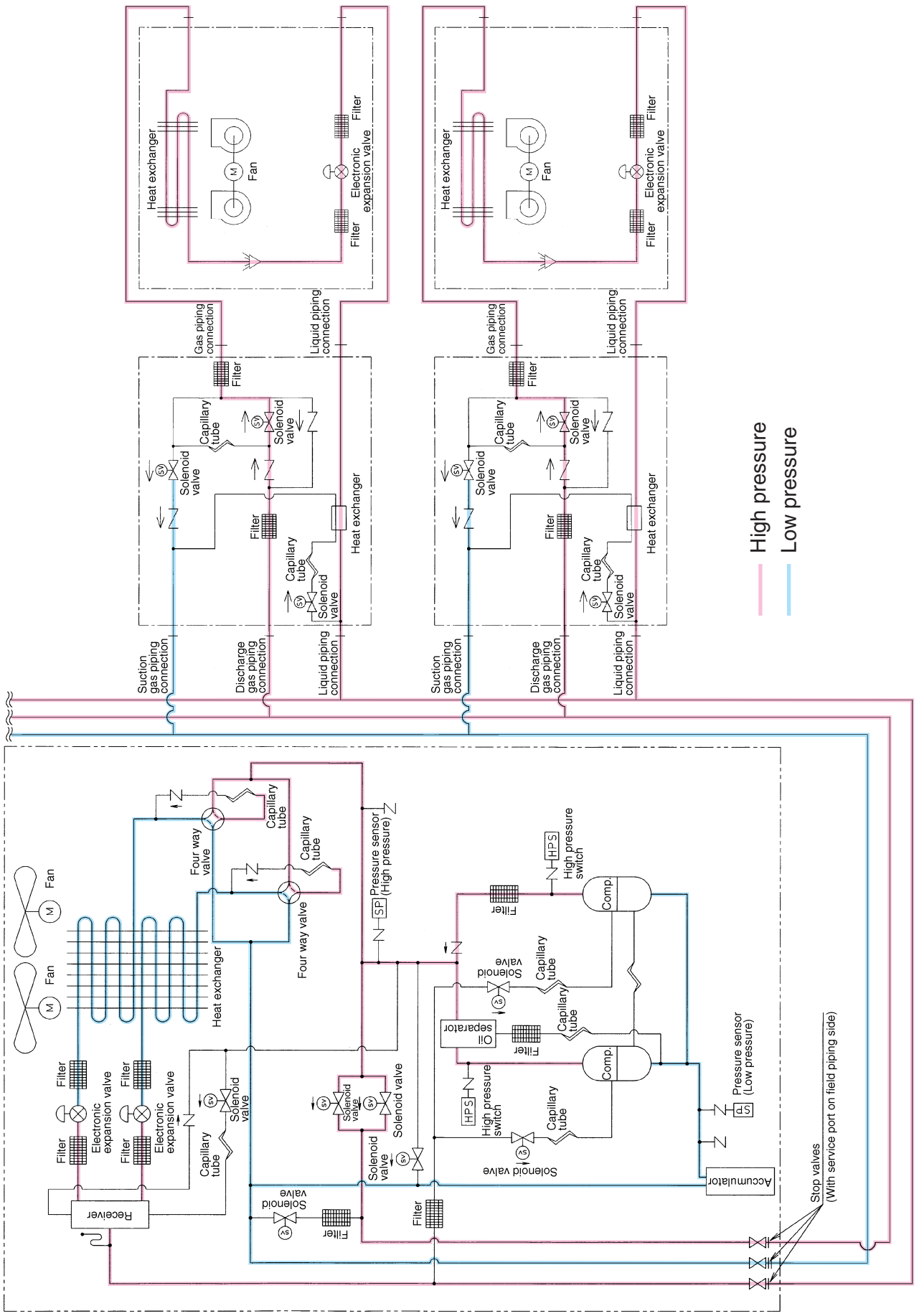
Item	Symbol	Name			Type			
					RSEY8KLY1(E)		RSEY10KLY1(E)	
Compressor		Inverter side Model Output	Y1	INV	JT100BAVTYE	3.5 kW	JT100BAVTYE	3.5 kW
				STD	JT100BATYE	2.2 kW	JT160BATYE	3.75kW
		Compressor safety thermostat			Discharge pipe thermistor 135˚C OFF			
	J1HC/ J2HC	Crank case heater			33W+33W			
	F2C	Over-current relay		Y1	HOE-20F-TRA1 10A		HOE-20F-TRA1 13A	
Safety device	Q1M Q2M	Fan motor			140W+230W			
		Safety thermostat			140W: Open 120 ± 5˚C, 230W: 135 ± 5˚C			
	S1HP	Pressure switch (for high pressure safety)			20SP-688-6 OFF: $27.5+0^{\sim}_{-1.0}$kg/cm^2 ON: 20.0+1.0~–1.0kg/cm^2			
	S2HP	Pressure switch (for high pressure safety)			20SP-688-6 OFF: $27.5+0^{\sim}_{-1.0}$kg/cm^2 ON: 20.0+1.0~–1.0kg/cm^2			
		Fusible plug			FPG-3D 70~75˚C			
Sensor	SENPH	Pressure sensor			PS8030A 0~30kg/cm^2 (0~2.94MPa)			
	SENPL	Pressure sensor			PS8030A 0~10kg/cm^2 (0~0.98MPa)			
	R1T	Thermistor (for outdoor air)			3.5~360KΩ			
	R2-1T R2-2T	Thermistor (for heat exchange)			3.5~360KΩ			
	R3-1T	Thermistor (for inverter discharge pipe)			3.5~400KΩ			
	R3-2T	Thermistor (for standard discharge pipe)			3.5~400KΩ			
	R4-1T R4-2T	Thermistor (for suction pipe)			3.5~360KΩ			
	R5T	Thermistor for inverter oil temperature)			3.5~360KΩ			
Other functions /parts	Y1E	Electronic expansion valve		When cooling	ON: 2,000 pulses (Fully open); OFF: 0 pulses (Fully closed)			
				When heating	ON: PI control; OFF: 0 pulses (Fully closed)			
	Y1S	Solenoid valve (pressure equalizing)			ST10D			
	Y2S	Solenoid valve (for hot gas bypass)			NEV603			
	Y3S	Solenoid valve (for inverter injection)			ST10D			
	Y4S	Solenoid valve (for standard injection)			ST10D			
	Y5S Y7S	Solenoid valve (for discharge gas)			NEV603			
	Y6S	Solenoid valve (for liquid pressure)			NEV603			

1.3 Flow of Refrigerant in Each Operation Mode

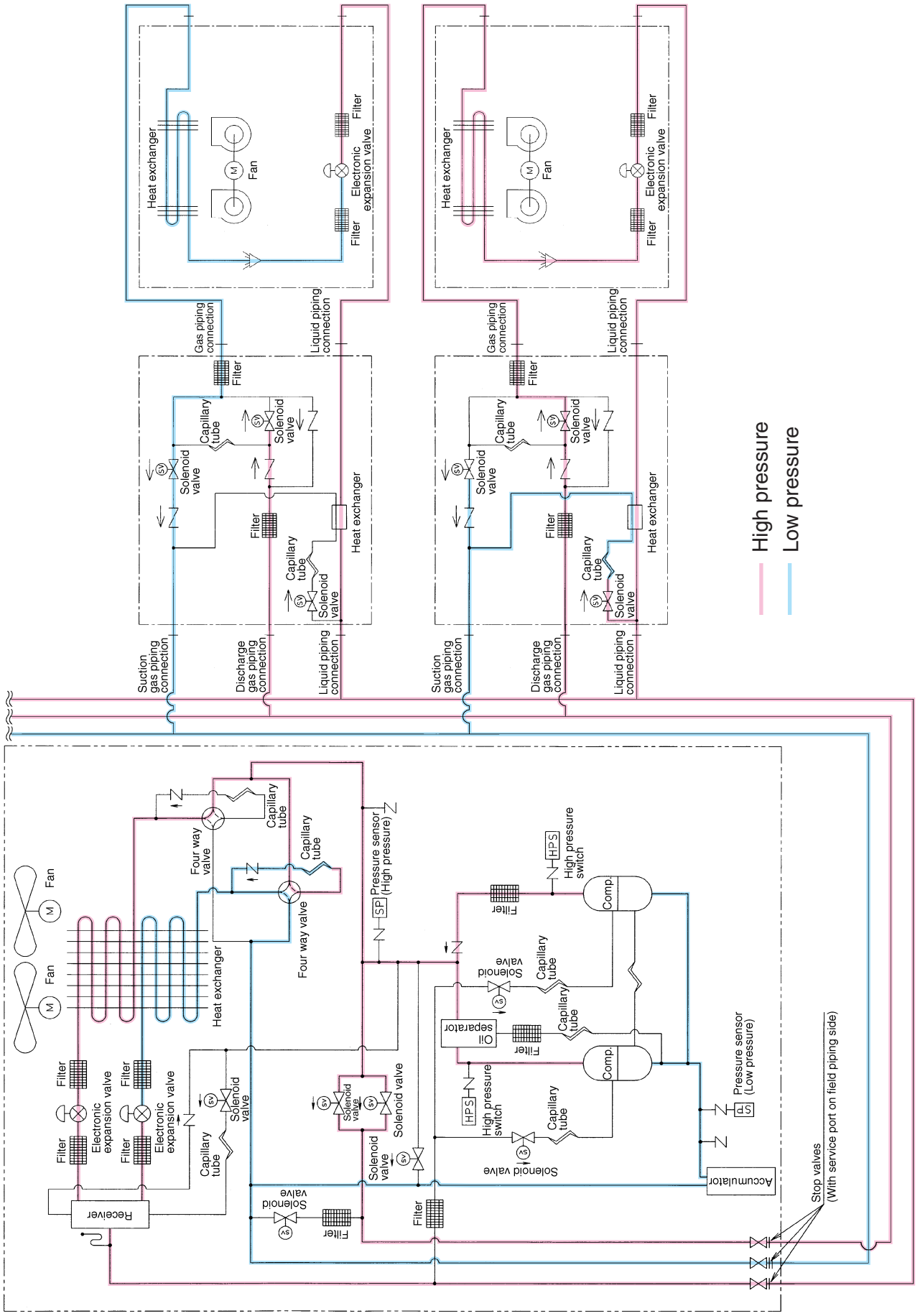
1.3.1 Cooling



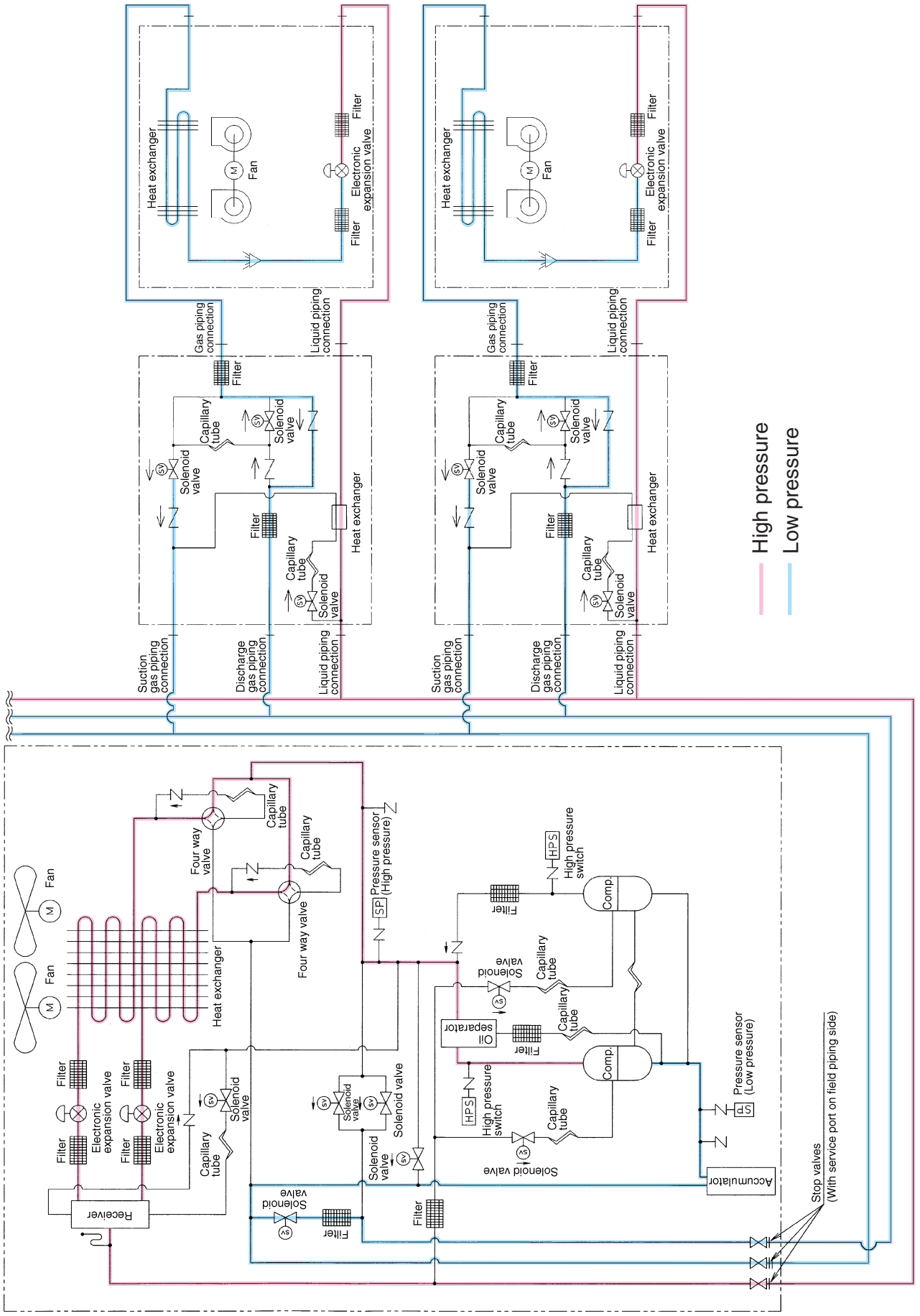
1.3.2 Heating



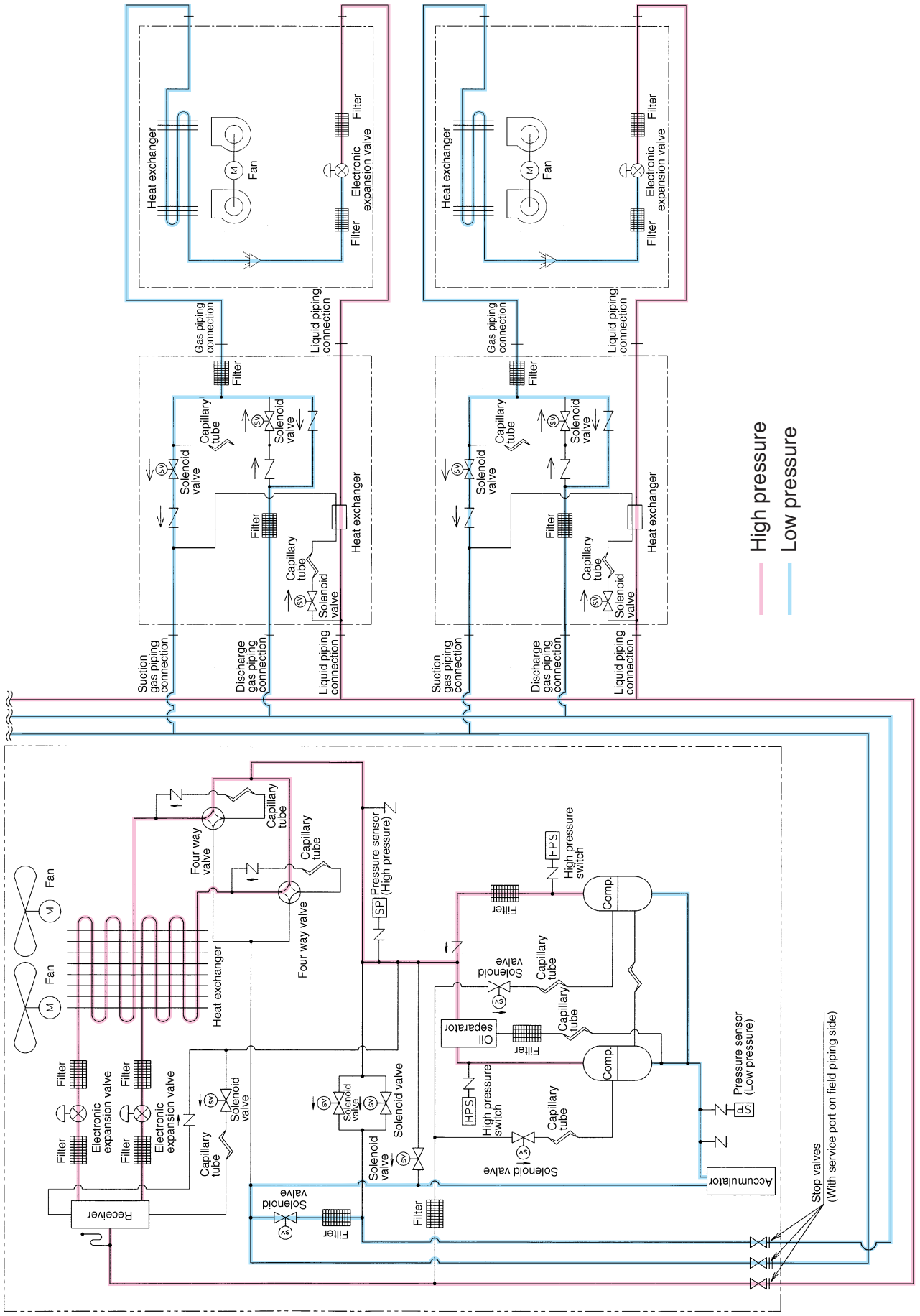
1.3.3 Simultaneous Cooling and Heating



1.3.4 Discharge Oil Return, Defrost



1.3.5 Suction Oil, Defrost



1.4 Outline of Control

1.4.1 Inverter Compressor, Motorized PI Control

1. Compressor PI control

■ Cooling operation
Controls TeS (target Te value) at constant ··· Constant-level control of Te (low pressure equivalent saturation temperature)
TeS = 5.5˚C

■ Heating operation
Controls TcS (target Tc value) at constant ··· Constant-level control of Tc (high pressure equivalent saturation temperature)
TcS = 48˚C

■ Simultaneous cooling/heating operations
Controls TeS and TcS at constant
TeS = 5.5˚C
TcS = 48˚C

∗ TeS setting values

L	M (Factory setting)	H
2.5	5.5	8.5

* TcS setting values

L	M (Factory setting)	H
43	46	49

2. Motorized valve PI control

Provides PI control for the motorized valves (Y1E and Y2E) to maintain a constant superheat (SH) level at the outlet of the outdoor heat exchanger (evaporator).
SHs = Ts - Te
SHs = 5˚C
∗ Ts1 :Suction pipe temperature (R4-1T)
Ts2: Suction pipe temperature (R4-2T)

3. Heat exchanger PI control

Provides PI control for the motorized valve (Y1E) to maintain TeS and TcS at constant.

Motorized valve mode

EV mode		Initial opening	Max. opening	Min. opening	Normal opening
1	Y1E	2000	2000	2000	Fixed at 2000
	Y2E	2000	2000	2000	Fixed at 2000
2	Y1E	2000	2000	1400	Heat exchanger PI control
	Y2E	0	0	0	Fixed at 0
3	Y1E	750	1400	100	Heat exchanger PI control
	Y2E	250	400	100	Motorized valve PI control
4	Y1E	0	0	0	Fixed at 0
	Y2E	700	1000	100	Motorized valve PI control
5	Y1E	700	2000	100	Motorized valve PI control
	Y2E	500	2000	100	Motorized valve PI control

Heat exchanger mode

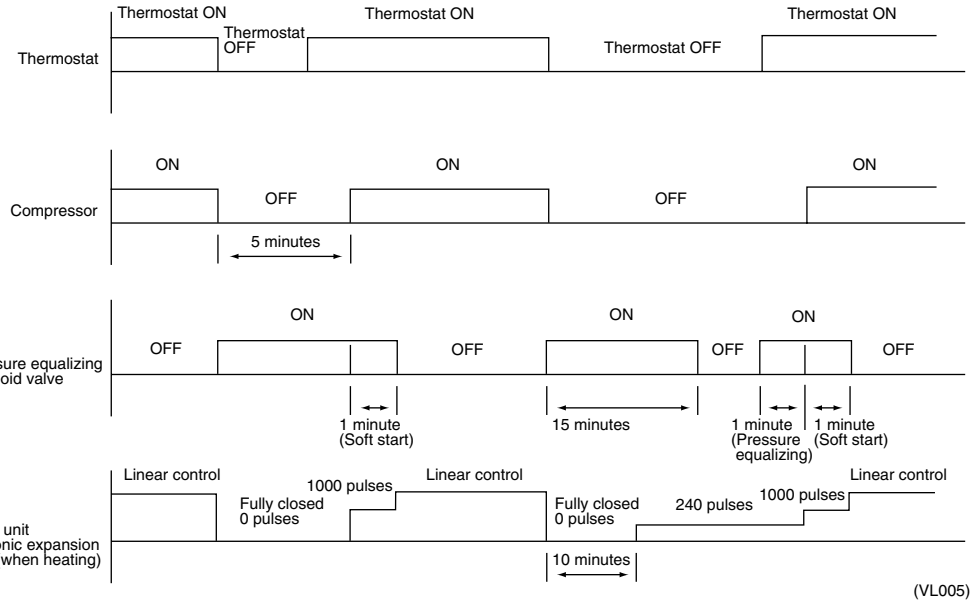
	Heat exchanger 1	Heat exchanger 2	FAN	EV mode
Cooling operation ↑	COND	COND	H + ON	1
	COND	COND	L + ON	1
	COND	COND	H + OFF	1
	COND	COND	L + OFF	1
	COND	EVAP	H + ON	2
	COND	EVAP	L + ON	2
	COND	EVAP	H + OFF	2
	COND	EVAP	L + OFF	2
	COND	EVAP	L + OFF	3
	COND	EVAP	L + OFF	4
	COND	EVAP	H + OFF	4
	COND	EVAP	H + ON	4
	EVAP	EVAP	L + OFF	4
	EVAP	EVAP	H + OFF	4
	EVAP	EVAP	H + ON	4
↓ Heat operation	EVAP	EVAP	H + ON	5

COND: Condenser
EVAP: Evaporator

1.5 Safety for Restart

1.5.1 Restart Safety Timer

The compressor will not run for five minutes by making forced thermostat OFF condition in order to prevent it from being turned on and off in rapid succession, and to equalize pressure in the refrigerant circuit. It however restarts automatically after five minutes passes if it is in thermostat ON condition. The pressure equalizing solenoid valve is actuated for 15 minutes after the compressor stops in order to equalize pressure.



If 15 minutes or more has elapsed since the compressor was turned off, turn the solenoid valve for equalizing pressure on for about 1 minute and equalize the pressure.

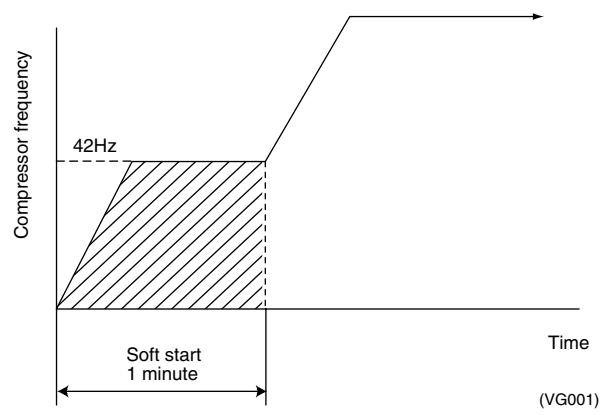
When heating, to prevent noise produced by the passing of indoor unit's refrigerant to equalize pressure after the compressor stops, fully close the indoor unit's electronic expansion valve for 10 minutes.

1.5.2 Soft Start

The following control is carried out to protect the compressor and inverter.

1. Operates at low frequency (fixed) for 1 minute after compressor starts. (Prevents liquid refrigerant backflow)
2. Hot gas bypass solenoid valves open and start low load.

Soft Start of Compressor



Frequency during soft start
42Hz+OFF

1.5.3 Pump Down Start

If the compressor stops running with refrigerant still remaining in the accumulator, in order to prevent wet operation at the next compressor starting, it will perform pump down start with a completely dry accumulator, then it will operate normally.

Pump down start should be performed if the unit is in any of the conditions given below when pressure equalizing control has been completed before start.
If R3-1T is less than 95˚C and the unit is in any of the following conditions.

- Within 10 minutes of the compressor starting
- Defrosting or during oil return
- Within 20 minutes of completion of defrost or oil return
- Outdoor air temperature (R1T) < 0ºC
- Oil temperature (R5T) < Te + 10ºC

Te : Low pressure equivalent saturated temperature

Operation During Pump Down Start

	← 11 min. 30 sec. →				
	1 min.	5 min.	30 sec.	30 sec.	4 min. 30 sec.
Compressor	42Hz+OFF	42Hz+OFF	30Hz+OFF		116Hz+OFF
Outdoor unit EV	0 pulses	0 pulses	0 pulses		150 pulses
Outdoor unit fan	H tap (H+ON)	H tap (H+ON)	H tap (H+ON)		H tap (H+ON)
Y2S	ON	ON	ON	OFF	ON/OFF (LP protection control)
Y3S, Y4S	ON	ON/OFF (Td protection control)	ON/OFF (Td protection control)		ON/OFF (Td protection control)

- Y2S: Hot gas bypass solenoid valve
- Y3S: Injection solenoid valve

1.5.4 Heating Lay-Up Start

If the compressor hasn't run for a long time and the refrigerant isn't circulated, foaming could cause a lack of oil when the compressor is started at the next time. It should therefore perform heating lay-up start to keep the low pressure from dropping too low in the following cases.

- First starting after being power ON.
- Starting after the compressor has been stopped or thermostat OFF for more than continuous 24 hours.

Operation During Heating Lay-Up Start

Make the compressor's upper limit frequency 60Hz (60Hz+OFF) for 10 minutes 20 seconds after the compressor starts.
∗ If the low pressure becomes < 1.5kg/cm^2 (0.147MPa) within 10 minutes after starting,
Y2S → ON
Outdoor EV → 0 pulses

1.6 Equalized Oil Level Operation (Equalized Oil Level between Twin Compressors)

If using two compressors (8, 10Hp) connected in parallel, oil level equalizing is carried out for 5 minutes if the cumulative running time of the standard compressor exceeds 2 hours in order to prevent lack of oil cause by difference in pressure inside the dome due to drift, and then reverts to normal operation.

Inverter compressor	Standard compressor
106Hz	OFF

∗ If oil pressure equalization is not achieved during 5 minutes by stopping or step down control, oil pressure equalization is carried out when the standard compressor starts running.

With an inverter compressor operation, however, if the standard compressor remains off for 10 minutes, the cumulative running time of the standard compressor is reset.

During equalized oil level operation with Y2R → ON, when low pressure < 2.0kg/cm^2, Y2S becomes ON.
(Reset at low pressure > 3.0kg/cm^2)

1.7 Oil Return Operation

In order to collect refrigeration oil held up in connecting piping, the compressor's operating time is counted, and oil return operation is carried out for 8 minutes 30 seconds every 8 hours (2 hour after turning on the power supply, and every 8 hours after that).
(When heating, the indoor unit's electric heater is tuned off one minute prior to oil return operation in preparation for oil return.)

Operation Contents

Preparation for Oil Return → (1 Minute Elapses)

Upper Limit Frequency Limited to 38Hz + ON

(VF014)

Step 1 → Discharge oil return

	k = kg/cm^2
Compressor	86Hz + OFF
EEV	2000pls
Outdoor Unit Fan	H + ON
Outdoor Unit Heat Exchanger	Condenser
4 Way Valve	OFF
Injection 1	Td Protection Control
Injection 2	OFF
Hot Gas	ON at Lp < 0.3k

↓ 4 Minutes Elapsed

Step 2 → Suction oil return

Compressor	86Hz + OFF
EEV	2000pls
Outdoor Unit Fan	H + ON
Outdoor Unit Heat Exchanger	Condenser
4 Way Valve	OFF
Injection 1	Td Protection Control
Injection 2	Td Protection Control
Hot Gas	ON at Lp < 0.3k

↓ 4 Minutes Elapsed
∗ Td : Discharge Pipe Temperature

Step 3 → BS solenoid valve changeover

Compressor	38Hz + OFF
EEV	2000pls
Outdoor Unit Fan	H + ON
Outdoor Unit Heat Exchanger	Condenser
4 Way Valve	OFF
Injection 1	Td Protection Control
Injection 2	OFF
Hot Gas	ON at Lp < 0.3k

↓ 30 Seconds Elapsed

Step 4 → Refrigerant is discharged from accumulator

Compressor	76Hz + OFF
EEV	Limit of Opening
Outdoor Unit Fan	H + ON
Outdoor Unit Heat Exchanger	Evaporater
4 Way Valve	ON
Injection 1	Td Protection Control
Injection 2	OFF
Hot Gas	Low Pressure Protection Control

↓ 5 Minutes Elapsed
Hp > 14k
R5T > Te + 10ºC
* Te : Low Pressure Equivalent Saturated Temperature

Normal Control

1.8 Defrost

Melts frost which might collect on outdoor heat exchangers during heating in order to recover their heat transfer performance.

Conditions for executing defrost

OR	**&**	At least 20 minutes have elapsed since completion of oil return or since compressor starts.
		High pressure < 20k (Tc = 52.4ºC)
		Compressor is running at least 30 minutes since completion of previous defrost.
		Either liquid pipe thermal detection temperature (R2-1T, R2-2T) < TºC for 5 minutes.
	&	Forced defrost test pin (MDS) is shorted.
		Liquid pipe thermal detection temperature (R2-1T, R2-2T) < 12.5ºC for all units
		High pressure < 20k (Tc = 52.4ºC)

∗ Tc : High pressure equivalent saturated temperature

T = C × (Outdoor temp.) – α
(C is constant)
C : Tair ≤ 0˚C → 0.8
Tair > 0˚C → 0.6
∗ Tair = Outdoor air temperature

The values of (α) according to defrost temperature changeover switch are given in the table below.

Switch position LED (H4P, H5P, H6P, H7P)	L (● ● ● ○)	M (● ● ○ ●)	H (● ○ ● ●)
(deg)	12	10	8

Therefore, if outdoor temperature is 0˚C:
(1) If position L, Tcoil (R2-1T, R2-2T) ≤ -12˚C
(2) If position M, Tcoil (R2-1T, R2-2T) ≤ -10˚C
(3) If position H, Tcoil (R2-1T, R2-2T) ≤ -8˚C
Because defrost operation is carried out, set to the “H” position if frost builds up easily, and set to “L” if not.
Factory set is position “M.”

Operation Contents

Preparation for Defrost → (1 Minute Elapses)

Upper Limit Frequency Limited to 38Hz + ON

(VF015)

Step 1 → Discharge defrost — k = kg/cm²

Compressor	86Hz + OFF
EEV	2000pls
Outdoor Unit Fan	OFF + OFF
Outdoor Unit Heat Exchanger	Condenser
4 Way Valve	OFF
Injection 1	Td Protection Control
Injection 2	OFF
Hot Gas	ON

↓ 3 Minutes Elapsed

Step 2 → Suction defrost

Compressor	86Hz + OFF
EEV	2000pls
Outdoor Unit Fan	OFF + OFF
Outdoor Unit Heat Exchanger	Condenser
4 Way Valve	OFF
Injection 1	Td Protection Control
Injection 2	Td Protection Control
Hot Gas	ON

↓ Conclution of Defrost Completion Condition

or
- All of R2-1T, R2-2T ≥ 12.5ºC
- Pc > 20.5k
- 10 Minutes Elapsed Since Defrost Operation Start

Step 3 → BS solenoid valve changeover

Compressor	38Hz + OFF
EEV	2000pls
Outdoor Unit Fan	OFF + OFF
Outdoor Unit Heat Exchanger	Condenser
4 Way Valve	OFF
Injection 1	Td Protection Control
Injection 2	OFF
Hot Gas	ON

↓ 40 Seconds Elapsed

Step 4 → Refrigerant is discharged from accumulator

Compressor	76Hz + OFF
EEV	Limit of EV Opening
Outdoor Unit Fan	H + ON
Outdoor Unit Heat Exchanger	Evaporator
4 Way Valve	ON
Injection 1	Td Protection Control
Injection 2	OFF
Hot Gas	Low Pressure Protection Control

↓

or
- 5 Minutes Elapsed
- Pc > 14k
- R5T > Te + 10ºC

Normal Control

∗Pc = Condensing Pressure

1.9 Pressure Equalization Control

The discharge gas and suction gas pipes are bypassed to eliminate differential pressure between the inlet and outlet of the solenoid valve during BS unit's solenoid switching operations.

■ Equalizing operation demand → Pressure equalization solenoid valve (Y1S) is ON at following conditions.

&	Operating condition of indoor unit with thermostat ON is different from the condition of BS unit's solenoid valve (see page 25).
	Not in startup control.
	Liquid refrigerant not being discharged from accumulator.
	Not in residual pump-down operation.
	7 minutes passed after completion of previous pressure equalizing control operation.
	Not in oil return control
	Not in defrost operation

1.10 Frequency Limit Control by Pressure Equalization

The compressor operating capacity is limited to prevent abnormal noise caused by the equalizing operation.
Operating conditions

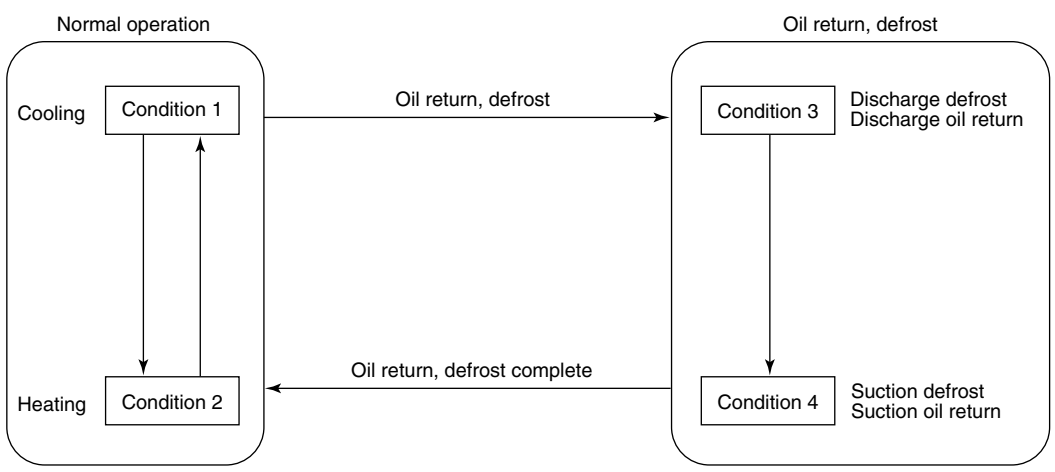
&	Equalizing operation demand issued
	Not in cooling operation only

During the first 30 seconds, the following operations are conducted.

	INV outdoor unit
Compressor operating capacity	54Hz + OFF

1.11 BS Changeover Control

The solenoid valve of the BS unit is switched according to the indoor unit operating condition.



(VF006)

Condition	Indoor unit operating condition	Y3S	Y2S	Y1S
1	Cooling Heating stop ∗1	OFF	ON	OFF
2	Heating thermostat OFF Heating thermostat ON	ON	OFF	∗2
3	Discharge oil return	OFF	OFF	OFF
4	Suction oil return Defrost	ON	ON	OFF

ON: Open
OFF: Closed

When the solenoid is operable, if the operating condition differs from the solenoid condition, the solenoid is switched according to the above table.
However, the following conditions take precedence.

∗1 : Condition 2 results in heating stop units when no unit in the system is in cooling operation.

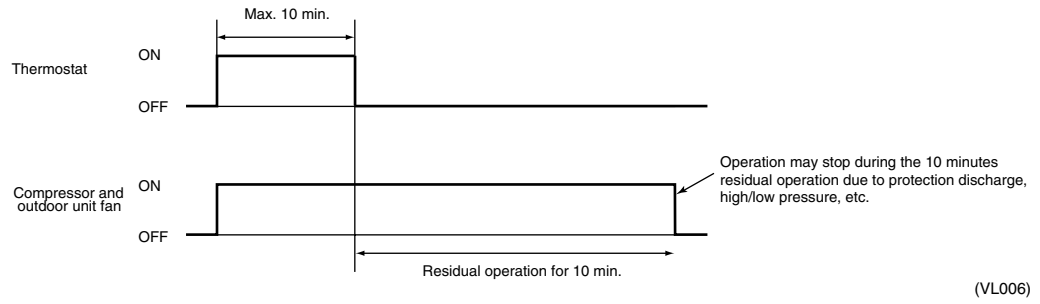
∗2 : Condition 1 results when a unit connected to the BS unit is in heating thermostat ON condition during simultaneous cooling/heating operations.

1.12 Pump Down Residual Operation

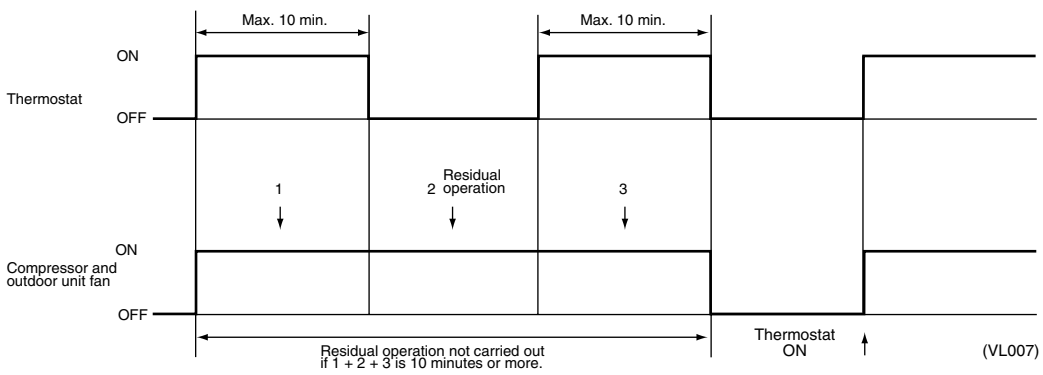
If refrigerant is remaining in the accumulator when the compressor starts, liquid refrigerant is sucked into the compressor, diluting the refrigerant machine oil and reducing the lubricating performance. To prevent this, the pump-down operation discharges refrigerant from the low pressure side when the unit is not in operation.

Residual operation may be carried out for Max.10 minutes under the following conditions.
1.

&	Secondary side heat exchanger 4 way valve (Y2R) is ON.		
	Discharge pipe thermistor (R3-1T) on inverter side: 95˚C or lower		
	OR	Outside air temperature thermistor (R1T) < 0˚C	
		When compressor continuous operating time is less than 1 minutes and thermostat is OFF, or when stop command is received from remote controller	
		Within 20 minutes after defrost or oil return operation	
		R5T (oil temperature) ≤ Te+15	



2. When the thermostat is ON during residual operation, residual operation is not carried out if the total of 1+2+3 is 10 minutes or more.



Outdoor Unit Function

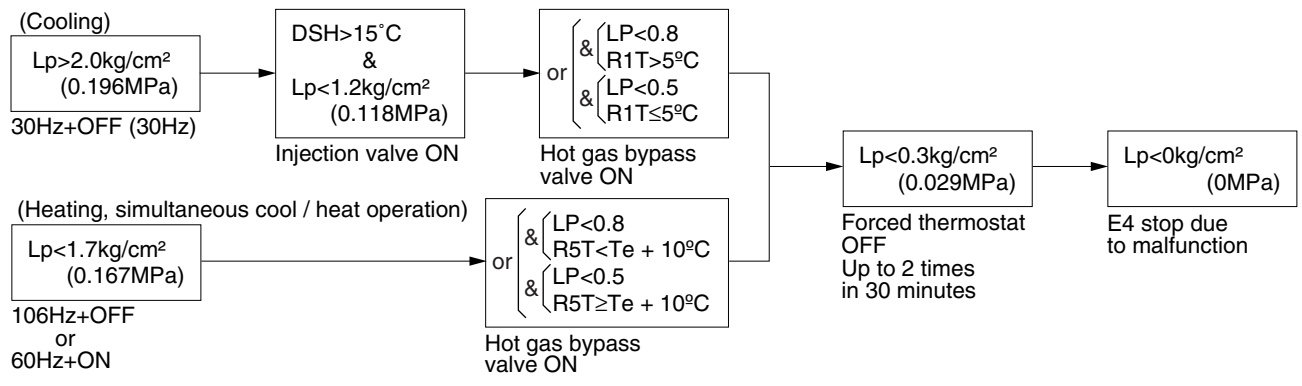
Outdoor air (R1T)	Compressor		Electronic expansion valve	Time
	INV	STD		
R1T < -10˚C	86Hz	OFF	0~300 pulses	10 min.
-10˚C ≤ R1T < 0˚C	76Hz	OFF	0~300 pulses	10 min.
R1T ≥ 0˚C	60Hz	OFF	0~300 pulses	10 min.

Notes
- During defrost or oil return, residual operation is not carried out even if a stop command comes.
- Forced thermostat OFF occurs if defrost or oil return signal comes during residual operation.

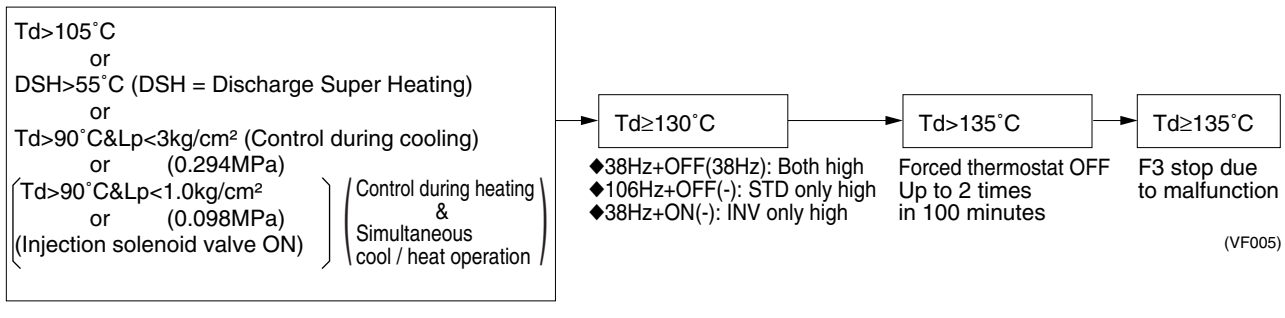
1.13 Step Down / Safety Control → Standby (Forced Thermostat OFF) → Stop Due to Malfunction

High Pressure (Hp) Control

Low Pressure (Lp) Control



Discharge Pipe Temperature (Td) Control



Inverter Current Control

Discharge Super Heating (DSH) Control

(DSH = Td - high pressure condensation saturation temperature)
During both the inverter and standard compressors are running, when the injection valve for either one goes OFF and discharge super heating (DSH) continues for 10 minutes at temperature difference of less than 10˚C, the inverter+standard compressor are controlled at 76 Hz or less+OFF for 3 minutes.

Control According to Outdoor Temperature

If the outdoor temperature exceeds 23˚C when heating, forced thermostat OFF is carried out in order to prevent a safety device from being tripped or a sensor malfunction.

1.14 Low Noise Control

If sound produced by outdoor units is a problem at night, etc., you can reduce the running noise by 2 to 3 dB by running the outdoor unit fans and compressors at low speed via contact input (low noise input) from outside. When low noise input is received (contact short circuit) while the compressor is running (except when defrosting or oil return is being carried out), the operation upper limit is as follows.

		8K	10K
		(8HP)	(10HP)
Outdoor unit fan	step 1	H tap+OFF	
	step 2	L tap+OFF	
compressor		86Hz+OFF	96Hz+OFF

◆ When cooling: Step1 → 2 high pressure > 24 kg/cm^2 (2.35 MPa)
Step2 → 1 high pressure < 19 kg/cm^2 (1.86 MPa)

- Low noise control reduces capacity by limiting the fan speed and compressor frequency. The load when heating is particularly large at night when the outdoor temperature is low, and could result in insufficient capacity.
- During low noise control, retry is unlimited for standby (forced thermostat OFF) produced by high pressure, low pressure or discharge pipe temperature.
- An optional external control adaptor of outdoor units is required for low noise control. For method of connection, see low noise operation in the test operation section.

1.15 Demand Control

When you like to save the power consumption, there are three modes of demand operation which controls forced capacity save for outdoor units via contact input (demand input) from outside in order to control demand.

Demand 1: Holds electric power consumption down to approx. 70%
Demand 2: Holds electric power consumption down to approx. 40%
Demand 3: Forced thermostat OFF

- An optional external control adaptor of outdoor units is required for demand control. For method of connection, see demand operation in the test operation section.
- Control is carried out by limiting the upper limit for frequency of demand 1 and demand 2 as given in the table below.

	8HP	10HP
Demand 1	48Hz+ON	60Hz+ON
Demand 2	60Hz+OFF	76Hz+OFF
Demand 3	Forced thermostat OFF	

1.16 Compressor Capacity Control

Pressure is sampled every 20 seconds by pressure sensors, and the inverter + standard compressor is controlled in 20 stages by microcomputer.

Commercial power supply compressor (off)	Commercial power supply compressor (full load)
Frequency	Frequency
30Hz+OFF	
34Hz+OFF	
38Hz+OFF	
42Hz+OFF	
48Hz+OFF	
54Hz+OFF	
60Hz+OFF	
68Hz+OFF	
76Hz+OFF	
86Hz+OFF	
96Hz+OFF	
106Hz+OFF	
	38Hz+ON
	48Hz+ON
	60Hz+ON
	76Hz+ON
	86Hz+ON
	96Hz+ON
	106Hz+ON
	116Hz+ON

(VE005)

1.17 Te / Tc Setting

You can alter the value of targets Te (evaporating pressure equivalent temperature) and Tc (condensing pressure equivalent temperature) with setting mode 2. PI control is used to control compressor capacity so that Te when cooling and Tc when heating are constant.

Te setting	Set temperature
High	8.5 ˚C
Standard	5.5 ˚C
Low	2.5 ˚C

- Target Te changes according to compressor operating frequency, length of piping and indoor load. The range is -10˚C ≤ target Te ≤ 5.5˚C. (Piping length is determined automatically during oil return operation.)

Tc setting	Set temperature
High	49 ˚C
Standard	46 ˚C
Low	43 ˚C

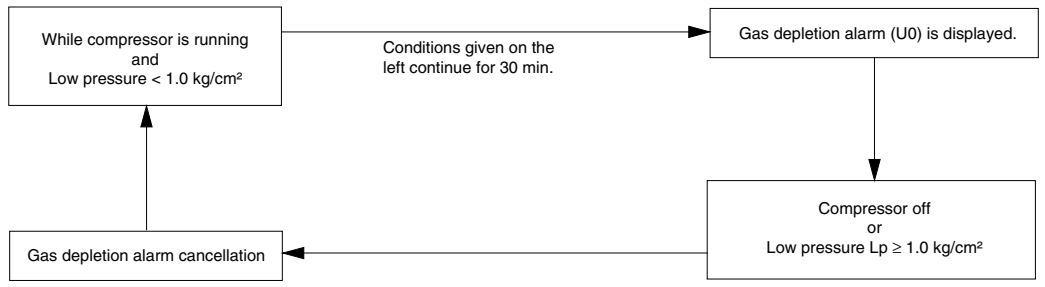
* Target Tc becomes 3˚C higher when indoor load is large. Target Tc is controlled in accordance with the following conditions:

- Outdoor temp. > 10˚C → target Tc ≤ 46˚C
- Outdoor temp. ≤ 10˚C → target Tc ≤ 49˚C
- Target Tc
  = 43˚C when high pressure > 17 kg/cm^2 (1.67 MPa) and low pressure < 1.8 kg/cm^2 (0.176 MPa).

1.18 Gas Depletion Alarm

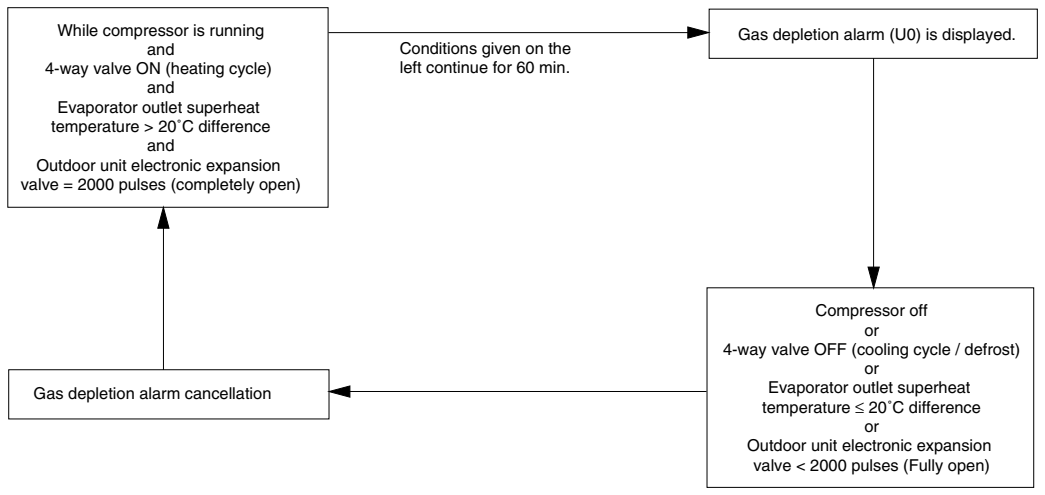
An alarm (U0) is given for severe gas depletion. Alarm is indicated but operation continues.

When cooling



(VF008)

When heating

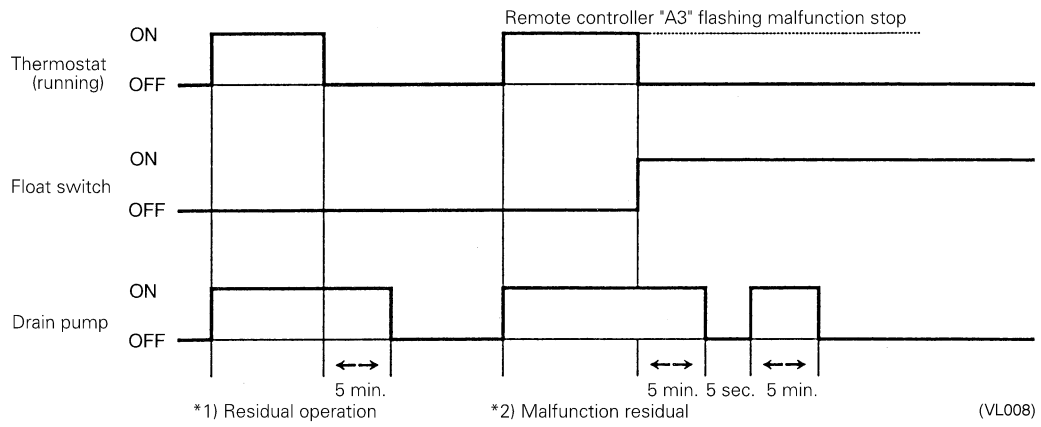


(VF009)

1.19 Drain Pump Control

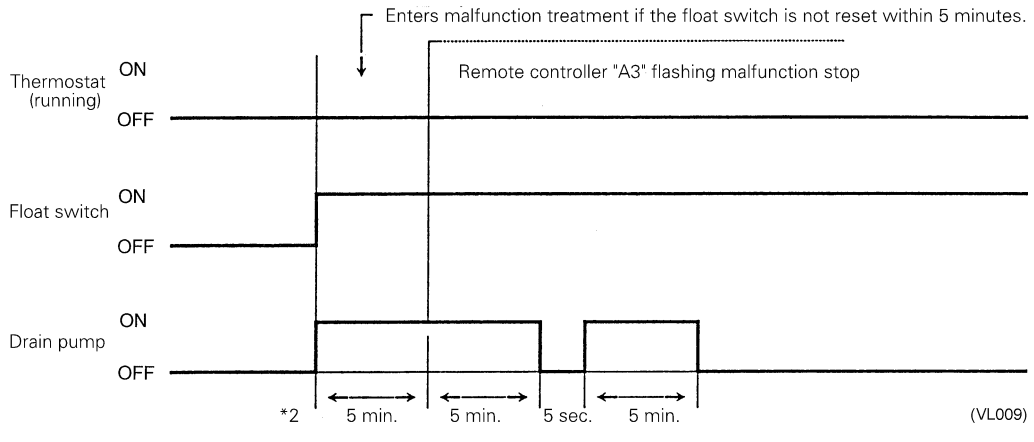
1. The drain pump is controlled by the ON/OFF buttons (4 button (1) - (4) given in the figure below).

1.19.1 When the Float Switch is Tripped While the Cooling Thermostat is ON:

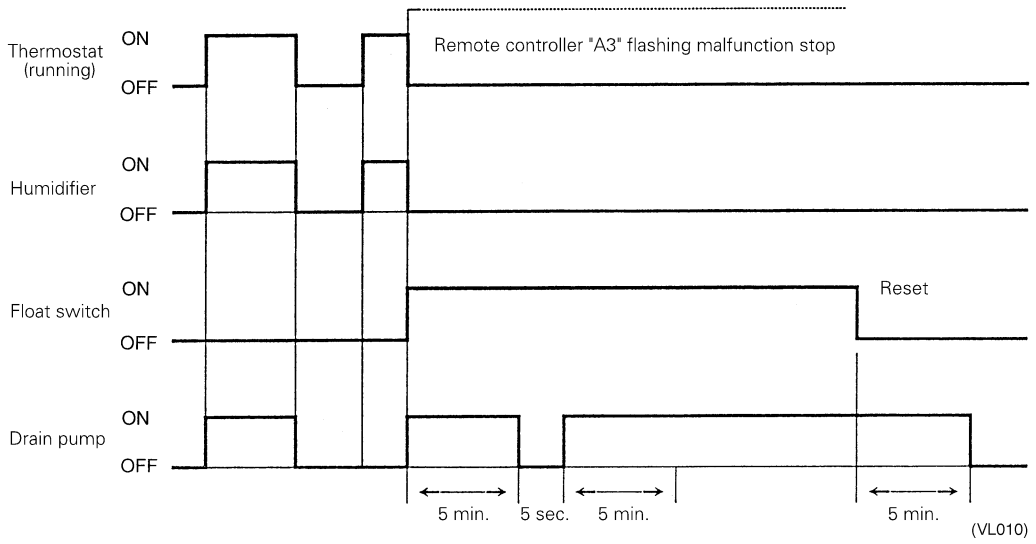


∗ 1. The objective of residual operation is to completely drain any moisture adhering to the fin of the indoor unit heat exchanger when the thermostat goes off during cooling operation.
∗ 2. One cycle consists of 5 minutes of operation, 5 seconds stop, and another 5 minutes of operation.

1.19.2 When the Float Switch is Tripped During Cooling OFF by Thermostat:

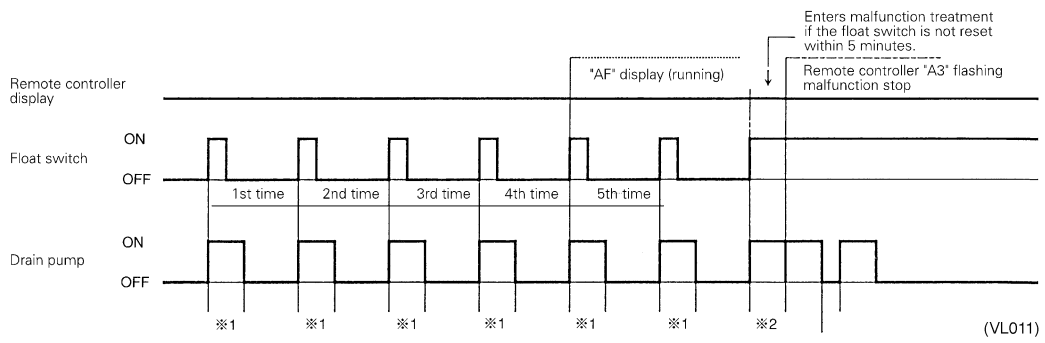


1.19.3 When the Float Switch is Tripped During Heating Operation:



During heating operation, if the float switch is not reset even after the 5 minutes operation, 5 seconds stop, 5 minutes operation cycle ends, operation continues until the switch is reset.

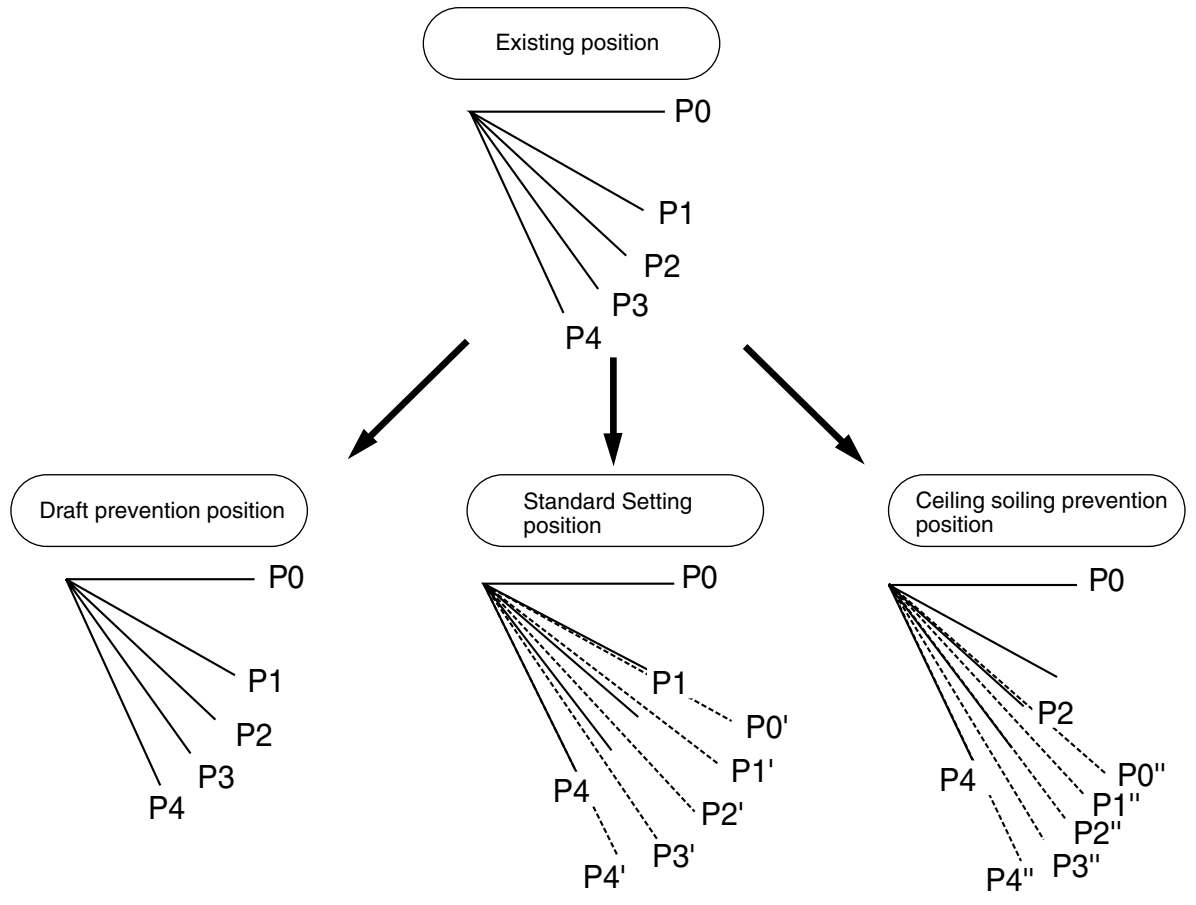
1.19.4 When the Float Switch is Tripped and “AF” is Displayed on the Remote Controller:



Note: If the float switch is tripped five times in succession, a drain malfunction is determined to have occurred. “AF” is then displayed as operation continues.

1.20 Louver Control for Preventing Ceiling Dirt

We have added a control feature that allows you to select the range of in which air direction can be adjusted in order to prevent the ceiling surrounding the air discharge outlet of ceiling mounted cassette type units from being soiled. (This feature is available on double flow, multiflow and corner types.)



Draft prevention position	P0	P1	P'	P3	P4	Same as existing position
		Range of direction adjustment				
Standard position	Prohibited	P0'	P1'	P2'	P3'	P4'	Separated into 5 positions (P1 - 4)
		Range of direction adjustment				
Dirt prevention position	Prohibited	P0"	P1"	P2"	P3"	P4"	Separated into 5 positions (P2 - 4)

The factory set position is standard position.

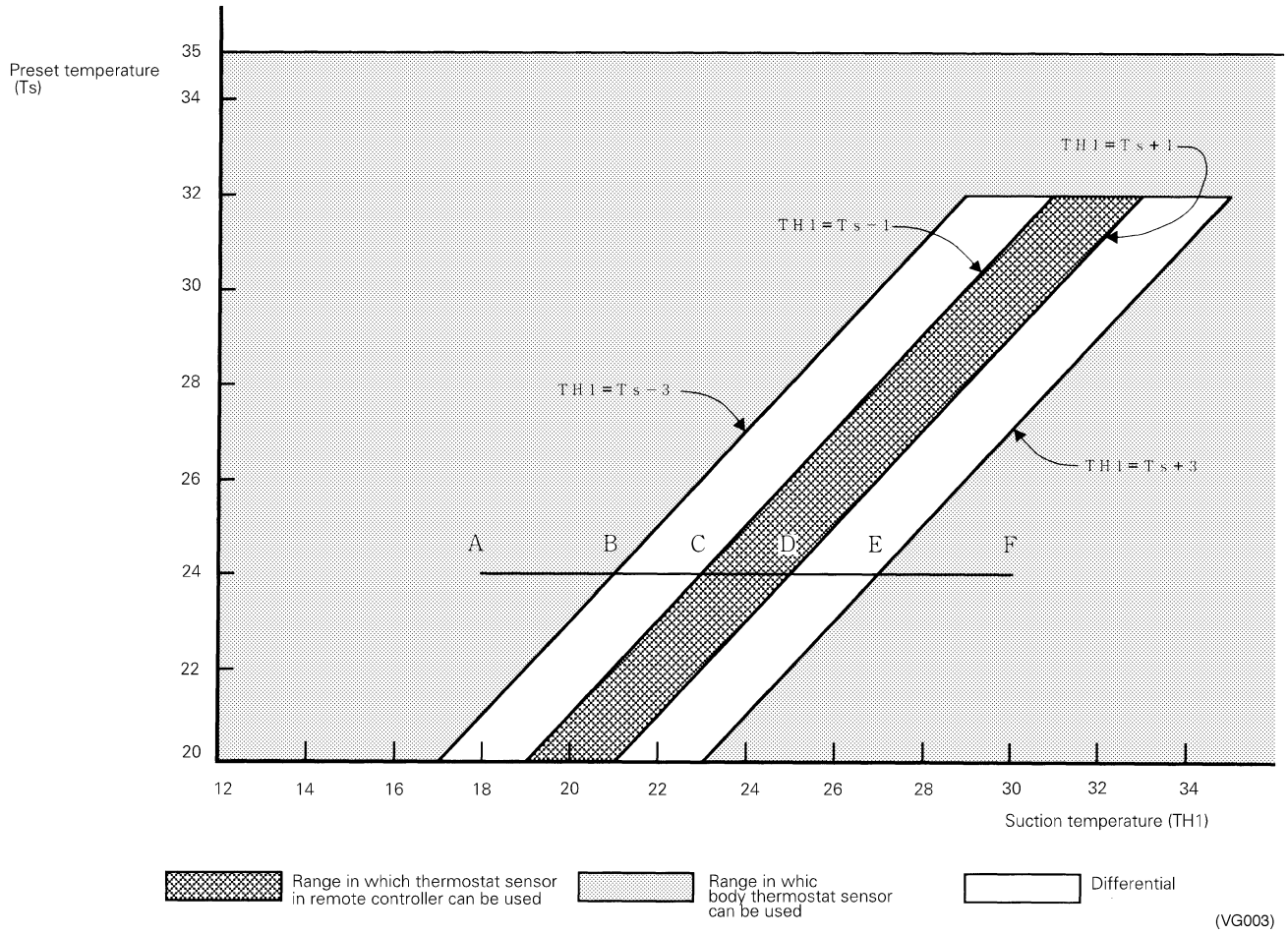
(VL012)

1.21 Thermostat Sensor in Remote Controller

Temperature is controlled by both the thermostat sensor in remote controller and air suction thermostat in the indoor unit. (This is however limited to when the field setting for the thermostat sensor in remote controller is set to “Use.”)

Cooling

If there is a significant difference in the preset temperature and the suction temperature, fine adjustment control is carried out using a body thermostat sensor, or using the sensor in the remote controller near the position of the user when the suction temperature is near the preset temperature.



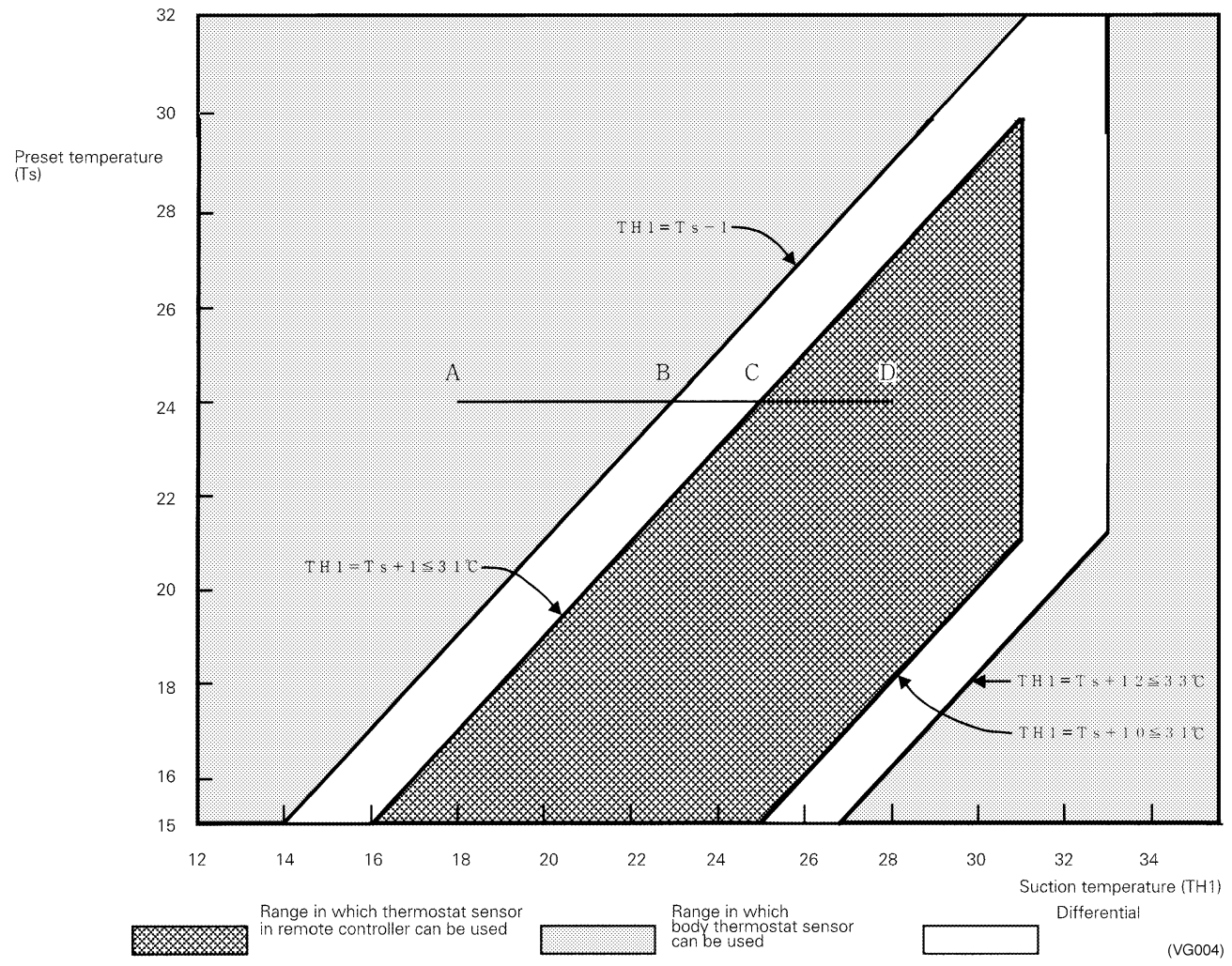
■ **Ex: When cooling**

Assuming the preset temperature in the figure above is 24˚C, and the suction temperature has changed from 18˚C to 30˚C (A → F):
(This example also assumes there are several other air conditioners, the VRV system is off, and that temperature changes even when the thermostat sensor is off.)
Body thermostat sensor is used for temperatures from 18˚C to 23˚C (A → C).
Remote controller thermostat sensor is used for temperatures from 23˚C to 27˚C (C → E).
Body thermostat sensor is used for temperatures from 27˚C to 30˚C (E → F).

And, assuming suction temperature has changed from 30˚C to 18˚C (F → A):
Body thermostat sensor is used for temperatures from 30˚C to 25˚C (F → D).
Remote controller thermostat sensor is used for temperatures from 25˚C to 21˚C (D → B).
Body thermostat sensor is used for temperatures from 21˚C to 18˚C (B → A).

Heating

When heating, the hot air rises to the top of the room, resulting in the temperature being lower near the floor where the occupants are. When controlling by body thermostat sensor only, the unit may therefore be turned off by the thermostat before the lower part of the room reaches the preset temperature. The temperature can be controlled so the lower part of the room where the occupants are doesn't become cold by widening the range in which thermostat sensor in remote controller can be used so that suction temperature is higher than the preset temperature.



■ **Ex: When heating**

Assuming the preset temperature in the figure above is 24˚C, and the suction temperature has changed from 18˚C to 28˚C (A → F):

(This example also assumes there are several other air conditioners, the VRV system is off, and that temperature changes even when the thermostat sensor is off.)

Body thermostat sensor is used for temperatures from 18˚C to 25˚C (A → C).

Remote controller thermostat sensor is used for temperatures from 25˚C to 28˚C (C → E).

And, assuming suction temperature has changed from 28˚C to 18˚C (D → A):

Remote controller thermostat sensor is used for temperatures from 28˚C to 23˚C (D → B).

Body thermostat sensor is used for temperatures from 23˚C to 18˚C (B → A).

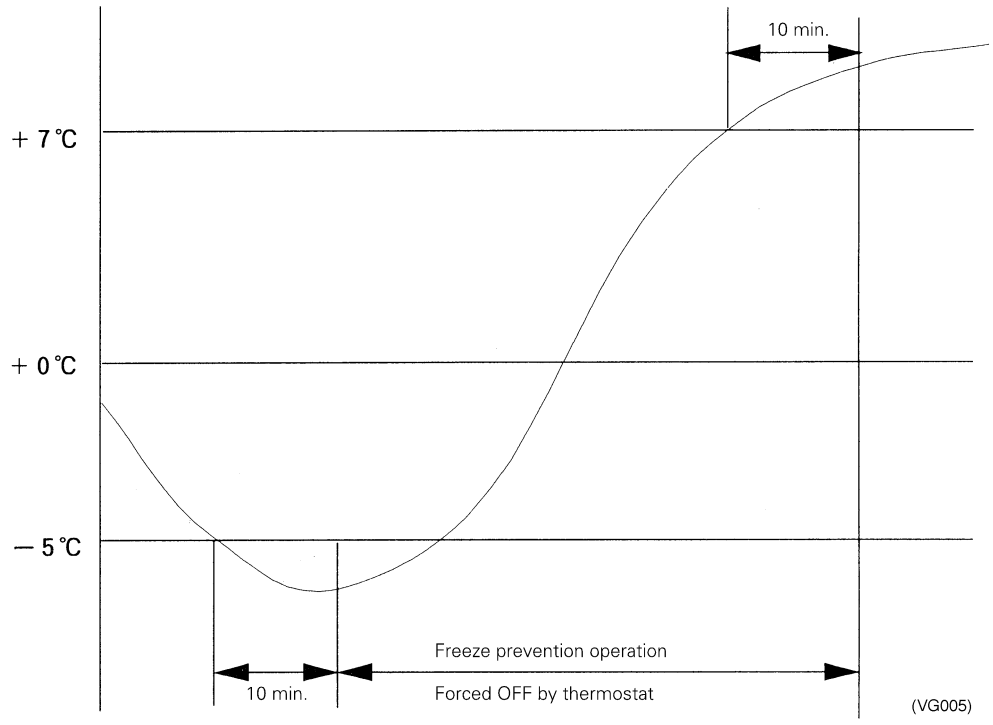
1.22 Freeze Prevention

Freeze Prevention by Off Cycle (Indoor Unit)

When the temperature detected by liquid pipe temperature thermistor (R2T) of the indoor unit heat exchanger drops too low, the unit enters freeze prevention operation in accordance with the following conditions, and is also set in accordance with the conditions given below.

Conditions for starting freeze prevention: Temperature is -1˚C or less for total of 40 min., or temperature is -5˚C or less for total of 10 min.
Conditions for stopping freeze prevention: Temperature is +7˚C or more for 10 min. continuously

Ex: Case where temperature is -5˚C or less for total of 10 min.



Part3
Test Operation
Inverter K Series

1. Test Operation

1.1 When Power is Turned On

1.1.1 When Turning Power on the First Time

The unit will not run for up to 12 minutes in order for master power supply and address (indoor unit address, etc.) to be set automatically.

Outdoor unit
LED HWL (H2P) ..... On
Test lamp (H2P) ..... Flicker
Can be set while in operation.

Indoor unit
“UH” malfunction code flickers when the ON/OFF button is pushed during the aforementioned operation.
(Returns to normal when automatic setting is complete.)

1.1.2 When Turning Power on after the First Time

∗ Tap the RESET button on the outdoor unit PC Board. The unit can be operated after setting up for about two minutes.
If the RESET button is not pushed, the unit will not run for up to 10 minutes in order for master power supply to be set automatically.

Outdoor unit
LED HWL (H2P) ..... On
Test lamp (H2P) ..... Flicker
Can be set while in operation.

Indoor unit
If the ON/OFF button is pushed during the aforementioned operation, the operation lamp lights but the unit will not run.
(Returns to normal when automatic setting is complete.)

1.1.3 If outdoor, indoor or BS unit is extended, or if indoor/outdoor unit PC board is replaced:

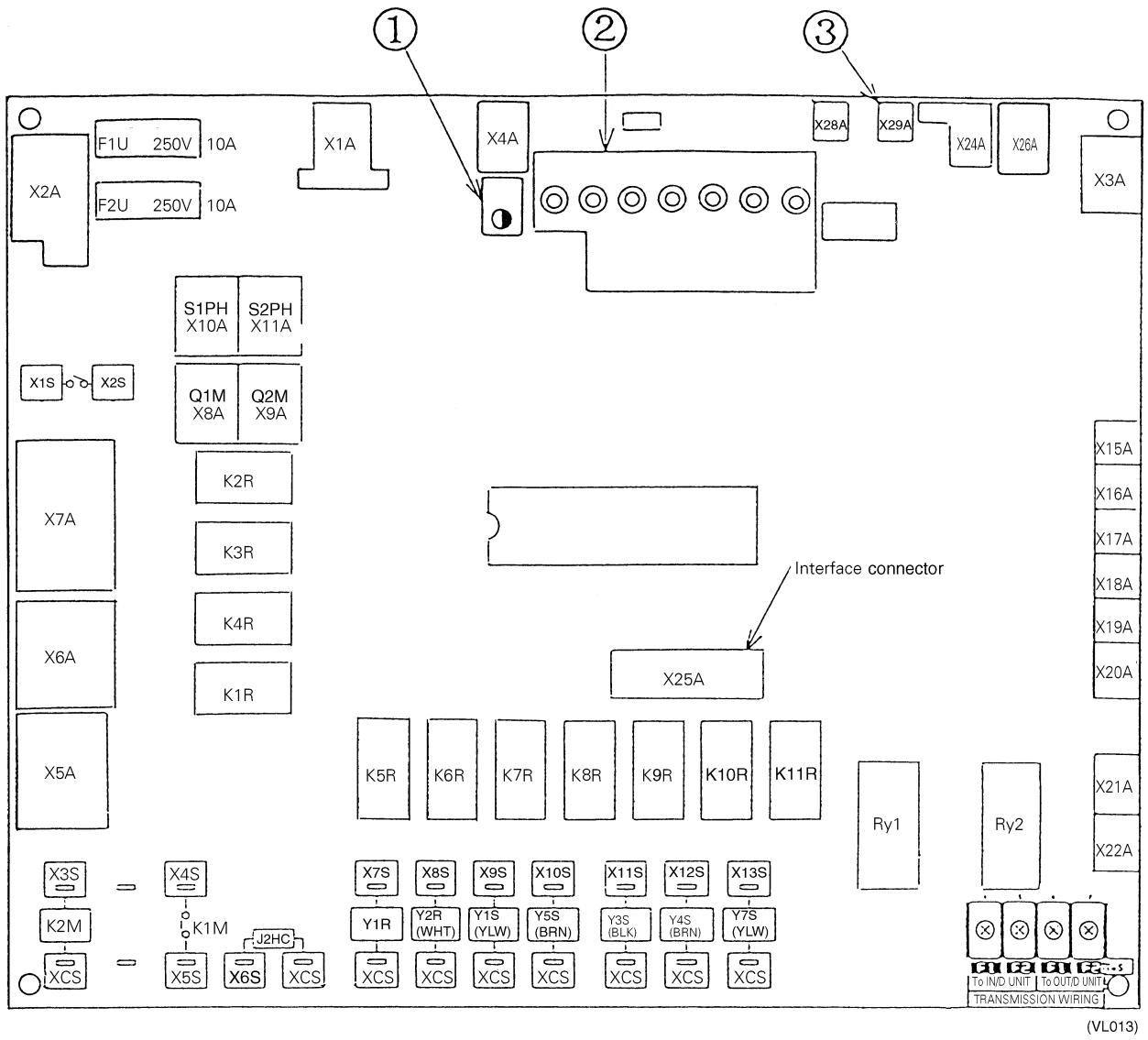
In these cases, be sure to push and hold the RESET button for 5 seconds or more. The system will not recognize the extension if this operation is not performed. The unit will not run for up to 12 minutes in order for the addresses (indoor unit address, etc.) to be set automatically.

Outdoor unit
LED HWL (H2P) ..... On
Test lamp (H2P) ..... OFF
Can be set while in operation.

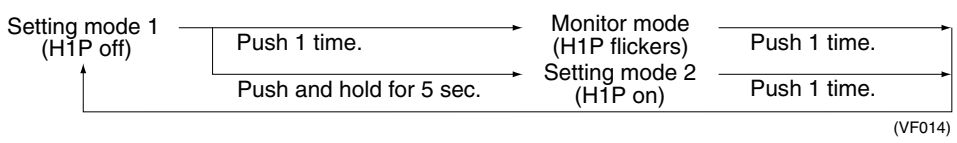
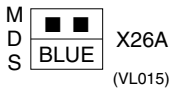
Indoor unit
“UF” or “U4” malfunction code flickers when the ON/OFF button is pushed during the aforementioned operation.
(Returns to normal when automatic setting is complete.)

1.2 Outdoor Unit PC Board Ass'y

RSEY8K / 10K



(VL013)

1	Service monitor <HAP> (Green)	Normal ..... licker Malfunction ..... On or off
2	Function setting switch or LED LED display ○ : On ◑ : Flicker ● : Off	Mode button ..... Mode change  (VF014) • Set return button ..... Changes or enters address or data. • Wiring check button .... Push and hold for 5 sec. to start wiring check. • Reset button ..... Push and hold for 5 sec. if the indoor unit's PC board has been replaced, or there has been a change in the combination of indoor and outdoor units, such as indoor unit extension, etc.
3	Jumper pin  (VL015)	Forced defrost operation by short circuit.

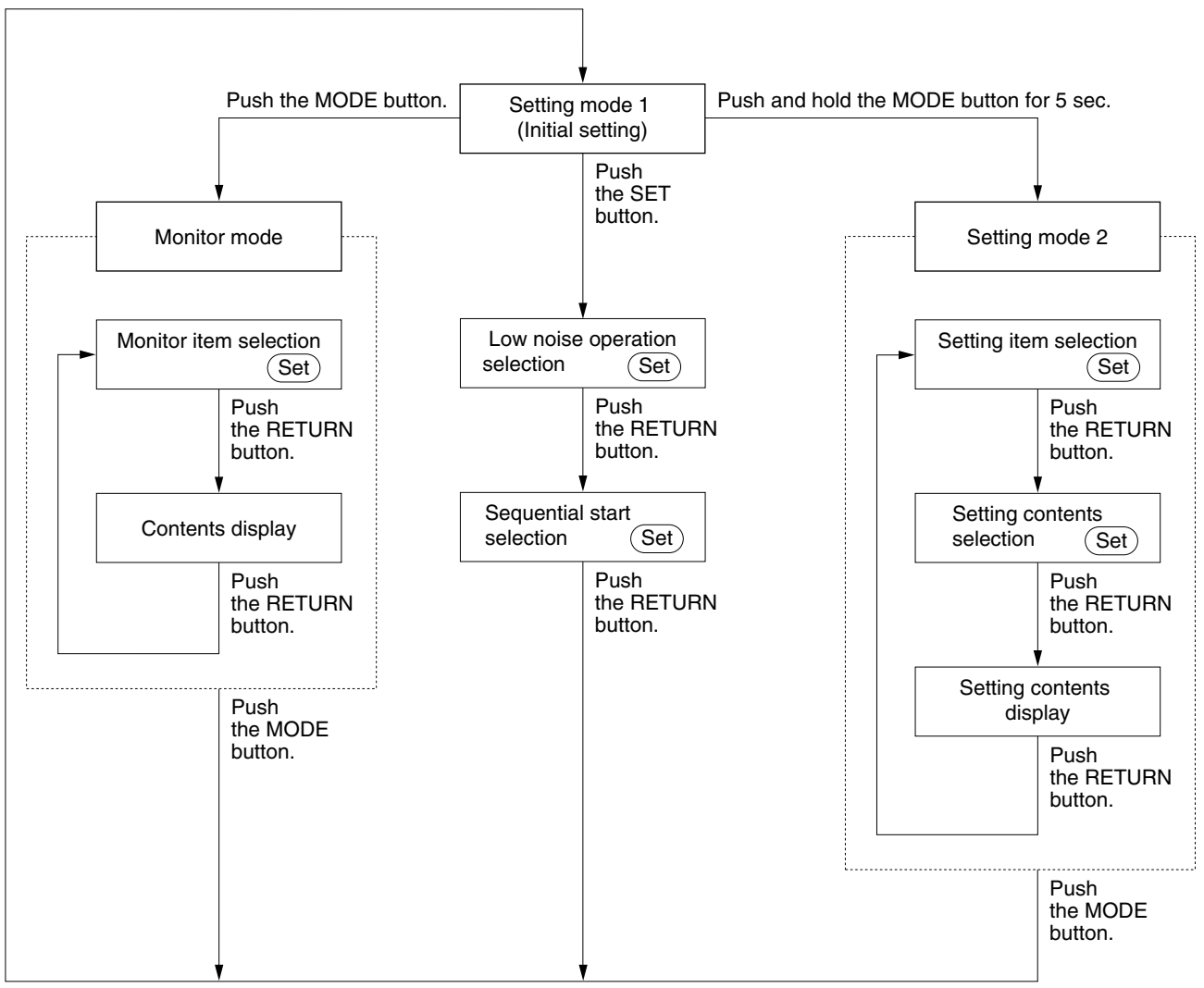
1.3 Setting Modes

The three setting modes are as follows:

- **Setting mode 1** ..... Mode for selecting cool/heat setting method, and whether or not to use low noise operation and sequential start.
  (H1P off)
- **Setting mode 2** ..... Mode for changing operating status and setting addresses; used primarily for service.
  (H1P on)
- **Monitor mode** ..... Mode for checking setting made in the setting modes, number of connected units, etc.
  (H1P flickers)

Mode Changing Procedure

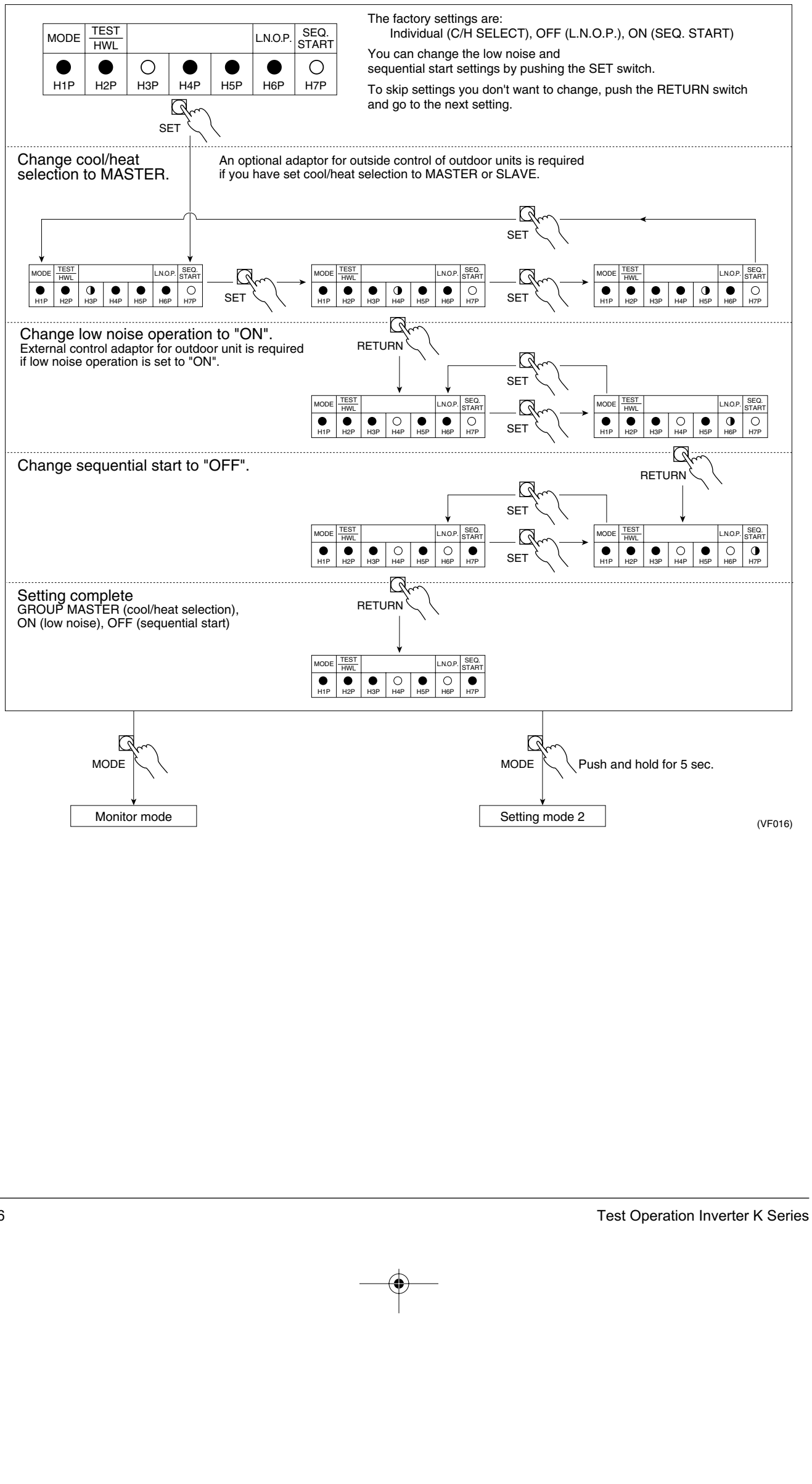
The flow of the setting modes is as follows. (See the following pages for details.)



(VF015)

- You can make your selections with the SET button (Set) .
- **If you become unsure of how to proceed, push the MODE button and return to setting mode 1.**
- You don't have to perform power supply reset after changing settings in setting mode 1 (including [SS1] cool/heat selection switch on the outdoor unit PC board) and setting mode 2.

1.3.1 Setting Mode 1



1.3.2 Setting Mode 2

To enter setting mode 2 from setting mode 1 (normal), you must push and hold the MODE button (BS1) for 5 seconds. (Setting mode 2 cannot be entered while still making settings in setting mode 1.)

Setting procedure

1. Push the SET button and match with the setting item (LED display). (All 9 settings)
↓
2. Push the RETURN button (BS3) and the present settings flicker (LED display).
↓
3. Push the SET button (BS2) and match with each setting (LED flicker display).
↓
4. Push the RETURN button (BS3) and enter the settings.
↓
5. Push the RETURN button (BS3) and return to the initial status.

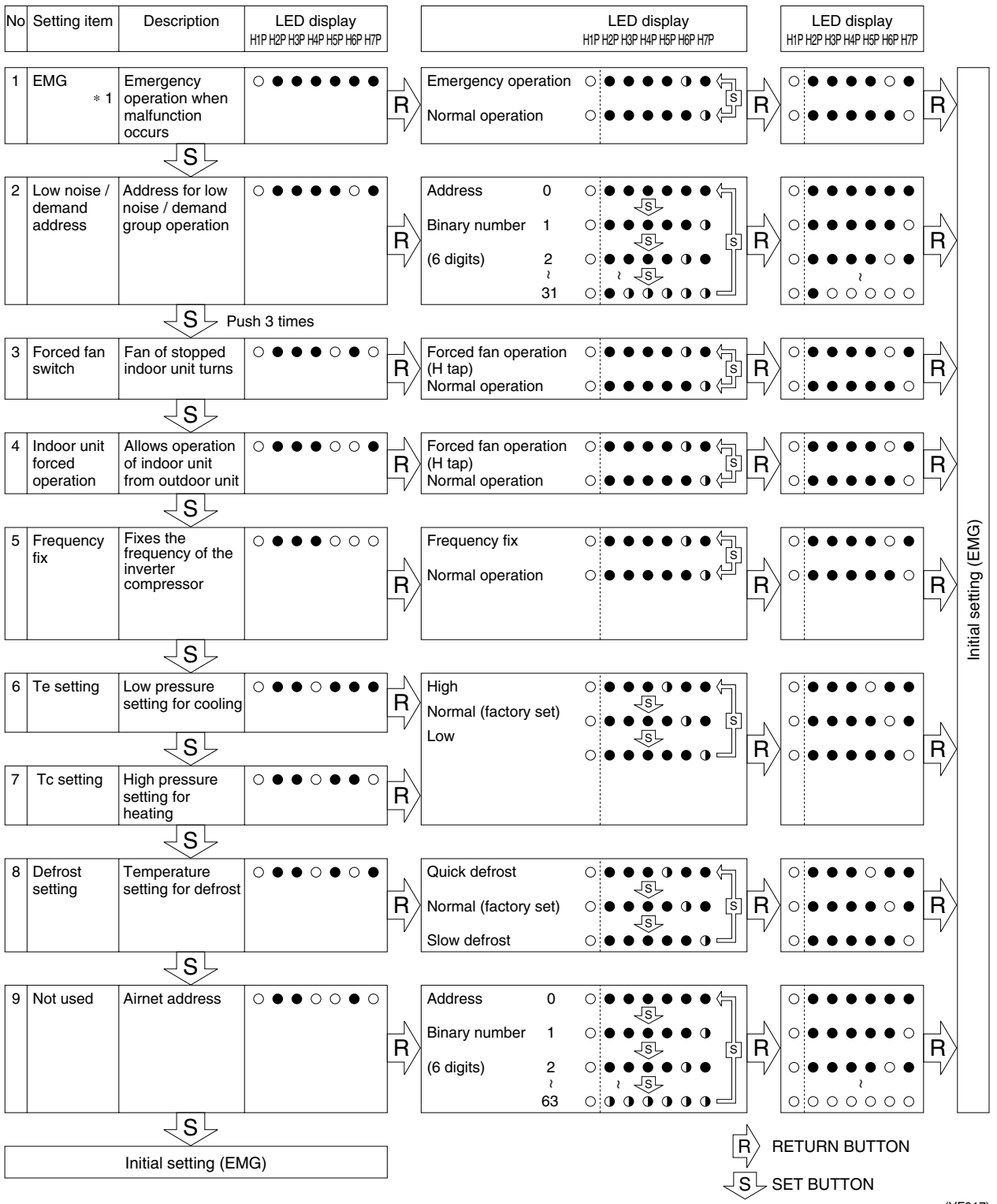
Note:
- If you become unsure of how to proceed, push the MODE button (BS1) and return to setting mode 1.
- The initial status of setting mode 2 is the status of setting item No. 1 in mode 2.

Setting items

	Setting item	Description	LED display H1P H2P H3P H4P H5P H6P H7P		LED display H1P H2P H3P H4P H5P H6P H7P
1	EMG ＊1	Emergency operation when malfunction occurs	○ ● ● ● ● ● ●	Emergency operation (Runs only by standard compressor) Normal operation	○ ● ● ● ● ○ ● ○ ● ● ● ● ● ○
2	Low noise / demand address	Address for low noise / demand group operation	○ ● ● ● ● ○ ●	Address 0 Binary number 1 (6 digits) 2 〜 31	○ ● ● ● ● ● ● ○ ● ● ● ● ● ○ ○ ● ● ● ○ ○ ● 〜 〜 ○ ● ○ ○ ○ ○ ○
3	Forced fan switch	Fan of stopped indoor unit turns	○ ● ● ● ○ ● ○	Forced fan operation (H tap) Normal operation	○ ● ● ● ● ○ ● ○ ● ● ● ● ● ○
4	Indoor unit forced operation	Allows operation of indoor unit from outdoor unit	○ ● ● ● ○ ○ ●	Indoor unit forced operation Normal operation	○ ● ● ● ● ○ ● ○ ● ● ● ● ● ○
5	Frequency fix	Fixes the frequency of the inverter compressor 5HP···68Hz 8.10HP··86Hz+ON	○ ● ● ● ○ ○ ○	Frequency fix Normal operation	○ ● ● ● ● ○ ● ○ ● ● ● ● ● ○
6	Te setting	Low pressure setting for cooling	○ ● ● ○ ● ● ●	High Normal (factory set) Low	○ ● ● ● ○ ● ● ○ ● ● ● ● ○ ● ○ ● ● ● ● ● ○
7	Tc setting	High pressure setting for heating	○ ● ● ○ ● ● ○		
8	Defrost setting	Temperature setting for defrost	○ ● ● ○ ● ○ ●	Quick defrost Normal (factory set) Slow defrost	○ ● ● ● ○ ● ● ○ ● ● ● ● ○ ● ○ ● ● ● ● ● ○
9	Not used	Airnet address	○ ● ● ○ ○ ● ○	Address 0 Binary number 1 (6 digits) 2 〜 63	○ ● ● ● ● ● ● ○ ● ● ● ● ● ○ ○ ● ● ● ○ ○ ● 〜 〜 ○ ○ ○ ○ ○ ○ ○

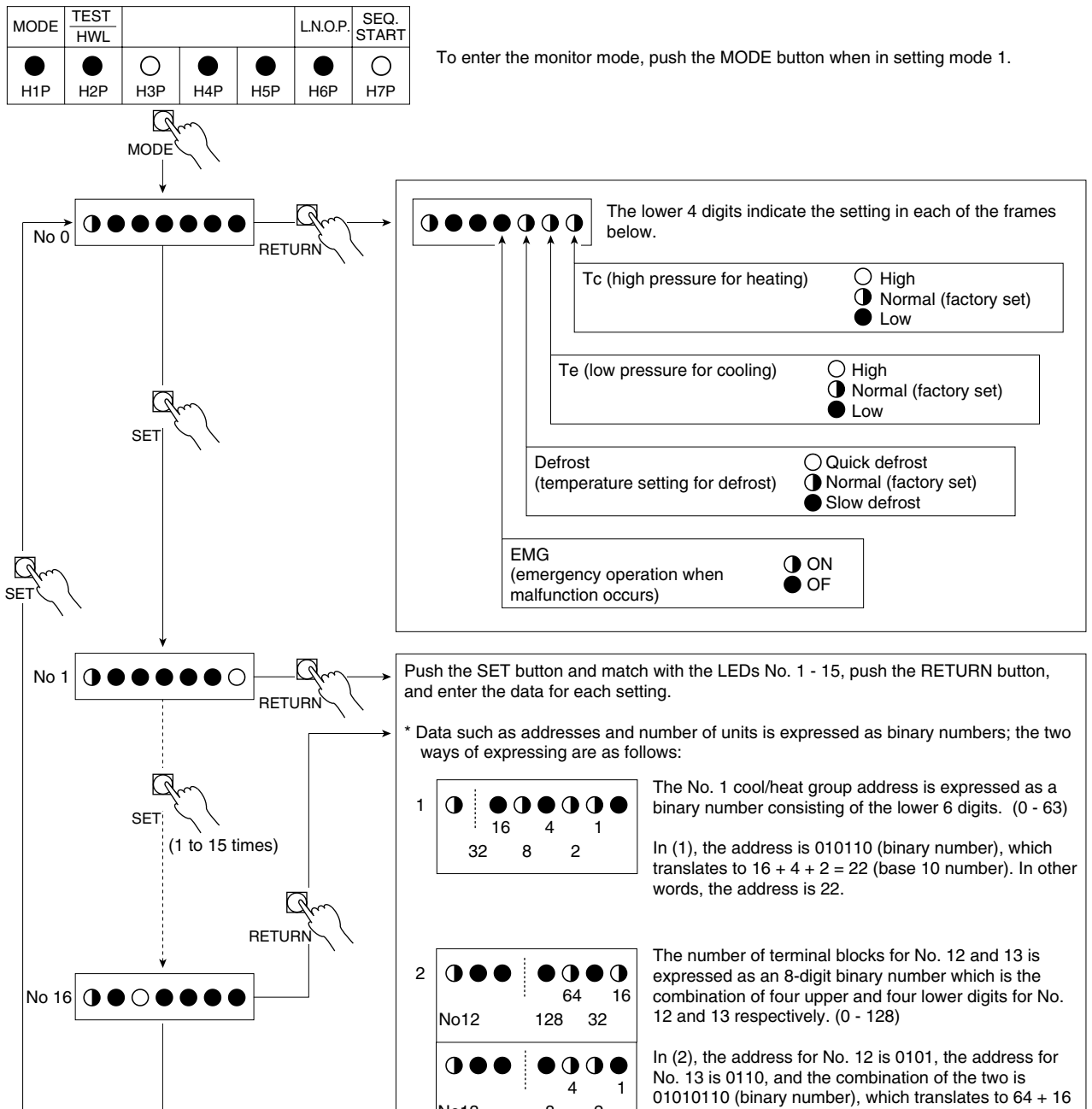
(VF084)

Note: ＊1 : Simultaneous cooling / heating operation is not possible by Emergency operation.



Note: ＊1 : Simultaneous cooling / heating operation is not possible by Emergency operation.

1.3.3 Monitor Mode



(VF018)

To enter the monitor mode, push the MODE button when in setting mode 1.

■ After making sure the data is correct, push the RETURN button and return to No. 0, or push the MODE button and return to setting mode 1.

Monitor Mode Data

Mode No.	LED	Data	Display method	Size (binary number)
No 1	○ ● ● ● ● ○ ●	Low noise / demand address	0 ~ 31	Lower 6 digits
No 2	○ ● ● ● ● ○ ○	Not used		
No 3	○ ● ● ● ○ ● ●	Not used	0 ~ 63	Lower 6 digits
No 4	○ ● ● ● ○ ● ○	Number of connected units	0 ~ 63 units	Lower 6 digits
No 5	○ ● ● ● ○ ○ ●	Number of connected BS units	0 ~ 63 units	Lower 6 digits
No 6	○ ● ● ● ○ ○ ○	Number of connected zone units (excluding outdoor and BS units)	0 ~ 63 units	Lower 6 digits
No 7	○ ● ● ○ ● ● ●	Number of outdoor units	0 ~ 63 units	Lower 6 digits
No 8	○ ● ● ○ ● ● ○	Number of BS units	0 ~ 128 units	Lower 4 digits, upper
No 9	○ ● ● ○ ● ○ ●	Number of BS units	0 ~ 128 units	Lower 4 digits, lower
No 10	○ ● ● ○ ● ○ ○	Number of zone units (excluding outdoor and BS units)	0 ~ 63 units	Lower 6 digits
No 11	○ ● ● ○ ○ ● ●	Number of terminal blocks	0 ~ 128 units	Lower 4 digits, upper
No 12	○ ● ● ○ ○ ● ○	Number of terminal blocks	0 ~ 128 units	Lower 4 digits, lower
No 13	○ ● ● ○ ○ ○ ●	Not used		
No 14	○ ● ● ○ ○ ○ ○	Not used		
No 15	○ ● ○ ● ● ● ●	Not used		

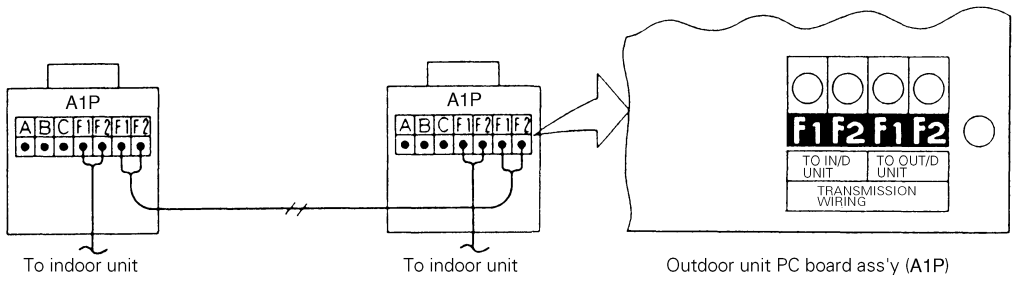
1.4 Sequential Start

Separates the start timing for standard compressors by three seconds each in order to prevent over-current when several compressors are to be started simultaneously.
Sequential start is possible for up to three units wired as a group to a single power supply. You should however connect an outdoor unit of small capacity as the third unit in the sequence.

Method of Sequential Start

1. Power supply wiring
Must be wired as a group to the power supply.

2. Wiring
Connect transmission wiring to terminals F1 and F2 (outdoor - outdoor) on the outdoor unit PC board (A1P). Switch to the monitoring mode and see if sequential start has been selected. If not, switch to setting mode 1 and select sequential start. (Sequential start is factory set to “ON.”) For transmission wiring, use 0.75 - 1.25 mm^2 sheathed vinyl cord or double-core cable.

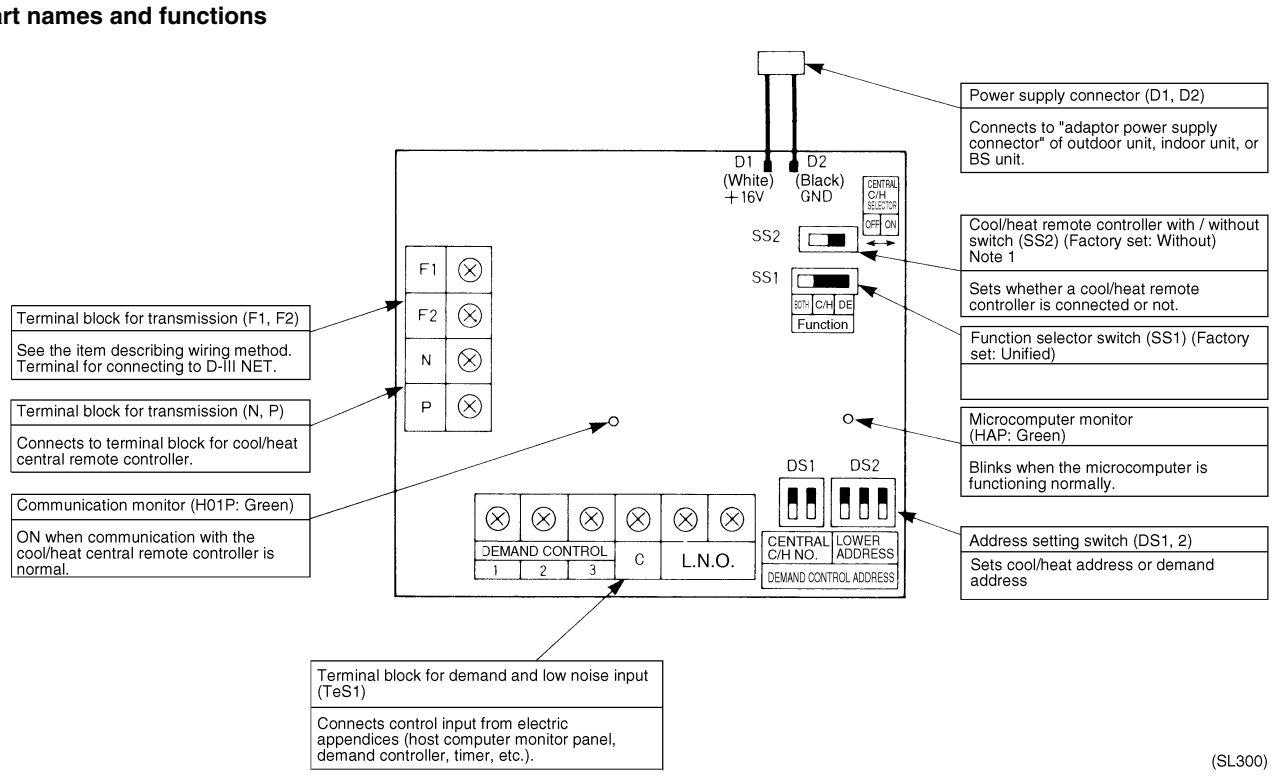


(VL016)

1.5 External Control Adaptor for Outdoor Units (DTA104A61 DTA104A62)

<Objective/use>
By adding an adaptor for outside control of outdoor units to BS units or indoor units connected in a DIII-NET, you can simultaneously select cool/heat mode for several outdoor units in the system, and it enables demand control and low noise control.

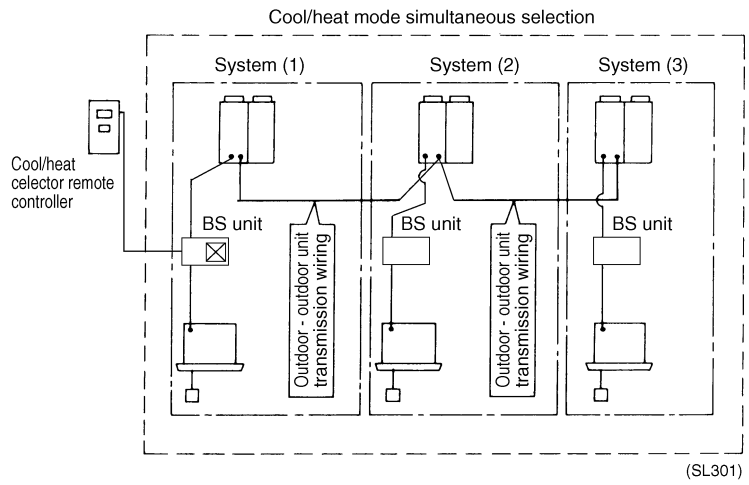
Part names and functions



Note 1. SS2 is not applicable to cooling only system.

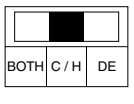
1.5.1 Cool/heat mode unified selection

(For detailed example of wiring, see the page describing cool/heat mode control.)
<System outline>



<Settings of switches on the PC board adaptor>

■SS1

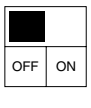


C / H

(SL302)

("BOTH" is selected when demand control is carried out at the same time.)

■SS2



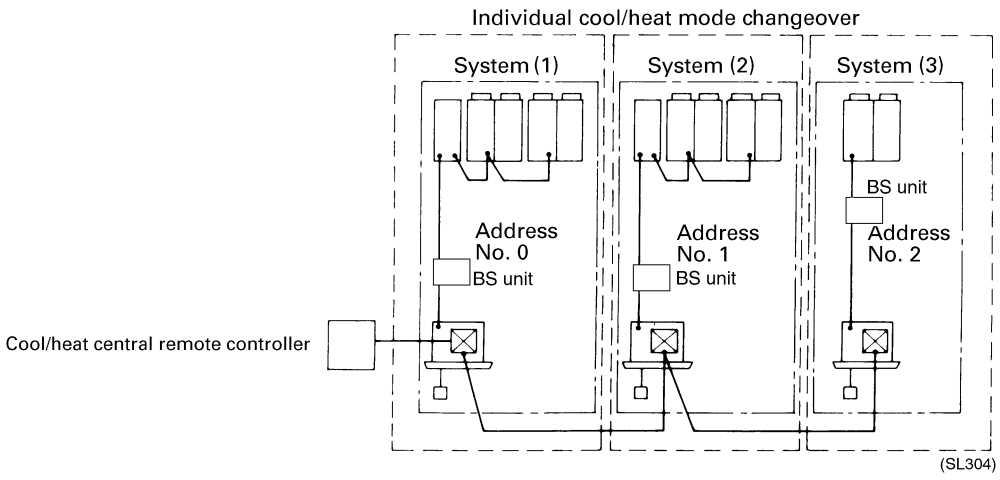
OFF

(SL303)

■DS1·2

Outdoor unit external control adaptor

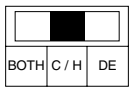
<Changeover by cool/heat central remote controller>



(SL304)

<Switch settings on adaptor printed circuit board>

■SS1



Cool

(SL305)

(When demand control is used together, set the switch to "BOTH")

■SS2

ON

(SL306)

■DS1·2 For individual control, do not use the same address twice.

1.5.2 Demand / low noise control

Connecting control input to the adaptor for outside control of outdoor units enables demand and low noise control.

■ **Demand control (figures indicate demand rate)**

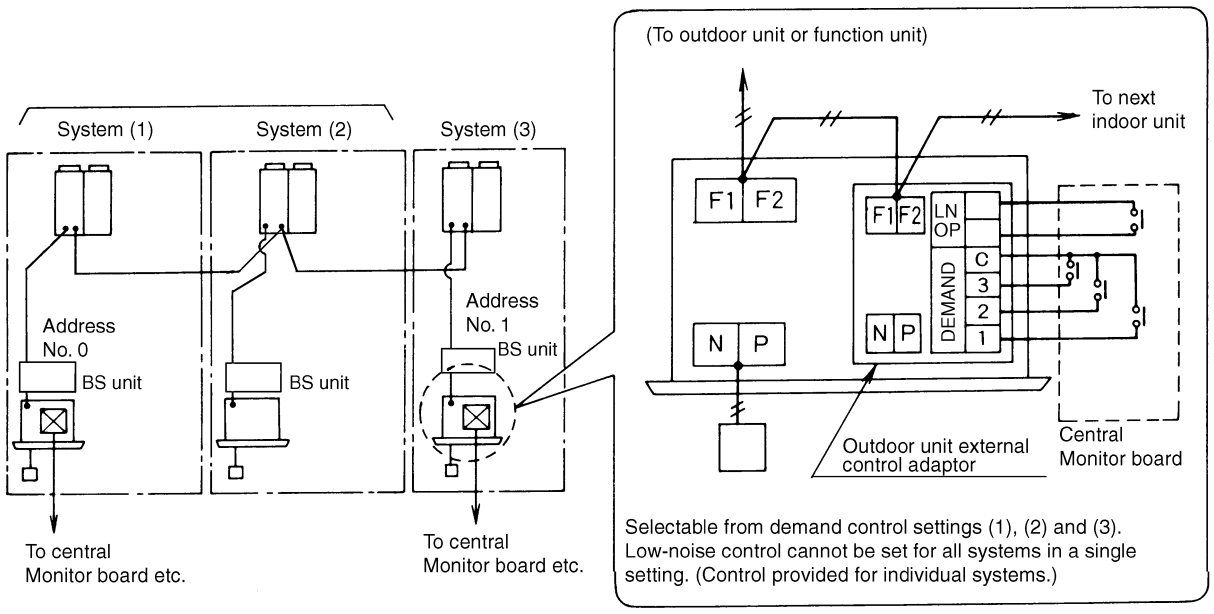
When short circuit between (1) and (C): Approx. 70% as a guideline
When short circuit between (2) and (C): Approx. 40% as a guideline
When short circuit between (3) and (C): Forced fan operation

■ **Low noise control (Outdoor unit)**

Running noise can be reduced by 2~ 3dB by controlling capacity of outdoor unit.

<System general>

When each system is set to the same address, the same demand control operation is conducted.

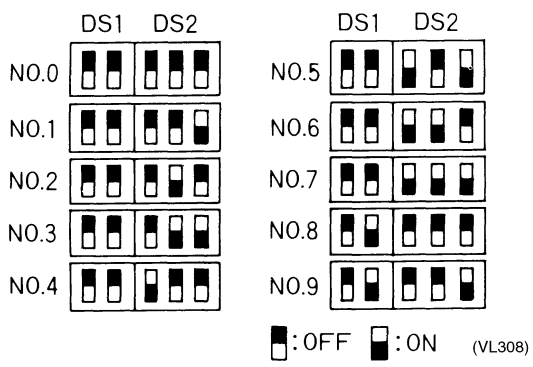


(SL307)

<Common>

<Address setting (DS1 / DS2)>

Decide the address for each control unit from 0~9 and set.



(VL308)

NOTES

- Setting is within 8 groups when using a cool/heat central remote controller. Set from No. 0~No. 7.
- Be sure to make the address No. of the PC board adaptor described above match the address No. of function unit or outdoor unit (BS unit if using cool/heat simultaneous selection type). (For detailed settings, see the installation instruction.)

<Control input specifications>

■ **Input signal**

Constant contact a
Input current is approx. 12 - 24 VDC, 10 mA per contact.
Use a micro-current contact for the relay contact.
(Max. 12 VDC, 1 mA)

■ **Outside wiring specifications**

Recommended electric wiring: Sheathed vinyl cord or cable 0.75~1.25 mm^2 (double core)
Wiring length: Max. 150 m
Run separate from power line in order to prevent malfunction.

■ **Installation positions**

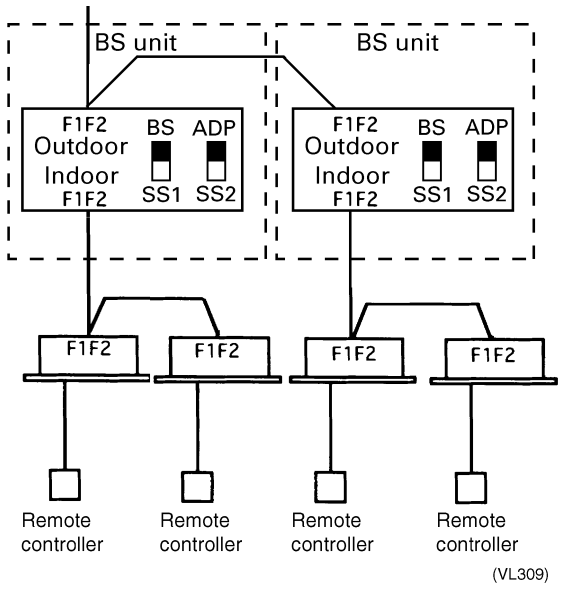
	Model/series	Installation box/plate	Installation position
Outdoor unit	Function unit, EXIII	Not necessary	Inside main unit's electric box
Indoor unit	FXYF~K	KRP1A90	* Regarding installation position, see the page describing the remote group control adaptor
	FXYF~KA	KRP1B98	
	FXYC~K(L)	KRP1B96	
	FXYK~K FXYS~K FXYM~K	Not necessary	
	FXYH~K	KRP1B93	
	FXYA~K	Not necessary	
	FXYL(M)~K		
	BSV~K	Not necessary	Inside main unit's electric box

1.6 Cool/Heat Mode Switching

The VRV K Series heat recovery system offers the following 3 cool/heat modes.

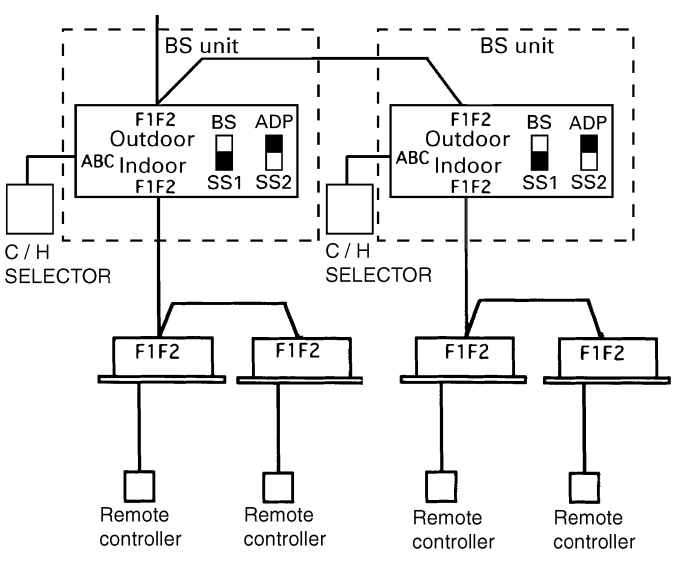
1. Set cool/heat individually for all BS unit systems using the indoor unit remote controller.
2. Set cool/heat individually for all BS unit systems using the cool/heat select remote controller.
3. Set cool/heat individually for all BS unit systems using the cool/heat central remote controller.

1.6.1 Set cool/heat individually for all BS unit systems using the indoor unit remote controller.



(VL309)

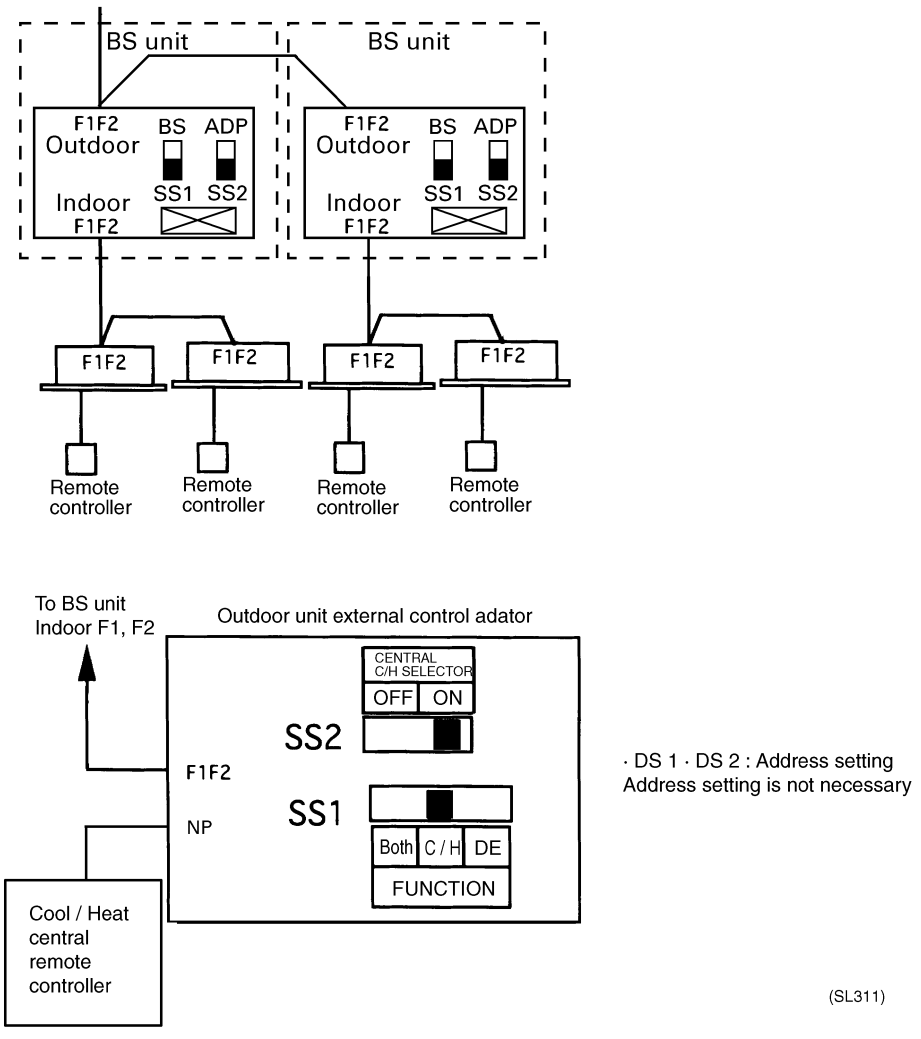
1.6.2 Set cool/heat individually for all BS unit systems using the cool/heat select remote controller.



(SL310)

1.6.3 Set cool/heat individually for all BS unit systems using the cool/heat central remote controller.

■ Install the "External control adaptor for outdoor unit" in BS unit.



· DS 1 · DS 2 : Address setting
Address setting is not necessary

(SL311)

1.7 Low Noise Operation

By connecting the external contact input to the low noise input of the outdoor unit external control adaptor for outdoor unit (optional), you can save power and lower operating noise by 2 -3 dB.

1. Outdoor unit field setting

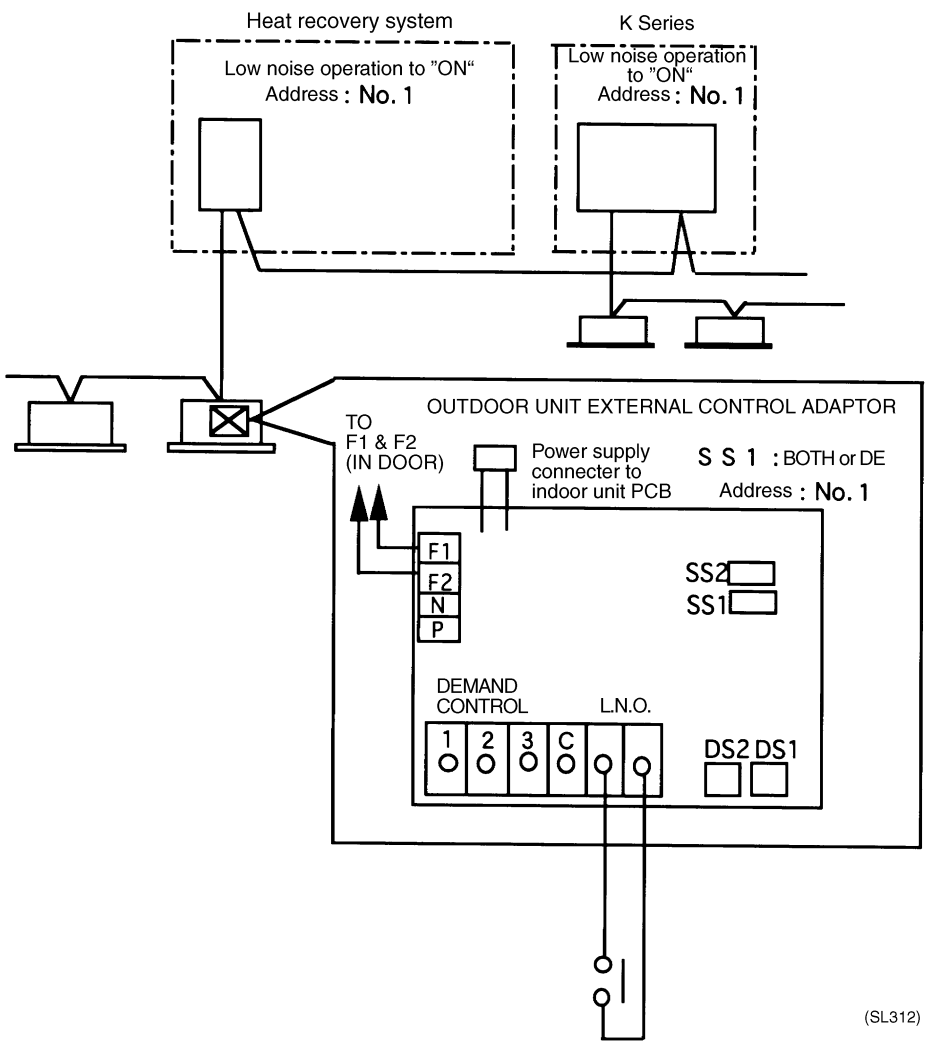
- Setting mode 1: Set low noise operation to “ON”.
- Setting mode 2: Match low noise operation and demand control address with address of outdoor unit external control adaptor.

2. Outdoor unit external control adaptor setting

- Function switch (SS1)
  Set to “BOTH” or “DE.”
- Address setting switches (DS1, DS2)
  Match with outdoor unit low noise operation and demand control address.

3. Short-circuit the low noise input of outdoor unit external control adaptor for outdoor unit.

Low noise control system example



1.8 Demand Control

By connecting the external contact input to the demand input of the outdoor unit external control adaptor (option), the compressor operating conditions can be controlled for reduced power consumption.

1. Demand 1 Approximately 70% level
2. Demand 2 Approximately 40% level
3. Demand 3 Forced thermostat OFF

1.8.1 Instructions for demand control operationx

1. Outdoor unit field setting

■ Setting mode 1: Set low noise operation to “ON”.
Match low noise operation and demand control address with address of outdoor unit external control adaptor.

2. Outdoor unit external control adaptor setting

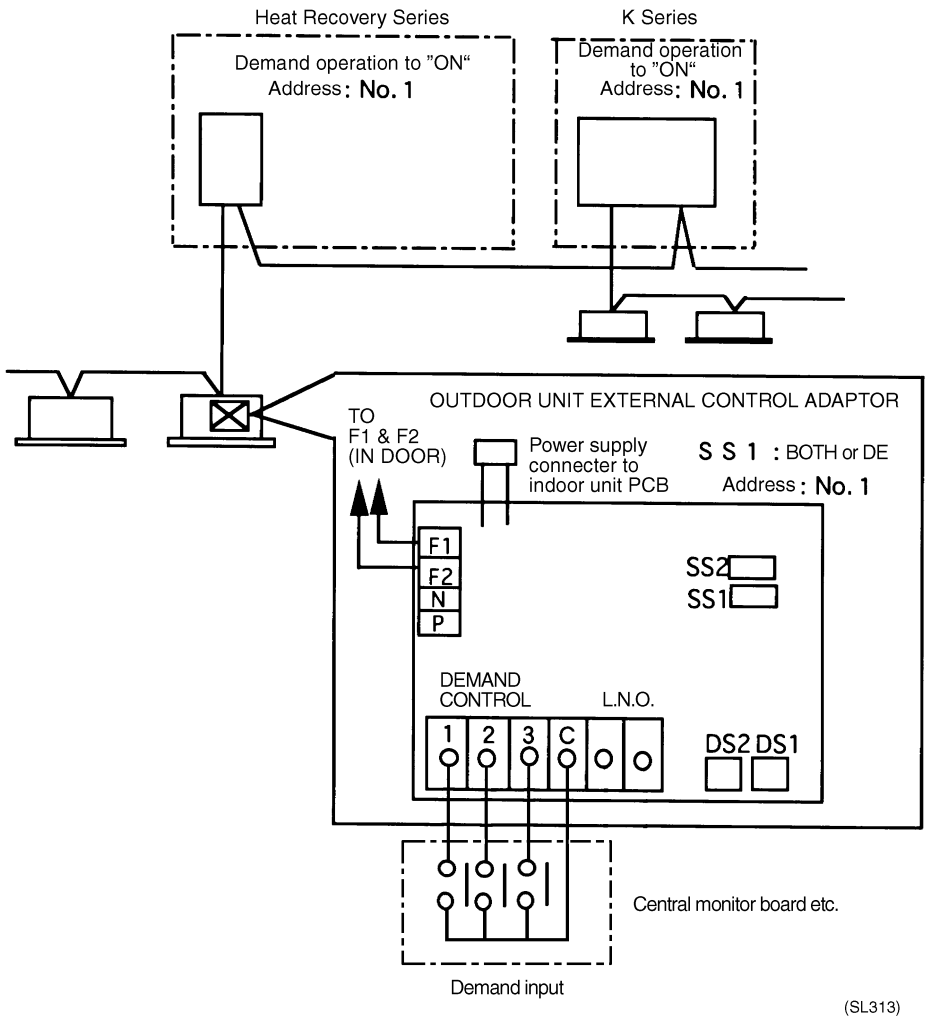
■ Function switch (SS1)
Set to “BOTH” or “DE.”

■ Address setting switches (DS1, DS2)
Match with outdoor unit low noise operation and demand control address.

3. Select one from demand input terminals 1 through 3 on the outdoor unit external control adaptor, and short the corresponding terminals.

1. Demand 1 Short 1-C.
2. Demand 2 Short 2-C.
3. Demand 3 Short 3-C.

Demand control system example



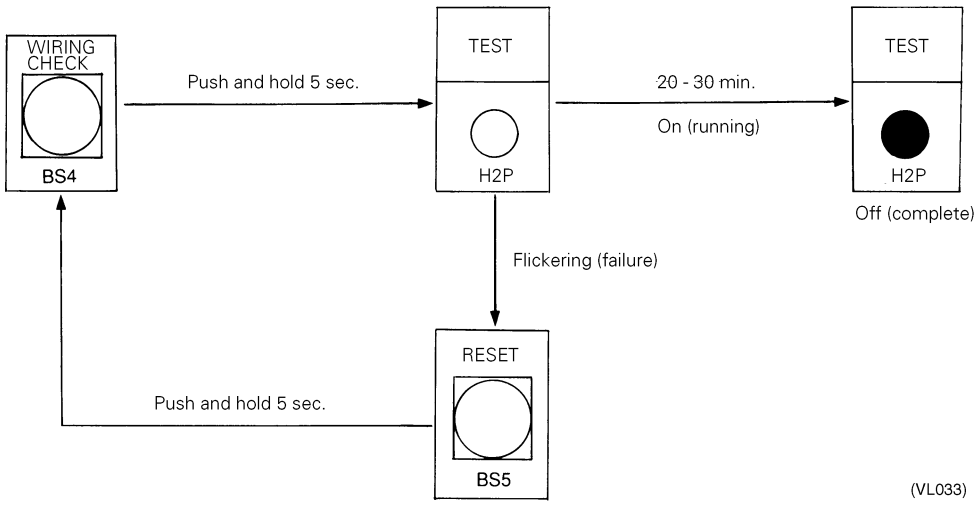
(SL313)

1.9 Wiring Check Operation

If within 12 hours of stopping cooling or heating, be sure to run all indoor units in the system you want to check in the fan mode for about 60 minutes in order to prevent mis-detection.

Operation Method

1. In the monitor mode, check the number of connected indoor units. (See monitor mode.)
2. Push and hold the WIRING CHECK button (BS4) for 5 seconds to perform wiring check operation. While running, TEST (H2P) lights and goes off when finished.
   If TEST (H2P) flickers (wiring check operation failure), push and hold the RESET button (BS5) for 5 seconds, and then repeat the procedure from the beginning.
3. About 1 minute after you finish running the system, once again check the number of connected indoor units in the monitor mode and make sure the number agrees with the first time you checked. If not, it indicates that there is a wiring mistake. Fix the wiring of the indoor unit whose remote controller displays "UF" when its ON/OFF switch is turned ON.



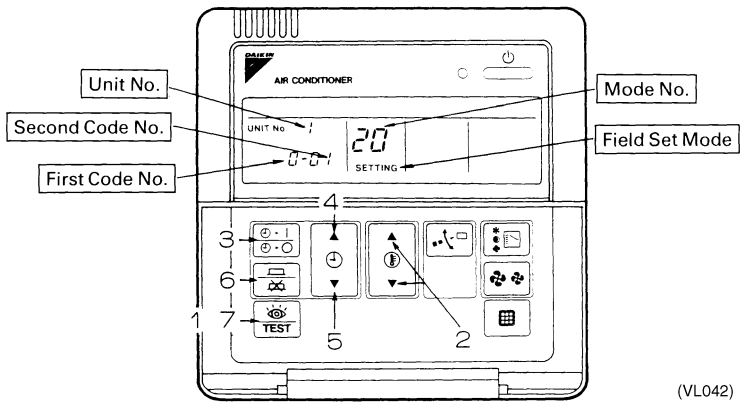
NOTE: Other settings are not accepted during wiring check operation.

1.10 Indoor Field Setting

Making a field setting

Field settings must be made by remote controller if optional accessories have been installed on the indoor unit, or if the indoor unit or HRV unit's individual functions have been modified.

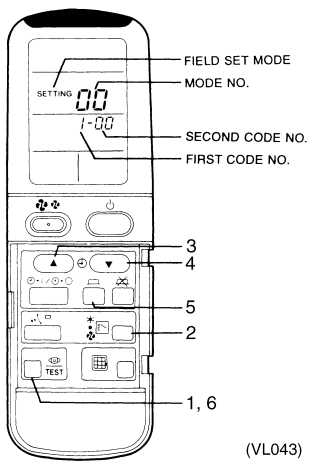
1.10.1 Wired Remote Controller



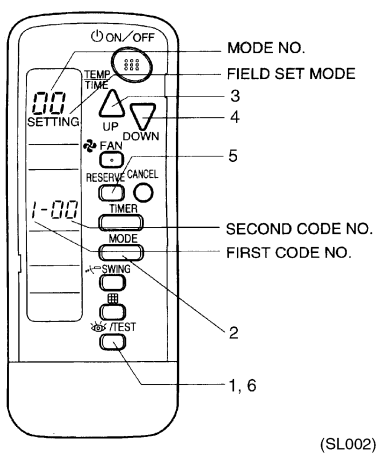
(VL042)

1. When in the normal mode, push the TEST button for 4 seconds or more, and operation then enters the "field set mode."
2. Select the desired "mode No." with the button.
3. During group control and you want to set by each individual indoor unit (when mode No. 20, 21, 22, 23, 25 has been selected), push the time mode button and select the "indoor unit No." to be set.
   Note: This operation is not required when setting as a group.
4. Push the button and select the first code No.
5. Push the button and select the second code No.
6. Push the timer button one time and "define" the currently set contents.
7. Push the TEST button to return to the normal mode.

1.10.2 Wireless Remote Controller



(VL043)



(SL002)

1. When in the normal mode, push the TEST button for 4 seconds or more, and operation then enters the "field set mode."
2. Select the desired "mode No." with the button.
3. Pushing the button, select the first code No.
4. Pushing the button, select the second code No.
5. Push the timer button and check the settings.
6. Push the TEST button to return to the normal mode.

NOTES:

1. Settings are made simultaneously for the entire group, however, if you select the mode No. inside parentheses, you can also set by each individual unit. Setting changes however cannot be checked except in the individual mode for those in parentheses.
2. The mode numbers inside parentheses cannot be used by wireless remote controllers, so they cannot be set individually. Setting changes also cannot be checked.
3. Mode numbers 17 (27) and 19 (29) are HRV functions that can be set from a VRV system remote controller.
4. The second code No. is factory set to “01.” The field set air flow direction position and thermostat sensor in remote controller is however set to “02,” and ventilation fan speed is set to “05.”
5. Do not make settings other than those described above. Nothing is displayed for functions the indoor unit is not equipped with.
6. “88” may be displayed to indicate the remote controller is resetting when returning to the normal mode.

1.10.3 Setting Contents and Code No.

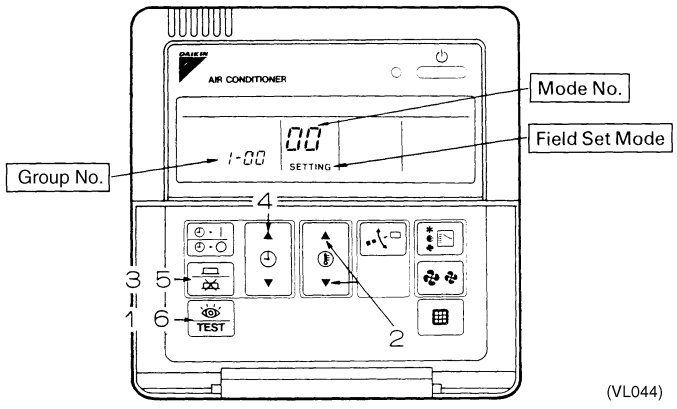
VRV system indoor unit settings	Mode No. Note 2	First Code No.	Setting Contents		Second Code No.(Note 3)							
					01		02		03		04	
	10(20)	0	Filter contamination heavy/ light (Setting for display time to clean air filter) (Sets display time to clean air filter to half when there is heavy filter contamination.)	Super long life filter	Light	Approx. 10,000 hrs.	Heavy	Approx. 5,000 hrs.	—		—	
				Long life filter		Approx. 2,500 hrs.		Approx. 1,250 hrs.				
				Standard filter		Approx. 200 hrs.		Approx. 100 hrs.				
		1	Long life filter type (FXYC only, 01 indicates long life)		Long life filter		Super long life filter		—		Soot filter	
		2	Thermostat sensor in remote controller		Use		No use		—			
		3	Display time to clean air filter calculation (Set when filter sign is not to be displayed.)		Display		No display		—			
	12(22)	0	Optional accessories output selection (field selection of output for adaptor for wiring)		Indoor unit turned ON by thermostat				Operation output		Malfunction output	
		1	ON/OFF input from outside (Set when ON/ OFF is to be controlled from outside.)		Forced OFF		ON/OFF control		External protection device		—	
		2	Thermostat differential changeover (Set when remote sensor is to be used.) FXYC, FXYF, FXYK, FXYH only		1˚C		0.5˚C		—		—	
		3	OFF by thermostat fan speed		LL		Set fan speed		—		—	
		4	Automatic mode differential (automatic temperature differential setting for VRV system heat recovery series cool/heat)		01:0	02:1	03:2	4:03	05:4	6:05	7:06	08:7
		5	Power failure automatic reset		Not equipped		Equipped		—		—	
	13(23)	0	High air outlet velocity (Set when installed in place with ceiling higher than 2.7 m.) FXYF only		N		H		—		—	
		1	Selection of air flow direction (Set when a blocking pad kit has been installed.) FXYF only		F (4 directions)		T (3 directions)		W (2 directions)		—	
		2	Horizontal air discharge		Equipped		Not equipped		—		—	
		3	Air flow direction adjustment (Set at installation of decoration panel.) FXYK only		Equipped		Not equipped		—		—	
		4	Field set air flow position setting		Draft prevention		Standard		Ceiling Soiling prevention		—	
		5	Field set fan speed selection (fan speed control by air discharge outlet for phase control)		Standard		Optional accessory 1		Optional accessory 2		—	
	15(25)	1	Thermostat OFF excess humidity		Not equipped		Equipped		—		—	
		3	Drain pump humidifier interlock selection		Not equipped		Equipped		—		—	
		4	Sets whether filter sign is to be output by time or by input.		Time addition		Input		—		—	
		5	Field set selection for individual ventilation setting by remote controller		Not equipped		Equipped		—		—	
		6	Field set selection for individual ventilation setting by remote controller		Not equipped		Equipped		—		—	

For HRV settings, see the proper documents for HRV.

1.11 Centralized Control Group No. Setting

- If carrying out centralized control by central remote controller or unified ON/OFF controller, group No. must be set for each group individually by remote controller.
- Group No. setting by remote controller for centralized control

1. When in the normal mode, push the TEST button for 4 seconds or more, and operation then enters the “field setting mode.”
2. Set mode No. “00” with the button. *
3. Push the button to inspect the group No. display.
4. Set the group No. for each group with the button (The group No. increases in the manner of 1-00, 1-01, ...,1-15, 2-00,...4-15. However, the unified ON/OFF controller displays only the group No. within the range selected by the switch for setting each address.)
5. Push the timer button to define the selected group No.
6. Push the TEST button to return to the normal mode.

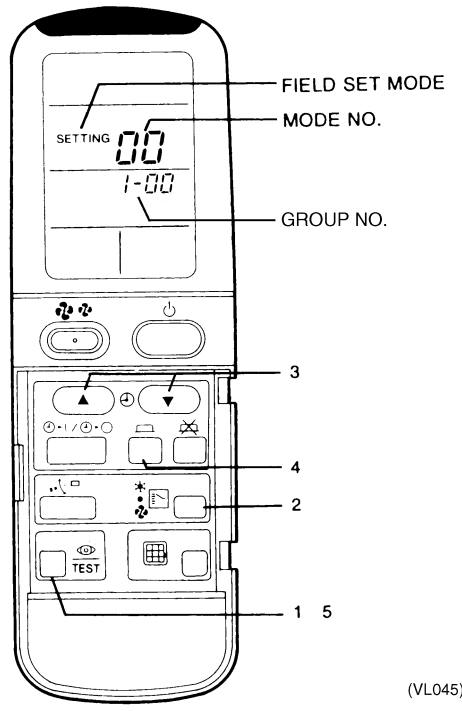


(VL044)

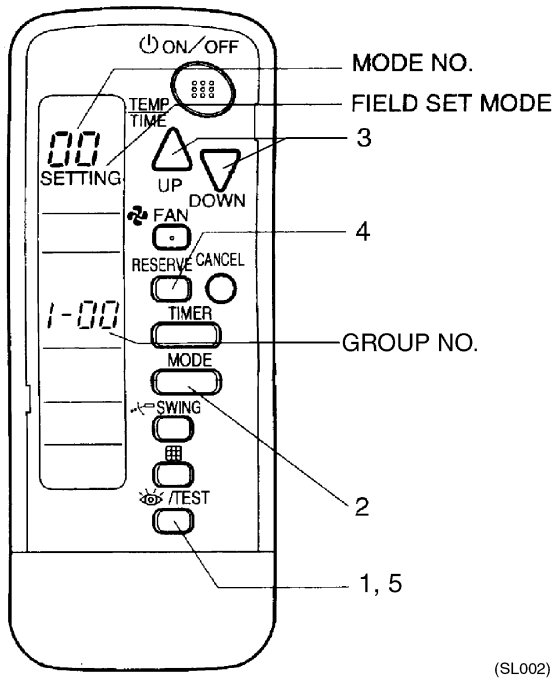
- Even if not using a remote controller, connect the remote controller when setting the group No., set the group No. for centralized control, and disconnect after making the setting.
- Set the group No. after turning on the power supply for the central remote controller, unified ON/OFF controller, and indoor unit.

■ Group No. setting by wireless remote controller for centralized control

1. When in the normal mode, push [TEST] button for 4 seconds or more, and operation then enters the "field set mode."
2. Set mode No. "00" with [FAN] button.
3. Set the group No. for each group with [▲] [▼] button (advance/backward).
4. Enter the selected group numbers by pushing [RESERVE] button.
5. Push [TEST] button and return to the normal mode.

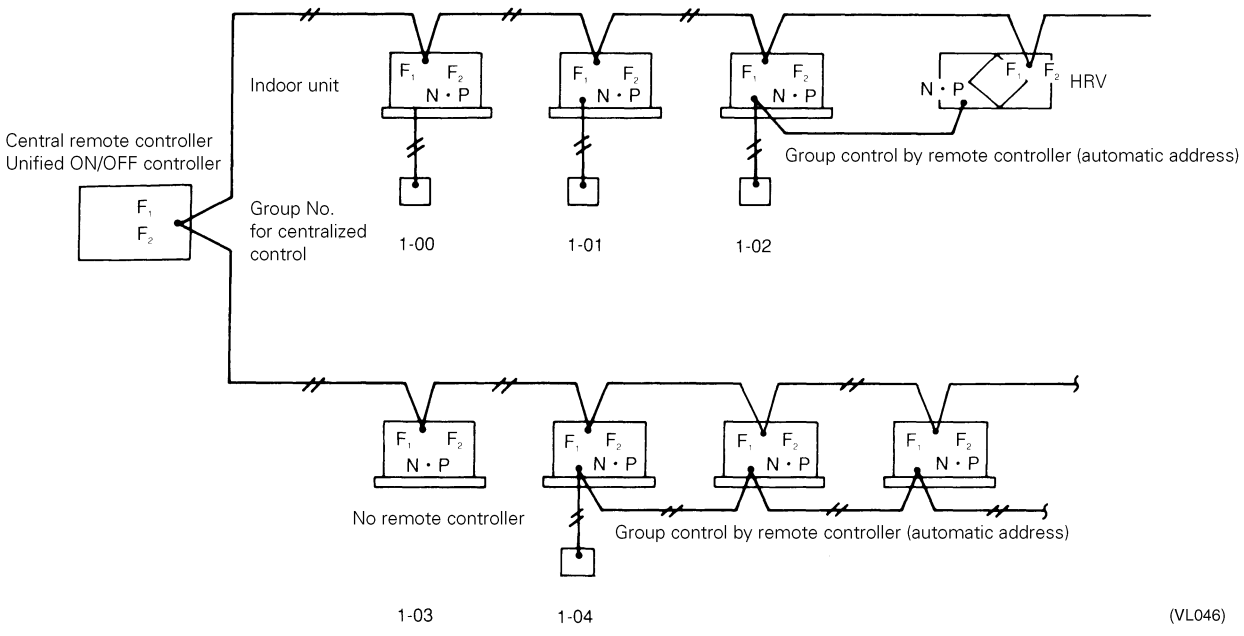


(VL045)



(SL002)

Group No. Setting Example



(VL046)

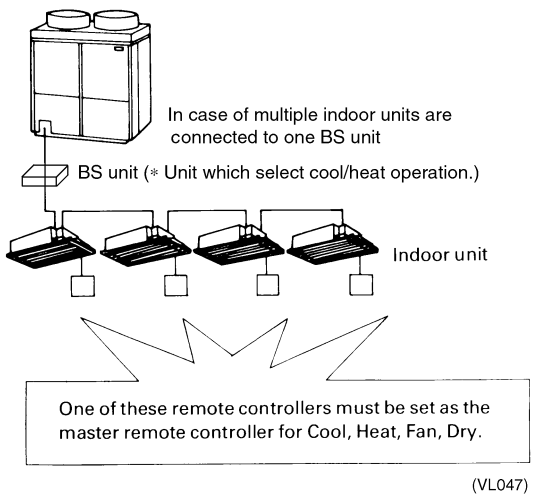
■ If you have to set the address for each unit for calculating cost, etc., set the mode No. to "30."

1.12 Setting of Master Remote Controller

By Indoor Unit Remote Controller

Operation mode (Fan, Dry, Cool, Heat) can be freely selected by indoor unit remote controller for the VRV K series outdoor units, however, as shown in the example below, the remote controller of one of the indoor units connected to 1 outdoor unit must be set as the master remote controller for Fan, Dry, Cool, Heat. (Operation mode can be switched by only the remote controller set as the master remote controller.)

VRV K series



Setting Method

Preparations

When turning the power supply on for the first time, the display of **<CHANGEOVER UNDER CONTROL>** lights. Start to set from 2.

Changing of master remote controller

1	Continue pushing **<OPERATION MODE SELECTOR>** bottun on remote controller which is not displaying <changeover under control> for about 4 seconds. The display of **<CHANGEOVER UNDER CONTROL>** on all remote controllers connected to the same outdoor unit blinks.

Setting of master remote controller

2	Push the **<OPERATION MODE SELECTOR>** of the remote controller you want to set as the master remote controller. This completes the setting. The remote controller is now set as the master remote controller and the display of **<CHANGEOVER UNDER CONTROL>** goes off. **<CHANGEOVER UNDER CONTROL>** is displayed on the other remote controllers.

Operation mode selection

3	Push the **<OPERATION MODE SELECTOR>** of the master remote controller (remote controller not displaying **<CHANGEOVER UNDER CONTROL>**) the amount of times required to select the desired operation mode. Each push switches the display from FAN to DRY, COOL, and HEAT. The operation mode changes automatically for all remote controllers that are not set as a master remote controller.

Operation Contents and Function

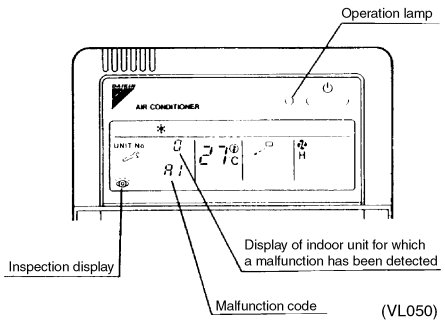
1. If you set a Master remote controller (Remote controller not displaying **<CHANGEOVER UNDER CONTROL>**) → Set to Cool/Heat/Auto → The other remote controllers (Remote controllers displaying **<CHANGEOVER UNDER CONTROL>**)
   - ● switch to the operation mode set by the master remote controller.
   - ● However, they can switch to FAN operation and from COOL to DRY.

2. If you set a Master remote controller (Remote controller not displaying **<CHANGEOVER UNDER CONTROL>**) → Set to FAN, → The other remote controllers (Remote controllers displaying **<CHANGEOVER UNDER CONTROL>**)
   - ● cannot set any mode other than FAN.

(VL049)

1.13 Remote Controller Self-Diagnosis Function

The remote controller switches are equipped with a self diagnosis function so that more appropriate maintenance can be carried out. If a malfunction occurs during operation, the operation lamp, malfunction code and display of malfunctioning unit No. let you know the contents and location of the malfunction. When there is a stop due to malfunction, the contents of the malfunction given below can be diagnosed by a combination of operation lamp, INSPECTION display of the liquid crystal display and display of malfunction code. It also lets you know the unit No. during group control.



Operation lamp	Inspection display	Unit No.	Malfunction code	Malfunction contents
Blinking	Blinking	Blinking	A0	Indoor unit: Error of external protection device
Blinking	Blinking	Blinking	A1	Indoor unit: Failure of PC board
On	Off	Blinking	A1	Indoor unit: Failure of PC board
Blinking	Blinking	Blinking	A3	Indoor unit: Malfunction of drain level control system (33H)
Blinking	Blinking	Blinking	A6	Indoor unit: Fan motor lock
On	Off	Blinking	A7	Indoor unit: Malfunction of swing flap motor (M1S)
Blinking	Blinking	Blinking	A9	Indoor unit: Malfunction of moving part of electronic expansion valve (Y1E)
On	Off	Blinking	AF	Indoor unit: Drain level above limit
Blinking	Blinking	Blinking	AH	Indoor unit: Malfunction of air cleaner
Blinking	Blinking	Blinking	AJ	Indoor unit: Malfunction of capacity setting
Blinking	Blinking	Blinking	C4	Indoor unit: Malfunction of thermistor (R2T) for liquid pipe (loose connection, disconnection, short circuit, failure)
Blinking	Blinking	Blinking	C5	Indoor unit: Malfunction of thermistor (R3T) for gas pipes (loose connection, disconnection, short circuit, failure)
Blinking	Blinking	Blinking	C9	Indoor unit: Malfunction of thermistor (R1T) for air inlet (loose connection, disconnection, short circuit, failure)
On	On	On	CJ	Indoor unit: Malfunction of thermostat sensor in remote controller
Blinking	Blinking	Blinking	E0	Outdoor unit: Actuation of safety device
Blinking	Blinking	Blinking	E1	Outdoor unit: PC board failure
On	Off	Blinking	E1	Outdoor unit: PC board failure
Blinking	Blinking	Blinking	E3	Outdoor unit: Actuation of high pressure switch
Blinking	Blinking	Blinking	E4	Outdoor unit: Actuation of low pressure switch
Blinking	Blinking	Blinking	E9	Outdoor unit: Malfunction of moving part of electronic expansion valve (Y1E)
Blinking	Blinking	Blinking	F3	Outdoor unit: Abnormal discharge pipe temperature
On	Off	Blinking	H3	Outdoor unit: High pressure switch failure
Blinking	Blinking	Blinking	H4	Outdoor unit: Actuation of low pressure switch
Blinking	Blinking	Blinking	H9	Outdoor unit: Malfunction of thermistor (R1T) for outdoor air (loose connection, disconnection, short circuit, failure)
On	Off	Blinking	H9	Outdoor unit: Malfunction of thermistor (R1T) for outdoor air (loose connection, disconnection, short circuit, failure)
Blinking	Blinking	Blinking	J1	Outdoor unit: Malfunction of pressure sensor
Blinking	Blinking	Blinking	J3	Outdoor unit: Malfunction of discharge pipe thermistor (R3T) (loose connection, disconnection, short circuit, failure)
On	Off	Blinking	J3	Outdoor unit: Malfunction of discharge pipe thermistor (R3T) (loose connection, disconnection, short circuit, failure)
Blinking	Blinking	Blinking	J5	Outdoor unit: Malfunction of thermistor (R4T) for suction pipe (loose connection, disconnection, short circuit, failure)

Operation lamp	Inspection display	Unit No.	Malfunction code	Malfunction contents
Blinking	Blinking	Blinking	J6	Outdoor unit: Malfunction of thermistor (R2T) for heat exchanger (loose connection, disconnection, short circuit, failure)
On	Off	Blinking	J6	Outdoor unit: Malfunction of thermistor (R2T) for heat exchanger (loose connection, disconnection, short circuit, failure)
Blinking	Blinking	Blinking	JA	Outdoor unit: Malfunction of discharge pipe pressure sensor
Blinking	Blinking	Blinking	JC	Outdoor unit: Malfunction of suction pipe pressure sensor
On	Off	Blinking	JH	Outdoor unit: Malfunction of oil temperature sensor
Blinking	Blinking	Blinking	L0	Outdoor unit: Failure of inverter system
Blinking	Blinking	Blinking	L4	Outdoor unit: Failure of inverter cooling
Blinking	Blinking	Blinking	L5	Outdoor unit: Compressor motor insulation defect, short circuit, power unit short circuit
Blinking	Blinking	Blinking	L6	Outdoor unit: Compressor motor insulation defect, short circuit
Blinking	Blinking	Blinking	L8	Outdoor unit: Compressor overload, compressor motor wire cut
Blinking	Blinking	Blinking	L9	Outdoor unit: Compressor seizing
Blinking	Blinking	Blinking	LA	Outdoor unit: Malfunction of power unit
Blinking	Blinking	Blinking	LC	Outdoor unit: Malfunction of transmission between inverter and outdoor control unit
Blinking	Off	Blinking	PO	Gas depletion (heat build up)
Blinking	Blinking	Blinking	P1	Outdoor unit: Power supply voltage imbalance, open phase
Blinking	Blinking	Blinking	P4	Outdoor unit: Malfunction of power unit temperature sensor
On	Off	Blinking	U0	Refrigerant shortage, low pressure drop due to failure of electronic expansion valve
Blinking	Blinking	Blinking	U1	Negative phase / open phase
Blinking	Blinking	Blinking	U2	Power supply insufficient or instantaneous failure
Blinking	Blinking	Blinking	U4	Malfunction of transmission between indoor unit and outdoor unit / BS unit, or outdoor unit and BS unit
Blinking	Blinking	Blinking	U5	Malfunction of transmission between remote controller and indoor unit
Off	On	Off	U5	Failure of remote controller PC board or setting during control by remote controller
Blinking	Blinking	Blinking	U7	Malfunction of transmission between outdoor units
On	Off	Blinking	U7	Malfunction of transmission between outdoor units (cool/ heat unified, low noise)
Blinking	Blinking	Off	U8	Malfunction of transmission between main remote controller and sub remote controller (malfunction of slave remote controller)
Blinking	Blinking	Blinking	U9	Malfunction of transmission between indoor unit and outdoor unit in same system Malfunction of transmission between BS unit and indoor/outdoor unit in same system
Blinking	Blinking	Blinking	UA	Failure of combination of indoor / BS / outdoor units (model, No. of units, etc.) Failure of combination of indoor unit and remote controller (applicable remote controller) Failure of BS unit connection position
On	On	On	UC	Address duplication of central remote controller
Blinking	Blinking	Blinking	UE	Malfunction of transmission between indoor unit and central remote controller
Blinking	Blinking	Blinking	UF	System not set
Blinking	Blinking	Blinking	UH	Failure of system

The system operates for malfunction codes indicated in black squares, however, be sure to check and repair.

Failure Diagnosis by Wireless Remote Controller

The indoor unit display section or the separately installed receiver unit's operation lamp blinks for stop due to malfunction. You can diagnose the problem as described on the following page using the malfunction code located by the method described below.

1. Push the TEST button; is displayed and "0" blinks.
2. Push the time mode ▲ ▼ button and locate the number of the unit which is stopped due to malfunction. A beep is then emitted to indicate signal reception.

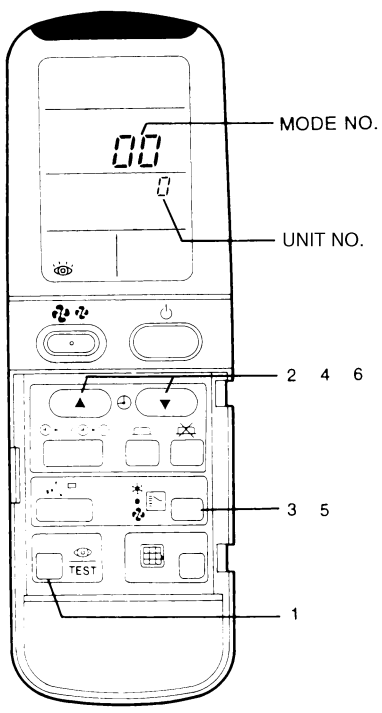
◆ **No. of times signal reception beep is emitted**

3 times	Perform the procedure given below in the order of 3, 4, 5, 6.
1 time	Perform steps 3 and 6.
Continuous beep	No malfunction

3. Push the operation mode selector button, and the upper digit of the malfunction code blinks.
4. Push the time mode ▲ ▼ button until signal reception beeps twice, and then locate the upper code.
5. Push the operation mode selector button, and the lower digit of the malfunction code blinks.
6. Push the time mode ▲ ▼ button until signal reception beeps continuously, and then locate the lower code.

◆ **Continuous signal reception beep indicates that the malfunction code has been ascertained.**

Note:
1. "INSPECTION" display blinks when the remote controller's TEST button is pushed.
2. If you push and hold the ON/OFF button for 5 seconds or more in the INSPECTION mode, the failure hysteresis is canceled. In this case, after the malfunction code blinks twice, the code display changes to "00" (normal) and the unit No. changes to "0." The mode than automatically changes from the inspection mode to the normal mode (preset temperature display).



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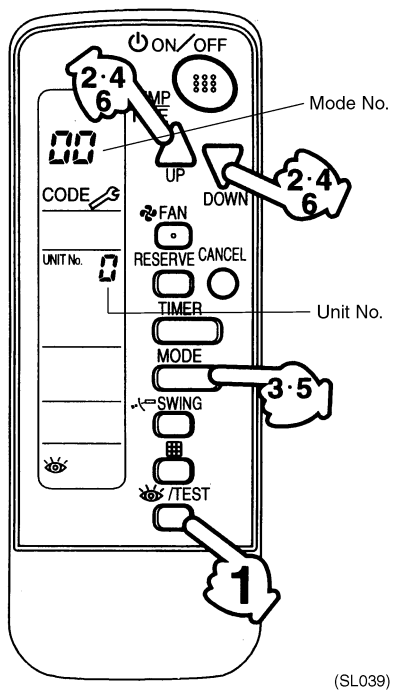
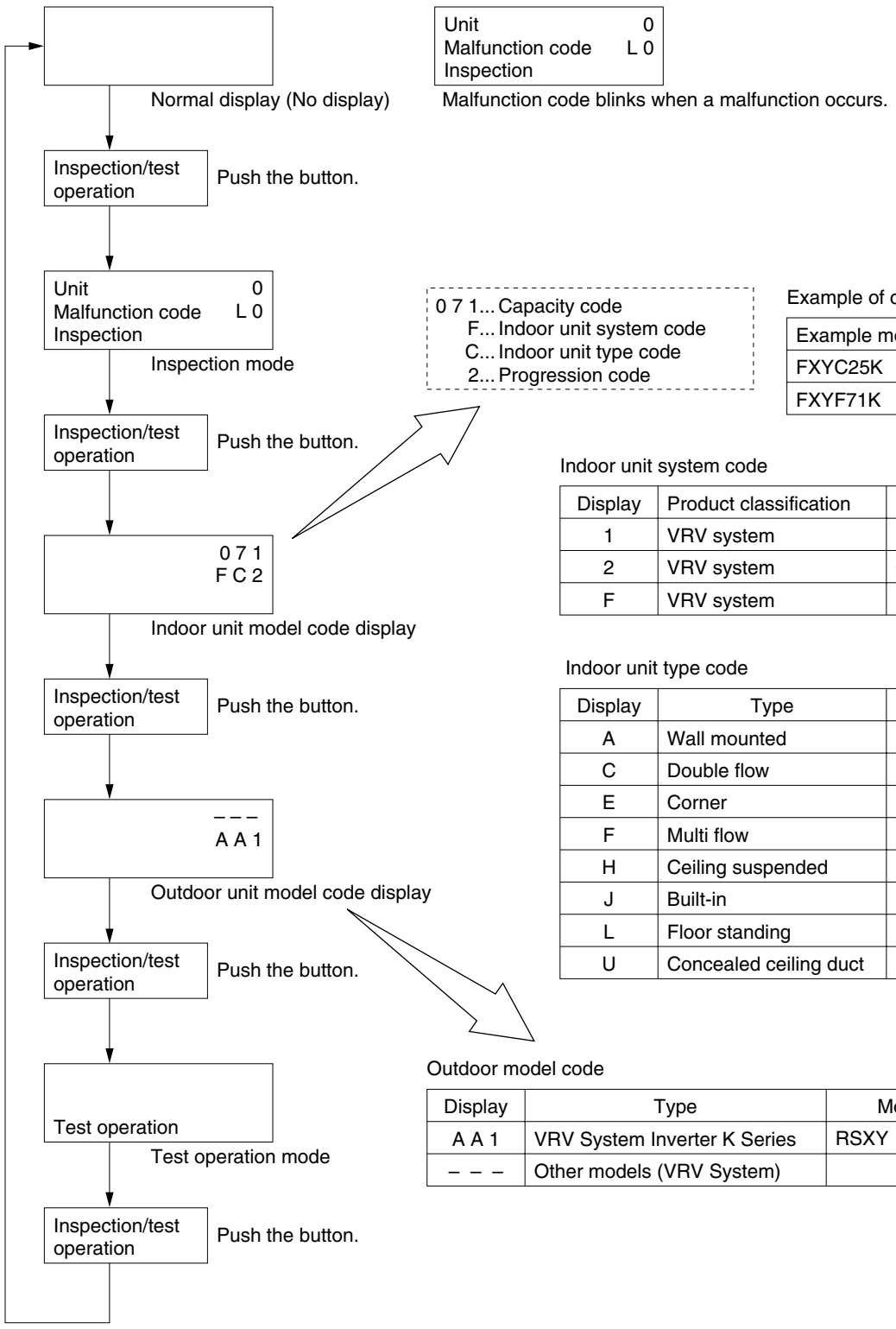


(SL039)

1.14 Operation of the Remote Controller's Inspection / Test Operation Button



Unit 0
Malfunction code L 0
Inspection

Malfunction code blinks when a malfunction occurs.

0 7 1... Capacity code
F... Indoor unit system code
C... Indoor unit type code
2... Progression code

Example of capacity code display

Example model	Display
FXYC25K	028
FXYF71K	080

Indoor unit system code

Display	Product classification	System classification
1	VRV system	(VAV indoor unit)
2	VRV system	Outdoor air intake
F	VRV system	Standard indoor unit

Indoor unit type code

Display	Type	Model
A	Wall mounted	FXYA
C	Double flow	FXYC
E	Corner	FXYK
F	Multi flow	FXYF
H	Ceiling suspended	FXYH
J	Built-in	FXYS
L	Floor standing	FXYL
U	Concealed ceiling duct	FXYM

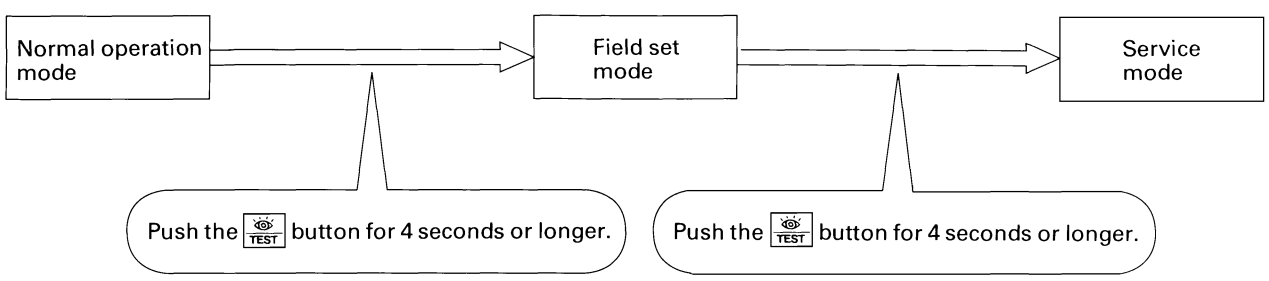
Outdoor model code

Display	Type	Model
A A 1	VRV System Inverter K Series	RSXY
– – –	Other models (VRV System)	

(VF019)

1.15 Remote Controller Service Mode

How to Enter the Service Mode



(VF020)

Service Mode Operation Method

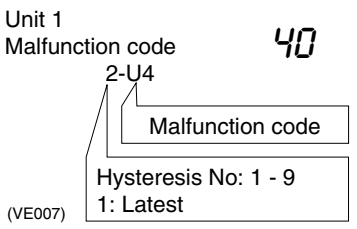
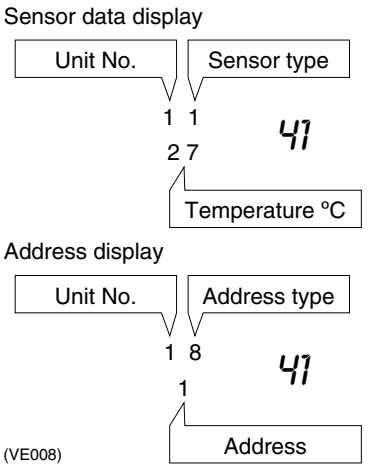
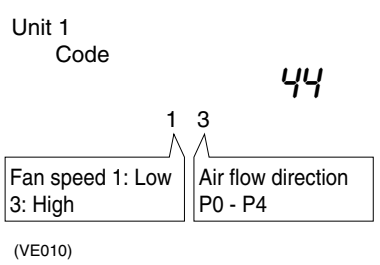
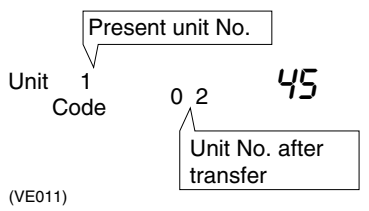
1. Select the mode No.
Set the desired mode No. with the button.
(Forced FAN ON “43” only can be set by wireless remote controller.)

2. Select the unit No. (For group control only)
Select the indoor unit No. to be set with the time mode
(Selected the unit No. with button for wireless remote controller)

3. Make the settings required for each mode. (Modes 41, 44, 45)
Before setting, press button and make condition to change setting.
(“Code” will flush on L. C. Display.)
For details, refer to the table next page.

4. Define the setting contents. (Modes 44, 45)
Define by pushing the timer button.
(After defining, “Code” will change from flushing to ON.)

5. Return to the normal operation mode.
Push the button one time.

Mode No	Function	Contents and operation method	Remote controller display example
40	Malfunction hysteresis display	Display malfunction hysteresis. The hysteresis No. can be changed with the button.	
41	Display of sensor and address data	Display various types of data. Select the data to be displayed with the button. Sensor data 0: Thermostat sensor in remote controller. 1: Suction 2: Liquid pipe 3: Gas pipe Address data 4: Indoor unit address 5: Outdoor unit address 6: BS unit address 7: Zone control address 8: Cool/heat group address 9: Demand / low noise address	
43	Forced fan ON	Manually turn the fan ON by each unit. (When you want to search for the unit No.) By selecting the unit No. with the button, you can turn the fan of each indoor unit on (forced ON) individually.	
44	Individual setting	Set the fan speed and air flow direction by each unit Select the unit No. with the time mode button. Set the fan speed with the button Set the air flow direction with the button.	
45	Unit No. transfer	Transfer unit No. Select the unit No. with the button. Set the unit No. after transfer with the button.	
46 47	This function is not used by VRV System Inverter K Series.		

Part 4
Troubleshooting Inverter K Series

1. Diagnosis by Malfunction Code

1.1 Diagnosis by Malfunction Code

Malfunction code	Malfunction contents	Fan operation	Page
A0	Indoor unit: Error of external protection device		77
A1	Indoor unit: PC board defect		78
A3	Indoor unit: Malfunction of drain level control system (33H)	○	79
A6	Indoor unit: Fan motor (M1F) lock, overload		80
A7	Indoor unit: Malfunction of swing flap motor (M1S)	○	81
A9	Indoor unit: Malfunction of moving part of electronic expansion valve (Y1E)	○	82
AF	Indoor unit: Drain level above limit		83
AJ	Indoor unit: Malfunction of capacity determination device		84
C4	Indoor unit: Malfunction of thermistor (R2T) for liquid pipe	○	85
C5	Indoor unit: Malfunction of thermistor (R3T) for gas pipes	○	86
C9	Indoor unit: Malfunction of thermistor (R1T) for air inlet	○	87
CJ	Indoor unit: Malfunction of thermostat sensor in remote controller	○	88
E0	Outdoor unit: Actuation of safety device		89
E1	Outdoor unit: PC board defect		90
E3	Outdoor unit: Actuation of high pressure switch		91
E4	Outdoor unit: Actuation of low pressure switch	○	92
E9	Outdoor unit: Malfunction of moving part of electronic expansion valve (Y1E)	○	93
F3	Outdoor unit: Abnormal discharge pipe temperature	○	94
H9	Outdoor unit: Malfunction of thermistor for outdoor air (R1T)	○	95
J3	Outdoor unit: Malfunction of discharge pipe thermistor (R3T)	○	96
J5	Outdoor unit: Malfunction of thermistor (R4T) for suction pipe	○	97
J6	Outdoor unit: Malfunction of thermistor (R2T) for heat exchanger	○	98
JA	Outdoor unit: Malfunction of discharge pipe pressure sensor	○	99
JC	Outdoor unit: Malfunction of suction pipe pressure sensor	○	100
JH	Outdoor unit: Malfunction of oil temperature thermistor (R5T)	○	101
U0	Low pressure drop due to refrigerant shortage or electronic expansion valve failure	○	102
U1	Negative phase, open phase	○	103
U2	Power supply insufficient or instantaneous failure	○	120
U4	Malfunction of transmission between indoor units	○	104
U5	Malfunction of transmission between remote controller and indoor unit		105
U7	Malfunction of transmission between outdoor units	○	106
U8	Malfunction of transmission between main and sub remote controllers	○	107
U9	Malfunction of transmission between indoor and outdoor units or between outdoor units in the same system	○	108
UA	Excessive number of indoor units Improper combination of indoor and outdoor units (incompatible refrigerant), improper number of connected indoor units or remote controllers (inappropriate remote controllers), faulty PCB model setting (replacement PCB)	○	109
UC	Address duplication of central remote controller	○	110
UF	Refrigerant system not set, incompatible wiring/piping	○	111
UH	Malfunction of system, refrigerant system address undefined	○	112

The system operates for malfunction codes indicated in black squares, however, be sure to check and repair.

1.2 Failure Diagnosis

1.2.1 Inverter Failure Diagnosis

Malfunction code	Malfunction contents	Fan operation	Page
L4	Outdoor unit: Malfunction of inverter radiating fin temperature rise	○	115
L5	Outdoor unit: Inverter instantaneous over-current	○	116
L8	Outdoor unit: Inverter electronic thermal, compressor overload	○	117
L9	Outdoor unit: Inverter stall prevention, compressor seizing	○	118
LC	Outdoor unit: Malfunction of transmission between inverter and control PC board	○	119
P1	Outdoor unit: Inverter over-ripple protection	○	121
P4	Outdoor unit: Malfunction of inverter radiating fin temperature rise sensor	○	122

1.2.2 Failure Diagnosis for Optional Controllers for Centralized Control

Malfunction code	Optional controllers for centralized control	Malfunction contents	Page
UE	Central remote controller Schedule timer	Malfunction of transmission between central remote controller and indoor unit	123 128
M1	Central remote controller Schedule timer	PC board defect	124 129
M8	Central remote controller Schedule timer	Malfunction of transmission between optional controllers for centralized control	125 130
MA	Central remote controller Schedule timer	Improper combination of optional controllers for centralized control	126 131
MC	Central remote controller Schedule timer	Address duplication, improper setting	127 132
—	Unified ON/OFF controller	Operation lamp blinks	133
		Display “under host computer integrate control” blinks (repeats single blink)	134
		Display “under host computer integrate control” blinks (repeats double blink)	136

2. Troubleshooting

2.1 Indoor Unit: Error of External Protection Device

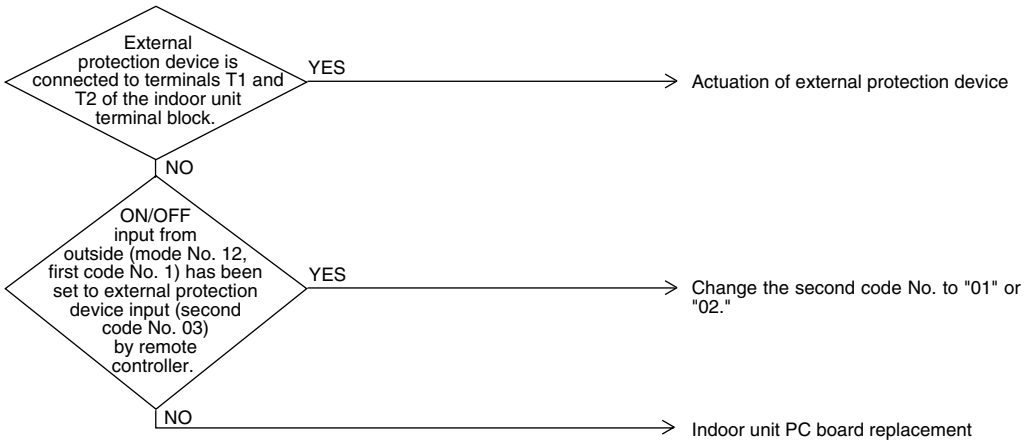
Remote Controller Display

A0

Supposed Causes

- Actuation of external protection device
- Improper field set
- Defect of indoor unit PC board

Troubleshooting



(VF029)

2.2 Indoor Unit: PC Board Defect

Remote Controller Display A1

Supposed Causes
- Defect of indoor unit PC board

Troubleshooting Replace the indoor unit PC board.

2.3 Indoor Unit: Malfunction of Drain Level Control System (33H)

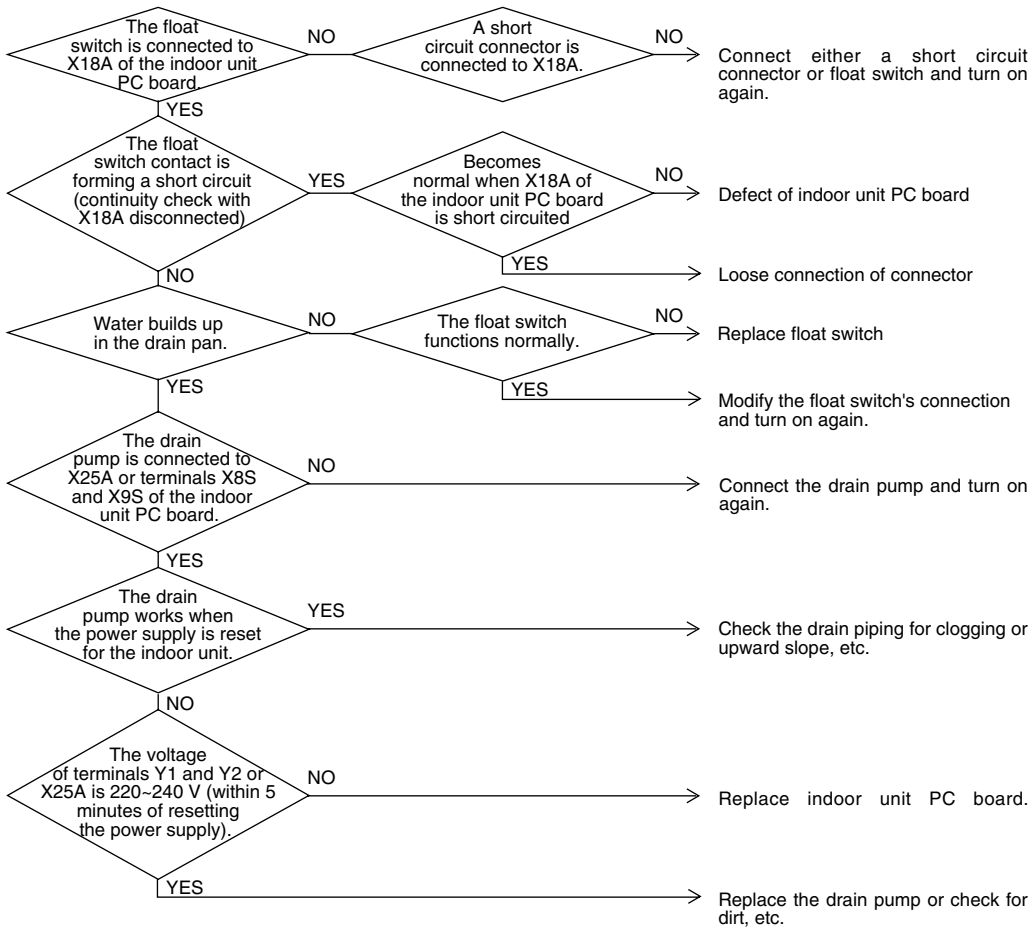
Remote Controller Display

A3

Supposed Causes

- Defect of float switch or short circuit connector
- Defect of drain pump
- Drain clogging, upward slope, etc.
- Defect of indoor unit PC board
- Loose connection of connector

Troubleshooting



(VF030)

2.4 Indoor Unit: Fan Motor (M1F) Lock, Overload

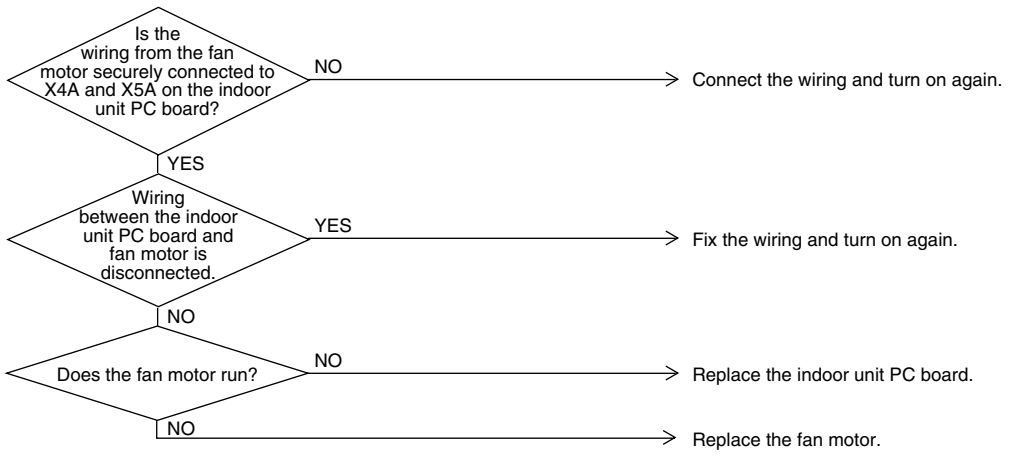
Remote Controller Display

A6

Supposed Causes

- Fan motor lock
- Disconnected or faulty wiring between fan motor and PC board

Troubleshooting



(VF031)

2.5 Indoor Unit: Malfunction of Swing Flap Motor (M1S)

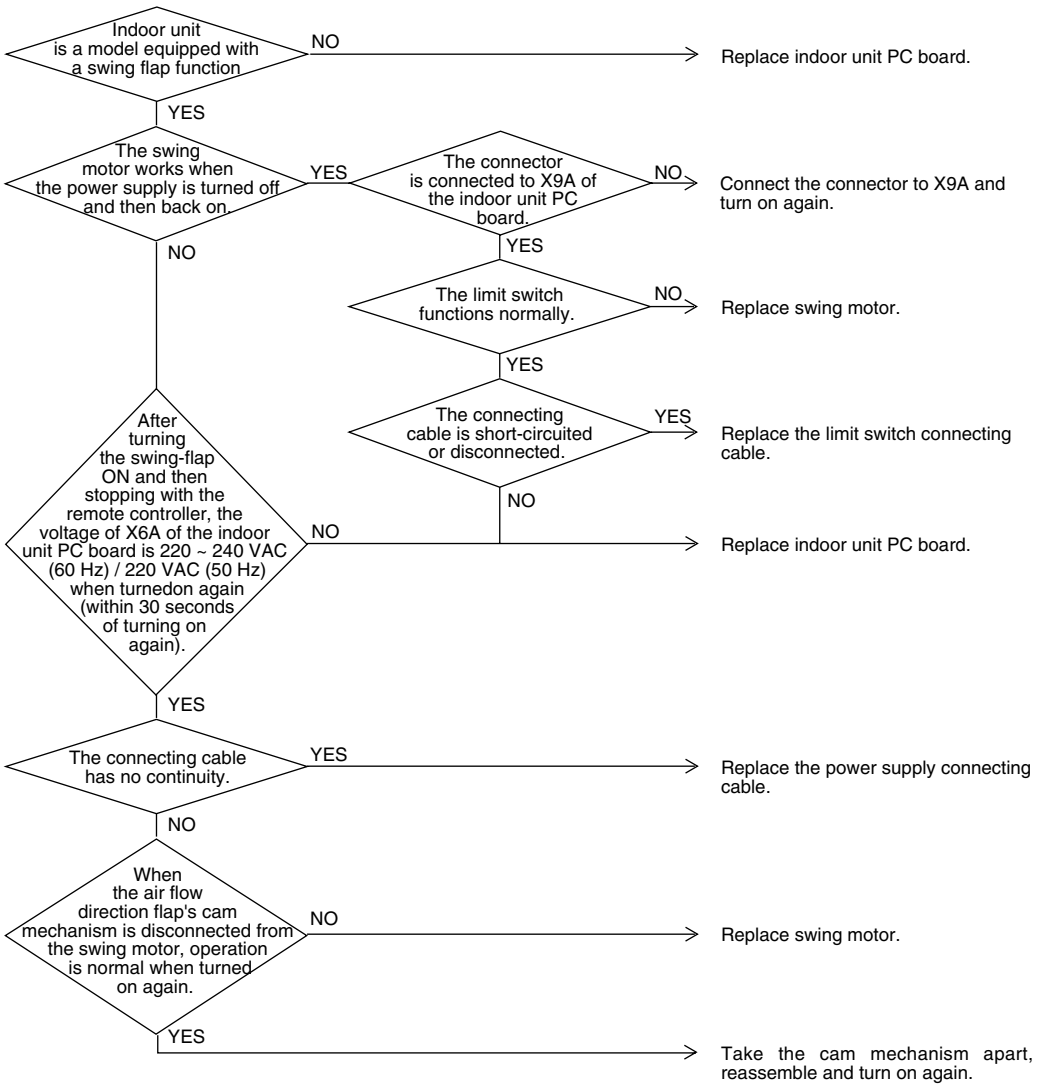
Remote Controller Display

A7

Supposed Causes

- Defect of swing motor
- Defect of connection cable (power supply and limit switch)
- Defect of air flow direction adjusting flap-cam
- Defect of indoor unit PC board

Troubleshooting



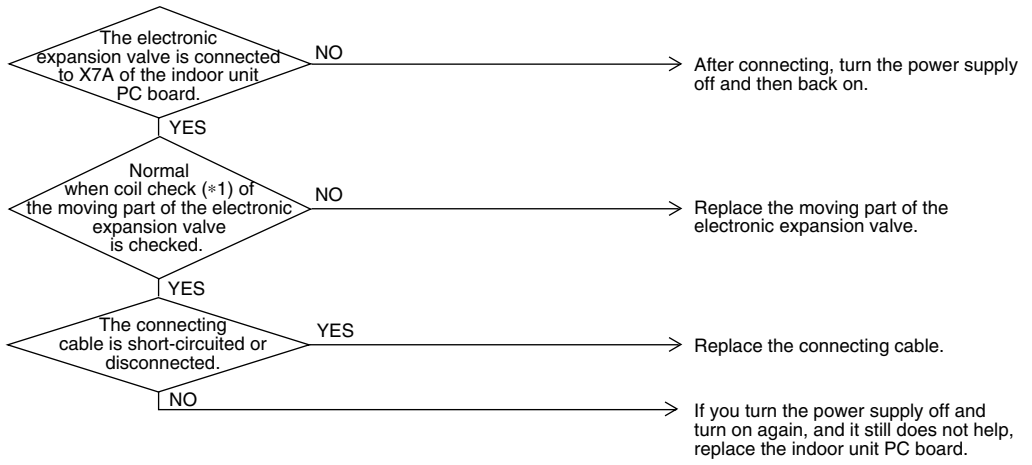
(VF032)

2.6 Indoor Unit: Malfunction of Moving Part of Electronic Expansion Valve (Y1E)

Remote Controller Display A9

Supposed Causes
- Malfunction of moving part of electronic expansion valve
- Defect of indoor unit PC board
- Defect of connecting cable

Troubleshooting



(VF033)

*1: Coil check method for the moving part of the electronic expansion valve
Disconnect electronic expansion valve from P.C.B, then check the continuity between connector pins and judge.

(Normal)

Pin No.	1. White	2. Yellow	3. Orange	4. Blue	5. Red	6. Brown
1. White		×	○ Approx. 300Ω	×	○ Approx. 150Ω	×
2. Yellow			×	○ Approx. 300Ω	×	○ Approx. 150Ω
3. Orange				×	○ Approx. 150Ω	×
4. Blue					×	○ Approx. 150Ω
5. Red						×
6. Brown						

○: Continuity
×: No continuity

2.7 Indoor Unit: Drain Level above Limit

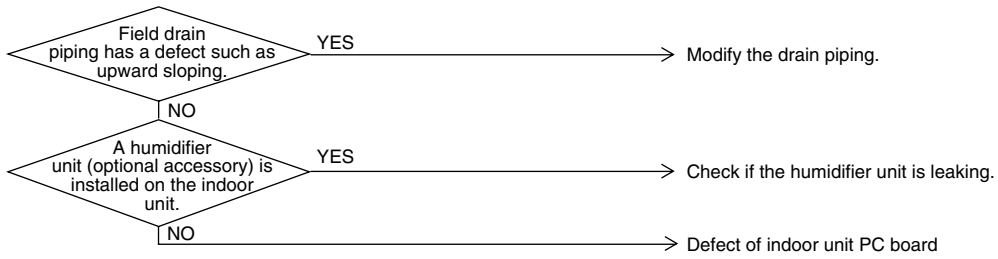
Remote Controller Display

AF

Supposed Causes

- Humidifier unit (optional accessory) leaking
- Defect of drain pipe (upward slope, etc.)
- Defect of indoor unit PC board

Troubleshooting



(VF034)

2.8 Indoor Unit: Malfunction of Capacity Determination Device

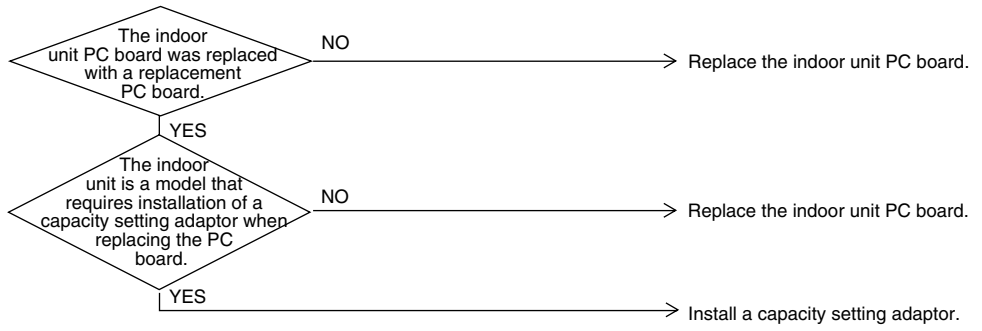
Remote controller display

AJ

Supposed Causes

- You have forgotten to install the capacity setting adaptor.
- Defect of indoor unit PC board

Troubleshooting



(VF035)

2.9 Indoor Unit: Malfunction of Thermistor (R2T) for Liquid Pipe

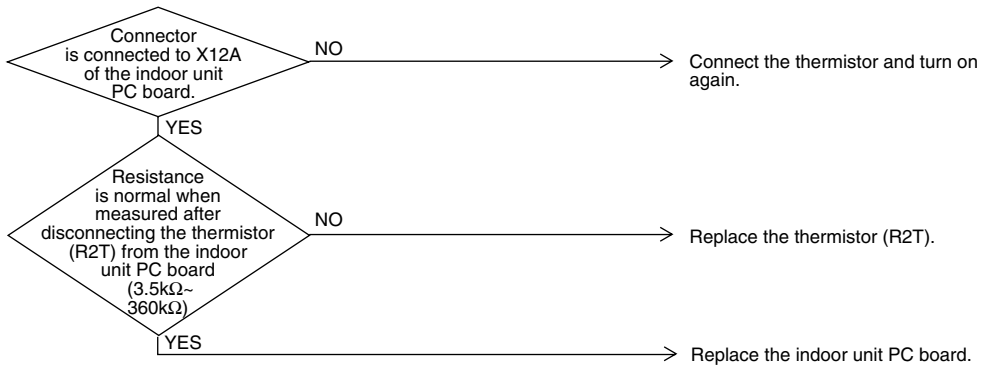
Remote Controller Display

C4

Supposed Causes

- Defect of thermistor (R2T) for liquid pipe
- Defect of indoor unit PC board

Troubleshooting



(VF036)

2.10 Indoor Unit: Malfunction of Thermistor (R3T) for Gas Pipes

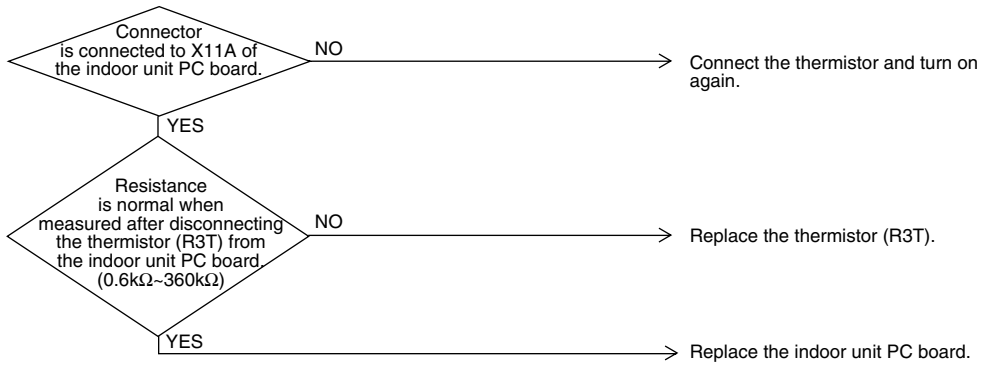
Remote Controller Display

C5

Supposed Causes

- Defect of indoor unit thermistor (R3T) for gas pipe
- Defect of indoor unit PC board

Troubleshooting



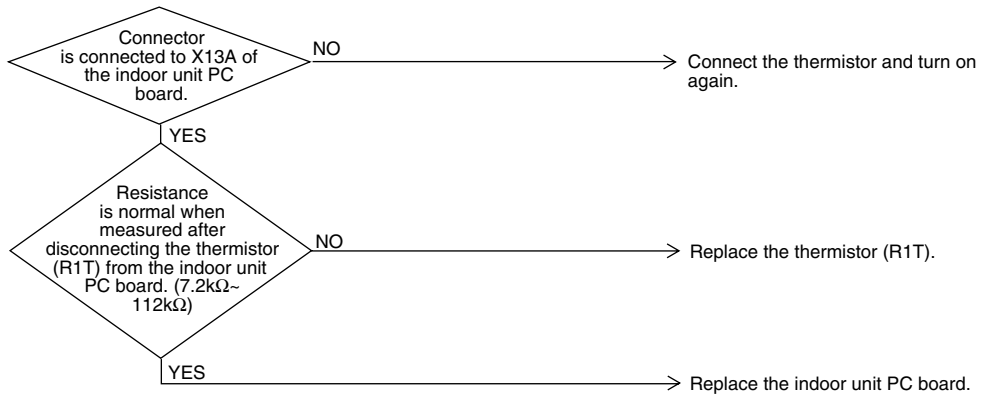
(VF037)

2.11 Indoor Unit: Malfunction of Thermistor (R1T) for Air Inlet

Remote Controller Display C9

Supposed Causes
- Defect of indoor unit thermistor (R1T) for air inlet
- Defect of indoor unit PC board

Troubleshooting



(VF038)

2.12 Indoor Unit: Malfunction of Thermostat Sensor in Remote Controller

Remote Controller Display

CJ

Supposed Causes

- Defect of remote controller thermistor
- Defect of remote controller PC board

Troubleshooting

(VF039)

2.13 Outdoor Unit: Actuation of Safety Device

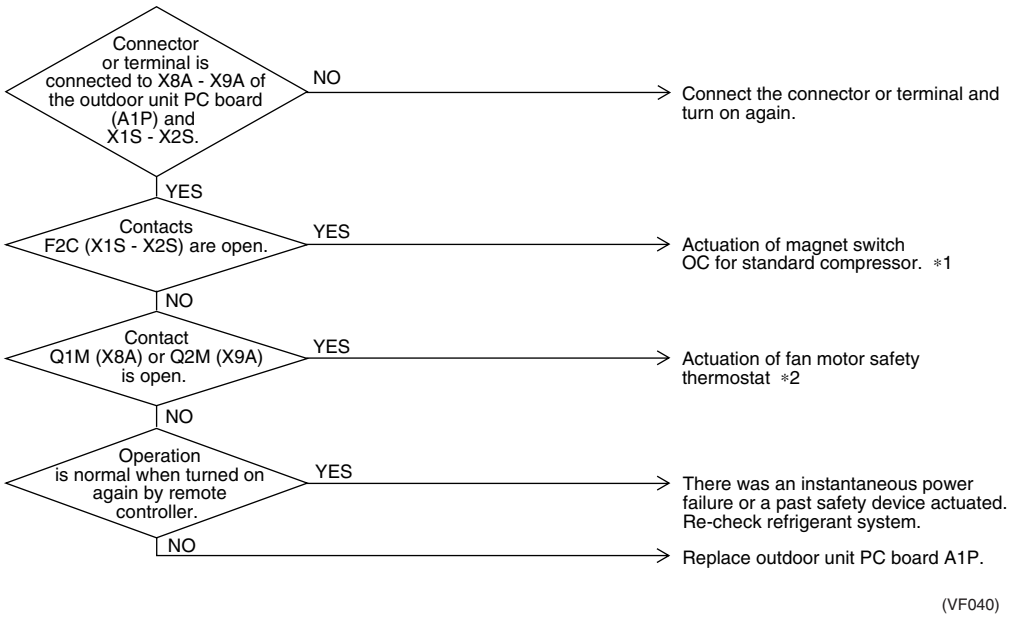
Remote Controller Display

E0

Supposed Causes

- Actuation of outdoor unit safety device
- Defect of outdoor unit PC board
- Instantaneous power failure

Troubleshooting



(VF040)

∗1: Actuation of magnet switch OC
Defect of compressor
Power supply insufficient
Defect of magnet switch, etc.

∗2: Actuation of fan motor safety thermostat
Defect of fan motor
Defect of capacitor, etc.

2.14 Outdoor Unit: PC Board Defect

Remote Controller Display E1

Supposed Causes
- Defect of outdoor unit PC board (A1P)

Troubleshooting Replace outdoor unit PC board A1P.

2.15 Outdoor Unit: Actuation of High Pressure Switch

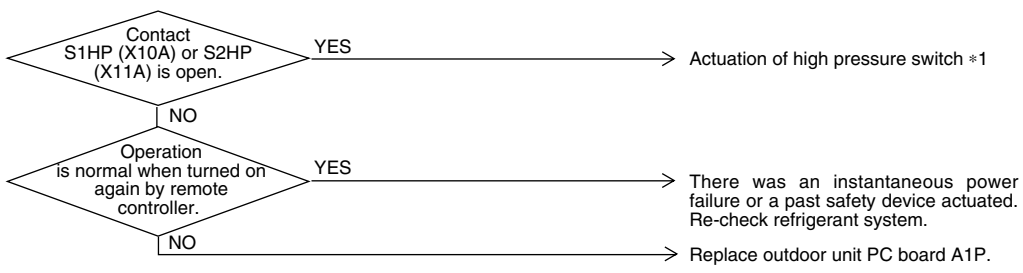
Remote Controller Display

E3

Supposed Causes

- Actuation of outdoor unit high pressure switch
- Defect of outdoor unit PC board (A1P)
- Instantaneous power failure

Troubleshooting



(VF041)

∗1: Actuation of high pressure switch (HPS)
The outdoor unit PC board's connector is disconnected.
Is the outdoor unit heat exchanger dirty?
Defect of outdoor fan
Is the refrigerant over-charged?

2.16 Outdoor Unit: Actuation of Low Pressure Sensor

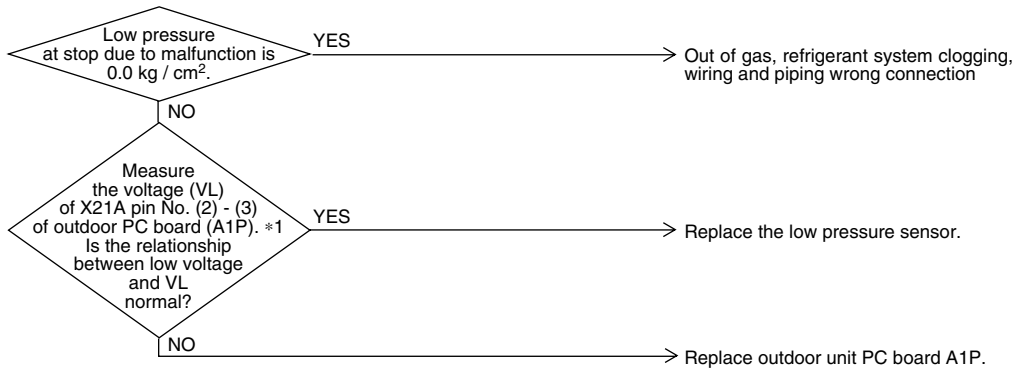
Remote Controller Display

E4

Supposed Causes

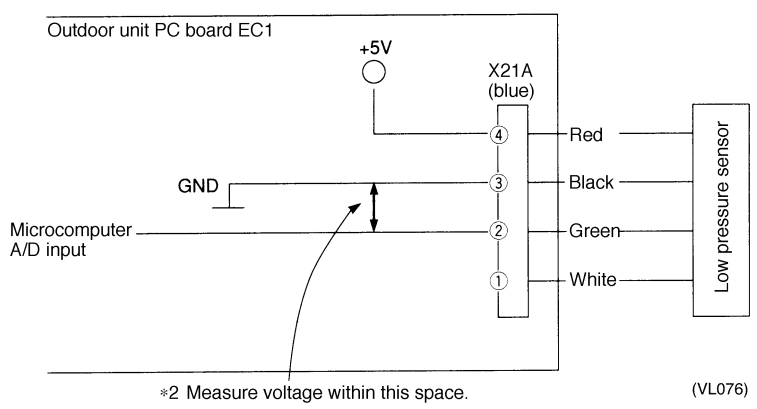
- Abnormal drop of low pressure (0 kg/cm^2 [0 MPa])
- Defect of low pressure sensor
- Defect of outdoor unit PC board

Troubleshooting



(VF042)

*1: Voltage measurement point



(VL076)

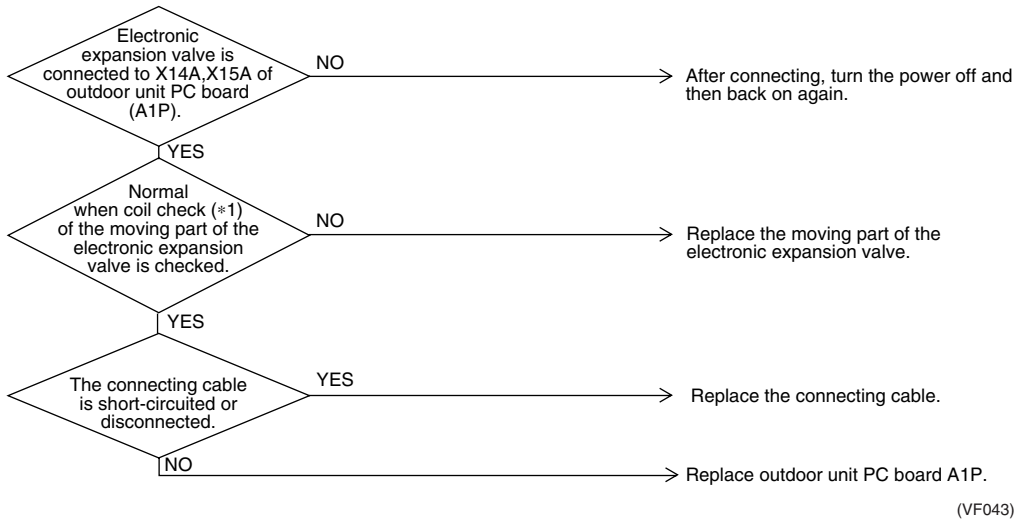
*2: Refer to pressure sensor, pressure - voltage characteristics table on P140.

2.17 Outdoor Unit: Malfunction of Moving Part of Electronic Expansion Valve (Y1E)

Remote Controller Display E9

Supposed Causes
- Defect of moving part of electronic expansion valve
- Defect of outdoor unit PC board (A1P)
- Defect of connecting cable

Troubleshooting



(VF043)

*1 Coil check method for the moving part of the electronic expansion valve
Disconnect the electronic expansion valve from the PC board and check the continuity between the connector pins.

(Normal)

Pin No.	1. White	2. Yellow	3. Orange	4. Blue	5. Red	6. Brown
1. White		×	◎	×	○	×
2. Yellow			×	◎	×	○
3. Orange				×	○	×
4. Blue					×	○
5. Red						×
6. Brown						

◎: Continuity Approx. 300Ω
○: Continuity Approx. 150Ω
×: No continuity

2.18 Outdoor Unit: Abnormal Discharge Pipe Temperature

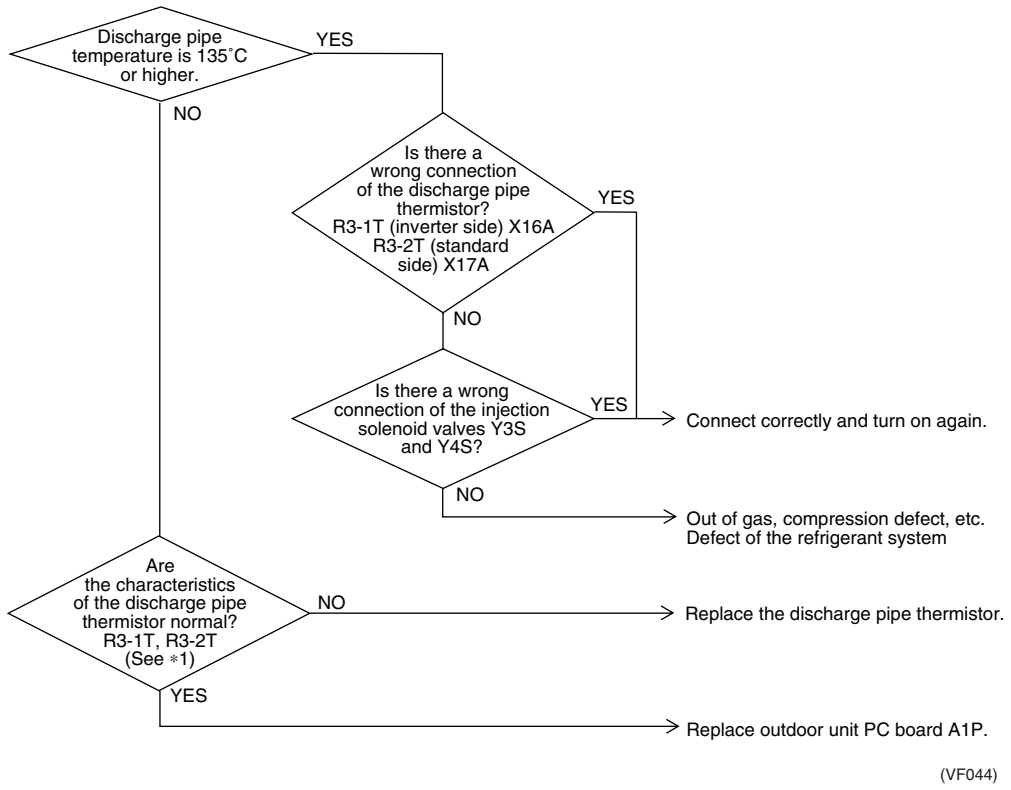
Remote Controller Display

F3

Supposed Causes

- Abnormal discharge pipe temperature
- Defect of discharge pipe thermistor (R3-1T, R3-2T)
- Defect of outdoor unit PC board
- Discharge pipe thermistor wrong connection
- Liquid injection solenoid valve wrong connection

Troubleshooting



(VF044)

∗1 Refer to Thermistor Resistance / Temperature Characteristics on P138

2.19 Outdoor Unit: Malfunction of Thermistor for Outdoor Air (R1T)

Remote Controller Display H9

Supposed Causes
- Defect of thermistor (R1T) for outdoor unit outdoor air intake
- Defect of outdoor unit PC board (A1P)

Troubleshooting

(VF045)

The alarm indicator is displayed when the fan is being used also.

2.20 Outdoor Unit: Malfunction of Discharge Pipe Thermistor (R3T)

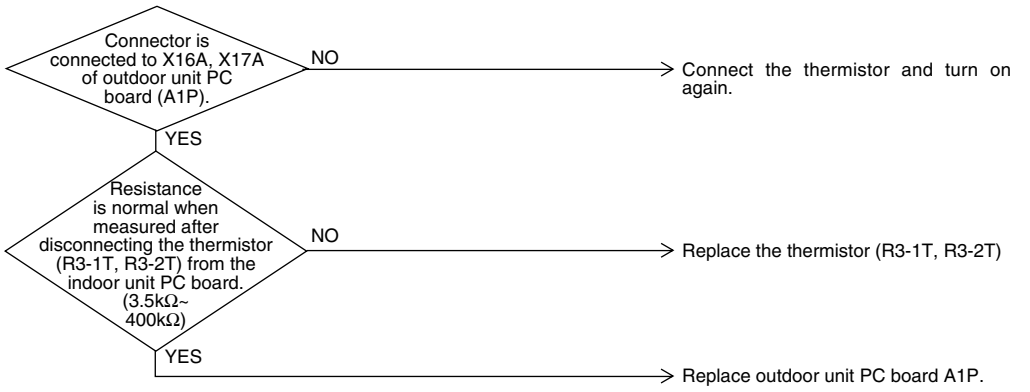
Remote Controller Display

J3

Supposed Causes

- Defect of thermistor (R3-1T, R3-2T) for outdoor unit discharge pipe
- Defect of outdoor unit PC board (A1P)

Troubleshooting



(VF046)

The alarm indicator is displayed when the fan is being used also.

2.21 Outdoor Unit: Malfunction of Thermistor (R4T) for Suction Pipe

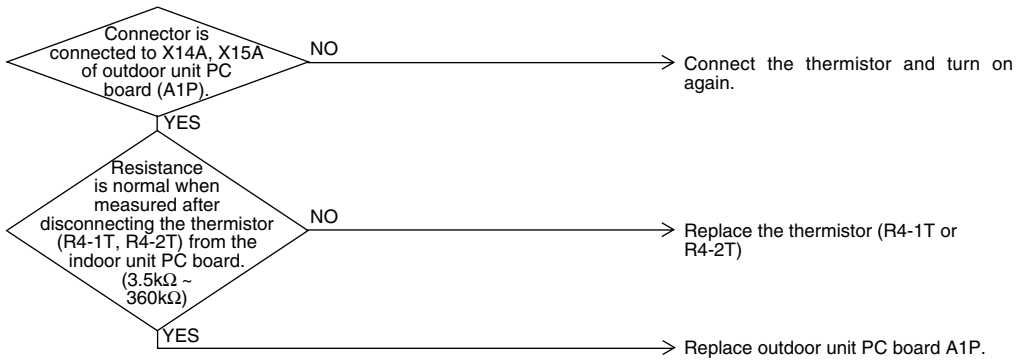
Remote Controller Display

J5

Supposed Causes

- Defect of thermistor (R4-1T, R4-2T) for outdoor unit suction pipe
- Defect of outdoor unit PC board (A1P)

Troubleshooting



(VF047)

The alarm indicator is displayed when the fan is being used also.

2.22 Outdoor Unit: Malfunction of Thermistor (R2T) for Heat Exchanger

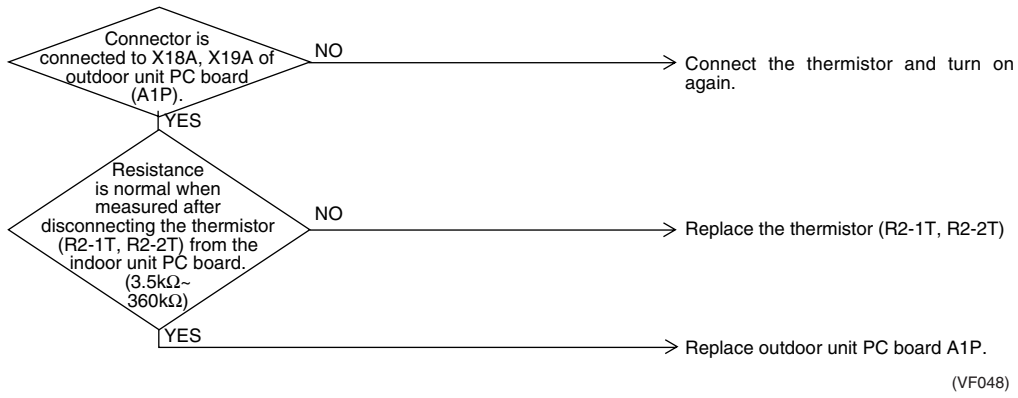
Remote Controller Display

J6

Supposed Causes

- Defect of thermistor (R2-1T, R2-2T) for outdoor unit coil
- Defect of outdoor unit PC board (A1P)

Troubleshooting



(VF048)

The alarm indicator is displayed when the fan is being used also.

2.23 Outdoor Unit: Malfunction of Discharge Pipe Pressure Sensor

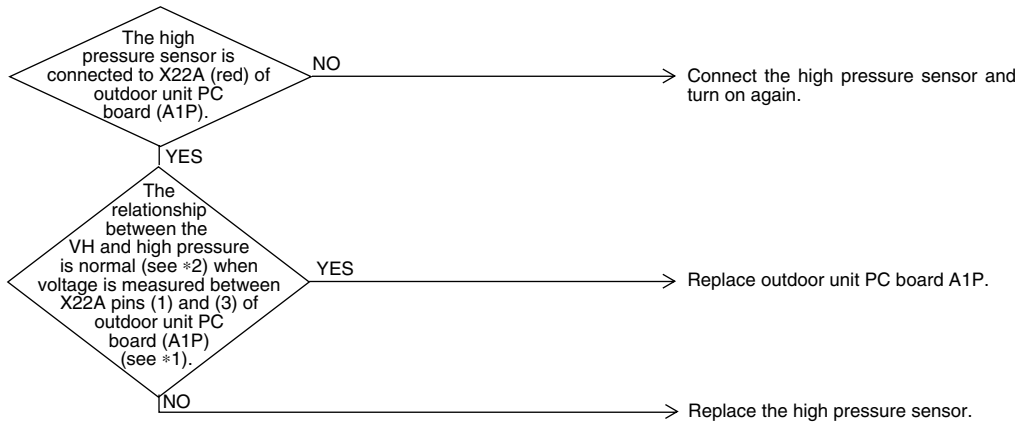
Remote Controller Display

JA

Supposed Causes

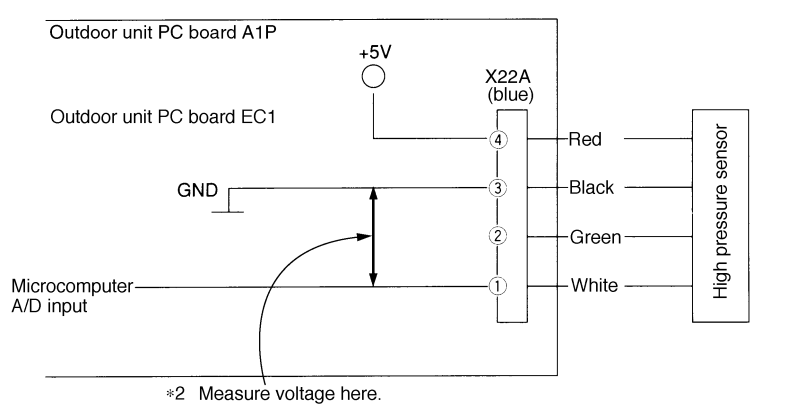
- Defect of high pressure sensor system
- Connection of low pressure sensor with wrong connection.
- Defect of outdoor unit PC board.

Troubleshooting



(VF049)

∗1: Voltage measurement point



(VL077)

∗2: Refer to pressure sensor, pressure / voltage characteristics table on P140.

2.24 Outdoor Unit: Malfunction of Suction Pipe Pressure Sensor

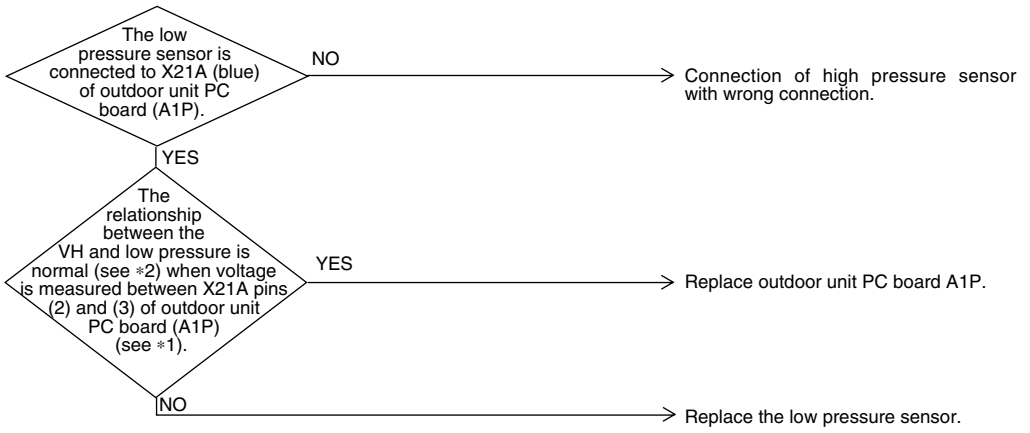
Remote Controller Display

JC

Supposed Causes

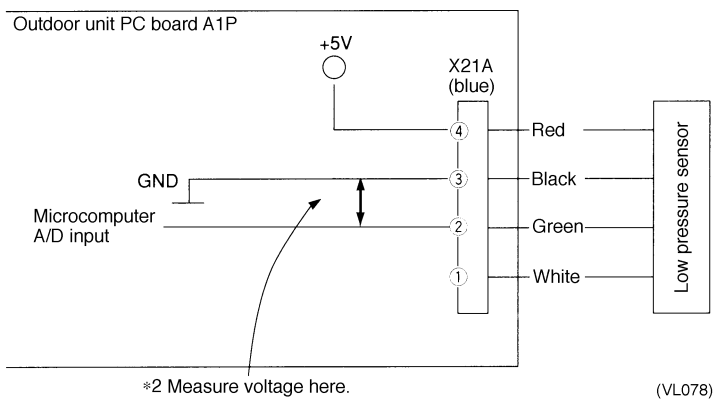
- Defect of low pressure sensor system
- Connection of high pressure sensor with wrong connection.
- Defect of outdoor unit PC board.

Troubleshooting



(VF050)

∗1: Voltage measurement point



(VL078)

∗2: Refer to pressure sensor, pressure/voltage characteristics table on P140.

2.25 Outdoor Unit: Malfunction of Oil Temperature Thermistor (R5T)

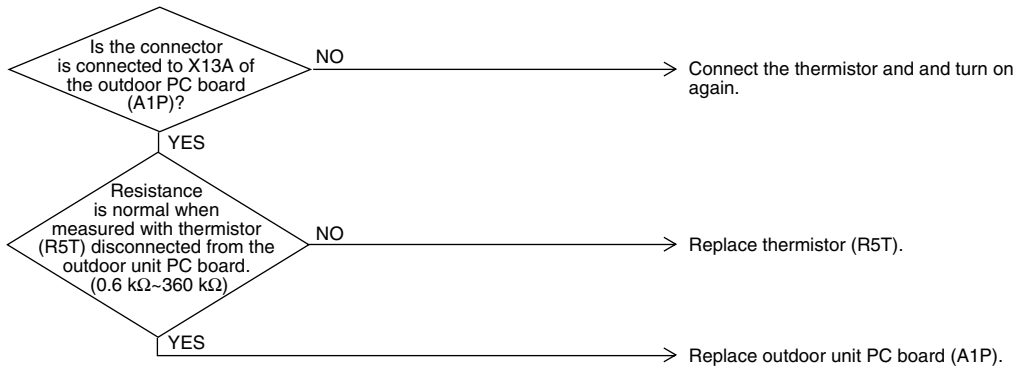
Remote Controller Display

JH

Supposed Causes

- Defect of oil temperature thermistor (R5T)
- Defect of outdoor unit PC board (A1P)

Troubleshooting



(VF051)

2.26 Low Pressure Drop Due to Refrigerant Shortage or Electronic Expansion Valve Failure

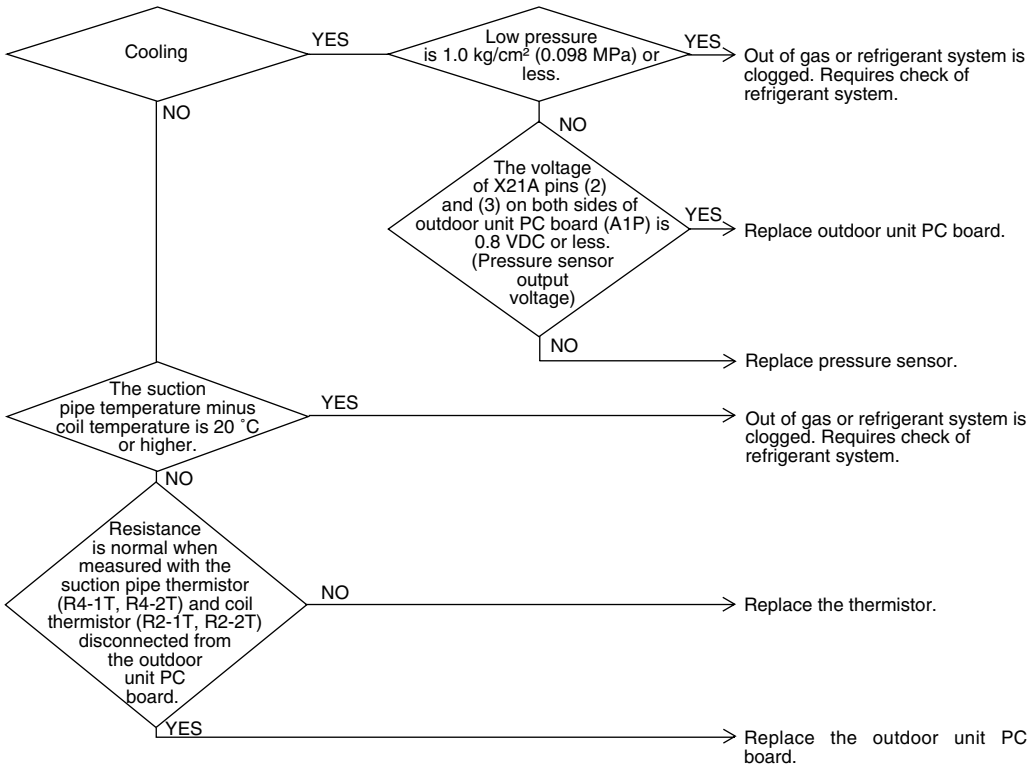
Remote Controller Display

U0

Supposed Causes

- Refrigerant shortage or refrigerant system clogging (incorrect piping)
- Defect of pressure sensor
- Defect of outdoor unit PC board

Troubleshooting



(VF052)

2.27 Negative Phase, Open Phase

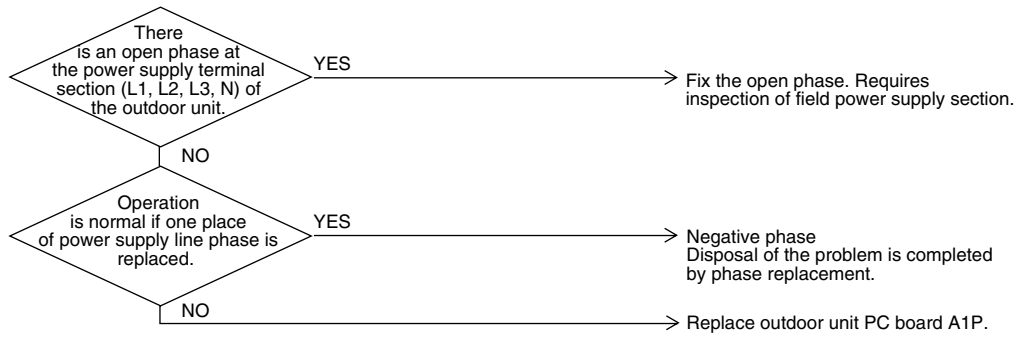
Remote Controller Display

U1

Supposed Causes

- Power supply negative phase
- Power supply open phase
- Defect of outdoor PC board A1P

Troubleshooting



(VF053)

2.28 Malfunction of Transmission Between Indoor Units

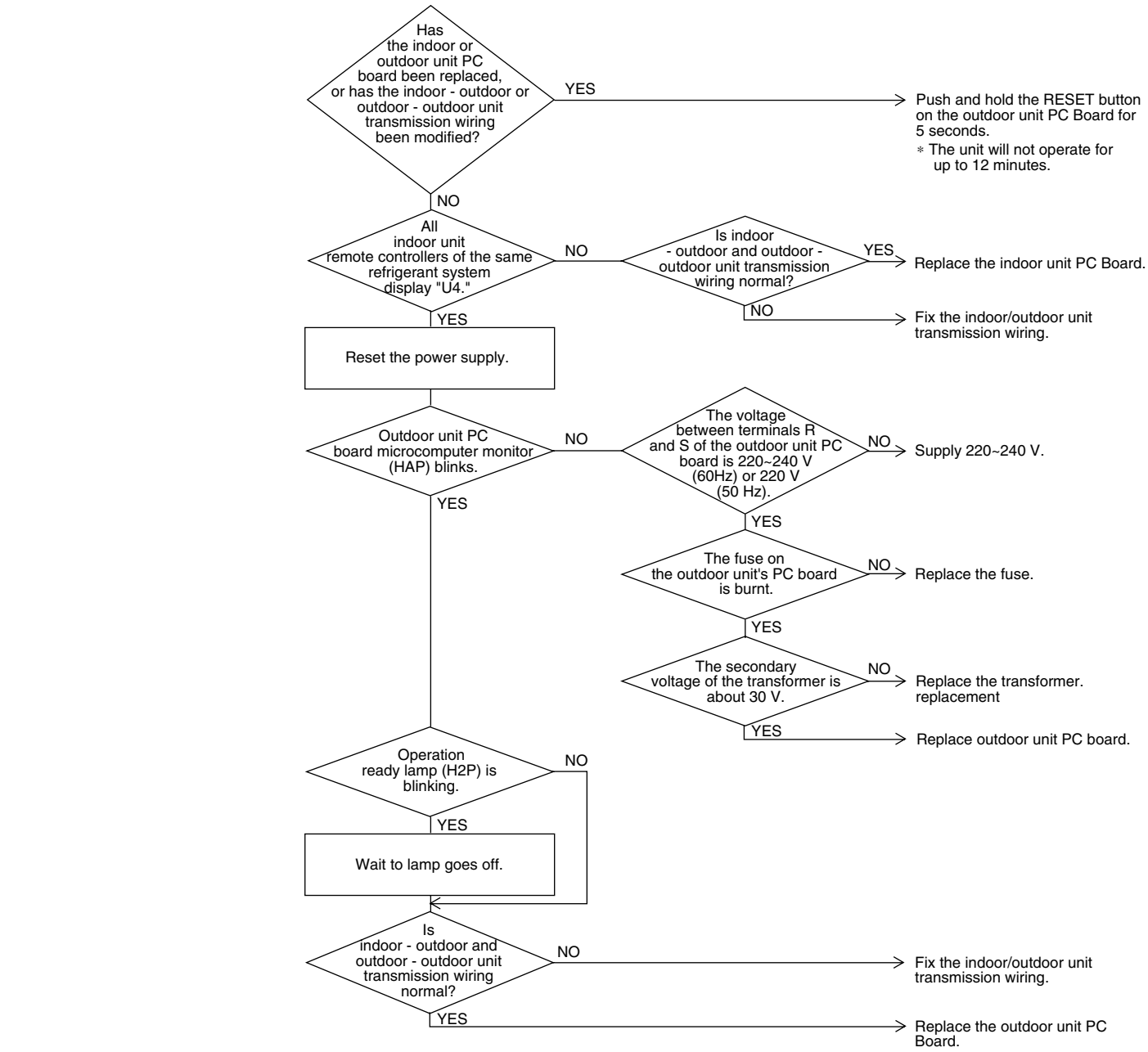
Remote Controller Display

U4

Supposed Causes

- Indoor to outdoor,outdoor to outdoor crossover wiring, disconnection or short circuit
- Outdoor unit power supply is OFF
- System address doesn't match
- Defect of indoor unit PC board
- Defect of outdoor unit PC board

Troubleshooting



(VF054)

2.29 Malfunction of Transmission Between Remote Controller and Indoor Unit

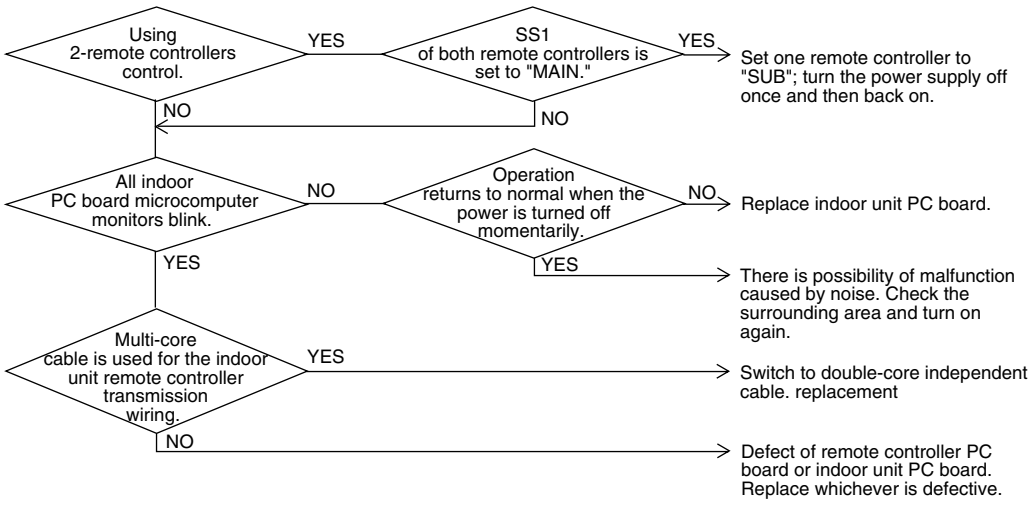
Remote Controller Display

U5

Supposed Causes

- Malfunction of indoor unit remote controller transmission
- Connection of two “main” remote controllers (when using 2 remote controllers)
- Defect of indoor unit PC board
- Defect of remote controller PC board
- Malfunction of transmission caused by noise

Troubleshooting



(VF055)

2.30 Malfunction of Transmission Between Outdoor Units

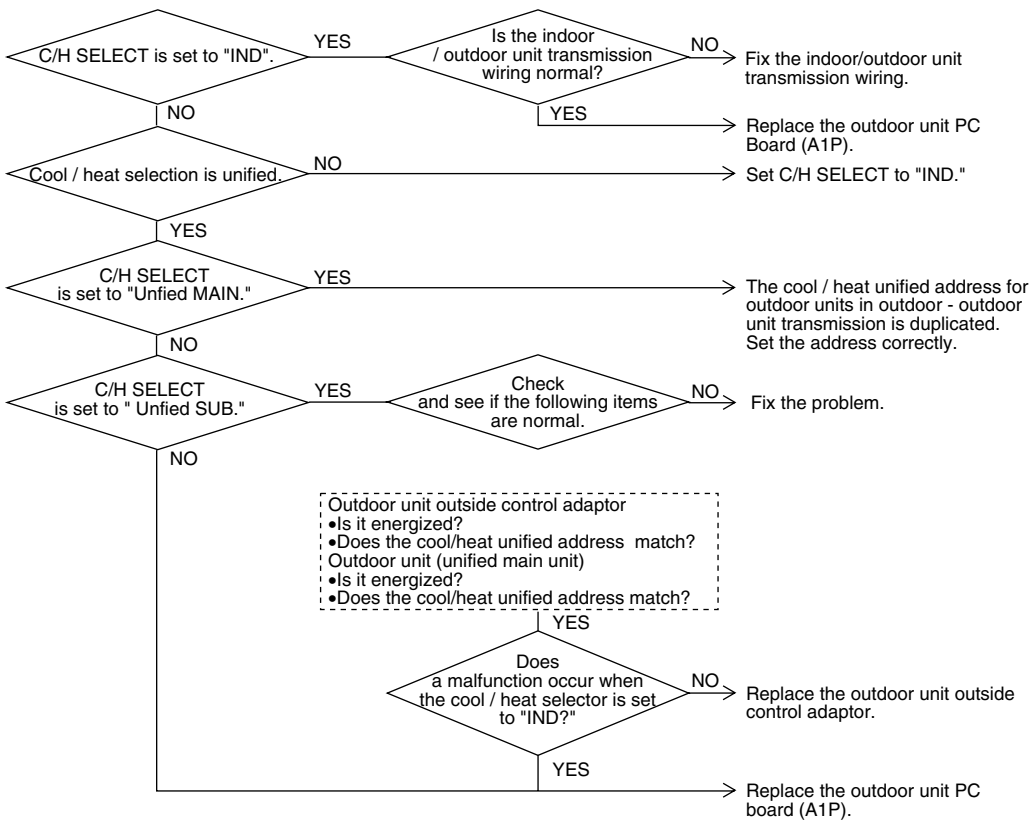
Remote Controller Display

U7

Supposed Causes

- Improper connection of transmission wiring between outdoor unit and outdoor unit outside control adaptor
- Improper cool/heat selection
- Improper cool/heat unified address (outdoor unit, external control adaptor for outdoor unit)
- Defect of outdoor unit PC board (A1P)
- Defect of external control adaptor of outdoor unit (option)

Troubleshooting



(VF056)

2.31 Malfunction of Transmission Between MAIN and SUB Remote Controllers

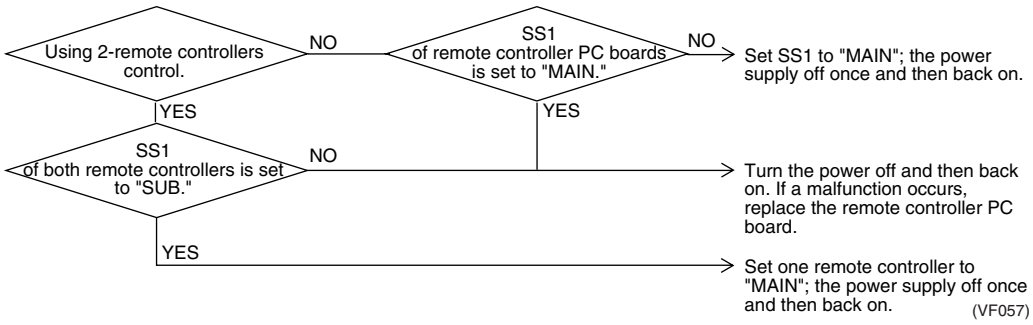
Remote Controller Display

U8

Supposed Causes

- Malfunction of transmission between main and sub remote controller
- Connection between sub remote controllers
- Defect of remote controller PC board

Troubleshooting



2.32 Malfunction of Transmission Between Indoor and Outdoor Units in the Same System

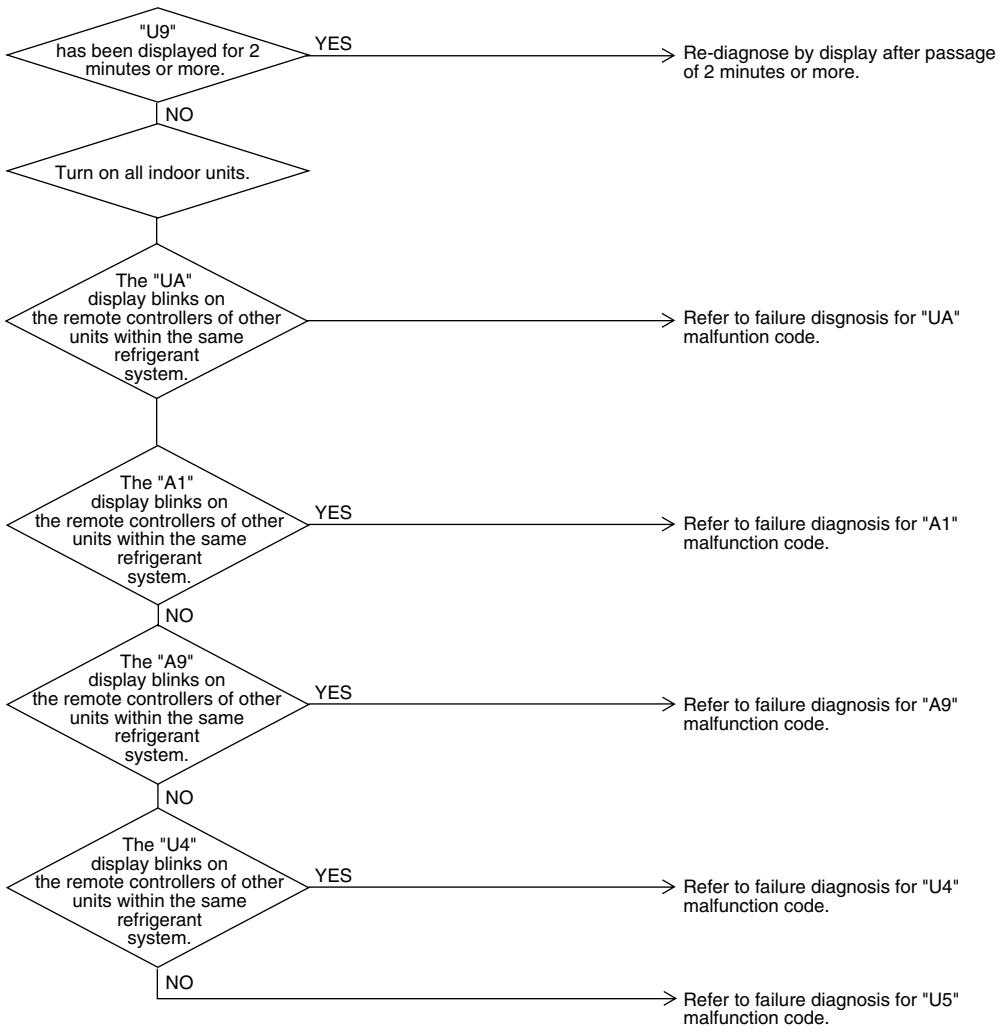
Remote Controller Display

U9

Supposed Causes

- Malfunction of transmission between indoor and outdoor of other system
- Malfunction of electronic expansion valve in indoor unit of other system
- Defect of PC board of indoor unit in other system
- Improper connection of transmission wiring between indoor and outdoor unit

Troubleshooting



(VF058)

2.33 Excessive Number of Indoor Units

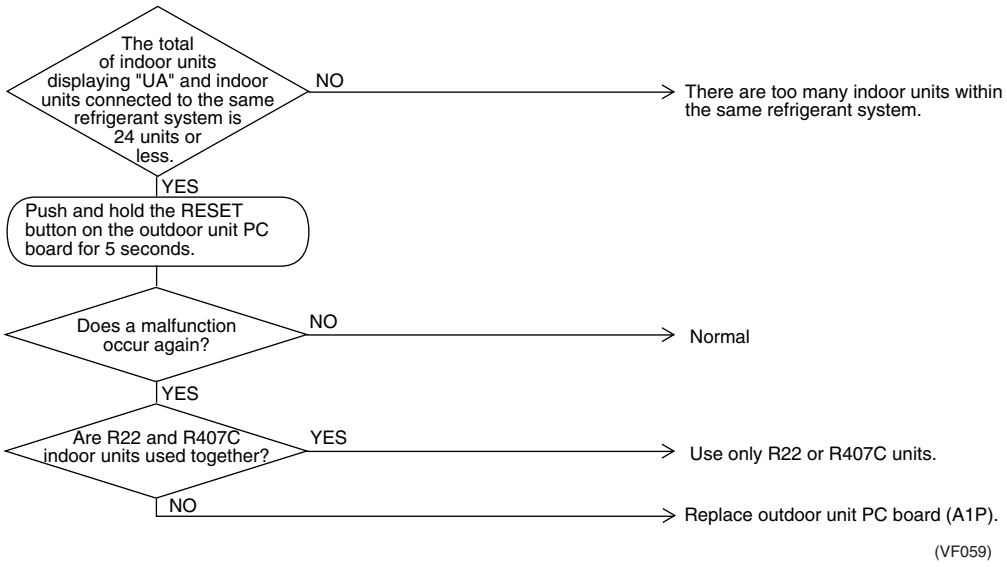
Remote Controller Display

UA

Supposed Causes

- Excess of connected indoor units
- Defect of outdoor unit PC board (A1P)

Troubleshooting



The number of indoor units that can be connected to a single outdoor unit system depends on the model of outdoor unit.
RSEY 8K : Max. 13 units
RSEY10K : Max. 16 units

2.34 Address Duplication of Central Remote Controller

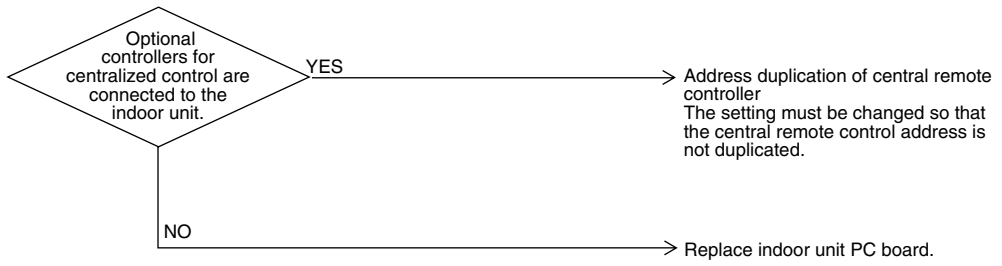
Remote Controller Display

UC

Supposed Causes

- Address duplication of central remote controller
- Defect of indoor unit PC board

Troubleshooting



(VF060)

2.35 Refrigerant System not set, Incompatible Wiring/Piping

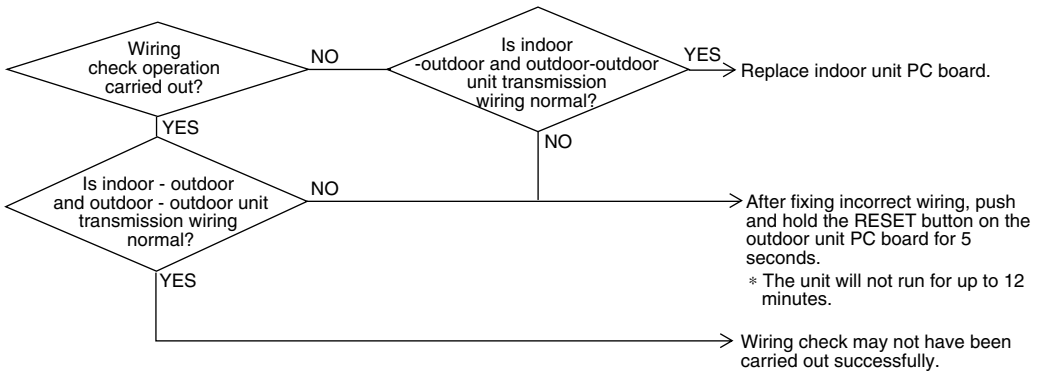
Remote Controller Display

UF

Supposed Causes

- Improper connection of transmission wiring between indoor-outdoor unit or outdoor-outdoor unit
- Failure to execute wiring check operation
- Defect of indoor unit PC board

Troubleshooting



(VF061)

Wiring check may not be successful if carried out after the outdoor unit has been off for more than 12 hours, or if it is not carried out after running all connected indoor units in the fan mode for at least an hour.

2.36 Malfunction of System, Refrigerant System Address Undefined

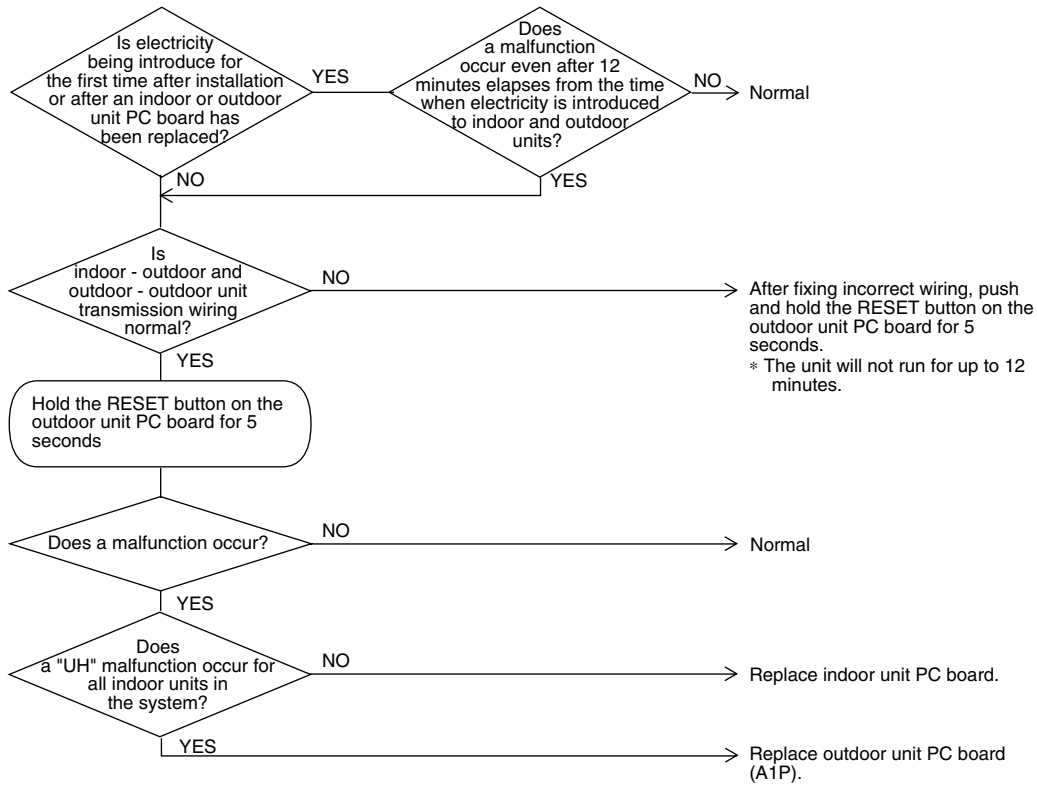
Remote Controller Display

UH

Supposed Causes

- Improper connection of transmission wiring between indoor-outdoor unit or outdoor-outdoor unit
- Defect of indoor unit PC board
- Defect of outdoor unit PC board (A1P)

Troubleshooting



(VF062)

3. Failure Diagnosis for Inverter System

3.1 Points of Diagnosis

The main causes for each malfunction code are given in the table below. (For details refer to the next page and those following.)

◎ : Failure is probable
○ : Failure is possible
□ : Failure is improbable
— : Failure is impossible

Malfunction code	Contents of malfunction	Location of failure							Point of diagnosis
		Inverter		Compressor	Refrigerant system	Outdoor unit PC board	Other	Field cause	
		PC board power unit	Other						
L4	Radiator fin temperature rise	□	◎	—	—	—	—	□	Is the intake port of the radiator fin clogged?
L5	Instantaneous over-current	○	—	◎	□	—	—	—	Inspect the compressor.
L8	Electronic thermal	□	—	◎	○	—	—	—	Inspection the compressor and refrigerant system.
L9	Stall prevention	□	—	○	◎	—	—	—	Inspection the compressor and refrigerant system.
LC	Malfunction of transmission between inverter PC board and outdoor unit PC board	○	◎	—	—	□	—	—	Inspect the connection between the inverter PC board and outdoor unit PC board. Next, inspect the inverter PC board.
U2	Abnormal current/ voltage	○	○	—	—	—	□	◎	• Inspect the fuse on the inverter PC board. • Check the DC voltage.
P1	Over-ripple protection	○	○	—	—	—	—	○	• Open phase • Current/voltage imbalance • Defect of main circuit wiring
P4	Defect of radiator fin temperature sensor	○	□	—	—	—	—	—	Inspect the radiator fin thermistor.

3.2 How to use the Monitor Switch on the Inverter PC Board

The monitor lets you know the contents of the latest stop due to malfunction by LED display on the inverter PC Board. The inverter is equipped with a retry function that retries operation each time stop due to malfunction occurs, and malfunction is therefore not ascertained by merely entering the five minutes standby while retry is attempted the prescribed number of times. If the number of retry times is exceeded within 60 minutes, malfunction is ascertained, and the corresponding malfunction code is displayed on the indoor unit remote controller.

LED	A	1	2	3	4	Malfunction contents	Retry times
	◑	●	●	●	●	Normal	
	◑	●	●	●	○	Malfunction of fin thermistor	3
	◑	○	○	●	●	Sensor malfunction	0
	◑	○	●	●	○	Insufficient voltage	3
	◑	●	●	○	●	Instantaneous over-current	3
	◑	●	○	○	○	Electronic thermal	3
	◑	○	○	○	○	Stall prevention	3
	◑	●	○	●	●	Open phase detection	3
	●	●	●	●	●	Malfunction of microcomputer	Unlimited

◑ : Blink
○ : On
● : Off

4. Troubleshooting (Inverter)

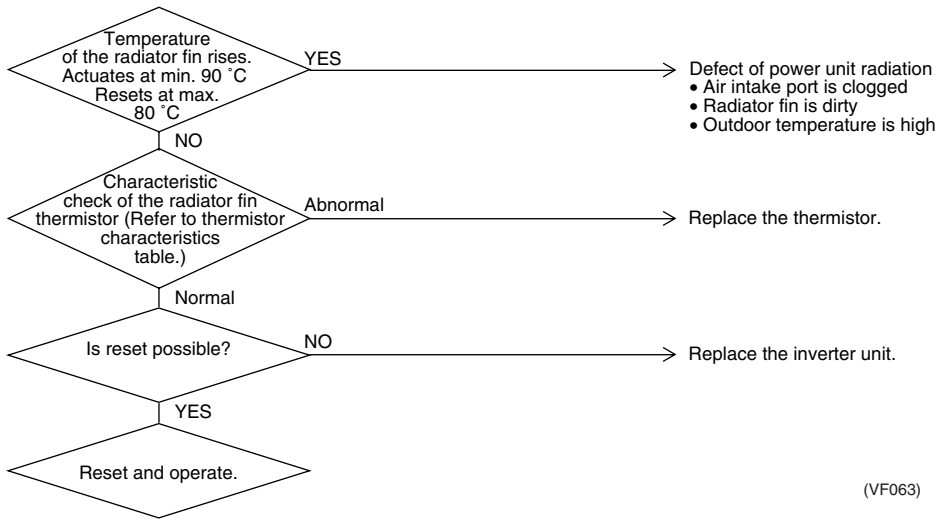
4.1 Outdoor Unit: Malfunction of Inverter Radiating Fin Temperature Rise

Remote Controller Display L4

Supposed Causes

- Actuation of fin thermal (Actuates at min. 90˚C and resets at max. 80˚C)
- Defect of inverter PC board
- Defect of fin thermistor

Troubleshooting



(VF063)

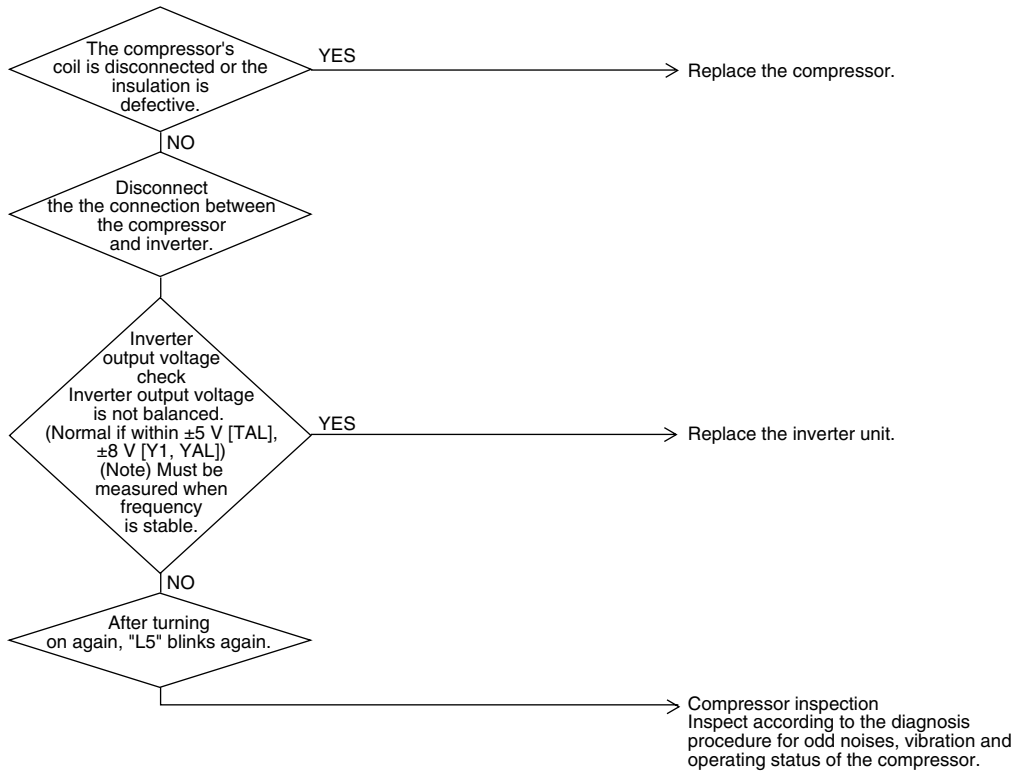
4.2 Outdoor Unit: Inverter Instantaneous Over-Current

Remote Controller Display L5

Supposed Causes
- Defect of compressor coil (disconnected, defective insulation)
- Compressor start-up malfunction (mechanical lock)
- Defect of inverter unit

Troubleshooting

Compressor inspection



(VF064)

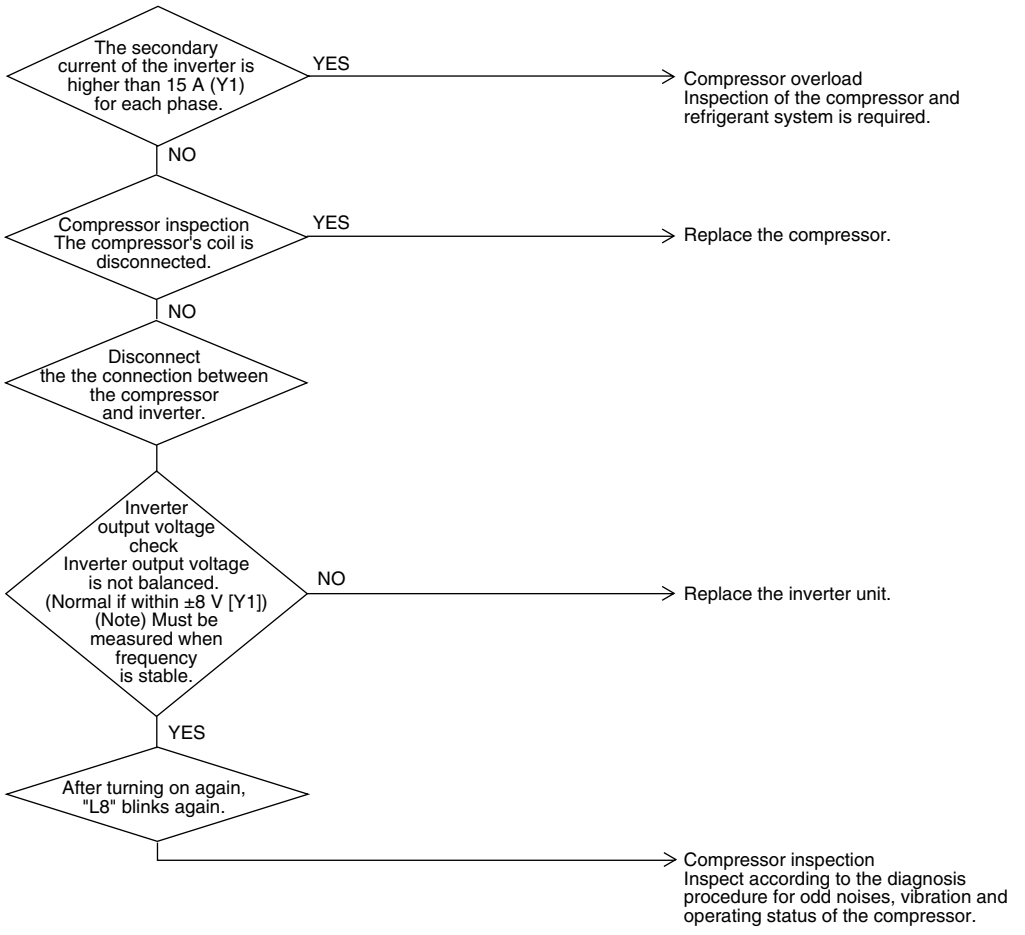
∗ If inverter output voltage is measured by tester, the displayed voltage is higher than artual voltage.

4.3 Outdoor Unit: Inverter Thermostat Sensor, Compressor Overload

Remote Controller Display L8

Supposed Causes
- Compressor overload
- Compressor coil disconnected
- Defect of inverter unit

Troubleshooting Output current check



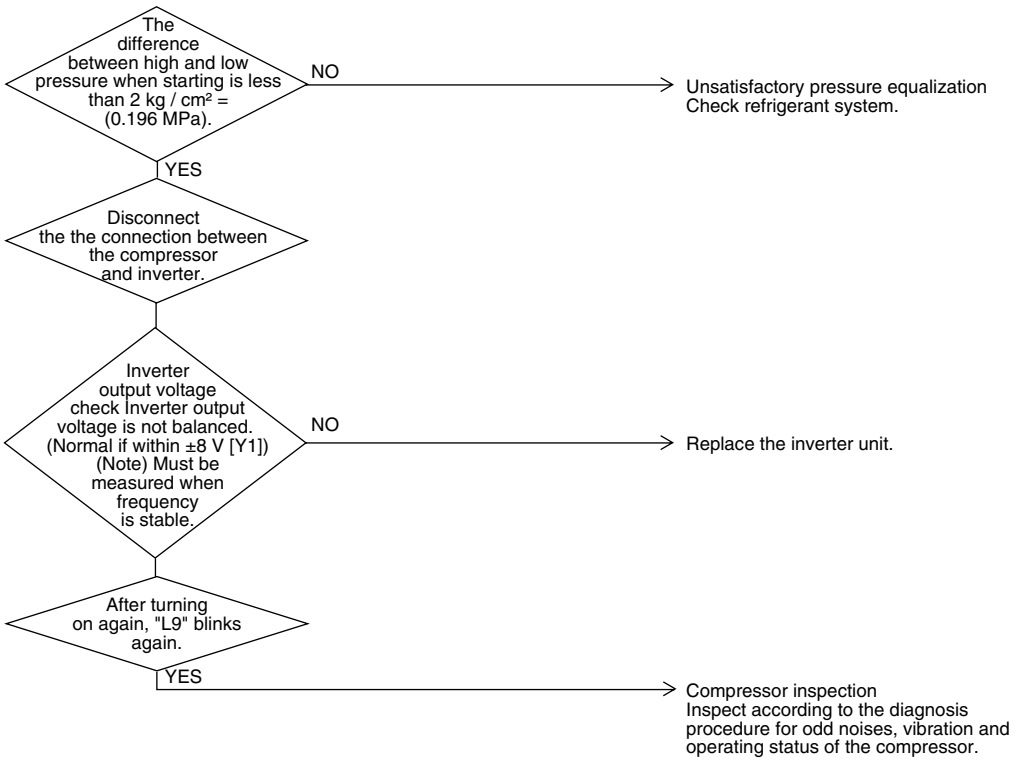
(VF065)

4.4 Outdoor Unit: Inverter Stall Prevention, Compressor Seized

Remote Controller Display L9

Supposed Causes
- Defect of compressor
- Pressure differential start
- Defect of inverter unit

Troubleshooting



(VF066)

4.5 Outdoor Unit: Malfunction of Transmission between Inverter and Control PC Board

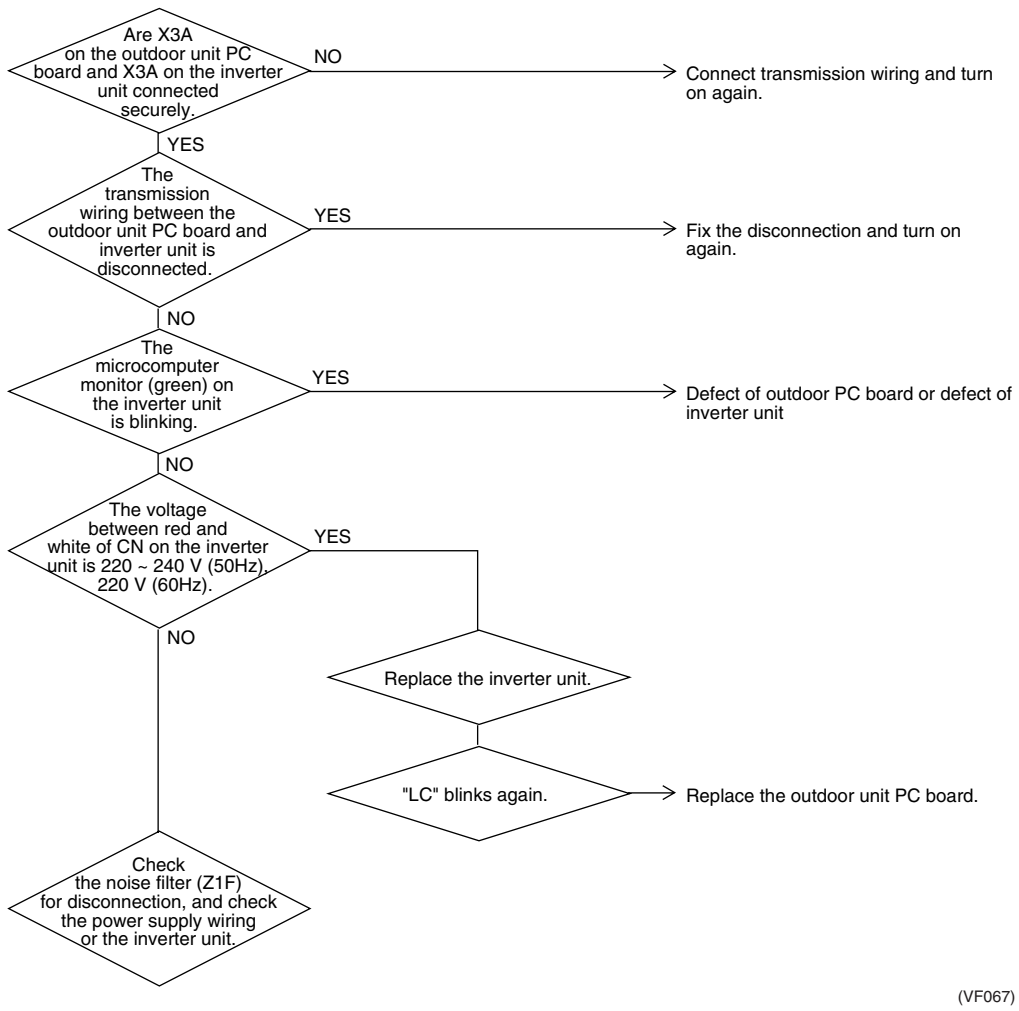
Remote Controller Display

LC

Supposed Causes

- Malfunction of connection between the inverter unit and outdoor unit PC board
- Defect of outdoor unit PC board (transmission section)
- Defect of inverter unit
- Defect of noise filter (Z1F)

Troubleshooting



(VF067)

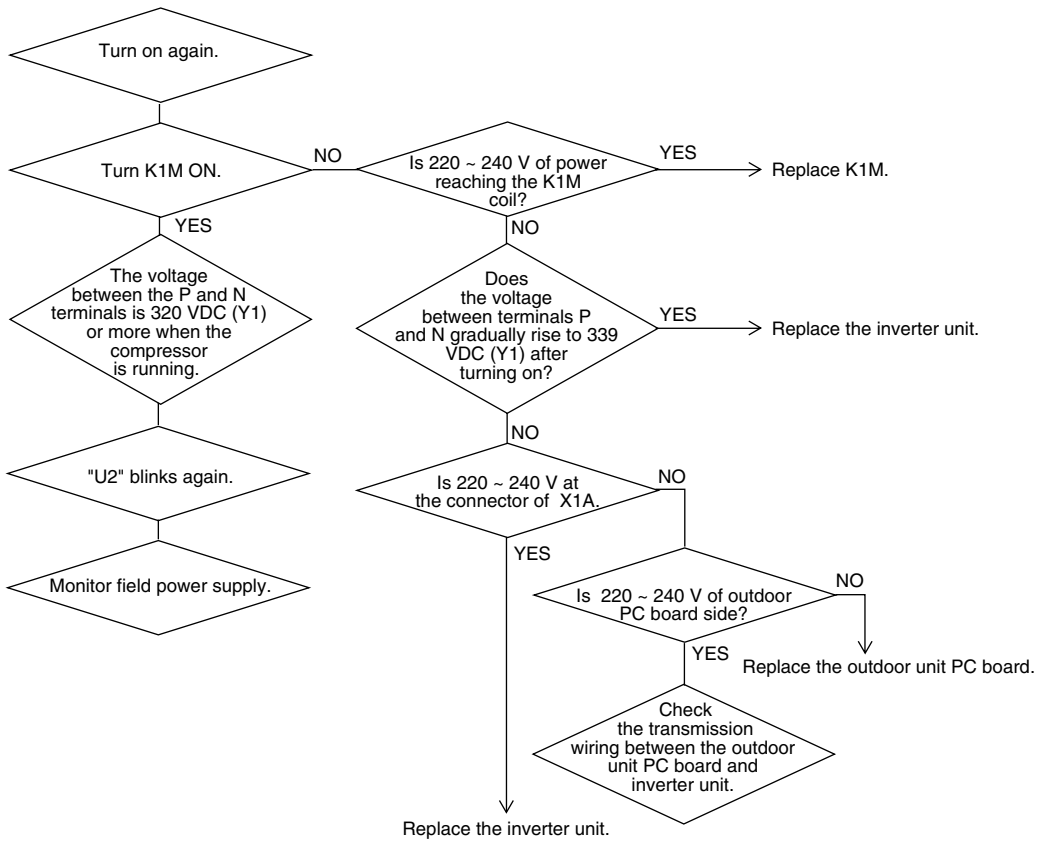
4.6 Power Supply Insufficient or Instantaneous Failure

Remote Controller Display U2

Supposed Causes

- Power supply insufficient
- Instantaneous power failure
- Lack of phase
- Defect of inverter unit
- Defect of outdoor PC board
- Defect of K1M.
- Main circuit wiring defect

Troubleshooting



(VF068)

4.7 Outdoor Unit: Malfunction of Inverter Radiating Fin Temperature Rise Sensor

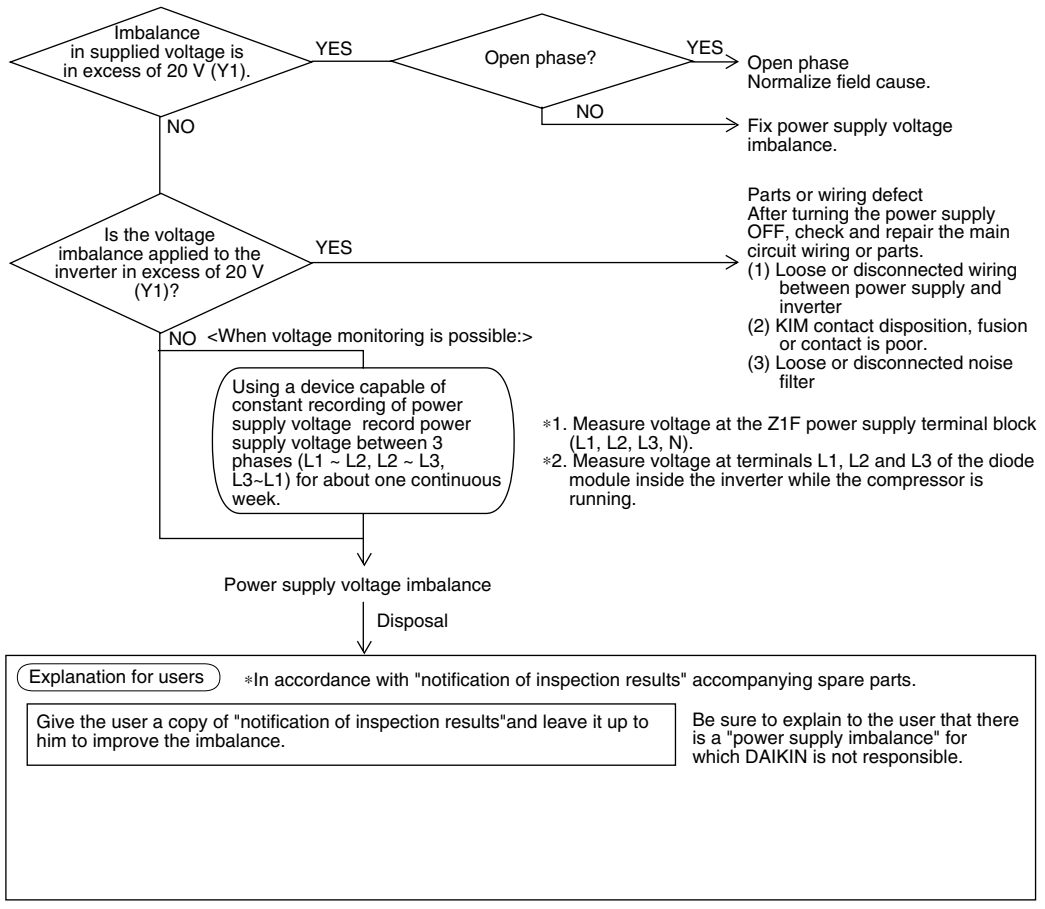
Remote Controller Display

P1

Supposed Causes

- Lack of phase
- Voltage imbalance between phases
- Defect of main circuit capacitor
- Defect of inverter unit
- Defect of K1M
- Improper main circuit wiring

Troubleshooting



(VF069)

4.8 Outdoor Unit: Inverter Over-Ripple Protection

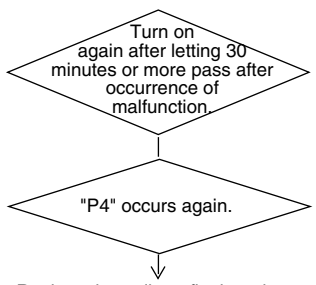
Remote Controller Display

P4

Supposed Causes

- Defect of radiator fin temperature sensor
- Defect of inverter unit

Troubleshooting



(VF070)

5. Troubleshooting (OP: Central Remote Controller)

5.1 Malfunction of Transmission between Central Remote Controller and Indoor Unit

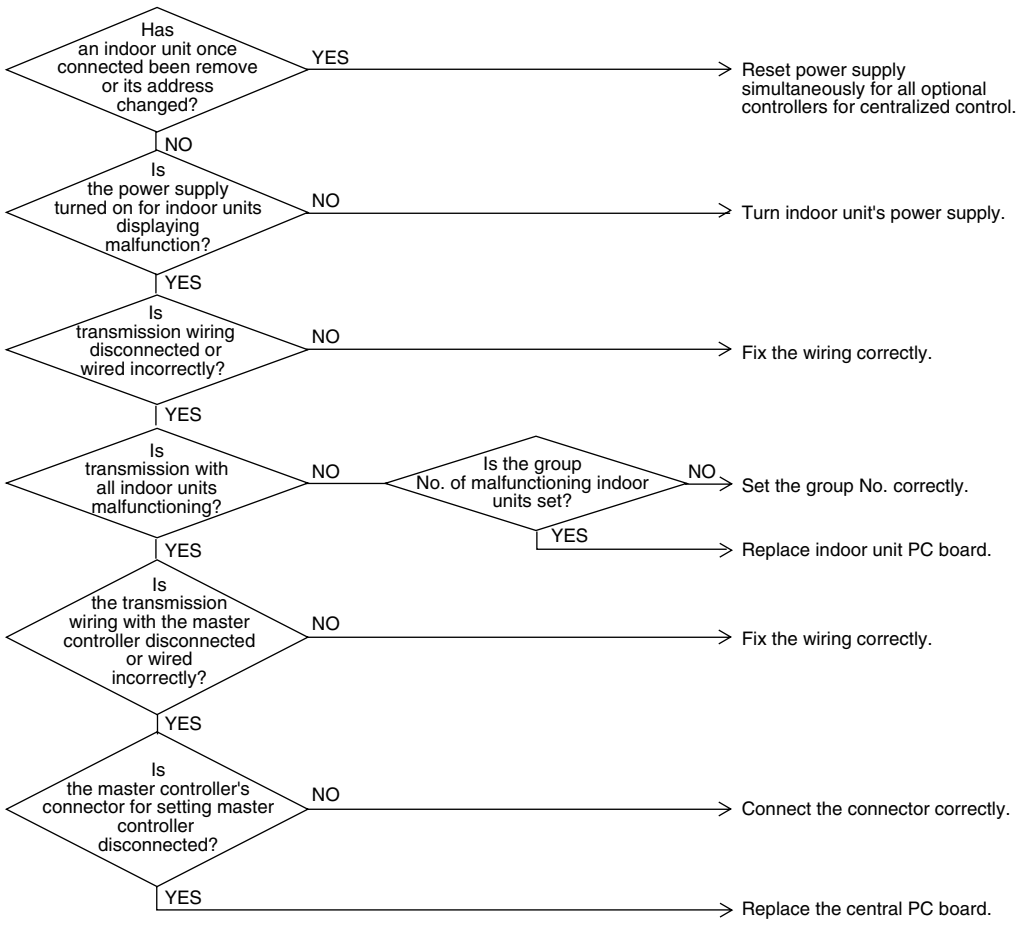
Remote Controller Display

UE

Supposed Causes

- Malfunction of transmission between optional controllers for centralized control and indoor unit
- Connector for setting master controller is disconnected.
- Failure of PC board for central remote controller
- Defect of indoor unit PC board

Troubleshooting



(VF071)

5.2 PC Board Defect

Remote Controller Display

Supposed Causes

- Defect of central remote controller PC board

Troubleshooting

Replace the central remote controller PC board.

5.3 Malfunction of Transmission between Optional Controllers for Centralized Control

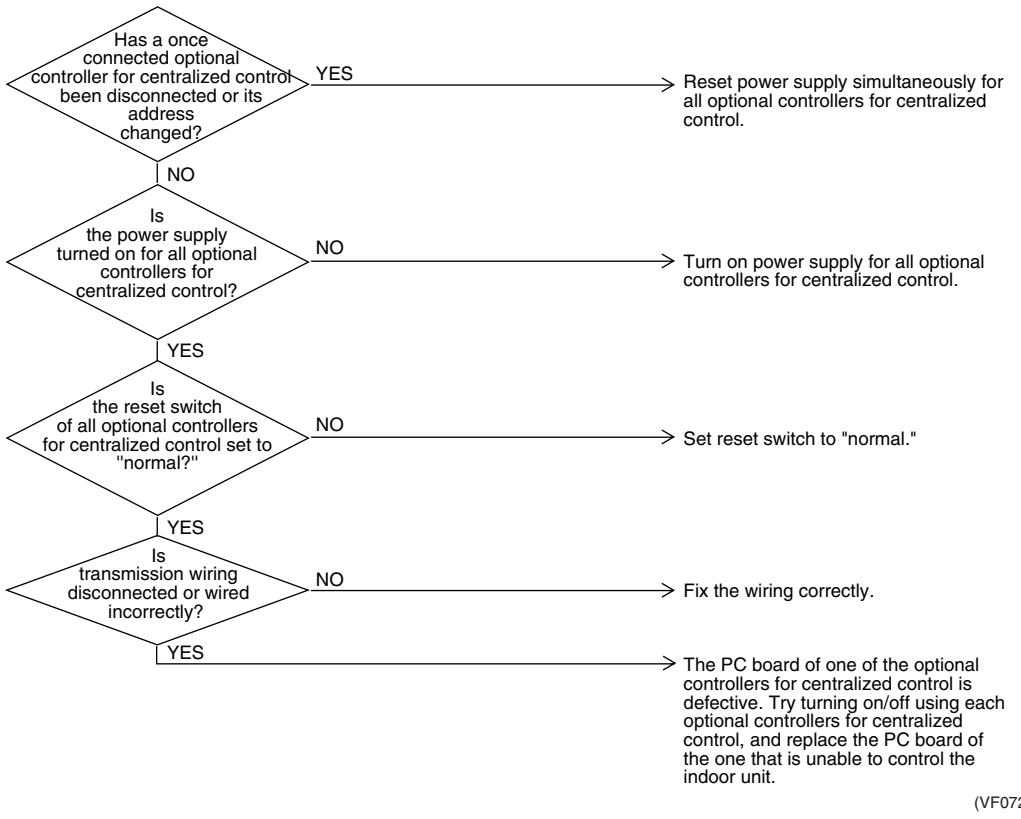
Remote Controller Display

M8

Supposed Causes

- Malfunction of transmission between optional controllers for centralized control
- Defect of PC board of optional controllers for centralized control

Troubleshooting



(VF072)

5.4 Improper Combination of Optional Controllers for Centralized Control

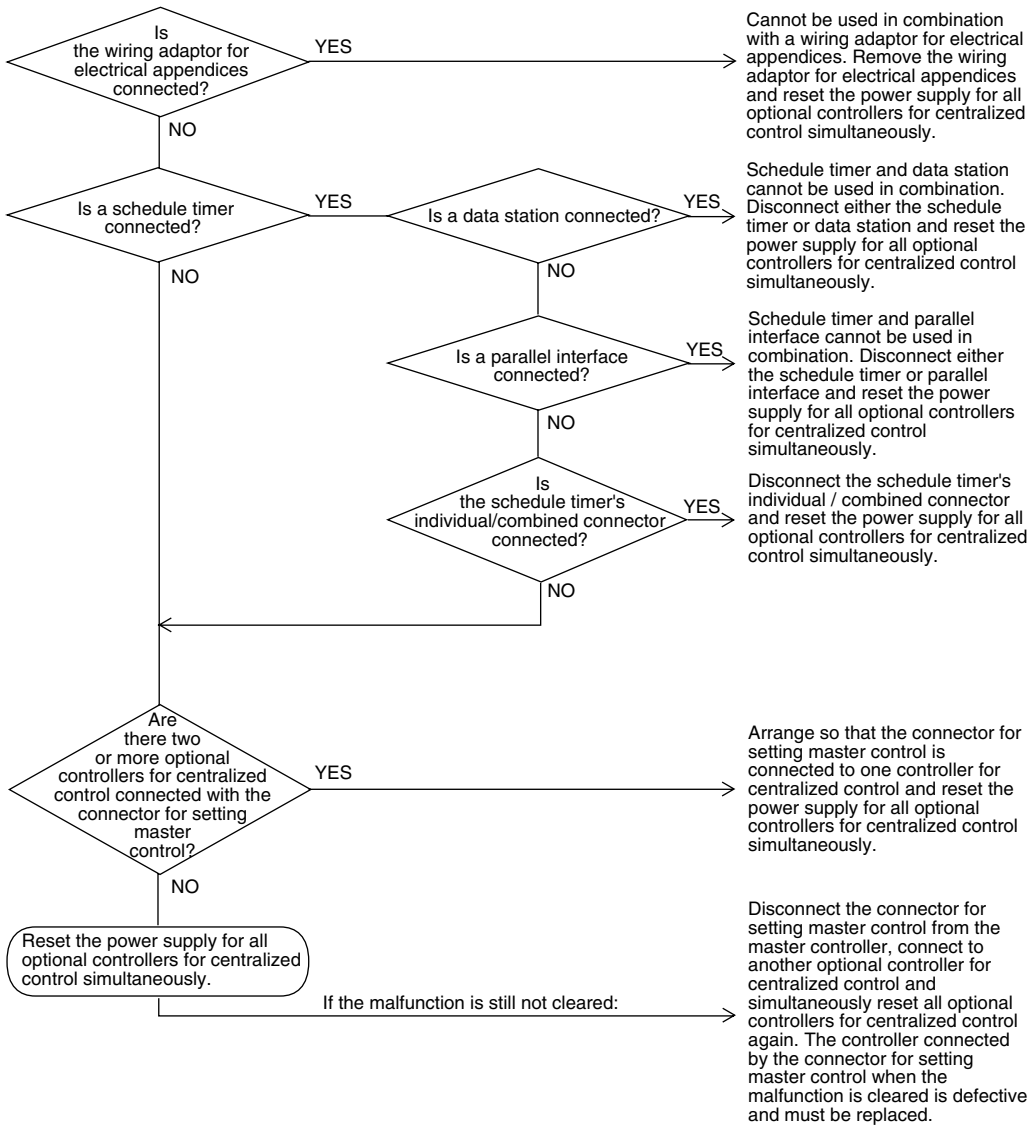
Remote Controller Display

MA

Supposed Causes

- Improper combination of optional controllers for centralized control
- More than one master controller is connected
- Defect of PC board of optional controller for centralized control

Troubleshooting



(VF073)

5.5 Address Duplication, Improper Setting

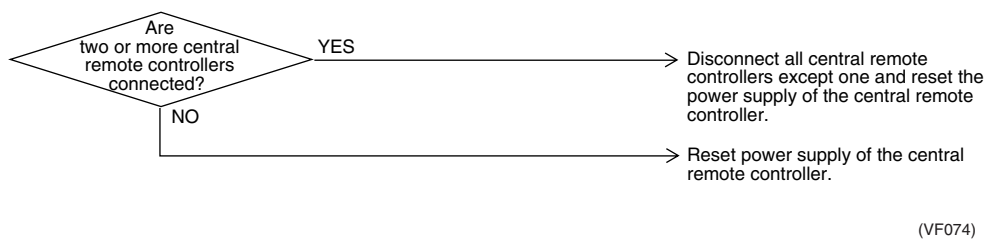
Remote Controller Display

MC

Supposed Causes

■ Address duplication of central remote controller

Troubleshooting



(VF074)

6. Troubleshooting (OP: Schedule Timer)

6.1 Malfunction of Transmission between Central Remote Controller and Indoor Unit

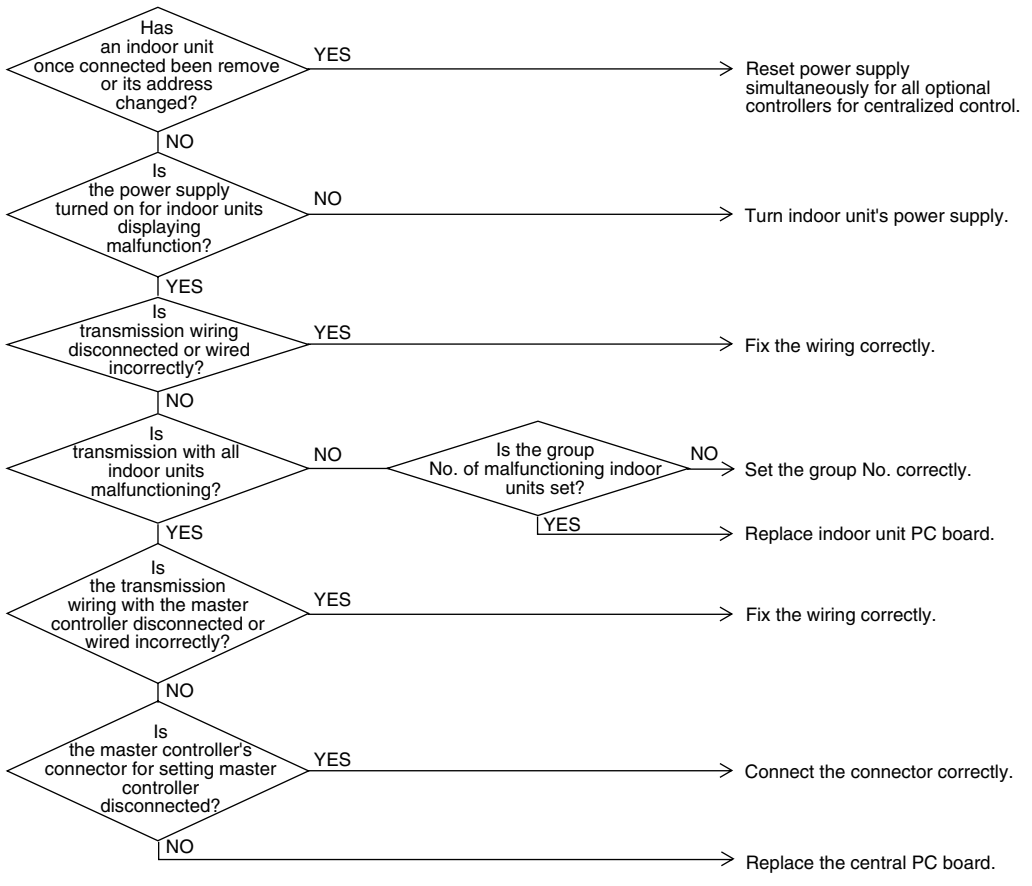
Remote Controller Display

UE

Supposed Causes

- Malfunction of transmission between central remote controller and indoor unit
- Disconnection of connector for setting master controller (or individual/combined switching connector)
- Defect of schedule timer PC board
- Defect of indoor unit PC board

Troubleshooting



(VF075)

6.2 PC Board Defect

Remote Controller Display

Supposed Causes

- Defect of schedule timer PC board

Troubleshooting

Replace the schedule timer PC board.

6.3 Malfunction of Transmission between Optional Controllers for Centralized Control

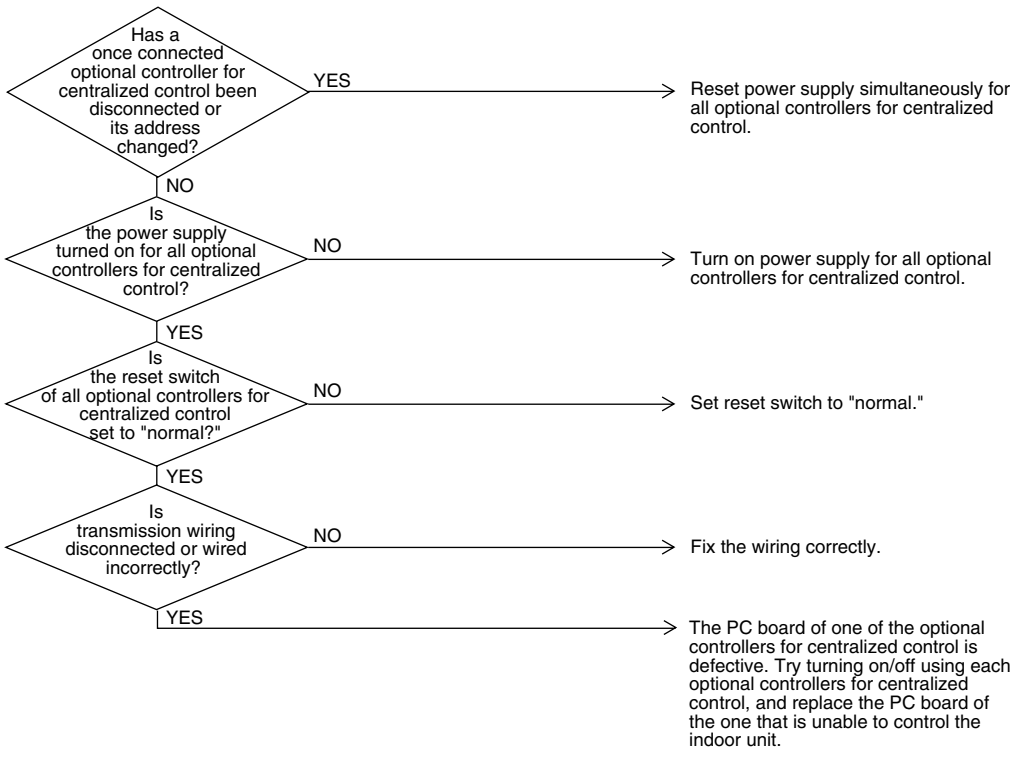
Remote Controller Display

M8

Supposed Causes

- Malfunction of transmission between optional controllers for centralized control
- Defect of PC board of optional controllers for centralized control

Troubleshooting



(VF076)

6.4 Improper Combination of Optional Controllers for Centralized Control

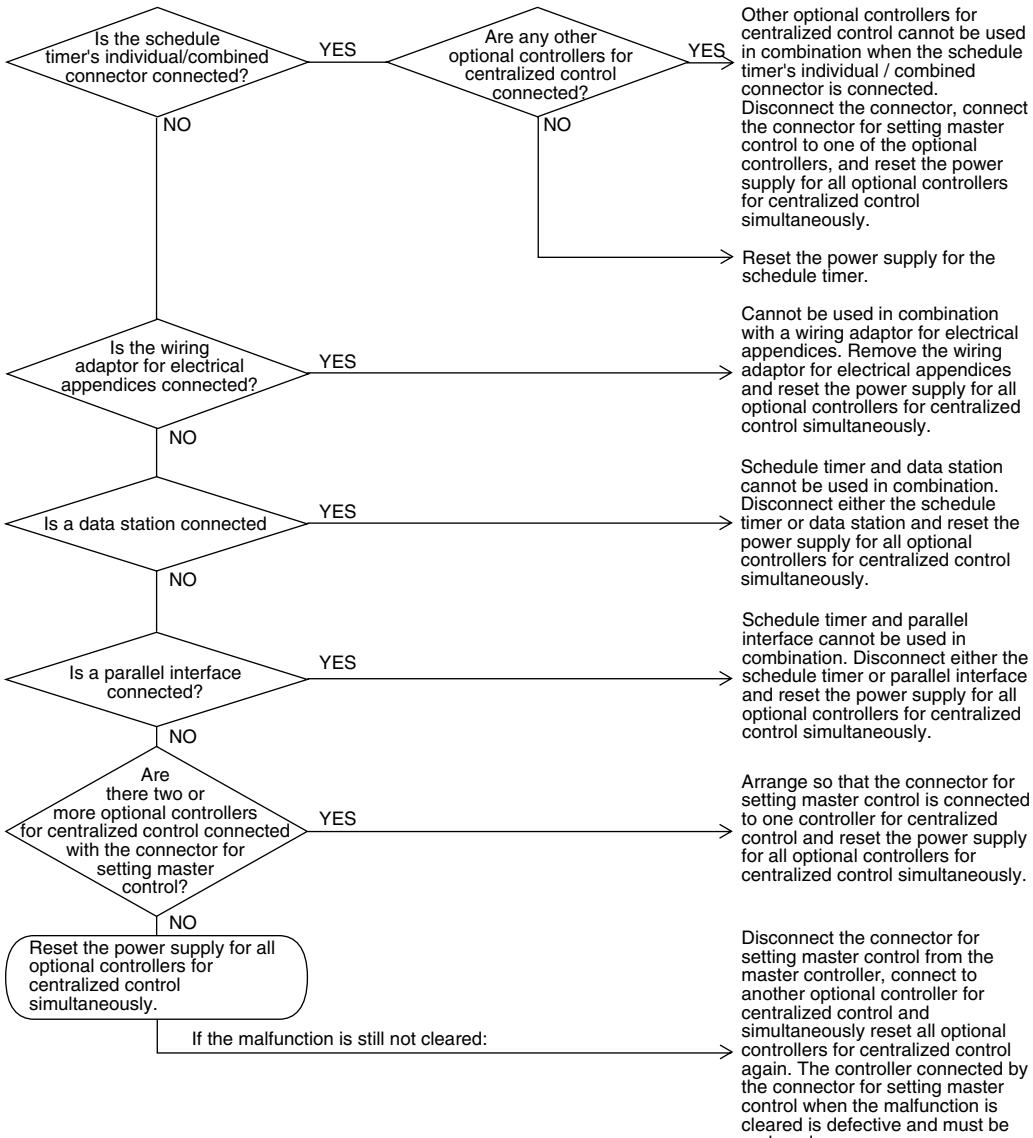
Remote Controller Display

MA

Supposed Causes

- Improper combination of optional controllers for centralized control
- More than one master controller is connected.
- Defect of PC board of optional controller for centralized control

Troubleshooting



(VF077)

6.5 Address Duplication, Improper Setting

Remote Controller Display

MC

Supposed Causes

■ Address duplication of optional controller for centralized control

Troubleshooting

7. Troubleshooting (OP: Unified ON/OFF Controller)

7.1 Operation Lamp Blinks

Remote Controller Display

Operation lamp blinks

Suppposed Causes

- Malfunction of transmission between optional controller and indoor unit
- Connector for setting master controller is disconnected
- Defect of unified ON/OFF controller
- Defect of indoor unit PC board
- Malfunction of air conditioner

Troubleshooting

(VF079)

7.2 Display “Under Host Computer Integrate Control” Blinks (Repeats Single Blink)

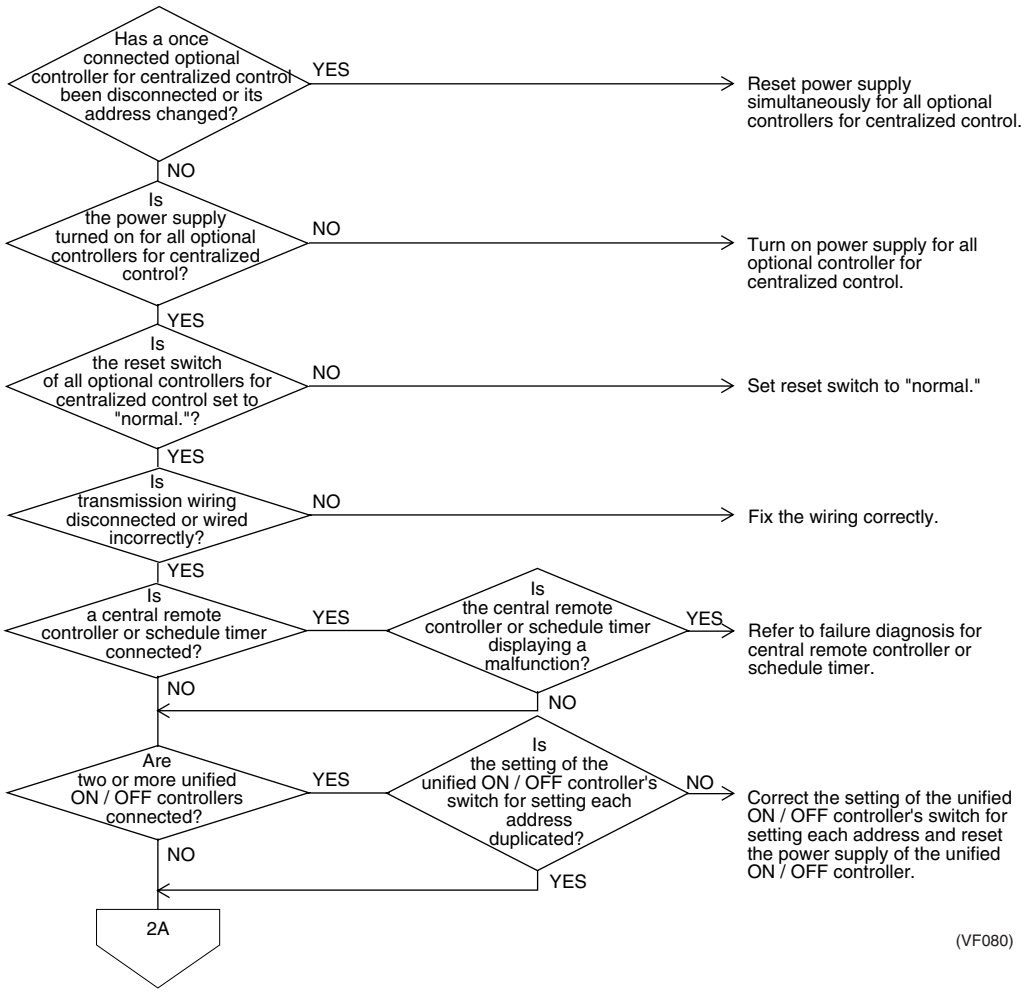
Remote Controller Display

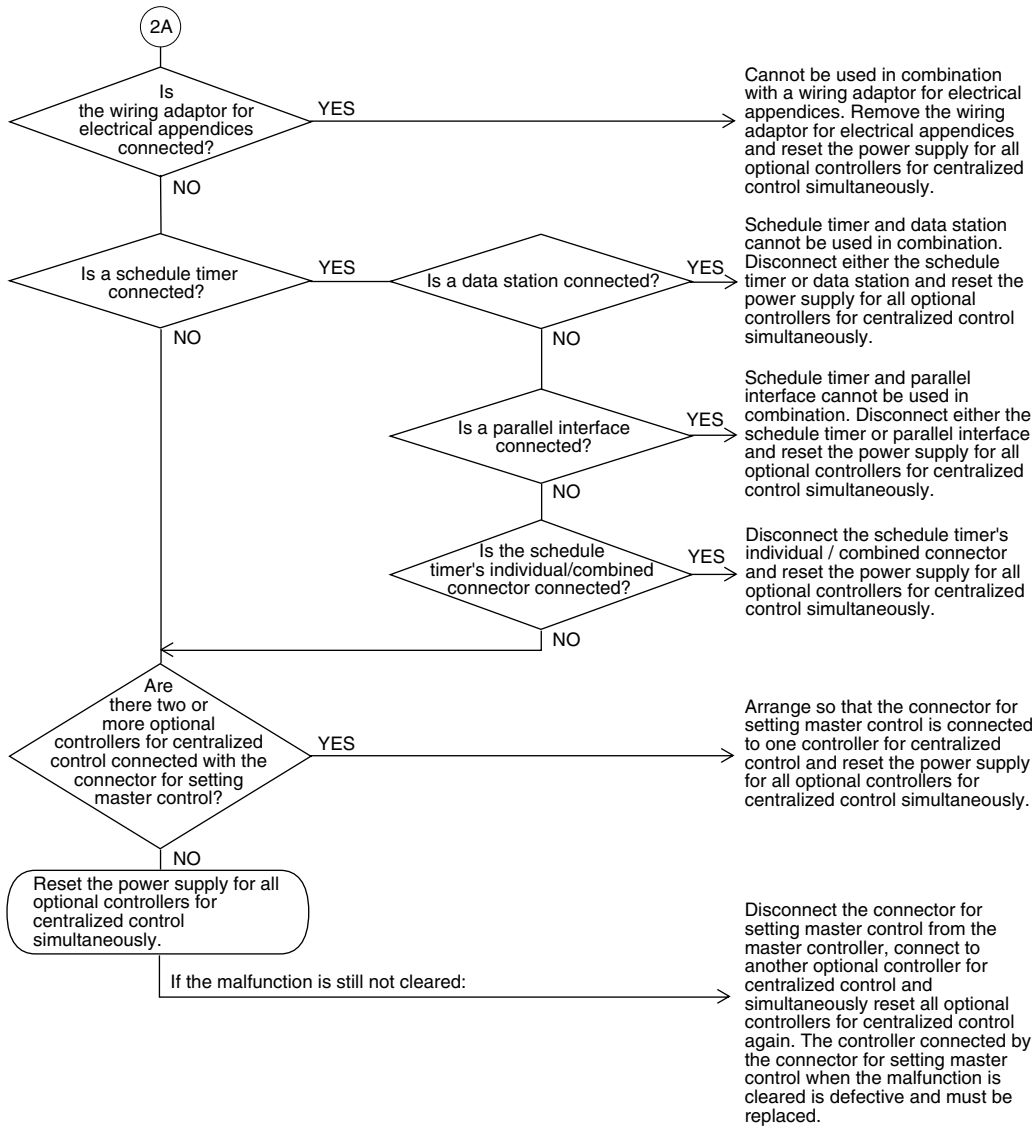
“under host computer integrated control” (Repeats single blink)

Supposed Causes

- Address duplication of central remote controller
- Improper combination of optional controllers for centralized control
- Connection of more than one master controller
- Malfunction of transmission between optional controllers for centralized control
- Defect of PC board of optional controllers for centralized control

Troubleshooting





(VF081)

7.3 Display “Under Host Computer Integrate Control” Blinks (Repeats Double Blink)

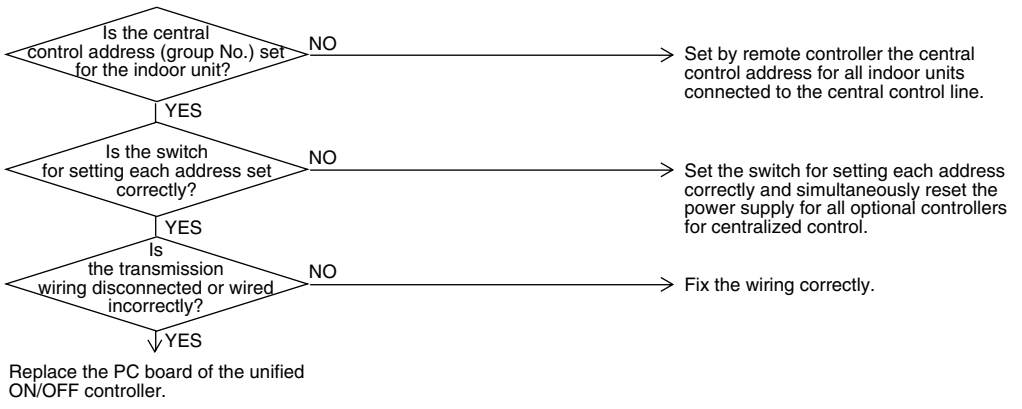
Remote Controller Display

“under host computer integrated control” (Repeats double blink)

Supposed Causes

- Central control address (group No.) is not set for indoor unit.
- Improper address setting
- Improper wiring of transmission wiring

Troubleshooting



(VF082)

Part 5
Appendix

1. Characteristics

1.1 Thermistor Resistance / Temperature Characteristics

Indoor unit	For air suction	R1T
	For liquid pipe	R2T
	For gas pipe	R3T
	For outdoor air	R1T
Outdoor unit	For coil	R2T (R2-1T, R2-2T)
	For suction pipe	R4T (R4-1T, R4-2T)
	For oil	R5T

(kΩ)

T˚C	0.0	0.05	T˚C	0.0	0.05
-20	197.81	192.08	30	16.10	15.76
-19	186.53	181.16	31	15.43	15.10
-18	175.97	170.94	32	14.79	14.48
-17	166.07	161.36	33	14.18	13.88
-16	156.80	152.38	34	13.59	13.31
-15	148.10	143.96	35	13.04	12.77
-14	139.94	136.05	36	12.51	12.25
-13	132.28	128.63	37	12.01	11.76
-12	125.09	121.66	38	11.52	11.29
-11	118.34	115.12	39	11.06	10.84
-10	111.99	108.96	40	10.63	10.41
-9	106.03	103.18	41	10.21	10.00
-8	100.41	97.73	42	9.81	9.61
-7	95.14	92.61	43	9.42	9.24
-6	90.17	87.79	44	9.06	8.88
-5	85.49	83.25	45	8.71	8.54
-4	81.08	78.97	46	8.37	8.21
-3	76.93	74.94	47	8.05	7.90
-2	73.01	71.14	48	7.75	7.60
-1	69.32	67.56	49	7.46	7.31
0	65.84	64.17	50	7.18	7.04
1	62.54	60.96	51	6.91	6.78
2	59.43	57.94	52	6.65	6.53
3	56.49	55.08	53	6.41	6.53
4	53.71	52.38	54	6.65	6.53
5	51.09	49.83	55	6.41	6.53
6	48.61	47.42	56	6.18	6.06
7	46.26	45.14	57	5.95	5.84
8	44.05	42.98	58	5.74	5.43
9	41.95	40.94	59	5.14	5.05
10	39.96	39.01	60	4.96	4.87
11	38.08	37.18	61	4.79	4.70
12	36.30	35.45	62	4.62	4.54
13	34.62	33.81	63	4.46	4.38
14	33.02	32.25	64	4.30	4.23
15	31.50	30.77	65	4.16	4.08
16	30.06	29.37	66	4.01	3.94
17	28.70	28.05	67	3.88	3.81
18	27.41	26.78	68	3.75	3.68
19	26.18	25.59	69	3.62	3.56
20	25.01	24.45	70	3.50	3.44
21	23.91	23.37	71	3.38	3.32
22	22.85	22.35	72	3.27	3.21
23	21.85	21.37	73	3.16	3.11
24	20.90	20.45	74	3.06	3.01
25	20.00	19.56	75	2.96	2.91
26	19.14	18.73	76	2.86	2.82
27	18.32	17.93	77	2.77	2.72
28	17.54	17.17	78	2.68	2.64
29	16.80	16.45	79	2.60	2.55
30	16.10	15.76	80	2.51	2.47

Outdoor Thermistors for Discharge Pipe (R3T, R3-1T, R3-2T)

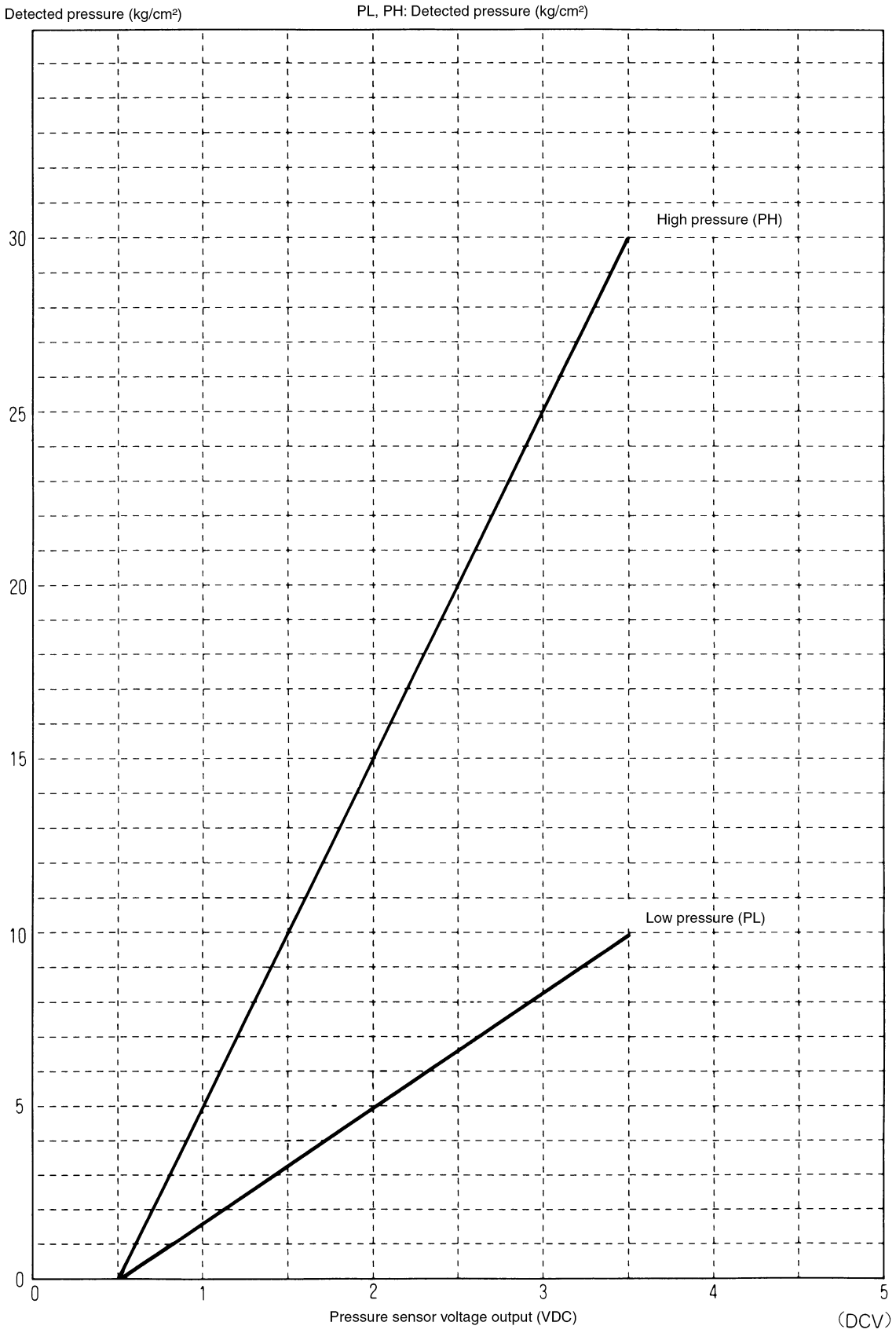
(kΩ))

T˚C	0.0	0.5	T˚C	0.0	0.5	T˚C	0.0	0.5
0	640.44	624.65	50	72.32	70.96	100	13.35	13.15
1	609.31	594.43	51	69.64	68.34	101	12.95	12.76
2	579.96	565.78	52	67.06	65.82	102	12.57	12.38
3	552.00	538.63	53	64.60	63.41	103	12.20	12.01
4	525.63	512.97	54	62.24	61.09	104	11.84	11.66
5	500.66	488.67	55	59.97	58.87	105	11.49	11.32
6	477.01	465.65	56	57.80	56.75	106	11.15	10.99
7	454.60	443.84	57	55.72	54.70	107	10.83	10.67
8	433.37	423.17	58	53.72	52.84	108	10.52	10.36
9	413.24	403.57	59	51.98	50.96	109	10.21	10.06
10	394.16	384.98	60	49.96	49.06	110	9.92	9.78
11	376.05	367.35	61	48.19	47.33	111	9.64	9.50
12	358.88	350.62	62	46.49	45.67	112	9.36	9.23
13	342.58	334.74	63	44.86	44.07	113	9.10	8.97
14	327.10	319.66	64	43.30	42.54	114	8.84	8.71
15	312.41	305.33	65	41.79	41.06	115	8.59	8.47
16	298.45	291.73	66	40.35	39.65	116	8.35	8.23
17	285.18	278.80	67	38.96	38.29	117	8.12	8.01
18	272.58	266.51	68	37.63	36.98	118	7.89	7.78
19	260.60	254.72	69	36.34	35.72	119	7.68	7.57
20	249.00	243.61	70	35.11	34.51	120	7.47	7.36
21	238.36	233.14	71	33.92	33.35	121	7.26	7.16
22	228.05	223.08	72	32.78	32.23	122	7.06	6.97
23	218.24	213.51	73	31.69	31.15	123	6.87	6.78
24	208.90	204.39	74	30.63	30.12	124	6.69	6.59
25	200.00	195.71	75	29.61	29.12	125	6.51	6.42
26	191.53	187.44	76	28.64	28.16	126	6.33	6.25
27	183.46	179.57	77	27.69	27.24	127	6.16	6.08
28	175.77	172.06	78	26.79	26.35	128	6.00	5.92
29	168.44	164.90	79	25.91	25.49	129	5.84	5.76
30	161.45	158.08	80	25.07	24.66	130	5.69	5.61
31	154.79	151.57	81	24.26	23.87	131	5.54	5.46
32	148.43	145.37	82	23.48	23.10	132	5.39	5.32
33	142.37	139.44	83	22.73	22.36	133	5.25	5.18
34	136.59	133.79	84	22.01	21.65	134	5.12	5.05
35	131.06	128.39	85	21.31	20.97	135	4.98	4.92
36	125.79	123.24	86	20.63	20.31	136	4.86	4.79
37	120.76	118.32	87	19.98	19.67	137	4.73	4.67
38	115.95	113.62	88	19.36	19.05	138	4.61	4.55
39	111.35	109.13	89	18.75	18.46	139	4.49	4.44
40	106.96	104.84	90	18.17	17.89	140	4.38	4.32
41	102.76	100.73	91	17.61	17.34	141	4.27	4.22
42	98.75	96.81	92	17.07	16.80	142	4.16	4.11
43	94.92	93.06	93	16.54	16.29	143	4.06	4.01
44	91.25	89.47	94	16.04	15.79	144	3.96	3.91
45	87.74	86.04	95	15.55	15.31	145	3.86	3.81
46	84.38	82.75	96	15.08	14.85	146	3.76	3.72
47	81.16	79.61	97	14.62	14.40	147	3.67	3.62
48	78.09	76.60	98	14.18	13.97	148	3.58	3.54
49	75.14	73.71	99	13.76	13.55	149	3.49	3.45
50	72.32	70.96	100	13.35	13.15	150	3.41	3.37

1.2 Pressure Sensor Voltage Output / Detected Pressure Characteristics

Low pressure $P_L = (V_L - 0.5) \times \frac{10}{3}$

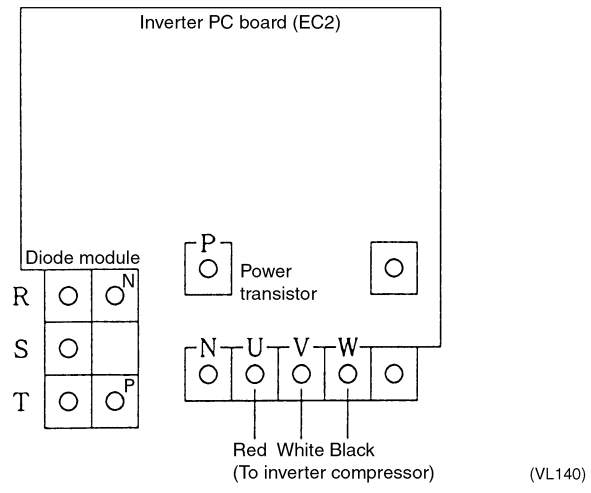
High pressure $P_H = (V_H - 0.5) \times 10$



(VG102)

2. Method of Replacing The Inverter's Power Transistors and Diode Modules

2.1 Method of Replacing The Inverter's Power Transistors and Diode Modules

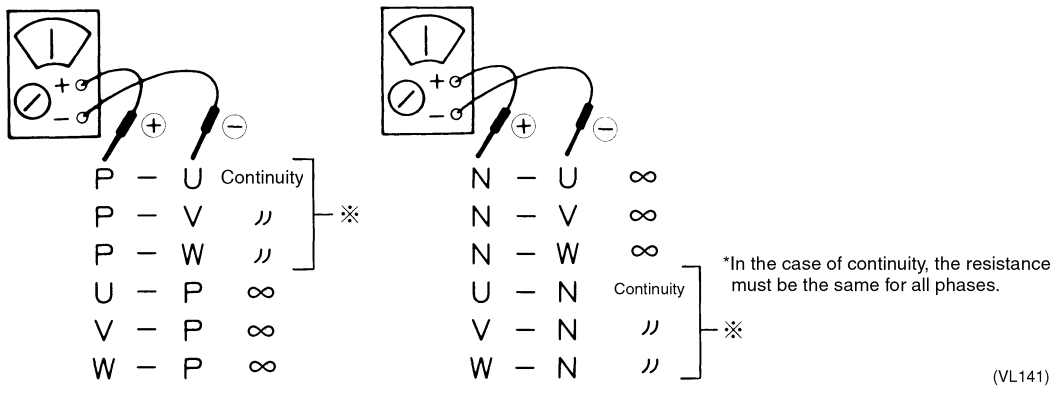


(VL140)

[Decision according to continuity check by analog tester]

■ Before checking, disconnect the electric wiring connected to the power transistor and diode module.

2.1.1 Power Transistor (On Inverter PC Board)



(VL141)

(Decision)

If other than given above, the power unit is defective and must be replaced.

Note: If using a digital tester, ∞ and continuity may be reversed.

3. Precaution

3.1 PC Boards and Remote Controller's Mode No.

3.1.1 Precautions When Replacing K Series PC Boards

If you replace the indoor or outside unit PC board, push and hold the RESET button on the outdoor unit PC Board for 5 seconds.

■ In this case, the unit will not run for up to 12 minutes.

■ **Precautions when replacing indoor unit PC board**

When replacing the indoor unit PC board, the following contents are factory set. Change the settings if necessary.

1. Field set contents (dirty filter, stop input from outside, etc.)

◆Change settings with the remote controller.

◆When using group control or setting by individual indoor units, the "indoor unit No." before and after changing the PC board may differ.

Set after checking the indoor unit No.

2. Central address

Change setting with the remote controller.

3. Capacity display

A capacity setting adaptor must be installed for all models.

∗Fan phase control is for FXYF, FXYH, FXYA only.

■ **Precautions when replacing outdoor unit PC board**

When replacing the outdoor unit PC board, set the following settings again.

1. Field set contents (setting mode 1)

Set cool/heat selection, low noise and sequential start again.

2. Setting mode 2

Change the TC setting, TE setting and defrost setting as required.

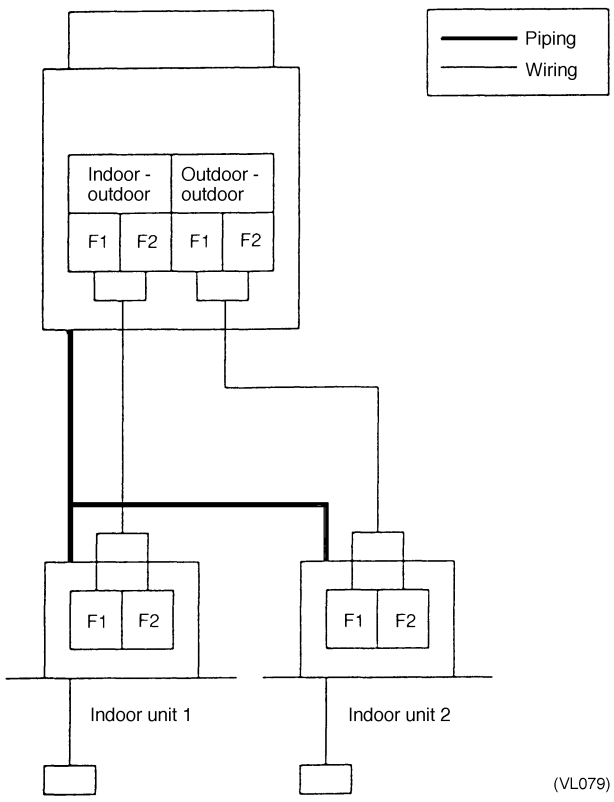
3.1.2 Precautions Concerning the Remote Controller's Mode No.

Mode numbers that are not in the list but can be set may be displayed by the remote controller. Do not change settings not included in the list. If so, we may not be able to guarantee operation.

4. Typical Wiring Mistakes

4.1 Typical Wiring Mistakes

One of the indoor units is connected to outdoor-to-outdoor transmission terminals



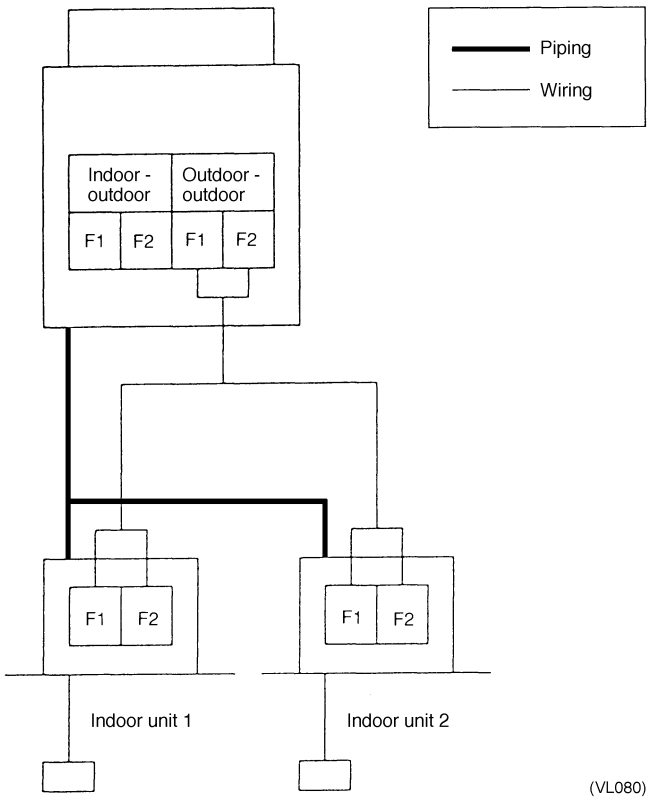
Installation / test operation

Indoor unit 1	Normal
Indoor unit 2	UF malfunction

Other than above

Indoor unit 1	Normal
Indoor unit 2	U4 malfunction or no malfunction display

All Indoor Units Connected to the Outdoor-to-Outdoor Unit Terminal



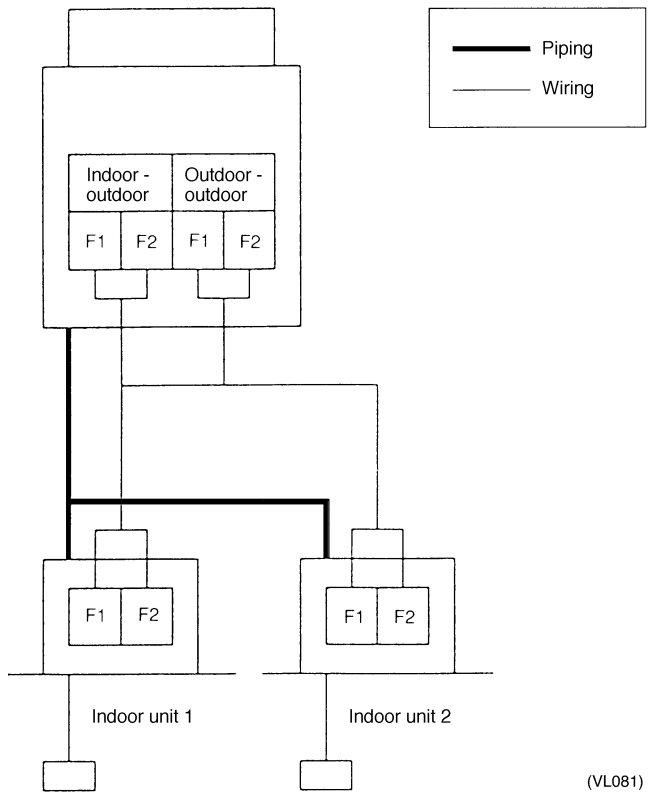
Installation / test operation

Indoor unit 1	UF malfunction
Indoor unit 2	

Other than above

Indoor unit 1	U4 malfunction or no malfunction display
Indoor unit 2	

All Indoor Units Connected to Indoor-to-Outdoor and Outdoor-to-Outdoor Unit Terminals

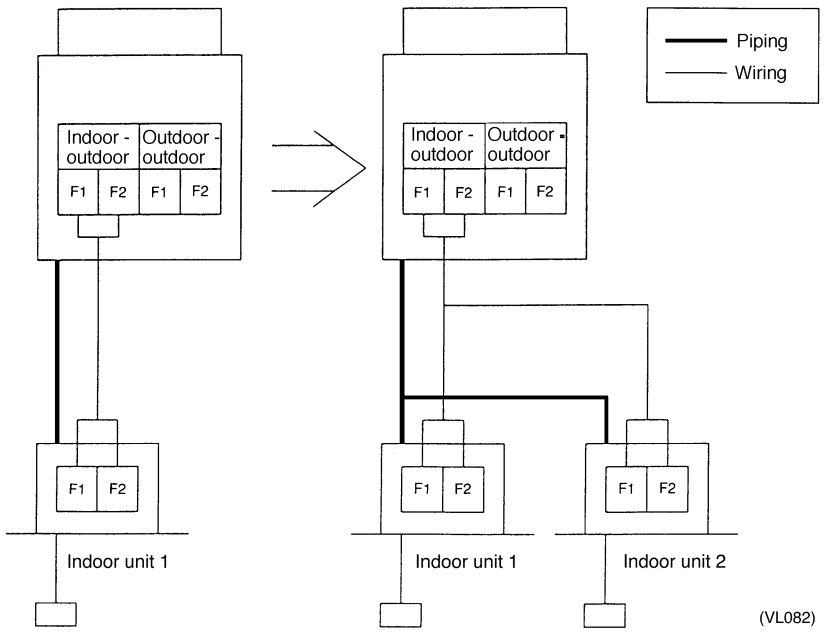


(VL081)

Installation / test operation

Indoor unit 1	U4 malfunction
Indoor unit 2	

Extended Indoor Unit



10 min. after turning power on

Indoor unit 1	Normal
Indoor unit 2	U4 malfunction

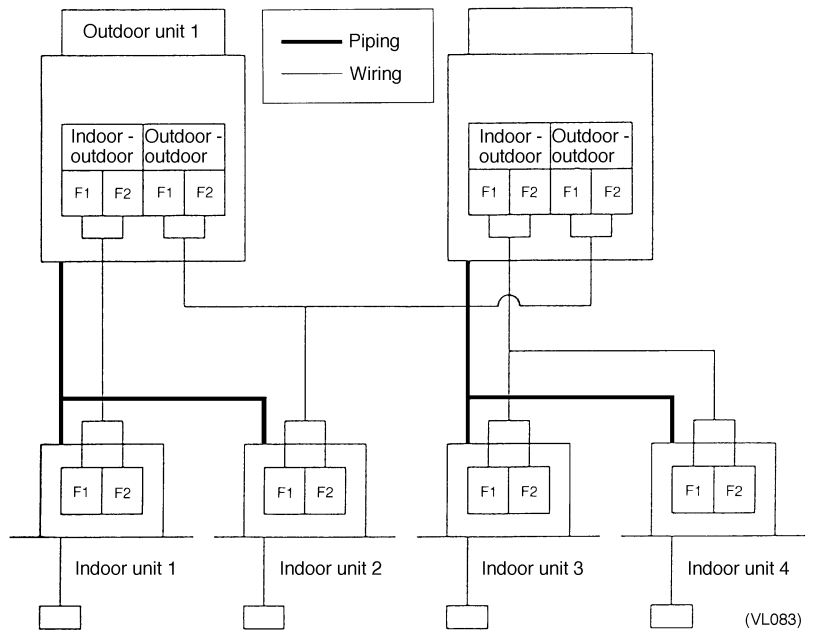
↓

Push and hold RESET button for 5 sec.

↓ After 12 minutes elapse

Indoor unit 1	Normal
Indoor unit 2	Normal

One of the indoor units of outdoor unit 1 is connected to outdoor-to-outdoor transmission terminals



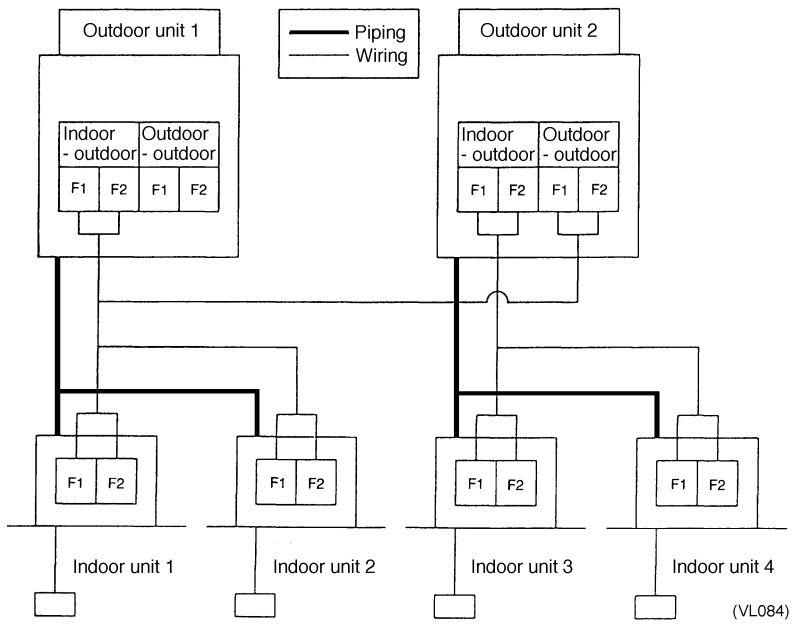
Installation / test operation

Indoor unit 1	Normal
Indoor unit 2	UF malfunction
Indoor unit 3	Normal
Indoor unit 4	Normal

Other than above

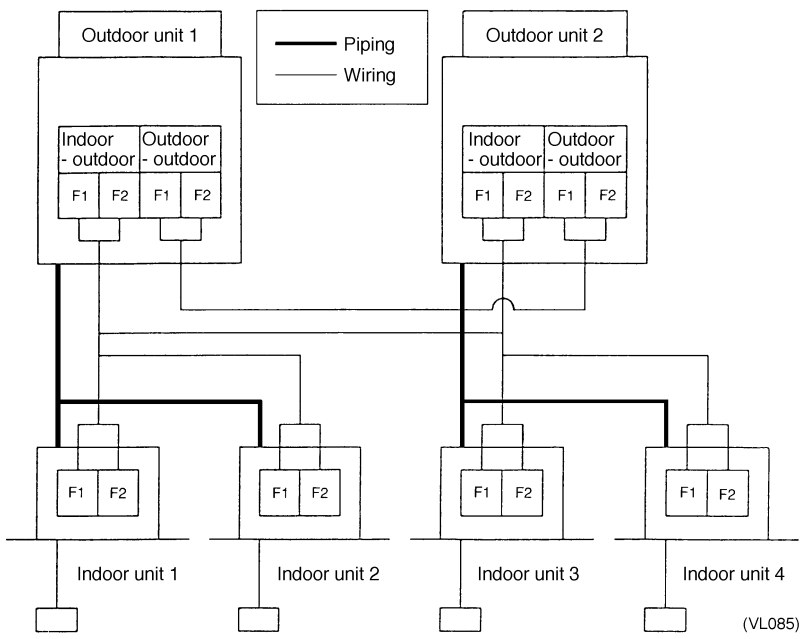
Indoor unit 1	Normal
Indoor unit 2	U4 malfunction
Indoor unit 3	Normal
Indoor unit 4	Normal

The indoor-to-outdoor terminal of outdoor unit 1 and the outdoor-to-outdoor terminal of outdoor unit 2 are connected



Indoor unit 1	Normal
Indoor unit 2	Normal
Indoor unit 3	UH malfunction
Indoor unit 4	

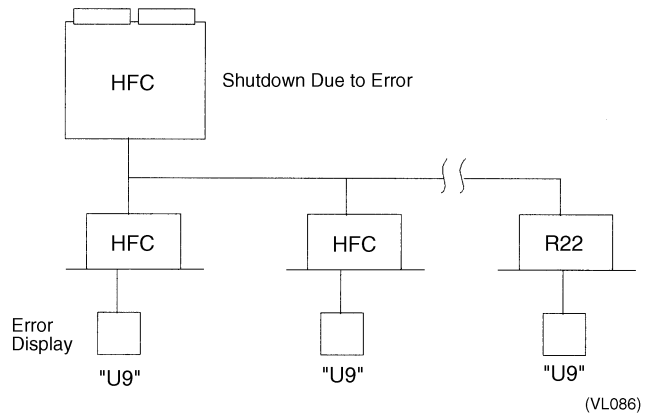
The indoor-to-outdoor terminals of outdoor units 1 and 2 are connected



Indoor unit 1	UH malfunction
Indoor unit 2	
Indoor unit 3	
Indoor unit 4	

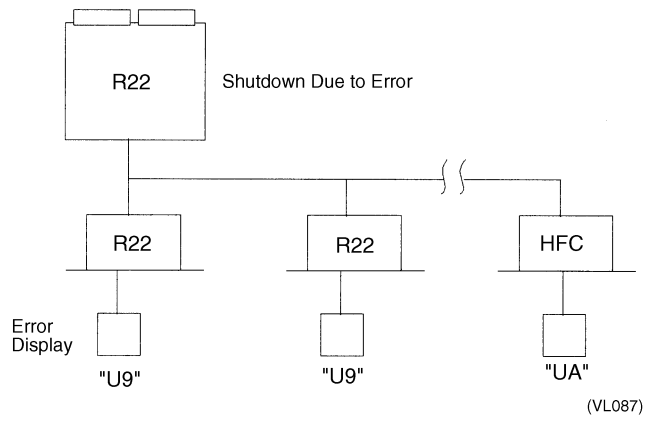
R22 model connection abnormalities

1. When R22 indoor unit is connected to HFC (R407C) system



Reason : Operation disallowed due to insufficient pressure proof in R22 indoor unit.

2. When HFC indoor unit is connected to R22 system

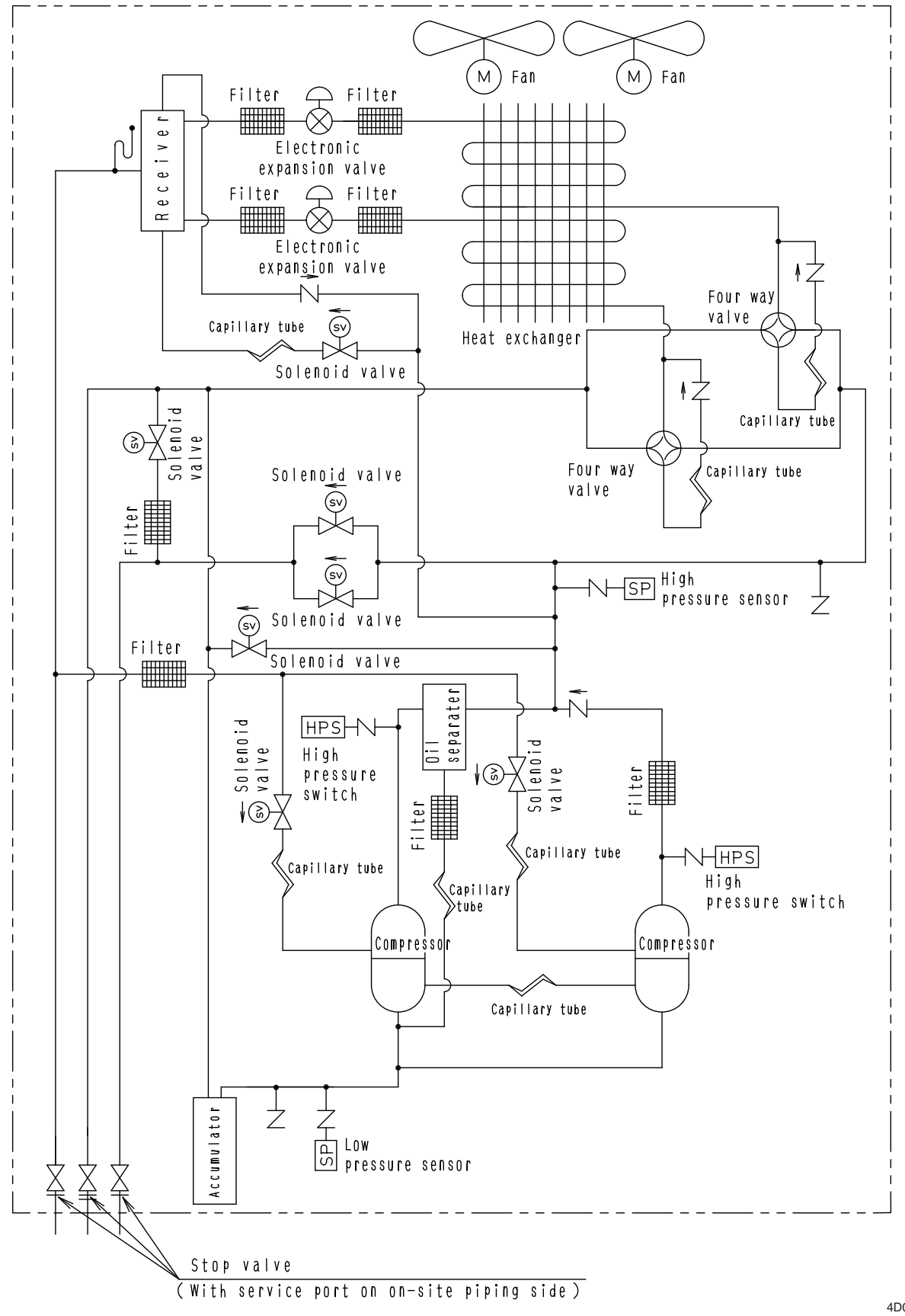


Reason : Operation disallowed to prevent contamination of another system by HFC indoor unit operated previously with R22 system. If HFC indoor unit that was operated with R22 system is removed and connected to another HFC system, it can contaminate (SUNISO oil etc.) the newly connected HFC system.

5. Piping Diagram

5.1 Heat Recovery Series Outdoor Unit

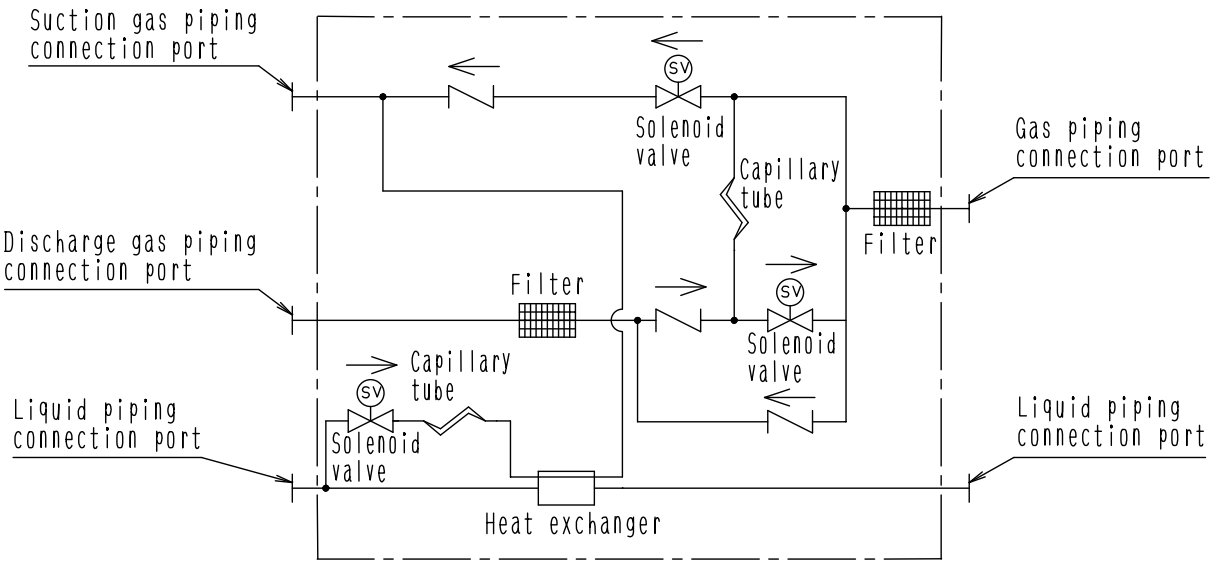
RSEY8·10KLY1(E)



4D018336

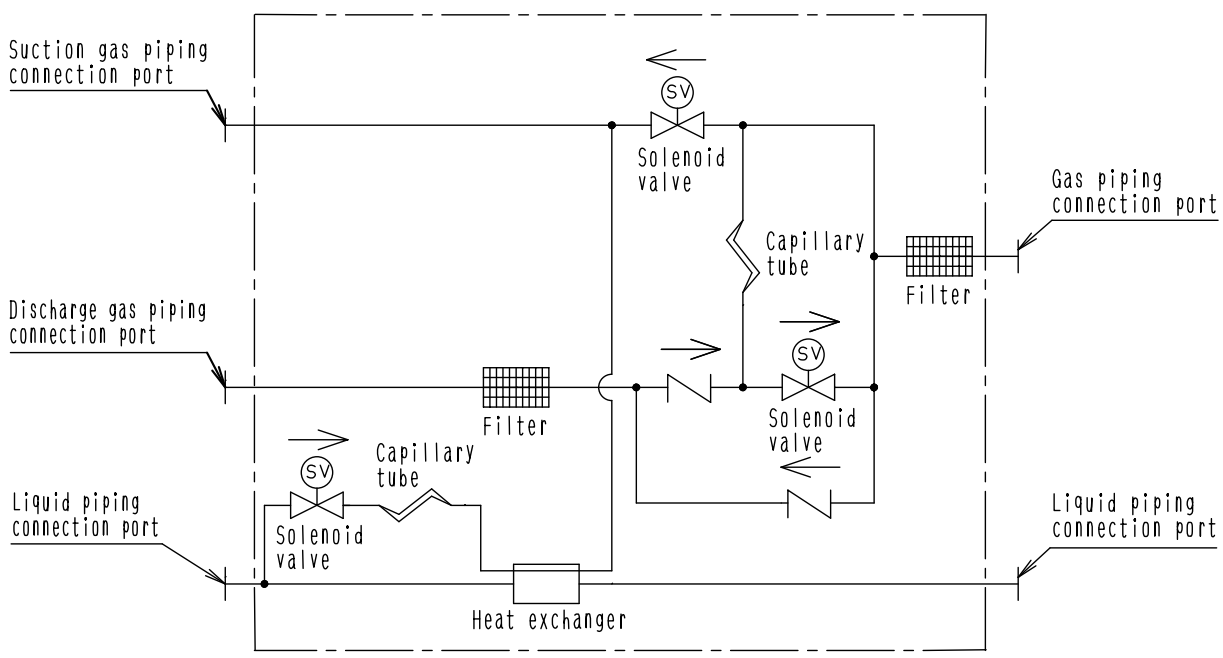
5.2 BS Unit

BSV100KLV1



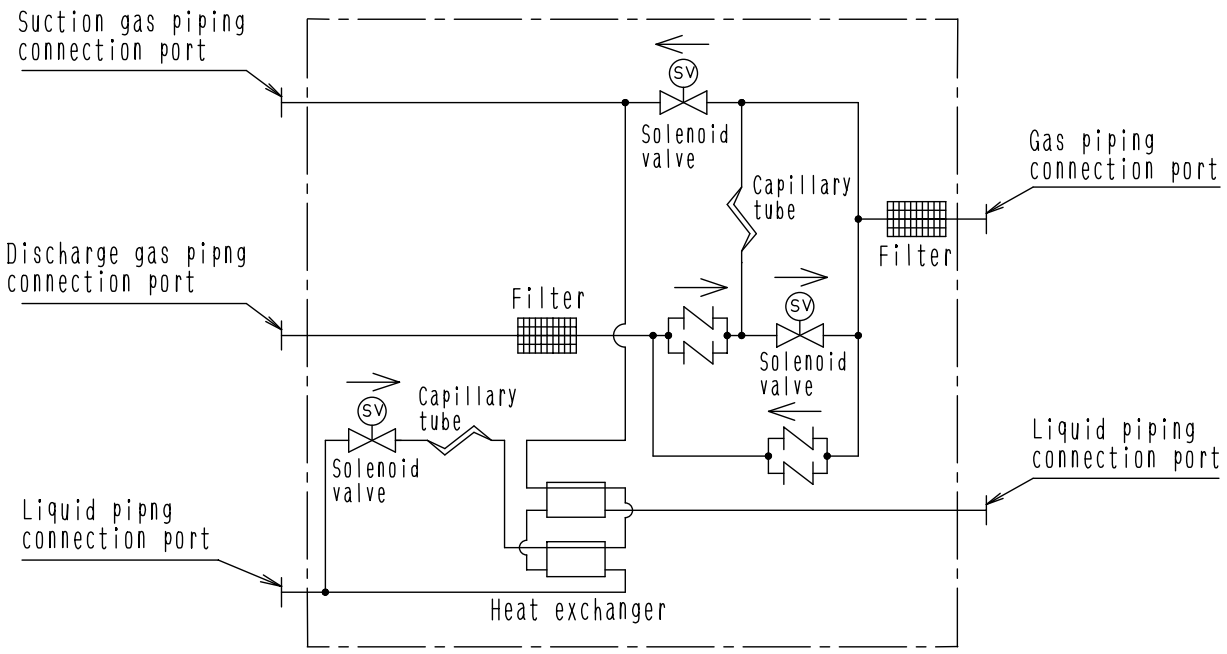
4D014497A

BSV160KLV1



4D014498A

BSV250KLV1



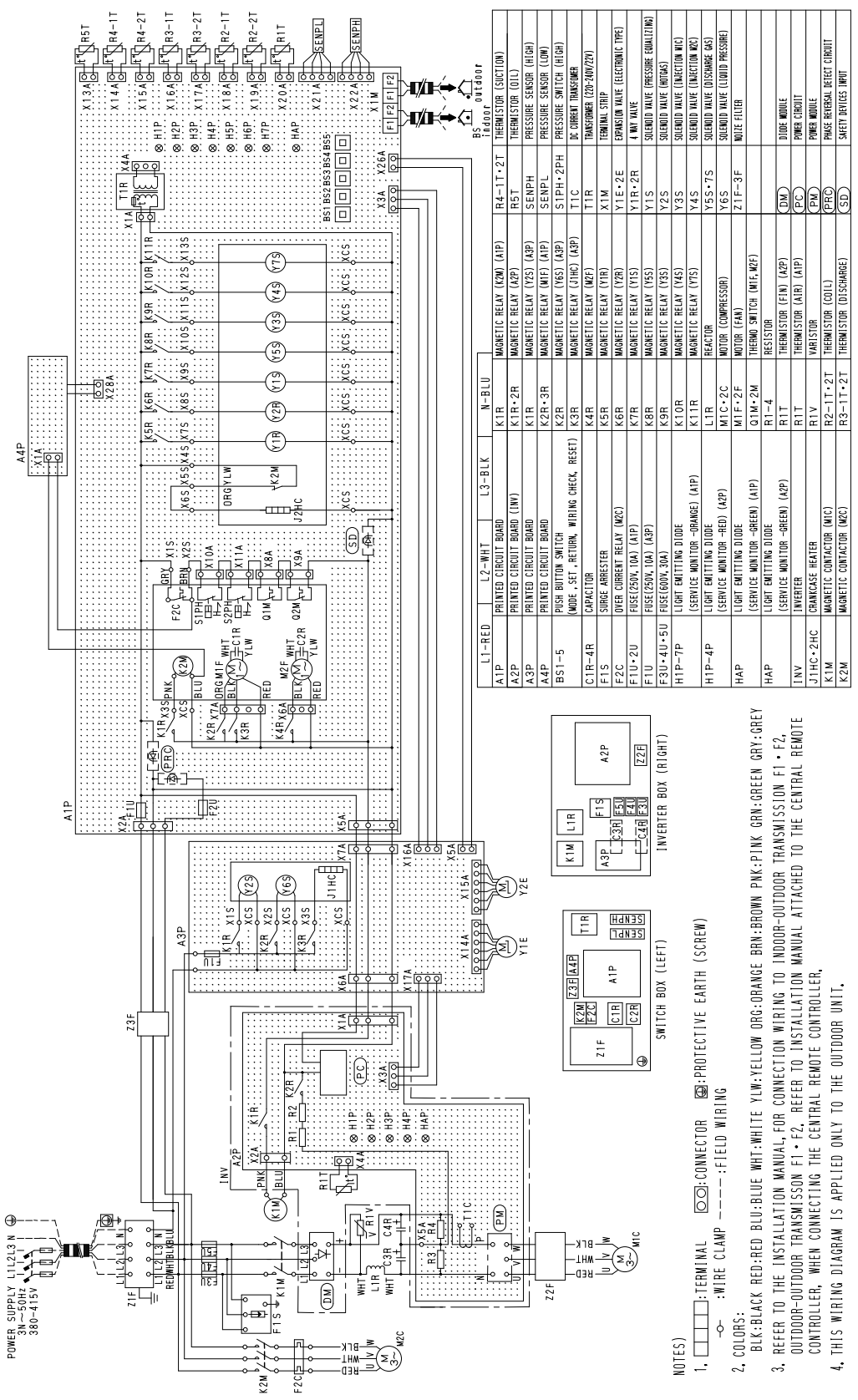
4D014499

6. Wiring Diagram

6.1 Heat Recovery Series Outdoor Unit

RSEY8·10KLY1(E)

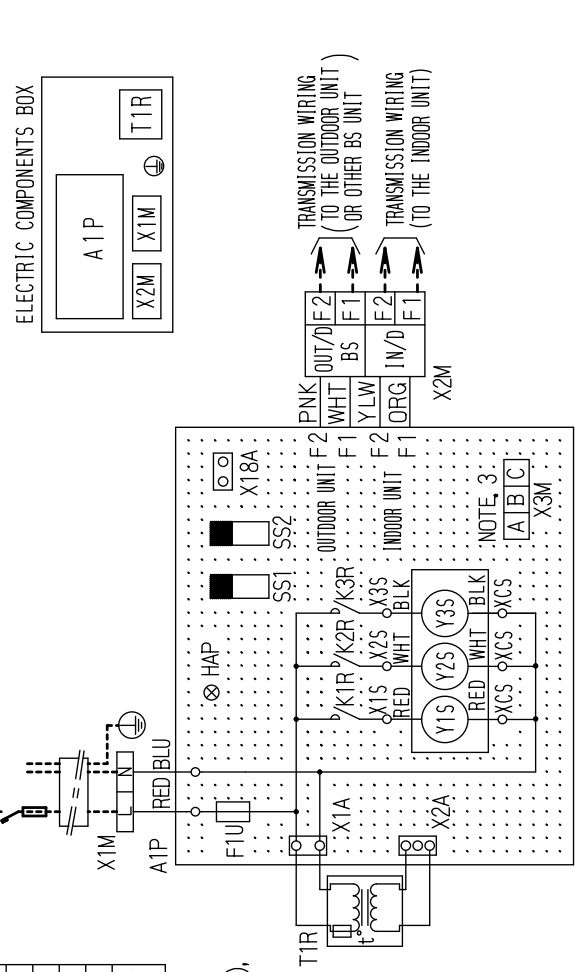
3D015462A



6.2 BS Unit

BSV100·160·250KLV1

3D014829A



A1P	PRINTED CIRCUIT BOARD	X1M TERMINAL STRIP(POWER)
F1U	FUSE(250V,5A)	X2M TERMINAL STRIP(CONTROL)
HAP	LIGHT EMITTING DIODE (SERVICE MONITOR-GREEN)	X3M TERMINAL STRIP(C/H SELECTOR)
		Y1S SOLENOID VALVE(LIQUID LINE)
K1R-3R	MAGNETIC RELAY	Y2S SOLENOID VALVE(SUCTION LINE)
SS1·2	SELECTOR SWITCH (SELECTION OF REMOTE CONTROLLER)	Y3S SOLENOID VALVE(DISCHARGE LINE)
		CONNECTOR FOR OPTIONAL PARTS
		X18A CONNECTOR(WIRING EXTERNAL CONTROL ADAPTOR FOR OUTDOOR UNIT)
T1R	TRANSFORMER(220-240V/22V)	CONNECTOR, —○— : WIRE CLAMP
	L:RED N:BLUE	

NOTES) 1. □□□□: TERMINAL, ○○ :CONNECTION
2. ----:FIELD WIRING
3. WHEN USING THE COOL/HEAT SELECTOR(OPTIONAL ACCESSORY), CONNECT IT TO TERMINALS A, B AND C ON THE A1P. IN THIS CASE, SET THE SELECTOR SWITCH SS1&SS2 ON THE A1P ACCORDING TO BELOW DRAWING.

C/H SELECTOR

IN/D UNIT

BS SS1

ADP SS2

4. AS FOR WIRING TO THE IN/D F1&F2 AND OUT/D, BS F1&F2, REFER TO INSTALLATION MANUAL.
5. THIS WIRING DIAGRAM APPLIES TO THE BS UNIT ONLY.
6. SYMBOLS SHOW AS FOLLOWS.
(BLU:BLUE ORG:ORANGE PNK:PINK RED:RED)
(WHT:WHITE YLW:YELLOW BLK:BLACK)
7. **USE COPPER CONDUCTORS ONLY.**

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U

W

Drawings & Flow Charts