Service Handbook PURY-P400, P500YEM-A

Service Handbook PURY-P400, P500YEM-A

MITSUBISHI ELECTRIC

AIR CONDITIONERS CITY MULTI

Models **PURY-P400, P500YEM-A**

Service Handbook

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE: MITSUBISHI DENKI BLDG., 2-2-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN

CITY MULTI

Issued in 2004 Mar. MEE03K208
Printed in Japan

New publication effective Mar. 2004
Specifications subject to change without notice.

Contents

Safety Precautions

Before installation and electric work

▶ Before installing the unit, be sure to read everything in the "Safety Precautions".
▶ The "Safety Precautions" provide critical information regarding safety. Be sure to exercise these precautions to ensure safety.
▶ This equipment may not be applicable to EN61000-3-2: 1995 and EN61000-3-3: 1995.
▶ This equipment may have an adverse effect on the equipment on the same electrical supply system.
▶ Please report to and seek an approval from the local power company before connecting to the system.

Symbols used in the text

⚠ Warning:
Describes precautions that should be observed to prevent danger of injury to the user or death.

⚠ Caution:
Describes precautions that should be observed to prevent damage to the unit.

Symbols used in the illustrations

⃠ : Indicates an action that must be avoided.

: Indicates important instructions that must be followed.

: Indicates a part that must be grounded.

⚠ : Risk of electric shock (This symbol is displayed on the main unit label.) <Color: Yellow>

⚠ Warning:
Carefully read the labels affixed to the main unit.

⚠ Warning:

- **Use the specified cables for wiring. Make the connections securely so that the outside force of the cable is not applied to the terminals.**
  - Inadequate connection and fastening may generate heat and cause a fire.
- **Have all electric work done by a licensed electrician according to "Electric Facility Engineering Standard," "Interior Wire Regulations," and the instructions given in this manual. Always use a circuit designated solely to the unit.**
  - If the power source capacity is inadequate or electric work is performed improperly, electric shock and fire may result.
- **Securely install the cover of control box and the panel.**
  - If the cover and panel are not installed properly, dust or water may enter the outdoor unit and fire or electric shock may result.
- **After completing service work, make sure that refrigerant gas is not leaking.**
  - If the refrigerant gas leaks and is exposed to a fan heater, stove, oven, or other heat source, it may generate noxious gases.
- **Do not try to defeat the safety features of devices, and do not change the settings.**
  - If the pressure switch, thermal switch, or other protection device is shorted and operated forcibly, or parts other than those specified by Mitsubishi Electric are used, fire or explosion may result.

1 PRECAUTIONS FOR DEVICES THAT USE R407C REFRIGERANT

⚠ Caution

Do not use the existing refrigerant piping.

- The old refrigerant and refrigerator oil in the existing piping contains a large amount of chlorine which may cause the refrigerator oil of the new unit to deteriorate.

Use pipes made of phosphorus deoxidized cover categorized under H3000 (Copper and copper alloy seamless pipes and tubes). Be sure that the inner and outer surfaces of the pipes are clean and free of contaminants, such as sulphur, oxides, dust/dirt, shaving particles, oils, and moisture.

- Contaminants on the inside of the refrigerant piping may cause the refrigerant residual oil to deteriorate.

Store the piping to be used during installation indoors, and keep both ends of the piping sealed until immediately before brazing. (Store elbows and other joints in a plastic bag.)

- If dust, dirt, or water enters the refrigerant cycle, deterioration of the oil and compressor trouble may result.

Use a small amount of ester oil, ether oil or alkylbenzene as the refrigerator oil to coat flares and flange connections.

- The refrigerator oil will degrade if it is mixed with a large amount of mineral oil.

Use liquid refrigerant to seal the system.

- If gas refrigerant is used to seal the system, the composition of the refrigerant in the cylinder will change and performance may drop.

Do not use a refrigerant other than R407C.

- If another refrigerant (R22, etc.) is used, the chlorine in the refrigerant may cause the refrigerator oil to deteriorate.

Use a vacuum pump with a reverse flow check valve.

- If other types of valves are used, the vacuum pump oil may flow back into the refrigerant cycle and cause the refrigerator oil to deteriorate.

Do not use the following tools that have been used with conventional refrigerants.
(Gauge manifold, charge hose, gas leak detector, reverse flow check valve, refrigerant charge base, vacuum gauge, refrigerant recovery equipment)

- If the conventional refrigerant and refrigerator oil left on these tools are mixed in with R407C, the refrigerant may deteriorate. If water is mixed in with R407C, the refrigerator oil may deteriorate. Since R407C does not contain any chlorine, gas leak detectors for conventional refrigerants will not operate properly.
- If water is mixed in with R407C, the refrigerator oil may deteriorate.
- Since R407C does not contain any chlorine, gas leak detectors for conventional refrigerants will not operate properly.

Do not use a charging cylinder.

- The use of a charging cylinder may cause the refrigerant to deteriorate.

Be especially careful when managing the tools.

- If dust, dirt, or water enters the refrigerant cycle, the refrigerant may deteriorate.

If the refrigerant leaks, recover the refrigerant in the refrigerant cycle; then, recharge the cycle with the specified amount of the liquid refrigerant indicated on the air conditioner.

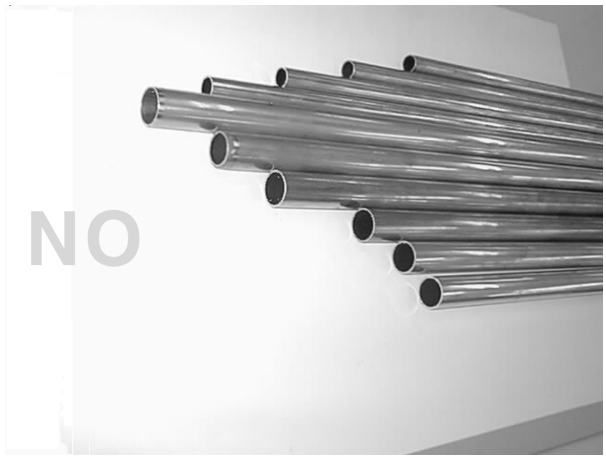
- Since R407C is a non-azeotropic refrigerant, if overcharged, the composition of the refrigerant in the refrigerant cycle will change and result in a drop in performance or abnormal stopping.

[1] Storage of Piping Material

(1) Storage location

Store the pipes to be used indoors.
Storing them outdoors may cause dirt, waste, or water to infiltrate.

(2) Pipe sealing before storage

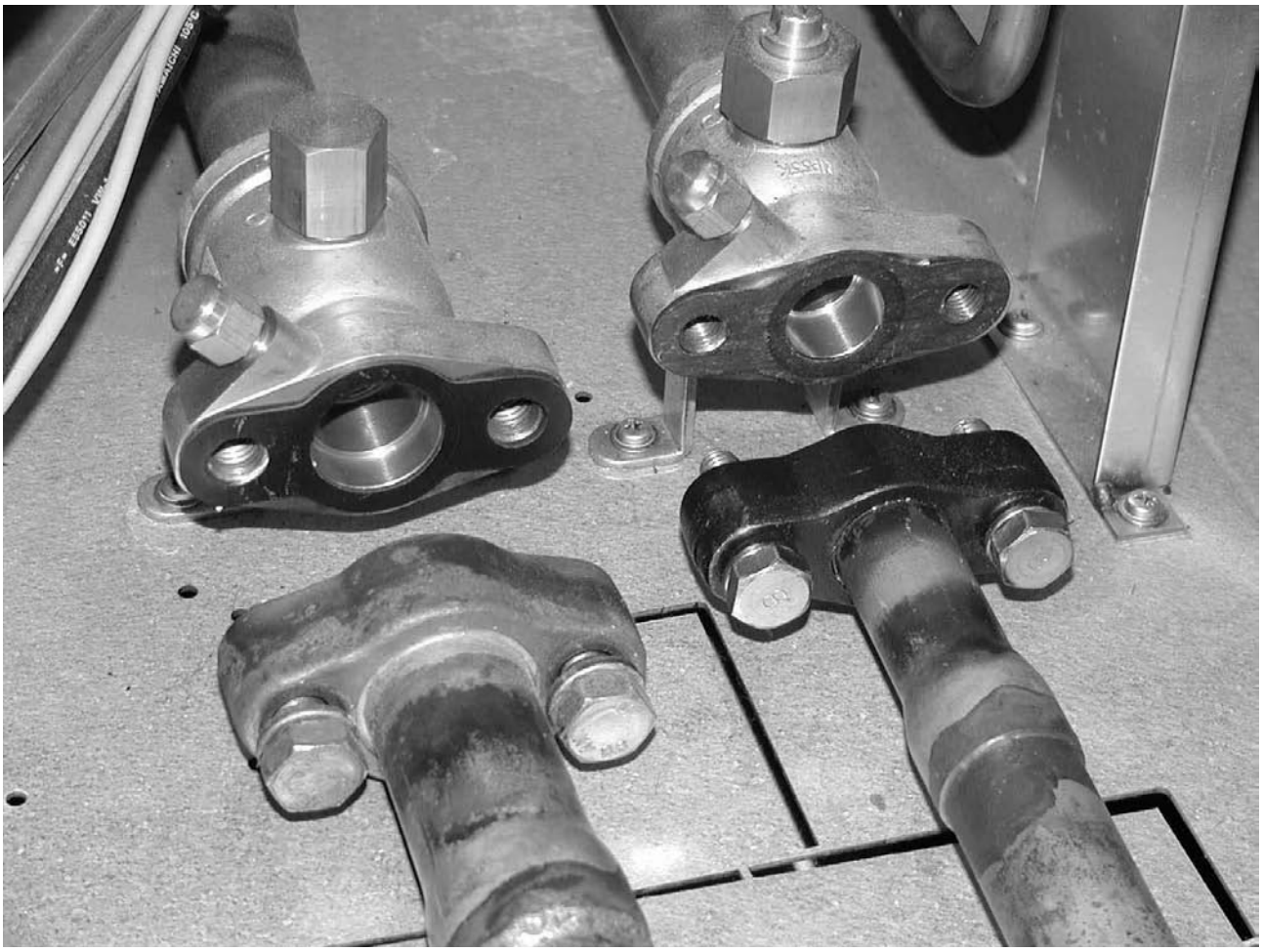


Both ends of the pipes should be sealed until immediately before brazing.
Wrap elbows and T's in plastic bags for storage.

* The new refrigerator oil is ten times more hygroscopic than the conventional refrigerator oil (such as Suniso). Water infiltration in the refrigerant circuit may deteriorate the oil or cause a compressor failure. Piping materials must be stored with more care than with the conventional refrigerant pipes.

[2] Piping Machining

Use a small amount of ester oil, ether oil, or alkylbenzene to coat flange connections.



Use only the necessary minimum quantity of oil.

Reason :

1. The refrigerator oil used for the equipment is highly hygroscopic and may introduce water inside.

Notes :

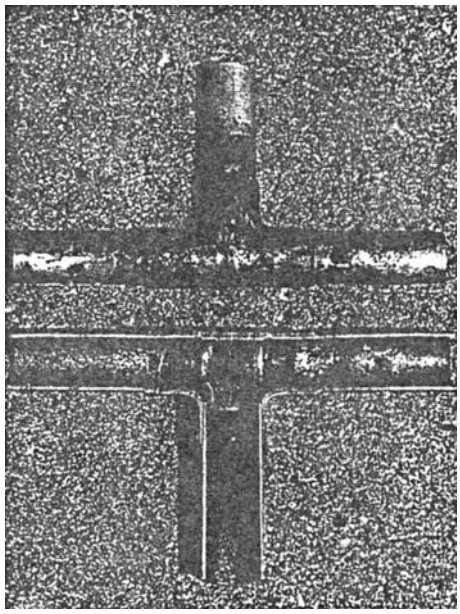
- Introducing a great quantity of mineral oil into the refrigerant circuit may also cause a compressor failure.
- Do not use oils other than ester oil, ether oil or alkylbenzene.

[3] Brazing

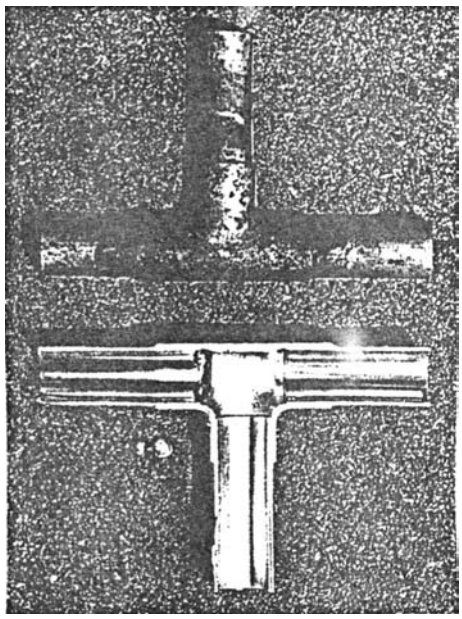
No changes have been noted from the conventional method, but special care is required to keep contaminants (i.e. oxide scale, water, dirt) from entering the refrigerant circuit.

Example : Inside a brazed section

When non-oxide brazing was not used



When non-oxide brazing was used



Items to be strictly observed :

1. Do not conduct refrigerant piping work outdoors on a rainy day.
2. Apply non-oxide brazing.
3. Use a brazing material (BCuP-3) which requires no flux when brazing the sections between copper pipes or between a copper pipe and copper coupling.
4. If installed refrigerant pipes are not immediately connected to the equipment, then braze and seal both ends of them.

Reasons :

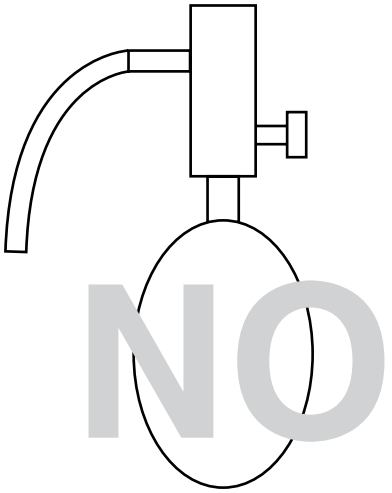
1. The new refrigerant oil is ten times more hygroscopic than the conventional oil. The probability of a machine failure due to water infiltration is higher than with conventional refrigerant oil.
2. A flux generally contains chlorine. A residual flux in the refrigerant circuit may generate sludge.

Note :

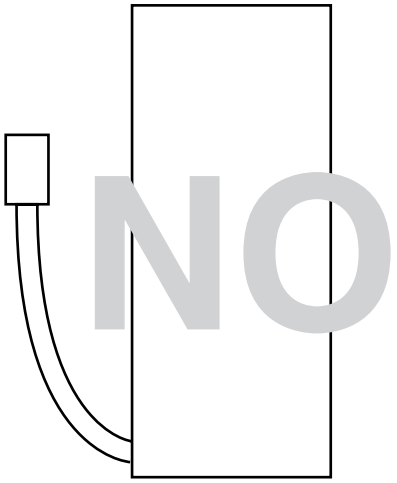
- Commercially available antioxidants may have adverse effects on the equipment due to its residue, etc. When applying non-oxide brazing, use oxygen free nitrogen (OFN).

[4] Airtightness Test

No changes from the conventional method. Note that a refrigerant leakage detector for R22 cannot detect R407C leakage.



Halide torch



R22 leakage detector

Items to be strictly observed :

1. Pressurize the equipment with nitrogen up to the design pressure and then check the equipment's airtightness, taking temperature variations into account.
2. When investigating leakage locations using a refrigerant, be sure to use R407C.
3. Ensure that R407C is in a liquid state when charging.

Reasons :

1. Use of oxygen as the pressurized gas may cause an explosion.
2. If gas refrigerant is used, the composition of the remaining refrigerant in the cylinder will change and this refrigerant will become unusable.

Note :

- A leakage detector for R407C is sold commercially, and it should be purchased.

[5] Vacuuming

1. Vacuum pump with check valve
   A vacuum pump with a check valve is required to prevent the vacuum pump oil from flowing back into the refrigerant circuit when the power supply is cut off due to power failure. A check valve may be added to a vacuum pump not equipped with one.

2. Standard degree of vacuum for the vacuum pump
   Use a pump which reaches 0.5 Torr (500 MICRON) or below after 5 minutes of operation.
   Be sure to use a vacuum pump that has been properly maintained and oiled with the specified oil. If the vacuum pump is not properly maintained, desired degree of vacuum may not be achieved.

3. Neccessary accuracy of the vacuum gauge
   Use a vacuum gauge that can measure up to 5 Torr. Do not use a general gauge manifold since it cannot measure a vacuum of 5 Torr.

4. Evacuating time

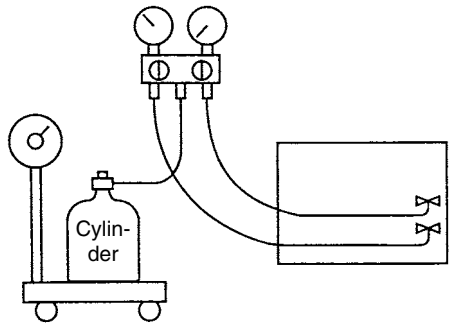
- Evacuate the equipment for 1 hour after –755 mmHg (5 Torr) has been reached.
- After envacuating, leave the equipment for 1 hour and make sure that the vacuum is not lost.

5. Operating procedure when the vacuum pump is stopped
   In order to prevent a backflow of the vacuum pump oil, open the relief valve on the vacuum pump side or loosen the charge hose to drawn in air before stopping operation.
   The same operating procedure should be used when using a vacuum pump with a check valve.

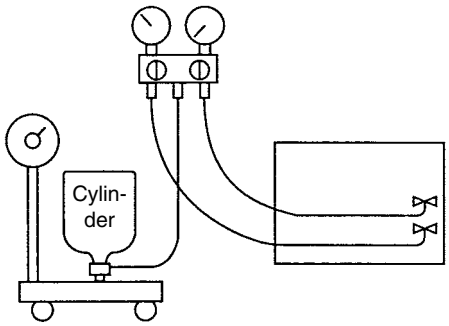
[6] Charging of Refrigerant

R407C must be in a liquid state when charging, because it is a non-azeotropic refrigerant.

For a cylinder with a syphon attached

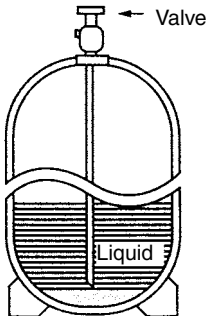


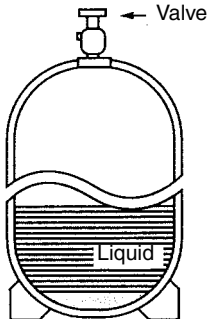
For a cylinder without a syphon attached



Cylinder color identification R407C-Gray
R410A-Pink

Charged with liquid refrigerant





Reasons :

1. R407C is a mixture of three refrigerants, each with a different evaporation temperature. If the equipment is charged with R407C gas, then the refrigerant whose evaporation temperature is closest to the outside temperature is charged first while the rest of refrigerants remain in the cylinder.

Note :

- Do not use cylinders that are equipped with a siphon upside-down. Check the type of cylinder before charging.

[7] Dryer

1. Replace the dryer when the refrigerant circuit is opened (Ex. Change the compressor, full gas leakage). Be sure to replace the dryer with a CITY MULTI Series Y (For use with R407C).

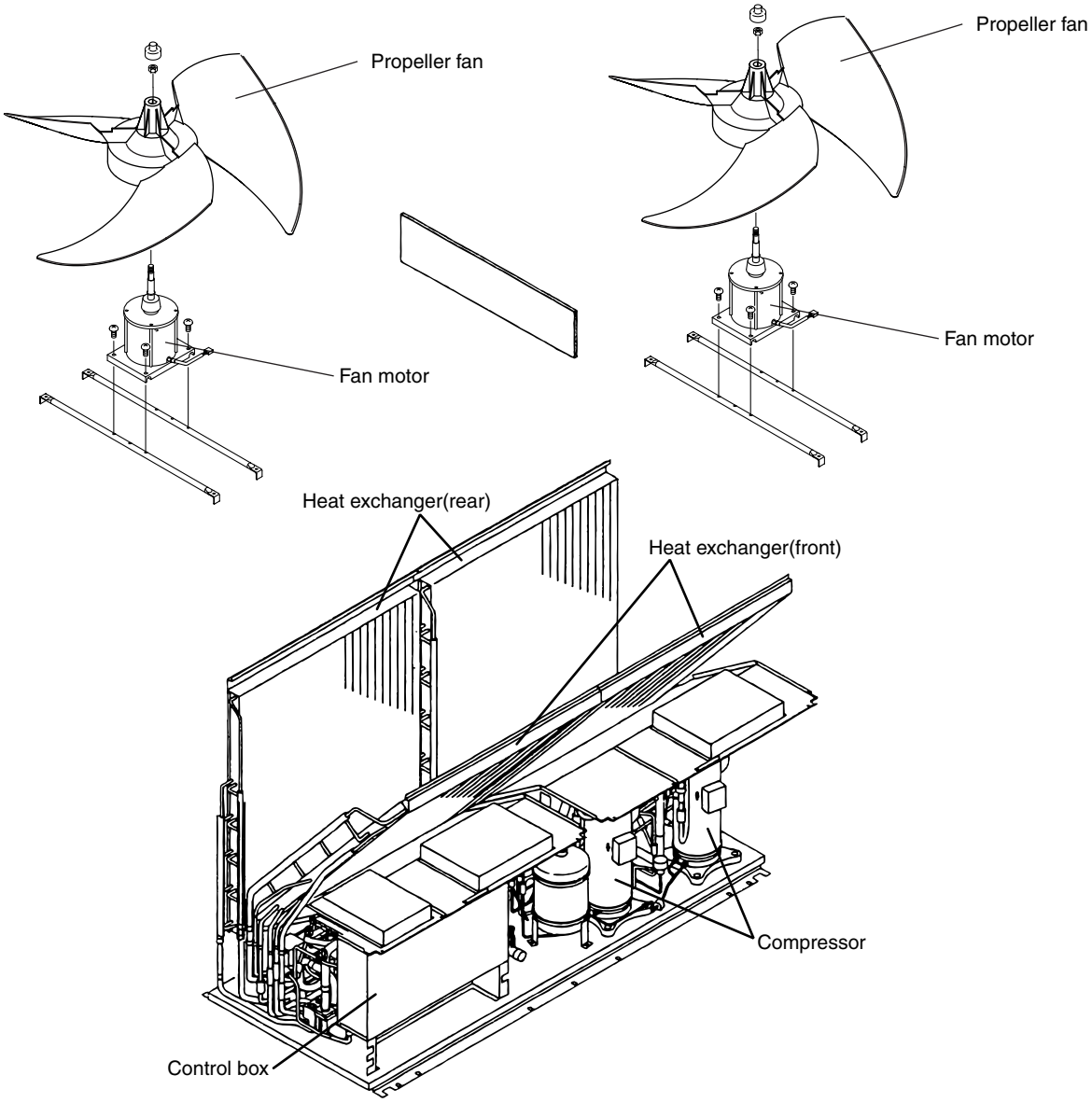
   The use of any other product will damage the unit.

2. Do not leave the refrigerant circuit open for longer than one hour after removing the old drier.

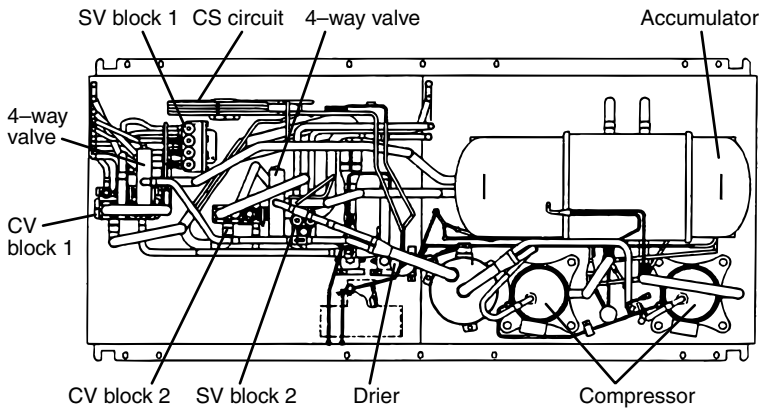
2 COMPONENT OF EQUIPMENT

[1] Appearance of Components

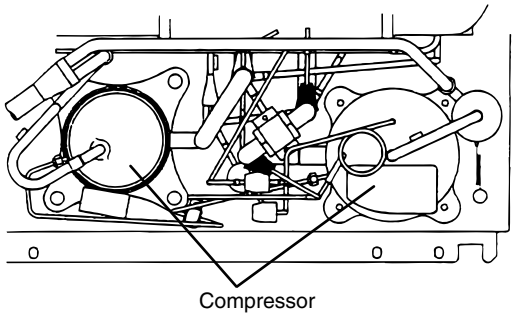
Outdoor unit



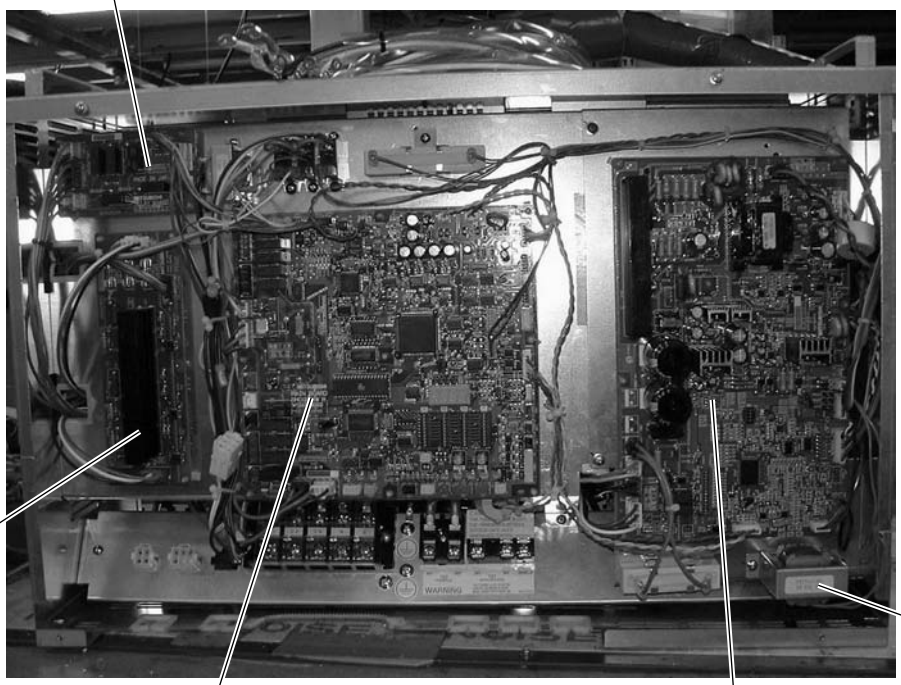
P400 TYPE

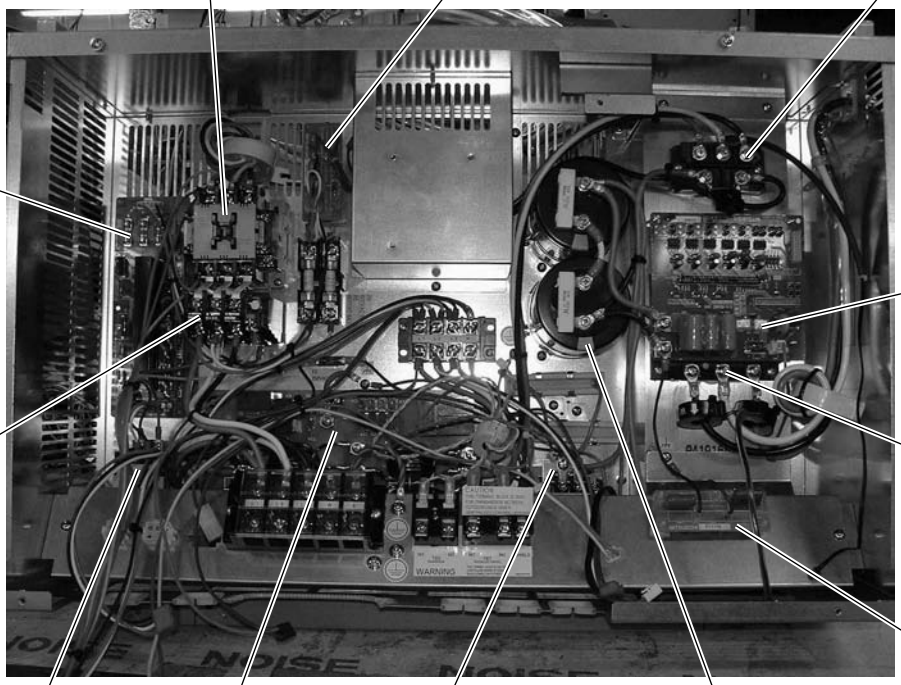


P500 TYPE



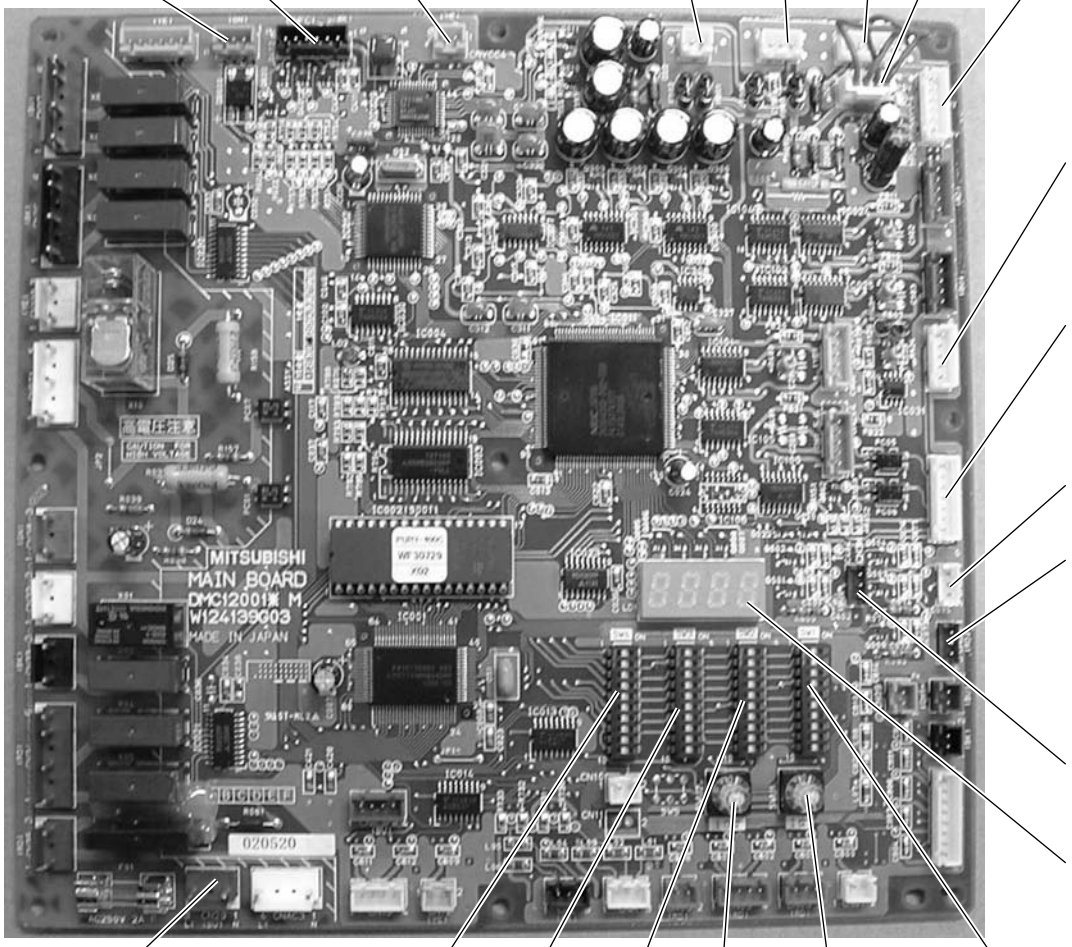
Controller Box



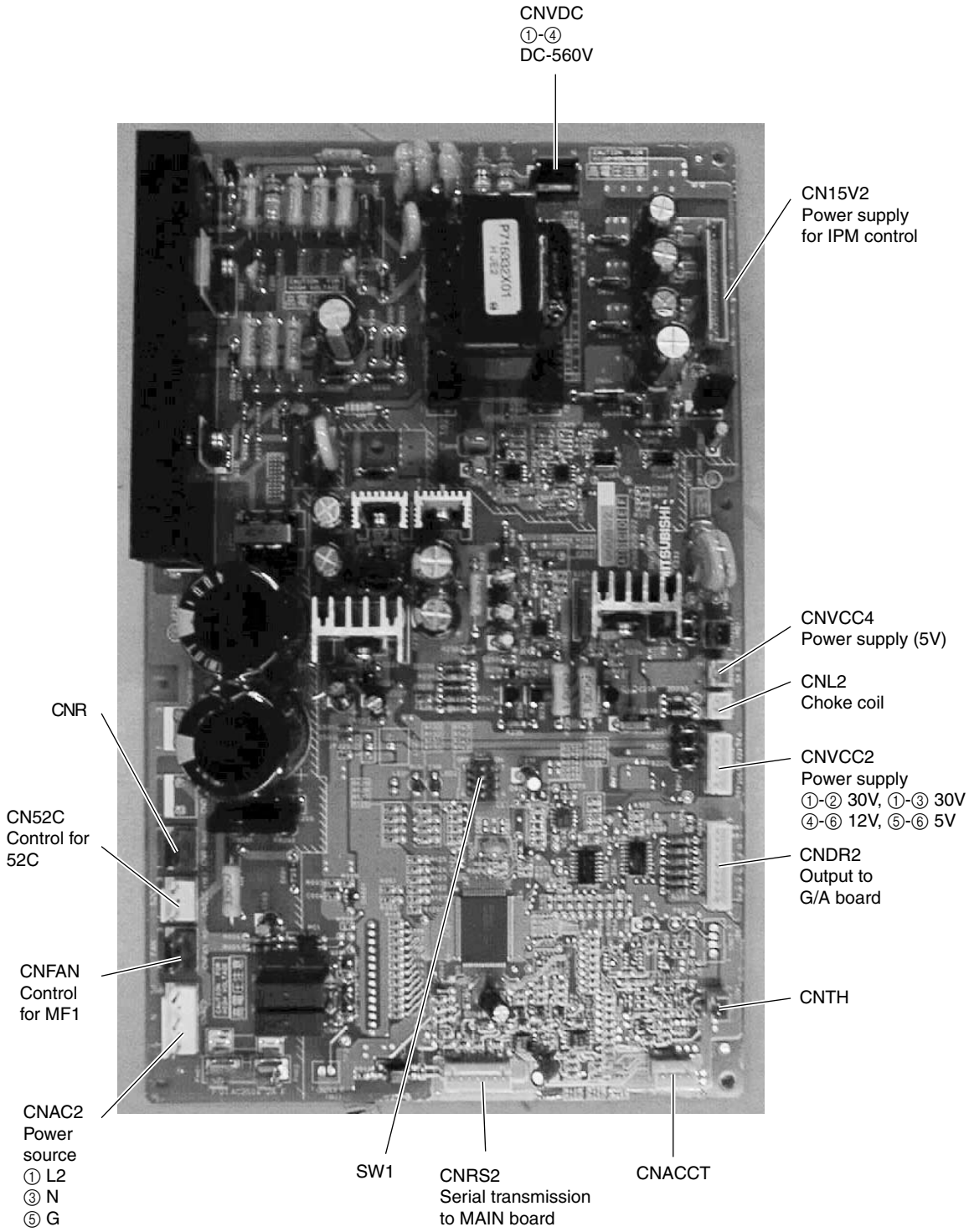


MAIN board

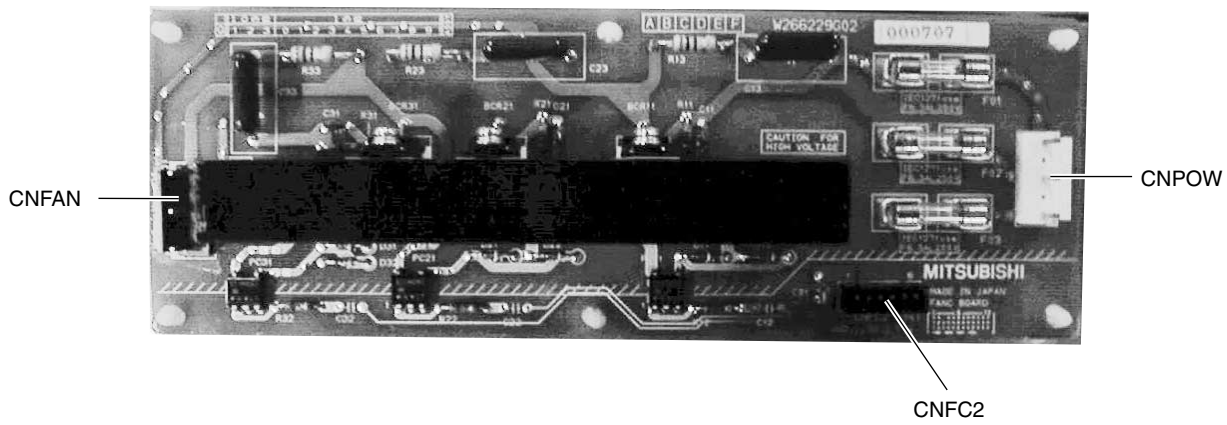
• PURY



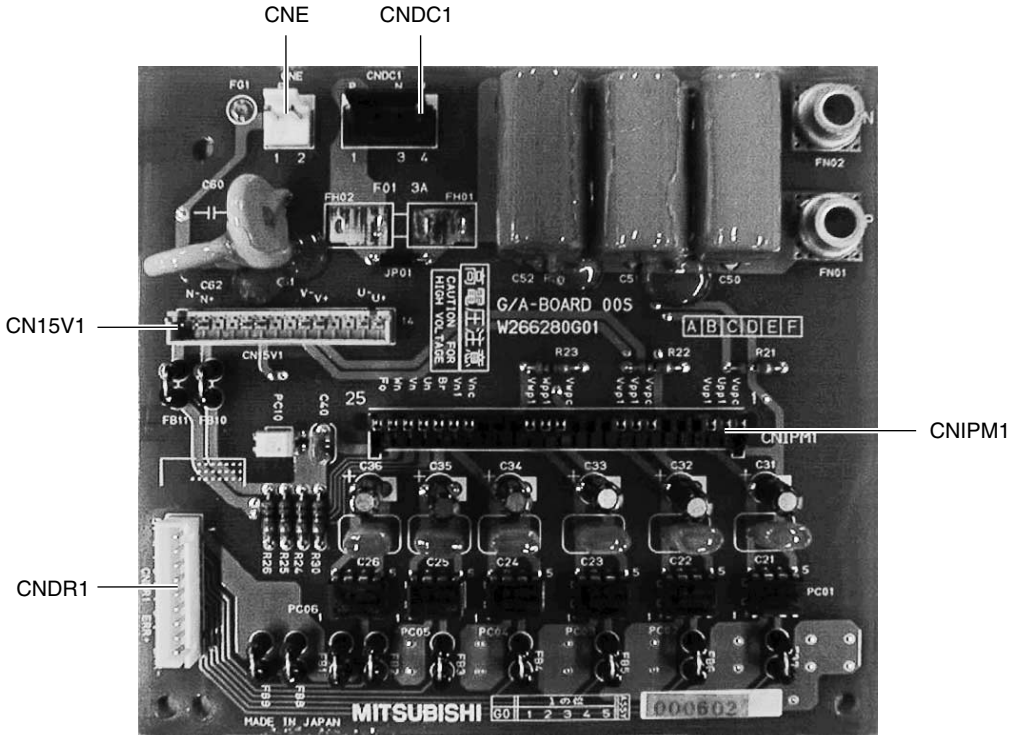
INV board


CNVDC
①-④
DC-560V
CN15V2
Power supply
for IPM control
CNVCC4
Power supply (5V)
CNL2
Choke coil
CNR
CNVCC2
Power supply
①-② 30V, ①-③ 30V
④-⑥ 12V, ⑤-⑥ 5V
CN52C
Control for
52C
CNDR2
Output to
G/A board
CNFAN
Control
for MF1
CNTH
CNAC2
Power
source
① L2
③ N
⑤ G
SW1
CNRS2
Serial transmission
to MAIN board
CNACCT

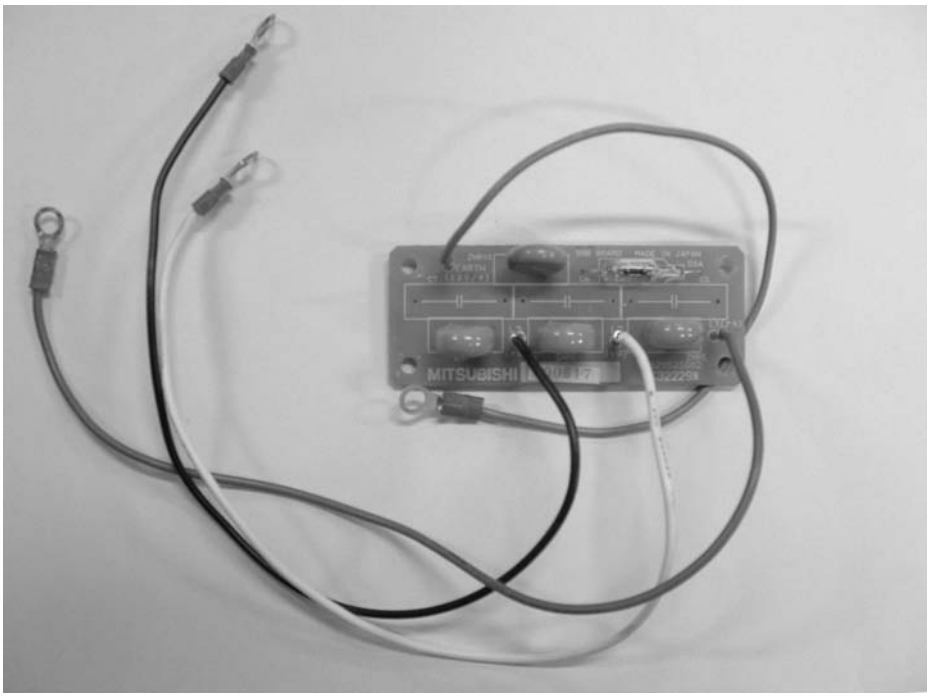
FANCON board



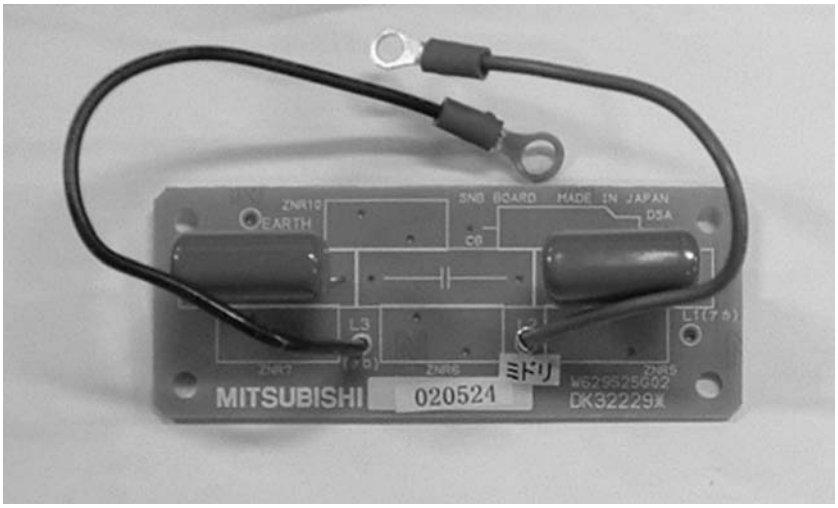
G/A board



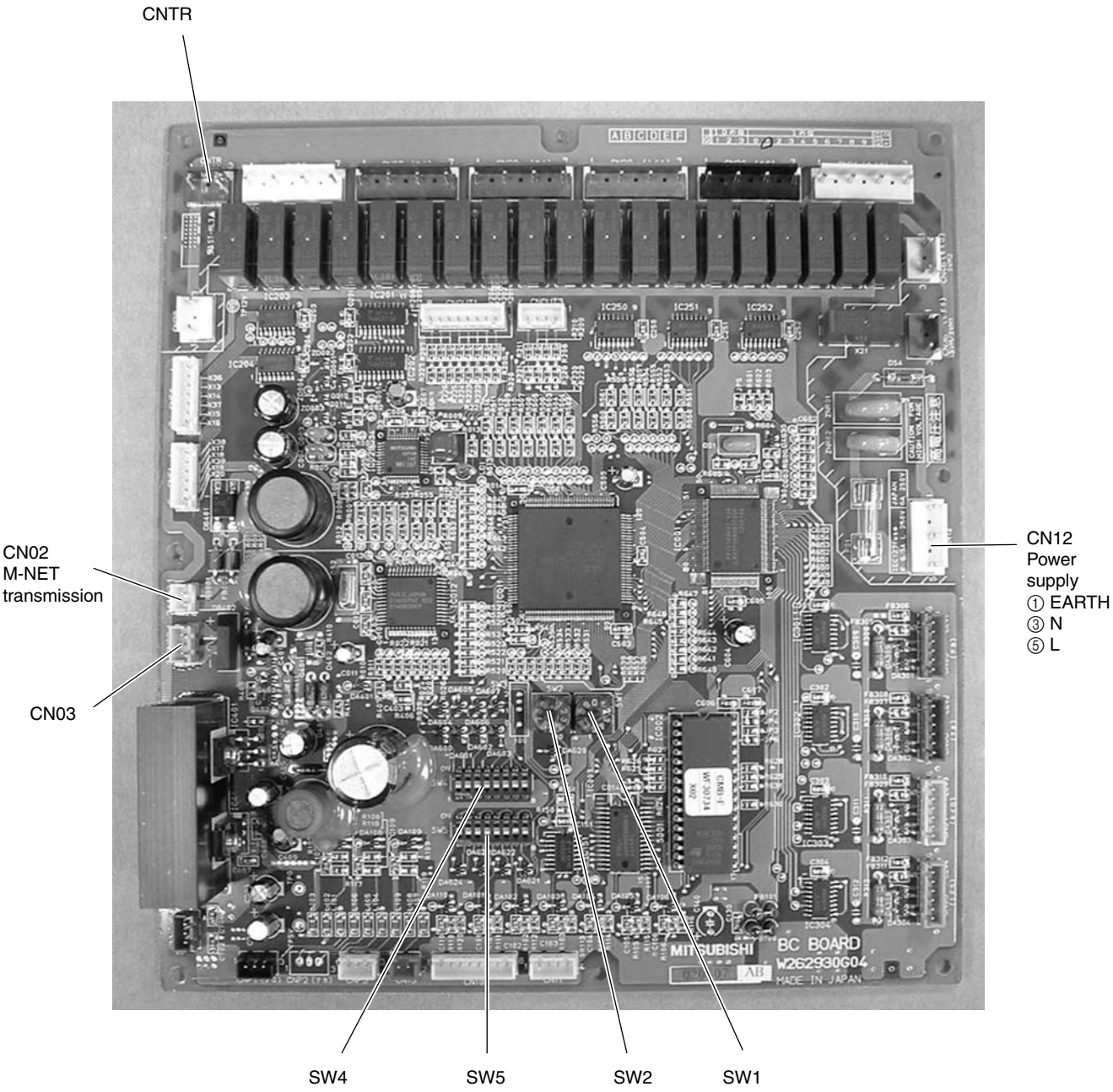
SNB board



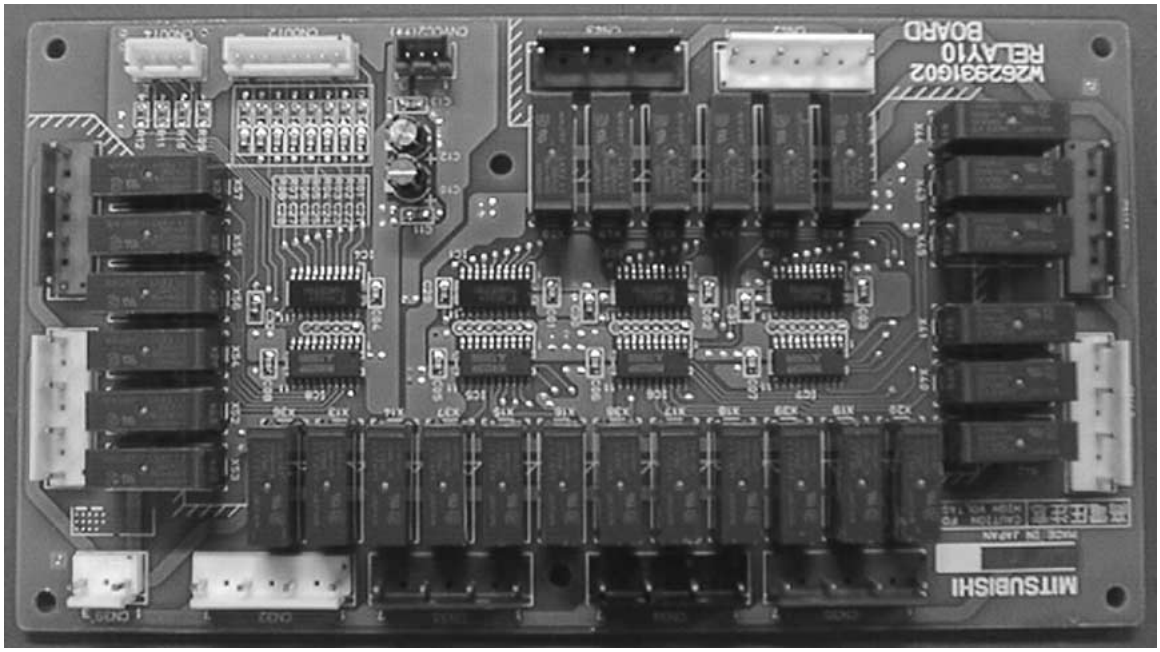
Y-C board



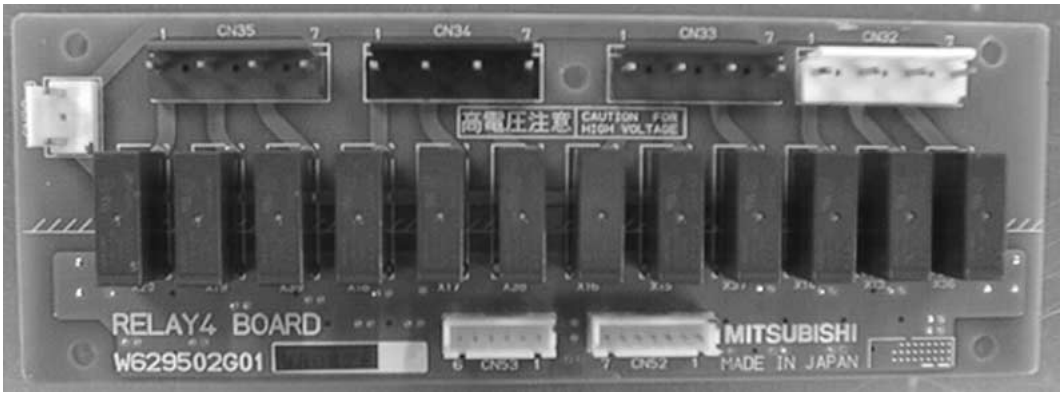
BC controller



RELAY 10 board



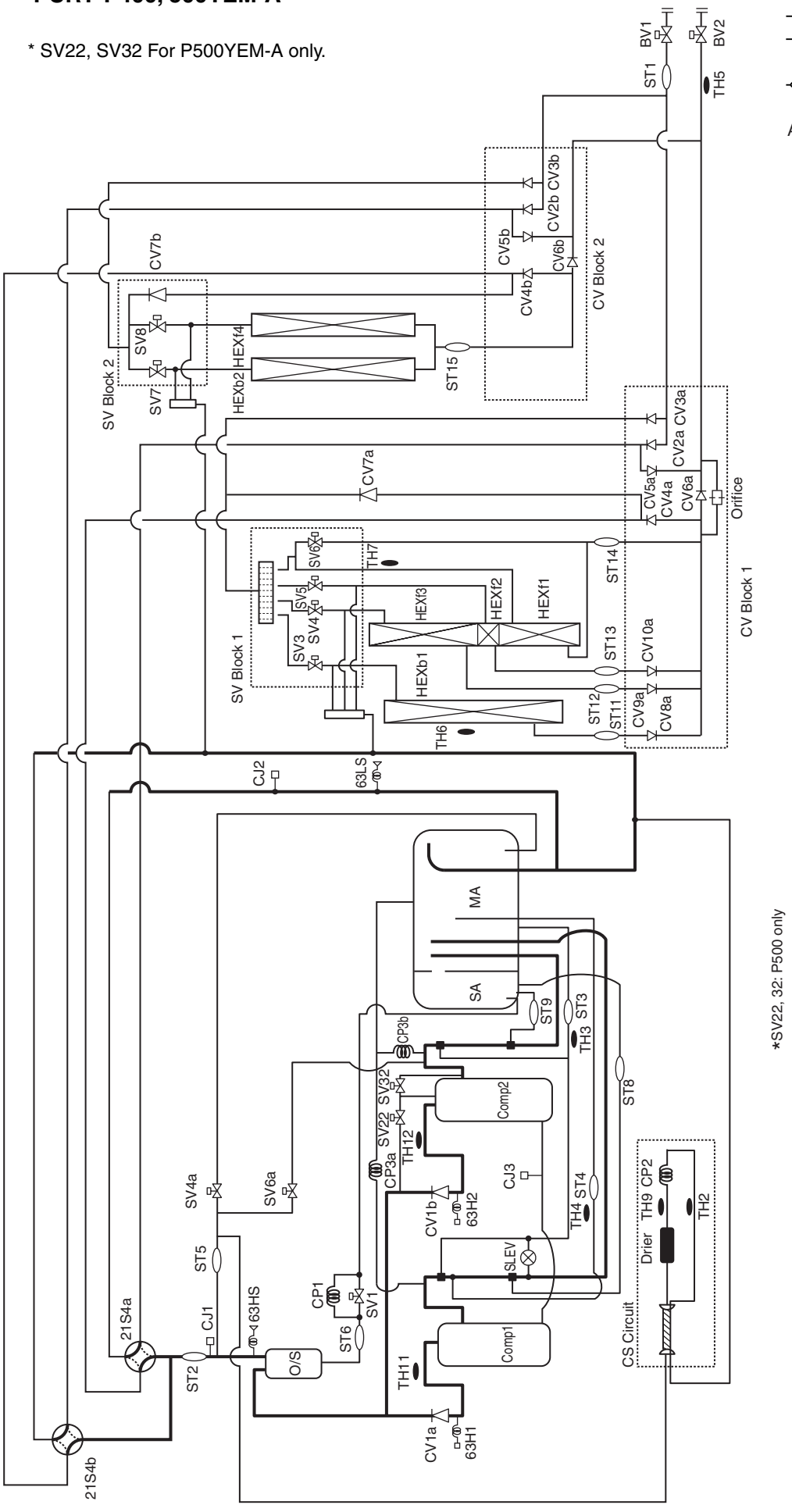
RELAY 4 board



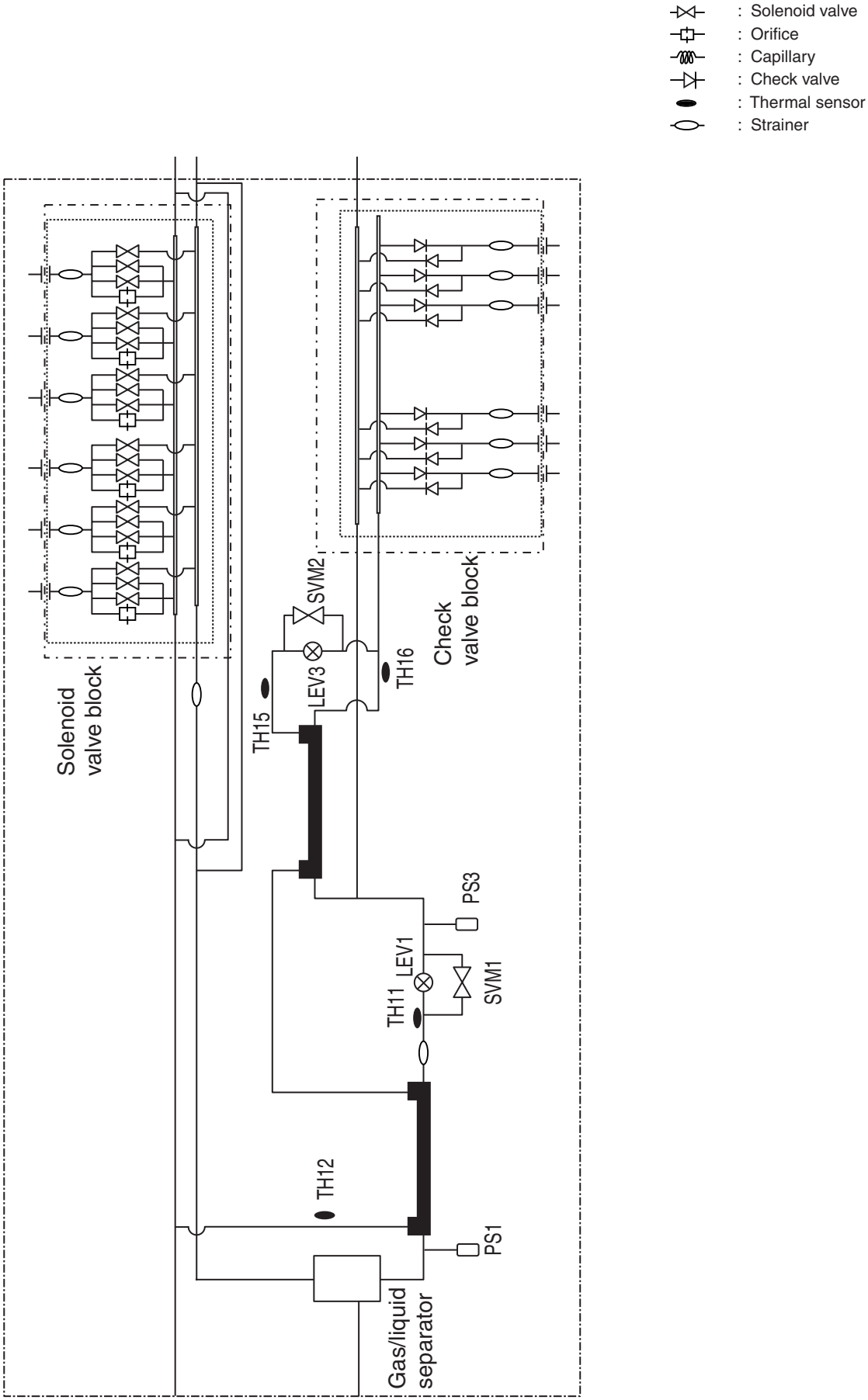
[2] Refrigerant Circuit Diagram and Thermal Sensor
PURY-P400, 500YEM-A

* SV22, SV32 For P500YEM-A only.

: Solenoid valve
: Orifice
: Capillary
: Check valve
: Thermal sensor
: Strainer
SP : Service port
ACC : Accumulator

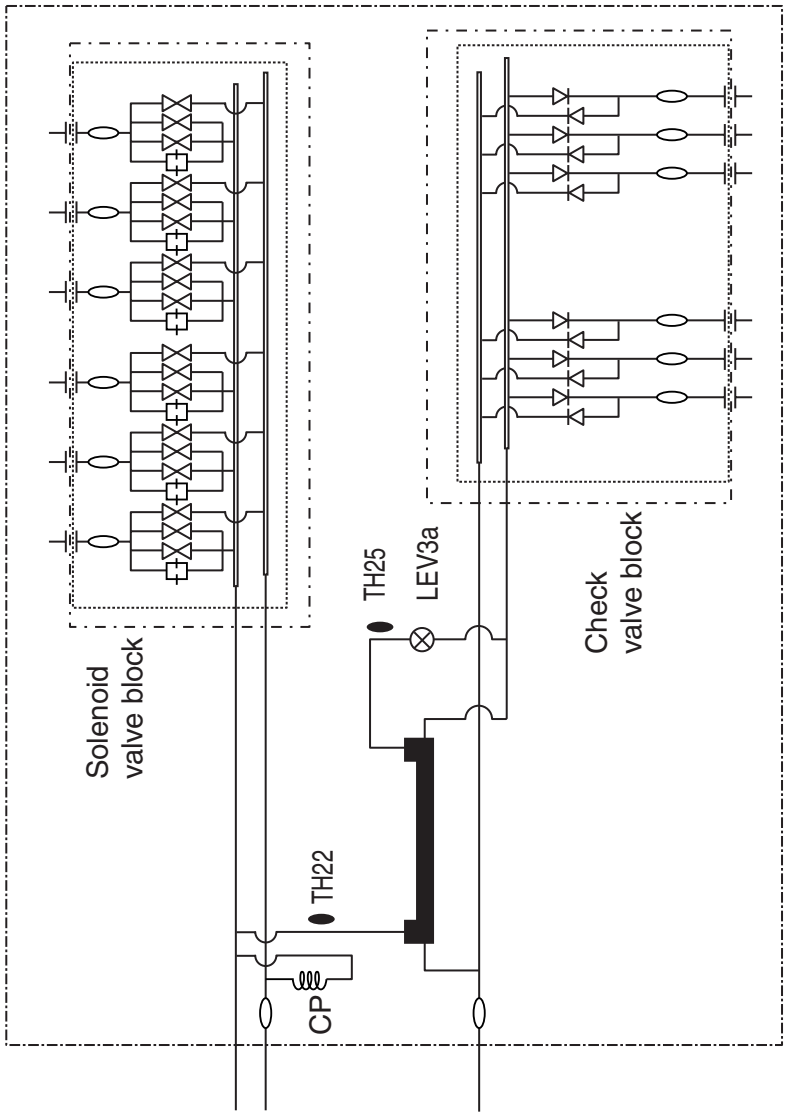


CMB-P108, 1010, 1013, 1016V-FA



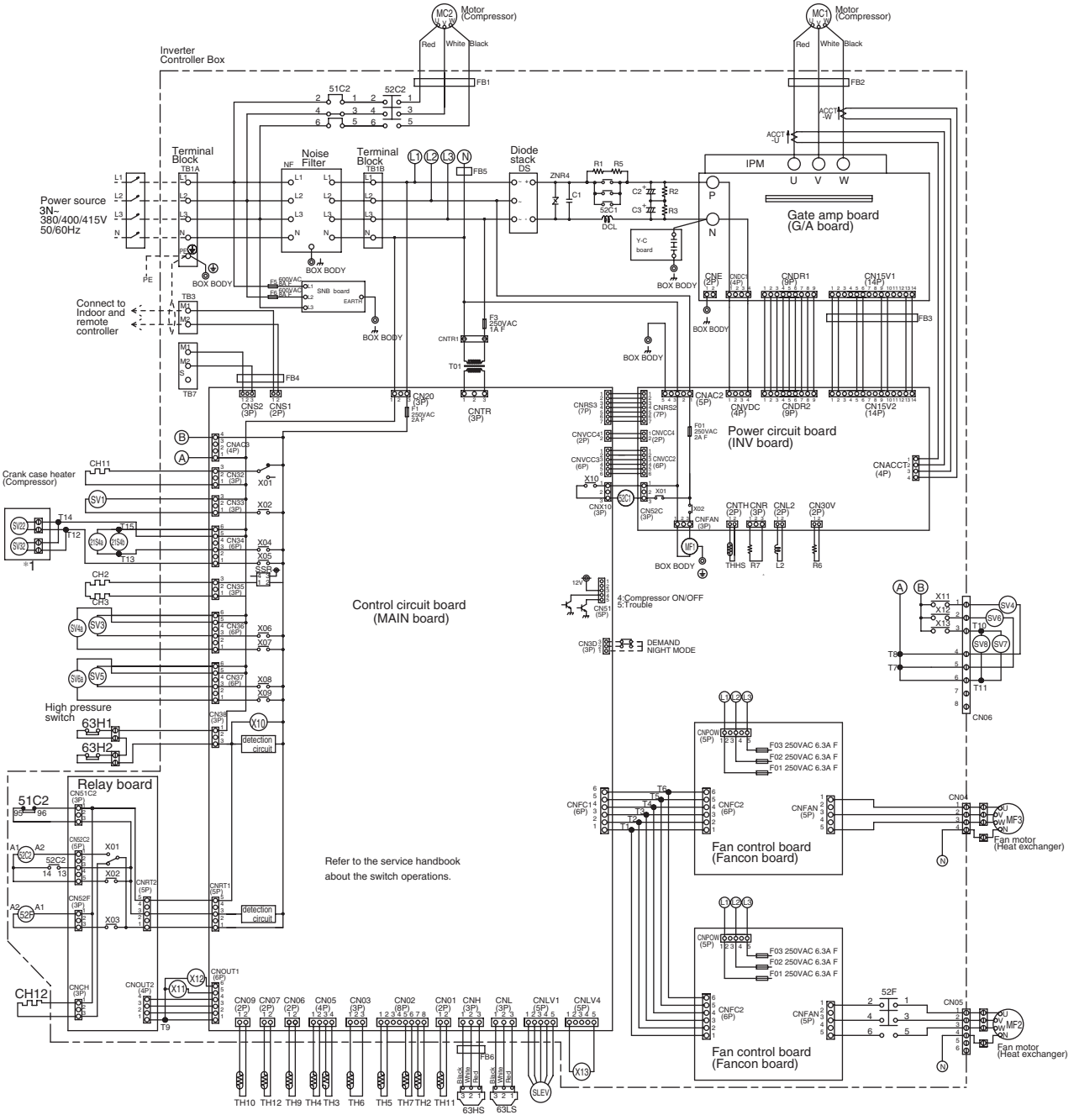
CMB-P108V-FB

: Solenoid valve
: Orifice
: Capillary
: Check valve
: Thermal sensor
: Strainer



[3] Electrical Wiring Diagram

PURY-P400·500



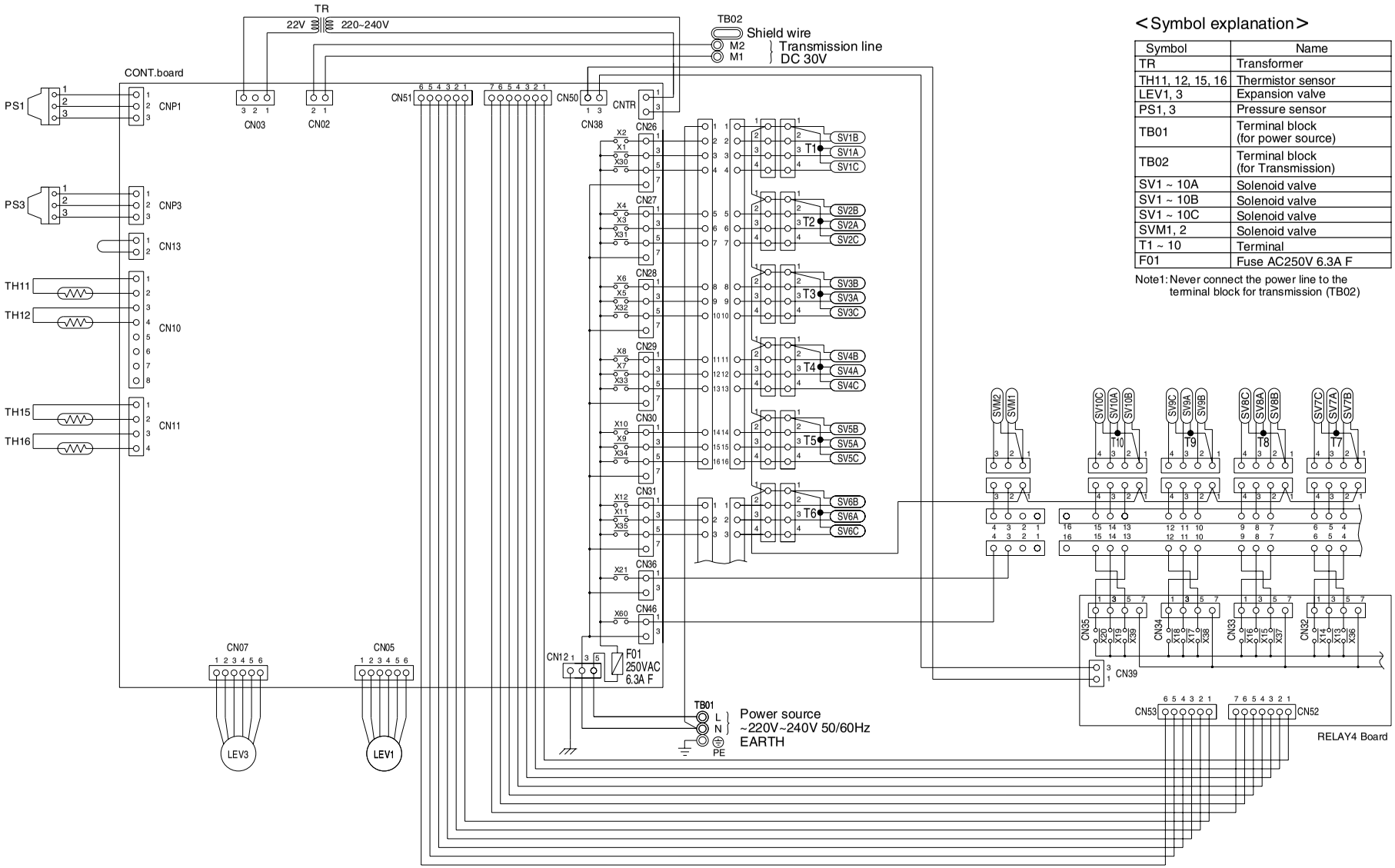
<Symbol explanation>

Symbol	Name	Symbol	Name
DCL	DC reactor (Power factor improvement)	IPM	Intelligent power module
		TH11,12	Thermistor: Discharge pipe temp. detect
ACCT-U,W	Current Sensor	TH2	Saturation evapo. temp. detect
ZNR4	Varistor	TH3	Accumurator liquid temp. detect: Lower
52C1	Magnetic contactor (Inverter main circuit)	TH4	Upper
		TH5	Pipe temp. detect(Hex outlet)
52C2	Magnetic contactor	TH6	OA temp. detect
51C2	Overload relay	TH7	Pipe temp.(Hex inlet)
52F	Magnetic contactor(Fan motor)	TH9	High pressure liquid temp.
MF1	Fan motor (Radiator panel)	TH10	Compressor shell temp.
21S4a,4b	4-way valve	THHS	Radiator panel temp. detect
SV1,22,32, 4a,6a	Solenoid valve	LD	Accumulator liquid level detect
		CH11,12	Crank case heater(Compressor)
SV3,4,5,6, 7,8	Solenoid valve (Heat exchanger capacity control)	CH2,3	Cord heater
		SSR	Solid state relay
SLEV	Electronic expansion valve(Oil return)	X1,2,4~13	Aux. relay
63HS	High pressure sensor	FB1~6	Ferrite core
63LS	Low pressure sensor	⏚	Earth terminal
63H1,2	High pressure switch		
L2	Choke coil(Transmission)	T1~15	Terminal

NOTE : Mark o indicates terminal bed, ▣ connector, ▣ board insertion connector

<Difference of appliance>

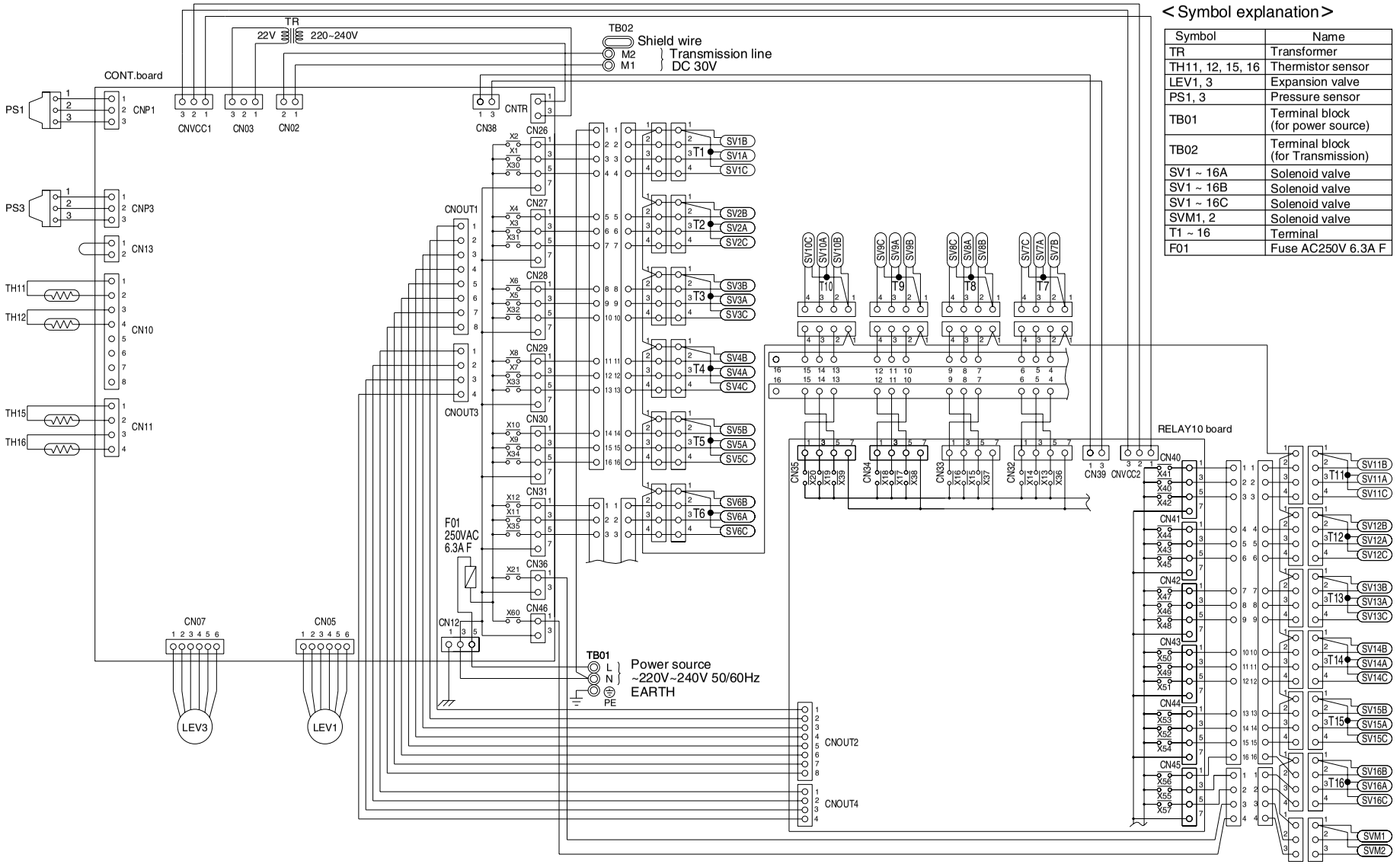
Appliance	Name
PURY-P400	"※1" are not existed
PURY-P500	All exists



<Symbol explanation>

Symbol	Name
TR	Transformer
TH11, 12, 15, 16	Thermistor sensor
LEV1, 3	Expansion valve
PS1, 3	Pressure sensor
TB01	Terminal block (for power source)
TB02	Terminal block (for Transmission)
SV1 ~ 10A	Solenoid valve
SV1 ~ 10B	Solenoid valve
SV1 ~ 10C	Solenoid valve
SVM1, 2	Solenoid valve
T1 ~ 10	Terminal
F01	Fuse AC250V 6.3A F

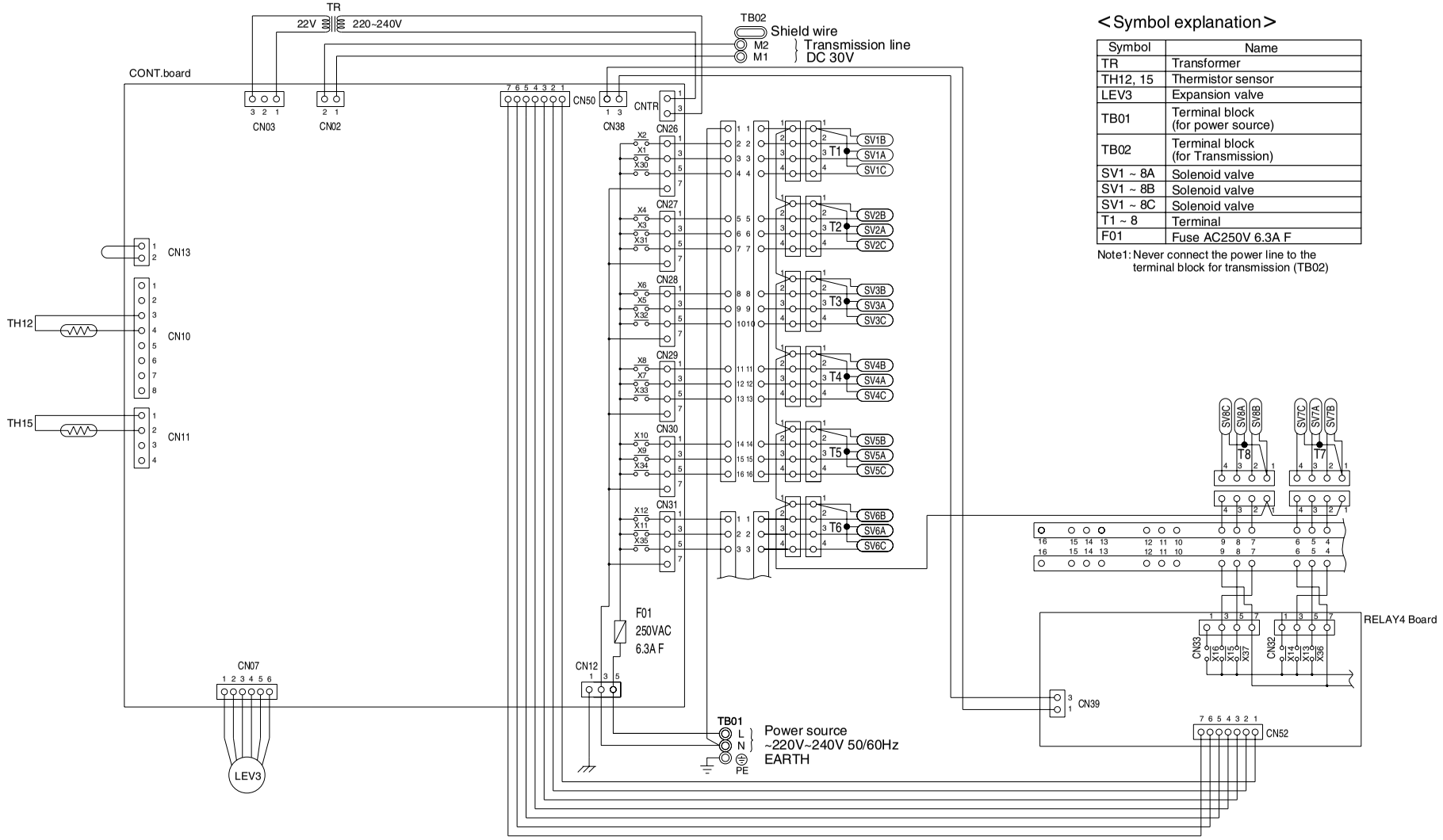
Note1: Never connect the power line to the terminal block for transmission (TB02)



< Symbol explanation >

Symbol	Name
TR	Transformer
TH11, 12, 15, 16	Thermistor sensor
LEV1, 3	Expansion valve
PS1, 3	Pressure sensor
TB01	Terminal block (for power source)
TB02	Terminal block (for Transmission)
SV1 ~ 16A	Solenoid valve
SV1 ~ 16B	Solenoid valve
SV1 ~ 16C	Solenoid valve
SVM1, 2	Solenoid valve
T1 ~ 16	Terminal
F01	Fuse AC250V 6.3A F

Note1: Never connect the power line to the terminal block for transmission (TB02)



<Symbol explanation>

Symbol	Name
TR	Transformer
TH12, 15	Thermistor sensor
LEV3	Expansion valve
TB01	Terminal block (for power source)
TB02	Terminal block (for Transmission)
SV1 ~ 8A	Solenoid valve
SV1 ~ 8B	Solenoid valve
SV1 ~ 8C	Solenoid valve
T1 ~ 8	Terminal
F01	Fuse AC250V 6.3A F

Note1: Never connect the power line to the terminal block for transmission (TB02)

[4] Standard Operation Data

① Cooling operation

Items \ Outdoor unit					P400					P500				
Condition	Ambient temp.	Indoor		DB/WB	27.0/19					27.0/19				
		Outdoor			35.0/24.0					35.0/24.0				
	Indoor unit	No. of units		Set	5					5				
		No. of units in operation			5					5				
		Model		-	100	100	100	50	50	125	125	125	100	25
	Piping	Main pipe		m	5					5				
		Branch pipe			10	10	10	10	10	10	10	10	10	10
		Total piping length			55					55				
	Indoor unit fan notch			-	Hi	Hi	Hi	Hi	Hi	Hi	Hi	Hi	Hi	Hi
	Refrigerant volume			kg	27.1					29.2				
Outdoor unit	Total electrical current			A	26.7/25.4/24.5					33.5/31.9/30.7				
	Voltage			V	380/400/415					380/400/415				
LEV opening	Indoor unit			Pulse	360	360	360	340	340	410	410	410	360	280
	BC controller (1, 3)				2000		300			2000		350		
	Oil return (SLEV)				200					344				
Pressure	High pressure/Low pressure (after O/S) (before MA)			MPa	2.11/0.43					2.11/0.42				
	BC controller	High/Intermediate			2.01/2.01					2.01/2.01				
Sectional temperature	Outdoor unit	Discharge (TH11/TH12)		°C	92/102					97/102				
		Heat exchanger outlet (TH5)			42									
		Accumulator	Inlet		4					5				
			Outlet		6					7				
		Suction (Comp) (No.1/No.2)			6/12					12/12				
		Low pressure saturation temperature (TH2)			1									
		Liquid level	Upper (TH4)		30									
			Lower (TH3)		1									
		Shell bottom (Comp No.1/No.2)			60/51					65/50				
		CS circuit (TH9)			16									
		Circulating refrigerant configuration (αOC)			0.23									
	Indoor unit	LEV inlet			26									
		Heat exchanger outlet			12									

② Heating operation

Items \ Outdoor unit				P400					P500				
Condition	Ambient temp.	Indoor	DB/WB	20.0/-					20.0/-				
		Outdoor		7.0/6.0					7.0/6.0				
	Indoor unit	No. of units	Set	5					5				
		No. of units in operation		5					5				
		Model	-	100	100	100	50	50	125	125	125	100	25
	Piping	Main pipe	m	5					5				
		Branch pipe		10	10	10	10	10	10	10	10	10	10
		Total piping length		55					55				
	Indoor unit fan notch		-	Hi	Hi	Hi	Hi	Hi	Hi	Hi	Hi	Hi	Hi
	Refrigerant volume		kg	27.1					29.2				
Outdoor unit	Total electrical current		A	24.6/23.4/22.5					30.8/29.2/28.2				
	Voltage		V	380/400/415					380/400/415				
LEV opening	Indoor unit		Pulse	600	600	600	450	450	650	650	650	600	350
	BC controller (1, 3)			60		1400			60		1600		
	Oil return (SLEV)			122									
Pressure	High pressure/Low pressure (after O/S) (before MA)		MPa	2.11/0.35					2.11/0.31				
	BC controller	High/Intermediate		2.01/1.72					2.01/1.72				
Sectional temperature	Outdoor unit	Discharge (TH11/TH12)	°C	88/93					88/93				
		Heat exchanger inlet (TH5)		– 3					– 1				
		Accumulator Inlet		– 6					– 7				
		Accumulator Outlet		– 6					– 7				
		Suction (Comp) (No.1/No.2)		– 5/2					– 5/0				
		Low pressure saturation temperature (TH2)		– 10									
		Liquid level Upper (TH4)		30									
		Liquid level Lower (TH3)		– 6									
		Shell bottom (Comp No.1/No.2)		43/45					40/33				
		CS circuit (TH9)		5									
		Circulating refrigerant configuration (αOC)		0.28									
	Indoor unit	LEV inlet		81									
		Heat exchanger outlet		34									

[5] Function of Dip SW and Rotary SW

(1) Outdoor unit

① Variable capacity unit

MAIN board

Switch		Function	Function According to Switch Operation		Switch Set Timing	
			When Off	When On	When Off	When On
SWU	1 ~ 2	Unit Address Setting	Set on 51 ~ 100 with the rotary switch.*2		Before power is turned on.	
SW1	1 ~ 8	For self-diagnosis/ operation monitoring	Refer to LED monitor display on the outdoor board.			
	9 ~ 10	-	-	-	-	
SW2	1	Centralized Control Switch	Centralized control not connected.	Centralized control connected.	Before power is turned on.	
	2	Deletion of connection information.	Storing of refrigeration system connection information.	Deletion of refrigeration system connection information.	Before power is turned on.	
	3	Deletion of error history.	Store IC•OC error history.	Erase IC·OC error history.	During normal operation with power on	
	4	• Adjustment of Refriger-ant Volume • Ignore liquid level errors	Ordinary control	• Refrigerant volume adjustment operation. • Ignore liquid level errors	During normal operation with power on	Invalid 2 hours after compressor starts.
	5	-	-	-	-	
	6	-	-	-	-	
	7	Forced defrosting	Ordinary control	Start forced defrosting.	During normal operation with power on.	10 minutes or more after compressor starts.
	8	-	-	-	-	
	9	-	-	-	-	
	10	-	-	-	-	
SW3	1	SW3-2 Function Valid/ Invalid	SW3-2 Function Invalid	SW3-2 Function Valid	During normal operation with power on.	
	2	Indoor Unit Test Operation	Stop all indoor units.	Test run all indoor units test run ON.	When SW3-1 is ON after power is turned on.	
	3	Defrosting starting temperature.	– 8°C	– 10°C	During normal operation with power on.	
	4	Defrosting ending temperature.	7°C	12°C	During normal operation with power on. (Except during defrost-ing)	
	5	Target low-pressure change	Ordinary control	2deg lower than normal	During normal operation with power on.	
	6	Pump Down Function	Ordinary control	Pump Down Operation	While the compressor is stopped.	
	7	Target high-pressure change	Ordinary control	High pressure / 1.5 ~ 2.5 K higher than normal	During normal operation with power on.	
	8	-	-	-	-	
	9	-	-	-	-	
	10	Models	Model 400	Model 500	When switching on the power.	
SW4	1	SW4-2 Function valid/ Invalid	SW4-2 Function invalid	SW4-2 Function valid	When switching on the power.	
	2	Configuration compensa-tion value	Changes as shown below by on → off change 0 %→3 %→6 %→9 %→12 %→ – 6 %→ – 3 %→0 %		When SW4-1 is ON	
	3	-	-	-	-	
	4	-	-	-	-	
	5	-	-	-	-	
	6	-	-	-	-	
	7	-	-	-	-	
	8	-	-	-	-	
	9	-	-	-	-	
	10	-	-	-	-	

Note 1: Factory setting is SWU 1 to 2 = 00, SW3 - 10 = set by model. All other switches are set to OFF.

Note 2: If the address is set from 01 to 50, it automatically becomes 100.

(2) Indoor unit

DIP SW1, 3

Switch		SW name	Operation by SW		Switch set timing		Remarks
			OFF	ON	OFF	ON	
SW1	1	Room temp. sensor position	Indoor unit inlet	Built in remote controller	At unit stopping (at remote controller OFF)		
	2	Clogged filter detect.	None	Provided			
	3	Filter duration	100h	2500h			
	4	OA intake	Ineffective	Effective			Always ineffective for PKFY-P.VAM
	5	Remote display select.	Fan output display	Thermo. ON signal display			
	6	Humidifier control	At stationary heating	Always in heating mode			
	7	Heating thermo. OFF airflow	Very low speed	Low speed			
	8	Heating thermo. OFF airflow	SW1-7 setting	Set airflow			
	9	Power failure automatic return	Ineffective	Effective			
	10	Power source start/stop	Ineffective	Effective			
SW3	1	Model selection	Heat pump	Cool.only			
	2	Louver (Cooling capacity saving for PKFY-P. VAM, effective/ineffective)	None	Provided			
	3	Vane	None	Provided			
	4	Vane swing function	None	Provided			Not provided for PKFY-P.VAM Provided for PLFY-P.VGM (ON) setting
	5	Vane horizontal angle	1st setting	2nd setting			
	6	Vane angle set for cooling	Down blow B, C	Horizontal			Always down blow B,C for PKFY-P.VAM Horizontal (ON) setting for PLFY-P. VLMD-A
		Vane first angle	Effective	Ineffective			PLFY-VLMD-B only
	7	–	–	–			
	8	Heating 4deg up	Effective	Ineffective			Ineffective (ON) setting for floor standing
	9	–	–	–			
	10	–	–	–			

Note 1: The shaded part ▭ indicates the setting at factory shipment. (For the SW not being shaded, refer to the table below.)

2: When both SW1-7 and SW1-8 are set to ON, the fan stops at the heating thermostat of OFF.

Switch \ Model		PLFY-P			PEFY-P				PDFY-P	PFFY-P	PCFY-P	PKFY-P		PMFY-P
		VAM-A(2)	VLMD-B	VKM-A	VML-A	VMH-A	20~80VMM-A	100~140VMM-A	VM-A	VLRM-A, VLEM-A	VGM-A	VAM-A	VGM-A	VBM-A
SW1	3	OFF	ON		OFF	ON	OFF		ON	OFF	ON	OFF		OFF
	6	OFF	ON								OFF			OFF
	7	OFF			ON		OFF	ON	OFF					OFF
SW3	3	ON			OFF						ON			ON
	4	ON	ON	ON	OFF						ON	OFF	ON	ON
	6	OFF	ON		OFF									OFF
	8	OFF								ON	OFF			OFF

Note 3: Changes to SW1, 2, 3, and 4 are only registered/effective when the remote controller is off. Resetting of the power sourse is not required.

Setting of DIP SW2

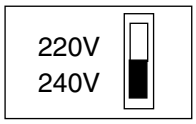
Model	P20	P25	P32	P40	P50	P63
Capacity (model name) code	4	5	6	8	10	13
SW2 setting						

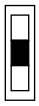
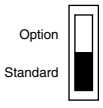
Model	P71	P80	P100	P125	P140	P200	P250
Capacity (model name) code	14	16	20	25	28	40	50
SW2 setting							

Setting of DIP SW4

Model	Circuit board used	SW4				
		1	2	3	4	5
PMFY-P-VBM-A	Phase control	ON	OFF	ON	OFF	–
PLFY-P125VLMD-B		OFF	ON	OFF	ON	OFF
PDFY-P20 ~ 80VM-A		ON	OFF	ON	OFF	–
PLFY-P40 ~ 63VKM-A		OFF	OFF	OFF	ON	–
PLFY-P80 ~ 125VAM-A(2)		ON	OFF	OFF	ON	–
PCFY-P-VGM-A		OFF	ON	OFF	ON	–
PKFY-P-VGM-A		OFF	OFF	ON	ON	–
PKFY-P-VAM-A		–	–	–	–	–
PEFY-P20 ~ 80VMM-A		ON	ON	OFF	OFF	–
PLFY-P20~100VLMD-B		OFF	ON	OFF	ON	OFF
PFFY-P-VLEM-A, P-VLRM-A	Relay selection	OFF	OFF	OFF	–	–
PEFY-P20 ~ 32VML-A		ON	ON	ON	–	–
PEFY-P40 ~ 140VMH-A		OFF	OFF	OFF	–	–
PEHY-P200·250VMH-A		ON	OFF	OFF	–	–
PDFY-P100·125VM-A		OFF	OFF	ON	–	–
PEFY-P100 ~ 140VMM-A		ON	ON	ON	OFF	–

Setting of DIP SW5



Switch	Function	Operation by switch	Switch set timing
SWA	Ceiling height setting	(PLFY-P-VKM-A) (PCFY-P-VGM-A)  *The ceiling height setting is changed by SWB setting.  Ceiling height: 3 → 3.5 m; 2 → 2.8 m; 1 → 2.3 m	After powering
SWA	External static pressure setting	(PDFY-P20 ~ 80VM-A, PEFY-P20 ~ 80VMM-A)  100Pa 50Pa 30Pa *For other models, change the setting of static pressure by replacing the connector.	After powering
SWA	For options	(PLFY-P125VLMD-B)  *As this switch is used by interlocking with SWC, refer to the item of SWC for detail.	After powering
SWB	Setting of air outlet opening	(PLFY-P-VKM-A)  SWA \ SWB: 2-way: 1 = 3.5 m, 2 = 3.8 m, 3 = 3.8 m; 3-way: 1 = 3.0 m, 2 = 3.3 m, 3 = 3.5 m; 4-way: 1 = 2.7 m, 2 = 3.0 m, 3 = 3.5 m	After powering
SWC	Airflow control	(PLFY-P-VKM-A, PCFY-P-VGM-A, PKFY-P-VGM-A, PDFY-P-VM-A)  *Set to the option to install the high-efficiency filter	After powering

3 TEST RUN

[1] Before Test Run

(1) Check points before test run

1	Neither refrigerant leak nor loose power source/ transmission lines should be found.
2	Confirm that the resistance between the power source terminal block and the ground exceeds 2MΩ by measuring it with a DC 500 V megger. Do not run if it is lower than 2MΩ. Note: Never apply a megger to the main board as it will damage the main board.
3	Confirm that the ball valves on gas, liquid, and oil balance sides are fully open. Note: Be sure to close the cap.
4	Be sure that the crankcase heater has been powered by turning the main power source on at least 12 hours before starting the test run. The shorter powering time causes compressor trouble.
5	If any of the power supply wires (L1, L2, L3, N, ⏚.) are incorrectly connected, it is possible to damage the unit. Please exercise caution.
6	A transmission booster (RP) is required when the number of connected indoor unit models in a cooling system exceeds the number of models specified in the chart below. Note: The maximum number of units that can be controlled is determined by the model of the indoor unit, the type of remote controller, and their capabilities.

Remote controller type / (*1) Capability of the connected indoor units / Number of connected indoor units that can be connected without a RP.	Remote controller PAR-F 25MA	
	Prior to Ver. E	After Ver. F
200 or lower	16 (32)	20 (40)
200 or higher	16 (32)	16 (32)

The number of indoor units and the total number of remote controllers is displayed in the parenthesis.

(*1) If even one unit that is higher than 200 exists in the cooling system, the maximum capacity will be “200 or higher”.

* Please refer to the installation manual for more details.
* Before turning the power of the outdoor unit on, first turn on the transmission booster. (If the outdoor unit are mistakenly turned on first, turn on the transmission booster, and then reset the outdoor unit power.)

(2) Caution at inverter check

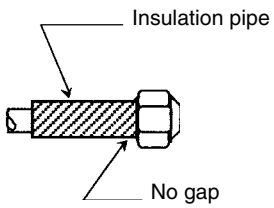
Because the inverter power portion of the electrical part box in the outdoor unit have many parts with high voltage, be sure to follow the instructions shown below to avoid the risk of electric shock.

1	During energizing power source, never touch inverter power portion because high voltage (approx. 580 V) is applied to inverter power portion.	
2	At the time of checking	
	▽1	Shut off the main power, and check the inverter with a tester.
	▽2	Wait for 10 minutes after shutting off the main power source.
	▽3	Open the main board mounting panel, and check whether the voltage at both ends of electrolytic capacitor is 20V or less (if over wait until it is less than 20V)

(3) Check points for test run when mounting options

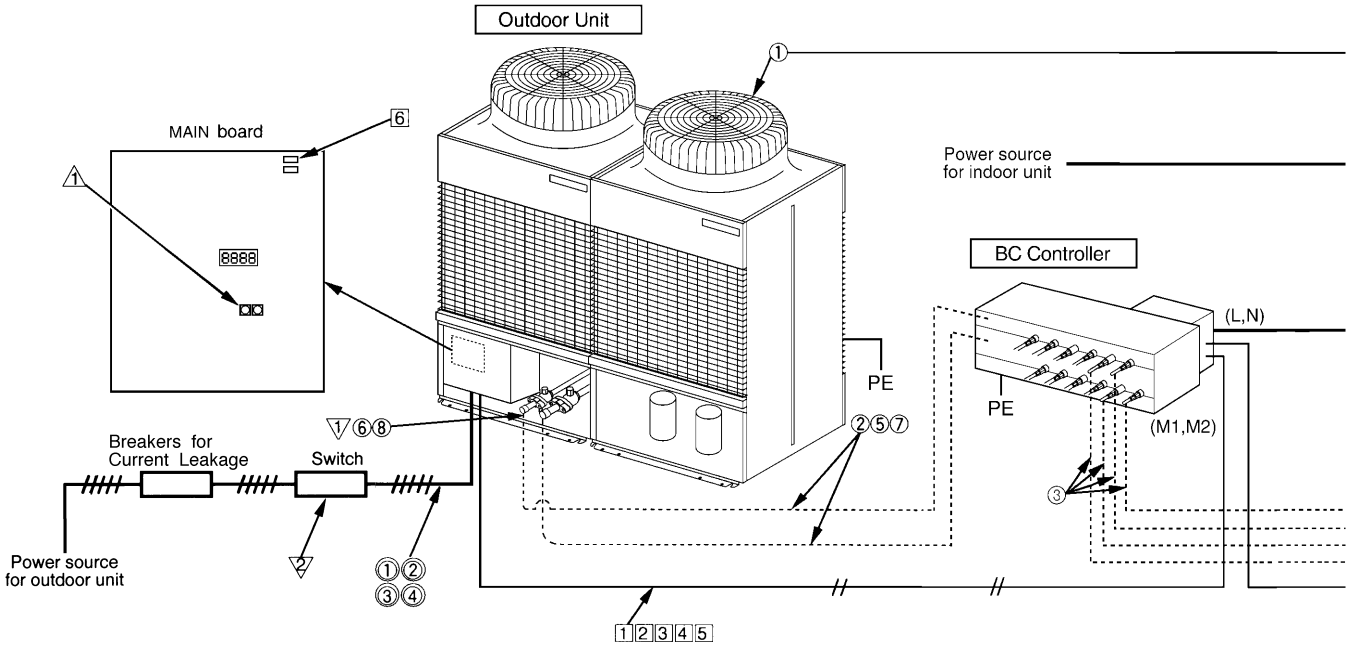
Built-in optional parts	Content of test run	Check point	Result
Mounting the drain water lift-up mechanism	▽1 Release connector of pump circuit, and check error detection by pouring water into drain pan water inlet.	Local remote controller displays code No. "2503," and the mechanism stops.	
		No overflow from drain pan.	
	▽2 Next, connect the connector of the circuit.	Drain water is discharged by the drain pump.	
	▽3 Check pump operations and drainage status in cooling (test run) mode.	Sound of pump operations is heard, and drain water comes out.	
Mounting the permeable film humidifier	Check humidifier operations and water supply status in heating (test run) mode.	No water leak from connecting portions of each water piping.	
		Water is supplied to water supply tank, and float switch is operating.	

(4) Notes on mounting drain water lifting-up mechanism

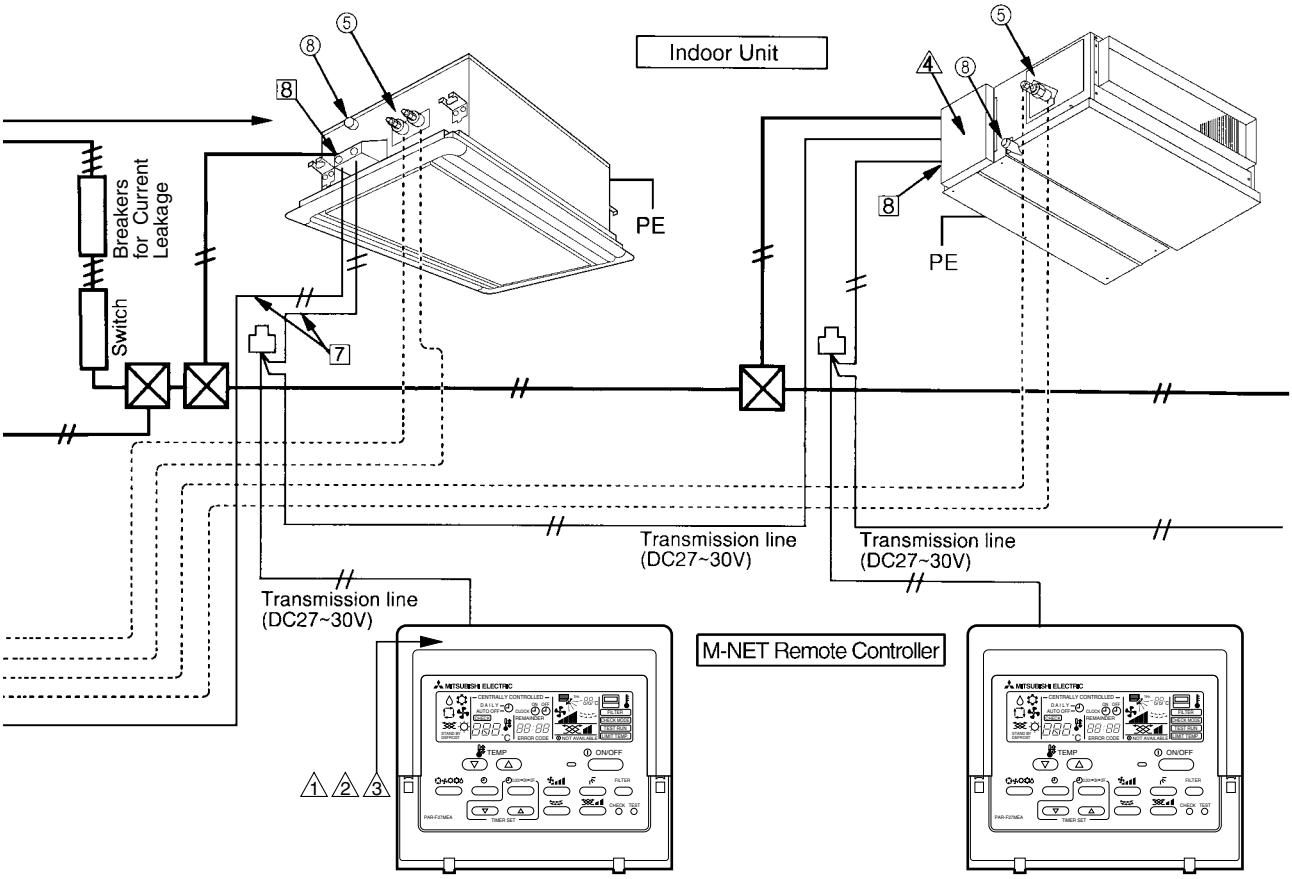
Work	Content of test run	Check point	Result
Disassembling and assembling the drain water lift-up mechanism	▽1 Lead wire from control box not damaged.		
	▽2 Rubber cap properly inserted to drain water outlet of drain pan?		
	▽3 Insulation pipe of gas and liquid pipes should be as shown in the right figure.		
	▽4 Hook the drain pan on the cut projection of the mechanism.		
	▽5 Drain pan on the cut projection of the mechanism?		
Mounting the float switch	Float switch installed without contacting the drain pan?	▽1 Float switch moves smoothly.	
		▽2 Float switch is mounted on mounting board straight without deformation.	
		▽3 Float switch does not contact copper pipe.	
Electric wiring	▽1 Confirm that wiring is correct.	Wiring procedure is exactly followed.	
	▽2 Connectors connected securely and tightly?	Connector portion is tightly hooked.	
	▽3 No tension on lead wire when sliding control box?		

(5) Check points for system structure

Check points from installation work to test run.



Classification	Portion	Check item	Problem
Installation and piping	①	Instruction for selecting combination of outdoor unit and indoor unit followed? (Maximum number of indoor units that can be connected, connecting model name, and total capacity.) Refer to data book or installation manual.	The unit does not operate.
	②	Are the specifications for refrigerant piping length met?	No cool air (at cooling). No heat (at heating).
	③	Piping size connections of branch piping correct?	
	④	Branch pipe properly selected?	
	⑤	Refrigerant piping diameter correct?	
	⑥	Refrigerant leak generated at connection?	No cool air, no heat, error stop.
	⑦	Insulation work for piping properly done?	Condensation drip in piping.
	⑧	Specified amount of refrigerant replenished?	No cool air, no heat, error stop.
	⑨	Pitch and insulation work for drain piping properly done?	Water leak, condensation drip in drain piping.
Power source wiring	⓵	Specified switch capacity and wiring diameter of main power source used?	Error stop. The unit does not operate.
	⓶	Proper grounding work done on outdoor unit?	Electric shock.
	⓷	The phases of the L line (L1, L2, L3) correct?	Error stop. The unit does not operate.
	⓸	L line and N line connected correctly?	Some electric parts may be damaged.



Classification	Portion	Check item	Problem
Transmission line	1	Limitation of transmission line length followed?	Erroneous operation, error stop.
	2	Transmission wire with diameter of 1.25mm^2 or larger used. (Remote controller 10m or less 0.75mm^2)	Erroneous operation, error stop.
	3	2-core cable used for transmission line?	Error stop in case multiple-core cable is used.
	4	Transmission line apart from power source line by 5cm or more?	Erroneous operation, error stop.
	5	One refrigerant system per transmission line?	The unit does not operate.
	6	The short circuit connector is changed form CN41 to CN40 on the MAIN board when the system is centralized control? (Just one outdoor unit. Not all outdoor units.)	The unit does not operate.
	7	• No connection trouble in transmission line?	Error stop or the unit does not operate.
	8	Connection of wrong remote controller line terminals? • MA Remote controller : TB15 • M-NET Remote controller : TB5	The system will not be able to finish the initial mode.
System set	△1	Address setting properly done? (M-NET Remote controller, indoor unit, BC controller, and outdoor unit.)	Error stop or the unit does not operate.
	△2	Setting of address No. done when shutting off power source?	Can not be properly set with power source turned on.
	△3	Address numbers not duplicated?	The unit does not operate.
	△4	Turned on SW3-8 on indoor unit circuit board when mounting room thermistor sensor?	Set temperature not obtained at heating operations (Thermostat stop is difficult)
Before starting	▽1	Refrigerant piping ball valve (Liquid pressure pipe, gas pressure pipe) opened?	Error stop.
	▽2	Turn on power source 12 hours before starting operations?	Error stop, compressor trouble.

[2] Test Run Method

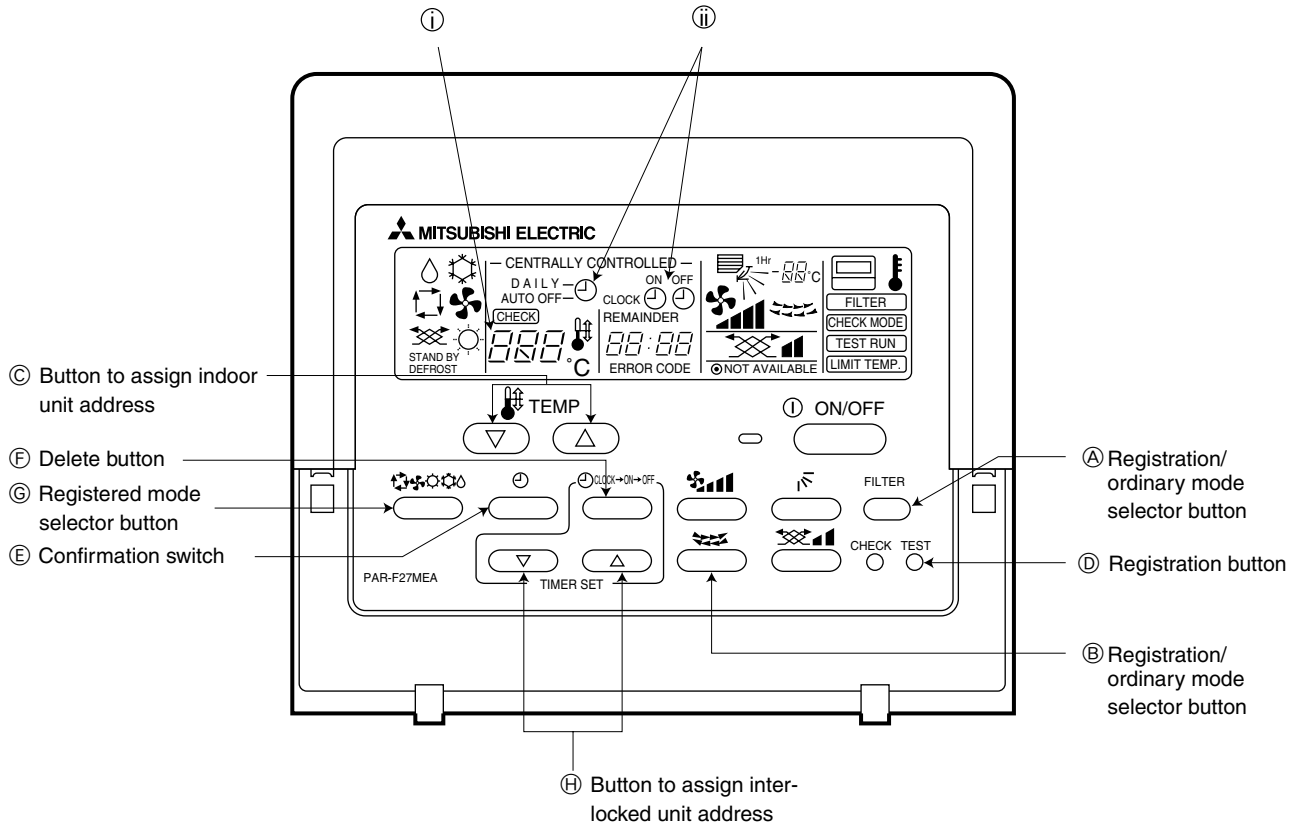
	Operation procedure
①	Turn on universal power supply at least 12 hours before starting → Displays “HO” on display panel for about two minutes
②	Press TEST RUN button twice → Displays “TEST RUN” on display panel
③	Press selection button → Make sure that air is blowing out
④	Press select button to change from cooling to heating operation, and vice versa → Make sure that warm or cold air is blowing out
⑤	Press adjust button → Make sure that air flow changes accordingly.
⑥	Press or button to change wind → Make sure that horizontal or downward air flow is adjustable.
⑦	Make sure that indoor unit fans operate normally
⑧	Make sure that interlocking devices such as ventilator operate normally if they exist in the system.
⑨	Press ON/OFF button to cancel test run → Stop operation

Note 1: If check code is displayed on remote controller or remote controller does not operate normally.
2: Test run automatically stops operating after two hours by activation of timer set to two hours.
3: During test run, the remaining time is displayed on the time display.
4: During test run, temperature of liquid pipe in indoor unit is displayed on the remote controller room temperature display.
5: When pressing adjust button, depending on the model, “NOT AVAILABLE” may be displayed on remote controller. However, it is not a malfunction.
6: When pressing or button, depending on the model, “NOT AVAILABLE” may be displayed on remote controller. However, it is not a malfunction.

4 GROUPING REGISTRATION OF INDOOR UNITS WITH M-NET REMOTE CONTROLLER

(1) Switch function

- The method used to register with a remote controller is shown below:



Name	Symbol of button	Symbols	Description
Registration/ordinary mode selection button	Ⓐ + Ⓑ	FILTER +	This button is used to switch between ordinary mode and registered mode (Ordinary mode is selected for the operation of indoor units) * To select the registered mode, press and hold FILTER + buttons for 2 seconds at stoppage. [Note] The registered mode cannot be obtained for a while after powering. Pressing the FILTER + buttons displays "CENTRALLY CONTROLLED".
Button to assign indoor unit address	Ⓒ	▲ ▼ of TEMP	This button assigns the unit address to "INDOOR UNIT ADDRESS NO."
Registration button	Ⓓ	TEST RUN	This button is used for group/interlocked registration.
Confirmation button	Ⓔ		This button is used to retrieve/identify the content of groups, interlock (connection information), and registration.
Delete button	Ⓕ	CLOCK → ON → OFF	This button is used to delete the content of groups, interlock (connection information), and registrtion.
Registered mode selector button	Ⓖ		This button selects indoor units to register as groups (group setting mode) or interlocked (interlocked setting mode). * The unit address is shown at one spot ⓘ for the group setting mode while at two spots ⓘⓘ for the interlocked setting mode.
Button to assign interlocked unit address	Ⓗ	▲ ▼ of TIMER SET	This button assigns the unit address of "OA UNIT ADDRESS NO."

(2) Nomenclature display of unit

- At the group registration and the confirmation/deletion of registration/connection information, the type (attribute) of the unit is displayed with two English characters.

Display	Type (Attribute) of unit/controller
IC	Indoor unit connectable to remote controller
OC	Outdoor unit
BC	BC controller (Master)
UC	BC controller (Slave)
RC	Local remote controller
SC	System controller (MJ)
LC	Lossnay Controller

[Description of registration/deletion/retrieval]

- Operations to be performed by the remote controller are given below. Please see the related paragraphs for details.

1 Group registration of indoor unit
- The group of the indoor units and operating remote controller is formed/registered.
- It is used for the group operation of indoor units.

2 Retrieval/identification of group registration information of indoor units
- The address of the registered indoor units in a group is retrieved (identified).

3 Retrieval/identification of registration information
- The connection information of any unit (indoor/outdoor units, remote controller or the like) is retrieved (identified).

4 Deletion of group registration information of indoor units
- The registration of the indoor units under group registration is released (deleted).

5 Deletion of the address not existing
- This operation is to be conducted when “6607” error (No ACK error) is displayed on the remote controller caused by a setting error during test run, or previous memory remaining after an alteration/modification of the group composition.

⚠ **Caution:**
When MELANS (G50-A for example) is connected to the system, do not conduct a group/pair registration using the remote controller. The group/pair registration should be conducted with MELANS. (For details, refer to the instruction prepared for MELANS)

(3) Group registration of indoor unit

1) Registration method

- Group registration of indoor units 1

  The indoor units to be controlled by a remote controller are registered on the remote controller.

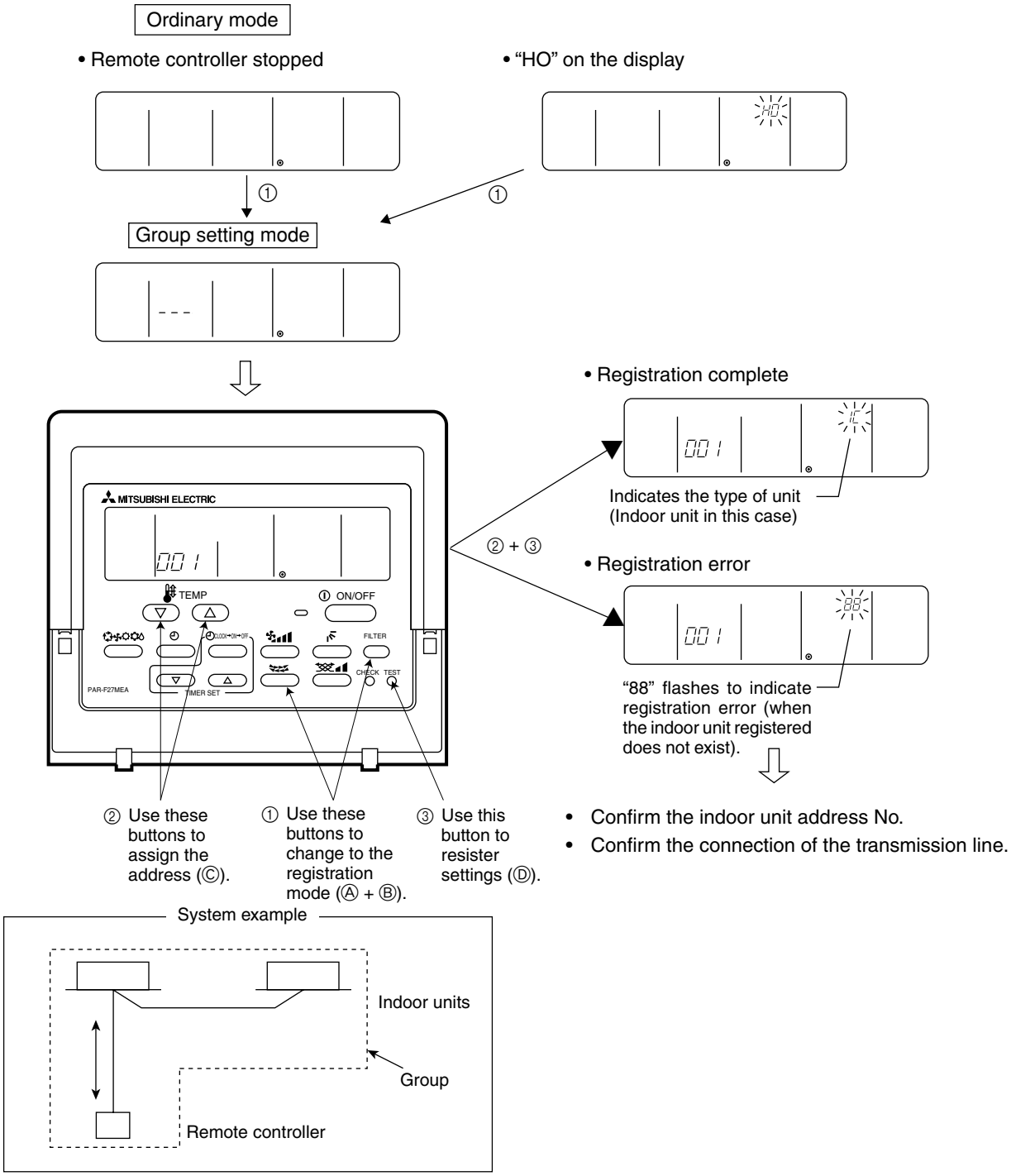
[Registration procedure]

① With the remote controller under stopping mode or with "HO" displayed on the LED, press and hold the (FILTER) + buttons (Ⓐ + Ⓑ) simultaneously for 2 seconds to switch to the registration mode. (See the figure below.)

② Assign the indoor unit address to "INDOOR UNIT ADDRESS NO." by operating the (▲) (▼) (Room temperature adjustment) (Ⓒ).

Then press the (TEST RUN) switch (Ⓓ) to register. In the figure below, the "INDOOR UNIT ADDRESS NO." is set to 001.

③ After completing the registration, press the (FILTER) + buttons (Ⓐ + Ⓑ) simultaneously for 2 seconds to return to the original mode (with the remote controller under stopping mode).



2) Method of retrieval/confirmation

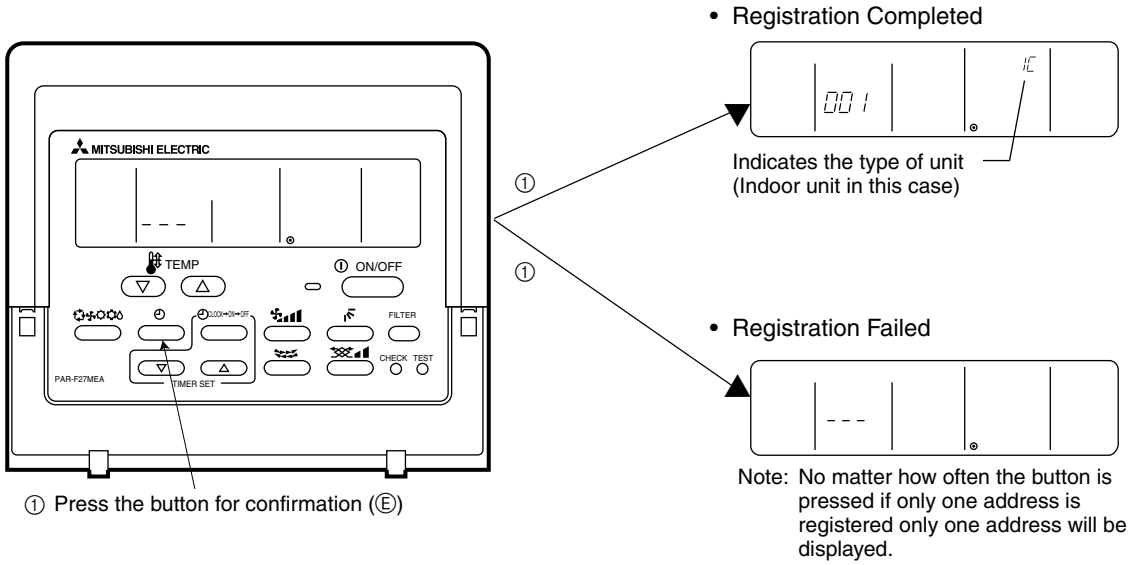
- Retrieval/confirmation of group registration information on indoor unit..... 2
  The address of the indoor unit registered on the remote controller is displayed.

[Operation procedure]

① With the remote controller under stopping mode or with "HO" displayed on the LED, press and hold the (FILTER) + buttons (Ⓐ + Ⓑ) simultaneously for 2 seconds to switch to the registration mode.

② In order to confirm the indoor unit address already registered, press button (Ⓔ). (See figure below.) When a group of multiple units is registered, the addresses will be displayed one at a time in order at each pressing of button (Ⓔ).

③ After completing the registration, press and hold the (FILTER) + buttons (Ⓐ + Ⓑ) simultaneously for 2 seconds to return to the original mode (with the remote controller under stopping mode).



- Retrieval/confirmation of registration information 3
  The registered information on a certain unit (indoor unit, outdoor unit, remote controller or the like) is displayed.

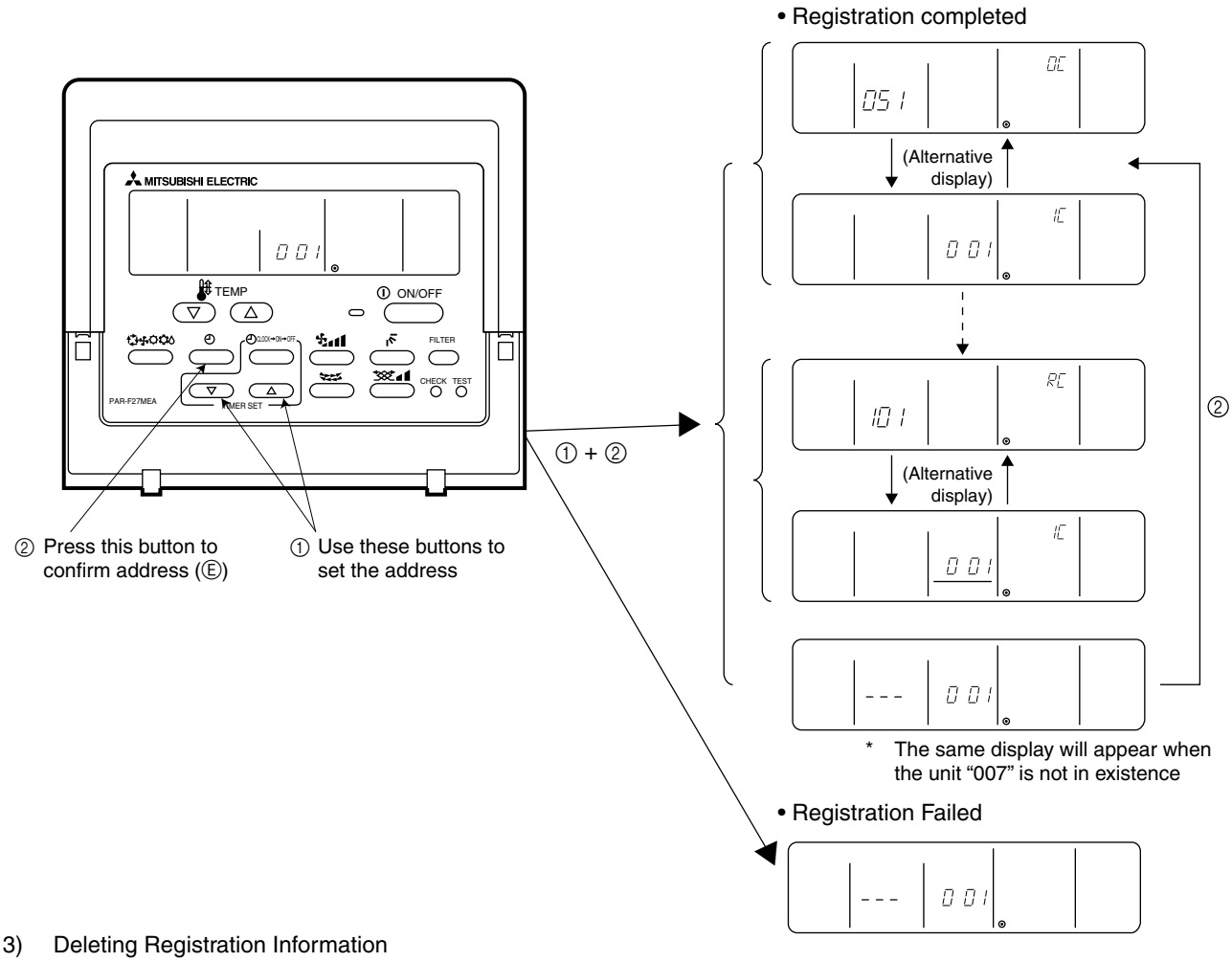
[Operation procedure]

① With the remote controller under stopping mode or with "HO" displayed on the LED, press and hold (FILTER) + buttons (Ⓐ + Ⓑ) simultaneously for 2 seconds to switch to the registration mode.

② Operate button (Ⓖ) for the interlocked setting mode. (See figure below.)

③ Assign the unit the desired registration address and confirm using this (TIMER SET) button (Ⓗ). Then press the button (Ⓔ) to display it on the remote controller. (See figure below.)
Each pressing of button (Ⓔ) changes the display of registered content. (See figure below.)

④ After completing the retrieval/confirmation, press and hold the (FILTER) + buttons (Ⓐ + Ⓑ) simultaneously for 2 seconds to return to the original mode (with the remote controller under stopping mode).



3) Deleting Registration Information
   - Deletion of group registration information of indoor unit 4

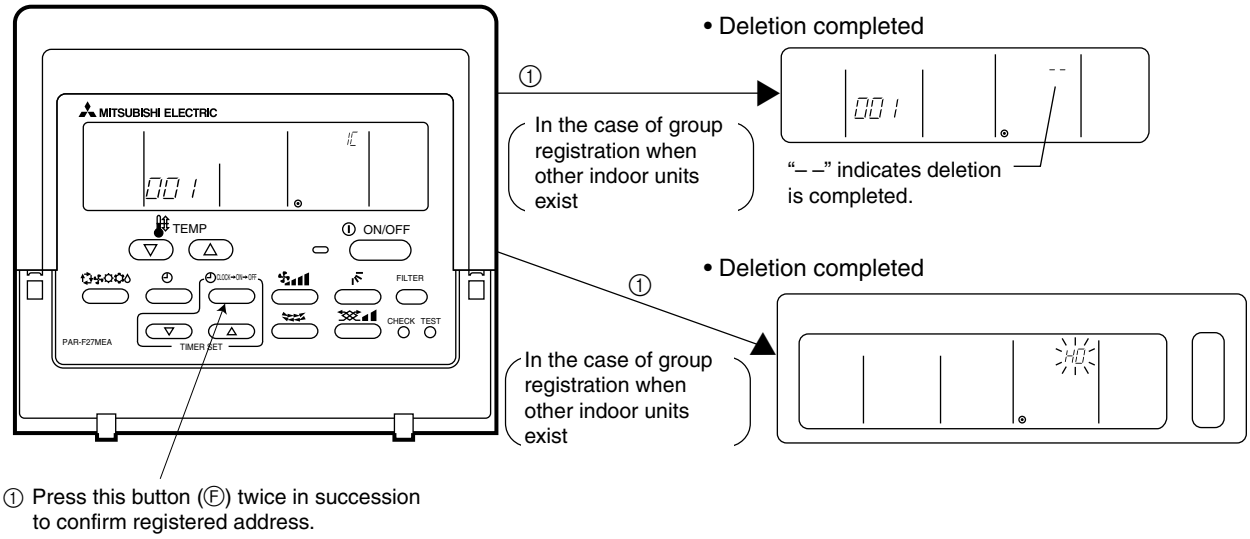
[Operation procedure]

① With the remote controller under stopping mode or with "HO" displayed on the LED, press and hold the (FILTER) + ≋ buttons (Ⓐ + Ⓑ) simultaneously for 2 seconds to switch to the registration mode.

② Press the ◴ button (Ⓔ) to confirm the indoor unit address registered (Same as 2)

③ In order to delete the registered indoor unit address being displayed on the remote controller, press the ◴CLOCK → ON → OFF (Ⓕ) button twice in succession. At the completion of deletion, " – – " will be displayed on the LED. (See figure below.)
Note: After deleting the addresses of all indoor units registered on the remote controller, "HO" will be displayed on the LED.

④ After completing the registration, press and hold the (FILTER) + ≋ buttons (Ⓐ + Ⓑ) simultaneously for 2 seconds to return to the original mode (with the remote controller under stopping mode).



4) Deletion of information on address not existing

- Deletion of information on address not existing 5

This operation is to be conducted when “6607” error (No ACK error) is displayed on the remote controller due to the setting error during test run, or due to the old memory remaining at the time of the modification of group composition, and the address with no corresponding units will be deleted.

Note: The connection information (connection between indoor unit and outdoor unit) on the refrigerant system cannot be deleted.

An example for deleting the system controller “250” from the indoor unit “007” is shown below.

[Operation procedure]

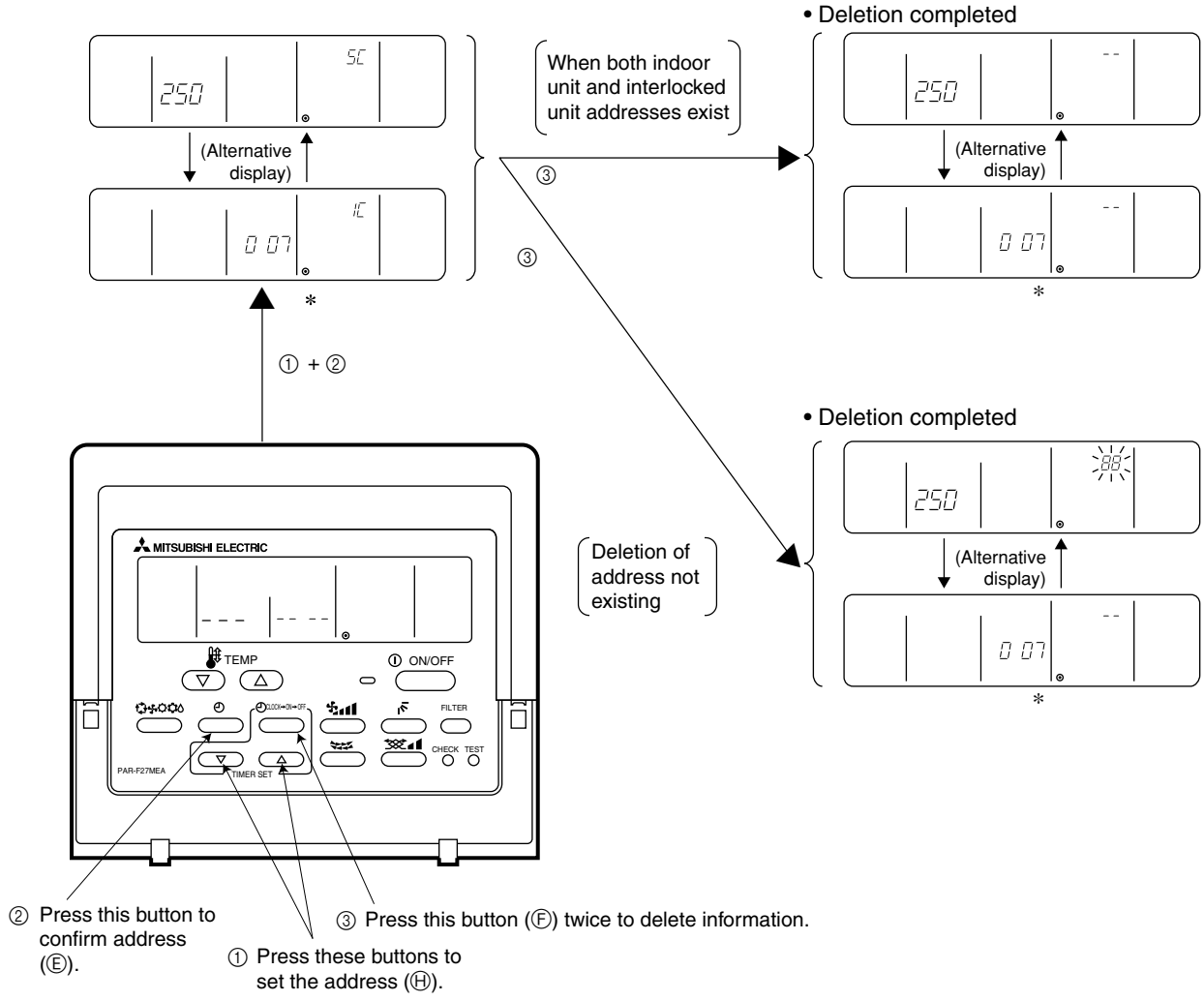
① With the remote controller under stopping mode or with “HO” displayed on the LED, press and hold the (FILTER) + buttons (Ⓐ + Ⓑ) simultaneously for 2 seconds to switch to the registration mode.

② Use button (Ⓖ) to switch to the interlocked setting mode (ii). (See the figure below.)

③ Call up the address of existing unit on “OA Unit Address No.” using the (▲) (▼) (TIMER SET) buttons (Ⓗ), and press button (Ⓔ) to display the address to be deleted. (See the figure below.) As the error display on the remote controller is usually transmitted from the indoor unit, “OA UNIT ADDRESS No.” is used as the address of the indoor unit.

④ Press the CLOCK → ON → OFF button (Ⓕ) twice. (See the figure below.)

⑤ After completing the deletion, press and hold the (FILTER) + buttons (Ⓐ + Ⓑ) simultaneously for 2 seconds to return to the original mode (with the remote controller under stopping mode).



5 CONTROL

[1] Control of Outdoor Unit

(1) Initial processing

- When turning on power source, initial processing of microcomputer is given top priority.
- During initial processing, control processing corresponding to operation signal is suspended. The control processing is resumed after initial processing is completed. (Initial processing: Data processing in microcomputer and initial setting of each LEV opening, requiring approx. 3 minutes at the maximum.)

(2) Control at start-up

- For 3 minutes after starting, the upper limit of frequency is 60Hz (when only No. 1 compressor is operating).
- The upper limit is 75Hz for 2 hours after the power has been turned on and for 30 minutes after the compressor has started operation.
- Normal control is performed after the initial start mode (described later) has been completed.

(3) Compressor capacity control

- Variable capacitor compressor is performed by the variable capacity compressor (No. 1: inverter motor) and constant capacity compressor (No. 2: It has capacity control switching).
- In response to the required performance, the number of compressors operating, the switching of capacity control and the frequency of the variable capacitor compressor are controlled so that the evaporation temperature is between – 2 and – 6°C in cooling mode and that the condensation temperature is at 49°C in heating mode.
- The fluctuation of the frequency of the variable capacitor compressor is as follows. This function is performed at 2Hz per second.
  20 to 100 Hz (TH6 > 20°C and in cooling mode, or in heating mode)
  30 to 100 Hz (TH6 < 20°C and in cooling mode)

1) No. 2 compressor operation, stopping and full-load/un-load switching

① Switching from stopping to operation of No. 2 compressor.
When an adequate performance level cannot be achieved with an operation of only No. 1 compressor, No. 2 compressor will start an un-load operation.
- After No. 1 compressor has reached 100 Hz, No. 2 compressor stops → un-load or un-load → full-load.

② Switching from operation to stopping of No. 2 compressor.
When the desired performance level is exceeded with the operation of the two compressors No. 1 and No. 2, No. 2 compressor stops or performs an un-load operation.

③ Switching from un-load to full-load of No. 2 compressor.
When the desired performance level cannot be achieved with the operation of No. 1 compressor and No. 2 compressor in un-load, No. 2 compressor will switch to full-load operation.

④ Switching from full-load to un-load of No. 2 compressor.
When the desired performance level has been exceeded with the operation of the two compressors No. 1 and No. 2 in full-load, No. 2 compressor switches to un-load operation.

2) Pressure control
The upper limit for the high pressure (Pd) has been set for each frequency. When this value is exceeded, the frequency is reduced every 30 seconds.

3) Discharge temperature control

The discharge temperature of the compressor (Td) is monitored during the operation. If the upper limit is exceeded, the frequency is reduced by 5 Hz.

- Control is performed every 30 seconds, starting at 30 seconds after the start of compressor.
- The operating temperature is 124°C (No. 1 compressor) and 115°C (No. 2 compressor).

4) Compressor frequency control

① Ordinary control

The ordinary control is performed after the following times have passed.

- 30 seconds after the start of the compressor or 30 seconds after the completion of defrosting.
- 30 seconds after frequency control operation has been performed by means of discharge temperature or high pressure.

② Amount of frequency fluctuation

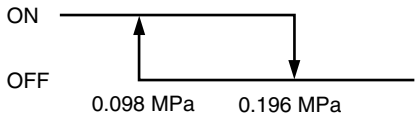
The amount of frequency fluctuation is controlled in response to the evaporation temperature (Te) and the condensation temperature (Tc) so that it will reach the target values.

③ Frequency control back-up by the bypass valve

Frequency control is backed-up by turning on (opening) the bypass valve (SV4a) when only No. 1 compressor is operated at its lowest frequency.

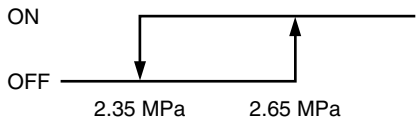
- Cooling

  After the compressor has been operated for 15 minutes and only No. 1 compressor is operated in un-load (its lowest frequency), the bypass valve is turned ON when the low pressure (63 LS) reaches 0.098 MPa or less and turned OFF when it reaches 0.196 MPa or more.



- Heating

  After the compressor has been operated for 3 minutes and only No. 1 compressor is operated in un-load (its lowest frequency), the bypass valve is turned ON when the high pressure (Pd) exceeds 2.65 MPa and turned OFF when it reaches 2.35 MPa or less.



(4) Bypass - capacity control

The solenoid valves are bypass valves (SV1, SV4a and SV6a) that allow bypassing of the high pressure and low pressure sides and solenoid valves (SV22 and SV32) that control the capacity control valve inside the compressor. They operate as follows:

1) Bypass valve (SV6a) [SV6a is on (open)]

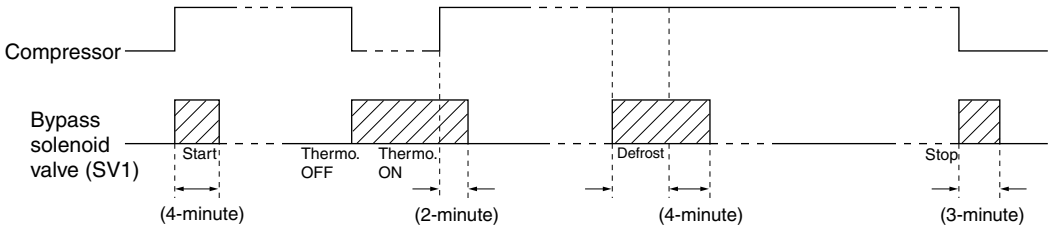
- As shown in the table below, control is performed by the operation and stopping of the No. 1 compressor and No. 2 compressor.

No. 1 compressor	No. 2 compressor	SV6a
In Stop	In Stop	OFF
In Operation	In Stop	ON
In Operation	In Operation	OFF

2) Bypass solenoid valves (SV1, SV4) [Both SV1 and SV4 are on (open)]

Item	SV1		SV4a	
	ON	OFF	ON	OFF
At start of compressor	ON for 4 minutes		—	
Compressor stopped during cooling or heating mode	ON		—	
After operation has been stopped	ON for 3 minutes		—	
During defrosting ((*1) in Fig. below)	ON		Normally ON	
During oil recovery operation	ON during oil recovery operation after continuous low-frequency compressor operation.		—	
When low pressure (Ps) has dropped during lower limit frequency operation(15 minutes after start)	—		Ps < 0.098 MPa	Ps ≧ 0.196 MPa
When the high pressure (Pd) is risen up during lower limit frequency operation (3 minutes after starting)	Pd ≧ 2.70 MPa	Pd ≦ 2.35 MPa and after 30 seconds.	Pd ≧ 2.65 MPa	Pd ≦ 2.35 MPa and after 30 seconds
When the discharge temperature (Td) rises	—		• Td > { 130°C (No. 1 compressor) / 115°C (No. 2 compressor) } and • Pd > 1.96 MPa or Ps < 0.34 MPa	Td ≦ { 115°C (No. 1 compressor) / 100°C (No. 2 compressor) }

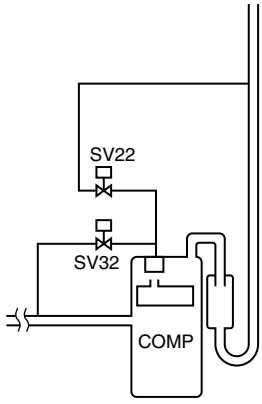
* Example of operation of SV1



3) Capacity control solenoid valve (SV22, SV32). :P500 only

• Operation of solenoid valve

Solenoid valve / Status	SV22		SV32	
	Coil	Valve	Coil	Valve
Full-load (Operating at 100 % capacity)	OFF	Open	OFF	Closed
Un-load (Capacity control operation)	ON	Closed	ON	Open



(5) Oil return control (Electronic expansion valve (SLEV))

- The amount of opening of the oil-return LEV (SLEV) is determined as follows: in cooling, by the operating capacity of No. 1 compressor and the ambient temperature; in heating, by the operating capacity of No. 1 compressor.
- It is opened at 64 pulses when both compressors have stopped or started for the duration of 10 minutes. (Upper limit of LEV opening is So = 388 pulse.)
- SLEV = 0 when the No. 1 compressor has stopped.

(6) Defrosting control

1) Starting defrosting
   - After the heating operation has been in operation for 50 minutes or after 90 minutes has passed and the piping temperature (TH5) has detected –8°C or below, defrosting operation begins.
   - When 10 minutes has passed since the compressor began operation or for forced defrosting (Setting of Dip SW2-7 on) when 10 minutes has passed since recovery from defrosting forced defrost mode becomes active.

2) End of defrosting
   - Defrosting ends when 12 minutes have passed since the start of defrosting, or when the piping temperature (TH5 and TH7) has remained at or above 7°C for 4 minutes or longer. (Note that if the defrost-prohibited time is set on 90 minutes, the defrost-prohibit time will be 50 minutes following a 12-minute timed recovery.
   - Termination of defrosting process is prohibited for 4 minutes after the start of defrosting.

3) Defrost-prohibit
   - Defrosting is not performed for 10 minutes after the start of compressor operation and during oil recovery mode.

4) Abnormalities during defrosting
   - If an error is detected during defrosting, the defrosting process is stopped and the defrost-suspension time is set at 20 minutes of cumulative compressor operation time.

5) Change in the number of operating indoor units while defrosting
   - Even if the number of operating indoor units changes while the outdoor unit is defrosting, the defrosting operation continues. Once defrosting has ended, control for changing the number of units is performed.
   - Even if the indoor unit is stopped while the outdoor unit is defrosting or if the thermostat is turned off, the defrosting operation continues. Once defrosting has ended, the unit will stop.

6) Number of compressors operating during defrosting
   - The number of compressors in operation during defrosting is always two.

(7) Control of liquid-level detecting heater

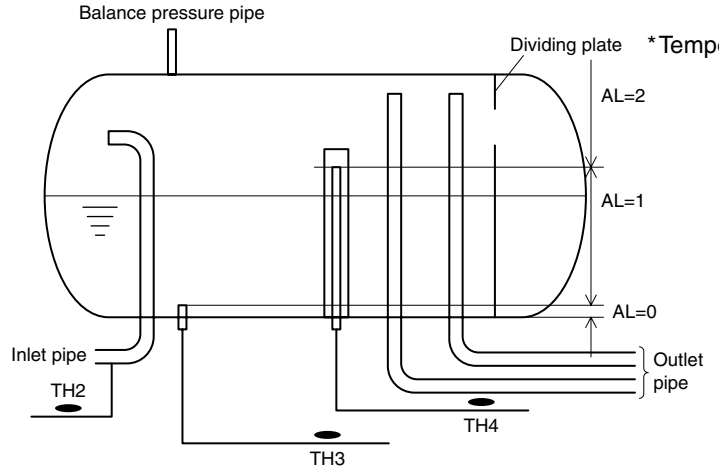
The function is to detect the refrigerant liquid level in accumulator, and heat refrigerant with liquid-level heater to judge refrigerant amount. Seven steps of duty control are applied to liquid-level heater, depending on frequency and outdoor air temperature. Control begins one-minute after starting compressor.

(8) Judgement and control of refrigerant amount

- Judges refrigerant amount by detecting refrigerant liquid surface level in the accumulator.

1) Judgement of accumulator liquid level

- Return refrigerant from accumulator liquid level detecting circuit to compressor inlet pipe, detect piping temperature, and judge liquid level.
  When heated with a heater, liquid refrigerant temperature is nearly equal to low pressure saturation temperature, and gas refrigerant temperature is slightly higher than low-pressure saturation temperature. By comparing these temperatures at the accumulator inlet, refrigerant liquid level can be determined.
  Accumulator liquid level is judged in 3 steps as shown in the figure, from temperature A and liquid level detecting temperatures (TH3, TH4). After deciding refrigerant status (Liquid: TH3 and TH4 are TH2 + 9°C or less, Gas: TH3 and TH4 are TH2 + 9°C or more), judge liquid level by comparing TH3 and TH4.



*Temperature A: low pressure saturation temperature (TH2).

- Judgement by the AL is at best only a rough guideline.
  Please do not add refrigerant based on the AL reading alone.

2) Control of liquid level detection

① Prohibition of liquid level detection
Liquid level is detected in normal conditions except in the following conditions:
(Cooling)
- For 6 minutes after starting unit, and during unit stopping.

(Heating)
- During defrosting.
- For 10 minutes after refrigerant recovery.
  (Note that liquid level determination is performed, even when liquid level detection is disregarded.)

② In case AL = 2 has been detected for 3 consecutive minutes (control during excessive refrigerant replenishment and error mode)
- Mode changes to intermittent fault check mode preceded by 3 minutes restart prevention. It is normal when the discharge SH is high. Error stop is observed when trouble is detected again, the same intermittent fault check mode is entered (for 30 minutes after unit stops for intermittent fault check).
- When turning on liquid level trouble disreguard switch (SW2-4), error stop is not observed, and 3 minutes restart prevention by intermittent fault check mode is enforced. However, LED displays overflow.
  (Turning SW2-4 on makes TH6 < outdoor air sensor > error ineffective.)

③ When operation mode shows “Stop,” excessive or insufficient refrigerant display and excessive or insufficient refrigerant ignore display are extinguished.

(9) Outdoor unit heat exchanger capacity control

1) Control method
   - In order to stabilize the evaporation temperature during cooling and the high-pressure pressure during heating that are required in response to performance needs, the capacity of the outdoor heat exchanger is controlled by regulating the fan volume of the outdoor unit by phase control and controlling the number of fans and by using the solenoid valves to vary the number of out door heat exchangers being used.

2) Control
   - When both of the compressors are stopped, the fans for the outdoor units are also stopped.
   - The fans operate at full speed for 5 seconds after starting.
   - The fans for the outdoor unit are stopped during defrosting.

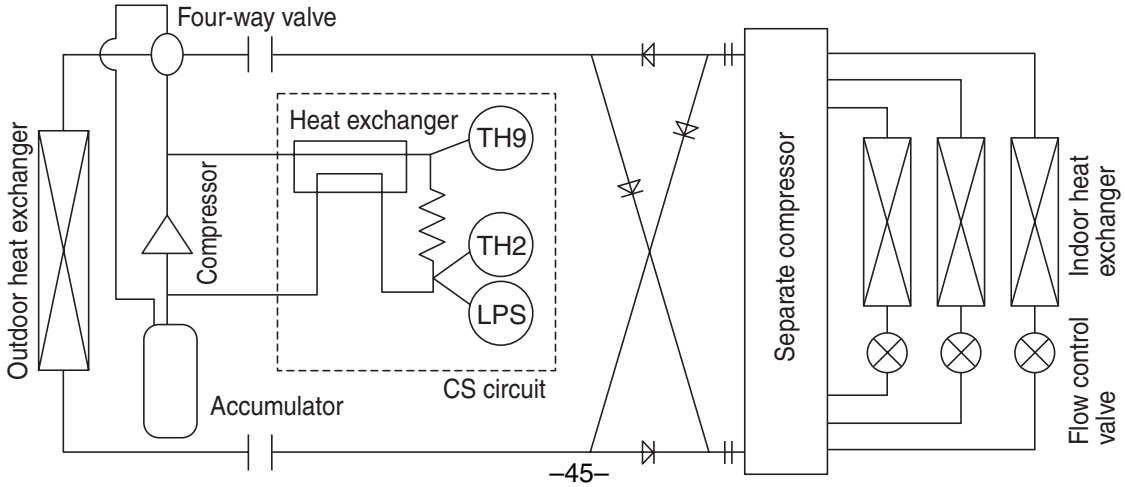
3) Capacity control pattern

Operation mode	Operation pattern	Solenoid valve					
		SV3	SV4	SV5	SV6	SV7	SV8
Full cooling	①	ON	ON	ON	OFF	ON	ON
	②	ON	ON	ON	OFF	OFF	OFF
	③	OFF	ON	ON	OFF	OFF	OFF
	④	OFF	ON	OFF	OFF	OFF	OFF
	⑤	OFF	OFF	ON	OFF	OFF	OFF
	⑥	OFF	OFF	OFF	OFF	OFF	OFF
Cooling mainly	①	ON	ON	ON	OFF	ON	ON
	②	ON	ON	ON	OFF	OFF	OFF
	③	OFF	ON	ON	OFF	OFF	OFF
	④	OFF	ON	OFF	OFF	OFF	OFF
	⑤	OFF	OFF	ON	OFF	OFF	OFF
	⑥	OFF	OFF	OFF	OFF	OFF	OFF
	⑧	OFF	OFF	OFF	ON	OFF	OFF
Full heating	①	ON	ON	ON	OFF	ON	ON
Heating mainly	①	ON	ON	ON	OFF	ON	ON
	②	ON	ON	ON	OFF	OFF	OFF
	⑦	ON	ON	ON	ON	OFF	OFF
	⑧	OFF	OFF	OFF	ON	OFF	OFF
Defrosting	①	ON	ON	ON	OFF	ON	ON

* In stop, all are OFF.

(10) Circulating composition sensor (CS circuit)

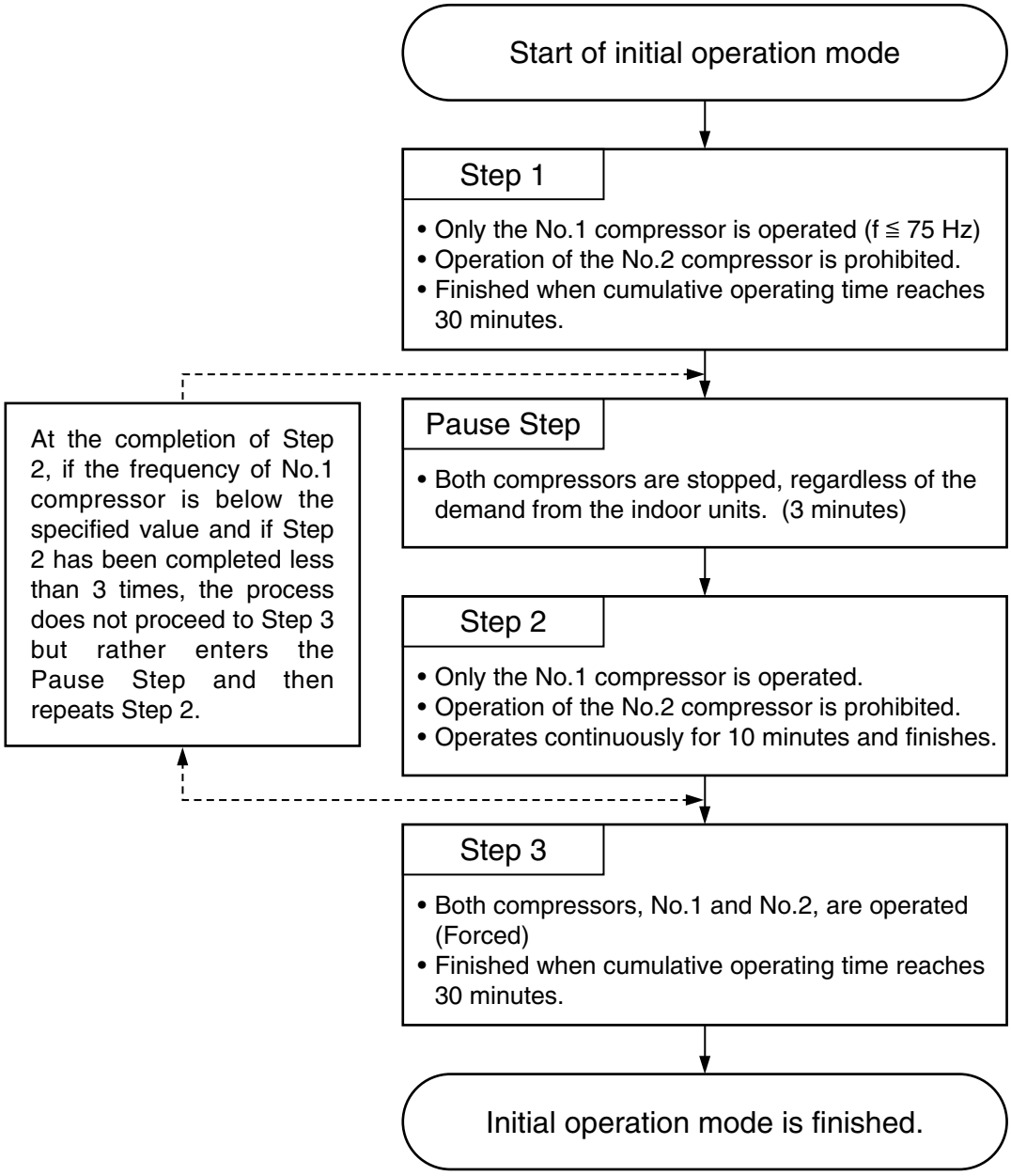
- As shown in the drawing below; the CS circuit has the structure to bypass part of the gas discharged from the compressor through the capillary tube to the suction side of the compressor, exchange heat before and after the capillary tube, and produce two phase (gaseous and liquid) refrigerant at the capillary tube outlet. The dryness fraction of refrigerant at the capillary tube outlet is estimated from the temperature of high pressure liquid refrigerant at the capillary tube inlet (TH9) and the temperature of low pressure two phase (gaseous and liquid) refrigerant at the capillary outlet (TH2) and the pressure (LPS) to calculate the composition of refrigerant circulating the refrigeration cycle (αOC). It is found by utilizing the characteristic that the temperature of two phase (gaseous and liquid) R407C under a specified pressure changes according to the composition and dryness fraction (gas-liquid ratio in weight).
- The condensing temperature (Tc) and the evaporating temperature (Te) are calculated from αOC, high pressure (HPS), and low pressure (LPS).
- The compressor frequency, the outdoor fan, and others are controlled according to the codensing temperature (Tc) and the evaporating temperature (Te).
- CS circuit configuration (Outline drawing)



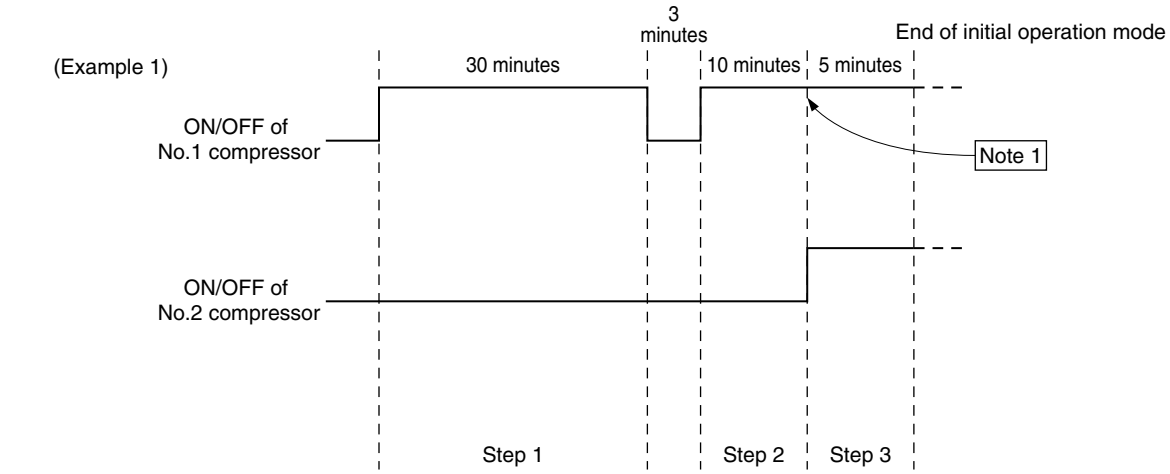
(11) Control at initial starting

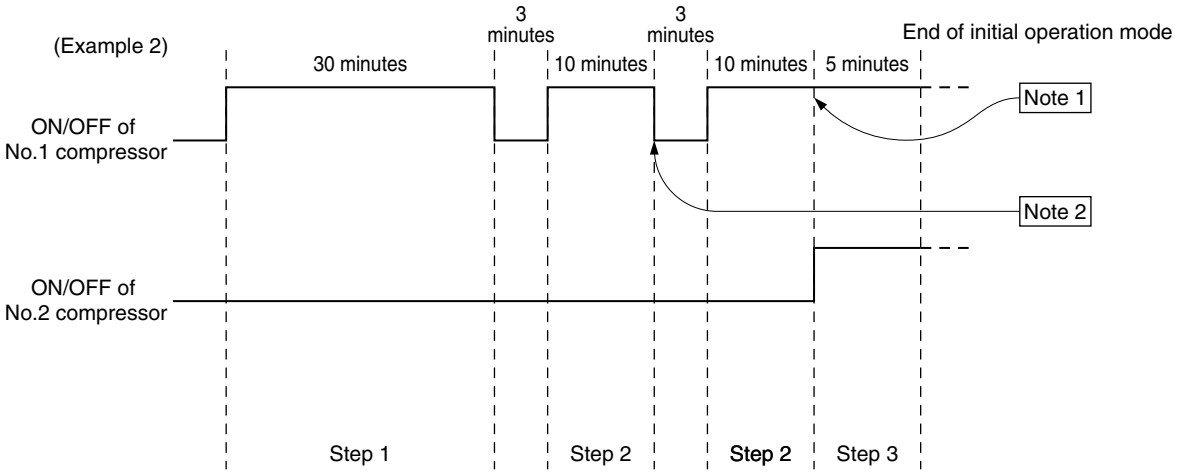
- When the ambient temperature is low (5°C or less in cooling and – 5°C or less in heating), initial starting will be performed if the unit is started within 4 hours of the power being turned on.
- The following initial start mode will be performed when the unit is started for the first time after the power has been turned on.

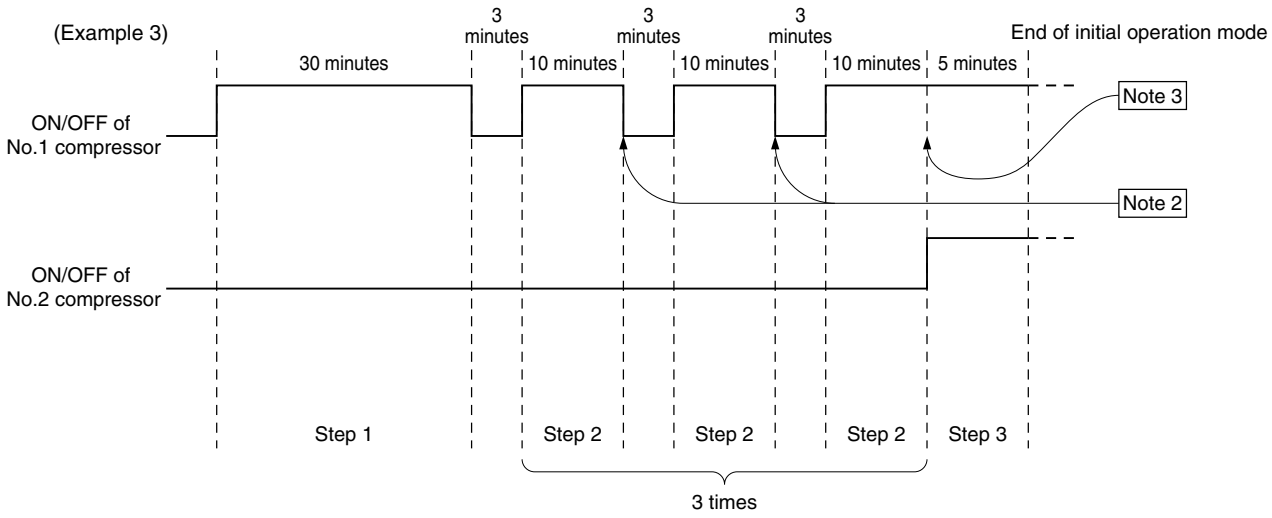
<Flow chart of initial start mode>



<Initial start control timing chart>







Note 1: If the frequency of No. 1 compressor is above the specified level at the end of Step 2, the mode proceeds to Step 3.

Note 2: At the completion of Step 2, if the frequency of No. 1 compressor is below the specified value and if Step 2 has been completed less than 3 times, the process does not proceed to Step 3 but rather enters the Pause Step and then repeats Step 2.

Note 3: At the completion of Step 2, if it has been completed more than 3 times, the mode will proceed to Step 3 even if the frequency of No. 1 compressor is below the specified value.

(12) Emergency response operating mode

The emergency operation mode is a mode in which the unit is run in an emergency to respond to the trouble when the compressors (No. 1, No. 2) break down, making it possible to carry out an abnormality reset using the remote control.

1) Starting the Emergency Operation Mode

① Trouble occurs (Display the abnormality code root and abnormality code on the remote control).

② Carry out trouble reset with the remote control.

③ If the abnormality indicted in ① above is of the kind that permits emergency operation (see the table below), initiate a retry operation.
If the trouble indicated in ① above is of the kind where emergency operation is impossible (see the table below), restart operation after carrying out the previous abnormality reset (without entering the emergency operation mode).

④ If the same abnormality is detected again during the retry operation in ③ above, carry out trouble reset once more with the remote control, then try emergency operation starting corresponding to the contents of the abnormality

Table Emergency Operation Mode Patterns and Abnormality Codes for which Emergency Operation is Possible or Impossible

Emergency Mode Pattern	Codes for which emergency operation is possible.		Abnormality Codes for which Emergency Operation is Impossible	Action
When a No. 1 Compressor Failure Occurs	Serial transmission abnormality VDC sensor/circuit abnormality Bus voltage abnormality Radiator panel overheat protection Overcurrent protection IPM alarm output /Bus voltage abnormality Thermal sensor abnormality (Radiator panel) IAC sensor/circuit abnormality	0403 4200 4220 4230 4240 4250 5110 5301	Trouble codes other than those at left.	Emergency Operation only with the No. 2 Compressor * After the retry operation, even if there is a different abnormality code detected within <Inverter Abnormality> at left, press the button and after resetting, start the unit by emergency operation. [Example] 4250 → Reset → Retry → 4240 → Reset → Emergency operation
When No. 2 Compressor Failure Occurs	Overcurrent protection			Emergency Operation only with the No. 1 Compressor

Caution

During emergency operation, only X-marked percentage of indoor units can be operated during emergency operation. In case more than X-marked percentage of indoor units are operated, the indoor units over the limit would be on the stand-by mode.

	400	500
No. 1 Compressor Failure	× ≦ 48 %	× ≦ 65 %
No. 2 Compressor Failure	× ≦ 65 %	× ≦ 65 %

[2] Control of BC Controller

(1) Control of SVA, SVB and SVC

SVA, SVB and SVC are turned on and off depending on connection mode.

Mode / Connection	Cooling	Heating	Stop	Defrost
SVA	ON	OFF	OFF	OFF
SVB	OFF	ON	OFF	OFF
SVC	ON	OFF	OFF	OFF

(2) Control of SVM1 (only FA type)

SVM1 is turned on and off corresponding to operation mode.

Operation mode	Cooling-only	Cooling-main	Heating-only	Heating-main	Stop
SVM1	ON	OFF	OFF	OFF	OFF

(3) Control of LEV

LEV opening (sj) is controlled corresponding to operation mode as follows: (Number of pulse)

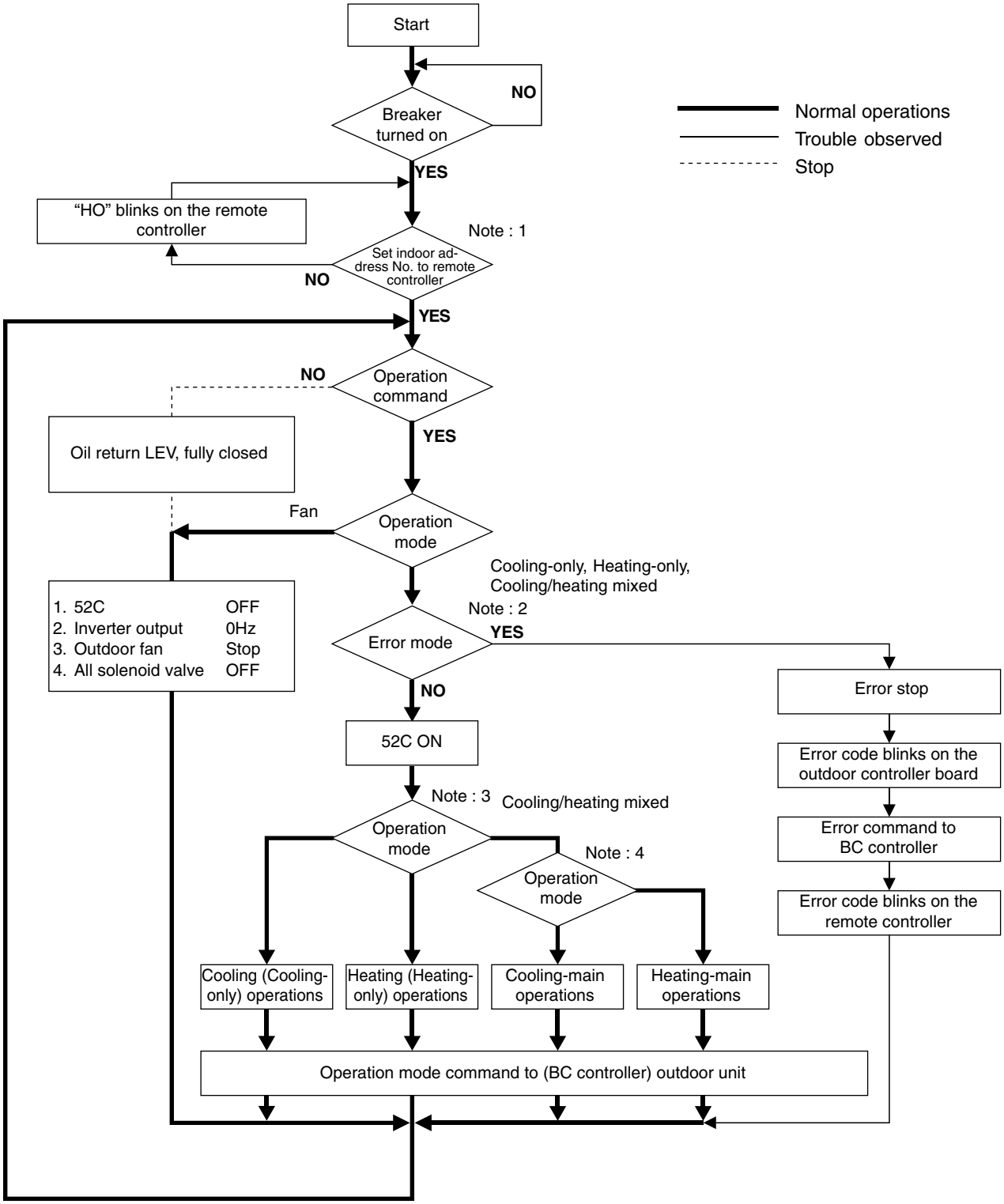
	Operation mode	Cooling-only	Heating-only	Cooling-main	Heating-main	Stop
FA	LEV1	2000	60	• Liquid level control *3 • Differential pressure control *2	60	2000
	LEV3	Superheat control *1	Differential Pressure control *2		Differential Pressure control *2	60
FB	LEV3a	Superheat control *1	60	Superheat control *1	Superheat control *1	60

*1	Superheat control	Control every minute so that superheat amount detected by bypass inlet and oulet temperatures TH12, TH15 stay in the specified range. (FA: TH12, TH15, FB: TH22, TH25)
*2	Differential pressure control	Control every minute so that detected differential pressure (PS1, PS3) stay in the specified range.
*3	–	60 or more pulses are sometimes detected because of rise in liquid side pressure (PS1).

* Please confirm that the above parts of BC controllers are being color-coded and shown with the name plate inside the BC controller unit.

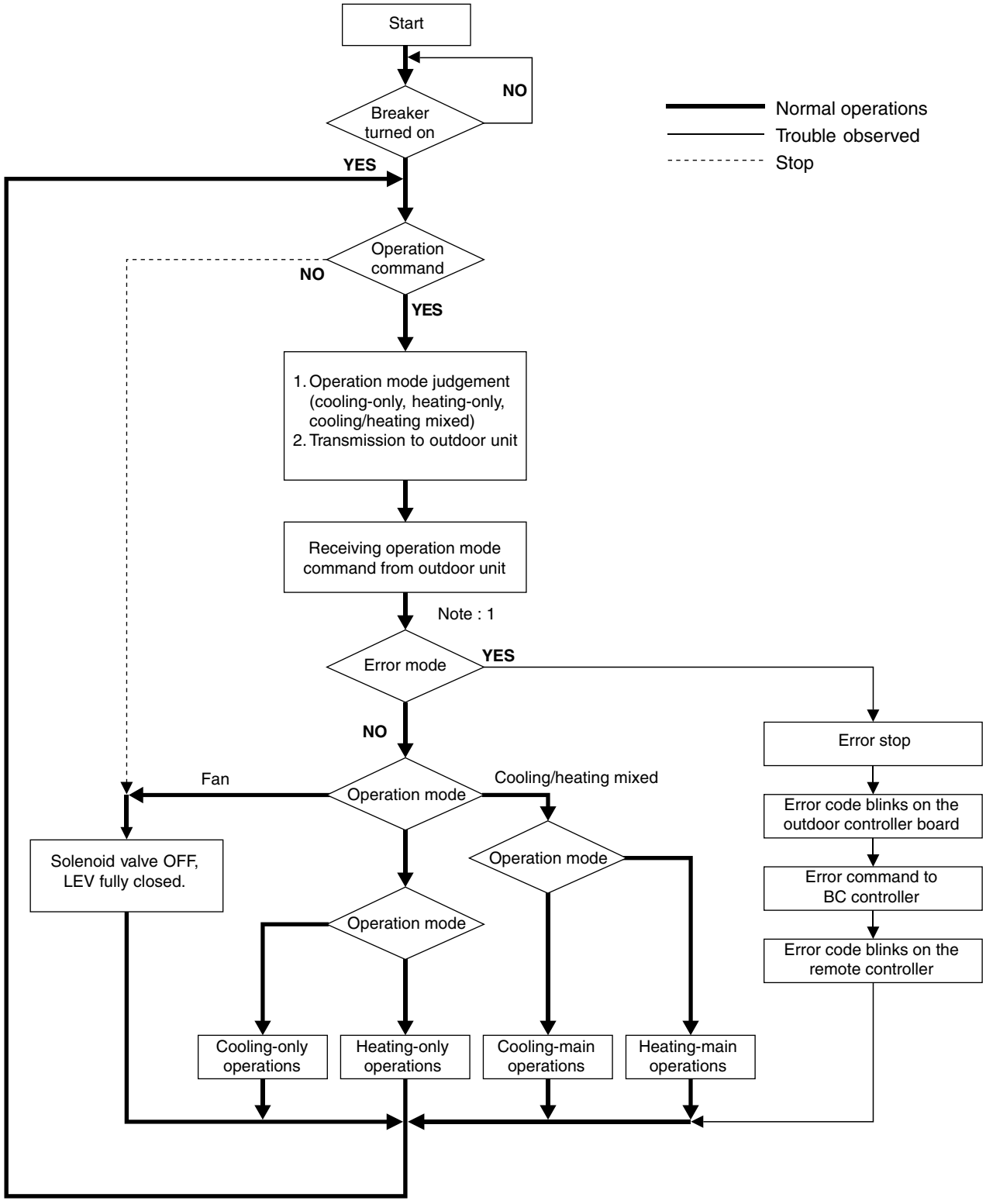
[3] Operation Flow Chart

(1) Outdoor unit



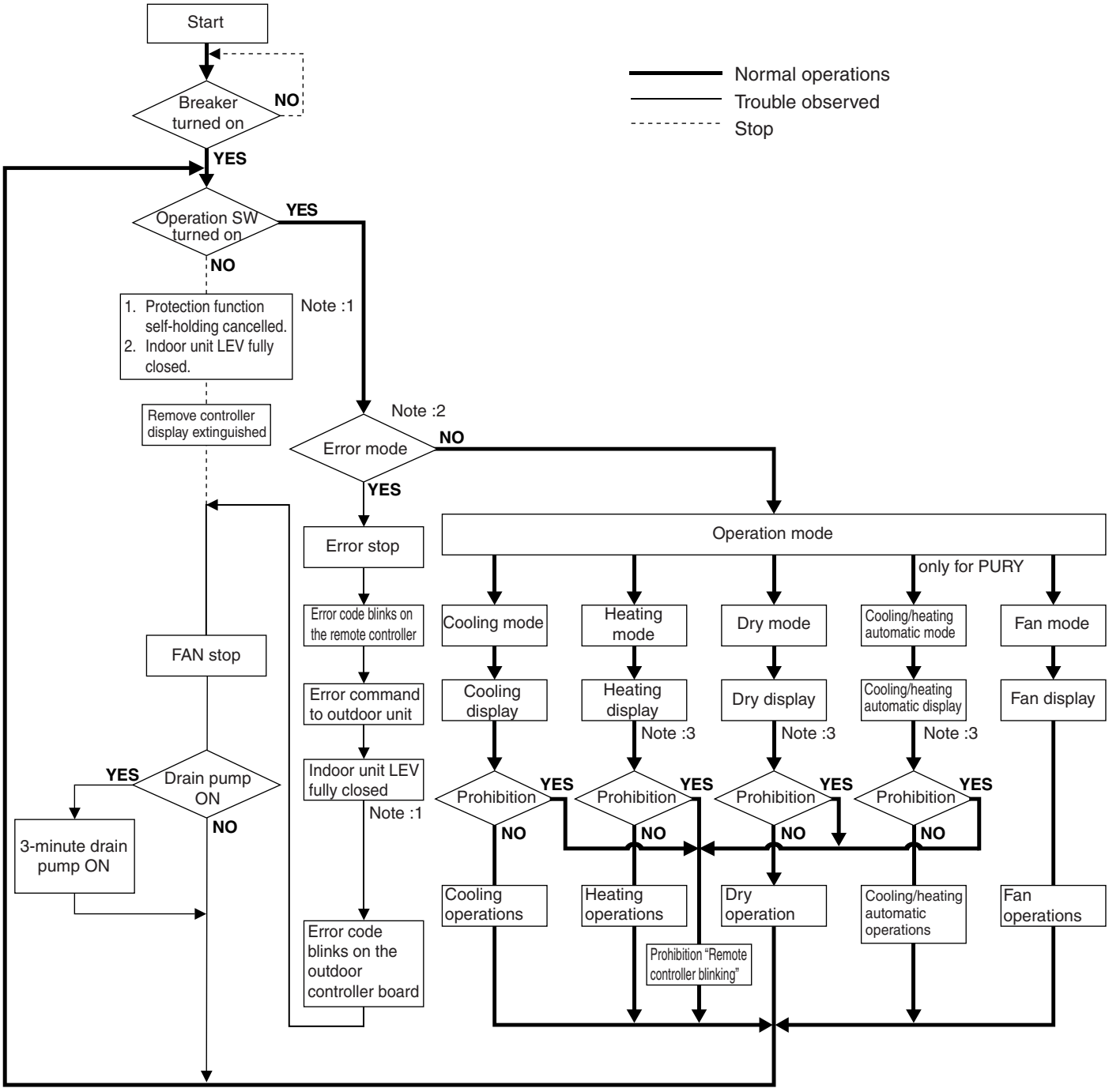
Note : 1	For about 3 minutes after turning on power source, address and group information of outdoor unit, BC, controller indoor unit, and remote controller are retrieved by remote controller, during which "HO" blinks on and off on remote controller. In case indoor unit is not grouped to remote controller, "HO" display on remote controller continues blinking, even after 3 minutes after turning on power source.
Note : 2	Two trouble modes included indoor unit side trouble (BC controller trouble) and outdoor unit side trouble. In the case of indoor unit side trouble, error stop is observed in outdoor unit only when all the indoor units are in trouble. However, if one or more indoor units are operating normally, outdoor unit shows only LED display without undergoing stop.
Note : 3	Operation mode conforms to mode command by BC controller.
Note : 4	In case BC controller issues cooling/heating mixed operation mode, outdoor unit decides operation mode of cooling-main operation or heating-main operation.

(2) BC controller



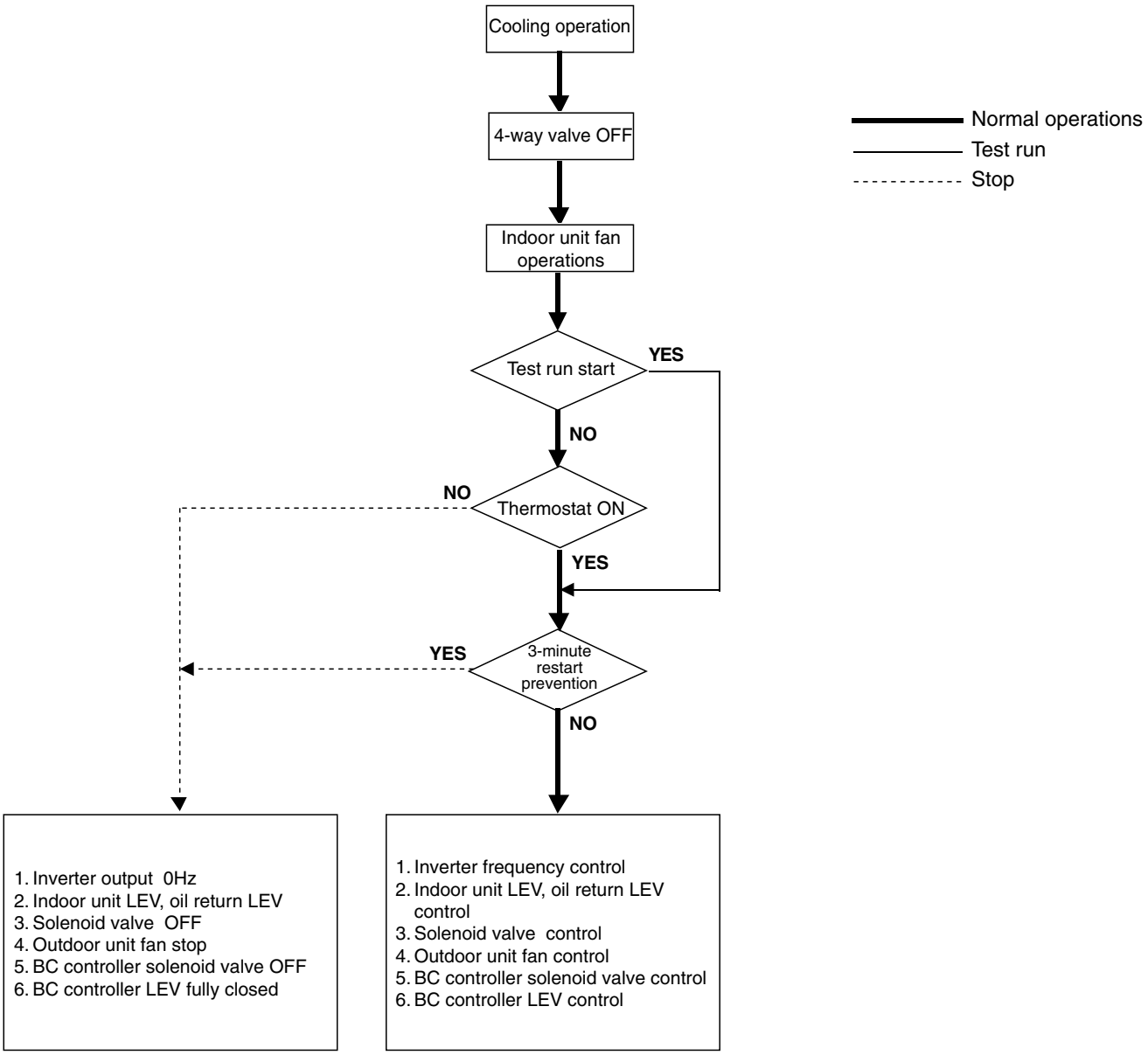
Note : 1	Two error modes include indoor unit side trouble, BC controller trouble, and outdoor unit side trouble. In the case of indoor unit side trouble, error stop is observed in the concerned indoor unit only, and in the cases of BC controller and outdoor unit side troubles, error stop is observed in all the indoor units, BC controller, and outdoor unit.

(3) Indoor unit

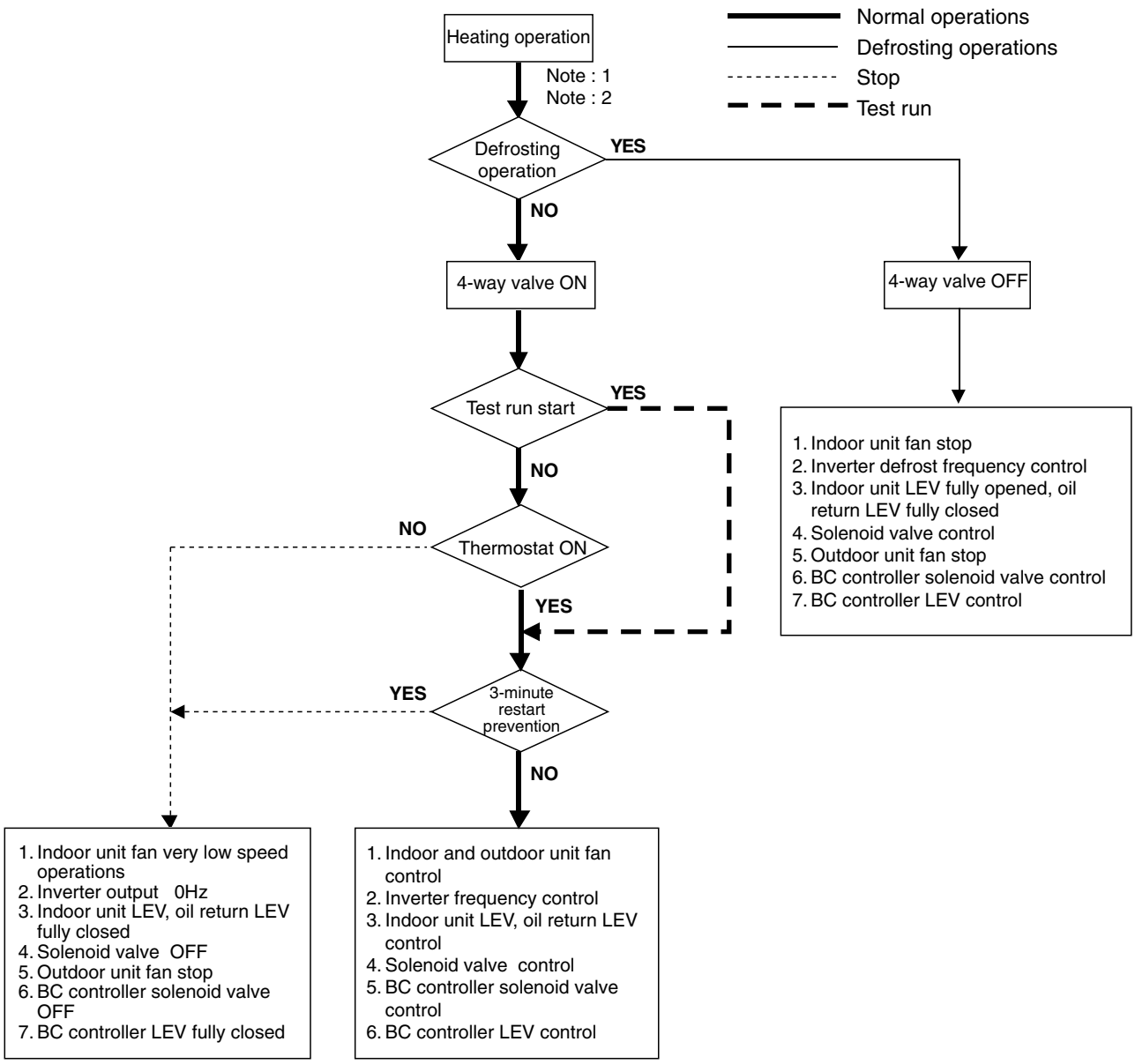


Note : 1	Indoor unit LEV fully closed : Opening 60 (41)
Note : 2	Two error codes include indoor unit trouble (BC controller trouble) and outdoor unit side trouble In the case of indoor unit trouble, error stop is observed in the concerned indoor unit only, and in the cases of (BC controller and) outdoor unit side troubles, error stop is observed in all the indoor units connected.
Note : 3	"Prohibition" status is observed (when several indoor units are connected to one connection, of BC controller and) when connection mode is different from indoor unit operation mode. (Operation mode display on the remote controller blinks on and off, fan stops, and indoor unit LEV is fully closed.)

(4) Cooling operation

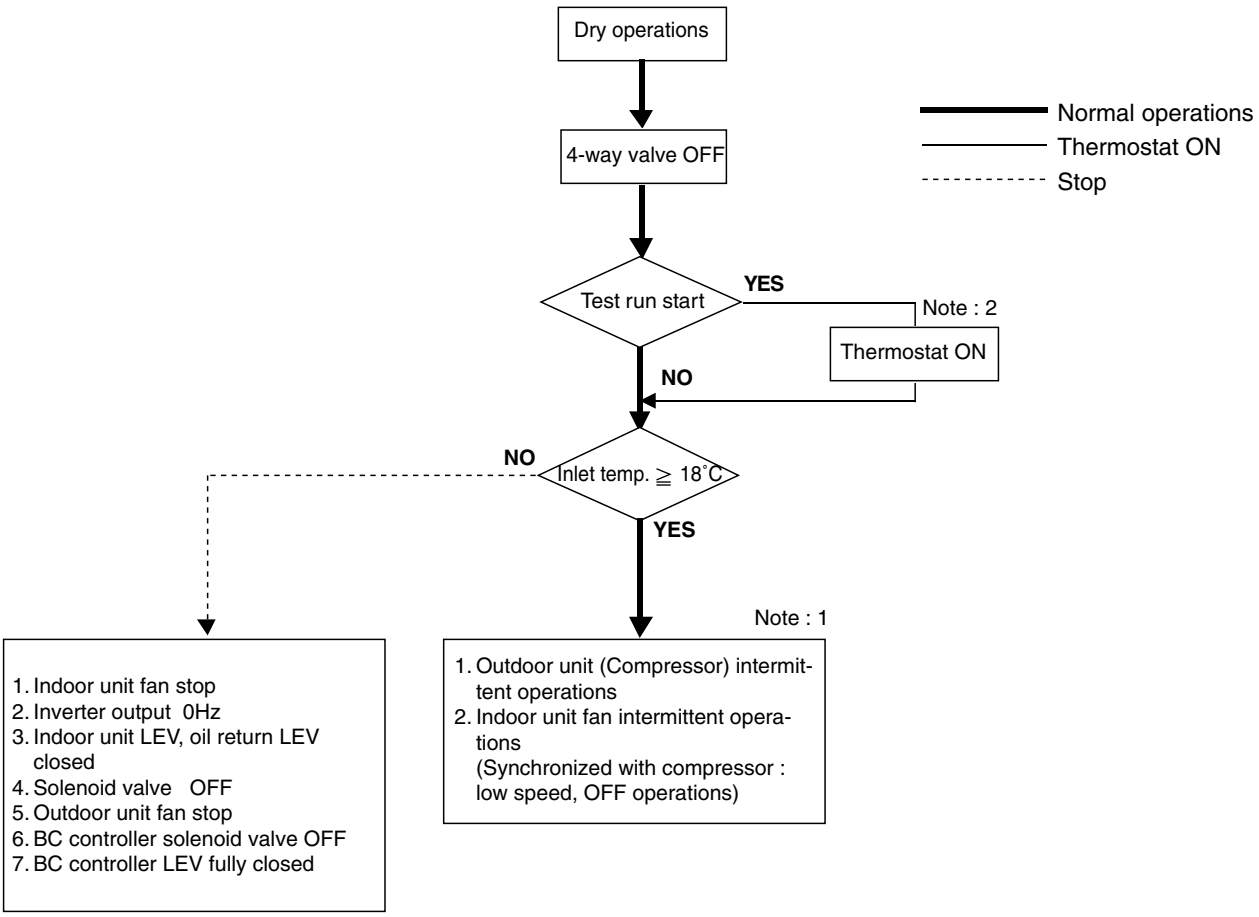


(5) Heating operation



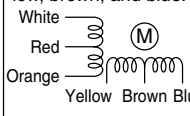
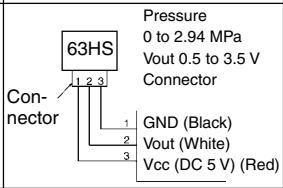
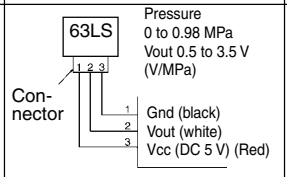
Note : 1	When outdoor unit starts defrosting, it transmits defrost operations command to (BC controller and) indoor unit, and the indoor unit starts defrosting operations. Similarly, when defrosting operation stops, indoor unit returns to heating operation after receiving defrost end command of outdoor unit.
Note : 2	Defrosting start condition : After integrated 50 minutes of compressor operations, and –8˚C: or less outdoor unit coil temperature. (TH7) Defrosting end condition : After 12 minutes of defrosting operation or the outdoor unit coil temperature (TH5 and TH7) having risen to 7˚C or more.

(6) Dry operation



Note : 1	When indoor unit inlet temperature exceeds 18˚C, outdoor unit (compressor) and indoor unit fan start intermittent operations synchronously. Operations of outdoor unit, BC controller, indoor unit LEV and solenoid valve accompanying compressor are the same as those in cooling operations.
Note : 2	Thermostat is always kept on in test run, and indoor and outdoor unit intermittent operation (ON) time is a little longer than normal operations.

[4] List of Major Component Functions

	Name	Code (Function)	Product code	Application	Specification	Inspection method
Indoor unit	Electronic expansion valve	LEV		① Adjustment of super heat of heat exchanger outlet port of indoor unit during cooling. ② Adjustment of sub-cool of heat exchanger outlet port of indoor unit during heating.	DC 12 V Amount of opening of the stepping motor drive valve 60 to 2000 pulse. (Gear Type)	Perform a continuity check using a tester. Conductivity among white, red, and orange. Conductivity among yellow, brown, and blue. 
	Thermistor	TH21 (Inlet air temperature)		Indoor unit control (Thermostat).	R_0 = 15 kΩ $B_{0/80}$ = 3460 Rt = $15\exp\{3460(\frac{1}{273+t} - \frac{1}{273})\}$ 0°C: 15 kΩ 10°C: 9.7 kΩ 20°C: 6.4 kΩ 25°C: 5.3 kΩ 30°C: 4.3 kΩ 40°C: 3.1 kΩ	Resistance value check
		TH22 (Piping temperature)		① Indoor unit control (Freeze prevention, hot adjust, etc.). ② LEV control during heating (sub-cool detection).		
		TH23 (Gas piping temperature)		LEV control during cooling (super-heat detection).		
Outdoor unit	Compressor	MC1		Uses the operating pressure to adjust the operating frequency and adjust the amount of circulating refrigerant.	Low-pressure shell scroll type. Winding resitance 0.481 (20°C).	
		MC2		When there is a load that cannot be adjusted by MC1, this function ensures the stable flow of refrigerant.	Low-pressure shell scroll type. Winding resistance: each phase. 1.996 (20°C): P400 1.197 (20°C): P500	
	High pressure sensor	63HS		① Detects high-pressure pressure. ② Performs frequency control and high-pressure protection.		
	Low pressure sensor	63LS		1) Detects low-pressure. 2) Calculates the refrigerant circulation configuration. 3) Protects the low pressure		
	Pressure switch	63H1 62H2		① Detects high-pressure. ② Performs high-pressure protection.	Set to 2.94 MPa OFF.	Conductivity check
	Thermistor	TH11,12 (Outlet)		① Detects high-pressure pressure. ② Performs high-pressure protection. 0°C: 698 kΩ 60°C: 48 kΩ 10°C: 413 kΩ 70°C: 34 kΩ 20°C: 250 kΩ 80°C: 24 kΩ 30°C: 160 kΩ 90°C: 17.5 kΩ 40°C: 104 kΩ 100°C: 13.0 kΩ 50°C: 70 kΩ 110°C: 9.8 kΩ	R_{120} = 7.465 kΩ $B_{25/120}$ = 4057 Rt = $7.465\exp\{4057(\frac{1}{273+t} - \frac{1}{393})\}$	Resistance check
		TH2 (Low pressure saturation temperature)		① Detects low pressure saturation temperature. ② Performs frequency control and liquid level of accumulator.	R_0 = 33 kΩ $B_{0/100}$ = 3965 Rt = $33\exp\{3965(\frac{1}{273+t} - \frac{1}{273})\}$ – 20°C: 92 kΩ – 10°C: 55 kΩ 0°C: 33 kΩ 10°C: 55 kΩ 20°C: 13 kΩ 30°C: 8.2 kΩ	Resistance check

	Name	Code (Function)	Product code	Application	Specification	Inspection method
Outdoor unit	Thermistor	TH3 TH4 (Liquid level detection)		Detects liquid level of refrigerant inside accumulator using the differences among TH2, TH3, TH4.	R_0 = 15 kΩ $B_{1/80}$ = 3460 Rt = $15\exp\{3460(\frac{1}{273+t} - \frac{1}{273})\}$	Resistance check
		TH5 (Pipe temperature)		① Frequency control. ② Controls defrosting during heating.	0°C: 15 kΩ 10°C: 9.7 kΩ 20°C: 6.4 kΩ 25°C: 5.3 kΩ 30°C: 4.3 kΩ 40°C: 3.1 kΩ	
		TH6 (Outdoor temperature)		① Detects the outdoor air temperature. ② Performs fan control, liquid level heater control, opening settings of LEV for oil return, and other functions.	R_0 = 15 kΩ $B_{1/80}$ = 3460 Rt = $15\exp\{3460(\frac{1}{273+t} - \frac{1}{273})\}$	Resistance check
		TH7 (Pipe inlet heat exchanger temperature)		Controls defrosfing during heating	0°C: 15 kΩ 10°C: 9.7 kΩ 20°C: 6.4 kΩ 25°C: 5.3 kΩ 30°C: 4.3 kΩ 40°C: 3.1 kΩ	
		TH9		1) Detects the CS circuit fluid temperature. 2) Calculates the refrigerant circulation configuration.		
		TH10		1) Detects the compressor shell temperature. 2) Provides compressor shell overheating protection.	R_{120} = 7.465 kΩ $B_{25/120}$ = 4057 Rt = $7.465\exp_1\{4057(\frac{1}{273+t} - \frac{1}{273+120})\}$ 20°C: 250 kΩ 70°C: 34 kΩ 30°C: 160 kΩ 80°C: 24 kΩ 40°C: 104 kΩ 90°C: 17.5 kΩ 50°C: 70 kΩ 100°C: 13.0 kΩ 60°C: 48 kΩ 110°C: 9.8 kΩ	
		THHS inverter heat sink temperature		Inverter cooling fan control using THHS temperature.	R_{50} = 17 kΩ $B_{25/120}$ = 4170 Rt = $17\exp\{4170(\frac{1}{273+t} - \frac{1}{323})\}$ 0°C: 181 kΩ 10°C: 105 kΩ 20°C: 64 kΩ 25°C: 50 kΩ 30°C: 40 kΩ 40°C: 26 kΩ	Resistance check
	Solenoid valve	SV1 discharge-suction bypass		① Capacity control of high/low pressure bypass when starting and stopping. ② Discharge pressure rise suppression.	AC 220 to 240 V Open : conducting Close: not conducting	Conductivity test using tester
		SV22 capacity control (full load)		Switching of capacity control valve inside No. 2 compressor (Switching between full load operation and unload operation) (only P500).	AC 220 to 240 V Close: conducting Open : not conducting	
		SV32 capacity control (unload)			AC 220 to 240 V Open : conducting Close: not conducting	
		SV4a discharge-suction bypass		Capacity control and controlling the rise of high-pressure (Back-up of frequency control).		

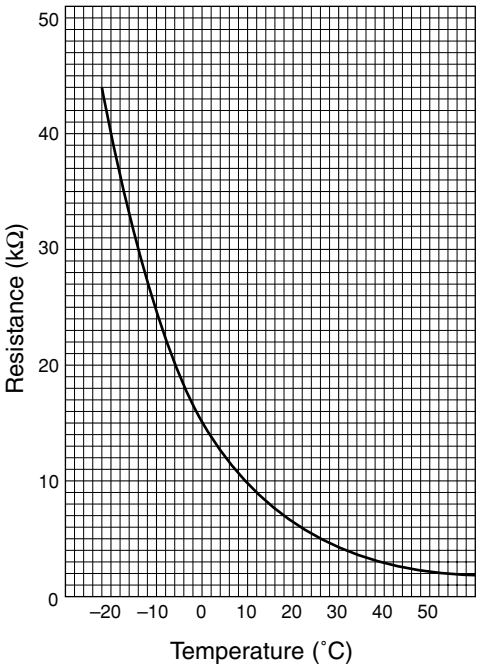
	Name	Code (Function)	Product code	Application	Specification	Inspection method
Outdoor unit	Solenoid vallve	SV3~8 heat exchanger capacity control		Controls heat exchanger capacity of outdoor unit.	AC 220 to 240 V Close: conducting Open : not conducting	Conductivity test using tester.
		SV6a discharge-suction bypass		Evaporation of liquid refrigerant inside MC2.	AC 220 to 240 V Open : conducting Close: not conducting	
	Linear expansion valve	SLEV (Oil re-turn)		Adjusts the rate of refrigerant (oil) re-turning from the accumulator.	DC 12 V stepping motor drive valve opening amount 0 to 480 pulse (Direct drive type).	Same as indoor unit LEV. However, the resistance value is different than the in-door unit.
	Heater	CH11 CH12 crankcase heater		Refrigerant heating inside compressor.	Belt heater AC 200 to 240 V MC1 1280 Ω 45 W MC2 400: 1280 Ω 45 W 500: 1029 Ω 56 W	Resistance check
		CH2 CH3 Accumulator liquid level detection		Refrigerant heating of accumulator liquid level detection circuit.	Code heater 2880 Ω (1440 Ω + 1440 Ω) AC 220 to 240 V 20 W (10 W + 10 W)	Resistance check
	4-way valve	21S4a		Switching of cooling/heating cycle.	AC 220 to 240 V Not conducting: cooling cycle Conducting : heating cycle	Conductivity check using tester.
		21S4b				

[5] Resistance of Temperature Sensor

Thermistor for low temperature

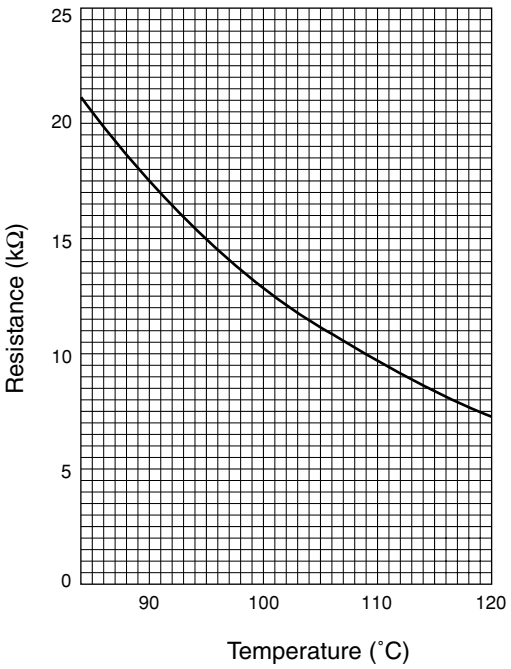
Thermistor R_o= 15kΩ ± 3% (TH3 ~ 9)

$R_t = 15\exp\{3460\,(\frac{1}{273+t} - \frac{1}{273+0})\}$



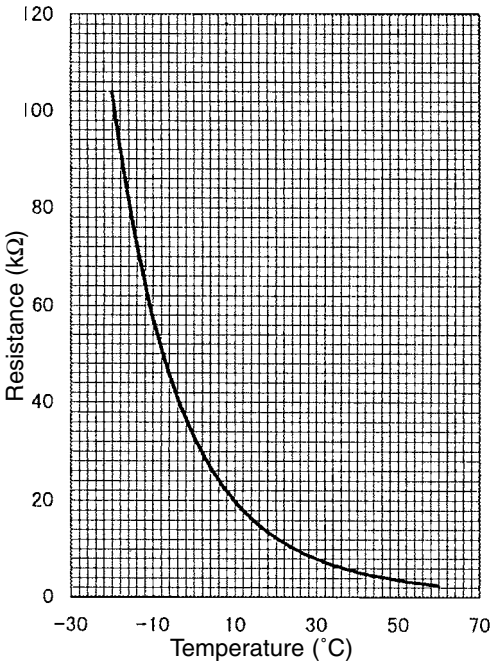
Thermistor R_{120} = 7.465kΩ ± 2% (TH1, 10)

$R_t = 7.465\exp\{4057\,(\frac{1}{273+t} - \frac{1}{273+120})\}$



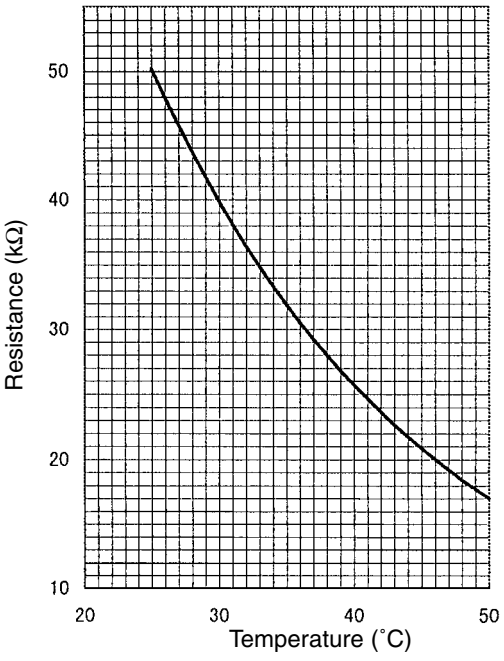
Thermistor R_o = 33kΩ ± 1% (TH2)

$R_t = 33\exp\{3965\,(\frac{1}{273+t} - \frac{1}{273+0})\}$



Thermistor R_{50} = 17kΩ ± 2% (THHS)

$R_t = 17\exp\{4170\,(\frac{1}{273+t} - \frac{1}{273+50})\}$



6 REFRIGERANT AMOUNT ADJUSTMENT

By clarifying the relationship between the refrigerant amount and operating characteristics for BgR2 Series, conduct service activities such as decision on the amount and adjustment of refrigerant on the market.

[1] Operating Characteristics and Refrigerant Amount

The followings are operating characteristics and refrigerant amount which draw special attention.

1	During cooling operations, required refrigerant amount tends to increase (refrigerant in accumulator decreases) in proportion to increase in the number of operating indoor units. However, the change of increase rate is small.		
2	During heating operations, liquid level of accumulator is the highest when all the indoor units are operating.		
3	Discharge temperature hardly changes when increasing or decreasing refrigerant amount with accumulator filled with refrigerant.		
4	Tendency of discharge temperature	During cooling operations, discharge temperature tends to rise at overload than low temperature.	Comparison including control system
		During heating operations, discharge temperature tends to rise at low temperature than overload.	
		The lower the operating frequency is, the higher the discharge temperature tends to become because of deteriorated compressor efficiency.	
5	Compressor shell temperature is 20 ~ 70 degrees higher than low pressure saturation temperature (TH2) when refrigerant amount is appropriate. → Judged as over replenishment when temperature difference from low pressure saturation temperature (TH2) is 10 degrees or less.		

[2] Adjustment and Judgement of Refrigerant Amount

(1) Symptom

The symptoms shown in the table below are the signs of excess or lack of refrigerant amount. Be sure to adjust the amount of refrigerant in refrigerant amount adjustment mode, by checking operation status, judging refrigerant amount, and performing LED monitor display with LED Dip S/W1, 1-10, for overall judgement of excess or lack of refrigerant amount.

1	Error stop at 1500 remote controller display (excessive refrigerant replenishment)	Excessive refrigerant replenishment
2	Operating frequency does not fully increase, thus resulting in insufficient capacity	Insufficient refrigerant replenishment
3	Error stop at 1102 remote controller display (discharge temperature trouble)	
4	Error stop at 1501 remote controller display (low refrigerant trouble)	

(2) Refrigerant Volume

1) Checking the Operating Condition

Operate all the indoor units in cooling or in heating, checking the discharge temperature, sub-cooling, low pressure saturation temperature, inlet temperature, shell bottom temperature, fluid level, fluid step, etc. and rendering an overall judgment.

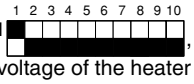
Note:

Depending on the operating state, AL = 0 does not mean that there is insufficient refrigerant.

	Condition	Judgment
1	Discharge temperature is high. (125°C or higher)	Refrigerant volume tends toward insufficient.
2	Low pressure saturation temperature is extremely low.	
3	Inlet superheating is high (if normal, SH = 20 deg. or lower).	
4	Shell bottom temperature is high (the difference with the low pressure saturation temperature is 70 deg. or greater)	
5	Shell temperature is low (the difference with the low pressure saturation temperature is 10 deg. or lower).	Refrigerant volume tends toward overcharge.
6	Liquid level AL = 2	

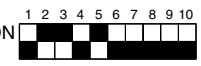
2) Cautions When Judging the Liquid Level

If you are judging the liquid level, be sure the liquid level sensor function (sensor and heater) are operating normally.

	Check Items	Judgment
1	Liquid Heater Disconnection Check	Normal if the resistance is 2.8 kΩ ± 7 %.
2	Liquid Heater Output Check Turn 1 ON on the LED monitor display switch (SW1)  , and output the signal for the heater relay to LED 5, then check the voltage of the heater terminal (AC 198 ~ 264 V) (leave the heater connections as they are).	Normal if AC 198 ~ 264 V is output together with the LED lighting.
3	Use the LED monitor display to check if there is misalignment between the actual temperature and the detected temperature of TH2 ~ TH4.	

3) Check the refrigerant volume by LED monitor display using the LED.

Set the LED monitor display switch (SW1) as shown below and check the past information (history) concerning the refrigerant volume.

Set SW1 as shown in the figure at right. 

If LD3 lights up, it indicates the refrigerant charge abnormal delay state just before emergency stop due to refrigerant overcharge (1500).

(3) Additional Refrigerant Charge Volume

At the time of shipping from the factory, the outdoor unit is charged with the amount of refrigerant shown in the following table, but since no extension piping is included, please carry out additional charging on-site.

Outdoor Unit Model	P400	P500
Refrigerant Charge Volume	20 kg	22 kg

Calculation Formula

Calculate the additional refrigerant volume by calculating the size of the extension liquid piping and its length (units: m).

Additional Refrigerant Volume (kg) = $(0.31 \times L_1) + (0.12 \times L_2) + (0.06 \times L_3) + (0.024 \times L_4) + \alpha 1 + \alpha 2$ (Note 1)

In the calculation results, round up fractions smaller than 0.01 kg. (Example: 18.54 kg → 18.6 kg)

(α Calculation Table)

Total Capacity of Connected Indoor Units	α1
161 ~ 330	2.0 kg
331 ~ 480	2.5 kg
481 ~ 630	3.0 kg
631 ~	4.0 kg

	α2
BC controller (master) only	0 kg
BC controller (slave) connected	3.0 kg

L_1: Length of ϕ25.4 high press pipe (m)
L_2: Length of ϕ12.7 liquid pipe (m)
L_3: Length of ϕ9.52 liquid pipe (m)
L_4: Length of ϕ6.35 liquid pipe (m)
α1: refer to the calculation table.

(Note 1) : In case high press pipe size (L_1) is ϕ22.22, $0.25 \times L_1$.

[3] Refrigerant Volume Adjustment Mode Operation

(1) Procedure

Depending on the operating conditions, it may be necessary either to charge with supplementary refrigerant, or to drain out some, but if such a case arises, please follow the procedure given below.

(1) Switching the function select switch (SW2-4), located on the outdoor unit's control board, ON starts refrigerant volume adjustment mode operation and the following operation occurs. (Refrigerant recovery mode and oil recovery mode will be invalid.)

(2) Additionally, if the LED monitor display switch (SW1) on the outdoor unit's control board is set to 

, the accumulator's liquid level is indicated by the LED lighting position.

AL = 0 (No fluid in accumulator)
AL = 1 (Liquid in accumulator)
AL = 2 (Overcharge)

Notes 1 **Even if AL = 1 for a short time after operation in the refrigerant volume adjustment mode starts, as time passes (as the refrigeration system stabilizes), it may change to AL = 0.**

Notes 2 **As the refrigerant volume cannot be adjusted in the heating mode, retrieve the refrigerant, evacuate air and then fill the specified volume of refrigerant if it is necessary to adjust the refrigerant volume in the winter season.**

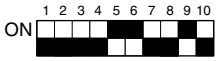
Notes 3 A refrigerant volume adjustment performed in the cooling mode must be done with a gauge reading of 13 kg/cm^{2}G or higher.
If the pressure does not reach this guage reading the refrigerant cannot be collected.
Therefore, collect used refrigerant and evacuate the unit completely, and then fill new refrigerant up to a specified quantity.

Notes 4 **Judgment by the AL is at best only a rough guideline. Please do not add refrigerant based on the AL reading alone. (Be sure to obtain calculations of the correct amount before adding refrigerant.)**

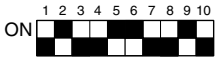
Notes 5 When supplementing the refrigerant volume, please be careful to charge with liquid refrigerant.

TH1

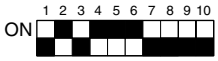
SC11



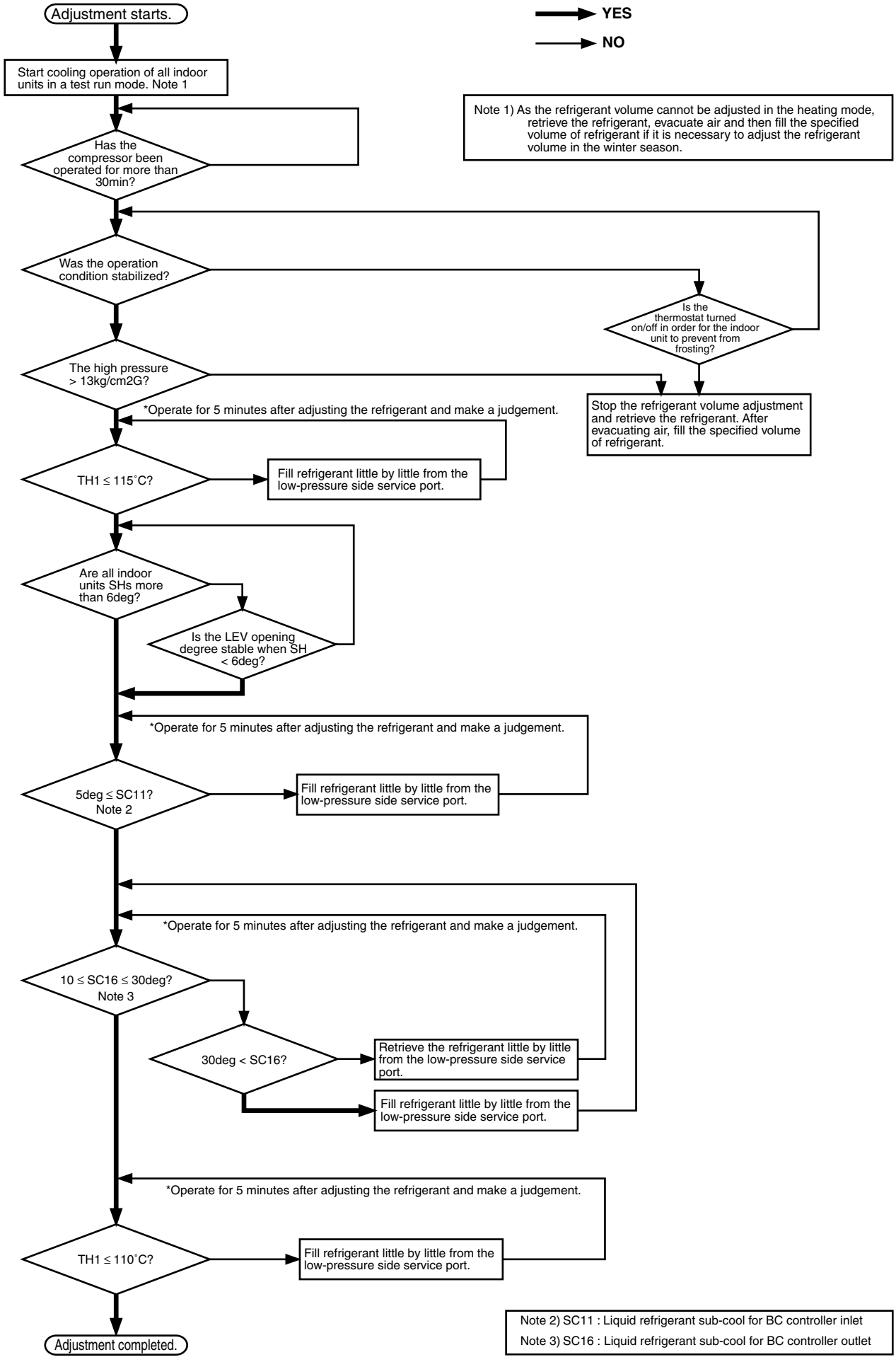
SC16



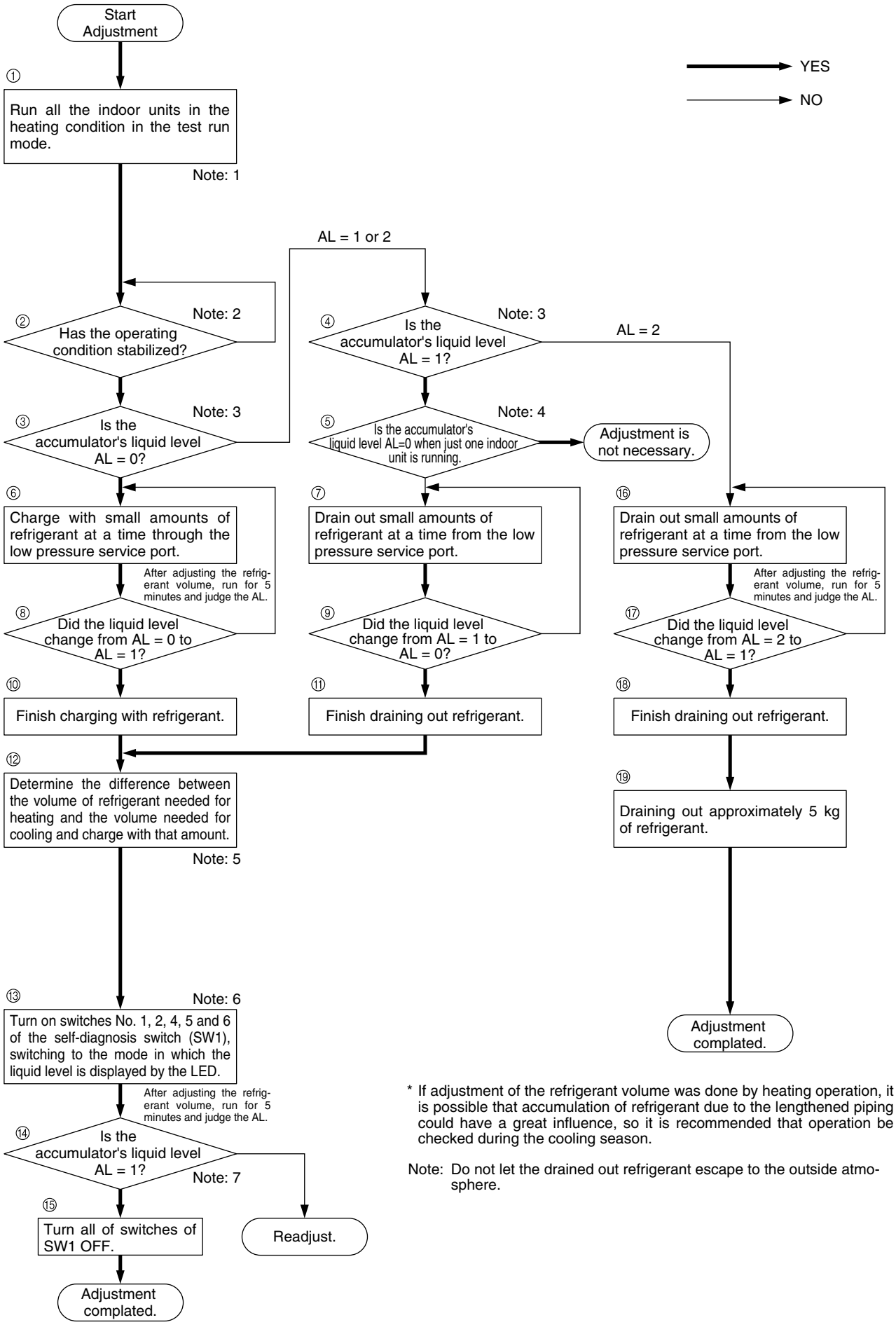
Pd (High pressure)



(2) Refrigerant adjustment in Cooling season (Flow chart)



(3) Refrigerant adjustment in heating season (Flow chart)



* If adjustment of the refrigerant volume was done by heating operation, it is possible that accumulation of refrigerant due to the lengthened piping could have a great influence, so it is recommended that operation be checked during the cooling season.

Note: Do not let the drained out refrigerant escape to the outside atmosphere.

Note: 1 If there are any units that are not operating, it will cause refrigerant to accumulate, so by all means operate all the indoor units. Also, in order to prevent stable operation from being disrupted by the thermostat going OFF, set the trial operation mode.

Note: 2 If the high pressure is stabilized, it is safe to judge that the operation condition is stable.
Judge that operation is stabilized or not stabilized by whether the compressor starts after 3 or more minutes have passed.

Note: 3 When turning on SW1 to 

, the LED will display the liquid level.

Note: 4 If AL = 1, it indicates that adjustment is not necessary, but when the liquid level is on the low side even if it is in the AL = 1 region, if one unit only is run and refrigerant is accumulating in the units that are stopped, it may result in there being insufficient refrigerant, so at such a time, adjustment is necessary.

Note: 5 Determine the difference in the volume of refrigerant necessary for cooling and for heating as follows, and carry out supplementary charging in accordance with the table below.

* The piping length is the total pipe length calculated for a high press pipe with a ϕ25.4 size.

Pipe Length	60 m or less	60 ~ 90 m	90 m or longer
Additional Refrigerant Volume	18 kg	27 kg	31 kg

If the liquid pipe size is ϕ 12.7, the actual length is 0.3
If the liquid pipe size is ϕ 9.52, the actual length is 0.2
If the liquid pipe size is ϕ 6.35, the actual length is 0.1

7 TROUBLESHOOTING

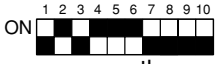
[1] Principal Parts

(1) Pressure Sensor

1) Check for failure by comparing the sensing pressure according to the high pressure/low pressure pressure sensor and the pressure gauge pressure.
Turn on switches 1, 3, 5, 6 (High) and 2, 4, 5, 6 (Low) of the digital display select switch (SW1) as shown below, and the sensor pressure of the high pressure/low pressure sensors is displayed digitally by the light emitting diode LD1.

High Pressure

Low Pressure



1 In the stopped condition, compare the pressure readings from the gauge and from the LD1 display.
(a) If the gauge pressure is 0.098MPa, the internal pressure is dropping due to gas leakage.
(b) If the pressure according to the LD1 display is 0.098MPa, there is faulty contact at the connector, or it is disconnected. Proceed to 4.
(c) If the pressure according to the LD1 display is 3.14MPa or higher, proceed to 3.
(d) If other than (a), (b) or (c), compare the pressure readings during operation. Proceed to 2.

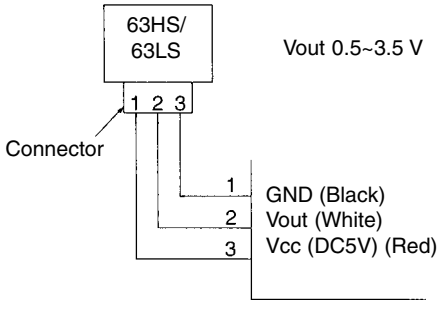
2 Compare the pressure readings from the gauge and from the LD1 display while in the running condition.
(a) If the difference between the two pressures is within 0.098MPa, both the affected pressure sensor and the main MAIN board are normal.
(b) If the difference between the two pressures exceeds 0.098MPa, the affected pressure sensor is faulty (deteriorating performance).
(c) If the pressure reading in the LD1 display does not change, the affected pressure sensor is faulty.

3 Disconnect the pressure sensor from the MAIN board and check the pressure according to the LD1 display.
(a) If the pressure is 0.098MPa on the LD1 display, the affected pressure sensor is faulty.
(b) If the pressure is 3.14MPa (in the case of the low pressure sensor, 0.98MPa) or higher, the MAIN board is faulty.

4 Disconnect the pressure sensor from the MAIN board and short out the No. 2 and No. 3 pins of the connector (63HS, 63LS), then check the pressure by the LD1 display.
(a) If the pressure according to the LD1 display is 3.14MPa (in the case of the low pressure sensor, 0.98MPa) or higher, the affected pressure sensor is faulty.
(b) If other than (a), the MAIN board is faulty.

2) Pressure sensor configuration.
The pressure sensors are configured in the circuit shown in the figure at right. If DC 5 V is applied between the red and black wires, a voltage corresponding to the voltage between the white and black wires is output, and this voltage is picked up by the microcomputer. Output voltages are as shown below.

High Pressure	0.1 V per 0.098MPa
Low Pressure	0.3 V per 0.098MPa



(2) Solenoid Valve (SV1~8)

Check if the control board's output signals and the operation of the solenoid valves match.

Setting the self-diagnosis switch (SW1) as shown in the figure below causes the ON signal of each relay to be output to the LED's.

Each LED shows whether the relays for the following parts are ON or OFF. When a LED lights up, it indicates that the relay is ON.

SW1	LED							
	1	2	3	4	5	6	7	8
				2154a 2154b	SV1		SV22/32	
	SV4a			SV6a				
	SV3	SV4	SV5	SV6	SV7, 8			

1) SV1 (Bypass valve)

① Since SV1 will be set to ON four minutes after the compressor has started operation, confirm operation by monitoring the LED display and listening for the operation of the solenoid valve.

② It is possible to confirm the switching being performed by the operation of the solenoid valve while the unit is operating by monitoring the temperature of the bypass circuit or the sound of the refrigerant.

2) SV22, SV32 (Full load/unload switching valve) (only P500YEM-A)

① The No. 1 compressor is started first and operates for approximately 10 minutes and then the No. 2 compressor starts in the unload mode. Since it will then switch to full load within 5 minutes, the operation can be confirmed by the LED display and the operating temperature of the solenoid valve. (If the indoor unit operating is small, the No. 2 compressor will not start.)

② It is possible to determine whether or not the compressors are switching from unload to full load by checking the changes in amperage of the compressor at the moment of switching. The amperage under full load will be approximately 30 to 40 % more than operation under unload.

Note: The solenoid valve for SV22 is closed when conducting electricity while the SV32 is open when conducting electricity.

3) SV4a (Bypass valve)

① During unload operation in the cooling mode and when there is a rise in temperature and during unload operation in the heating mode, SV4a will be set to ON according to conditions, making is possible to check operation by the LED display and the operating sound of the solenoid valve.

② It is possible to confirm the switching for the operating status by the temperature of the bypass circuit or the sound of the refrigerant during the operation of the solenoid valve.

4) SV6b

When No. 2 compressor is operating and No. 2 compressor is stopped, the main SV6 will be set to ON, making it possible to confirm operation by monitoring the LED display and listening to the operating sound. Note that it may be set to OFF if the outlet temperature (TH11) exceeds 120°C .

5) 21S4a, 21S4b

21S4a, 21S4b are turned on during heating mode and heating-main mode.

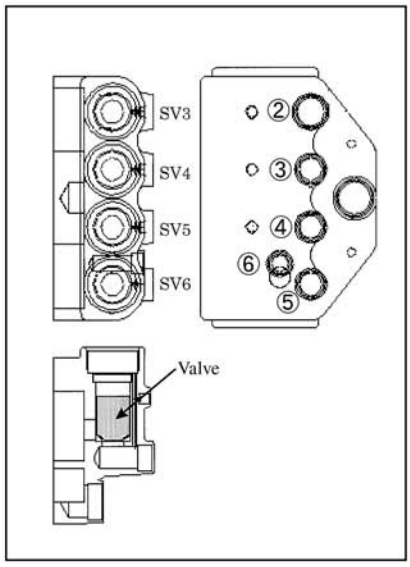
6) SV3 ~ 8 (Control of heat exchanger capacity)

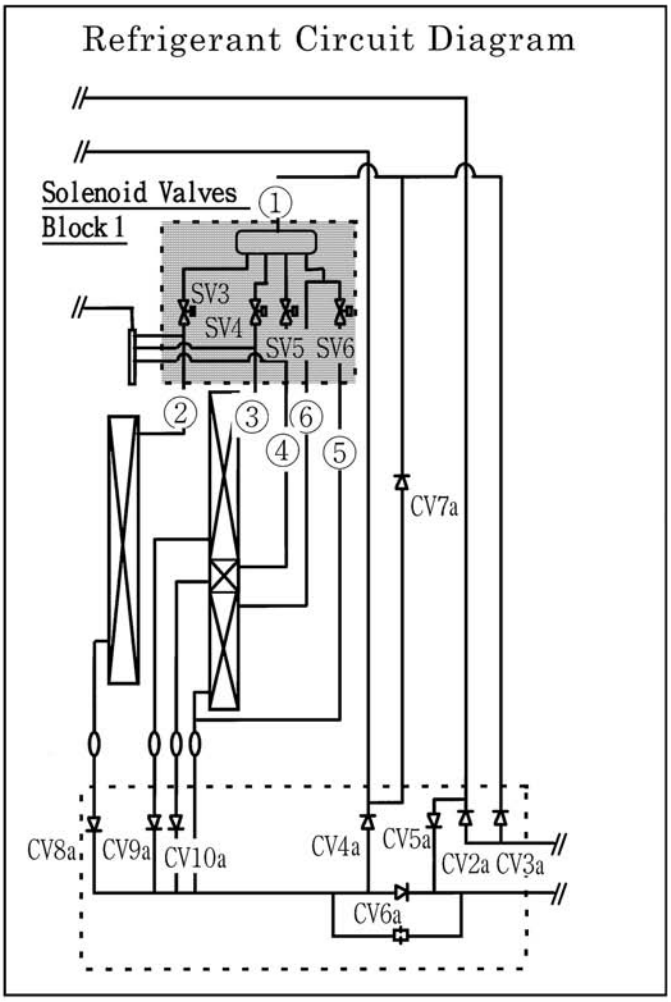
(a) Operations can be confirmed by LED display and operating sound of solenoid valve, because one or more of SV3 ~8 are turned on depending on conditions during cooling-only operations.

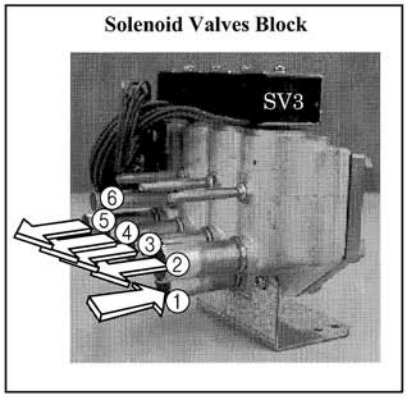
(b) Operation can be confirmed by LED display and operating sound of solenoid valve, because all of SV3 ~ 8 are turned on during heating-only operations.

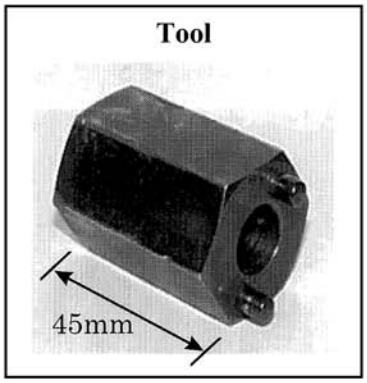
(c) Operations can be confirmed by LED display and operating sound of solenoid valve, because one or more of SV3 ~8 are turned on depending on conditions during cooling-principal and heating-principal operations.

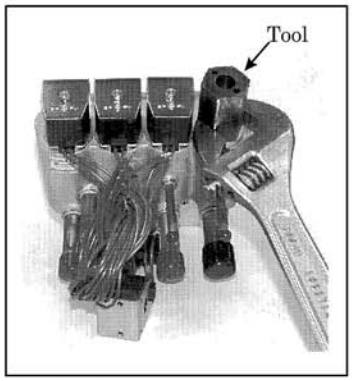
(d) The refrigerant flow is shown in the following figure. Hot gas (high pressured) flows in cooling mode and cool gas/ liquid (low pressured) flows in heating mode. Please refer to the Refrigerant Circuit Diagram.
ON/OFF status of solenoid valves depend on the number of running indoor units, ambient temperature, and other factors. Check on the LED monitor display.
If the SV coil is taken off, the caps and check plungers can be opened with a tool listed on the Service Parts List.

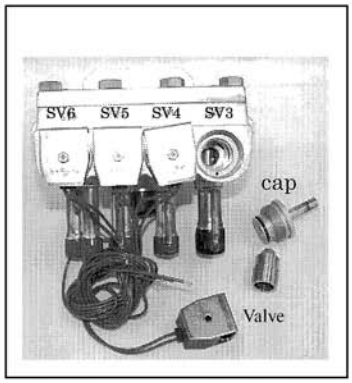




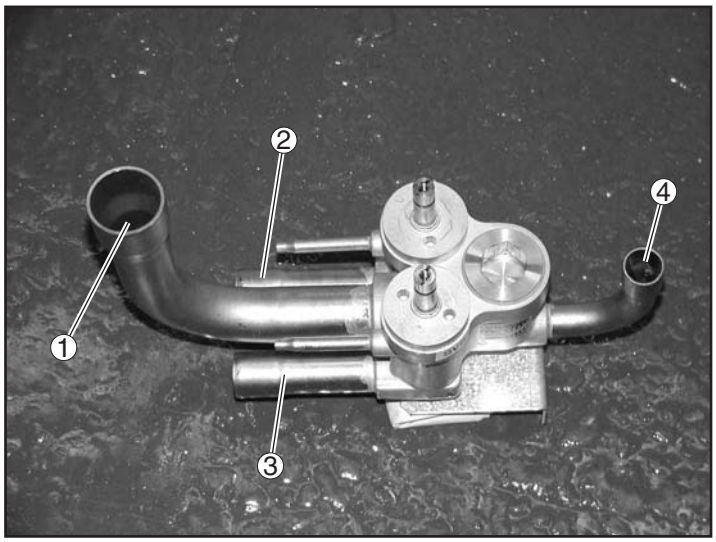


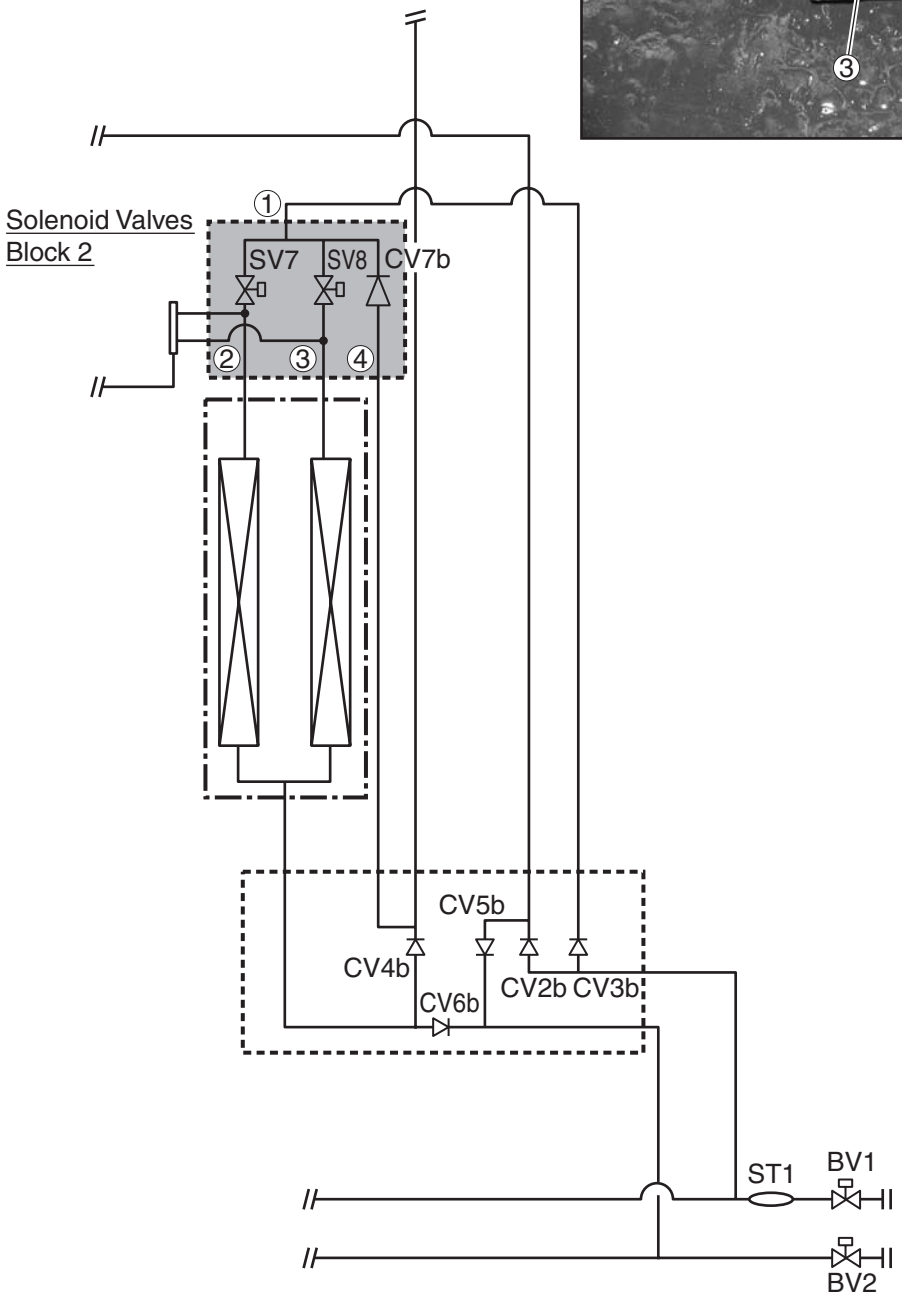






* Closed torque : 1.3N·m


①
②
③
④

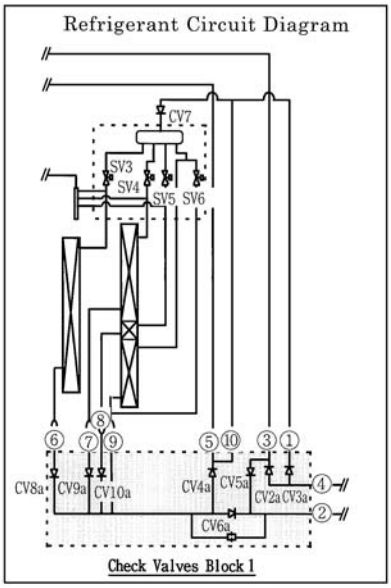

Solenoid Valves
Block 2
①
SV7
SV8
CV7b
②
③
④
CV5b
CV4b
CV2b
CV3b
CV6b
ST1
BV1
BV2

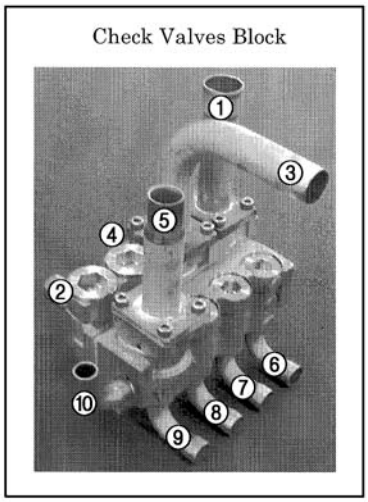
(3) Check Valves Block

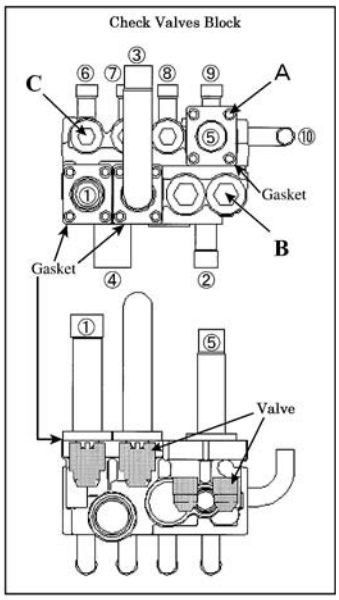
• Check Valves Block1

The refrigerant flow in the pipes ⑥, ⑦, ⑧ and ⑨ depends on the ON/OFF status of the SV3, 4, 5, and 6. Confirm the status on the LED monitor display.

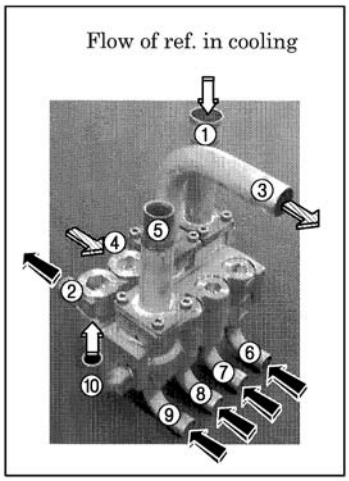
The caps on valves A, B, and C can be opened with Allen wrenches. The size is as follows.

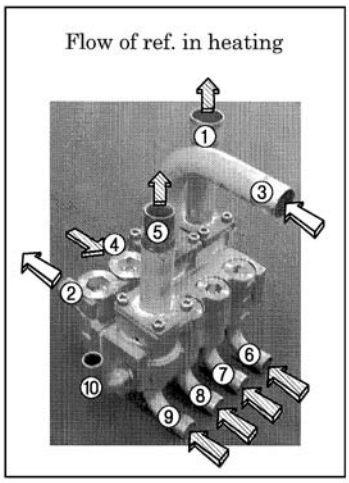




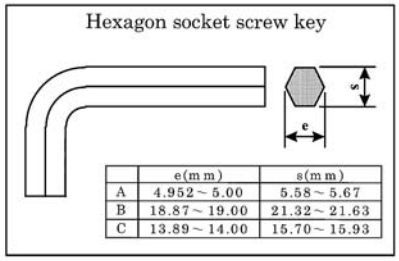


* Closed torque : A : 0.17N·m
B : 2.0N·m
C : 1.3N·m



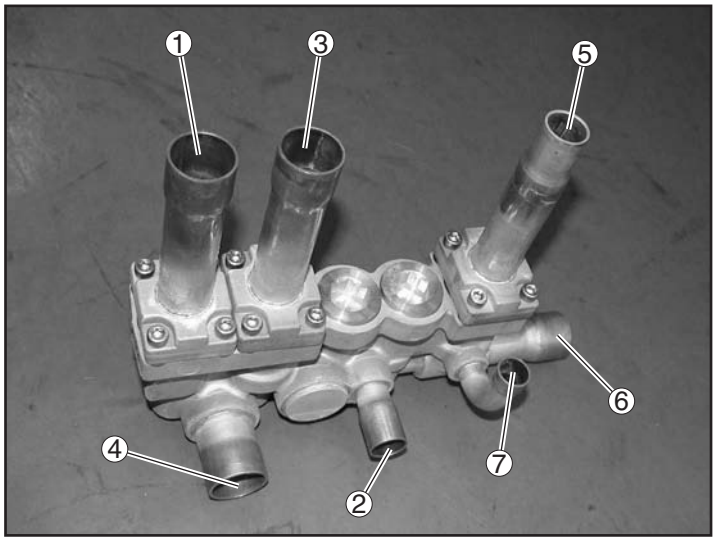


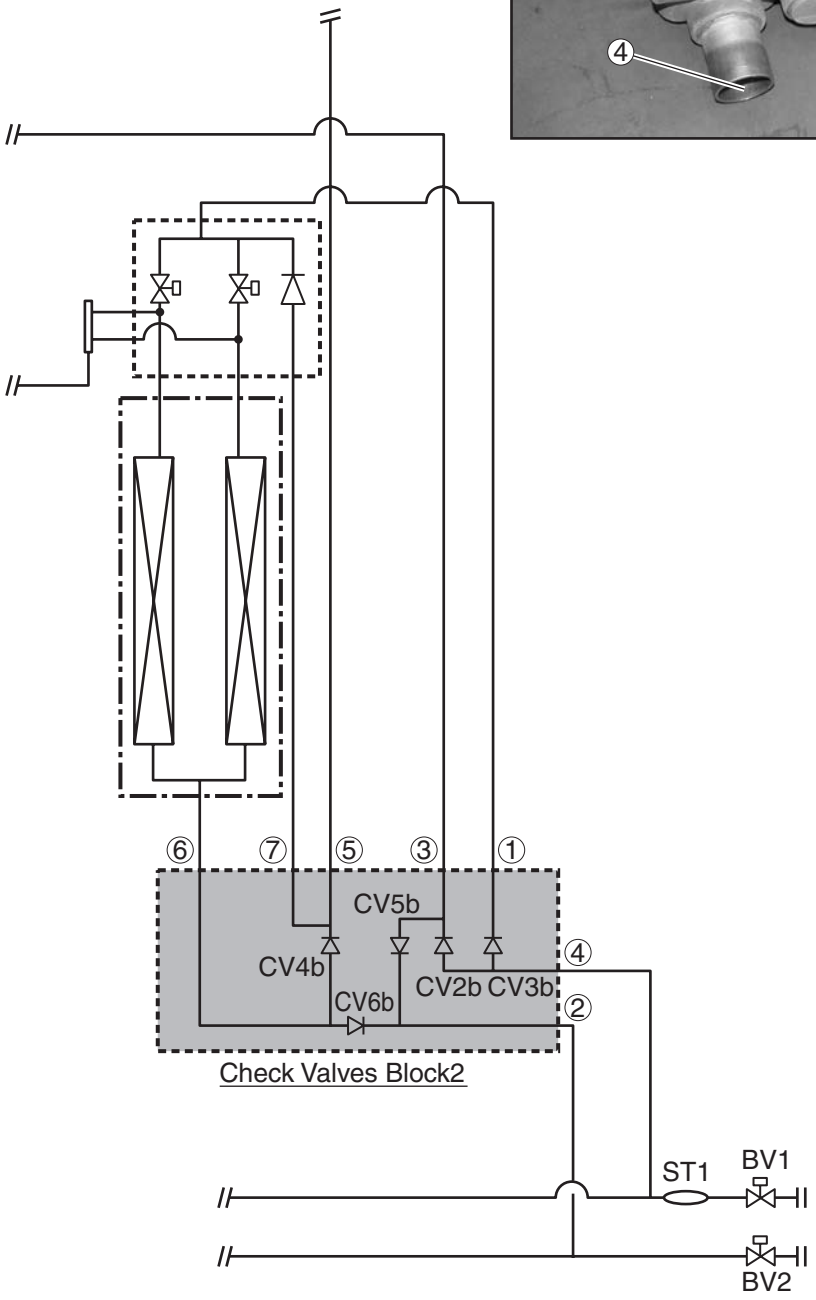
High pressure gas
High pressure liquid
Low pressure gas/liquid



	e(mm)	s(mm)
A	4.952～5.00	5.58～5.67
B	18.87～19.00	21.32～21.63
C	13.89～14.00	15.70～15.93

• Check Valves Block2



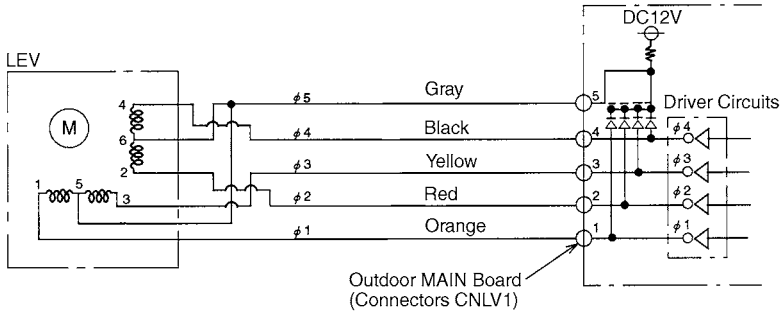


(4) LEV

• Outdoor unit

The valve percentage opening changes in proportion to the number of pulses.

(Connections between the outdoor unit's MAIN board and SLEV, (PURY-P400·500YEM-A))



Pulse Signal Output and Valve Operation

Output (phase)	Output states							
	1	2	3	4	5	6	7	8
ϕ1	ON	OFF	OFF	OFF	OFF	OFF	ON	ON
ϕ2	ON	ON	ON	OFF	OFF	OFF	OFF	OFF
ϕ3	OFF	OFF	ON	ON	ON	OFF	OFF	OFF
ϕ4	OFF	OFF	OFF	OFF	ON	ON	ON	OFF

Output pulses change in the following orders:

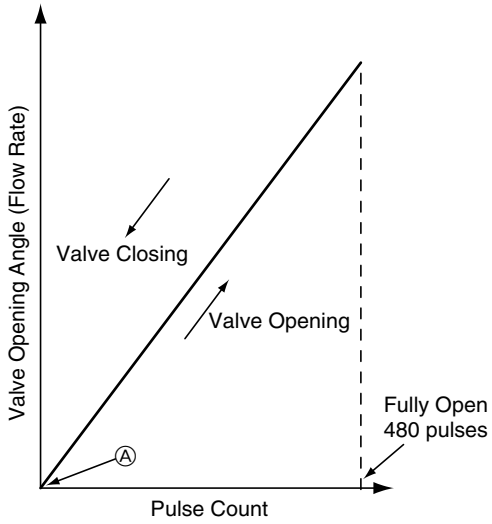
When the valve is Closed 1→2→3→4→5→6→7→8→1

When the valve is Open 8→7→6→5→4→3→2→1→8

*1. When the LEV percentage opening does not change, all the output phases are off.

2. When the output is out of phase or stays on, the motor cannot run smoothly, and it jerks and vibrates.

LEV Valve Closing and Valve Opening Operations



* When the power is switched on, a 520-pulse valve opening signal is output to locate the valve's position to ensure that it is at point Ⓐ. (The pulse signal is output for approximately 17 seconds.)

* Normal operation of the valve does not produce noise or vibration. When the valve is locked, it produces noise.

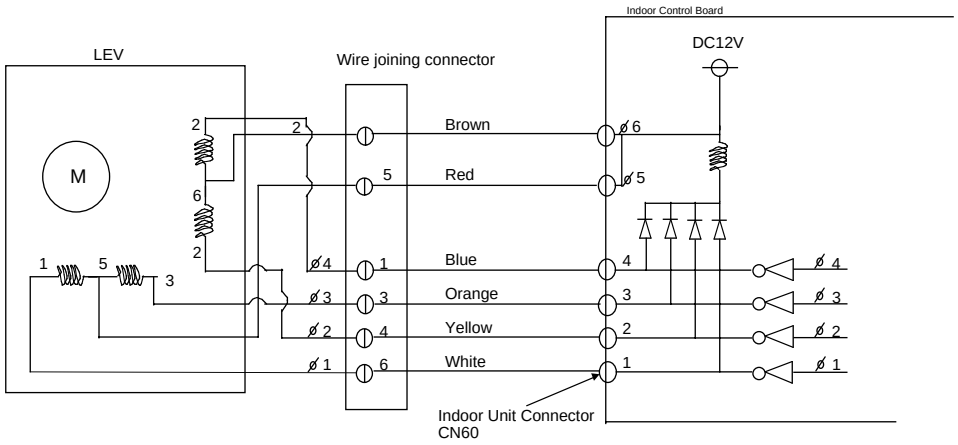
* Hold the tip of a screwdriver against it and the handle against your ear, and listen for operating sounds.

* If there is liquid refrigerant inside the LEV, the sound may become lower.

• Indoor unit and BC controller

The valve opening angle changes in proportion to the number of pulses.

(Connections between the indoor unit's MAIN board and indoor LEV)



Pulse Signal Output and Valve Operation

Indoor LEV Pulse Signal and Valve Operation

Output Phase	Output State			
	1	2	3	4
ø 1	ON	OFF	OFF	ON
ø 2	ON	ON	OFF	OFF
ø 3	OFF	ON	ON	OFF
ø 4	OFF	OFF	ON	ON

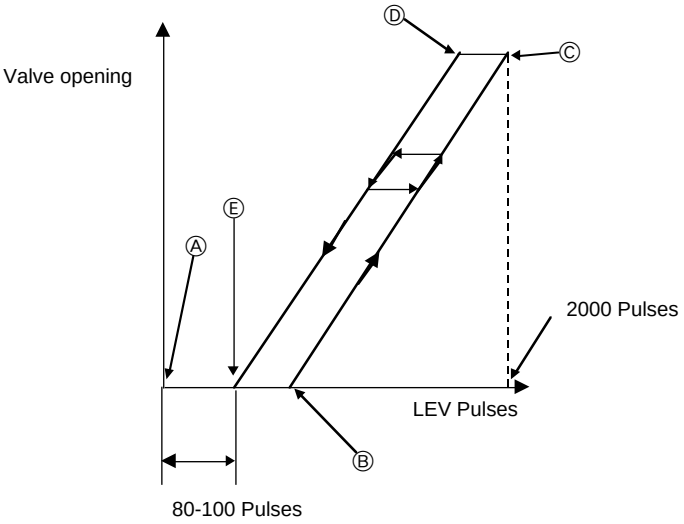
Output pulses change in the following orders:

When the valve is Closed 1→2→3→4→1

When the valve is Open 4→3→2→1→4

* 1. When the LEV opening angle does not change, all the output phases are off.
2. When the output is out of phase or stays on, the motor cannot run smoothly, and it jerks and vibrates.

LEV Valve Closing and Valve Opening Operations



* When the power is switched on, a 2200-pulse valve opening signal is output to locate the valve's position to ensure that it is at point Ⓐ. (The pulse signal is output for approximately 17 seconds.)

* Normal operation of the valve does not produce noise or vibration. When the valve is locked, or Ⓔ → Ⓐ it produces noise.

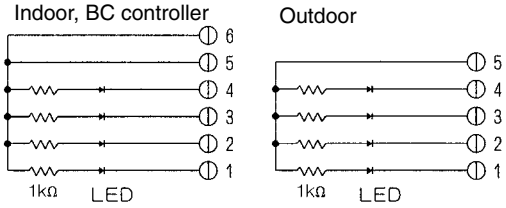
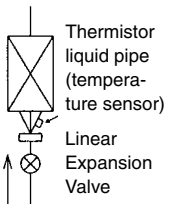
* Hold the tip of a screwdriver against it and the handle against your ear, and listen for operating sounds.

* If there is liquid refrigerant inside the LEV, the sound may become lower.

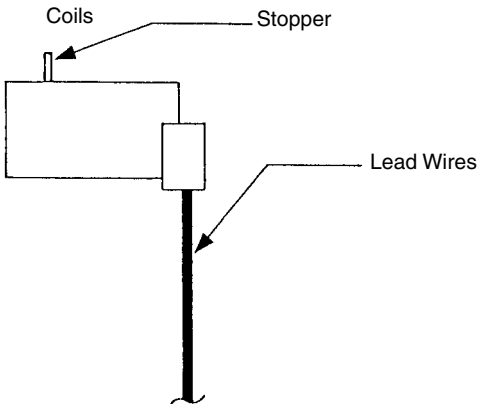
• Judgment methods and likely modes of failure

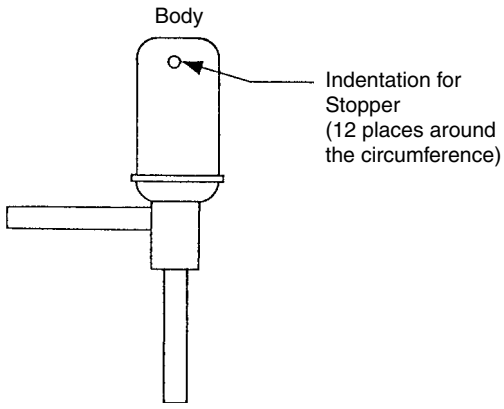
Caution:

Since the specifications of the outdoor unit (outdoor LEV) and indoor unit (indoor LEV) differ, there are cases where remedies to be taken also differ. Follow the remedy specified for the appropriate LEV as indicated in the right column.

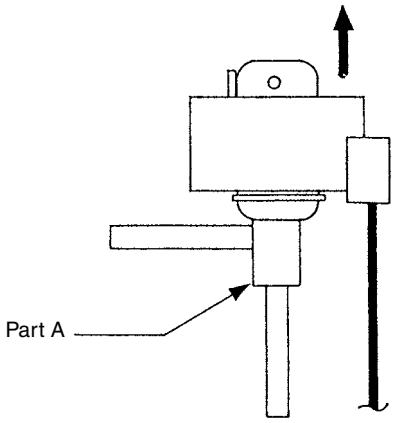
Failure Mode	Judgment Method	Remedy	Affected LEV
Microcomputer driver circuit failure	① Disconnect the control board connector and connect the check LED as shown in the figure below.  When the base power supply is turned on, the indoor LEV outputs pulse signals for 10 seconds, the outdoor LEV outputs pulse signals for 17 seconds, and BC controller outputs pulse signals for 10-20 seconds. If the LED does not light up, or lights up and stays on, there is a problem with the driver circuit.	In the case of driver circuit failure, replace the control board.	Indoor BC controller Outdoor
LEV mechanism is locked.	① If the LEV is locked up, the drive motor turns with no load and generates a small clicking sound. Generation of this sound when the LEV is fully closed or fully open is abnormal.	Replace the LEV.	Indoor BC controller Outdoor
The LEV motor coils have a disconnected wire or is shorted.	Measure the resistance between the coils (red - white, red - orange, brown - yellow, brown - blue) using a tester. They are normal if the resistance is within 150Ω ± 10%.	Replace the LEV coils.	Indoor BC controller
	Measure the resistance between the coils (gray - orange, gray - red, gray - yellow, gray - black) using a tester. They are normal if the resistance is within 46Ω ± 3%.	Replace the LEV coils.	Outdoor
Incomplete closure of the valve	① When checking the indoor unit's LEV, operate the indoor unit's blower and the other indoor units in the cooling mode; then, check the piping temperatures (liquid pipe temperatures) of the indoor units by the operation monitor through the heat source unit's control board. When the fan is running, the linear expansion valve should be fully closed, so if there is leakage, the temperature sensed by the thermistor (liquid pipe temperature sensor) will become low. If the temperature is considerably lower compared to the remote control's intake temperature display, it can be judged that the LEV is not fully closed.  In the case of minimal leakage, it is not necessary to replace the LEV.	If there is a large amount of leakage, replace the LEV.	Indoor BC controller
Faulty wire connections in the connector or faulty contact.	① Check for pins not fully inserted on the connector and check the colors of the lead wires visually. ② Disconnect the control board's connector and conduct a continuity check using a tester.	Check the continuity at the places where trouble is found.	Indoor BC controller Outdoor

Outdoor LEV (SLEV) Coil Removal Procedure (configuration)
As shown in the figure, the outdoor LEV is made in such a way that the coils and the body can be separated.

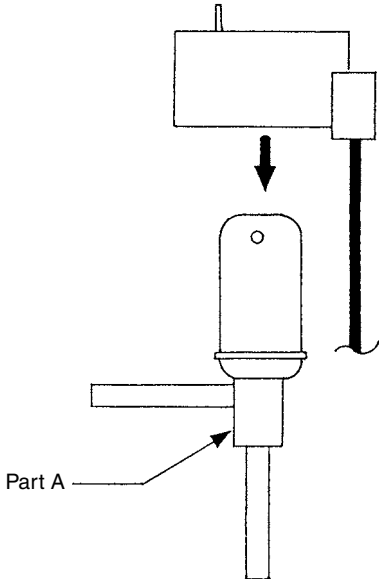




<Removing the Coils>
Fasten the body tightly at the bottom (Part A in the figure) so that the body will not move, then pull out the coils from the top. If they catch on the stopper and are difficult to remove, turn the coils left and right until the stoppers are free from the stopper indentations; then pull the coils out.
If you take out only the coils without gripping the body, undue force will be applied to the piping and the pipe may be bent, so be sure to fasten the body in such a way that it will not move.



<Installing the Coils>
Fasten the body tightly at the bottom (Part A in the figure) so that the body will not move; then, insert the coils from the top, inserting the coils' stopper securely in one of the indentations on the body. (There are four indentations for the stopper on the body around its circumference, and any of the four indentations may be used. However, be careful not to apply undue force to the lead wires or twist them around inside the body.) If the body is not gripped firmly when the coils are inserted, it may exert undue force on the piping, causing it to bend. Be sure to hold the body firmly and securely in place when installing the coils.



(5) Inverter and Compressor

a. **Replace only the compressor** if only the compressor is found to be defective.
(Over current will flow through the inverter if the compressor is damaged; however, the power supply is automatically cut off when over current is detected, protecting the inverter from damage.)
b. Replace the defective components if the inverter is found to be defective.
c. If both the compressor and the inverter are found to be defective, replace the defective components of both devices.

1) Inverter related defect identification and countermeasures

	Error display/failure condition	Measure/inspection item
[1]	Inverter-related errors (0403, 4200, 4220, 4230, 4240, 4250, 4260, 5110, 5301)	7 [3] Check the details of the inverter error in the error log at the outdoor PCB LED monitor display. 7 [2] Perform the measures corresponding to the error code and error details determined, using the remote control error display self-diagnosis and countermeasures.
[2]	Main power breaker trip	a. Check the breaker capacity.
		b. Electrical system short circuit or grounding other than the inverter
		c. Refer to 3)-[1] if not a, or b.
[3]	Main power earth leakage breaker trip	a. Earth leakage breaker capacity/sensitivity current check
		b. Meg defect for electrical system other than the inverter
		c. Refer to 3)-[1] if not a, or b.
[4]	Only the Compressor does not operate.	· Check the inverter frequency at the LED monitor and proceed to 2)-[3] if the status is operational.
[5]	The compressor always vibrates strongly or emits an abnormal noise.	Go to 2)-[3].
[6]	Noise has penetrated the peripheral device.	a. Check to ensure that power supply wiring, etc. of the peripheral device is not in close contact with the power supply wiring of outdoor unit.
		b. Check to ensure that the inverter output wiring is not in close contact with the power supply wiring and transmission lines.
		c. Check to ensure that the transmission line shield wiring is being used properly in the necessary environment, and that the shield wire ground is appropriate.
		d. Meg defect for electrical system other than the inverter
		e. Attach a ferrite core to the inverter output wiring. (Please contact the factory for details of the service part settings)
		f. Change the power to another system.
		g. If this problem occurs suddenly, there is a possibility that the inverter output is grounded. Proceed to 2)-[3].
		* Contact the factory for cases other than those listed above.
[7]	Sudden malfunction (as a result of external noise.)	a. Check to ensure that the unit is grounded.
		b. Check to ensure that the transmission line shield wiring is being used properly in the necessary environment and that the shield wire ground is appropriate.
		c. Check to ensure that neither the transmission line nor external connection wiring runs close to another power supply system or runs through the same conduit.
		* Contact the factory for cases other than those listed above.

1. Due to a large capacity electrolytic capacitor used in the inverter, voltage is still applied, even after turning off the main power, creating the possibility of electric shock. Wait for a sufficient length of time (5-10 min.) after turning off the main power, and check the voltage at both terminals of the electrolytic capacitor before performing any checks on the inverter.
2. Damage to the components of IPM will result, if the inverter wiring is not properly secured with screws, or if the connector has not been properly inserted. It is likely that any errors occurring after replacing components are the result of wiring mistakes. Ensure that the wiring, screws, connectors, and Faston, etc. are properly inserted.
3. Do not remove or insert inverter connectors with the main power supply on, as this will result in damage to the PCB.
4. The current sensor will be damaged if current flows through without it being connected to the PCB. Always insert connectors into the corresponding PCB when running the inverter.

2) Treatment of Inverter Output Related Troubles

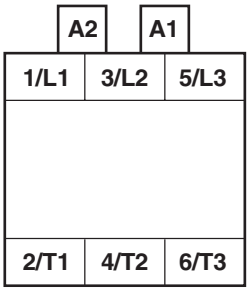
	Check item	Symptom	Remedy
[1] Check the INV board error detection circuit.	Perform the following: ①Disconnect INV board CNDR2. After removing, turn on the outdoor unit and check the error status. (The compressor does not operate when CNDR2, which carries the IPM drive signal, has been disconnected.)	① IPM/overcurrent error. (4250)	· Replace INV board.
		② ACCT sensor circuit error. (5301 detailed No. 6)	See to 7 [1] (5) 4) "Current Sensor ACCT" Check the resistance and replace if erroneous. Replace the INV board if the ACCT status is normal.
		③ ACCT sensor circuit error. (5301 detailed No. 13)	· INV board error detection circuit is normal. Because IPM cannot run, if the CNDR2 is disconnected.
[2] Check for compressor ground fault or coil error.	Disconnect the compressor wiring, and check the compressor Meg and coil resistance.	①Compressor Meg failure Error if less than 1MΩ. * When no refrigerant is accumulated in the compressor. ②Compressor coil resistance failure Coil resistance value of 0.48Ω (20°C)	· Replace compressor Check whether the refrigerant is accumulating in the compressor again.
[3] Check to see if the inverter is damaged. * Perform this check if an error occurs immediately before or after turning on the compressor.	Perform the following actions: ①Reconnect the connector removed in item [1] above. ②Disconnect the compressor wiring. ③Turn on SW1-1 on the INV board. Operate the outdoor unit after taking the above two steps. Check the inverter output voltage. * It is recommended that the tester be used to determine the 7, [1] (5) 5) IPM troubleshooting when checking the inverter output voltage. * Measure when the inverter output frequency is stable.	① IPM/overcurrent error. (4250)	· Refer to item [5] for inverter circuit trouble.
		②There is a strong possibility of an inverter circuit error if the voltage unbalance across all wiring is greater than the larger of the values represented by 5% or 5V.	
		③No voltage unbalance across all wiring	See item [2]. Proceed to item [5] if there is no problem in [2]. Replace the compressor if there is no problem in [5].
[4] Check to see if the inverter is damaged. * Perform this check if an error occurs during steady operation.	Turn on the outdoor unit. Check the inverter output voltage. * It is recommended that the tester be used to determine the 7, [1] (5) 5) IPM troubleshooting when checking the inverter output voltage. * Measure when the inverter output frequency is stable.	①There is a strong possibility of an inverter circuit error if the voltage unbalance across all wiring is greater than the larger of the values represented by 5% or 5V.	· Refer to item [5] for inverter circuit trouble.
		②No voltage unbalance across all wiring	See item [2]. Proceed to item [5] if there is no problem in [2]. Replace the compressor if there is no problem in [5].

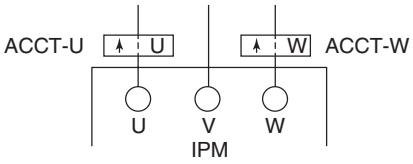
	Check item	Symptom	Remedy
[5] Check the inverter circuit trouble.	①Check to see if the IPM screw terminal is securely tightened.	①Screw terminal is loose.	· Check all IPM screw terminals and tighten them.
	②Check the exterior of the IPM.	②IPM is cracked due to swelling.	· IPM replacement Check the operation in [3] or [4] after replacing the IPM. In the case of an output voltage unbalance or error recurrence → Replace the G/A board In the case of an output voltage unbalance or error recurrence after replacement: → Replace the INV board
	③Check the resistances between each terminal of IPM. Refer to 7 [1] (5) 5) for details on IPM troubleshooting.	③Resistance error between each terminal of IPM.	· IPM replacement Check the operation in [3] or [4] after replacing the IPM. In the case of an output voltage unbalance or error recurrence: → Replace the G/A board In the case of an output voltage unbalance or error recurrence after replacement: → Replace the INV board
		④All normal for items ①-③ above	· IPM replacement In the case of an output voltage unbalance or error recurrence after replacement: → Replace the G/A board In the case of an output voltage unbalance or error recurrence after replacement: → Replace the INV board

3) Remedies for a Main Power Breaker Trip

	Check item	Symptom	Remedy
[1]	Perform Meg check between the terminals in the power terminal block Tba.	①Zero to several ohm, or Meg failure.	Check each part in the main inverter circuit. * Refer to "Simple Checking Procedure for individual component of main inverter circuit". a. Diode Stack b. IPM c. Rush current protection resistor d. Electromagnetic relay e. DC reactor f. Noise filter
[2]	Turn on the power again and check once more.	①Main power breaker trip	
		②No remote control display	
[3]	Turn on the outdoor unit and check that it operates normally.	①Operates normally without tripping the main breaker.	a. There is a possibility that the wiring shorted momentarily. Trace the short and repair. b. If item a. above is not the case, there is a possibility that there was a compressor failure.
		②Main power breaker trip	· A compressor ground fault can be suspected. Go to (2)-[2].

4) Simple Checking Procedure for Individual Component of Main Inverter Circuit

<table>
<tr><th>Part name</th><th>Inspection method</th></tr>
<tr><td>Diode Stack</td><td>Refer to "Determining Diode Stack Troubleshooting" (7 [1] (5) 6))</td></tr>
<tr><td>IPM
(Intelligent Power Module)</td><td>Refer to "Determining IPM interference" (7 [1] (5) 5))</td></tr>
<tr><td>Rush current protection resistor
R1, R5</td><td>Measure the resistance between terminals: 4.5~5.5kΩ</td></tr>
<tr><td>Electromagnetic contactor (52C)</td><td>Measure the resistance value at each terminal.
 

<table>
<tr><th>Check Location</th><th>Judgement value</th></tr>
<tr><td>A1-A2</td><td>0.1k~1.3kΩ</td></tr>
<tr><td>1/L1-2/T1
3/L2-4/T2
5/L3-6/T3</td><td>∞</td></tr>
</table></td></tr>
<tr><td>DC reactor DCL</td><td>Measure the resistance between terminals: 1Ω or lower (almost 0Ω)
Measure the resistance between terminals and the chassis: ∞</td></tr>
<tr><td>Cooling fan (MF1)</td><td>Measure the resistance between terminals : 0.1k~1.5kΩ</td></tr>
<tr><td>Transformar (To1)</td><td>Measure the resistance between terminals on the primary side (CNTR1) : 1.0k~2.5kΩ
Measure the resistance between terminals on the secondary side (CNTR) : 20~60Ω</td></tr>
<tr><td>Current sensor
ACCT</td><td>Disconnect the CNCT2 target connector and check the resistance between terminals: 35~45Ω
1-2PIN (U-phase)
3-4PIN (W-phase)
 

* Check the ACCT connecting phase and direction.</td></tr>
</table>

[Caution at replacement of inverter parts]

① Carefully check the wiring for loose and incorrect connections, for incorrect or loose connection of the power circuit wiring such as IPM and diode module causes damage to the IPM. Since loose screws are difficult to find, tighten them all after finishing all other works. When wiring the base for IPM, follow the wiring diagram below carefully.

② Coat evenly with the grease provided the heat radiation surface of IPM/diode modules.
Apply a thin layer of grease evenly to the entire surface, and fix the module securely with the screw for fastening.
As the radiation grease attached on the wiring terminal causes poor contact, wipe it off.

5) Intelligent Power Module (IPM)

Measure resistance between each terminal of IPM with a tester, and use the results for troubleshooting.

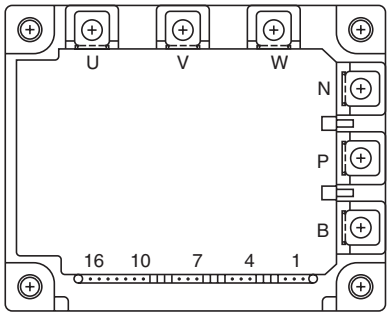
① Focus on whether there is a complete open (∞Ω) state or short-circuit (~0Ω).
The measured resistance value is a guideline and may deviate slightly.
Measure between several similar measurement points.
If the value does not differ by more than double or half from the other points, then judge the state as OK.

② Restrictions to applicable tester
Use a tester with an internal power of 1.5V or more.

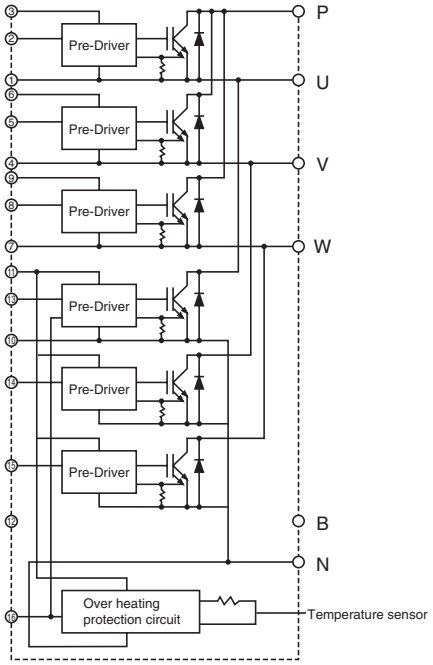
* Battery type tester
A card tester with button battery has a low applied voltage, so the resistance value of the diode characteristics cannot be measured correctly.
Use a measurement range that measures the low resistance when possible. An accurate measurement with less fluctuation will be possible.

The measured values for troubleshooting are shown in the table below.

• External view



• Internal circuit diagram

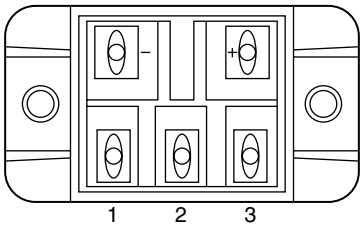


• Judged value

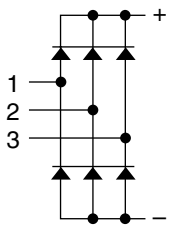
Tester Black / Tester Red	P	N	U	V	W
P			5~200Ω	5~200Ω	5~200Ω
N			∞	∞	∞
U	∞	5~200Ω			
V	∞	5~200Ω			
W	∞	5~200Ω			

6) Diode stack

Perform continuity check with a tester. Judged as normal if the following conditions are met.



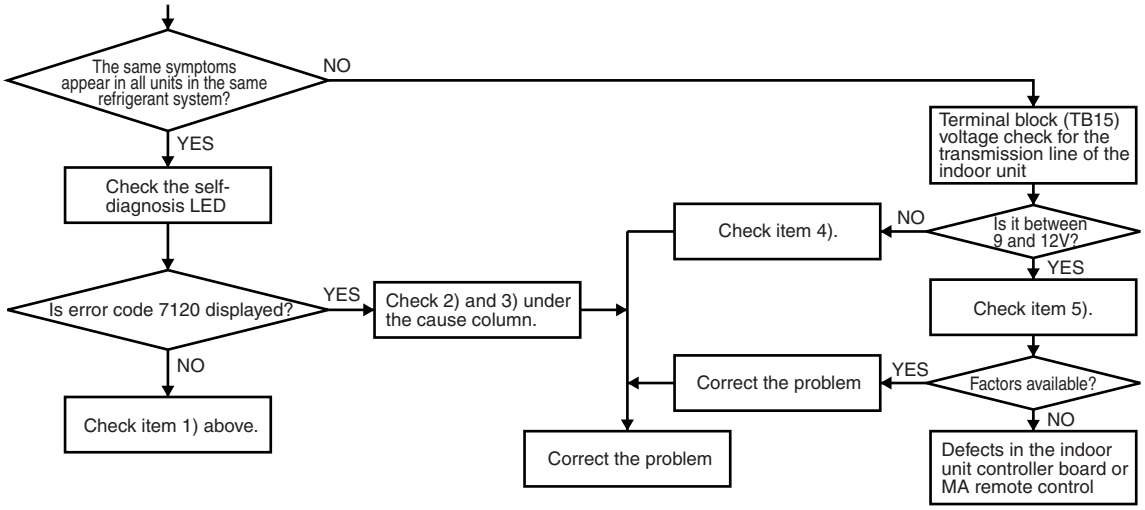
Tester Black / Tester Red	+	–	1	2	3
+			5~200Ω	5~200Ω	5~200Ω
–			∞	∞	∞
1	∞	5~200Ω			
2	∞	5~200Ω			
3	∞	5~200Ω			



(6) Trouble and remedy of remote controller

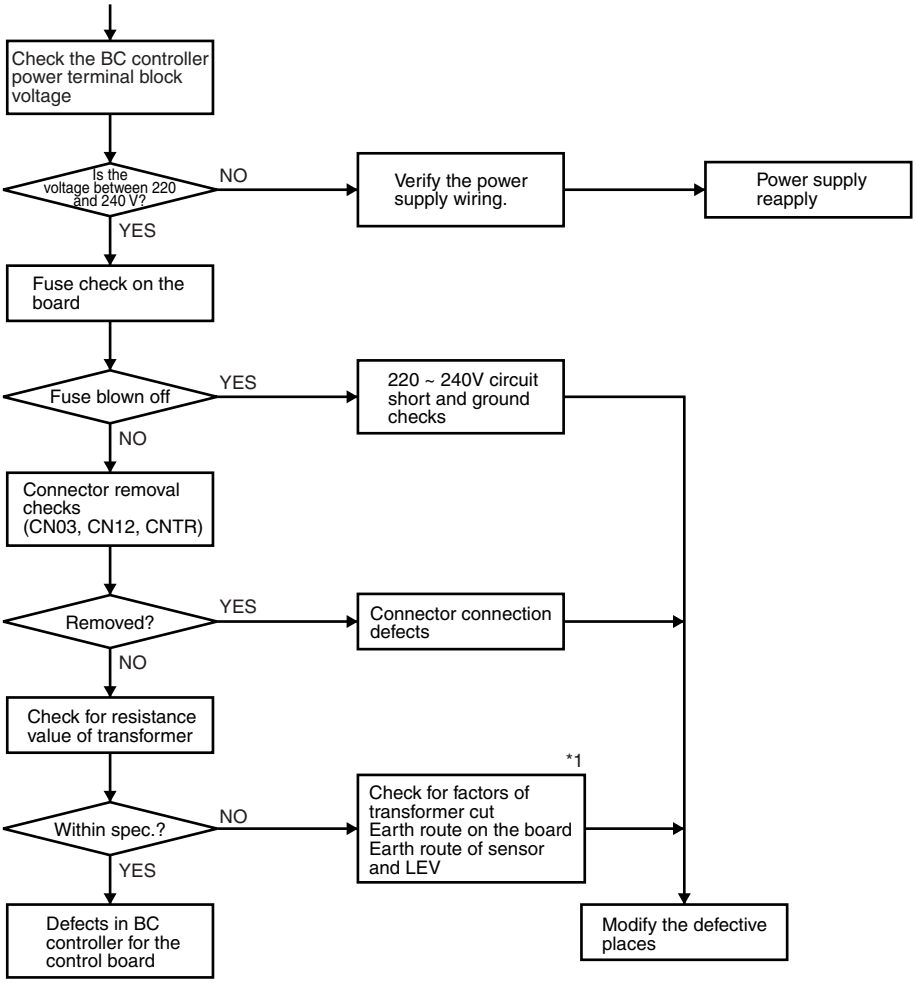
(In the case of MA remote controller)

<table>
<tr><th></th><th>Symptom</th><th>Cause</th><th>Check method and Remedy</th></tr>
<tr><td>1</td><td>If the controller does not beep when the buttons are pressed, if the monitor is off, or no operation is possible.

(An appropriate display ◎ on the remote control is not on.)</td><td>1) Power supply from transformers to the indoor unit is not turned on.
① The original power supply of Indoor Unit is not turned on.
② Disconnected connector (CND, CNT, CN3T) on the controller board in the room.
③ Blown fuse on the control board in the indoor unit.
④ Transformer defects or damage to unit.
2) MA remote controller has been wired incorrectly.
① The MA remote controller line has been broken, and the connection to the terminals has been disconnected.
② Short circuit of the MA remote control wiring
③ Reversed connections of the wiring on remote controller.
④ Incorrect connection of the MA remote control wiring to the transmission line terminal block (TB 5).
⑤ Reversed connections between the MA remote control wiring in the indoor unit and AC 200V power supply wiring.
⑥ Reversed connection between the MA remote control wiring in the indoor unit and M-NET transmission wiring.
3) The maximum number of MA remote controllers connected to a unit exceeds two.
4) The length and diameter of the MA remote line do not meet the specifications.
5) The wiring of the remote display output to the outdoor unit is short circuited, or the relay is connected with reversed polarity.
6) Defective of the controller board in the room
7) Defects of MA remote control</td><td>a) Check the MA remote control terminal voltage (between A and B).
i) In the case of voltage between DC 8.5 and 12V, and there is a problem with the remote controller
ii) In the case of the absence of voltage
● Check items 1) and 3) on the left. If these turn out to be the factors, then modifications should be made.
● If item 1) or 3) is not found to be the cause of the problem, proceed to b).
b) Remove the remote control wiring from the terminal block TB13 for the MA remote control in the indoor unit, and check voltage between A and B.
i) In the case of voltage between DC9 and 12V.
Check the left described 2) and 4), if these are factors, then modifications should be performed.
ii) In the case of the absence of voltage
● Recheck item 1). If problems are found, then modifications should be made.
● If no problems are found with items listed under 1) on the left, check the wiring for the remote display (the relay polarity, etc.)
● If no problems are found, replace the controller board in the indoor unit.
In the case of item 1), the LED 1 on the controller board in the unit is off.</td></tr>
<tr><td>2</td><td>When turning on the remote control operation SW, a temporary operation display is indicated, and the display lights out immediately, and the unit stops.</td><td>1) M-NET transmission power supply from the outdoor unit is not supplied.
① The original power supply of the outdoor unit is not turned on.
② Disconnection of connectors on the board of the outdoor unit.
Main board --- CNS1, CNVCC3
INV board --- CNAC2, CNVCC1, CNL2
③ Problems with the power supply circuit of the outdoor unit.
● INV board defects
● Blown fuse (F1 on INV Board)
● Diode stack destruction
● Prevention resistance of rush current (R1) damage
2) Shorted transmission line.
3) Wiring error in the M-NET transmission line on the outdoor unit side.
① Broken transmission line and disconnected terminal block.
② The room transmission line is wired to the transmission line terminal block (TB7) for the central control by mistake.
4) M-NET transmission line break on the side of the room unit
5) Broken wires between the M-NET transmission terminal block (TB5) and the room controller board CN2M and dislocated connectors.</td><td>In the case of factors 2) and 3) Indicated by 7102 error code on the self-diagnosis LED of the outdoor unit.</td></tr>
<tr><td></td><td colspan="3">Check method and handling
 
</td></tr>
</table>

	Symptom	Cause
3	When the remote control SW is turned on, the indication goes off after approximately 20- 30 seconds, and indoor unit stops.	1) Power supply from the transformer is not available to the control board of BC controller. ① The original power supply of the BC controller is not turned on. ② Removal of connectors (CN12, CN38, CNTR) on the control board of the BC controller. ③ Fuse on the control board of the BC controller is blown. ④ Defective transformer of the BC controller. ⑤ Defects on the control board of the BC controller.

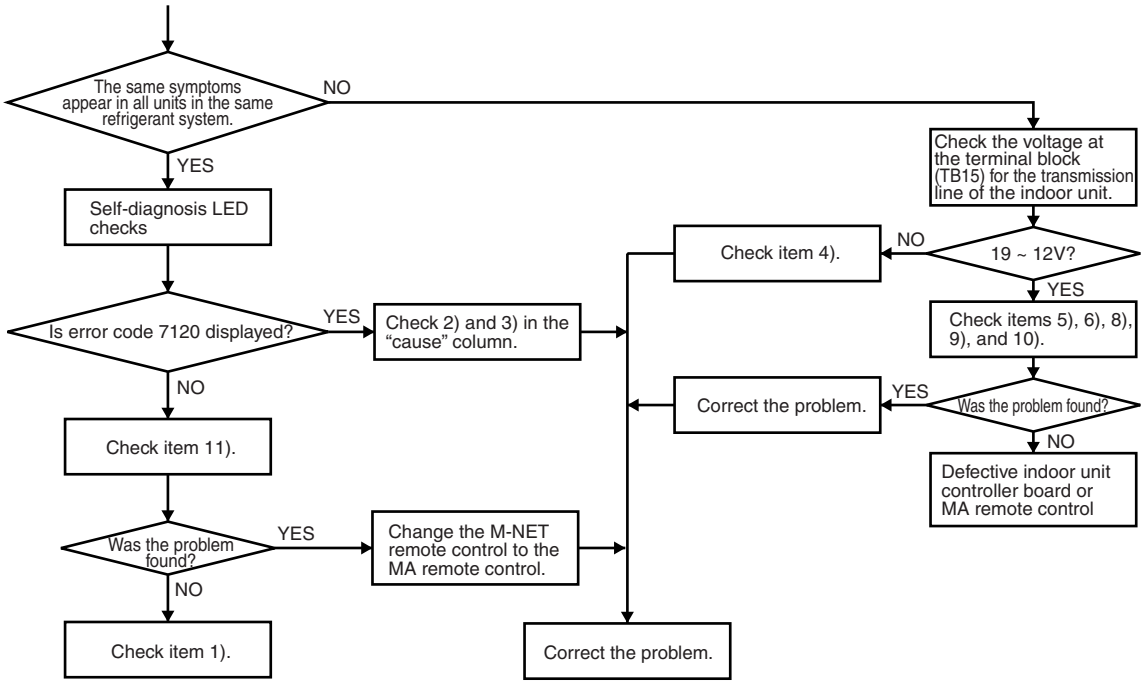
Check method and Remedy



*1 For transformer checks, It is subject to the failure judgment method of main parts in 4.5.

	Symptom	Cause	
4	"HO" indication on the remote controller is not lit, and the ON/OFF switch does not work.	1) The M-NET transmission power supply from the outdoor unit is not supplied. ① The original power supply of Indoor Unit is not turned on. ② The connector on the controller board in Indoor Unit is removed. Main board ----CNS1, CNVCC3 INV board----CNAC2, CNVCC1, CNL2 ③ Defects in the power supply circuit of the outdoor unit (For detail, refer to Pages 127) ● INV board defects ● Diode stack defects ● Prevention resistance of rush current (R1) damage. 2) Short circuit of the M-NET transmission line. 3) Erroneous wiring of the M-NET transmission line on the outdoor unit side. ① Broken transmission line or terminal block removal ② Indoor Unit transmission line is wired to the transmission line terminal block (TB7) for the central control by mistake. 4) M-NET transmission line break on the Indoor Unit (Short/ Open) side. 5) Loose or disconnection of wiring between the M-NET transmission terminal block (TB 5) of Indoor Unit and Indoor Unit controller board CN2M and disconnection of connectors. 6) Erroneous wiring of the MA remote control. ① Short circuit of the MA remote wiring ② Broken MA remote control line (No.2) and disconnection of the terminal block connection ③ Reversed wiring, cross-over in the group control ④ Mis-wiring of MA remote control to the terminal block (TB5) for the transmission line ⑤ Mis-wiring of M-NET transmission line to the MA remote control terminal block (TB13) 7) The unit address is not "00" as it should be with automatic address setting. 8) The address of Indoor Unit exceeds 50. 9) The master and slave setting of the MA remote control becomes the slave setting. 10) Use of M-NET (vs. MA) remote controller when using automatic address setting. 11) Defective room controller board (MA remote communication circuits). 12) Defective remote controller.	In the case of 2), 3) and 7) factors, indicate 7102 errors by the self-diagnosis LED of the outdoor unit.

Check method and Remedy

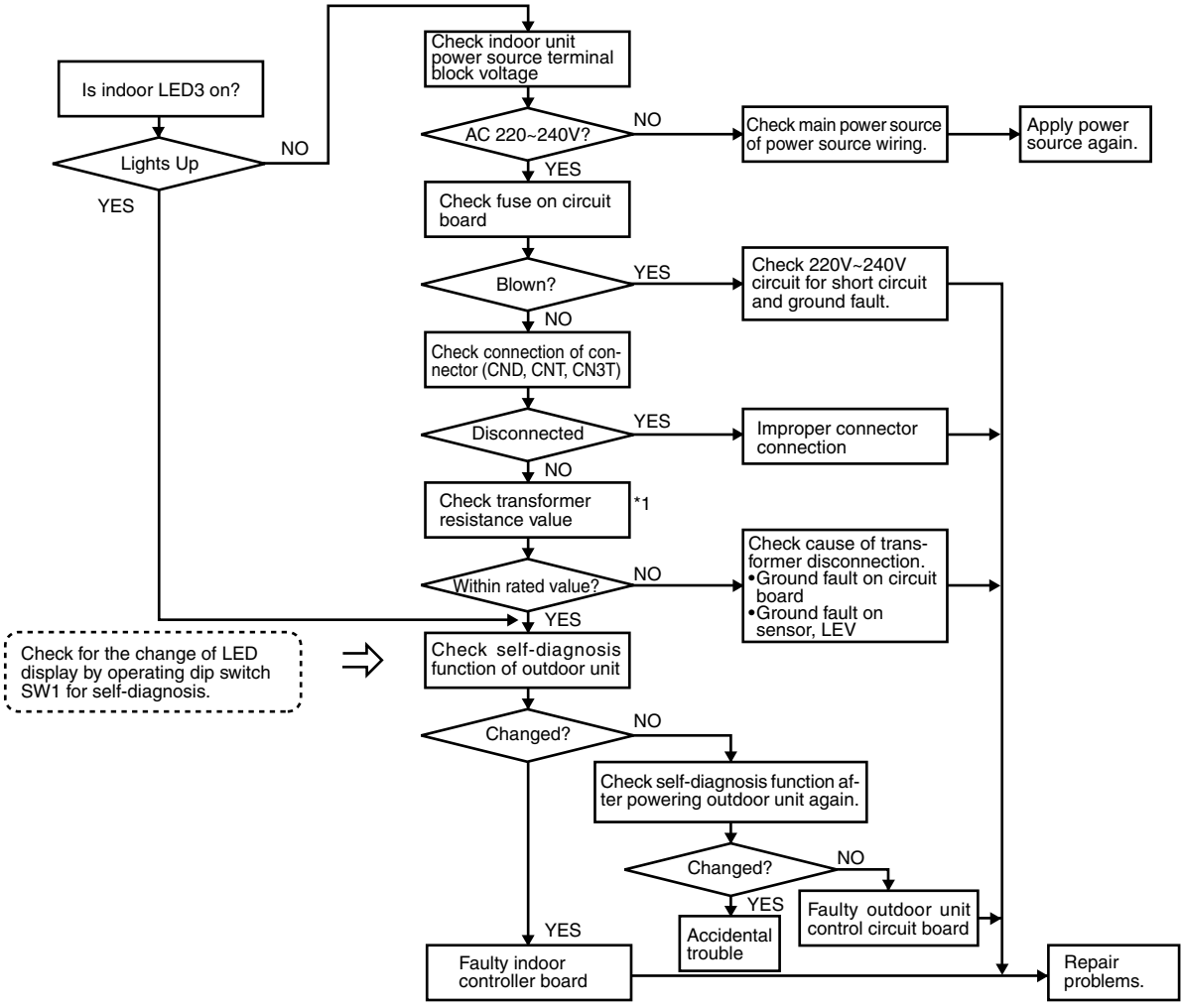


(In the case of M-NET remote controller)

<table>
<tr><th></th><th>Symptom</th><th>Cause</th><th>Checking method & countermeasure</th></tr>
<tr><td>1</td><td>When pressing remote controller ON/OFF switch, operation does not start and there is no electronic sound.

(No powering signal ◎ appears.)</td><td>1) M-NET transmission power is not supplied from outdoor unit.
① Main power source of outdoor unit is not connected.
② Disconnection of connector on outdoor unit circuit board.
Main board : CNS1, CNVCC3
INV board : CNAC2, CNVCC1, CNL2
③ Faulty power source circuit of outdoor unit.
• Faulty INV board,
• Blown fuse (F1 on INV board)
• Broken diode stack
• Broken resistor (R1) for rush current protection
2) Short circuit of transmission line.
3) Erroneous wiring of M-NET transmission line for the outdoor unit.
① Transmission line disconnection from terminal block.
② Erroneous connection of indoor/outdoor transmission line to TB7.
4) Disconnection of transmission wiring at remote controller.
5) Faulty remote controller.</td><td>a) Check transmission terminal block of remote controller for voltage.
i) In case of 17 ~ 30V
→ Faulty network remote controller
ii) In case of less than 17V
→ See “Transmission Power Circuit (30V) Check Procedure”.

The cause of 2) and 3) is displayed with self-diagnosis LED for 7102 error.</td></tr>
<tr><td>2</td><td>At about 10 seconds after turning remote controller operation switch ON, the display disappears and the operation stops.</td><td>1) Power is not supplied to indoor unit from transformer.
① Main power source of indoor unit is not turned on.
② Disconnection of connector (CND, CNT, CN3T) on indoor controller board.
③ Blown fuse on indoor controller board.
④ Faulty or disconnected transformer of indoor unit.
⑤ Faulty indoor controller board.

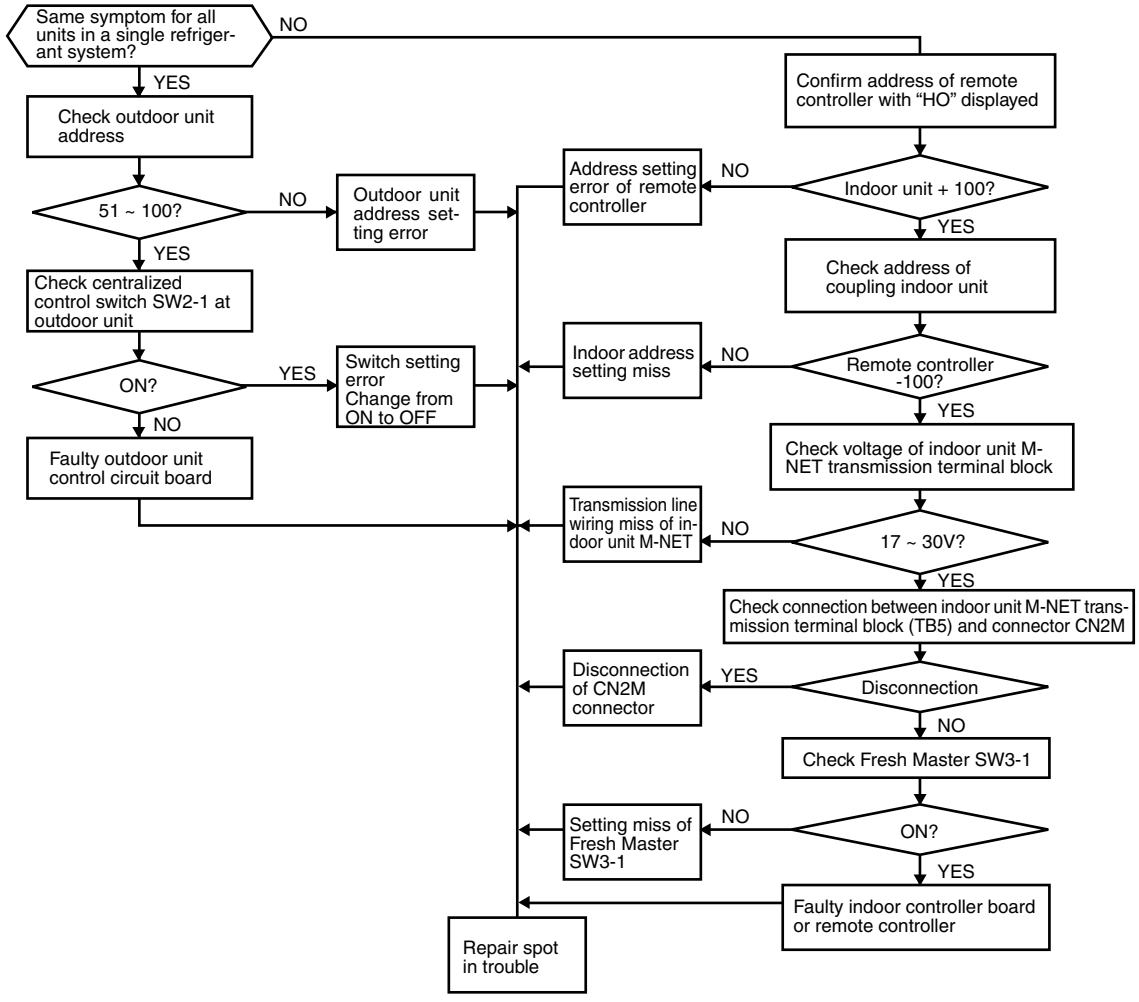
2) Faulty outdoor control circuit board.
Transmission fails between indoor and outdoor units, outdoor unit model cannot be recognized.</td><td></td></tr>
<tr><td></td><td colspan="3">Checking method & countermeasure
 

*1 Check the transformer in accordance with the “TROUBLE SHOOTING” in the indoor unit’s service handbook.</td></tr>
</table>

	Symptom	Cause
3	"HO" displayed on remote controller does not disappear and ON/OFF switch is ineffective.	(Without using MELANS) 1) Outdoor unit address is set to "00" 2) Erroneous address. ① Address setting of indoor unit to be coupled with remote controller incorrect. (Indoor unit = remote controller - 100.) ② Address setting of remote controller incorrect. (Remote controller = indoor unit + 100.) 3) Faulty wiring of transmission terminal block TB5 of indoor unit in the same group with remote controller. 4) Centralized control SW2-1 of outdoor unit is turned ON. 5) Setting to interlocking system from indoor unit (Switch 3-1 = OFF), while Fresh Master is intended to be use by remote controller operation (indoor unit attribute). 6) Disconnection or faulty wiring of indoor unit transmission line. 7) Disconnection between indoor unit M-NET transmission line terminal block (TB5) and connector CN2M. 8) More than 2 sets of power supply connector (CN40) are inserted into centralized control transmission line of outdoor unit. 9) Faulty outdoor unit control circuit board. 10) Faulty indoor controller board. 11) Faulty remote controller. (Interlocking control with MELANS) 12) No grouping registration from MELANS (Neglecting to set the relation between indoor unit and network remote controller). 13) Disconnection of centralized control transmission line (TB7) at outdoor unit. 14) At system connected with MELANS, power supply connector (CN40) is inserted to centralized control transmission line of outdoor unit.

Checking method & countermeasure

In case MELANS is not used



In case with MELANS used

When MELANS is used, "HO" display on the remote controller will disappear at the group registration of the indoor unit and local remote controller.
If "HO" does not disappear after the registration, check the items 12) ~ 14) in the Cause column.

	Symptom	Cause	Checking method & countermeasure
4	"88" appears on remote controller at registration and access remote controller	[Failure registration and confirmation] 1) Erroneous address of unit to be coupled. 2) Disconnection of transmission line of unit to be coupled (No connection). 3) Faulty circuit board of unit to be coupled. 4) Installation miss of transmission line.	a) Confirm the address of unit to be coupled. b) Check the connection of transmission line. c) Check the transmission terminal block voltage of unit to be coupled. i) Normal if voltage is DC17 ~ 30V ii) Check the item d) in case other than i).
		[Confirmation of different refrigerant system controller] 5) Disconnection of power source of outdoor unit to be confirmed. 6) Disconnection of centralized control transmission line (TB7) of outdoor unit. 7) Power supply connector (CN40) is not inserted into centralized control transmission line in grouping with different refrigerant system without using MELANS. 8) More than 2 sets of power supply connectors are inserted into the centralized control transmission line of outdoor unit. 9) In the system connected with MELANS, power supply connector (CN40) is inserted into the centralized control transmission line of outdoor unit. 10) Short circuit of centralized control transmission line.	d) Confirm the power source of outdoor unit to be coupled with the unit to be confirmed. e) Confirm that the centralized control transmission line (TB7) of outdoor unit is not disconnection. f) Confirm the voltage of centralized control transmission line. i) Normal in case of 10V ~ 30V ii) Check the items 7) ~ 10) left in case other than i).

(7) Transmission Power Circuit (30 V) Check Procedure

If "◎" is not displayed on the remote control, investigate the cause of the problem by following the procedures listed below and correct the problem.

No.	Check Item	Judgment	Response
1	Disconnect the transmission line from TB3 and check the TB3 voltage.	DC24~30 V	Check the transmission line for the following, and correct any defects: Broken wire, short circuit, grounding, faulty contact.
		Except the above-mentioned	Go to No. 2
2	Check if the following connectors are disconnected in the outdoor unit's control box. MAIN Board: CNS1, CNVCC3, CNVCC4 INV Board: CNVCC2, CNVCC4, CNL2, CNR, CNAC2	Connector disconnected	Connect the connectors as shown on the electric wiring diagram.
		Except the above-mentioned	Go to No. 3
3	Disconnect the wires from CNVCC3 on the Main board, and check the voltage between pins 1 and 3 on the wire side of the CNVCC3. Tester ⊕ ..... 1 pin Tester ⊖ ..... 3 pin	DC24~30 V	Check the wiring between CNS1 and TB3 for the following, and correct any defects: broken wire, short circuit, grounding, faulty contact. If there is no trouble, replace the Main board.
		Except the above-mentioned	Go to No. 4
4	Disconnect the wiring from CNVCC2 on the INV board, and check the voltage between pins 1 and 3 of CNVCC2. Tester ⊕ ..... 1 pin Tester ⊖ ..... 3 pin	DC24~30 V	Check the wiring between CNVCC2 and CNVCC3 for the following, and correct any defects: broken wire, short circuit, grounding, faulty contact.
		Except the above-mentioned	Go to No. 5
5	Disconnect the wiring from CNL2 on the INV board, and check the resistance at both ends of choke coil L2.	0.5~2.5Ω	Go to No. 6
		Except the above-mentioned	Replace choke coil L2.
6	Disconnect the wiring from CNR on the INV board, and check the resistance at both ends of R7.	19~25Ω	Go to No. 7
		Except the above-mentioned	Replace R7.
7	Check the resistance at both ends of F01 on the INV board.	0Ω	Go to No. 8
		Except the above-mentioned	Replace F01
8	Check the voltage between pins 1 and 3 of CNAC2 on the INV board.	AC198~264 V	Replace the INV board.
		Except the above-mentioned	Go to No. 9
9	Check the voltage between L2 and N on power supply terminal block TB1.	AC198~264 V	Check the wiring to CNAC2 for the following and correct any defects: broken wire, faulty contact.
		Except the above-mentioned	Check the power supply wiring and base power supply, and correct any defects.

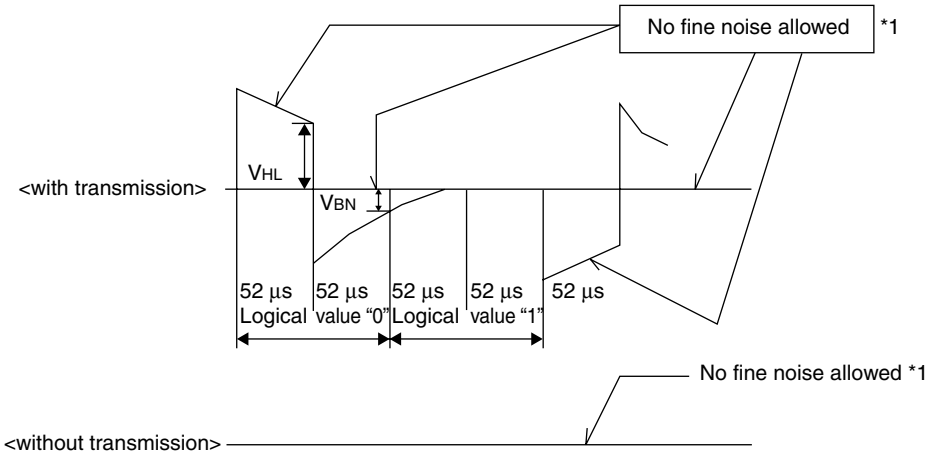
(8) Investigation of transmission wave shape/noise

Control is performed by exchanging signals between outdoor unit, indoor unit, and remote controller by M-NET transmission. If noise should enter into the transmission line, the normal transmission will be hindered, causing erroneous operation.

1) Symptom caused by the noise entered into transmission line

Cause	Erroneous operation	Error code
Noise entered into transmission line	Signal changes and is misjudged as the signal of other address.	6600
	Transmission wave shape changes to other signal due to noise.	6602
	Transmission wave shape changes due to noise, and cannot be received normally, thus providing no reply (ACK).	6607
	Transmission cannot be made continuously due to the entry of fine noise.	6603
	Transmission can be made normally, but reply (ACK) or reply cannot be issued normally due to noise.	6607 6608

2) Method to confirm wave shape



Check the wave shape of transmission line with an oscilloscope to confirm that the following conditions are being satisfied.

① The figure should be 104µs/bit ± 1%.
② No finer wave shape (noise) than the transmission signal (52µs ± 1%) should be allowed. *1
③ The sectional voltage level of transmission signal should be as follows.

Logic value	Transmission line voltage level
0	V_{HL} = 2.0V or more
1	V_{BN} = 1.3V or less

*1 However, minute noise from the DC-DC converter or inverter operation may be picked up.

3) Checkpoints and measures to be taken

(a) Measures against noise

Check the items below when noise can be confirmed on wave shape or the error code in the item 1) is generated.

	Items to be checked	Measures to be taken
Checking for wiring method	① Wiring of transmission and power lines in crossing.	Isolate transmission line from power line (5cm or more). Never put them in the same conduit.
	② Wiring of transmission line with that of other system in bundle.	Wire transmission line isolating from other transmission line. Wiring in bundle may cause erroneous operation like crosstalk.
	③ Use of shield wire for transmission line (for both indoor unit control and centralized control).	Use specified transmission wire. Type : Shield line CVVS/CPEVS Wire diameter : 1.25mm^2 or more
	④ The shield is to be daisy-chained in exactly the same way as the transmission line.	The transmission line is wired with 2-mumper system. Wire the shield with jumper system in the same way for transmission line. When the jumper wiring is not applied to the shield, the effect against noise will be reduced.
	⑤ Are the units and transmission lines grounded as instructed in the INSTALLATION MANUAL?	Connect to ground as shown in the INSTALLATION MANUAL.
Check for earthing	⑥ Earthing of the shield of transmission line (for indoor unit control) to outdoor unit.	One-point earthing should be made at outdoor unit. Without earthing, transmission signal may be changed as the noise on the transmission line has no way to escape.
	⑦ Arrangement for the shield of transmission line (for centralized control).	For the shield earth of the transmission line for centralized control, the effect of noise can be minimized if it is from one of the outdoor units in case of the group operation with different refrigerant systems, and from the upper rank controller in case the upper rank controller is used. However, the environment against noise such as the distance of transmission line, the number of connecting sets, the type of connecting controller, and the place of installation, is different for the wiring for centralized control. Therefore, the state of the work should be checked as follows: a) No earthing • Group operation with different refrigerant systems One-point earthing at outdoor unit • Upper-rank controller is used Earthing at the upper-rank controller b) Errors occur even though one-point earth is being connected. Earth shield at all outdoor units. Provide grounding as shown in the user's manual.

(b) If the wave of the transmission wave is low, 6607 error has occurred, or "HO" is displayed on the remote controller.

Items to be checked		Measures to be taken
	⑧ The farthest distance of transmission line.	Confirm that the farthest distance from outdoor unit to indoor unit/ remote controller is less than 200m.
	⑨ The types of transmission lines.	Use the transmission wire specified. Type of transmission line : Shield wire CVVS/CPEVS Wire dia. of transmission line : 1.25mm^2 or larger
	⑩ Transmission power (30V) supplied to the idoor unit or the remote control.	Refer to "Transmission Power Supply (30V) Circuit Check Procedure."
	⑪ Faulty indoor unit/remote controller.	Replace outdoor unit circuit board or remote controller.

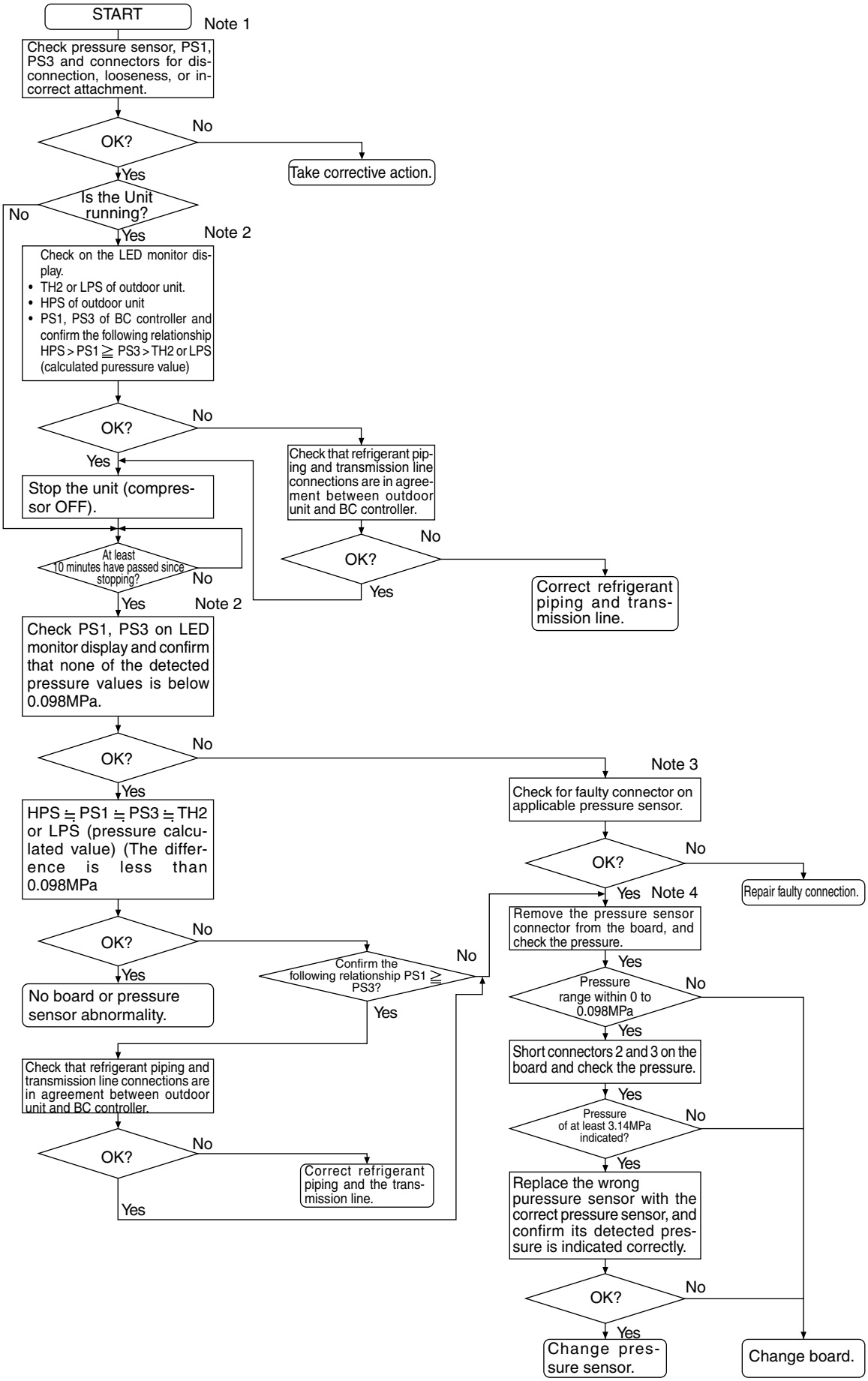
(9) Treatment of Fan Motor Related Troubles

Condition	Possible Cause	Check Method and Treatment
① The fan motor will not run for 20 minutes or longer when the AK value is ≧ 10%. (When the MAIN board's SW1 is set as shown below, the AK value is displayed by the service LED.) SW1 = 1110001000 ② The fan motor vibrates considerably.	1) The power supply voltage is abnormal.	If there is an open phase condition before the breaker, after the breaker, or at the power supply terminal blocks TB1A or TB1B, correct the connections.
		If the power supply voltage deviates from the specified range, connect the specified power supply.
	2) Wiring is faulty.	For the following wiring, 1) check the connections, 2) check the contact at the connectors, 3) check the tightening torque at parts where screws are tightened, 4) check the wiring polarity, 5) check for a broken wire, and 6) check grounding. TB1A~NF~TB1B~CNTR1~T01~CNTR, TB1B~CNPOW, CNFAN~CN04~CNMF, CNFAN~52F~CN05~CNMF CNFC1~CNFC2 * Check if the wiring polarity is as shown on the wiring diagram.
	3) The motor is faulty.	Measure the resistance of the motor's coils: 20~60Ω Measure the motor's insulation resistance with a megger: 10 MΩ (DC 500 V) or more
	4) A fuse (F1, F2, F3) is defective.	If a fuse is blown, replace it.
	5) The transformer (T01) is defective.	Judge that T01 is faulty. Go to "Individual Parts Failure Judgment Methods."
	6) The circuit board is faulty.	If none of the items in 1) through 5) is applicable, and the trouble reappears even after the power is switched on again, replace the circuit board using the following procedure. (When replacing the circuit board, be sure to connect the connectors and ground wire securely.) ① Replace the FANCON board only. If the problem disappears, there is a problem with the FANCON board. ② Replace the FANCON board and the MAIN board. If the problem disappears, there is a problem with the MAIN board. ③ If the problem continues even after performing the procedures 1 and 2 above, then there are problems with both boards.

(10) Troubleshooting the major components of the BC controller

1) Pressure sensor

Pressure sensor troubleshooting flow chart



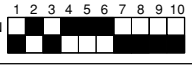
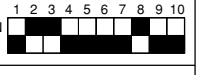
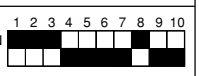
Note 1 :

- Symptoms of incorrect (i.e, reverse) connection of PS_1 and PS_3 to BC controller board

Symptom						
Cooling-only	Cooling-principal		Heating-only		Heating-principal	
Normal	Insufficient cooling	SC11 large SC16 small △ PHM < 0	Warm indoor SC small. When SV opens, some noise produced.	SC11 small SC16 small △PHM < 0	Insufficient heating Warm indoor SC small When SV opens, some noise produced.	SC11 large SC16 small △ PHM < 0

Note 2 :

- Items to be checked using LED monitor display switch (outdoor Main board SW1)

Measured Data	Signal	SW1 Setting	Remarks
High pressure of outdoor unit	HPS		See converter.
Low pressure saturation temperature	TH2		See converter.
Low pressure of outdoor unit	LPS		See converter.
BC controller pressure (liquid measurement)	PS1		Convert saturation temperature to desired pressure using converter.
(intermediate)	PS3		

Note 3 :

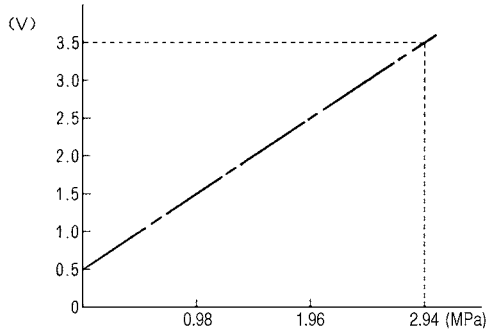
- Check CNP1 (liquid measurement) and CMP3 (intermediate) connectors on BC controller board for disconnection or looseness.

Note 4 :

- With the sensor of the applicable connector removed from the board, use the LED monitor display switch (Note 1) to check the pressure value.

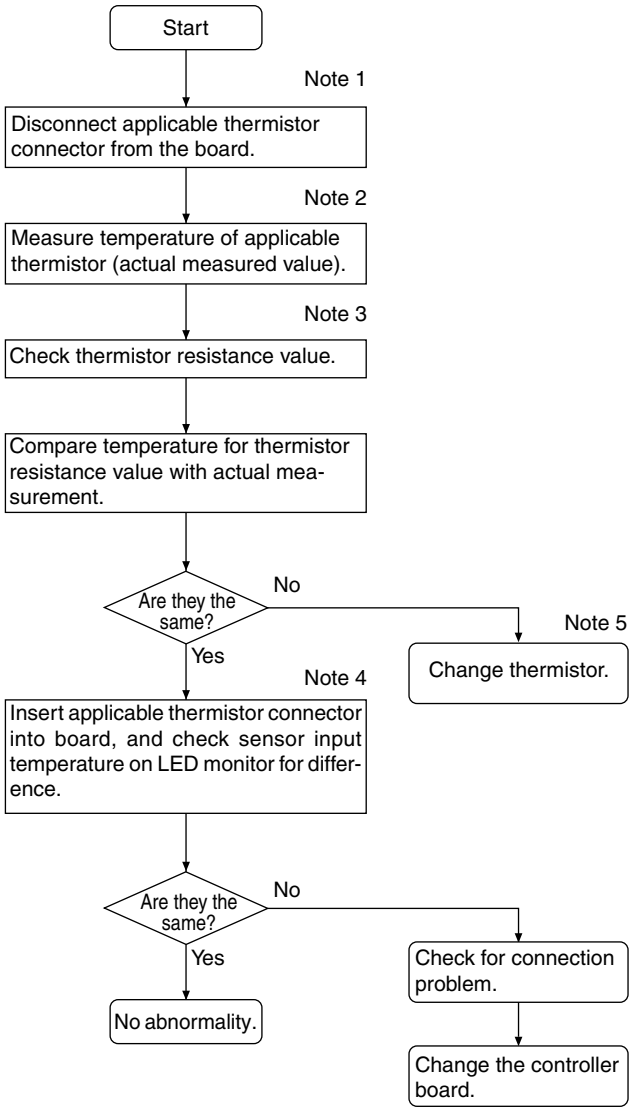
Pressure Sensor Replacement Precaution

(Pressure sensor output voltage)



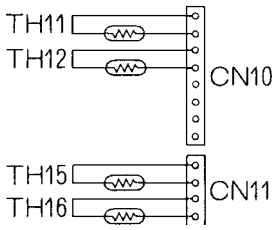
2) Temperature Sensor

Thermistor troubleshooting flow chart



Note 1 :

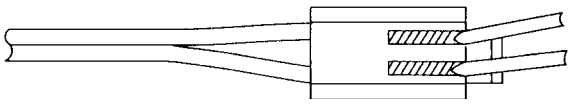
- Board connector CN10 corresponds to TH11 through TH14, while connector CN11 corresponds to TH15 through TS15. Remove the applicable connector and check the sensor for each number.



Note 2, 3 :

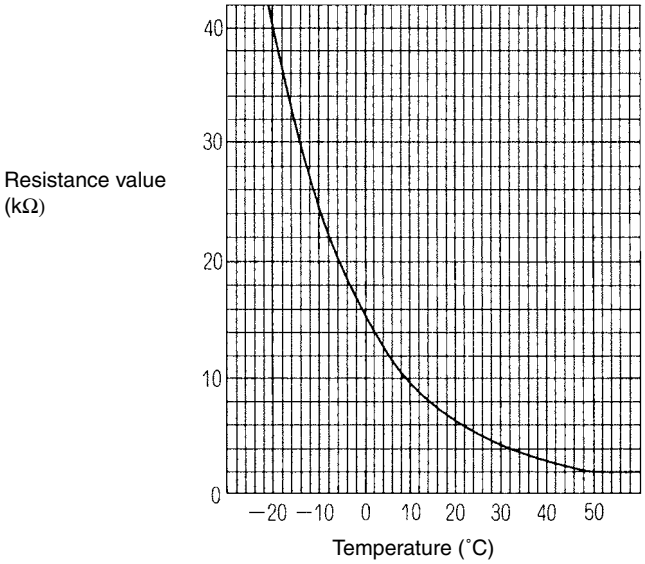
1. Pull the sensor connector from the I/O board. Do not pull on the lead wire.
2. Measure resistance using a tester or other instrument.
3. Compare measured values with values on the graph below. A value within a range of ±10% is normal.

Resistance measurement point (connector)



Apply the probes of the tester or other instrument to the shaded areas to measure.

Temperature sensor resistance (graph)

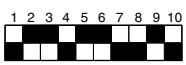


Thermistor R_o=15 kΩ

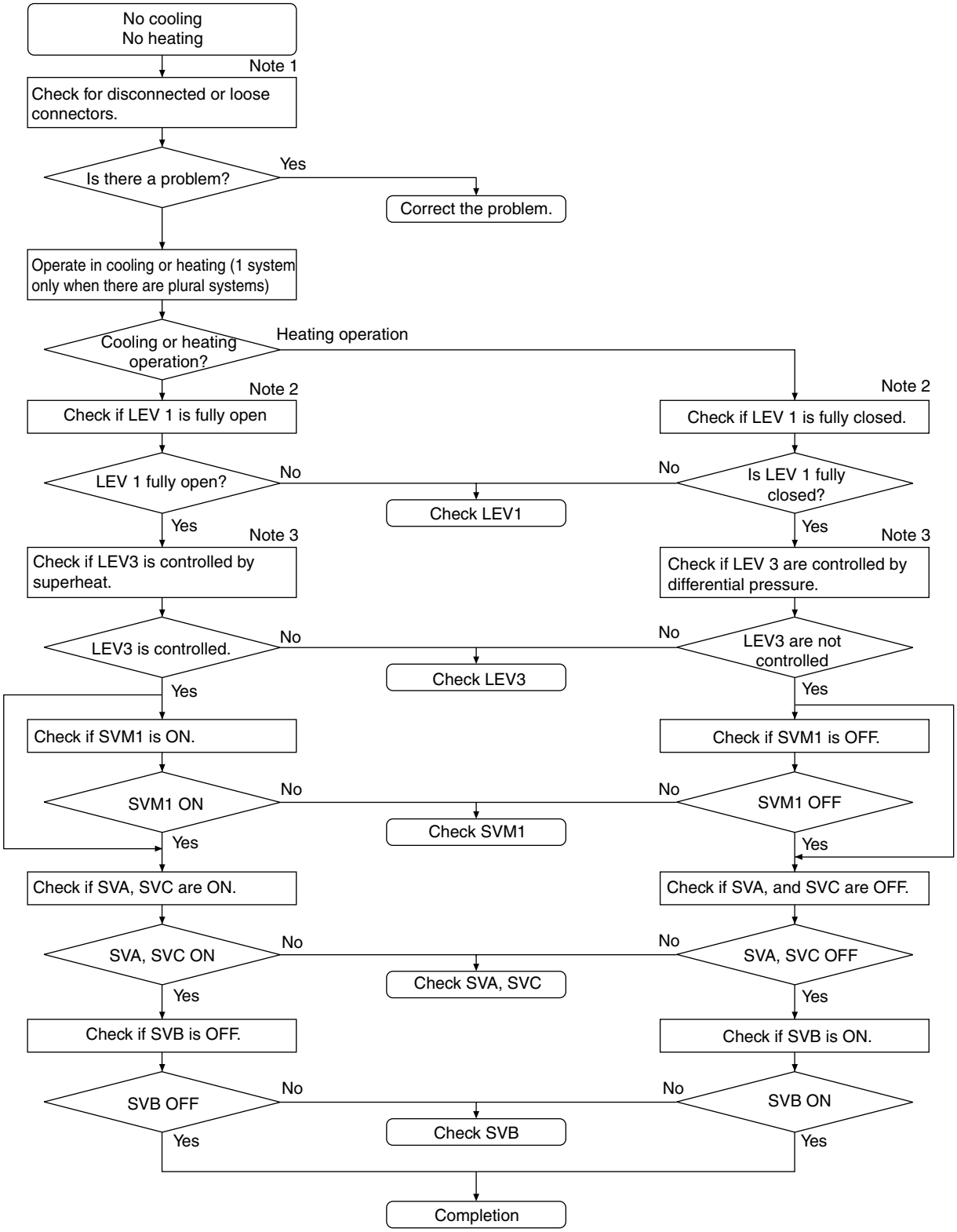
$$Rt=15\exp 3460\left\{\left(\frac{1}{273+t}-\frac{1}{273+0}\right)\right\}$$

Note 4 :

- Check using LED monitor display switch (outdoor MAIN board SW1)

	Measured Data	Signal	SW1 Setting	Remarks
FA	Liquid inlet temperature	TH11		See converter.
	Bypass inlet temperature	TH12		See converter.
	Bypass outlet temperature	TH15		See converter.
	Bypass inlet temperature	TH16		See converter.
FB	Bypass inlet temperature	TH22		See converter.
	Bypass outlet temperature	TH25		See converter.

3) LEV, Solenoid Valve Troubleshooting Flow Chart



① LEV

Note 1 :

- Symptoms of incorrect connection to BC controller LEV board

LEV No.	1	3	Cooling-only	Cooling-main	Heating-only	Heating-main
1)	1	3	Normal	←	←	←
2)	3	1	Insufficient cooling SH12 small SC11 small SC16 small Branch piping SC small	Insufficient cooling, insufficient heating SH12 small, SC11 small SC16 large, Branch piping SC small △ PHM large	Heating indoor SC small △ PHM large	Insufficient cooling Heating indoor SC small △ PHM large

Improper installation is the same for ① and ②, so it is omitted here.

Note 2: Method of checking LEV's fully-open and fully-closed status

① Check LEV's full opening (pulse), using the LED monitor display (outdoor controller board SW1).
Fully opened: 2000 pulsed
Fully closed: 60 pulses (LEV 1 may be greater than 60 during full-heating operation.)

② With LEV fully open, check for pressure difference by measuring the temperature of the piping on both sides.

③ With LEV fully closed, check for refrigerant noise.

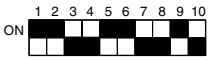
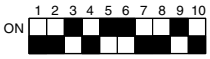
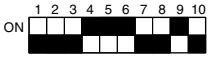
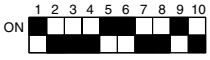
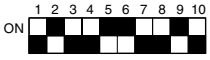
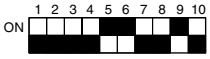
Note 3 : Use the following table to determine opening due to LEV differential pressure control and superheat control.

- BC controller LEV basic operation characteristics

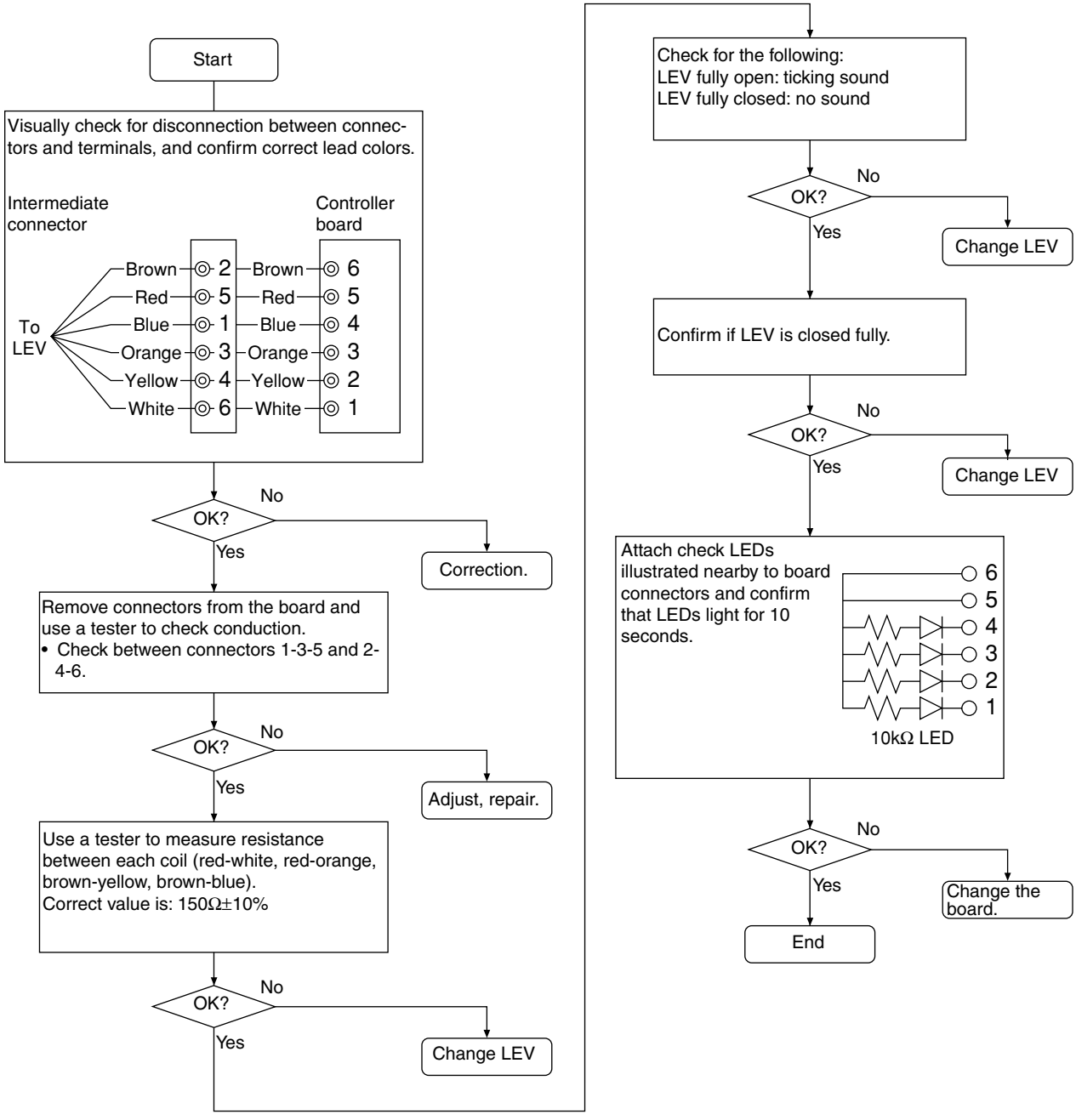
	Region	Failure mode	Operating mode	Description	Normal range
FA	LEV1 pulse	Small	Heating-only Heating-main Cooling-main	High pressure (PS1) - medium pressure (PS3) is large.	0.20~0.34MPa
		Large		High pressure (PS1) - medium pressure (PS3) is small.	
	LEV3 pulse	Small	Cooling-only Cooling-main	SH12 is large.	SH12<25
			Heating-only Heating-main	High pressure (PS1) - mid pressure (PS3) is small.	0.20~0.34MPa
		Large	Cooling-only Cooling-main	SC16 and SH12 are small.	SC16>6 SH12>5
			Heating-only Heating-main	High pressure (PS1) - mid pressure (PS3) is large.	0.20~0.34MPa
FB	LEV3a pulse *	Small	Cooling-only Cooling-main Heating-main	SH22 is large.	SH22<25
			Cooling-only Cooling-main Heating-main	SH22 is small.	SH12>5

* LEV3a operates when indoor unit connected to FB type is in cooling mode.

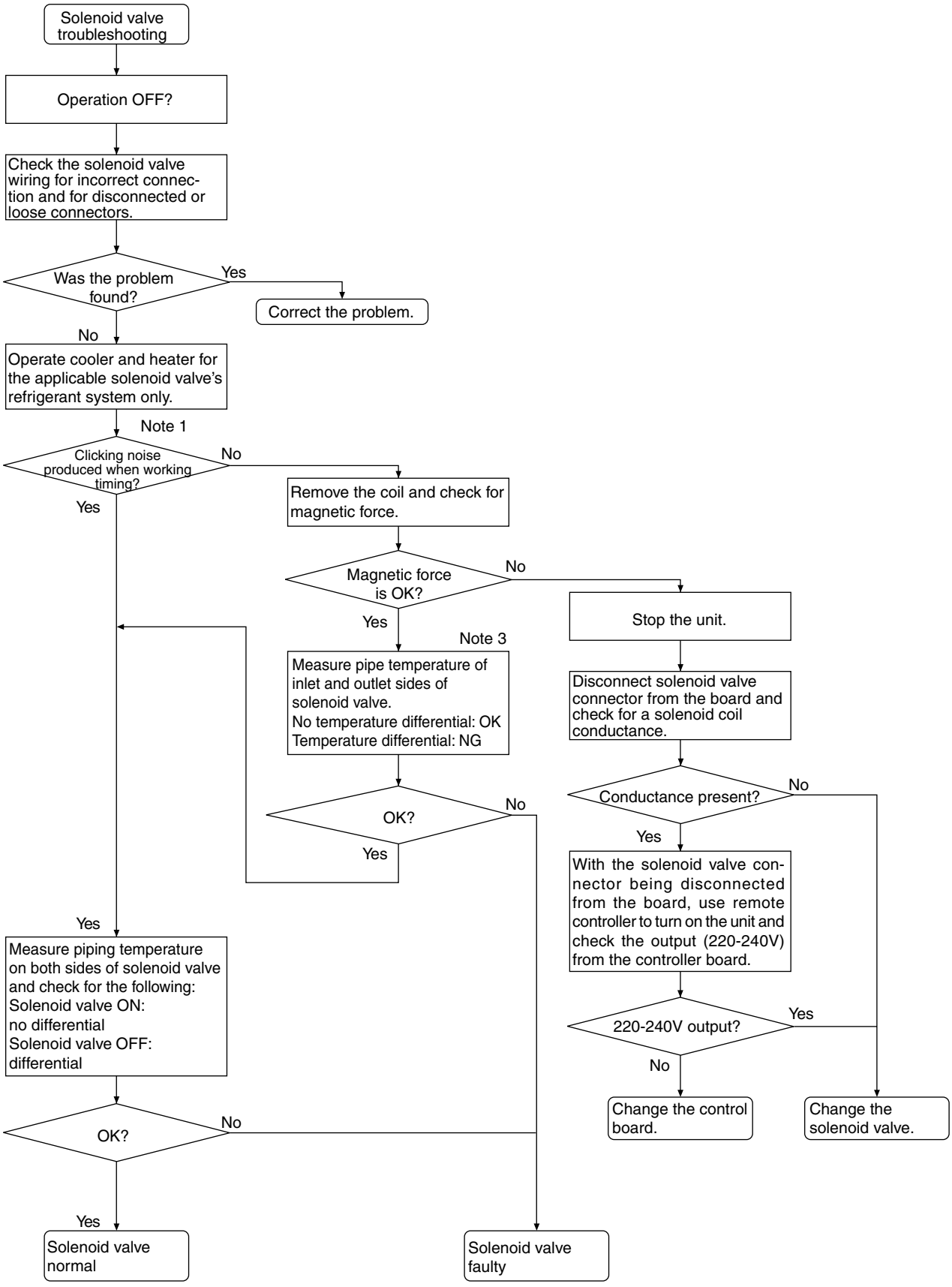
(Self-diagnostic monitor)

Measured Data	Signal	OUTDOOR MAIN board SW1 Setting
LEV1 pulse	–	
LEV 3 pulse	–	
LEV 3a pulse	–	
BC controller bypass output superheat	SH12	
BC controller intermediate subcool	SC16	
BC controller liquid subcool	SC11	

(Solenoid Valve Troubleshooting Flow)



② Solenoid Valve



Solenoid valves (SVA, SVB, SVC, SVM1)
Coordination signals output from the board and solenoid valve operations. *Depending on the models, SVM is not built in.

Note 1 : (SVA, SVB, SVC)

SVA, SVB and SVC are turned on and off in accordance with operation mode.

Mode / Branch port	Cooling	Heating	Stopped	Defrosting
SVA	ON	OFF	OFF	OFF
SVB	OFF	ON	OFF	OFF
SVC	ON	OFF	OFF	OFF

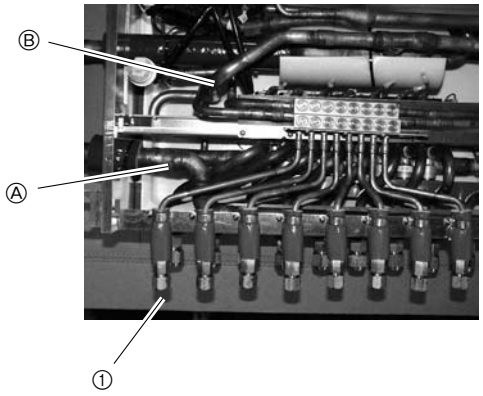
(SVM1)

SVM is turned on and off in accordance with operation mode.

Operation Mode	Cooling-only	Cooling-principal	Heating-only	Heating-principal	Defrosting	Stopped
SVM1	ON	OFF	OFF	OFF	ON	OFF

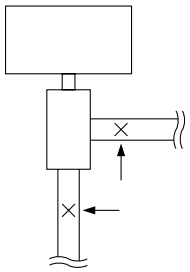
Note 2 : (SVA, SVB, SVC)

Measure temperature of piping on either side of SVA ①-Ⓐ
Measure temperature of piping on either side of SVB ①-Ⓑ

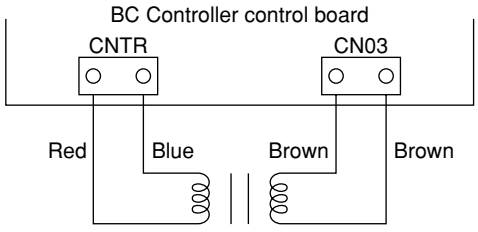


(SVM1)

Measure temperature at points marked with an “X”.



4) BC controller transformer



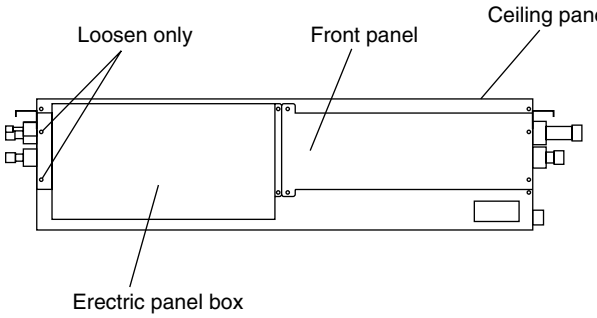
	Normal	Malfunction
CNTR(1)-(3)	Approximately 90Ω	Open or shorted
CN03(1)-(3)	Approximately 1.7Ω	

* Disconnect the connector before measurering.

[2] BC Controller Disassembly Procedure

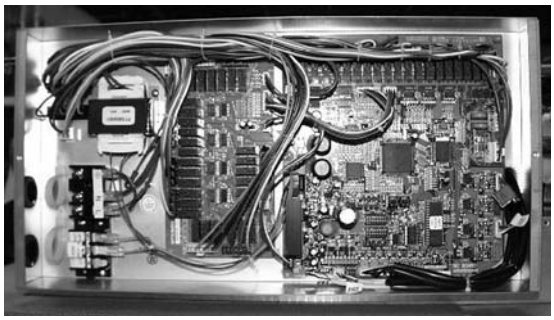
(1) Service panel

Be careful when removing heavy parts.

Procedure	Illustrations
1. Remove the two screws securing the electric panel box. Loosen the two screws securing the electric panel box, and then remove the box. 2. Remove the four screws securing the front panel and then remove the panel. 3. Remove the nine screws securing the ceiling panel and then remove the panal.	

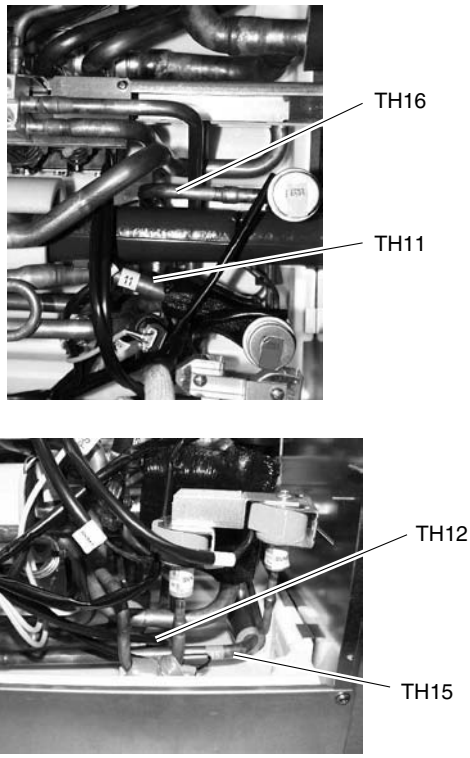
(2) Control Box

Be careful when removing heavy parts.

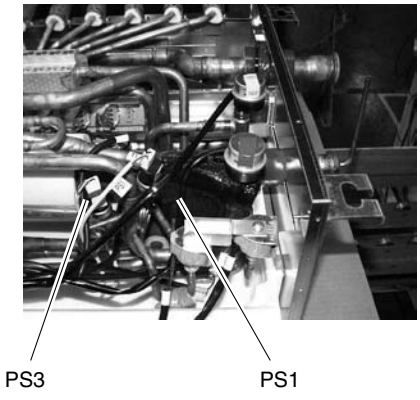
Procedure	Photos
Removing the two screws that secures the electric panel box cover provides access to the controller board and all of the relay board for checking, so it is not necessary to perform the task #2 above.	

(3) Thermistor (Liquid and gas piping temperature detection)

Be careful when removing heavy parts.

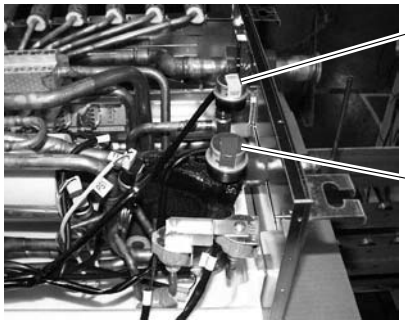
Procedure	Photos
1. Remove the front panel ① Follow the procedures under (1)-1.2.3 to check TH11, TH12, TH15, and TH16. 2. Disconnect the piping sensor lead from the controller panel. ① TH11 - TH12 (CN10) ② TH15, TH16 (CN11) 3. Pull out the temperature sensor from the sensor housing, and replace it with a new one. 4. Connect the temperature sensor lead securely to the controller board.	

(4) Pressure Sensor

Procedure	Photos
1. Remove the front panel. ① Follow the procedures under (1)-1.2 to check PS1 and PS3. 2. Disconnect the connector of the applicable pressure sensor from the controller board, and insulate the connector. ① Liquid pressure sensor (CNP1) ② Intermediate pressure sensor (CNP3) 3. Install a new pressure sensor at the location shown in the photograph, and plug the connector into the controller board. Important ① In the case of gas leakage from the pressure sensor, repair the leak before performing the above procedures.	

(5) LEV

Be careful on removing heavy parts.

Procedure	Photos
1. Remove the service panel. See (1)-1.2.3 2. Replace the applicable LEV. Important! ① When performing the above procedure, be sure to allow for enough service space in the ceiling area for welding. ② If necessary, the unit can be lowered from the ceiling before starting work.	

(6) Solenoid Valve Coil

Procedure	Photos
1. Remove the service panel. See (1)-1.2.3 2. Disconnect the connector of the applicable solenoid valve. 3. Remove the solenoid valve coil. ① SVA, SVB, and SVM1, 2 solenoid valve coils can be serviced from the maintenance port. If service space is available. SVC can be serviced from the back.	

Check Code List

Check Code		Types of Errors	
0403		Serial transmission abnormality	
0900		Trial operation	
1102		Discharge temperature abnormality	
1111		Low pressure saturation temperature sensor abnormality (TH2)	
1112		Low pressure saturation temperature abnormality	Liquid level sensing temperature sensor abnormality (TH4)
1113			Liquid level sensing temperature sensor abnormality (TH3)
1143		Insufficient refrigerant	
1301		Low pressure abnormality (OC)	
1302		High pressure abnormality (OC)	
1368		Liquid-side pressure abnormality (BC)	
1370		Intermediate pressure abnormality (BC)	
1500		Overcharged refrigerant abnormality	
2500		Water leakage	
2502		Drain pump abnormality	
2503		Drain sensor abnormality	
4103		Reverse phase abnormality	
4115		Power supply sync signal abnormality	
4116		Fan-speed abnormality (motor abnormality)	
4200		VDC sensor/circuit abnormality	
4220		Bus voltage abnormality	
4230		Radiator panel overheat protection	
4240		Over loard protection	
4250	[1]	IPM Alarm output / Bus voltage abnormality	
	[11]	IAC sensor overcurrent abnormality	
4260		Cooling fan abnormality	
5101		Thermal sensor abnormality	Air inlet (TH21:IC)
			Discharge (TH1:OC)
5102			Liquid pipe (TH22:IC)
			Low pressure saturation (TH2:OC)
5103			Gas pipe (TH23:IC)
			Accumulater liquid level (LD1)
5104			Accumulater liquid level (LD2)
5105			Liquid pipe (TH5)
5106			Ambient temperature (TH6)
5107			SC coil outlet (TH7)
5108			SC coil bypass outlet (TH8)
5109			CS circuit (TH9)
5110			Radiator panel (THHS)
5112			Compressor shell temperature (TH10)
5201		Pressure sensor abnormality (OC)	
		Liquid side pressure sensor abnormality (BC)	
5203		Intermediate side pressure sensor abnormality (BC)	
5301	[6]	IAC sensor/circuit abnormality	
	[13]	Incorrect IAC sensor	
6600		Multiple address error	
6602		Transmission processor hardware abnormality	
6603		Transmission circuit bus-busy abnormality	

Check Code	Types of Errors
6606	Problem communicating with transmission processor
6607	No ACK abnormality
6608	No response abnormality
6831	MA communication, No-reception error
6832	MA communication, Synchronization recovery error
6833	MA communication, Transmission/reception handware error
6834	MA communication, Start bit error
7100	Total capacity abnormality
7101	Capacity code abnormality
7102	Connected unit count over
7105	Address setting abnormality
7106	Characteristics setting error
7111	Remote control sensor abnormality
7130	Different indoor model connected abnormality

Intermittent fault check code

Trouble Delay Cope		Trouble Delay Content
1202 (1102)		Preliminary discharge temperature abnormality or preliminary discharge thermal sensor abnormality (TH1)
1205		Preliminary high pressure pipe temperature sensor abnormality (TH5)
1211 (1111)		Preliminary low pressure saturation abnormality or preliminary low pressure saturation sensor abnormality (TH2)
1212 (1112)		Preliminary low pressure saturation abnormality or preliminary liquid level-sensor upper thermal sensor abnormality (TH4)
1213 (1113)		Preliminary low pressure saturation abnormality or preliminary liquid-level-sensor lower thermal sensor abnormality (TH3)
1214		Preliminary THHS sensor/circuit abnormality
1216		Preliminary heat exchanger thermal sensor abnormality (TH7)
1219		Preliminary CS circuit thermal sensor abnormality (TH9)
1221		Preliminary ambient temperature thermal sensor abnormality (TH6)
1402 (1302)		Preliminary high pressure abnormality or preliminary pressure sensor abnormality
1600 (1500)		Preliminary overcharged refrigerant abnormality
1601		Preliminary insufficient refrigerant abnormality
1605 (1505)		Preliminary suction pressure abnormality
1607		CS circuit block abnormality
1608		Control valve abnormality
4300 (0403)	[9]	Preliminary serial transmission abnormality
4300 (5301)	[6]	IAC sensor/circuit abnormality
	[13]	Incorrect IAC sensor
4320 (4220)		Preliminary bus voltage abnormality
4330 (4230)		Preliminary heat sink overheating abnormality
4340 (4240)		Preliminary overload protection
4350 (4250)	[1]	IPM Alarm output/Bus voltage abnormality
	[11]	IAC sensor overcurrent abnormality
4360 (4260)		Preliminary cooling fan abnormality

Please refer to ( ) : Check Code. [ ] : Error detail No.

[3] Self-diagnosis and Countermeasures Depending on the Check Code Displayed

(1) Mechanical

Checking code		Meaning, detecting method	Cause	Checking method & Countermeasure
0403	Serial transmission abnormality	Serial transmission cannot be established between the MAIN and INV boards.	1) Wiring is defective.	Check the connections, contact at the connectors, and for broken wires in the following wiring: CNRS2 - CNRS3 CNAC2 - TB1B
			2) Switches are set incorrectly on the INV board.	SW1-4 on the INV board should be OFF.
			3) A fuse (F01) on the INV board has been blown.	Find out if the fuse is blown, (if the resistance between the both ends of fuse is ∞), replace the fuse.
			4) The circuit board is defective.	If none of the items in 1) to 3) is applicable, and if the trouble reappears even after the power is switched on again, replace the circuit board according to the following procedures (When replacing the circuit board, be sure to connect all the connectors, ground wires, etc. securely). ① If serial transmission is restored after only the INV board is replaced, then the INV board is defective. ② If serial transmission is not restored, reinstall the INV board and replace the MAIN board. If serial transmission is restored, the MAIN board is defective. ③ If serial transmission is not restored by peforming both procedures ① and ② above, replace both boards.

Checking code		Meaning, detecting method	Cause	Checking method & Countermeasure
1102	Discharge temperature abnormality (Outdoor unit)	1. When discharge temperature exceeds 140°C for the first time during operation, outdoor unit stops, goes into a restart mode after 3 minutes, then restarts. 2. When 140°C or higher temperature is detected again (the second time) within 30 minutes of the first incident, emergency stop is observed with code No. "1102" being displayed. 3. When 140°C or higher temperature is detected again after at least 30 minutes have past since the initial stop of the outdoor unit, resulting stoppage of the outdoor unit is considered the initial stop, and the process shown in 1 is observed. 4. Thirty minutes have past since the outdoor unit first stopped and no stop for this reason has occurred for 30 minutes, the preliminary fault code "1202" will be displayed.	1) Gas leak, gas shortage.	See **Refrigerant amount check.**
			2) Overload operations.	Check operating conditions and operation status of indoor/outdoor units.
			3) Poor operations of indoor LEV. 4) Poor operations of BC controller LEV: Cooling-only : LEV3 Cooling-main : LEV1, 3 Heating-only, Heating-main: LEV3 Defronst : LEV3 5) Poor operations of BC controller SVM1 : Cooling-only, defrost 6) Poor operations of BC controller SVA : Cooling-only, Cooling-main 7) Poor operations of BC controller SVB : Heating-only, Heating-main 8) Poor operations of solenoid valves. SV (3 ~ 8) Heating-only, Heating-main	Check operation status by actually performing cooling or heating operations. Cooling : Indoor LEV (Cooling-only) LEV1, 3 (BC) SVM1 (BC) SVA (BC) Heating : Indoor LEV (Heating-only) LEV3 (BC) SVB (BC) SV3 ~ 8 See **Trouble check of LEV and solenoid valve.**
			9) Setting error of connection address (PURY).	Check address setting of indoor unit connection.
			10) Poor operations of ball valve.	Confirm that ball valve is fully opened.
			11) Outdoor unit fan block, motor trouble, poor operations of fan controller→Heating (Heating-only, Heating-main). [3) ~ 11) : Rise in discharge temp. by low pressure drawing.]	Check outdoor fan. See **Trouble check of outdoor fan.**
			12) Gas leak between low and high pressures. [4-way valve trouble, compressor trouble, solenoid valve SV1 trouble.]	Check operation status of cooling-only or heating-only.
			13) Poor operations of solenoid valve SV4a. [Bypass valve SV2 can not control rise in discharge temp.]	See **Trouble check of solenoid valve.**
			14) Thermistor trouble.	Check resistance of thermistor.
			15) Thermistor input circuit trouble on control circuit board.	Check inlet temperature of sensor with LED monitor.

Checking code			Meaning, detecting method	Cause	Checking method & Countermeasure
1111	Low pressure saturation temperature trouble	Low pressure saturation temperature sensor abnormality (TH2)	1. When saturation temperature sensor (TH2) or liquid level detecting temperature sensors (TH3, TH4) detects -40˚C or less (the first time) during operations, outdoor unit stops once, mode is changed to restart mode after 3 minutes, then the outdoor unit restarts. 2. When -40˚C or lower temp. is detected again (the second time) within 30 minutes after stop of outdoor unit, error stop is observed with code Nos. "1111," "1112," or "1113" displayed. 3. When -40˚C or lower temperature is detected 30 or more minutes after stop of outdoor unit, the stop is regarded as the first time and the process shown in 1. is observed. 4. Thirty minutes have past since the outdoor unit first stopped and no stop for this reason has occurred for 30 minutes, the preliminary fault code "1202" will be displayed. Note: 1. Low press. saturation temperature trouble is not detected for 3 minutes after compressor start, and finish of defrosting operations, and during defrosting operations. 2. In the case of short/open of TH2~TH4 sensors before starting of compressor or within 10 minutes after starting of compressor, "1111," "1112," or "1113" is displayed too.	1) Gas leak, Gas shortage.	See **Refrigerant amount check.**
				2) Insufficient load operations.	Check operating conditions and operation status of outdoor unit.
				3) Poor operations of indoor LEV. 4) Poor operations of BC controller LEV: Cooling-only : LEV3 Cooling-main : LEV1, 3 Heating-only, Heating-main: LEV3 Defrost : LEV3 5) Poor operations of BC controller SVM1: Cooling-only, Defrost 6) Poor operations of BC controller SVM1: Cooling-only, Cooling-main 7) Poor operations of BC controller SVB: Heating-only, Heating-main 8) Solenoid valve trouble (SV3 ~ 8) Heating-only, Heating-main	Check operation status by actually performing cooling-only or heating-only operations. Cooling-only : indoor LEV LEV1, 3 (BC) SVM (BC) SVA (BC) Heating-only : indoor LEV LEV3 (BC) SVB (BC) SV3~8 See **Trouble check of LEV and solenoid valve.**
1112		Liquid-level detecting temperature sensor abnormality (TH4)		9) Setting error of connection address.	Check address setting of indoor unit connector.
				10) Poor operations of ball valve.	Confirm that ball valve is fully opened.
				11) Short cycle of indoor unit. 12) Clogging of indoor unit filter. 13) Fall in air volume caused by dust on indoor unit fan. 14) Dust on indoor unit heat exchanger. 15) Indoor unit block, Motor trouble. [9)~14) : Fall in low pressure caused by evaporating capacity in cooling-only cooling-principal operation.]	Check indoor unit, and take measu-res to troube.
1113		Liquid-level detecting temperature sensor abnormality (TH3)		16) Short cycle of outdoor unit. 17) Dust on outdoor heat exchanger.	Check outdoor unit, and take measures to trouble.
				18) Indoor unit fan block, motor trouble, and poor operations of fan controller. [15)~17) : Fall in low press. caused by lowered evaporating capacity in heating-only heating-principal operation.]	Check outdoor unit fan. See **Trouble check of outdoor unit fan.**
				19) Poor operations of solenoid valve SV4a. [Bypass valve (SV4a) cannot control low pressure drop.]	See **Trouble check of solenoid valve.**
				20) Thermistor trouble (TH2~TH10).	Check resistance of thermistor.
				21) Pressure sensor abnormality.	See **Trouble check of pressure sensor.**
				22) Control circuit board thermistor abnormality and pressure sensor input circuit abnormality.	Check inlet temp. and press. of sensor by LED monitor.
				23) Poor mounting of thermistor (TH2~TH10).	

Checking code		Meaning, detecting method	Cause	Checking method & Countermeasure
1301	Low pressure abnoramlity	When starting from the stop mode for the first time, (if at the start of bind power transmission, the end of bind power transmission, and in the mode when the thermostat goes OFF immediately after the remote control goes ON, the following compressor start time is included), if the low pressure pressure sensor before starting is at 0.098MPa, operation stops immediately.	1) Internal pressure is dropping due to a gas leak. 2) The low pressure pressure sensor is defective. 3) Insulation is torn. 4) A pin is missing in the connector, or there is faulty contact. 5) A wire is disconnected. 6) The control board's low pressure pressure sensor input circuit is defective.	Refer to the item on judging low pressure pressure sensor failure.
1302	High pressure abnoramlity 1 (Outdoor unit)	1. When pressure sensor detects 2.47MPa or higher for the first time, the outdoor unit stops, goes into restart mode after 3 minutes, then restarts. 2. When 2.94MPa or higher pressure is detected again (the second time) within 30 minutes after stop of outdoor unit,error stop is observed with code No. "1302" displayed. 3. When 2.47MPa or higher pressure is detected 30 or more minutes after stop of outdoor unit, the detection is regarded as the first time and the process shown in 1 is observed. 4. Thirty minutes have past since the outdoor unit first stopped and no stop for this reason has occurred for 30 minutes, the preliminary fault code "1202" will be displayed. 5. Error stop is observed immediately when press. switch ($2.94^{+0}_{-1.5}$MPa) operates in addition to pressure sensor.	1) Poor operations of indoor LEV. 2) Poor operations of BC controller LEV: Heating-only, heating-principal: LEV3 Defrost: LEV3 3) Poor operations of BC controller SVM1: Cooling-only, defrost 4) Poor operations of BC controller SVA: Cooling-only, cooling-main 5) Poor operations of BC controller SVB: Heating-only, heating-main 6) Solenoid valve SV (3 ~ 8) trouble Cooling-only, cooling-main	Check operations status by actually performing cooling or heating operations. Cooling : Indoor LEV LEV1, 3 (BC) SVM SVA (BC) SV3~8 Heating : Indoor LEV LEV3 (BC) SVB (BC) See **Trouble check of LEV and solenoid valve.**
			7) Setting error of connection address.	Check address setting of indoor unit connector.
			8) Poor operations of ball valve.	Confirm that ball valve is fully open-ed.
			9) Short cycle of indoor unit. 10) Clogging of indoor unit filter. 11) Fall in air volume caused by dust on indoor unit fan. 12) Dust on indoor unit heat exchanger. 13) Indoor unit fan block, motor trouble. [8)~13) : Rise in high pressure caused by lowered condensing capacity in heating-only and heating-principal operation.]	Check indoor unit and take measures to trouble.
			14) Short cycle of outdoor unit. 15) Dust on outdoor unit heat exchanger.	Check outdoor unit and take measures to trouble.
			16) Outdoor unit fan block, motor trouble, poor operations of fan controller. [14)~16):Rise in high press. caused by lowered condensing capacity in cooling-only and cooling-pincipal operation.]	Check outdoor unit fan See **Trouble check of outdoor unit fan.**
			17) Poor operations of solenoid valves SV1, 4a (Bypass valves (SV1, 4a) can not control rise in high pressure).	See **Trouble check of solenoid valve**.
			18) Thermistor trouble (TH2, TH5, TH6).	Check resistance of thermistor.
			19) Pressure sensor trouble.	Check **Trouble check of pressure sensor.**
			20) Control circuit board thermistor trouble, press. sensor input circuit trouble.	Check inlet temperature and press. of sensor with LED monitor.

Checking code			Meaning, detecting method	Cause	Checking method & Countermeasure
1302	High pressure abnoramlity 2 (Outdoor unit)		When press. sensor detects 0.098MPa or less just before starting of operation, erro stop is observed with code No. “1302” displayed.	1) Fall in internal press. caused by gas leak. 2) Press. sensor trouble. 3) Film breakage. 4) Disconnection off of pin in connector portion, poor contact. 5) Broken wire. 6) Press. sensor input circuit trouble on control circuit board.	See **Trouble check of pressure sensor.**
1368	High pressure abnoramlity (BC controller)	Liquid side	When liquid side press sensor, gas side pressure sensor, or intermediate pressure sensor detects 2.94MPa or more, error stop is observed with code No. “1368”, or “1370” displayed.	1) Poor operations of indoor LEV. 2) Poor operations of BC controller LEV: Heating-only, heating-principal: LEV3 Defrost: LEV3 3) Poor operations of BC controller SVM: Cooling-only, defrost 4) Poor operations of BC controller SVA: Cooling-only, cooling-principal 5) Poor operations of BC controller SVB: Heating-only, heating-principal 6) Solenoid valve SV (3 ~ 8) trouble. Cooling-only, cooling-principal	Check operations status by actually performing cooling or heating operations. Cooling : Indoor LEV LEV1, 3 SVM SVA SV3~8 Heating : Indoor LEV LEV3 SVB See **Trouble check of LEV and solenoid valve.**
				7) Setting error of connection address.	Check address setting of indoor unit connector.
				8) Poor operations of ball valve.	Confirm that ball valve is fully opened.
				9) Short cycle of indoor unit. 10) Clogged of indoor unit filter. 11) Fall in air volume caused by dust on indoor unit fan. 12) Dust on indoor unit heat exchanger. 13) Indoor unit fan block, motor trouble. [9)~13) : Rise in high pressure caused by lowered condensing capacity in heating-only and heating-principal operation.]	Check indoor unit and take measures to trouble.
				14) Short cycle of outdoor unit. 15) Dust on outdoor unit heat exchanger.	Check outdoor unit and take measures to trouble.
1370		Intermediate side		16) Outdoor unit fan block, motor trouble, poor operations of fan controller. [14)~16) : Rise in high press. caused by lowered condensing capacity in cooling-only and cooling-principal operation.]	Check outdoor unit fan. See **Trouble check of outdoor unit fan.**
				17) Poor operations of solenoid valves SV1, 4a. (Bypass valves (SV1, 4a) cannot control rise in high pressure.)	See **Trouble check of solenoid valve.**
				18) Thermistor trouble (TH2, TH5, TH6).	Check resistance of thermistor.
				19) Pressure sensor trouble.	Check **Trouble check of pressure sensor.**
				20) Control circuit board thermistor trouble, press. sensor input circuit trouble.	Check inlet temperature and press. of sensor with LED monitor.
				21) Poor mounting of thermistor. (TH2, TH5, H6)	

Checking code		Meaning, detecting method	Cause	Checking method
1500	Overcharged refrigerant	1. When discharge superheart ≦ 10 deg is kept for 10 minutes or discharge superheat ≦ 20 deg for 15 minutes, outdoor unit stops once, and after 3 minutes, the unit restarts. 60 minutes after unit stopped is an intermittent fault check period. 2. When discharge superheart ≦ 10 deg is detected for 10 minutes or discharge superheat ≦ 20 deg for 15 minutes again (second time), the unit stops and error code 1500 is displayed. 3. In case of SW2-6 ON, the detection for the second time is followed by the first time.	1) Excessive refrigerant charge.	Check refrigerant amount.
			2) Thermistor trouble (TH1).	Check resistance of thermistor.
			3) Pressure sensor trouble (63HS).	See trouble shooting of pressure sensor.
			4) Control circuit board trouble.	Check temperature and pressure sensor with LED monitor.
2500	Water leak abnormality	When drain sensor detects flooding during drain pump OFF.	1) Water leak due to humidifier or the like in trouble.	Check water leak in the humidifier and clogging of drain pan.
2502	Drain pump abnormality	When indirect heater of drain sensor is turned on, rise in temperature is 20 deg. or less (in water) for 40 seconds, compared with the temperature detected before turning on the indirect heater.	1) Drain sensor sinks in water because drain water level rises due to drain water lifting-up mechanism trouble.	Check operations of drain pump.
			2) Broken wire of indirect heater of drain sensor.	Measure resistance of indirect heater of drain sensor. (Normal: Approx. 82Ω between 1-3 of CN50)
			3) Detecting circuit (circuit board) trouble.	Indoor board trouble if no other problems are detected.
2503	Drain sensor abnormality	Short/open is detected during drain pump operations. (Not detected when drain pump is not operating.) Short : 90˚C or more detected Open : -40˚C or less detected	1) Thermistor trouble. 2) Poor contact of connector. (insufficient insertion) 3) Full-broken of half-broken thermistor wire.	Check resistance of thermistor. 0˚C : 15kΩ 10˚C : 9.7kΩ 20˚C : 6.4kΩ 30˚C : 4.3kΩ
			4) Indoor unit circuit board (detecting circuit) trouble.	Check contact of connector. Indoor port trouble if no other problem are detected.
	Operation of float switch	When float switch operates (point of contact : OFF), error stop is observed with code No. “2503” displayed.	1) Drain up input trouble. 2) Poor contact of float switch circuit. 3) Float switch trouble.	Check drain pump operations. Check connection contact. Check float switch operations.

Checking code		Meaning, detecting method	Cause	Checking method & Countermeasure
4103	Reverse phase abnormality	Reverse phase (or open phase) in the power system is being detected, so operation cannot be started.	1) The phases of the power supply (L1, L2, L3) have been reversed.	If there is reverse phase before the breaker, after the breaker or at the power supply terminal blocks TB1A, reconnect the wiring.
			2) Open phase has occurred in the power supply (L1, L2, L3, N).	Check before the breaker, after the breaker or at the power supply terminal blocks TB1A, and if there is an open phase, correct the connections. a) Check if a wire is disconnected. b) Check the voltage between each of the wires.
			3) The wiring is faulty.	Check 1 the connections, 2, the contact at the connector, 3, the tightening torque at screw tightening locations and 4 for wiring disconnections. TB1A~NF~TB1B~CNTR1~F3~T01~CNTR Refer to the circuit number and the wiring diagram plate.
			4) The fuse is faulty.	If F1 on the MAIN board, or F3 is blown, (Resistance between both ends of the fuse is ∞), replace the fuses.
			5) T01 is faulty.	To judge failure of the T01, go to "Individual Parts Failure Judgment Methods."
			6) The circuit board is faulty.	If none of the items in 1) through 5) is applicable, and if the problem persists even after the power is switched on again, replace the MAIN board (When replacing the circuit board, be sure to connect all the connectors, etc. securely)
4115	Power supply sync signal abnormality	The frequency cannot be determined when the power is switched on. (The power supply's frequency cannot be detected. The outdoor fan cannot be controlled by phase control.)	1) There is an open phase in the power supply (L1, L2, L3, N).	Check before the breaker, after the breaker or at the power supply terminal blocks TB1A, and if there is an open phase, correct the connections.
			2) The power supply voltage is distorted.	If the power supply voltage waveform is distorted from a sine wave, improve the power supply environment.
			3) A fuse is defective.	If F1 on the MAIN board, or F3 is blown, (Resistance between both ends of the fuse is ∞), replace the fuses.
			4) T01 is defective.	To judge failure of the T01, go to "Individual Parts Failure Judgment Methods."
			5) The circuit board is defective.	If none of the items in 1) through 4) is applicable, and if the problem persists even after the power is switched on again, replace the MAIN board (When replacing the circuit board, be sure to connect all the connectors, ground wires, etc. securely).

Checking code		Meaning, detecting method	Cause	Checking method & Countermeasure
4116	Fan-speed abnormality (motor abnoramlity)	(Detects only for PKFY-VAM) 1. Detecting fan-speed below 180rpm or over 2000rpm during fan operation at indoor unit (first detection) enters into the 3-minute restart prevention mode to stop fan for 30 seconds. 2. When detecting fan-speed below 180rpm or over 2000rpm again at fan returning after 30 seconsd from fan stopping, error stop (fan also stops) will be commenced displaying 4116.	1) Slipping off of fan-speed detecting connector (CN33) of indoor controller board.	• Confirm slipping off of connector (CN33) on indoor controller board.
			2) Slipping off of fan output connector (FAN1) of indoor power board.	• Confirm slipping off of connector (FAN1) on indoor power board.
			3) Disconnection of fan-speed detecting connector (CN33) of indoor controller board, or that of fan output connector (FAN1) of indoor power board.	• Check wiring for disconnection.
			4) Filter cologging	• Check filter.
			5) Trouble with indoor fan motor.	• Check indoor fan motor.
			6) Faulty fan-speed detecting circuit of indoor controller board, or faulty fan output circuit of indoor power board.	• When there are no problems with the items above. 1) For trouble after operating fan. Replace indoor controller board. If the problems persist, replace the indoor power board. 2) For trouble without operating fan. Replace indoor power board.
4200	VDC sensor/circuit abnormality	1 If VDC $\leqq$ 304 V is detected just before the inverter starts. 2 If VDC $\geqq$ 750 V is detected just before starting of and during operation of the inverter.	1) Power supply voltage is abnormal.	• Check if an instantaneous power failure or power failure, etc. has occurred. • Check if the voltage is within the rated voltage value.
			2) The wiring is defective.	Check the following items: 1) connections, 2) contact at the connectors, 3) tightening torque of the screws, 4) wiring polarities, 5) for broken wires, and 6) for grounding for the following wiring. TB1A~NF~TB1B, TB1B~DS~[52C, R1, R5]~[C2, C3]~IPM Wiring CNDC1 (G / A) ~ CNVDC (INV) Wiring * Check if the wiring polarities are as shown on the wiring diagram plate.
			3) The rush current prevention resistors (R1, 5) are defective.	To judge failure of R1 and R5, go to “Individual Parts Failure Judgment Methods.”
			4) The electromagnetic contactor (52C) is defective.	To judge failure of the 52C, go to “Individual Parts Failure Judgment Methods.”
			5) The diode stack (DS) is defective.	To judge failure of the DS, go to “Individual Parts Failure Judgment Methods.”
			6) The reactor (DCL) is defective.	To judge failure of the DCL, go to “Individual Parts Failure Judgment Methods.”
			7) The INV board is defective.	If none of the items in 1) to 6) is applicable, and if the trouble reappears even after the power is switched on again, replace the INV board (when replacing the circuit board, be sure to connect all the connectors, ground wires, etc. securely).

Checking code		Meaning, detecting method	Cause	Checking method & Countermeasure
4220	Bus voltage abnormality	① If VDC ≦ 400 V is detected during inverter operation.	1) The power supply voltage is abnormal.	• Check if an instantaneous stop or power failure, etc. has occurred. • Check if the voltage is within rated voltage range.
			2) The wiring is defective.	Check the following items: 1) connections, 2) contact at the connectors, 3) tightening torque of the screws, 4) wiring polarities, 5) for broken wires, and 6) for grounding for the following wiring. TB1A~NF~TB1B, TB1B~DS~[52C, R1, R5]~[C2, C3]~IPM Wiring CNDC1 (G / A) ~ CNVDC (INV) Wiring * Check if the wiring polarities are as shown on the wiring diagram plate.
			3) The rush current prevention resistors (R1, 5) are defective.	To judge failure of R1 and R5, go to "Individual Parts Failure Judgment Methods."
			4) The electromagnetic contactor (52C) is defective.	To judge failure of the 52 C, go to "Individual Parts Failure Judgment Methods."
			5) The diode stack (DS) is defective.	To judge failure of the DS, go to "Individual Parts Failure Judgment Methods."
			6) The reactor (DCL) is defective.	To judge failure of the DCL, go to "Individual Parts Failure Judgment Methods."
			7) The inverter output is grounded.	• Check the wiring between the IPM and the compressor. • Check the compressor's insulation resistance.
			8) The IPM is defective.	Check the IPM. Judge that the IPM is fauly (Go to "Individual Parts Failure Judgment Methods.")
			9) The circuit board is defective.	If none of the items from 1 through 8 is applicable, and if the problem persists even after the power is switched off then turned on again, replace the circuit board by following the procedures below (When replacing the circuit board, be sure to connect all the connectors and grounding wires securely.) ① If the problem is solved after only the G/A board is replaced, then the G/A board is defective. ② If the problem is not solved, reinstall the G/A board and replace the INV board. If the problem is solved, the INV board is defective. ③ If the problem is not solved by ① or ② above, replace both boards.
4230	Radiator panel overheat protection	If the cooling fan stays ON for 5 minutes or longer during inverter operation, and if THHS ≧ 100°C is detected.	1) Faulty wirings	Check the following items: 1) connections, 2) contact at the connectors, and 3) for broken wires in the following wiring. MF1~CNFAN
			2) The INV boar's fuse (F01) is defective.	If the fuse is defective, replace the fuse.
			3) The cooling fan (MF1) is defective.	To judge failure of the MF1, go to "Individual Parts Failure Judgment Methods."
			4) The THHS sensor is defective.	To judge failure of the THHS, go to error code "5110".
			5) The air passage is clogged.	If the air passage of the heat sink is clogged, clear the air passage.
			6) The IPM is defective.	Check the IPM. Judge that the IPM is fauly, (Go to "Individual Parts Failure Judgment Methods.")
			7) The circuit board is defective.	If none of the items from 1 through 6 is applicable, and if the problem persists even after the power is switched off and then turned on again, replace the circuit board by following the procedures below. (When replacing the circuit board, be sure to connect all the connectors and grounding wires securely.) ① If the problem is solved after only the G/A board is replaced, then the G/A board is defective. ② If the problem is not solved, reinstall the G/A board and replace the INV board. If the problem is solved, the INV board is defective. ③ If the problem is not solved by ① or ② above, replace both boards.

Checking code		Meaning, detecting method	Cause	Checking method & Countermeasure
4240	Over load protection	IAC ≧ 32 Arms is detected continuously for 10 minutes during operation of the inverter after 5 or more seconds have passed since the inverter started.	1) Air passage short cycle.	Is the unit's exhaust short cycling?
			2) The heat exchanger is clogged.	Clean the heat exchanger.
			3) Power supply voltage.	If the power supply voltage is less than 342 V, it is outside specifications.
			4) External air temperature.	If the external air temperature is over 43°C, it is outside the specifications.
			5) Capacity setting error.	• Is the indoor unit capacity total correct? • Are the outdoor/indoor unit capacity settings correct?
			6) The solenoid valves (SV1, 2) are defective, or the solenoid valve drive circuit is defective.	To judge failure of the solenoid valve, go to "Individual Parts Failure Judgment Methods" for the "Solenoid Valve."
			7) The wiring is defective.	Check the following items: 1) connections, 2) contact at the connectors, and 3) for broken wires in the following wiring. TB1A~NF~TB1B TB1B~FANCON board~CN04 CNMF~MF TB1B~CNTR1 CNFC1~CNFC2
			8) Fan motor (MF) malfunction.	Go to "Treating Fan Motor Related Trouble."
			9) The inverter/compressor is defective.	Go to "Treating Inverter/Compressor Related Trouble."
4250	IPM alarm output / Bus voltage abnormality	① Over current, overheat or undervoltage of drive cirduit is detected by IPM during inverter operation. [Inverter error detail : 1] ② VDC ≦ 300 or VDC ≧ 760V is detected during inverter operation. [Inverter error detail : 1] ③ IAC ≧ 39Arms is detected during inverter operation. [Inverter error detail : 11]	1) The power supply voltage is abnormal.	• Check if an instantaneous stop or power failure, etc. has occurred. • Check if the voltage is within the rated voltage range.
			2) Faulty wiring.	Check the following items: 1) connections, 2) contact at the connectors, 3) tightening torque of the screws, 4) wiring polarities, 5) for broken wires, and 6) for grounding for the following wiring. TB1A~NF~TB1B, TB1A~DS~[52C, R1, R5]~[C2, C3]~IPM Wiring CNDC1 (G / A) ~ CNVDC (INV) Wiring * Check if the wiring polarities are as shown on the wiring diagram plate.
			3) The inverter / compressor is defective.	Go to "Treatment of Inverter/Compressor Related Trouble."

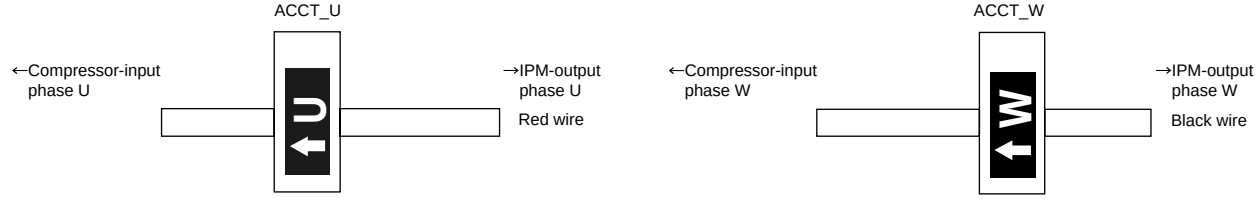
Checking code			Meaning, detecting method	Cause	Checking method & Countermeasure
4260	Cooling fan abnormality		The heat sink temperature (THHS) ≧ 100°C for 20 minutes or longer just before the inverter starts.	1) Same as "4230."	Same as "4230."
5101	Thermal sensor abnormality (Outdoor Unit)	Discharge (TH11, TH12)	<Other than THHS> ① A short in the thermistor or an open circuit was sensed. The outdoor unit switches to the temporary stop mode with re-starting after 3 minutes, then if the temperature detected by the thermistor just before restarting is in the normal range, restarting takes place. ② If a short or open circuit in the thermistor is detected just before restarting, error code "5101", "5102", "5103", "5104", "5105", "5106", "5108", "5109" or "5112" is displayed. ③ In the 3-minute restart mode, the abnormal stop delay LED is displayed. ④ The above short or open circuit is not detected for 10 minutes after the compressor starts, or for 3 minutes during defrosting or after recovery following defrosting. <THHS> If a heat sink (THHS) temperature of ≦ -40°C is detected just after the inverter starts or during inverter operation.	1) Thermistor	Check the thermistor's resistance.
5102		Low pressure saturation (TH2)		2) Lead wires are being pinched.	Check if the lead wires are pinched.
5103		Liquid-level detection (TH3)		3) Insulation is torn.	Check for tearing of the insulation.
5104		Liquid-level detection (TH4)		4) A connector pin is missing, or there is faulty contact.	Check if a pin is missing on the connector.
5105		Heat exchanger inlet pipe (TH5)		5) A wire is disconnected.	Check if a wire is disconnected.
5106		Ambient temperature (TH6)		6) The thermistor input circuit on the MAIN circuit board is faulty. (In the case of the THHS, replace the INV board.)	Check the temperature picked up by the sensor using the LED monitor. If the deviation from the actual temperature is great, replace the MAIN circuit board. (In the case of the THHS, replace the INV board.)
5107		Heat exchanger outlet pipe (TH7)			
5109		CS circuit (TH9)			
5110		Radiator panel (TH HS)			
5112		Compressor shell temperature (TH10)			

	Short Circuit Detection	Open Circuit Detection
TH11, TH12	240°C or higher (0.57 kΩ)	15°C or lower (321 kΩ)
TH2	70°C or higher (1.71 kΩ)	-40°C or lower (130 kΩ)
TH3	70°C or higher (1.71 kΩ)	-40°C or lower (130 kΩ)
TH4	70°C or higher (1.71 kΩ)	-40°C or lower (130 kΩ)
TH5	110°C or higher (0.4 kΩ)	-40°C or lower (130 kΩ)
TH6	110°C or higher (0.4 kΩ)	-40°C or lower (130 kΩ)
TH7	110°C or higher (1.14 kΩ)	-40°C or lower (130 kΩ)
TH8	70˚C or higher (1.14 kΩ)	-40°C or lower (130 kΩ)
TH9	70°C or higher (1.14 kΩ)	-40°C or lower (130 kΩ)
THHS		-40°C or lower (2.5 MΩ)
TH10	240°C or higher (0.57 kΩ)	-15°C or lower (1656 kΩ)

5111	Thermal sensor abnormality (BC controlled)	Liquid inlet (TH11)	1. When short (high temp. inlet) or open (low temperature inlet) of thermistor is detected during operation, error stop will be commenced displaying "5111" or "5112", "5113" or "5114", or "5115" or "5116." 2. The above detectection is not made during defrostig and 3-minute after changing operation mode.	1) Thermistor trouble.	Check thermistor resistance.
		Bypass outlet (TH12)		2) Biting of lead wire.	Check lead wire biting.
		Bypass inlet (TH15)		3) Broken cover.	Check broken cover.
		Intermediate section (TH16)		4) Disconnection of pin at connector portion, poor contact.	Check coming off of pin at connector.
				5) Broken wire.	Check broken wire.
				6) Faulty thermistor input circuit of control board.	Check sensor sensing temperature. If it deviates from the actual temerature by a velatively large amount, replace control panel.

	Short Detected	Open Detected
TH11	110°C or more (0.4 kΩ)	-40°C or less (130 kΩ)
TH12	110°C or more (0.4 kΩ)	-40°C or less (130 kΩ)
TH15	70°C or more (1.14 kΩ)	-40°C or less (130 kΩ)
TH16	70°C or more (0.4 kΩ)	-40°C or less (130 kΩ)

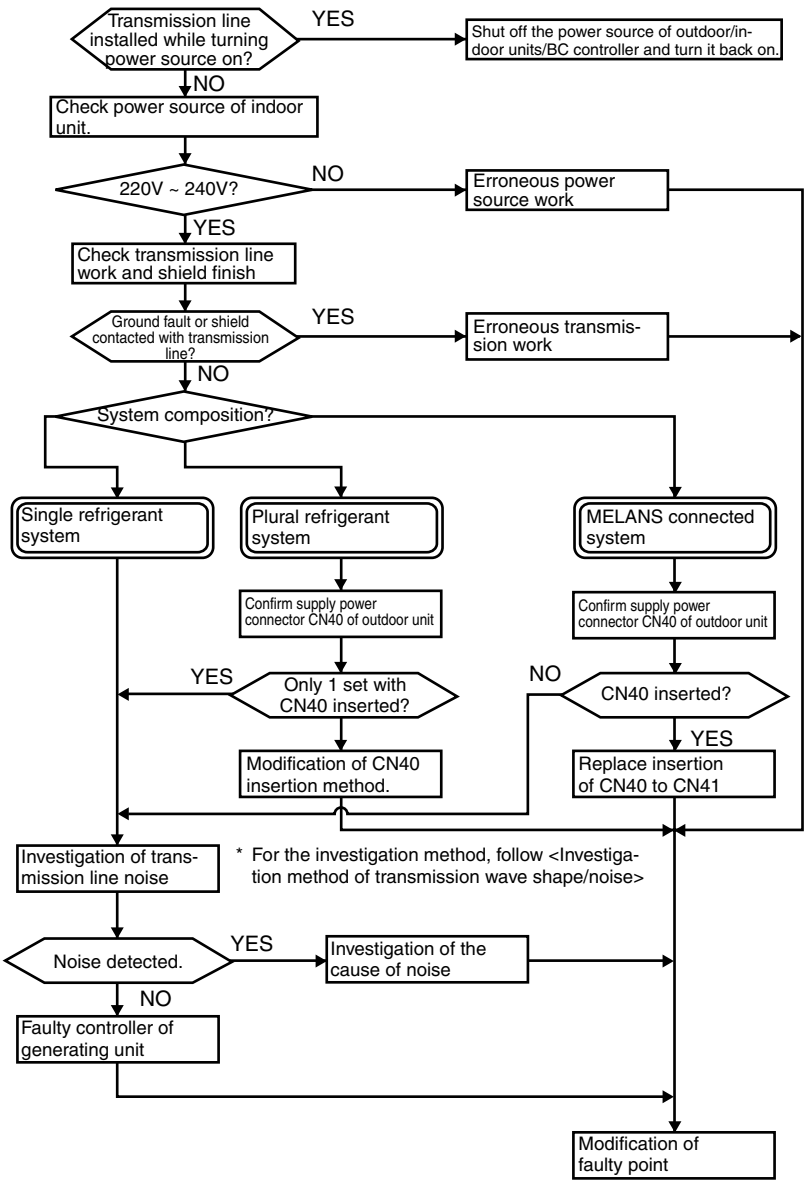
Checking code			Meaning, detecting method	Cause	Checking method & Countermeasure
5201	Pressure sensor abnormality (outdoor unit)		① When pressue sensor detects 0.098MPa or less during operation, outdoor unit stops within a 3-minute restarting mode and restarts if the detected pressure of pressure sensor exceeds 0.098MPa imediately before restarting. ② If the detected pressure of sensor is less than 0.098MPa immediately before restarting, error stop is commenced, displaying 5201. ③ Under 3 minutes restarting mode, LED displays intermittent fault check. ④ During 3 minutes after compressor start, defrosting and 3 minutes after defrosting operations, trouble detection is ignored.	1) Pressutre sensor trouble. 2) Inner pressure drop due to a leakage. 3) Broken cover. 4) Disconnected pin at connector portion, poor contact. 5) Broken wire. 6) Faulty thermistor input circuit of MAIN board.	See **Troubleshooting of pressure sensor**.
5201	Pressure sensor abnormality (BC controller)	High pressure side	When high or intermidiate pressure sensor detects 0.098MPa or less immediately before starting, error stop is commenced displaying "5201", or "5203".	1) Pressure sensor trouble. 2) Inner pressure drop due to gas leak. 3) Broken cover. 4) Disconnected pin at connector portion, poor contact. 5) Broken wire. 6) Faulty pressure sensor input circuit of control board.	See **troubleshooting of pressure sensor**.
5203		Intermediate			
5301	IAC sensor/ circuit abnormality		① IAC ≧ 3 Amps is detected just before the inverter starts, or IAC ≦ 3 Amps is detected during inverter operation after 5 seconds has passed since the inverter started when the INV board's SW1-1 is OFF. [Inverter error detail : 6] ② The current sensor (ACCT) miss-wiring is detected during inverter operation. [Inverter error detail : 13]	1) Contact is faulty.	Check the contacts of CNACCT on the INV board.
				2) The current sensor (ACCT) is connected with wrong polarity.	Check the ACCT_U, W polarity with below drawing.
				3) The wiring is defective	Check 1. connections. 2. contact at the connectors. 3. for broken wires in the following wiring. CNDR2-CNDR1 CN15V2-CN15V1 IPM-MC1
				4) The Ac current sensor (ACCT) is defective.	To judge failure of ACCT, go to "individual Parts Failure Judgment Methods."
				5) The IPM is defective.	Check the IPM. Judge that the IPM is fauly, (Go to "Individual Parts Failure Judgment Methods.")



Checking code		Meaning, detecting method	Cause	Checking method & Countermeasure
5301	IAC sensor/ circuit abnormality	① IAC ≧ 3 Arms is detected just before the inverter starts, or IAC ≦ 3 Arms is detected during inverter operation after 5 seconds has passed since the inverter started when the INV board's SW1-1 is OFF. [Inverter error detail : 6] ② The current sensor (ACCT) miss-wiring is detected during inverter operation. [Inverter error detail : 13]	6) The circuit board is defective.	If none of the items from 1) through 5) is applicable, and if the problem persists even after the power is switched off and then turned on again, replace the circuit board by following the procedures below. (When replacing the circuit board, be sure to connect all the connectors and grounding wires securely.) ① If the problem is solved after only the G/A board is replaced, then the G/A board is defective. ② If the problem is not solved, reinstall the INV board and replace the INV board. If the problem is solved, the INV board is defective. ③ If the problem is not solved by ① and ② above, replace both boards.
7130	Connection to incorrect indoor model	An exclusive R22 refrigerant indoor unit was connected to a R407C refrigerant outdoor unit.	1) Error in the MAIN board of the outdoor unit (replaced with the wrong circuit board).	If the model name plate on the outdoor unit says that it is an exclusive R22 model, and if error "7130" has occurred, the MAIN board for the outdoor unit is a R407C model circuit board, so replace it with the MAIN board for the R22 model.
			2) Wrong selection of indoor unit.	If the model name plate for the indoor unit is an exclusive R22 model, install a unit which can also operate with R407C.
			3) The indoor unit's circuit board was replaced with the wrong one.	If the model name plate on the indoro unit indicates that it is also capable of operating with R407C, and error "7130" occurs, the indoor unit's circuit board is exclusively for an R22 model, so replace it with the circuit board for a unit which is also capable of using R407C.

(2) Communication/system

Checking code	Meaning, detecting method	Cause	Checking method & Countermeasure
6600	Multiple address error Transmission from units with the same address is detected. Note: The address/attribute shown on remote controller indicates the controller which has detected error.	1) Two or more controllers of outdoor unit, indoor unit, remote controller, BC controller, etc. have the same address. 2) The signal has changed due to noise entered into the transmission signal.	Upon encountering the 6600 error, release the error by remote controller (with stop key) and start again. a) If the error occures again within 5 minutes. → Search for the unit which has the same address as that of the source of the trouble. When identical addresses are found, turn off the power source of outdoor unit, BC controller, and indoor unit for 5 minutes or more after modifying the address, and then turn them on again. b) When no trouble is encountered even continuing operation over 5 minutes. → The transmission wave shape/noise on the transmission line should be investigated in accordance with <Investigation method of transmission wave shape/noise>.
6602	Transmission processor hardware error Though transmission processor intends to transmit “0”, “1” is displayed on transmission line. Note: The address/attribute shown on remote controller indicates the controller which has detected error.	1) The collision of mutual transmission data generated during the wiring work or polarity change of the transmission line of indoor or outdoor unit while turning the power source on, the wave shape is changed and the error is detected. 2) 100V power source connection to indoor unit or BC controller. 3) Ground fault of transmission line. 4) Insertion of power supply connector (CN40) of plural outdoor units at the grouping of plural refrigerant systems. 5) Insertion of power supply connector (CN40) of plural outdoor units in the connection system with MELANS. 6) Faulty controller of unit in trouble. 7) Change of transmission data due to noise in transmission. 8) Connection system with plural refrigerant systems or MELANS for which voltage is not applied on the transmission line for central control.	

<table>
<tr><th>Checking code</th><th>Meaning, detecting method</th><th>Cause</th><th>Checking method & Countermeasure</th></tr>
<tr><td>6602</td><td>Transmission processor hardware error</td><td colspan="2">Checking method and processing
 
</td></tr>
<tr><td>6603</td><td>Transmission circuit bus-busy error
1 Data transmission conflict; Transmission cannot be performed for 4~10 consecutive minutes due to collision of data transmission.
2 Data cannot be transmitted on transmission line due to noise for 4~10 consecutive minutes.

Note:
The address/attribute shown on remote controller indicates the controller which has detected error.</td><td>1) Due to constant short frequency noise in the transmission line, transmission processor is unable to transmit signals.
2) Faulty controller of generating unit.</td><td>a) Check transmission wave shape/noise on transmission line by following <Investigation method of transmission wave shape/noise>.
→ No noise indicates faulty controller of generating unit.
→ It noise detected, check the noise.</td></tr>
</table>

Checking code	Meaning, detecting method	Cause	Checking method & Countermeasure
6606	Communication error with transmission processor Communication trouble between apparatus processor and transmission processor. Note: The address/attribute shown on remote controller indicates the controller which has detected error.	1) Data is not properly transmitted due to casual errouneous operation of the generating controller. 2) Faulty generating controller.	Turn off power sources of indoor unit, BC controller, and outdoor unit. (When power sources are turned off separately, microcomputer is not reset and normal operations cannot be restored.) → Controller is the source of the trouble when the same trouble is observed again.

Checking code	Meaning, detecting method
6607	No ACK error When no-ACK signal is detected 6 consecutive intervals of 30 seconds by transmission side controller, the transmission side detects error. Note: The address/attribute shown on remote controller indicates that the controller is not sending acknowledgement signals.

System composition	Generating unit address	Display of trouble	Detecting method	Cause	Checking method & countermeasure
(1) Single refrigerant system	① Outdoor unit (OC)	Remote controller (RC)	No reply (ACK) at OC transmission to BC	1) Poor contact of transmission line of OC or BC. 2) Damping of transmission line voltage/signal by acceptable range of transmission wiring exceeded. Farthest : Less than 200m Remote controller wiring : Less than 10m 3) Erroneous sizing of transmission line (Not within the range below). Wire diameter : 1.25mm^2 or more 4) Faulty control circuit board of OC.	Shut down OC unit power source, and switch on again. It will return to normal state in an accidental case. When the normal state cannot be restored, check 1) through 4) for the cause.
	② BC controller <master> (BC)	Remote controller (RC)	No reply (ACK) at BC <master> transmission to IC	1) BC controller (master) address is changed or modified during operation. 2) Faulty or disconnection of transmission wiring of BC controller (master). 3) Disconnection of BC unit connector (CN02). 4) Faulty BC controller (master) circuit board.	Shut down both OC and IC power sources simultaneously for 5 minutes or longer and then switch on again. It will return to the normal state in an accidental case. When the normal state cannot be restored, check for 1)-4) for the cause.
	③ BC controller <slave> (BS)	Remote controller (RC)	No reply (ACK) at BC <slave> transmission to BC <master>	1) When BC controller (slave) is changed or modified during operation. 2) Faulty or disconnection of transmission wiring of BC controller (slave). 3) Disconnection of BC unit connector (CN02). 4) Faulty BC controller (slave) circuit board.	Shut down both OC and master BC power sources simultaneously for 5 minutes or longer and then switch on again. It will return to the normal state in an accidental case. When the normal state cannot be restored, check for 1)-4) for the cause.
	④ Indoor unit (IC)	Remote controller (RC)	No reply (ACK) at IC transmission to RC	1) When IC unit address is changed or modified during operation. 2) Faulty or disconnection of transmission wiring of IC. 3) Disconnection of IC unit connector (CN2M). 4) Faulty IC unit controller. 5) Faulty remote controller.	Shut down both OC and IC power sources simultaneously for 5 minutes or longer and then switch on again. It will return to the normal state in an accidental case. When the normal state cannot be restored, check for 1)-4) for the cause.
	⑤ Remote controller (RC)	Remote controller (RC)	No reply (ACK) at RC transmission to IC	1) Faulty transmission wiring at IC unit side. 2) Faulty transmission wiring of RC. 3) When remote controller address is changed or modified during operation. 4) Faulty remote controller.	Shut down both OC power source for 5 minutes or longer and then switch on again. It will return to the normal state in an accidental case. When the normal state cannot be restored, check for 1)-4) for the cause.

Checking code	Meaning, detecting method
6607 (continued)	No ACK error When no-ACK signal is detected 6 consecutive intervals of 30 seconds by transmission side controller, the transmission side detects error. Note: The address/attribute shown on remote controller indicates that the controller is not sending acknowledgement signals (ACK).

System composition	Generating unit address	Display of trouble	Detecting method	Cause	Checking method & countermeasure
(2) Group operation system using plural refrigerants	① Outdoor unit (OC)	Remote controller (RC)	No reply (ACK) at OC transmission to BC	Same as that for single refrigerant system.	Same as measure for single refrigerant system.
	② BC controller <master> (BC)	Remote controller (RC)	No replay (ACK) at BC <master> transmission to IC	Same as that for single refrigerant system.	Same as measure for single refrigerant system.
	③ BC controller <slave> (BS)	Remote controller (RC)	No reply (ACK) at BC <slave> transmission to BC <master>	Same as that for single refrigerant system.	Same as measure for single refrigerant system.
	④ Indoor unit (IC)	Remote controller (RC)	No reply (ACK) at IC transmission to RC	1) Cause of 1) ~ 5) "Cause for single refrigerant system". 2) Disconnection or short circuit of transmission line of OC terminal block for centralized control (TB7). 3) Shut down of OC unit power source in one refrigerant system. 4) Neglecting to insert OC unit power supply connector (CN40). 5) Inserting more than 2 sets of power supply connector (CN40) for centralized control use. For generation after normal operation conducted once, the following causes can be suspected. • Total capacity error (7100) • Capacity code setting error (7101) • Connecting set number error (7102) • Address setting error (7105)	a) Shut down both OC and IC power sources simultaneously for 5 minutes or longer and then switch on again. It will return to the normal state in an accidental case. b) Check 1) through 5) for the causes of the problem. Remedy the problem if found. c) Check other remote controller or OC unit LED for troubleshooting. Trouble → Correct the problem according to the content of check code. No trouble → Faulty indoor controller
	⑤ Remote controller (RC)	Remote controller (RC)	No reply (ACK) at RC transmission to IC	1) Cause of 1) ~ 3) "Cause for single refri- gerant system". 2) Disconnection or short circuit of transmission line of OC terminal block for centralized control (TB7). 3) Shut down of OC unit power source of one	a) Shut down the power source of OC for over 5 minute, and then switch on again. Normal state will be returned in case of accidental trouble. b) Check 1) through 5) for the causes of the problem. Remedy the problem if found. When the normal state cannot be restored, check for 1) ~ 5) for the cause.

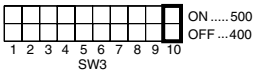
Checking code	Meaning, detecting method	
6607 (continued)	No ACK error	When no-ACK signal is detected 6 consecutive intervals of 30 seconds by transmission side controller, the transmission side detects error. Note: The address/attribute shown on remote controller indicates that the controller is not sending acknowledgement signals.

System composition	Generating unit address	Display of trouble	Detecting method	Cause	Checking method & countermeasure
(3) Connecting system with system controller (MELANS)	① Outdoor unit (OC)	Remote controller (RC)	No reply (ACK) at OC transmission to BC	Same as that for single refrigerant system.	Same countermeasure as that for single refrigerant system.
	② BC controller <master> (BC)	Remote controller (RC)	No reply (ACK) at BC <master> transmission to IC	Same as that for single refrigerant system.	Same countermeasure as that for single refrigerant system.
	③ BC controller <slave> (BS)	Remote controller (RC)	No reply (ACK) at BC <slave> transmission to BC <master>	Same as that for single refrigerant system.	Same countermeasure as that for single refrigerant system.
	④ Indoor unit (IC)	Remote controller (RC)	No reply (ACK) at IC transmission RC	Same cause as that of grouping from plural refrigerants.	Same countermeasure as that for IC unit error in plural refrigerant system.
		System controller (SC)	No reply (ACK) at IC transmission to SC	Problem with partial IC units: 1) Same cause as that for single refrigerant system.	→ Same countermeasure as that for single refrigerant system.
				Problem with all IC in one refrigerant system: 1) Cause of total capacity error. (7100) 2) Cause of capacity code setting error. (7101) 3) Cause of connecting number error. (7102) 4) Cause of address setting error. (7105) 5) Disconnection or short circuit of transmission line of OC unit terminal block for central control (TB7). 6) Power source shut down of OC unit. 7) Trouble of OC unit electrical system.	Confirm OC trouble diagnosis LED. → During fault generation, check the LED check codes. Check the content of 5)~7) shown left.
				Problem with all IC: 1) As same that for single refrigerant system. 2) Insertion of power supply connector (CN40) into OC unit transmission line for centralized control. 3) Disconnection or power source shut down of power supply unit for transmission line. 4) Faulty system controller (MELANS).	Confirm voltage of transmission line for centralized control. • More than 20V → Confirm 1) 2) left. • Less than 20V → Confirm 3) left.
	⑤ Remote controller (RC)	Remote controller (RC)	No reply (ACK) at RC transmission to IC	Same cause as that for plural refrigerant system.	Same countermeasure as that for plural refrigerant system.
		System controller (SC)	No reply (ACK) at RC transmission to MELANS	Problem with partial IC units: 1) Same cause as that of single refrigerant system.	→ Same countermeasure as that for single refrigerant system.
				Problem with all IC in one refrigerant system: 1) Error detected by OC unit. Total capacity error. (7100) Capacity code setting error. (7101) Connecting number error. (7102) Address setting error. (7105) 2) Disconnection or short circuit of transmission line of OC unit terminal block for central control (TB7). 3) Power source shut down of OC unit. 4) Trouble of OC unit electrical system.	Confirm OC trouble diagnosis LED. → Upon encountering a problem, check the content according to check code. Check the content of 2)~4) shown on the left.
				Problem with all IC: 1) As same that for single refrigerant system. 2) Insertion of power supply connector (CN40) into OC unit transmission line for central-ized control. 3) Disconnection or power shutdown of power supply unit for transmission line. 4) Faulty MELANS.	Check the causes of 1) ~ 4) on the left.

Checking code	Meaning, detecting method				
6607 (continued)	No ACK error			When no-ACK signal is detected 6 consecutive intervals of 30 seconds by transmission side controller, the transmission side detects error. Note: The address/attribute shown on remote controller indicates that the controller is not sending acknowledgement signals (ACK).	
System composition	Generating unit address	Display of trouble	Detecting method	Cause	Checking method & countermeasure
(3) Connecting system with system controller (MELANS)	⑤ System controller (SC)	Remote controller (RC)	No reply (ACK) at SC transmission to IC	Problem with partial remote controller: 1) Faulty wiring of RC transmission line. 2) Disconnection or poor contact of RC transmission connector. 3) Faulty RC.	Check 1) ~ 3) on the left.
				Problem with all IC in one refrigerant system. 1) Error detected by OC unit. Total capacity error (7100) Capacity code setting error (7101) Connecting number error (7102) Address setting error (7105) 2) Disconnection or short circuit of transmission line of OC unit terminal block for central control (TB7). 3) Power source shut down of OC unit. 4) Trouble of OC unit electrical system.	Confirm OC trouble diagnosis LED. → During fault generation, check the LED check codes. Check the content of 2) ~ 4) shown left.
				Problem with all RC: 1) Same as that for single refrigerant system. 2) Inserting supply power connector (CN40) to OC transmission line for centralized control. 3) Disconnection or power shutdown of power supply unit for transmission line. 4) Faulty MELANS.	Check the causes 1)~4) left.
No relation with system	Address that should not exist	-	-	1) IC unit is keeping the memory of the original group setting with RC although the RC address was changed later. The same symptom will appear for the registration with SC. 2) IC unit is keeping the memory of the original interlocking registration with Fresh Master with RC, although the Fresh Master address was changed later.	Delete addresses that do not have a corresponding unit. Employ one of the following two deleting methods. 1) Deletion by remote controller. Delete unnecessary information by the manual setting function of remote controller. 2) Deletion by connecting information deleting switch of OC unit. Note: That the use of this method will delete all the group information set with RC and all the interlocking information of Fresh Master and IC unit. ① Shut down OC unit power source, and wait for 5 minutes. ② Turn on the dip switch SW2-2 provided on OC unit control circuit board. ③ Turn on OC unit power source, and wait for 5 minutes. ④ Shut down OC unit power source, and wait for 5 minutes. ⑤ Turn off the dip switch SW2-2 provided on OC unit control circuit board. ⑥ Make OC unit power source.

Checking code	Meaning, detecting method	Cause	Checking method & Countermeasure
6608	**No response error** Though acknowledgement of receipt (ACK) is received after transmission, no response command is recived. Detected as error by the transmission side when the same symptom is repeated 10 times at 3-second intervals. Note: The address/attribute shown on remote controller indicates the controller which has detected error.	1) Caused by the transmission data conflicts when transmission wiring is modified or the polarity is changed while turning the power on. Wave shape change detection error will occur. 2) Repetition of transmission error due to noise. 3) Damping of transmission line voltage/signal, due to exceeding the acceptable range for transmission wiring. • Farthest Less than 200m • RC wiring Less than 10m 4) Damping of transmission voltage/signal due to the use of incorrect type of transmission line. • Wire side: Diameter larger than 1.25mm^2	a) Generation of fault is during test run. Turn off the power sources of OC unit, IC unit and BC controller for more them 5 minutes simultaneously, and switch them on again. → Returning to normal state means, the trouble detected due to transmission line work while powering. b) Check items 3) and 4) in the “causes” column on the left. c) Investigate the transmission wave shape/noise on transmission line according to <Investigation method of transmission wave shape/noise>. There is a higher possibility of a noise if 6602 is generated.

(3) System error

Checking code	Meaning, detecting method	Cause	Checking method & Countermeasure
7100	**Total capacity error** Total capacity of indoor units in the same refrigerant system exceeds the limit. Trouble source: Outdoor unit	1) Total capacity of indoor units in the same refrigerant system exceeds the following limits: Model / Total capacity / Total capacity code PURY-P400 / 599 / 123 PURY-P500 / 756 / 156	a) Check the model total (capacity code total) of indoor units connected. b) Check whether indoor unit capacity code (SW2) is wrongly set. Correct the erroneous switch setting, if any, turn off power source of outdoor unit and indoor unit simultaneously for 5 minutes or more to modify the switch for setting the model name (capacity coad).
		2) Erroneous setting of OC model selector switch (SW3-10). 	Check the model selector switch (Dip switches SW3-10 on outdoor unit control circuit) of OC.
7101	**Capacity code error** Error display at erroneous connection of Indoor unit of which model name can not be connected. Trouble source : Outdoor unit Indoor unit	1) The Indoor unit model name (model code) connected is not connectable. Connectable range.....20~250 2) Erroneous setting of the switch (SW2) for setting of model name of Indoor unit connected.	a) Check the model name of the Indoor unit connected. b) Check the switch (SW2 if indoor controller for setting of Indoor unit model name of generating address. When it is not agreed to the model name, modify the capacity code while shutting off the power source of Indoor unit. * The capacity of Indoor unit can be confirmed by the self-diagnosios function (SW1 operation) of Indoor unit.
7102	**Connected unit count over** Number of units connected in the same refrigerant system exceeds the limit. Trouble source: Outdoor unit	1) Number of unit connected to terminal block (TB3) for outdoor/indoor transmission line exceeds limitations given belows: Item / Limit ① Total number of indoor units / 1~24 ② Total number of BC controllers (master) / 1 ③ Total number of BC controllers (slave) / 0 or 1	a) Make sure that the number of units connected to the terminal block for indoor/outdoor transmission wiring (TB3) of the outdoor unit does not exceed the limit. (See ① ~ ③ left.) b) Check items 2), 3), 4), and 5). c) Check the connection of transmission wiring to the terminal block for centralized control to see if it is erroneously connected to the indoor/outdoor transmission wiring terminal block (TB3).

Checking code	Meaning, detecting method	Cause	Checking method & Countermeasure
7102	**Connected unit count over**	2) The Outdoor unit address is set to 51~100 under automatic address mode (Remote controller displays "HO"). 3) Disconnection of transmission wiring at Outdoor unit. 4) Short circuit of transmission line in case of 3) & 4), remote controller displays "HO". 5) Disconnection of transmission wiring at BC controller. 6) BC controller not for the BIG R2 (model: FA, FB type) is connected.	d) Check for the model total (capacity code total) of indoor units connected.
7105	**Address setting error** • Erroneous setting of OC unit address • Erroneous setting of BC controller address Trouble source : Outdoor unit BC controller	1) Setting error of Outdoor unit address. The address of Outdoor unit is not being set to 51~100. 2) The address of BC controller is not being set within 51~100.	Check that the address of OC unit is set to 51~100. Reset the address if it stays out of the range, while shutting the power source off. When BC controller is out of the range, reset it while shutting the power source of both OC unit and BC controller off.
7107	**Branch No. setting error** Can not operate because branch No. of indoor unit wrongly set. Trouble source : BC controller	1) Indoor unit capacity per connector joint exceeds the following limitis: Single connection : 81 or more Two connection joint : 161 or more Three connection joint : 241 or more Four connection joint : 321 or more 2) Four or more indoor units are set for the same connection. 3) The smallest branch No. has not been set when used at joint. 4) Does the address of BC controller (slave) become the least address + 50 of Indoor controller connecting to BC controller (slave)? 5) The address of Indoor Unit, which is connected to BC controller (slave), sets up the small address from the greatest address of Indoor Unit which is connected to BC control (master).	a) Check indoor unit connection No. in refrigerant circuit. ① No four or more indoor units which are set for the same branch No. A? ② Check total capacity of indoor units which are set for the same branch No. Judged as trouble when it applies to Cause 1). ③ Check whether the smallest branch No. is set when used at joint. b) Check whether indoor unit capacity code (SW2) is wrongly set. (Keep the factory setting.) For erroneous switch setting, if any, turn off the power source of outdoor unit and indoor unit simultaneously for 5 minutes or more, and then turn them back on. C) Verify the address of BC controller (slave) and Indoor Unit.
7111	**Remote control sensor error** Error not providing the temperature designed to remote controller sensor. Trouble source : Indoor unit	1) The old type remote controller for M-NET is used and the remote controller sensor is designed for the indoor unit. (SW1-1 turned ON)	a) Replace the old remote controller with a new remote controller.
7130	**Different Indoor model and BC controller connection error**	An indoor unit not intended for use with R407C (model: P•••) is connected.	Use the P••• indoor unit.

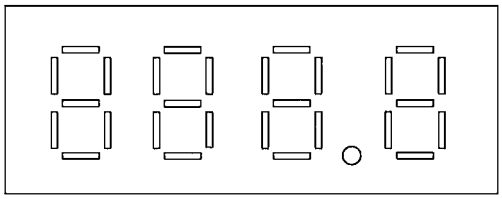
[4] LED Monitor Display

(1) How to read LED on the service monitor

By setting DIP SW1-1 ~ 1-8, the units' operating condition can be observed with the service LED on the control circuit board. (For the relation of each DIP SW to the content, see the table provided.)
As shown in the table below, the LED consists of 7 segments is put in 4 sets side by side for numerical and graphic display.

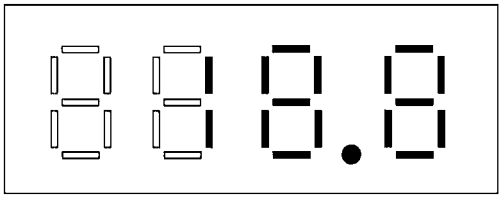
OC	:	Outdoor unit	SV	:	Solenoid valve	THHS	:	Inverter radiator panel
IC	:	Indoor unit	LEV	:	Electronic expansion valve			
			COMP	:	Compressor			
SW1	:	Outdoor unit control circuit board						
E	:	Memory storage for service activities (sampling per minute)						

7 seg LED

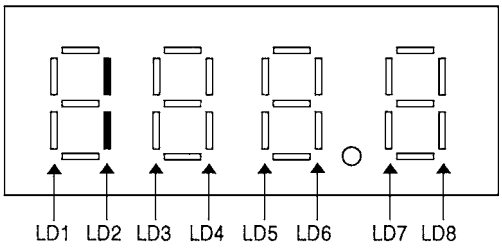


The numerical display includes pressure, temperature or the like, while the graphic display includes operating condition, solenoid valve ON/OFF state or the like.

• Numerical display
Example : display at 18.8kg/cm^{2}G (1.84MPa) of pressure sensor data (Item No. 56)



• Graphic display (Two LEDs aligned vertically express a flag.)
Example : At forcible powering in outdoor unit operation display



Remarks: E: Contents into EPROM M: IC monitor through communication E*: Store in service memory

No	SW	Item	Display								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
0	0000000000	Relay output display 1, Light ON display	COMP operating	COMP1 start	52C2	21S4a 21S4b	SV1		SV 22/32	Regularly light ON	
		Inspection display 1, OC error	0000~9999 (Address and error code inverted)								
1 ☆	1000000000	Relay output display 2	SV4a			SV6a	CH2, 3	52F	Retry operation	Emergency operation	
2	0100000000 (IC also included)	Inspection display 2	0000~9999 (Address and error code inverted)								
3 ☆	1100000000	Relay output display 3	SV3	SV4	SV5	SV6	SV7, 8				
4	0010000000										
5	1010000000	Communication demand capacity	0000~9999								
6	0110000000	External signal	Contact demand	Night mode							
7	1110000000	Outdoor unit operation display	BC operation instruct	Restriction active	3-minute restart	Compressor running	Error delayed	Error		Vaccum operation protection delay	
8	0001000000	Indoor unit inspection	Machine No.1	Machine No.2	Machine No.3	Machine No.4	Machine No.5	Machine No.6	Machine No.7	Machine No.8	
9	1001000000		Machine No.9	Machine No.10	Machine No.11	Machine No.12	Machine No.13	Machine No.14	Machine No.15	Machine No.16	
10	0101000000	Indoor unit operation mode	Machine No.1	Machine No.2	Machine No.3	Machine No.4	Machine No.5	Machine No.6	Machine No.7	Machine No.8	
11	1101000000		Machine No.9	Machine No.10	Machine No.11	Machine No.12	Machine No.13	Machine No.14	Machine No.15	Machine No.16	
12	0011000000	Indoor unit thermo	Machine No.1	Machine No.2	Machine No.3	Machine No.4	Machine No.5	Machine No.6	Machine No.7	Machine No.8	
13	1011000000		Machine No.9	Machine No.10	Machine No.11	Machine No.12	Machine No.13	Machine No.14	Machine No.15	Machine No.16	
14	0111000000	BC operation mode	Cooling-only ON	Cooling-only OFF	Heating-only ON	Heating-only OFF	Mixed ON	Mixed OFF	Fan	Stop	
15	1111000000	Outdoor unit operation mode	Permission stop	Standby		Cooling-only	Cooling main	Heating-only	Heating main	Demand	
16	0000100000	Outdoor unit control mode	Initial start	Cooling-only, cooling main refrigerant recovery	Heating-only, heating main refrigerant recovery	Defrosting	Balance oil	Low oil recovery			
17	1000100000	Outdoor unit error delay	High pressure error 1, 2	–	Low pressure error	NO1 Discharge temperature error	NO2 Discharge temperature error	NO1 Overcurrent protection	NO2 Overcurrent protection	Radiator thermo operation	
18	0100100000		Overcurrent cut off	INV error	Refrigerant overcharge	Composition sensor error	Oil temperature error				
19	1100100000		TH11 error	TH12 error	TH2 error	TH3 error	TH4 error	TH5 error	TH6 error	TH7 error	
20	0010100000			TH9 error		TH10 error	High pressure sensor error	THHS error			

No	SW	Item	Display								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
21	1010100000	Outdoor error delay history	High pressure error 1, 2	–	Low pressure error	NO1 Discharge temperature error	NO2 Discharge temperature error	NO1 Overcurrent protection	NO2 Overcurrent protection	Radiator thermo operation	
22	0110100000		Overcurrent cut off	INV error	Refrigerant overcharge	Composition sensor error	Oil temperature error				
23	1110100000		TH11 error	TH12 error	TH2 error	TH3 error	TH4 error	TH5 error	TH6 error	TH7 error	
24	0001100000			TH9 error		TH10 error	High pressure sensor error	THHS error			
25	1001100000	Error log 1	0000~9999								
26	0101100000	Inverter error details	Inverter error details (0001 - 0009)								
27	1101100000	Error log 2	0000~9999								
28	0011100000	Inverter error details	Inverter error details (0001 - 0009)								
29	1011100000	Error log 3	0000~9999								
30	0111100000	Inverter error details	Inverter error details (0001 - 0009)								
31	1111100000	Error log 4	0000~9999								
32	0000010000	Inverter error details	Inverter error details (0001 - 0009)								
33	1000010000	Error log 5	0000~9999								
34	0100010000	Inverter error details	Inverter error details (0001 - 0009)								
35	1100010000	Error log 6	0000~9999								
36	0010010000	Inverter error details	Inverter error details (0001 - 0009)								
37	1010010000	Error log 7	0000~9999								
38	0110010000	Inverter error details	Inverter error details (0001 - 0009)								
39	1110010000	Error log 8	0000~9999								
40	0001010000	Inverter error details	Inverter error details (0001 - 0009)								
41	1001010000	Error log 9	0000~9999								
42	0101010000	Inverter error details	Inverter error details (0001 - 0009)								
43	1101010000	Error log 10	0000~9999								
44	0011010000	Inverter error details	Inverter error details (0001 - 0009)								
45	1011010000	Type of inverter Error preliminary	0001 - 0009								
46	0111010000	TH11 data	-99.9~999.9								
47	1111010000	TH12 data	↑								
48	0000110000	TH2 data	↑								
49	1000110000	TH3 data	↑								
50	0100110000	TH4 data	↑								
51	1100110000	TH5 data	↑								
52	0010110000	TH6 data	↑								
53	1010110000	TH7 data	↑								
54	0110110000		↑								
55	1110110000	TH9 data	↑								
56	0001110000		↑								
57	1001110000	TH10 data	↑								
58	0101110000	High pressure sensor data	↑								

No	SW	Item	Display								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
59	1101110000	Low pressure sensor data	↑								
60	0011110000	THHS data	↑								
61	1011110000										
62	0111110000	α oc	↑								
63	1111110000	α oc*	↑								
64	0000001000	Accumulator level	0~9 ("AL=" also displayed)								
65	1000001000	HzAK increase/decrease	Δ Hz –	Δ Hz 0	Δ Hz +	–	–	Δ AK –	Δ AK 0	Δ AK +	
66	0100001000	Difference from target Tc	Low -3deg or less	Low -3 ~-2 deg	Low -2 ~ -1 deg	Stable range		High 1 ~ 2 deg	High 2 ~ 3 deg	High, 3deg or more	
67	1100001000	Difference from target ET	Low -3deg or less	Low -3 ~-2 deg	Low -2 ~ -1 deg	Stable range		High 1 ~ 2 deg	High 2 ~ 3 deg	High, 3deg or more	
68	0010001000	Target Tc	-99.9~999.9								
69	1010001000	Target ET	↑								
70	0110001000	Tc	↑								
71	1110001000	Te	↑								
72	0001001000	Temporary frequency	0000~9999								
73	1001001000	COMP1 output frequency	↑								
74	0101001000	AK	↑								
75	1101001000	SLEV	↑								
76	0011001000										
77	1011001000	Fancon output value(Toff%)	↑								
78	0111001000	COMP1 operating current	↑								
79	1111001000	Number of fans used	↑								
80	0000101000	OC address	↑								
81	1000101000	IC1 address / Capacity code	0000~9999				0000~9999				
82	0100101000	IC2 address / Capacity code	↑				↑				
83	1100101000	IC3 address / Capacity code	↑				↑				
84	0010101000	IC4 address / Capacity code	↑				↑				
85	1010101000	IC5 address / Capacity code	↑				↑				
86	0110101000	IC6 address / Capacity code	↑				↑				
87	1110101000	IC7 address / Capacity code	↑				↑				
88	0001101000	IC8 address / Capacity code	↑				↑				
89	1001101000	IC9 address / Capacity code	↑				↑				
90	0101101000	IC10 address / Capacity code	↑				↑				
91	1101101000	IC11 address / Capacity code	↑				↑				
92	0011101000	IC12 address / Capacity code	↑				↑				
93	1011101000	IC13 address / Capacity code	↑				↑				
94	0111101000	IC14 address / Capacity code	↑				↑				
95	1111101000	IC15 address / Capacity code	↑				↑				
96	0000011000	IC16 address / Capacity code	↑				↑				
97	1000011000	COMP1 operating time, Upper four figures	0000~9999								

When error stop occurs, No.101 - 125 display the last data just before error stop which is stored in the service memory.

No	SW	Item	Display								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
98	0100011000	Lower four figures	0000~9999								
99	1100011000	COMP2 operating time, Upper four figures	↑								
100	0010011000	Lower four figures	↑								
101	1010011000	Relay output display 1, Light display	COMP operating	52C1	52C2	21S4a 21S4b	SV1		SV 22/32	Regularly light ON	
102	0110011000	Relay output display 2	SV4a			SV6a	CH2, 3	52F			
103	1110011000	TH11 data	-99.9~999.9								
104	0001011000	TH12 data	↑								
105	1001011000	TH2 (Te) data	↑								
106	0101011000	TH3 data	↑								
107	1101011000	TH5 data	↑								
108	0011011000	TH9 data	↑								
109	1011011000	Relay output display 2	SV3	SV4	SV5	SV6	SV7, 8				
110	0111011000	TH10 data	-99.9~999.9								
111	1111011000	High pressure sensor data	↑								
112	0000111000	Low pressure sensor data	↑								
113	1000111000	THHS data	↑								
114	0100111000	Accumulator level	0~9 ("AL=" also displayed)								
115	1100111000	All tentative frequency	0000~9999								
116	0010111000	αoc	↑								
117	1010111000	αoc*	↑								
118	0110111000	Tc	↑								
119	1110111000	COMP1 output frequency	↑								
120	0001111000	AK	↑								
121	1001111000	SLEV	↑								
122	0101111000	TH7	-99.9~999.9								
123	1101111000	TH6	↑								
124	0011111000	COMP1 operating current	0000~9999								
125	1011111000	Outdoor unit operation display	BC operation instruct	Restriction energized	3-minute restart	Compressor running	Error delayed	Error		Vaccum operation protection delay	
126	0111111000	Circulating composition correction value	-99.9~999.9								
127	1111111000	CS circuit block detecting time	0000~9999 (9999 and on are displayed as 9999)								
128	0000000100	IC1 suction temperature	-99.9~999.9								
129	1000000100	IC2 suction temperature	↑								
130	0100000100	IC3 suction temperature	↑								
131	1100000100	IC4 suction temperature	↑								
132	0010000100	IC5 suction temperature	↑								
133	1010000100	IC6 suction temperature	↑								
134	0110000100	IC7 suction temperature	↑								
135	1110000100	IC8 suction temperature	↑								
136	0001000100	IC9 suction temperature	↑								
137	1001000100	IC10 suction temperature	↑								
138	0101000100	IC11 suction temperature	↑								

No	SW	Item	Display								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
139	1101000100	IC12 suction temperature	-99.9~999.9								
140	0011000100	IC13 suction temperature	↑								
141	1011000100	IC14 suction temperature	↑								
142	0111000100	IC15 suction temperature	↑								
143	1111000100	IC16 suction temperature	↑								
144	0000100100	IC1 liquid piping temperature	-99.9~999.9								
145	1000100100	IC2 liquid piping temperature	↑								
146	0000100100	IC3 liquid piping temperature	↑								
147	1100100100	IC4 liquid piping temperature	↑								
148	0010100100	IC5 liquid piping temperature	↑								
149	1010100100	IC6 liquid piping temperature	↑								
150	0110100100	IC7 liquid piping temperature	↑								
151	1110100100	IC8 liquid piping temperature	↑								
152	0001100100	IC9 liquid piping temperature	↑								
153	1001100100	IC10 liquid piping temperature	↑								
154	0101100100	IC11 liquid piping temperature	↑								
155	1101100100	IC12 liquid piping temperature	↑								
156	0011100100	IC13 liquid piping temperature	↑								
157	1011100100	IC14 liquid piping temperature	↑								
158	0111100100	IC15 liquid piping temperature	↑								
159	1111100100	IC16 liquid piping temperature	↑								
160	0000010100	IC1 gas piping temperature	-99.9~999.9								
161	1000010100	IC2 gas piping temperature	↑								
162	0100010100	IC3 gas piping temperature	↑								
163	1100010100	IC4 gas piping temperature	↑								
164	0010010100	IC5 gas piping temperature	↑								
165	1010010100	IC6 gas piping temperature	↑								
166	0110010100	IC7 gas piping temperature	↑								
167	1110010100	IC8 gas piping temperature	↑								
168	0001010100	IC9 gas piping temperature	↑								
169	1001010100	IC10 gas piping temperature	↑								
170	0101010100	IC11 gas piping temperature	↑								
171	1101010100	IC12 gas piping temperature	↑								
172	0011010100	IC13 gas piping temperature	↑								
173	1011010100	IC14 gas piping temperature	↑								
174	0111010100	IC15 gas piping temperature	↑								
175	1111010100	IC16 gas piping temperature	-99.9~999.9								
176	0000110100	IC1SH	↑								
177	1000110100	IC2SH	↑								
178	0100110100	IC3SH	↑								
179	1100110100	IC4SH	↑								
180	0010110100	IC5SH	↑								
181	1010110100	IC6SH	↑								
182	0110110100	IC7SH	↑								
183	1110110100	IC8SH	↑								

No	SW	Item	Display								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
184	0001110100	IC9SH	-99.9~999.9								
185	1001110100	IC10SH	↑								
186	0101110100	IC11SH	↑								
187	1101110100	IC12SH	↑								
188	0011110100	IC13SH	↑								
189	1011110100	IC14SH	↑								
190	0111110100	IC15SH	↑								
191	1111110100	IC16SH	↑								
192	0000001100	IC1SC	-99.9~999.9								
193	1000001100	IC2SC	↑								
194	0100001100	IC3SC	↑								
195	1100001100	IC4SC	↑								
196	0010001100	IC5SC	↑								
197	1010001100	IC6SC	↑								
198	0110001100	IC7SC	↑								
199	1110001100	IC8SC	↑								
200	0001001100	IC9SC	↑								
201	1001001100	IC10SC	↑								
202	0101001100	IC11SC	↑								
203	1101001100	IC12SC	↑								
204	0011001100	IC13SC	↑								
205	1011001100	IC14SC	↑								
206	0111001100	IC15SC	↑								
207	1111001100	IC16SC	↑								
208	0000101100	IC1 LEV opening	0000~9999								
209	1000101100	IC2 LEV opening	↑								
210	0100101100	IC3 LEV opening	↑								
211	1100101100	IC4 LEV opening	↑								
212	0010101100	IC5 LEV opening	↑								
213	1010101100	IC6 LEV opening	↑								
214	0110101100	IC7 LEV opening	↑								
215	1110101100	IC8 LEV opening	↑								
216	0001101100	IC9 LEV opening	↑								
217	1001101100	IC10 LEV opening	↑								
218	0101101100	IC11 LEV opening	↑								
219	1101101100	IC12 LEV opening	↑								
220	0011101100	IC13 LEV opening	↑								
221	1011101100	IC14 LEV opening	↑								
222	0111101100	IC15 LEV opening	↑								
223	1111101100	IC16 LEV opening	↑								
224	0000011100	IC1 operation mode	0000:Stop								
225	1000011100	IC2 operation mode	0001:Fan								
226	0100011100	IC3 operation mode	0002:Cooling								
227	1100011100	IC4 operation mode	0003:Heating								
228	0010011100	IC5 operation mode	0004:Dry								

No	SW	Item	Display								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
229	1010011100	IC6 operation mode									
230	0110011100	IC7 operation mode									
231	1110011100	IC8 operation mode									
232	0001011100	IC9 operation mode				0000:Stop					
233	1001011100	IC10 operation mode				0001:Fan					
234	0101011100	IC11 operation mode				0002:Cooling					
235	1101011100	IC12 operation mode				0003:Heating					
236	0011011100	IC13 operation mode				0004:Dry					
237	1011011100	IC14 operation mode									
238	0111011100	IC15 operation mode									
239	1111011100	IC16 operation mode									
240	0000111100	IC1 filter	0000~9999								
241	1000111100	IC2 filter	↑								
242	0100111100	IC3 filter	↑								
243	1100111100	IC4 filter	↑								
244	0010111100	IC5 filter	↑								
245	1010111100	IC6 filter	↑								
246	0110111100	IC7 filter	↑								
247	1110111100	IC8 filter	↑								
248	0001111100	IC9 filter	↑								
249	1001111100	IC10 filter	↑								
250	0101111100	IC11 filter	↑								
251	1101111100	IC12 filter	↑								
252	0011111100	IC13 filter	↑								
253	1011111100	IC14 filter	↑								
254	0111111100	IC15 filter	↑								
255	1111111100	IC16 filter	↑								
256	0000000010										
257	1000000010										
258	0100000010										
259	1100000010										
260	0010000010										
261	1010000010										
262	0110000010										
263	1110000010										
264	0001000010	Indoor unit inspection	Machine No.17	Machine No.18	Machine No.19	Machine No.20	Machine No.21	Machine No.22	Machine No.23	Machine No.24	
265	1001000010										
266	0101000010	Indoor unit operation mode	Machine No.17	Machine No.18	Machine No.19	Machine No.20	Machine No.21	Machine No.22	Machine No.23	Machine No.24	
267	1101000010										
268	0011000010	Indoor unit thermo	Machine No.17	Machine No.18	Machine No.19	Machine No.20	Machine No.21	Machine No.22	Machine No.23	Machine No.24	
269	1011000010										
270	0111000010										
271	1111000010										
272	0000100010										
273	1000100010										

No	SW	Item	Display								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
274	0100100010										
275	1100100010										
276	0010100010										
277	1010100010										
278	0110100010										
279	1110100010										
280	0001100010										
281	1001100010										
282	0101100010										
283	1101100010										
284	0011100010										
285	1011100010										
286	0111100010										
287	1111100010										
288	0000010010										
289	1000010010										
290	0100010010										
291	1100010010										
292	0010010010										
293	1010010010										
294	0110010010										
295	1110010010										
296	0001010010										
297	1001010010										
298	0101010010										
299	1101010010										
300	0011010010	BC (master) TH11 data	-99.9~999.9								
301	1011010010	BC (master) TH12 data	↑								
302	0111010010	BC (master) TH15 data	↑								
303	1111010010	BC (master) TH16 data	↑								
304	0000110010	BC (master) SC11 data	↑								
305	1000110010	BC (master) SH12 data	↑								
306	0100110010	BC (master) SC16 data	↑								
307	1100110010	BC (master) LEV1 data	0000~9999								
308	0010110010	BC (master) LEV3 data	↑								
309	1010110010										
310	0110110010	BC (slave) TH22 data	-99.9~999.9								
311	1110110010	BC (slave) TH25 data	↑								
312	0001110010	BC (slave) LEV3a data	0000~9999								
313	1001110010										
314	0101110010										
315	1101110010										
316	0011110010										
317	1011110010										
318	0111110010										

No	SW	Item	Display								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
319	1111110010										
320	0000001010										
321	1000001010										
322	0100001010										
323	1100001010										
324	0010001010										
325	1010001010										
326	0110001010										
327	1110001010										
328	0001001010										
329	1001001010										
330	0101001010										
331	1101001010										
332	0011001010										
333	1011001010										
334	0111001010										
335	1111001010										
336	0000101010										
337	1000101010	IC17 address / capacity code	0000~9999				0000~9999				
338	0100101010	IC18 address / capacity code	↑				↑				
339	1100101010	IC19 address / capacity code	↑				↑				
340	0010101010	IC20 address / capacity code	↑				↑				
341	1010101010	IC21 address / capacity code	↑				↑				
342	0110101010	IC22 address / capacity code	↑				↑				
343	1110101010	IC23 address / capacity code	↑				↑				
344	0001101010	IC24 address / capacity code	↑				↑				
345	1001101010										
346	0101101010										
347	1101101010										
348	0011101010										
349	1011101010										
350	0111101010										
351	1111101010										
352	0000011010										
353	1000011010										
354	0100011010										
355	1100011010										
356	0010011010										
357	1010011010										
358	0110011010										
359	1110011010										
360	0001011010										
361	1001011010										
362	0101011010										
363	1101011010										

No	SW	Item	Display								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
364	0011011010										
365	1011011010										
366	0111011010										
367	1111011010										
368	0000111010										
369	1000111010										
370	0100111010										
371	1100111010										
372	0010111010										
373	1010111010										
374	0110111010										
375	1110111010										
376	0001111010										
377	1001111010										
378	0101111010										
379	1101111010										
380	0011111010										
381	1011111010										
382	0111111010										
383	1111111010										
384	0000000110	IC17 suction temperature	-99.9~999.9								
385	1000000110	IC18 suction temperature	↑								
386	0100000110	IC19 suction temperature	↑								
387	1100000110	IC20 suction temperature	↑								
388	0010000110	IC21 suction temperature	↑								
389	1010000110	IC22 suction temperature	↑								
390	0110000110	IC23 suction temperature	↑								
391	1110000110	IC24 suction temperature	↑								
392	0001000110										
393	1001000110										
394	0101000110										
395	1101000110										
396	0011000110										
397	1011000110										
398	0111000110										
399	1111000110										
400	0000100110	IC17 liquid piping temperature	-99.9~999.9								
401	1000100110	IC18 liquid piping temperature	↑								
402	0100100110	IC19 liquid piping temperature	↑								
403	1100100110	IC20 liquid piping temperature	↑								
404	0010100110	IC21 liquid piping temperature	↑								
405	1010100110	IC22 liquid piping temperature	↑								
406	0110100110	IC23 liquid piping temperature	↑								
407	1110100110	IC24 liquid piping temperature	↑								
408	0001100110										

No	SW	Item	Display								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
409	1001100110										
410	0101100110										
411	1101100110										
412	0011100110										
413	1011100110										
414	0111100110										
415	1111100110										
416	0000010110	IC17 gas piping temperature	-99.9~999.9								
417	1000010110	IC18 gas piping temperature	↑								
418	0100010110	IC19 gas piping temperature	↑								
419	1100010110	IC20 gas piping temperature	↑								
420	0010010110	IC21 gas piping temperature	↑								
421	1010010110	IC22 gas piping temperature	↑								
422	0110010110	IC23 gas piping temperature	↑								
423	1110010110	IC24 gas piping temperature	↑								
424	0001010110										
425	1001010110										
426	0101010110										
427	1101010110										
428	0011010110										
429	1011010110										
430	0111010110										
431	1111010110										
432	0000110110	IC17SH	-99.9~999.9								
433	1000110110	IC18SH	↑								
434	0100110110	IC19SH	↑								
435	1100110110	IC20SH	↑								
436	0010110110	IC21SH	↑								
437	1010110110	IC22SH	↑								
438	0110110110	IC23SH	↑								
439	1110110110	IC24SH	↑								
440	0001110110										
441	1001110110										
442	0101110110										
443	1101110110										
444	0011110110										
445	1011110110										
446	0111110110										
447	1111110110										
448	0000001110	IC17SC	-99.9~999.9								
449	1000001110	IC18SC	↑								
450	0100001110	IC19SC	↑								
451	1100001110	IC20SC	↑								
452	0010001110	IC21SC	↑								
453	1010001110	IC22SC	↑								

No	SW	Item	Display								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
454	0110001110	IC23SC	-99.9~999.9								
455	1110001110	IC24SC	↑								
456	0001001110										
457	1001001110										
458	0101001110										
459	1101001110										
460	0011001110										
461	1011001110										
462	0111001110										
463	1111001110										
464	0000101110	IC17 LEV opening	0000~9999								
465	1000101110	IC18 LEV opening	↑								
466	0100101110	IC19 LEV opening	↑								
467	1100101110	IC20 LEV opening	↑								
468	0010101110	IC21 LEV opening	↑								
469	1010101110	IC22 LEV opening	↑								
470	0110101110	IC23 LEV opening	↑								
471	1110101110	IC24 LEV opening	↑								
472	0001101110										
473	1001101110										
474	0101101110										
475	1101101110										
476	0011101110										
477	1011101110										
478	0111101110										
479	1111101110										
480	0000011110	IC17 opeartion mode	0000: Stop 0001: Fanning 0002: Cooling 0003: Heating 0004: Drying								
481	1000011110	IC18 opeartion mode									
482	0100011110	IC19 opeartion mode									
483	1100011110	IC20 opeartion mode									
484	0010011110	IC21 opeartion mode									
485	1010011110	IC22 opeartion mode									
486	0110011110	IC23 opeartion mode									
487	1110011110	IC24 opeartion mode									
488	0001011110										
489	1001011110										
490	0101011110										
491	1101011110										
492	0011011110										
493	1011011110										
494	0111011110										
495	1111011110										
496	0000111110	IC17 filter	0000~9999								
497	1000111110	IC18 filter	↑								
498	0100111110	IC19 filter	↑								

No	SW	Item	Display								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
499	1100111110	IC20 filter	0000~9999								
500	0010111110	IC21 filter	↑								
501	1010111110	IC22 filter	↑								
502	0110111110	IC23 filter	↑								
503	1110111110	IC24 filter	↑								
504	0001111110										
505	1001111110										
506	0101111110										
507	1101111110										
508	0011111110										
509	1011111110										
510	0111111110										
511	1111111110										

8 PREPARATION, REPAIRS, AND REFRIGERANT REFILLING WHEN REPAIRING LEAKS

[1] Location of leaks: Extension piping or indoor units (when cooling)

(Pump down operation)

① Attach a pressure gauge to the low-pressure servicing check joint (CJ2).

② Stop all of the indoor units. When the compressor has stopped, shut off the liquid ball valve (BV2) for the outdoor unit.

③ Stop all of the indoor units. When the compressor has stopped, turn the SW3-6 switch on the main board for the outdoor unit to ON. (This will start the pump down operation, causing all of the indoor units to enter the cooling mode.)

④ While in the pump-down operation (SW3-6 ON), the low pressure (LPS) will reach below 0.20 MPa, or the indoor unit and the compressor will automatically shut down within 15 minutes of starting the pump-down operation. Shut down all of the indoor units and the compressor if the pressure gauge for the low-pressure servicing joint (CJ2) reads 0.15 MPa or after running the pump down operation for 20 minutes.

⑤ Shut off the gas ball valve (BV1) for the outdoor unit.

⑥ Remove any refrigerant remaining in the extension piping and the indoor units.
Be sure to recover the refrigerant without releasing it into the air.

⑦ Repair the location of the leak.

⑧ After repairing the leak, create a vacuum to remove any air from inside of the extension piping or the indoor units.

⑨ Open the ball valves for the outdoor unit (BV1 and BV2), turn the SW3-6 switch to OFF, adjust refrigerant levels, and confirm proper circulation.

[2] Location of leaks: Outdoor unit (Cooling mode)

① Test-run all indoor units in cooling mode.
1. With SW3-1 on the MAIN board of the outdoor unit set to ON and SW3-2 OFF → ON to test-run all indoor units.
2. Change the remote controller settings so that all indoor units run in cooling mode.
3. Check that all indoor units are running in cooling mode.

② Check the Tc and SC16 data.
(The LED monitor switch (SW1) on the MAIN board of the outdoor unit can be used to display this data on the LED.)
1. If SC16 is 10 degrees or more ..... Continue to step ③.
2. If SC16 is less than 10 degrees ..... After stopping the compressor, remove all refrigerant, repair the leaks, then extract the air to create a vacuum and refill with new refrigerant (same procedure as 4. Location of leaks: Outdoor unit (when heating)).

[Tc LED monitor switch]

[SC16 LED monitor switch]

③ Stop all indoor units and the compressor.
1. With SW3-1 on the MAIN board of the outdoor unit set to ON and SW3-2 ON → OFF to stop all indoor units and the compressor.
2. Check that all indoor units have been stopped.

④ Close both ball valves (BV1 and BV2).

⑤ Remove a small amount of refrigerant from the liquid ball valve (BV2) check joint. If this operation is not performed, remaining refrigerant may cause the unit to malfunction.

⑥ Remove any refrigerant remaining in the outdoor unit.
Reclaim the refrigerant; do not discharge it into the air.

⑦ Repair the leaks.

⑧ After the leak has been repaired, change the dryer and extract all of the air from the outdoor unit to create a vacuum.

⑨ Open both ball valves (BV1 and BV2) on the outdoor unit; then, adjust the refrigerant amount and verify that the refrigerant is circulating properly.

[3] Location of leaks: Extension piping or indoor units (Heating mode)

① Test-run all indoor units in heating mode.
1. With SW3-1 on the MAIN board of the outdoor unit set to ON and SW3-2 OFF → ON to test run all indoor units.
2. Change the remote controller settings so that all indoor units run in heating mode.
3. Check that all indoor units are running in heating mode.

② Stop all indoor units and the compressor.
1. With SW3-1 on the MAIN board of the outdoor unit set to ON and SW3-2 ON → OFF to stop all indoor units and the compressor.
2. Check that all indoor units have been stopped.

③ Close both ball valves (BV1 and BV2).

④ Remove any refrigerant remaining in the extension piping or the indoor units.
Reclaim the refrigerant; do not discharge it into the air.

⑤ Repair the leaks.

⑥ After the leaks are repaired, extract all air from the extension piping and the indoor units to create a vacuum. Open both ball valves (BV1 and BV2), adjust the refrigerant amount, and verify that the refrigerant is circulating properly.

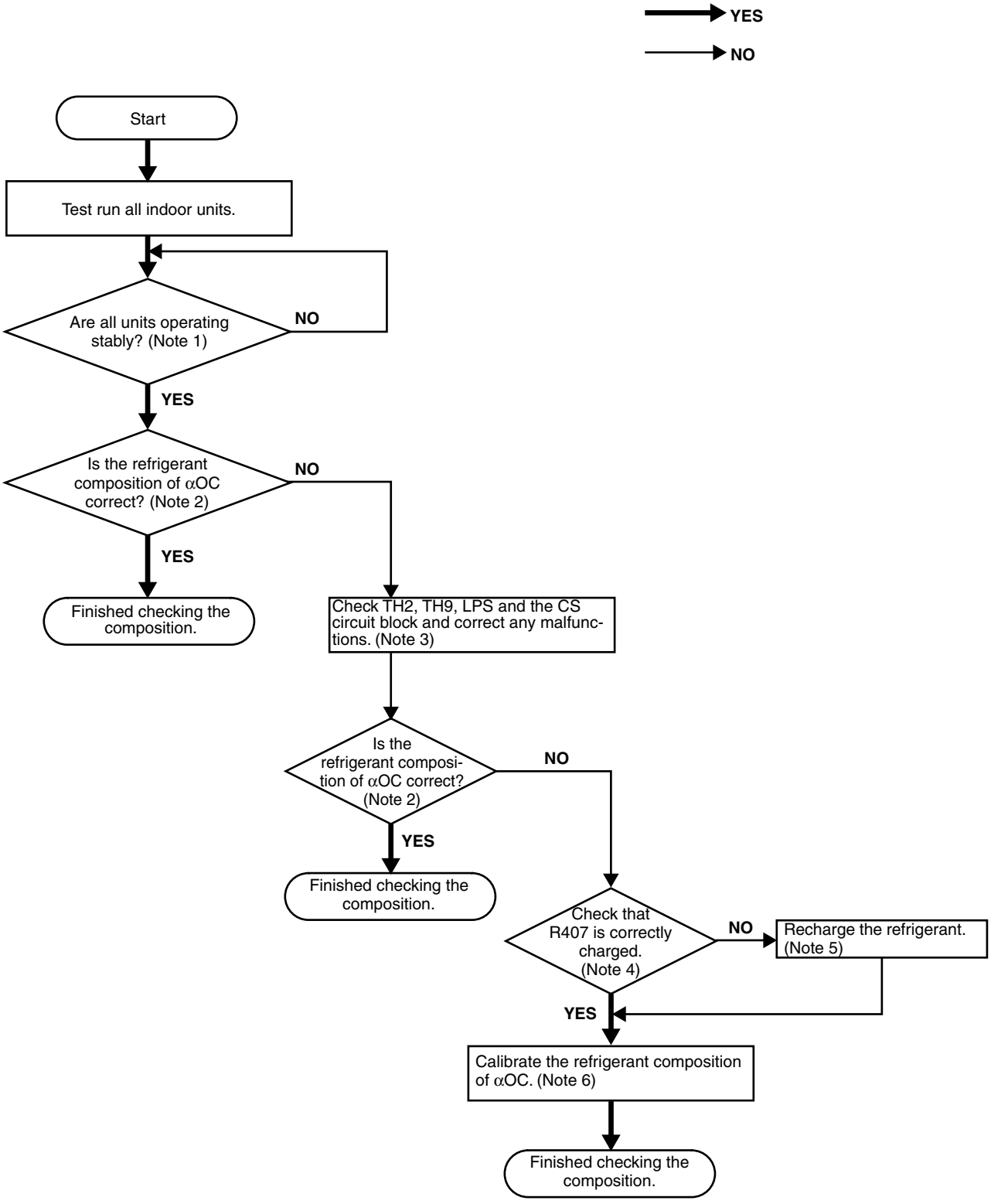
[4] Location of leaks: Outdoor unit (when heating)

① Remove all refrigerant from the entire system, including outdoor unit, extension piping, and indoor units.
Reclaim the refrigerant; do not discharge it into the air.

② Repair the leaks.

③ After the leaks are repaired, replace the dryer with a new one and extract all of the air from the entire system to create a vacuum. Then, refill with refrigerant until it reaches the calculated specification (outdoor unit + extension piping + indoor units). Refer to “Chapter 6” for more details.

9 CHECK THE COMPOSITION OF THE REFRIGERANT



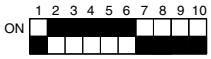
Note 1 Wait until the units stabilize as described in the refrigerant amount adjustment procedure in "Chapter 6".

Note 2 After the units are operating stably, check that the refrigerant composition of αOC is within the following ranges, indicating that the composition check is finished.

If the accumulator liquid level AL = 0 when cooling: αOC = 0.20 ~ 0.26
If the accumulator liquid level AL = 1 when cooling: αOC = 0.23 ~ 0.34
When heating: αOC = 0.25 ~ 0.34

(The self-diagnosis switch (SW1) on the main board of the outdoor unit can be used to display this data on the LED.)

[αOC self-diagnosis switch]



Note 3 TH2 and TH9: Check and make any corrections using the same method as that for a faulty temperature sensor, (refer to TROUBLESHOOTING).

LPS: Check and make any corrections using the same method as that for a faulty low pressure sensor, (refer to TROUBLESHOOTING).

CS circuit block: Set the self-diagnosis switch on the outdoor MAIN board as shown below.

- Check and make any corrections so that "0" is displayed.
- If any number other than 0 is displayed and TH2, TH9 or LPS are malfunctioning, correct them; then, set SW2-9 on the MAIN board of the outdoor unit from OFF to ON.
- If any number other than 0 is displayed and TH2, TH9 or LPS are not malfunctioning, replace the CS circuit if refrigerant is not flowing through it (while operating) and set SW2-9 on the MAIN board of the outdoor unit from OFF to ON.

Note 4 If it can be verified that R407C was correctly charged in the liquid phase, continue to Yes. If there is a possibility that it was not charged correctly, such as with a gas charger, continue to No.

Note 5 After reclaiming the system's refrigerant, extract the air to create a vacuum; then, refill with new refrigerant. Be sure to charge in the liquid phase. In addition, be sure to change the dryer.

Note 6 After the units are operating stably, check that the refrigerant composition of αOC is within the following ranges, indicating that the circulation check is finished.

If the accumulator liquid level AL = 0 when cooling: αOC = 0.21 ~ 0.25
If the accumulator liquid level AL = 1 when cooling: αOC = 0.24 ~ 0.28
When heating: αOC = 0.27 ~ 0.31

If the refrigerant composition of αOC is not within the ranges specified above, a major error has been detected. Refer to section 1-3 in Chapter 6; then, after setting SW4-1 on the MAIN board of the outdoor unit to ON, calibrate the refrigerant circulation constant αOC with SW4-2 until it is within the ranges specified above.

After calibrating, keep the SW4-1 ON and finish the circulation check.

<Example calibration of the refrigerant circulation constant αOC>

Conditions: If the accumulator liquid level AL = 0 and αOC = 0.29 when cooling, αOC must be adjusted so that it is between 0.21 and 0.25.

By switching SW4-2 between ON and OFF, adjustments can be made in the following order:
0 → 3% → 6% → 9% → 12% → -6% → -3% → 0

In this example, by making an adjustment of -0.06 (-6%), αOC can be adjusted to 0.23.

1. If SW4-2 is already set to OFF, press the switch 5 times.
   OFF (0.29) → ON (0.32) → OFF (0.35) → ON (0.38) → OFF (0.41) → ON (0.23)
2. If SW4-2 is already set to ON, press the switch 5 times.
   ON (0.29) → OFF (0.32) → ON (0.35) → OFF (0.38) → ON (0.41) → OFF (0.23)