Service Handbook Replace Multi PUHY-P200·250YREM-A

MITSUBISHI ELECTRIC

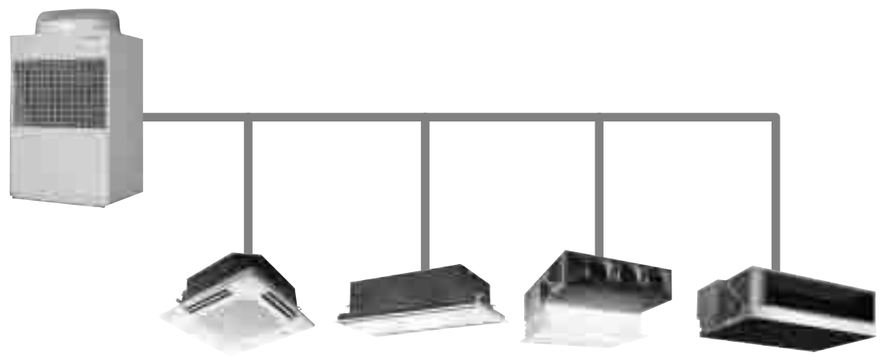
AIR CONDITIONERS CITY MULTI

Changes for the Better

2004

Replace MULTI

Service Handbook



MITSUBISHI ELECTRIC CORPORATION

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Issued in Mar. 2004 MEE03K220
Printed in Japan

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

Caution to REPLACE MULTI Installation Work

Flow of installation work in the field

Items to be observed

Before local installation work

Confirming the possibility of existing refrigerant piping for reuse

Confirming the possibility of existing control wiring for reuse

Confirming the possibility of existing power source system for reuse

Confirming the objective range for replacing

- Please note that our Corporation is not liable to the reliability of existing piping, wiring and power system for reuse (in relation with the gas leak of piping, partially defective/disconnection of wiring, deteriorated insulation, characteristic faults due to worn out system).
- For limitation on the refrigerant piping and applicable piping diameter, check the existing piping for reuse in accordance with the specified check sheet by referring products catalogs and manuals for judgement to reuse.
- If vapor condensation was found in the past, check the thermal insulation.
- For a portion suffered by condensation dripping, check the deterioration of the insulation, and repair the insulation materials if required.
- When the copper piping is seriously deteriorated, do not use parts with verdigris or black spots.
- For reusing the existing control wiring between the outdoor unit, and remote controller, check the wire type, size or the like based on the check sheet to judge the possibility.
- Even when the above does not meet the item on the check sheet, existing wiring may be reused depending on the number of connecting indoor units and piping length. Ask us for detail.
- For the power source system, employ the voltage and number of phase meeting the outdoor unit, indoor unit and heat storage unit, and adopt the breaker capacity and wiring size based on the power source wiring connection diagram.
- When the existing power source system (including the power source wiring) is used, check the system for deterioration and damages.

During local installation work

Recovering the refrigerant of old system

- Check the refrigerating machine oil used in the existing system. (As is found at the oil inspection, if the refrigerating machine oil used in the existing system is mineral oil, use the ester oil sampling kit for inspection.
- When the length of piping for reuse is unknown, additional refrigerant charge is to be calculated based on the quantity of recovered refrigerant. For this reason, you are kindly requested to recover all refrigerant inside the existing outdoor/indoor units and extended piping to check and record the quantity. (The standard of additional refrigerant is (Quantity of R22 recovered - Charged quantity of existing outdoor unit + 3kg). Adjust the refrigerant quantity after mineral oil recovery operation.)

Removing the outdoor/indoor units, remote controllers, etc.

Installing the outdoor/indoor units, remote controllers, etc., and executing electrical work

■ Outdoor unit
- Confirm the space around the outdoor unit.
  (Verifying the installation space of the oil trap kit)

Setting the address, checking the system

■ Turn the power source on, and confirm the normality of the system
- Check the remote controller or outdoor unit for error display.
- Run the indoor unit for fan operation after turning the remote controller on, and check the air feeding and direction.

Do not run the compressor until finishing the mineral oil recovery operation.

Executing the piping work (mounting of ball valve).
Air tightening and evacuating the existing piping and charging refrigerant

■ Mount the valve to the field piping (extended piping). (The ball valve is being attached to the outdoor unit.)
■ Execute an airtight test to check the existing piping for deterioration or leaking.
■ Calculate the quantity required by the extended piping, and charge the additional refrigerant. Make sure to enter the value in the additional refrigerant charge column on the label of combined outdoor unit being pasted on the outdoor unit.

Without applying any operation, keep the ball valves of the outdoor unit closed before mineral oil recovery operation.

Enter required items in the request form of REPLACE MULTI mineral oil recovery work.

Operating mineral oil recovery

Executing test run and adjustment (for final verification of operation).

It is necessary to charge refrigerant in a rated quantity and adjust the quantity.
Be sure to execute when the piping length is unknown.
For detail, consult the agent of your dealer.

Safety Precautions

- **Before installing the unit, make sure you read all the "Safety precautions".**
- **The "Safety precautions" provide very important points regarding safety. Make sure you follow them.**

Symbols used in the text

⚠ Warning:

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

⚠ 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 that important instructions must be followed.

: Indicates a part which must be grounded.

⚠ : Beware 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

Ask your dealer or specialized contractor for installation.
- If your own installation work is improper, fire, electric shock or water leakage may result.

Connect wiring using the specified cable and fasten it securely to prevent the external force of the cable from being transferred to the terminal connecting sections.
- Improper connection or fastening may cause heat generation or fire.

Conduct specified installation work durable against strong winds around buildings.
- Improper installation work can cause trouble i.e. the unit toppling over.

Never attempt to repair the unit. For repair, ask your dealer.
- Improper repair may result in water leakage, electric shock or fire.

Do not touch the heat exchanger fins.
- Improper handling may cause cuts.

When refrigerant gas is leaked during work, conduct ventilation.
- If refrigerant gas comes into contact with fire, it may cause the generation of poisonous gases.

Please conduct correct installation work by observing this Installation Manual.
- Improper installation work may result in water leakage, electric shock or fire.

Conduct all electrical work by a licensed engineer according to "Technical Standard relating to Electrical Facility," "Wiring Regulation of Power Company," and instructions in this Manual, and always use an exclusive circuit.
- Insufficient power source capacity or improper installation may cause electric shock or fire.

When installing or moving the unit, do not charge other than the specified refrigerant (R407C) into the refrigeration cycle.
- Air if mixed generates abnormally high pressure inside the refrigeration cycle which may damage the unit.

Do not reconstruct or reset the protection devices.
- If the protection devices like the pressure switch or thermal switch is forcibly operated by short circuiting, or parts other than that specified by Mitsubishi Electric are used, fire or explosion may be caused.

Precautions for Devices that Use R407C Refrigerant

⚠ Caution

Use refrigerant piping made of phosphorus deoxidized copper and copper alloy seamless pipes and tubes. In addition, be sure that the inner and outer surfaces of the pipes are clean and free of hazardous sulphur, oxides, dust/dirt, shaving particles, moisture, or any other contaminant.

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

Store the piping to be used during installation indoors and keep both ends of the piping sealed until just 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 ester oil, ether oil or alkylbenzene (small amount) as the refrigerating machine oil to coat flares and flange connections.

- The refrigerating machine 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 other refrigerant other than R407C.

- Use of other refrigerants (R22 for example) may deteriorate refrigerating machine oil due to chlorine generation.

Use a vacuum pump with reverse flow protection.

- Otherwise the vacuum pump oil will reversely flow into the refrigerant circuit causing the possible deterioration of the refrigerating machine.

Do not use the following tools used for conventional refrigerant.
(Gauge manifold, Charging hose, Gas leak detector, Reverse flow protector, Cap for refrigerant charge, Refrigerant recovery device)

- Mixing of conventional refrigerant /refrigerating machine oil may cause to deteriorate the refrigerating machine oil.
- Mixing with water may cause deterioration of the refrigerating machine oil.
- As this refrigerant does not contain chloride, the gas leak detector for conventional refrigerant gas can not be used.

Do not use a charging cylinder.

- Use of a charging cylinder changes the composition of refrigerant resulting in possible performance deterioration.

More careful management is required for the tools than that for the conventional.

- Dust, trash or water content if mixed into the refrigerant circuit may cause to deteriorate the refrigerating machine oil.

Caution to Equipment Used for Replacing

⚠ Caution

Do not operate any valves before conducting mineral oil recovery operation.

Operating valves before conducting mineral oil recovery operation may cause a deterioration in the performance of mineral oil recovery.

For mineral oil recovery operation, the system controller and MA remote controller may be required to be remove sometimes.

- Improper handling can lead to an inability to perform oil recovery operation.
- For removal, follow the instruction displayed on the PC for mineral oil recovery.
- Mount the controllers again after finishing the oil recovery operation.

Observe a safe distance from the indoor unit fan which runs during the mineral oil recovery operation.

Working in the surrounding of the indoor unit fan can cause personal injury.

Record the quantity of refrigerant replenished. (Enter into the column for replenished refrigerant quantity on the label of the indoor unit.)

- Missing the description may deteriorate the performance of mineral oil recovery.
- Malfunction or poor cooling/heating may also be caused.

During the mineral oil recovery operation, an error display may be shown on the remote controller or system controller.

- When an error display was shown during mineral oil recovery operation, reset the error display after finishing the operation.

To conduct the refrigerant recovery/evacuation of the inside of exiting piping, choose tools only used with R407C e.g. charging hose.

- Using a charging hose for R407C causes it to mix the conventional refrigerating machine oil leading to the deterioration of refrigerating machine oil.

Before Conducting Installation Work/Electrical Work

⚠ Caution

Do not install the unit at a place where combustible gas can possibly be generated.

- Leaked combustible gas if stagnated around the unit may cause explosion.

Do not use the unit in a special atmosphere.

- Use in an atmosphere containing high levels of oil, steam or sulfide gas may seriously degrades the performance or damage parts.

Do not install the unit on a material which is not designed to be wet.

- If liquid drips from the oil trap kit, apply centralised drainage work to the oil trap kit.

Apply grounding work securely.

- Do not connect the grounding line to gas pipe, city water pipe, lightning rod or telephone grounding line. Improper grounding may cause electric shock.

For the power source wiring, refrain from giving tensile force to the wiring.

- Disconnection, heat generation or fire may be caused.

Make sure to mount a leak breaker to the power source.

- Otherwise electric shock may be caused.

Be sufficiently careful in transporting products.

- Do not transport a product with a weight exceeding 20kg by a single person.
- Some products are packed with PP band. Do not use it as a means of transporting.
- During transport cuts may be caused by the fin surface of the heat exchanger, please refrain from touching it without gloves.

Do not use the same switch or the like for plural outdoor units.

Otherwise, malfunction, heat generation or fire may be caused.

Be sure to mount the valve to the field piping (extended piping).

After mineral oil recovery, the oil trap kit can not be removed disabling air conditioning operation.

When installing the unit in hospitals or communication equipment plants, prepare measures to prevent noise generation beforehand.

- The noise may cause the erroneous operation or failure and may give negative effect to medial equipment or communication equipment to disturb medical treatment on human bodies or hinders image broadcasting or generates noise.

Check possibility for the reuse of existing refrigerant piping by observing this manual.

- The conventional refrigerating machine oil is contained inside existing piping and some residual oil deteriorates oil recovery performance which may lead to the deterioration of refrigerating machine oil.
- The piping specification (diameter, length , height difference) out of the use specified range may hinder the mineral oil recovery performance, possibly leading to deterioration of refrigerating machine oil.

Do not use breakers or fuses other than that with correct capacities.

- Use of a fuse with excessively large capacity or wire/copper wire may cause troubles or fire.

For the power source wiring, use wire with rated current capacity.

- Otherwise an electric leak, heat generation or fire may be caused.

When using existing wiring (for power source or transmission) or switches, check them for disconnection and deterioration beforehand.

- Otherwise an electric leak, heat generation or fire may be caused.

Dispose the packing materials properly.

- As the packing materials are using metal products or wooden pieces such as nails, nail wounds may be caused if it is improperly treated. Please observe caution to avoid this from occuring.
- Dispose the polyethylene bag for packing only after tearing. Otherwise a suffocation accident may be caused by children play with the disposed bag.

Provide thermal insulation to the valve on the field piping (extended piping) properly.

- Insufficient thermal insulation generates condensation that may cause to deteriorate the performance.
- Provide thermal insulation (including lagging) after recovering mineral oil.

Before Conducting Mineral Oil Recovery Operation

⚠ Caution

Turn the power source on 12 hours or more before starting operation.

- Otherwise trouble may be caused. Do not turn the power off during the operating season.

Do not operate the unit without the panels or guard.

- Touching the rotating parts, high temperature parts or high voltage may cause personal injury such as burns or electric shock.

Do not operate switches with wet fingers.

- Electric shock may be caused.

Do not turn off the power source immediately after stopping.

- Be sure to wait for 5 minutes or more. Otherwise water leakage or troubles may be caused.

Do not touch the refrigerant piping during operation or immediately after stopping with bare hands.

- The refrigerant piping or the refrigerant circuit parts of the compressor during operation or immediately after stopping may have low or high temperature. Touching with bare hands may cause a burn or frostbite.

Do not run the outdoor unit during a test run until finishing the mineral oil recovery operation.

- The indoor unit fan will run.

Caution to Mineral Oil Recovery Operation

⚠ Warning

Be sufficiently careful to avoid the oil trap kit, falling or toppling over.

- If this happens the oil trap kit may be damaged and refrigerant piping may malfunction.
- Falling down during flushing operation causes the leak of refrigerant from the joint which is dangerous if contacts it human body.

After flushing operation, check the residual pressure inside the oil trap kit with a pressure gauge. If the residual pressure is exceeding 0.294MPa, recover refrigerant inside the oil trap kit to reduce the pressure to within 0.2 ~ 0.294MPa.

- Under high inner pressure, pressure rises during storing, inducing a dangerous situation.
- Under low inner pressure, water content or foreign matter enters during storing, causing corrosion to the oil trap kit which may cause troubles.

Be careful not to expose the oil trap kit unit (especially electrical parts) to rain water.

- The electrical parts if wet with rain water may cause machine trouble.
- The electrical parts if wet with rain water may cause electrical shock.

Conduct oil recovery from the oil recovery service valve outdoor or at a place with good ventilation. Use leather gloves when opening the oil recovery service valve and open it slowly.

- If done in a closed space, suffocation can be caused.
- Opening the oil recovery service valve fully and quickly allows oil to splash, which is dangerous.
- As the oil recovered is of low temperature, frostbite may be caused if it touches skin.

⚠ Caution

When the oil trap kit is transported while lying sideways, do not place any thing on the sheet metal of the kit.

- Otherwise, the sheet metal or inner piping may be deformed leading to breakage.

Before removing the oil trap kit after flushing operation, make sure to discharge and process the oil recovered from the oil recovery service valve.

- If it is not discharged, the oil accumulated inside will flow out during flushing operation hindering proper recovery of mineral oil thus leading to machine trouble.

For inspection, use the ester oil sampling kit when the refrigerating machine oil used in the existing unit is mineral oil.
(Confirm the type of refrigerating machine oil used in the existing unit by reading the name plate or the like.)

- Proper checking can not be executed if not using the kit meeting the refrigerating machine oil used by the existing unit. This possibly causes machine trouble.

Contents

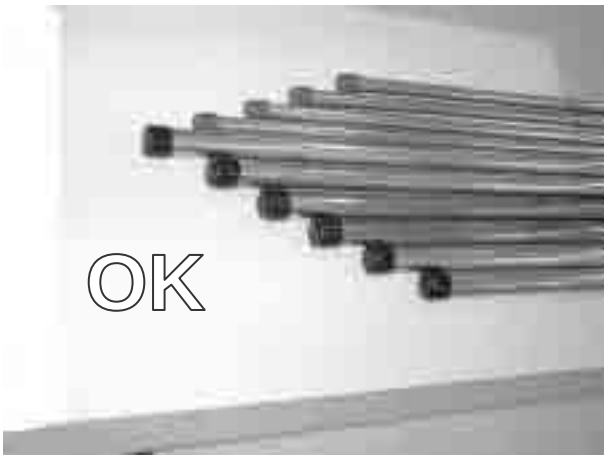
1 PRECAUTIONS FOR DEVICES THAT USE R407C REFRIGERANT

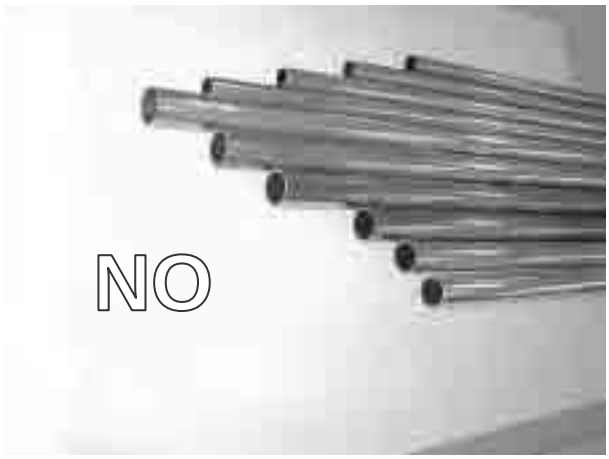
[1] Storage of Piping Material

(1) Storage location

Store the pipes to be used indoors. (Warehouse at site or owner's warehouse)
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 10 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 ester oil, ether oil or alkylbenzene (small amount) as the refrigerator oil to coat flares and 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] Necessary Apparatus and Materials and Notes on Their Handling

The following tools should be marked as dedicated tools for R407C.

<<Comparison of apparatus and materials used for R407C and for R22>>

Apparatus Used	Use	R22	R407C
Gauge manifold	Evacuating, refrigerant filling	Current product	◎
Charging hose	Operation check	Current product	◎
Charging cylinder	Refrigerant charging	Current product	◎ Do not use.
Gas leakage detector	Gas leakage check	Current product	◎ Shared with R134a
Refrigerant collector	Refrigerant collection	R22	◎ For R407C use only
Refrigerant cylinder	Refrigerant filling	R22	◎ Identification of dedicated use for R407C : Record refrigerant name and put brown belt on upper part of cylinder.
Vacuum pump	Vacuum drying	Current product	△ Can be used by attaching an adapter with a check valve.
Vacuum pump with a check valve		Current product	△
Flare tool	Flaring of pipes	Current product	△
Bender	Bending of pipes	Current product	△
Application oil	Applied to flared parts	Current product	◎ Ester oil or Ether oil or Alkybenzene (Small amount)
Torque wrench	Tightening of flare nuts	Current product	△
Pipe cutter	Cutting of pipes	Current product	△
Welder and nitrogen cylinder	Welding of pipes	Current product	△
Refrigerant charging meter	Refrigerant charging	Current product	△
Vacuum gauge	Checking the vacuum degree	Current product	△

Symbols : ◎ To be used for R407C only. △ Can also be used for conventional refrigerants.

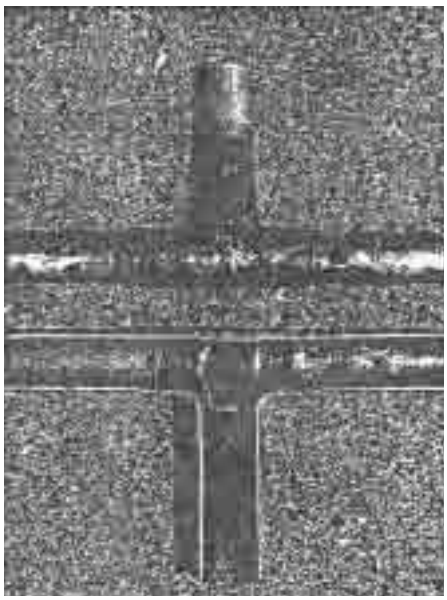
Tools for R407C must be handled with more care than those for conventional refrigerants. They must not come into contact with any water or dirt.

[4] Brazing

No changes from the conventional method, but special care is required so that foreign matter (i.e. oxide scale, water, dirt, etc.) does not enter the refrigerant circuit.

Example : Inner state of 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 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 :

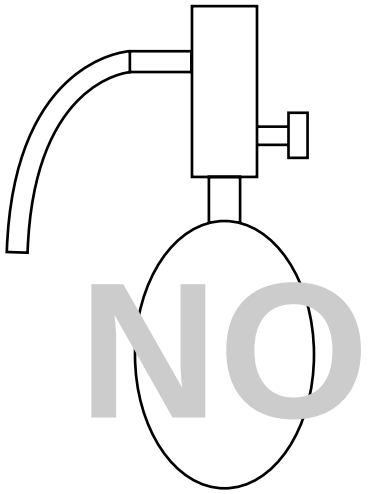
1. The new refrigerant oil is 10 times more hygroscopic than the conventional oil. The probability of a machine failure if water infiltrates is higher than with conventional refrigerant oil.
2. A flux generally contains chlorine. A residual flux in the refrigerant circuit may generate sludge.

Note :

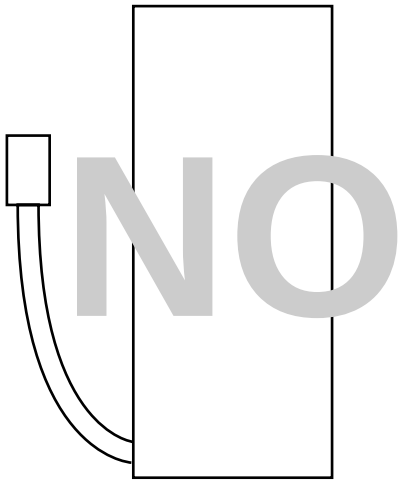
- Commercially available antioxidants may have adverse effects on the equipment due to its residue, etc. When applying non-oxide brazing, use nitrogen.

[5] 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 judge 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. Charging with R407C gas will lead the composition of the remaining refrigerant in the cylinder to change and this refrigerant can then not be used.

Note :

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

[6] 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 vacuum pump power is turned off (power failure).
   It is also possible to attach a check valve to the actual vacuum pump afterwards.

2. Standard degree of vacuum for the vacuum pump
   Use a pump which reaches 65Pa or below after 5 minutes of operation.
   In addition, be sure to use a vacuum pump that has been properly maintained and oiled using the specified oil. If the vacuum pump is not properly maintained, the degree of vacuum may be too low.

3. Required accuracy of the vacuum gauge
   Use a vacuum gauge that can measure up to 650Pa. Do not use a general gauge manifold since it cannot measure a vacuum of 650Pa.

4. Evacuating time

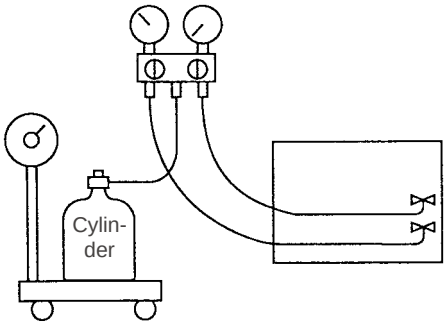
- Evacuate the equipment for 1 hour after 650Pa has been reached.
- After envacuating, leave the equipment for 1 hour and make sure the that vacuum is not lost.

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.

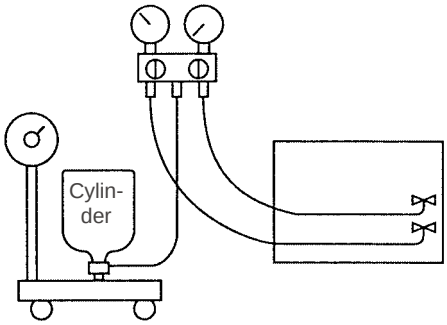
[7] Charging of Refrigerant

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

For a cylinder with a syphon attached

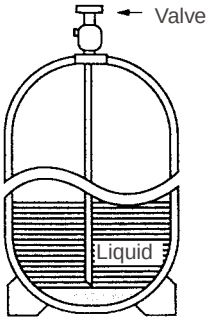


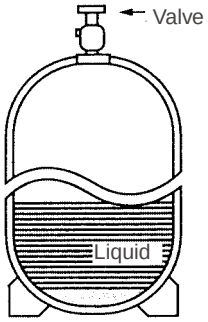
For a cylinder without a syphon attached



Cylinder color identification R407C-Gray
R410A-Pink

Charged with liquid refrigerant





Reasons :

1. R407C is a mixture of 3 refrigerants, each with a different evaporation temperature. Therefore, 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 :

- In the case of a cylinder with a syphon, liquid R407C is charged without turning the cylinder up side down. Check the type of cylinder before charging.

[8] 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(For use with R407C).

   If any other product is used, the unit will be damaged.

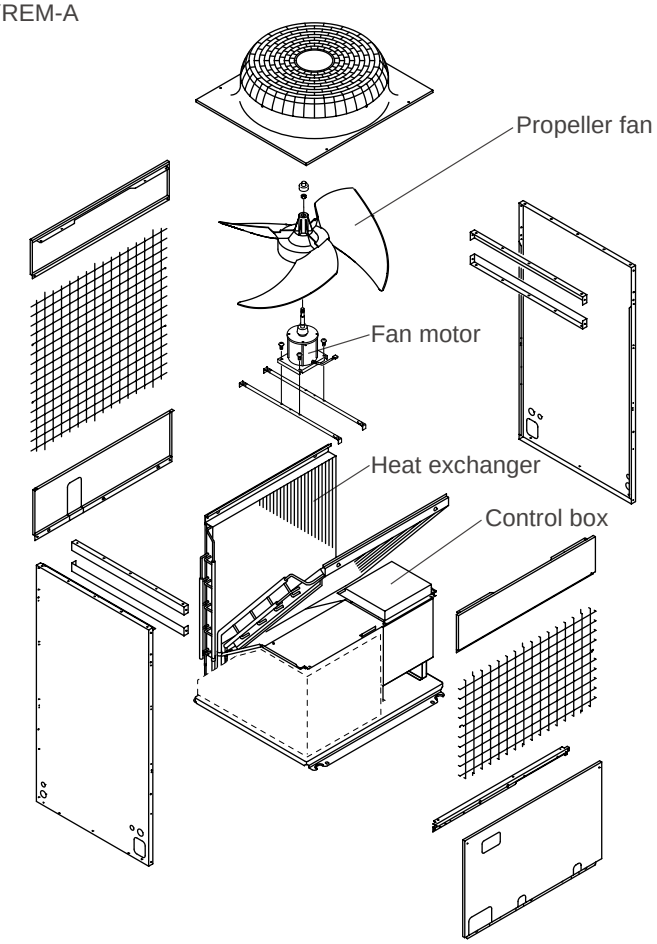
2. Opening the refrigerant circuit after changing to a new dryer is less than 1 hour. The replacement of the dryer should be the last operation performed.

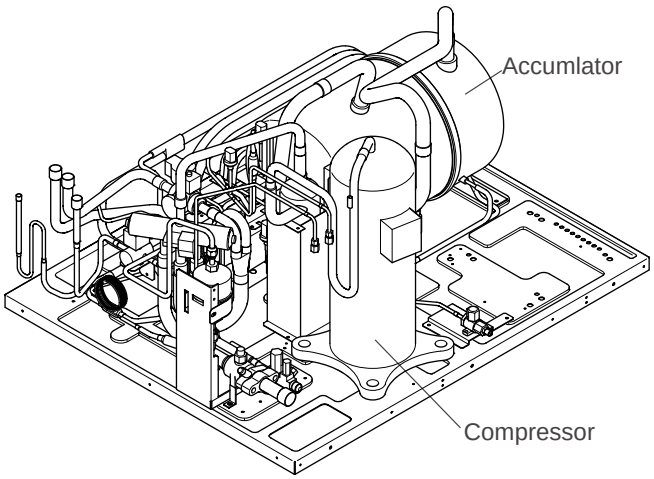
2 COMPONENT OF EQUIPMENT

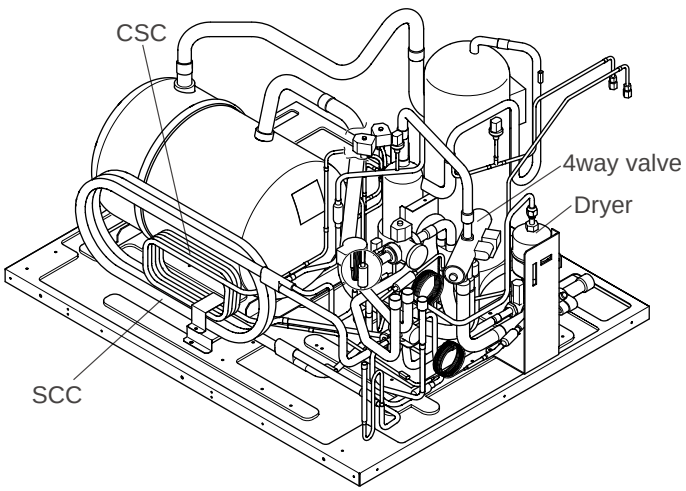
[1] Appearance of Components

Outdoor unit

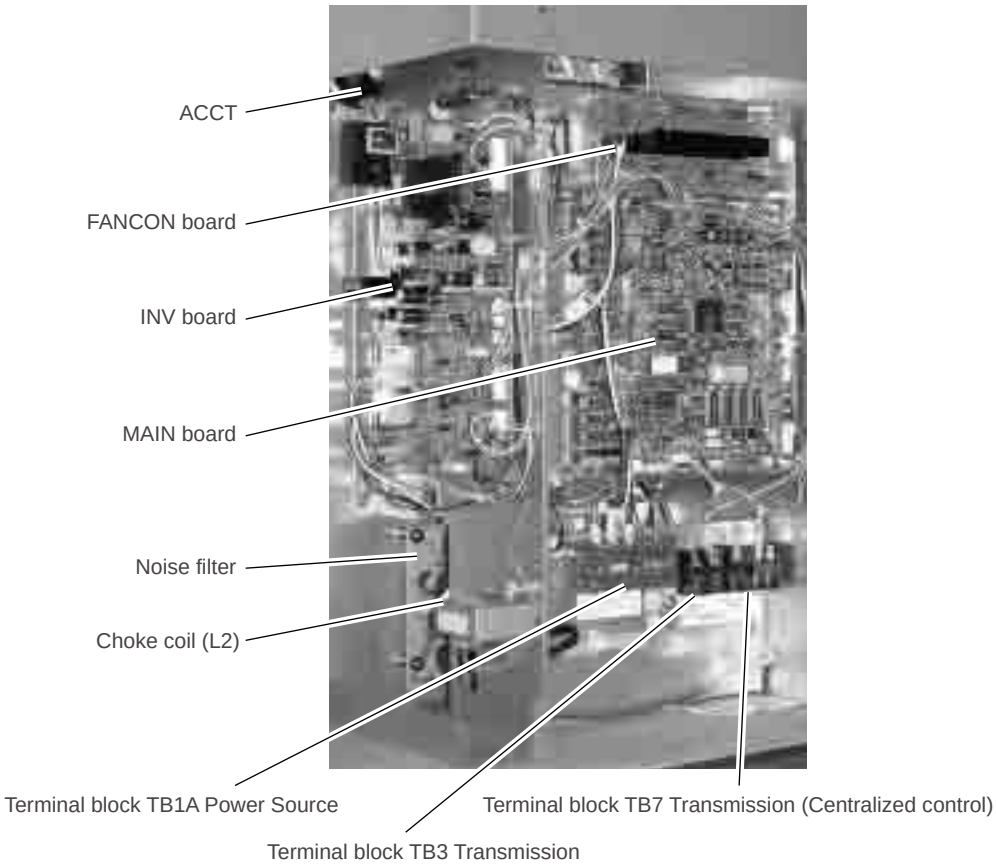
• PUHY-P200, 250YREM-A

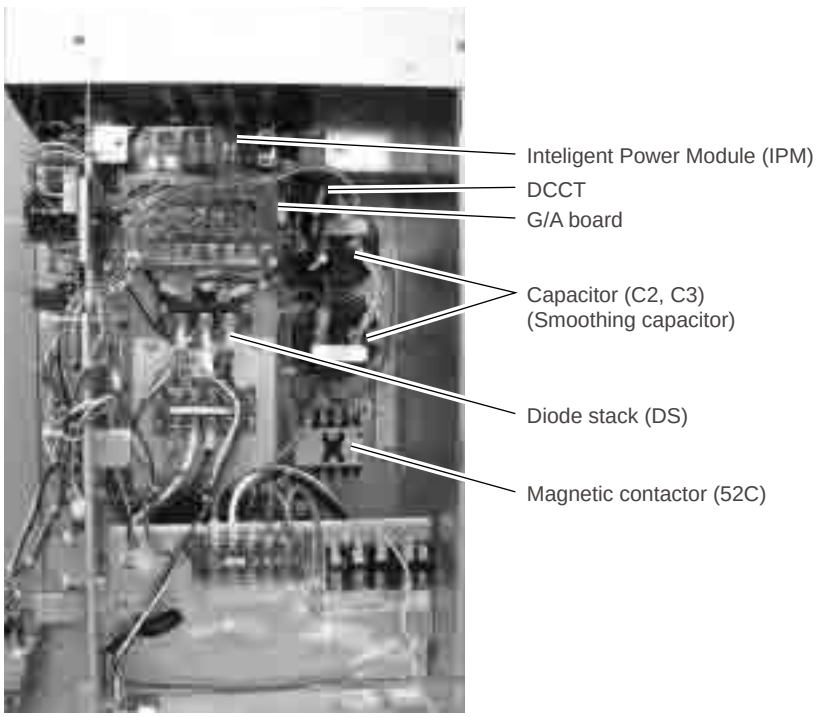




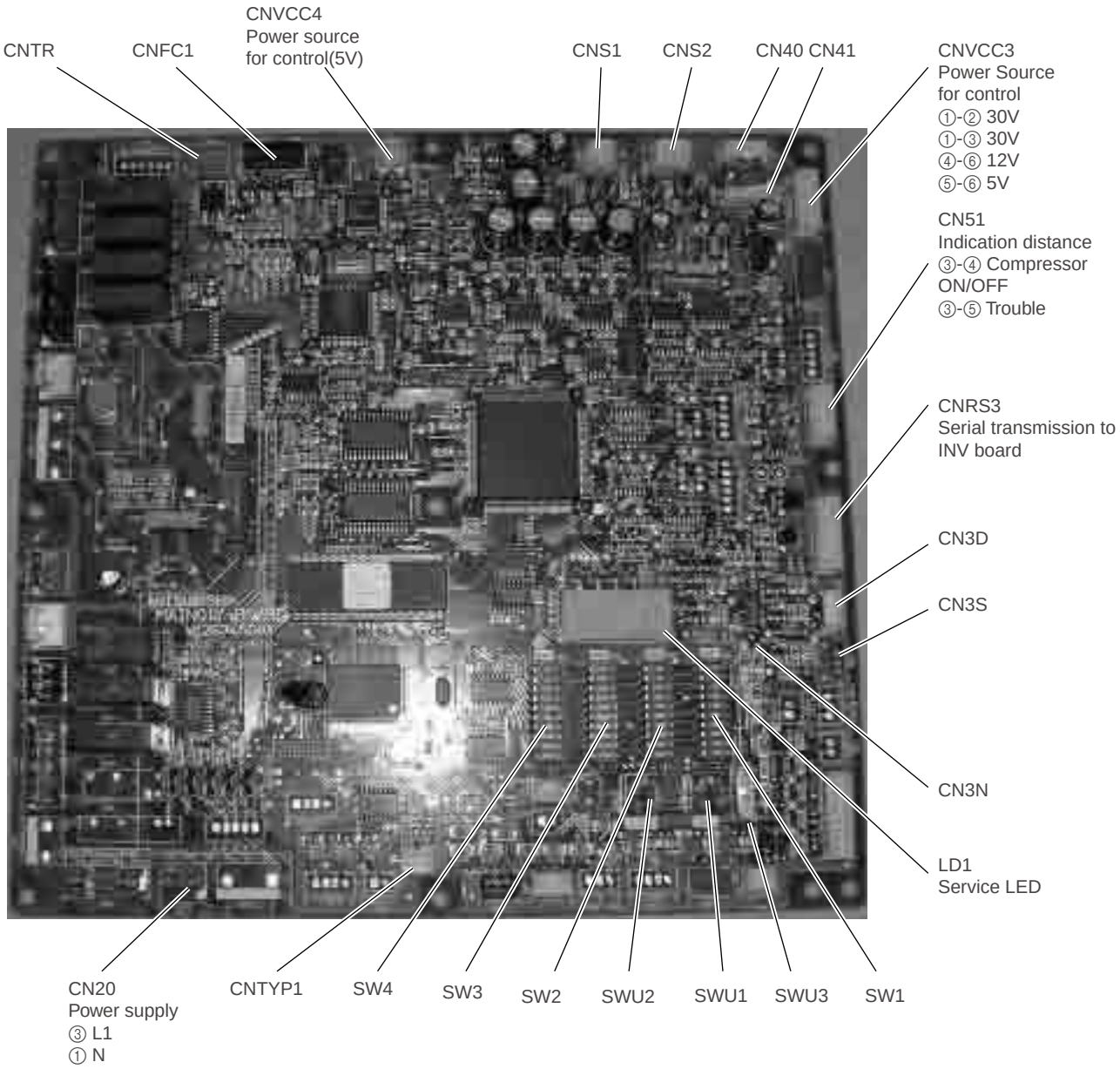


Controller Box

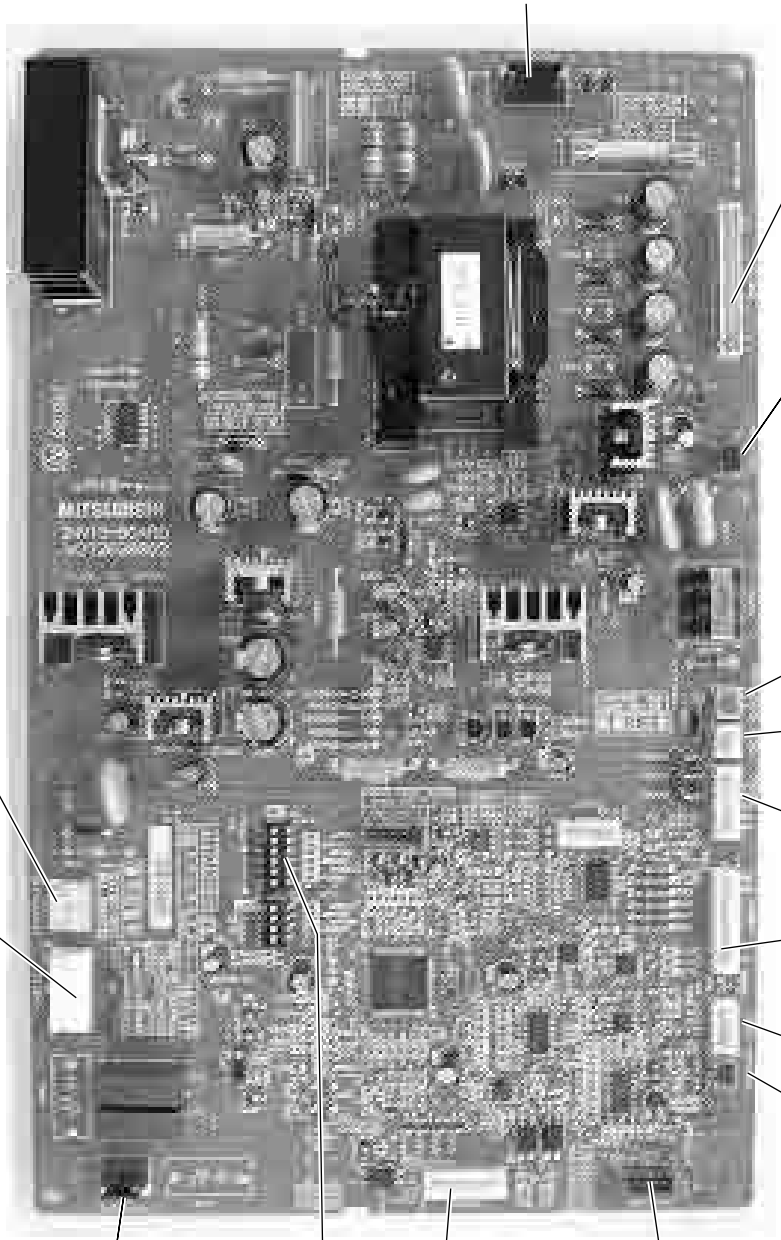




MAIN board

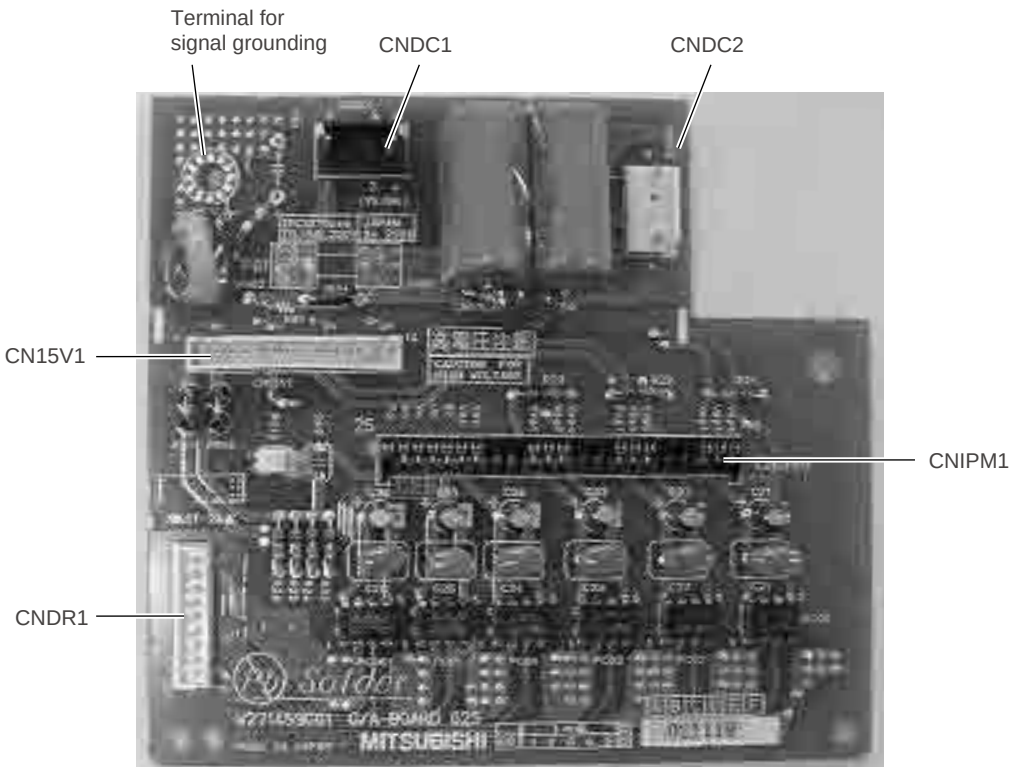

CNTR
CNFC1
CNVCC4
Power source
for control(5V)
CNS1
CNS2
CN40 CN41
CNVCC3
Power Source
for control
①-② 30V
①-③ 30V
④-⑥ 12V
⑤-⑥ 5V
CN51
Indication distance
③-④ Compressor
ON/OFF
③-⑤ Trouble
CNRS3
Serial transmission to
INV board
CN3D
CN3S
CN3N
LD1
Service LED
CN20
Power supply
③ L1
① N
CNTYP1
SW4
SW3
SW2
SWU2
SWU1
SWU3
SW1

INV board

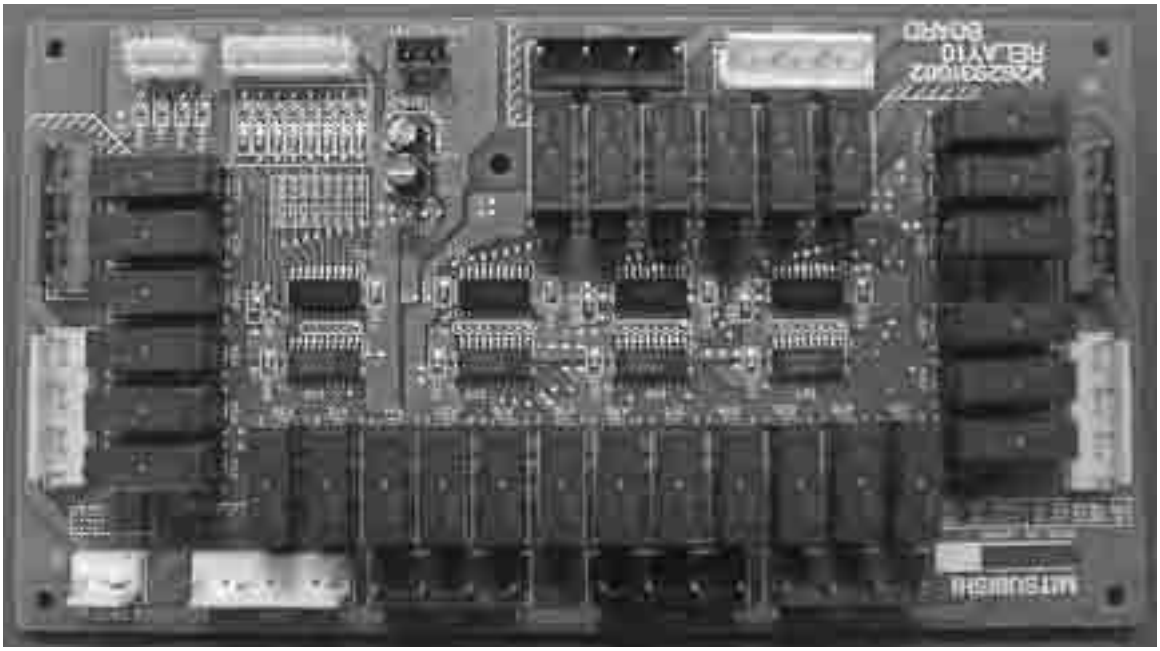

CNVDC
①-④
DC-560V
CN15V2
Power supply
for IPM control
CNFG
Frame grounding
CNVCC4
Power supply (5V)
CNL2
Choke coil
CNVCC2
Power supply
①-② 30V, ①-③ 30V
④-⑥ 12V, ⑤-⑥ 5V
CNDR2
Out put to
G/A board
CNCT
DCCT
CNTH
CN52AC
Control for
52C
CNAC2 I
Power source
1 L2
3 N
5 G
CN FAN
Control for MF1
SW1
CNRS2
Serial transmission
to MAIN board
CNCT2
ACCT

FANCON board

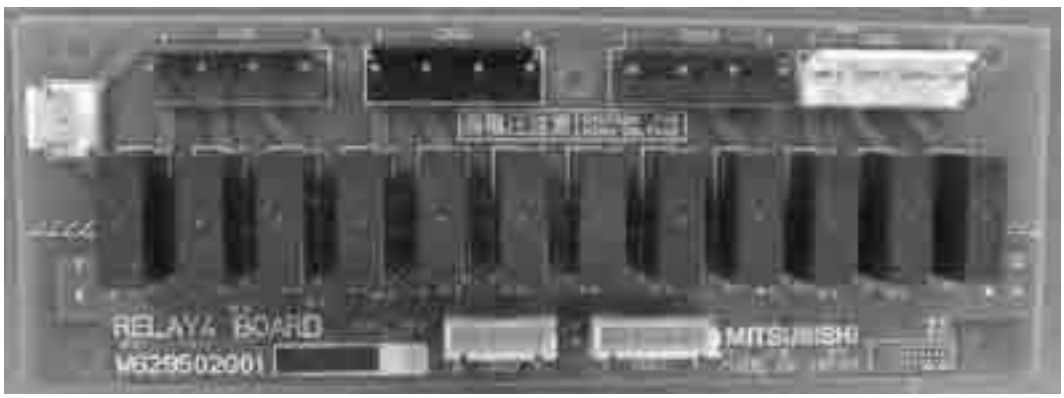
G/A board



RELAY 10 board

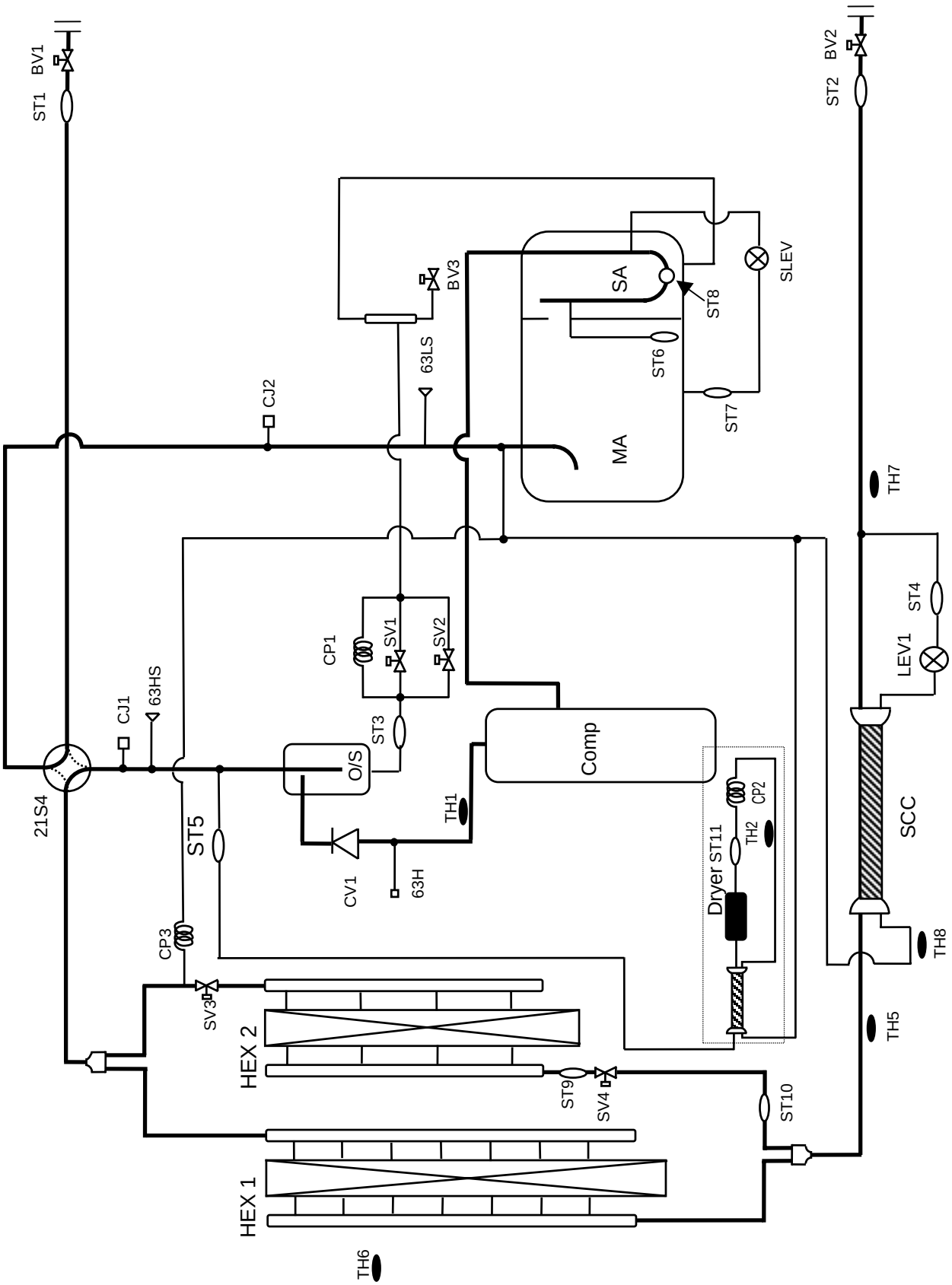


RELAY 4 board



[2] Refrigerant Circuit Diagram and Thermal Sensor

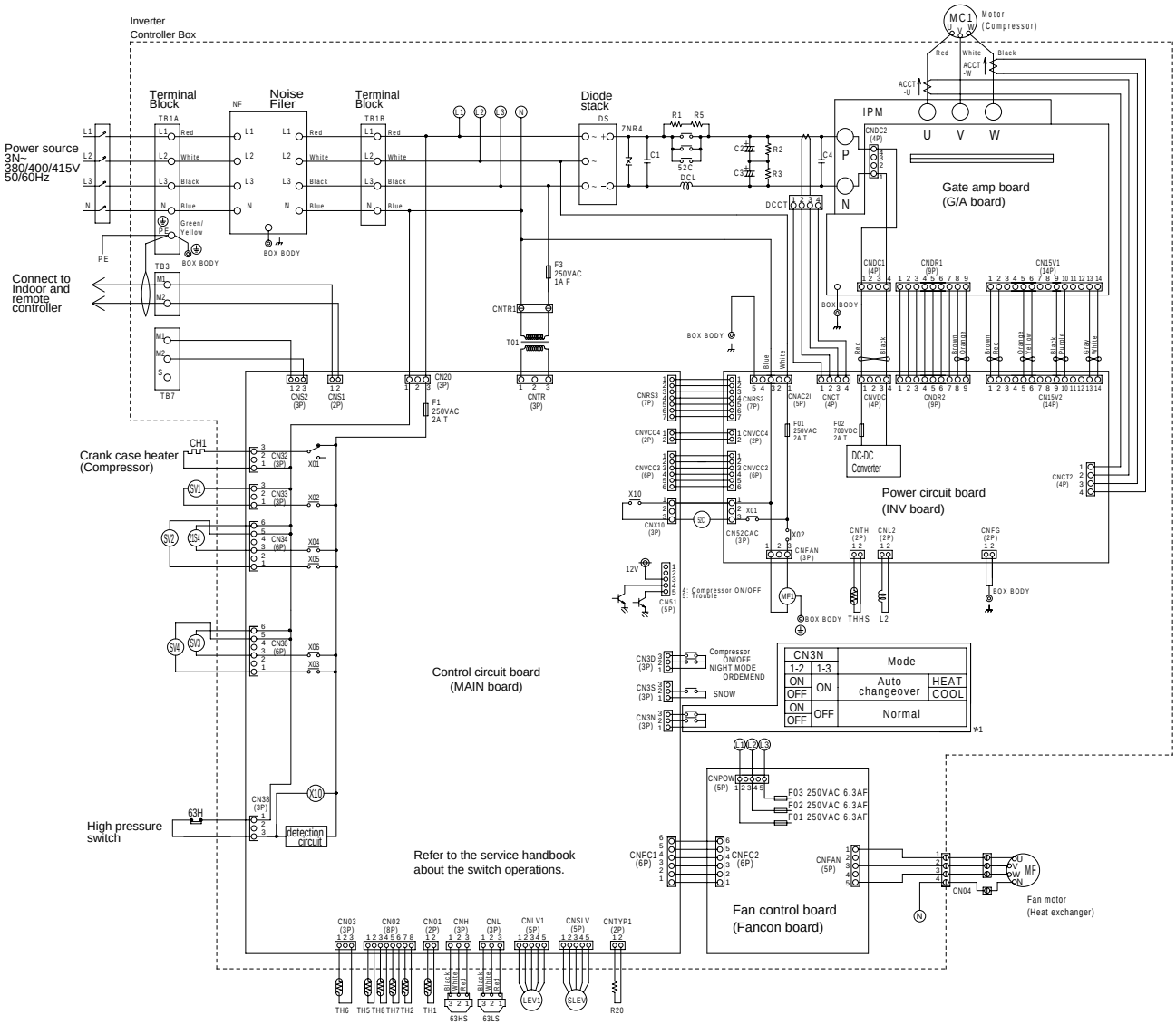
①PUHY-P200/250YREM-A



[3] Electrical Wiring Diagram

① PUHY-P200·250YREM-A

no fuse breaker	
PUHY-P200YREM-A	30A
PUHY-P250YREM-A	30A



<SYMBOL EXPLANATION>

Symbol	Name	Symbol	Name	Symbol	Name	Symbol	Name
DCL	DC reactor (Power factor improvement)	SV3	Solenoid valve (Heat exchanger capacity control)	63HS	High pressure sensor	TH7	Thermistor: liquid outlet temp. detect at Sub-cool coil
DCCT	Current Sensor			63LS	Low pressure sensor		
ACCT-U,W	Current Sensor	SV4	Solenoid valve (Heat exchanger capacity control)	L2	Choke coil (Transmission)	TH8	bypass outlet temp. detect at Sub-cool coil
ZNR4	Varistor			IPM	Intelligent power module		
52C	Magnetic contactor (Inverter main circuit)	LEV1	Electric expansion valve (Sub-cool coil bypass)	TH1	Thermistor: Discharge pipe temp. detect	THHS	Radiator panel temp. detect
MF1	Fan motor (Radiator panel)			TH2	Saturation evapo. temp. detect	X1~10	Aux. relay
21S4 ✻1	4-way valve	SLEV	Electric expansion valve (Sub-cool coil bypass)	TH5	Pipe temp. detect	⏚	Earth terminal
SV1, SV2	Solenoid valve (Discharge-suction bypass)			TH6	OA temp. detect		

[4] Standard Operating Data

① PUHY-P200·250YREM-A

• Cooling

Items \ Outdoor unit					PUHY-P200YREM-A				PUHY-P250YREM-A			
Condition	Ambient temp.	Indoor		DB/WB	27.0/19.0				27.0/19.0			
		Outdoor			35.0/24.0				35.0/24.0			
	Indoor unit	Quantity		Set	4				4			
		Quantity in operation			4				4			
		Model		–	71	63	50	20	100	71	63	20
	Piping	Main pipe		m	5				5			
		Branch pipe			10	10	10	10	10	10	10	10
		Total piping length			45				45			
	Indoor unit fan notch			–	Hi	Hi	Hi	Hi	Hi	Hi	Hi	Hi
	Refrigerant volume			kg	11.7				11.7			
Outdoor unit	Total current			A	10.6		9.7		14.4		13.2	
	Volts			V	380		415		380		415	
LEV opening	Indoor unit			Pulse	270	420	360	250	360	270	420	250
	SC (LEV1)				122				150			
	Oil back (SLEV)				200				272			
Pressure	High pressure/Low pressure (after O/S) (before Accumulator)			MPa	2.00/0.55				2.08/0.54			
Sectional temperature	Outdoor unit	Discharge (TH1)		˚C	81				80			
		Heat exchanger outlet (TH5)			42				44			
		Accumulator	Inlet		16				16			
			Outlet		17				17			
		Suction (Comp)			20				20			
		CS circuit (TH2)			5				5			
		Shell bottom (Comp)			44				44			
		SCC outlet (TH7)			20				22			
		Bypass outlet (TH8)			13				13			
	Indoor unit	LEV inlet			20				20			
		Heat exchanger outlet			14				14			
α OC					0.23				0.23			

• Heating

Items \ Outdoor unit				PUHY-P200YREM-A				PUHY-P250YREM-A			
Condition	Ambient temp.	Indoor	DB/WB	20.0/–				20.0/–			
		Outdoor		7.0/6.0				7.0/6.0			
	Indoor unit	Quantity	Set	4				4			
		Quantity in operation		4				4			
		Model	–	71	63	50	20	100	71	63	20
	Piping	Main pipe	m	5				5			
		Branch pipe		10	10	10	10	10	10	10	10
		Total piping length		45				45			
	Indoor unit fan notch		–	Hi	Hi	Hi	Hi	Hi	Hi	Hi	Hi
	Refrigerant volume		kg	11.7				11.7			
Outdoor unit	Total current		A	11.4		10.5		15.1		13.8	
	Volts		V	380		415		380		415	
LEV opening	Indoor unit		Pulse	290	470	410	250	330	290	470	250
	SC (LEV1)			0				0			
	Oil back (SLEV)			123				200			
Pressure	High pressure/Low pressure (after O/S) (before Accumulator)		MPa	2.10/0.43				2.10/0.38			
Sectional temperature	Outdoor unit	Discharge (TH1)	˚C	73				80			
		Heat exchanger inlet (TH5)		0				–2			
		Accumulator Inlet		2				0			
		Accumulator Outlet		2				0			
		Suction (Comp)		4				2			
		CS circuit (TH2)		–4				–6			
		Shell bottom (Comp)		33				33			
	Indoor unit	Heat exchanger inlet		60				60			
		Heat exchanger outlet		34				34			
∝ OC				0.28				0.28			

[5] Function of Dip SW and Rotary SW

(1) Outdoor unit

① PUHY-P200·250YREM-A

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 dial switch.		Before power is turned on.	
	3	Refrigerant model	R407C	R22	Before power is turned on.	
SW1	1~8	For self diagnosis/ operation monitoring	LED Monitering Display		During normal operation when power is on.	
	9~10	–	–	–	Should be set on OFF.	
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.	–	Deletion	During normal operation when power is on.	
	4	Refrigerant amount adjustments	Ordinary control	Adjustment operation	During normal operation when power is on (only when switching from OFF/ON)	
	5	–	–	–	–	
	6	Disregard ambient air sensor errors, liquid overflow errors.	Errors valid.	Disregard errors.	During normal operation when power is on.	
	7	Forced defrosting	Ordinary control	Start forced defrosting.	During normal operation when power is on.	10 minutes or more after compressor starts.
	8	Defrost prohibited timer	39 min.	90 min.	During normal operation when power is on. (Except during defrosting)	
	9	–	–	–	–	
	10	–	–	–	–	
SW3	1	SW3-2 Function valid/ invalid	SW3-2 Function invalid	SW3-2 Function valid	During normal operation when power is on.	
	2	Indoor unit test operation	Stop all indoor units.	All indoor units test operation ON.	When SW3-1 is ON after power is turned on.	
	3	Defrosting start temperature of TH	– 10˚C	–7˚C	During normal operation when power is on.	
	4	Defrosting end temperature of TH5.	10˚C For 2 minutes.	15˚C For 2 minutes.	During normal operation when power is on. (Except during defrosting)	
		Opening angle of IC except when heater thermostat is ON during defrosting.	(no operation)	2000		
	5	–	–	–	–	
	6	Pump down	Ordinary control	Pump down	During normal operation (only when switching from OFF/ON)	
	7	Target Tc (High pressure) in Heating	49˚C	53˚C	During normal operation when power is on.	
	8	–	–	–	–	
	9	Models	See **Note2**.		–	
	10	Models			Before power is turned on.	
SW4	1	SW4-2 Function valid/ invalid	Invalid	Valid	During normal operation when power is on.	
	2	Configuration compensation 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	Night mode/Step demand	Night mode	Step demand	During normal operation when power is on.	
	8	–	–	–	–	
	9	–	–		–	
	10	–	–		–	

Note 1

- SWU1~2=00 when shipped from the factory. Other factory settings are indicated by shaded portions.
- If the address is set from 01 to 50, it automatically becomes 100.
- The refrigerant model is recognized with SW3 and TH2.

SWU3 \ TH2	Exist	Not exist
R407C	R407C	Different unit model error (7130)
R22	Different unit model error (7130)	R22

Note 2

SW3-9 \ SW3-10	OFF	ON
OFF	P200YREM-A	P250YREM-A
ON	–	–

(2) Indoor unit

DIP SW1, 3

Switch		SW name	Operation by SW OFF	Operation by SW ON	Switch set timing OFF	Switch set timing ON	Remarks
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 at heat.			
	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	–	–	–			

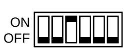
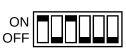
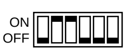
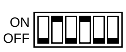
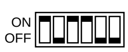
Note 1: The shaded part ▭ indicates the setting at factory shipment. (For the SW not being shaded, refer to the table below.)

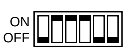
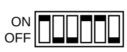
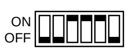
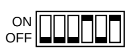
2: When both SW1-7 and SW1-8 are being set to ON, the fan stops at the heating thermostat of OFF.

<table>
<tr><th colspan="2" rowspan="2">Model / Switch</th><th colspan="3">PLFY-P</th><th colspan="4">PEFY-P</th><th>PDFY-P</th><th>PFFY-P</th><th>PCFY-P</th><th colspan="2">PKFY-P</th><th>PMFY-P</th></tr>
<tr><th>VAM-A(2)</th><th>VLMD-B</th><th>VKM-A</th><th>VML-A</th><th>VMH-A</th><th>20~80VMM-A</th><th>100~140VMM-A</th><th>VM-A</th><th>VLRM-A, VLEM-A</th><th>VGM-A</th><th>VAM-A</th><th>VGM-A</th><th>VBM-A</th></tr>
<tr><td rowspan="3">SW1</td><td>3</td><td>OFF</td><td colspan="2">ON</td><td>OFF</td><td>ON</td><td colspan="2">OFF</td><td>ON</td><td>OFF</td><td>ON</td><td colspan="2">OFF</td><td>OFF</td></tr>
<tr><td>6</td><td>OFF</td><td colspan="8">ON</td><td colspan="3">OFF</td><td>OFF</td></tr>
<tr><td>7</td><td colspan="3">OFF</td><td colspan="2">ON</td><td>OFF</td><td>ON</td><td colspan="5">OFF</td><td>OFF</td></tr>
<tr><td rowspan="4">SW3</td><td>3</td><td colspan="3">ON</td><td colspan="6">OFF</td><td colspan="3">ON</td><td>ON</td></tr>
<tr><td>4</td><td>ON</td><td>ON</td><td>ON</td><td colspan="6">OFF</td><td>ON</td><td>OFF</td><td>ON</td><td>ON</td></tr>
<tr><td>6</td><td>OFF</td><td>ON</td><td colspan="10">OFF</td><td>OFF</td></tr>
<tr><td>8</td><td colspan="8">OFF</td><td>ON</td><td colspan="3">OFF</td><td>OFF</td></tr>
</table>

Note 3: The DipSW setting is only effective during unit stopping (remote controller OFF) for SW1,2,3 and 4 commonly and the power source is not required reset.

Setting of DIP SW2

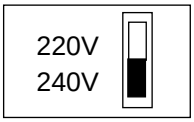
Model	P20	P25	P32	P40	P50	P63
Capacity (model name) code	4	5	6	8	10	13
SW2 setting						

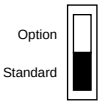
Model	P71	P80	P100	P125	P140	P200	P250
Capacity (model name) code	14	16	20	25	28	40	50
SW2 setting							

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 is changed by SWB setting.  Ceiling height: 3 → 3.5 m; 2 → 2.8 m; 1 → 2.3 m	Always 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.	Always 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.	Always after powering
SWB	Setting of air outlet opening	(PLFY-P-VKM-A)  SWA \ SWB: 1 / 2 / 3 2-way: 3.5 m / 3.8 m / 3.8 m 3-way: 3.0 m / 3.3 m / 3.5 m 4-way: 2.7 m / 3.0 m / 3.5 m	Always 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	Always 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 DC500V megger. Do not run if it is lower than 2MΩ. Note) Never apply the megger to the MAIN board. If applied, the MAIN board will be broken.
3	Confirm that the Ball valve at both gas and liquid sides is being fully opened. Note) Certainly 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 mistakenly 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 indoor unit model, the type of remote controller and their capabilities.

(※1) Capability of the connected indoor units / Remote controller type / Number of connected indoor units that can be connected without a RP.	Remote controller PAR-F25MA	
	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 id displayed within 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 power on to the outdoor unit, 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

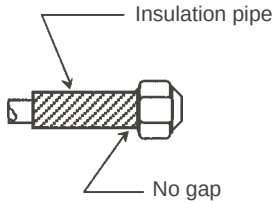
Because the inverter power portion in outdoor unit electrical part box have a lot of high voltage portion, be sure to follow the instructions shown below.

1	During energizing power source, never touch inverter power portion because high voltage (approx. 580V) is applied to inverter power portion.	
2	When checking,	
	▽1	Shut off main power source, and check it with tester, etc.
	▽2	Allow 10 minutes after shutting off main power source.
	▽3	Open the MAIN board mounting panel, and check whether voltage of both ends of electrolytic capacitor is 20V or less.

(3) Check points for test run when mounting options

Built-in optional parts	Content of test run	Check point	Result
Mounting of drain water removing mechanism	▽1 Release connector of pump circuit, 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 After that, connect connector of circuit.	Drain water comes out by operations of 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 of permeable film humidifier	Check humidifier operations and water supply status in heating (test run) mode.	No water leakage from connecting portions of water piping.	
		Water is supplied to water supply tank, and float switch is operating.	

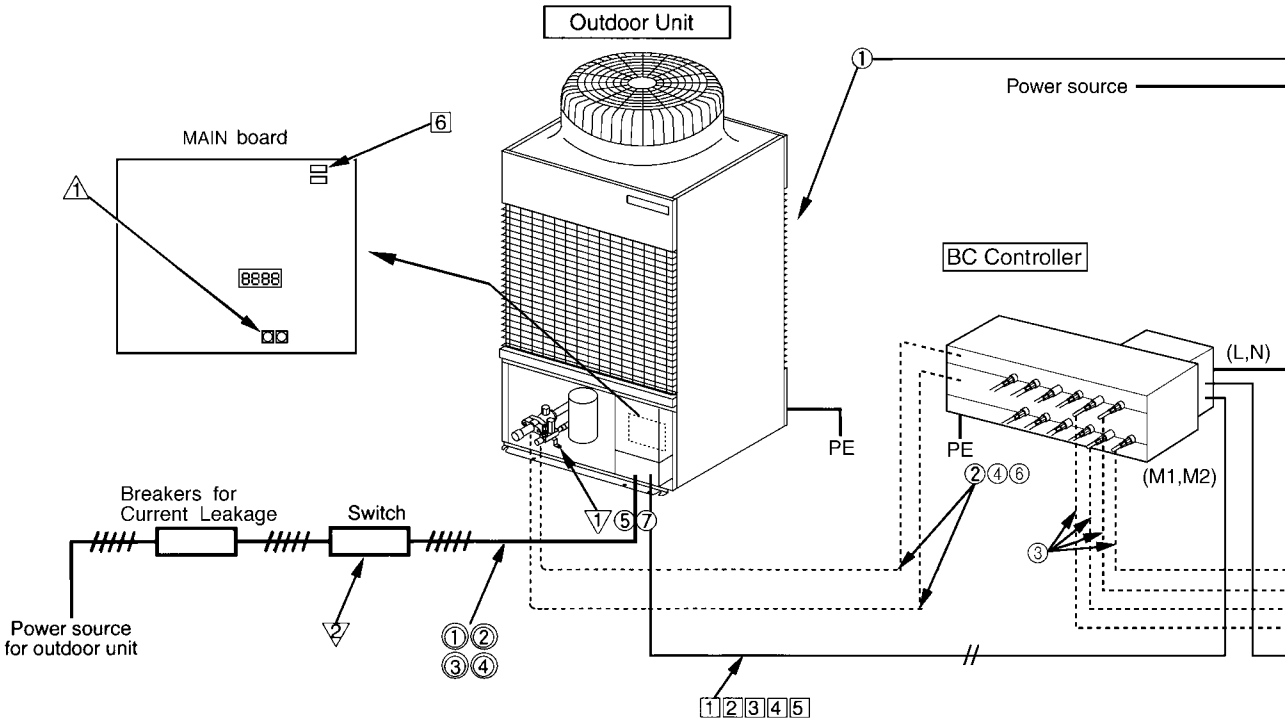
(4) Attention for mounting drain water lifting-up mechanism

Work	Content of test run	Check point	Result
Disassembling and assembling of drain water removing mechanism	▽1 Lead wire from the control box is not damaged.		
	▽2 Rubber cap is properly inserted into drain water outlet of the drain pan?		
	▽3 Insulation of gas and liquid pipe is dealt with as shown in the right figure?		
	▽4 Drain pan and piping cover are mounted without gap?		
	▽5 Drain pan hooked on cut projection of the mechanism?		
Mounting of float switch	Float switch is installed without contacting the drain pan?	▽1 Float switch moves smoothly.	
		▽2 Float switch is mounted on mounting board straigh and without deformation.	
		▽3 Float switch has no contact with copper pipe.	
Electric wiring	▽1 No mistakes in wiring?	Wiring procedure is exactly followed.	
	▽2 Connectors connected securely and tightly?	Connector portion is tightly hooked.	
	▽3 No tension on lead wire when sliding on control box?		

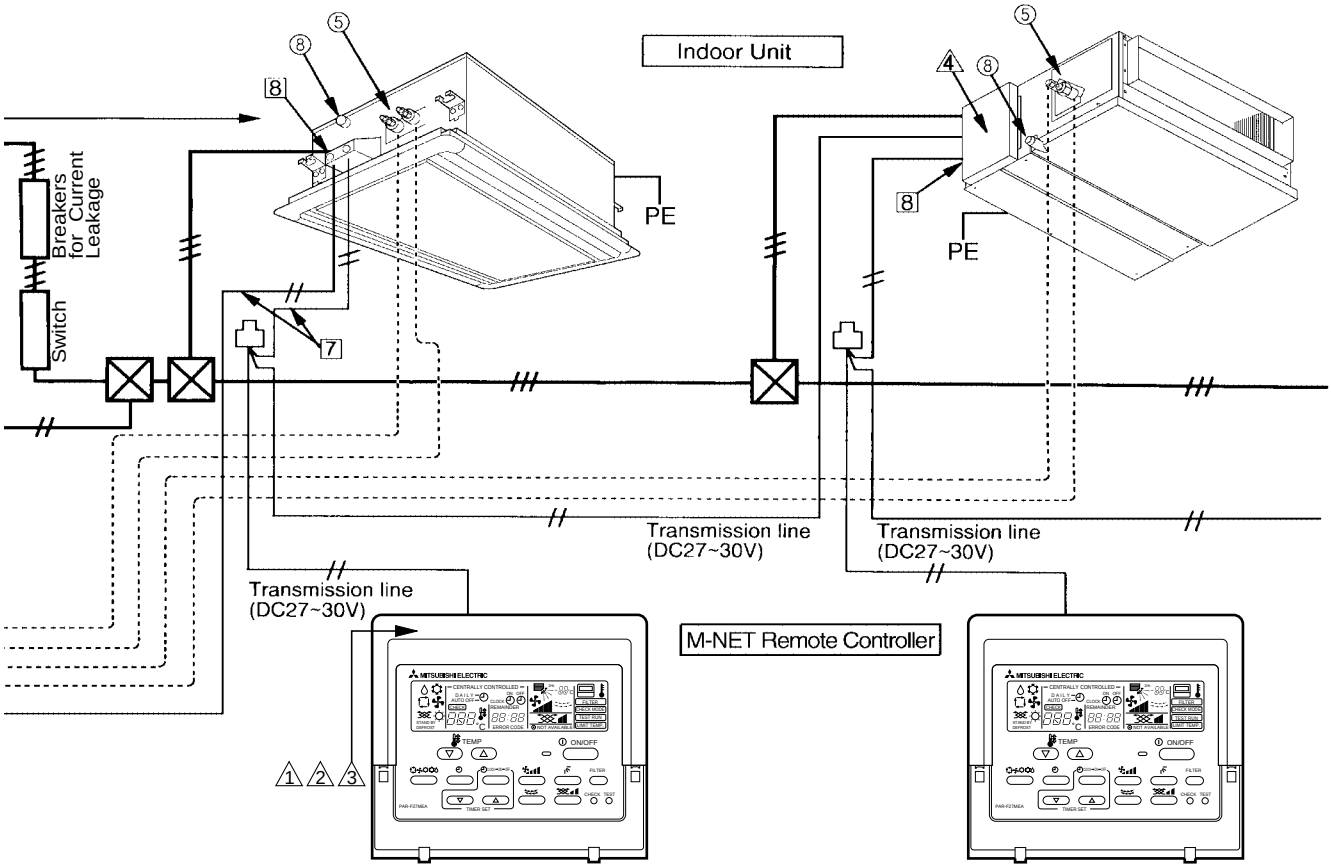
(5) Check points for system structure

ex. PUHY-P200YREM-A

Check points from installation work to test run.



Classification	Portion	Check item	Trouble
Installation and piping	①	Instruction for selecting combination of outdoor unit, and indoor unit followed? (Maximum number of indoor units which can be connected, connecting model name, and total capacity.)	Not operate.
	②	Follow limitation of refrigerant piping length? For example, 80m or less (total length : 240m) at the farthest.	Not cool (at cooling). Not heat (at heating).
	③	Connecting piping size of branch piping correct?	
	④	Refrigerant piping diameter correct?	
	⑤	Refrigerant leak generated at connection?	Not cool, not heat, error stop.
	⑥	Insulation work for piping properly done?	Condensation drip in piping.
	⑦	Specified amount of refrigerant replenished?	Not cool, not heat, error stop.
	⑧	Pitch and insulation work for drain piping properly done?	Water leak, condensation drip in drain piping.
Power source wiring	⑨	Specified switch capacity and wiring diameter of main power source used?	Error stop, not operate.
	⑩	Proper grounding work done on outdoor unit?	Electric shock.
	⑪	The phases of the L line (L1, L2, L3) correct?	Error stop, not operate.
	⑫	L line and N line connected correct?	Some electric parts should be damaged.



Classification	Portion	Check item	Trouble
Transmission line	1	Limitation of transmission line length followed? For example, 200m or less (total length : 500m) at the farthest.	Erroneous operation, error stop.
	2	1.25mm^2 or more transmission line 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?	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.)	Not operate.
	7	• No connection trouble in transmission line?	Error stop or not operate.
	8	Connection of wrong remote controller line terminals? • MA Remote controller : TB15 • M-NET Remote controller : TB5	Never finish the initial mode.
System set	△1	Address setting properly done? (M-NET Remote controller, indoor unit and outdoor unit.)	Error stop or 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?	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

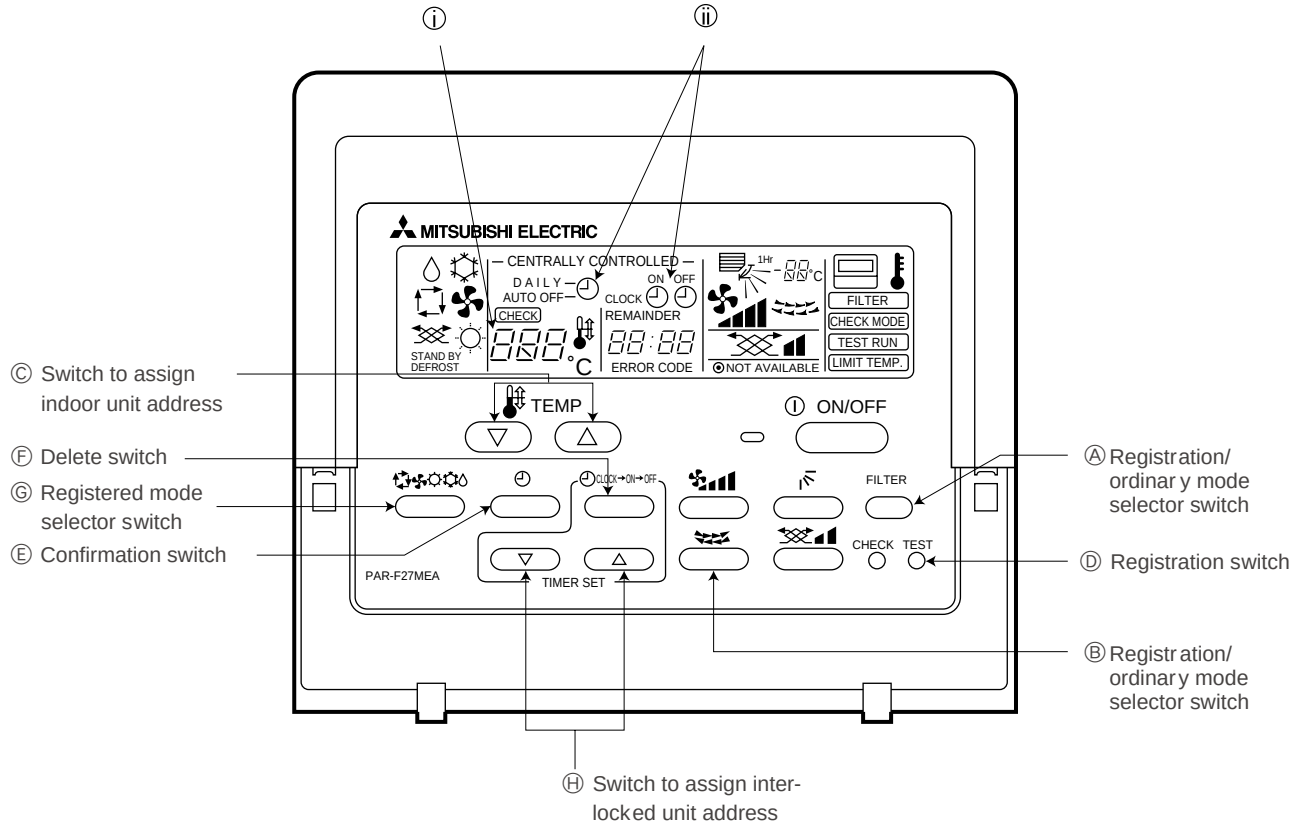
	Operation procedure
①	Turn on universal power supply at least 12 hours before getting started → Displaying “HO” on display panel for about two minutes.
②	Press TEST RUN button twice → Displaying “TEST RUN” on display panel.
③	Press selection button → Make sure that air is blowing out.
④	Press select 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 blow is changed.
⑥	Press or button to change wind → Make sure that horizontal or downward blow is adjustable.
⑦	Make sure that indoor unit fans operate normally.
⑧	Make sure that interlocking devices such as ventilator operate normally if any.
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, test run remaining time is displayed on time display section.
4: During test run, temperature of liquid pipe in indoor unit is displayed on remote controller room temperature display section.
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 switch operation to register with the remote controller is shown below:



Name	Symbol of switch	Name of actual switch	Description
Registration/ordinar mode selection switch	Ⓐ + Ⓑ	FILTER +	This switch selects the ordinary mode or registered mode (ordinary mode represents that to operate indoor units). ※ To select the registered mode, press the FILTER + switch continuously for over 2 seconds under stopping state [Note] The registered mode can not be obtained for a while after powering. Pressing the FILTER + switch displays "CENTRALLY CONTROLLED".
Switch to assign indoor unit address	Ⓒ	▲ ▼ of TEMP	This switch assigns the unit address for "INDOOR UNIT ADDRESS NO."
Registration switch	Ⓓ	TEST RUN	This switch is used for group/interlocked registration.
Confirmation switch	Ⓔ		This switch is used to retrieve/identify the content of group and interkloced (connection information) registered.
Delete switch	Ⓕ	CLOCK ON OFF	This switch is used to retrieve/identify the content of group and interlocked (connection information) registered.
Registered mode selector switch	Ⓖ		This switch selects the case to register indoor units as group (group setting mode) or that as interlocked (interlocked setting mode). ※ The unit address is shown at one spot ⓘ for the group setting mode while at two spots ⅱ for the interlocked setting mode.
Switch to assign interlocked unit address	Ⓗ	▲ ▼ of TIMER SET	This switch assigns the unit address of "OA UNIT ADDRESS NO."

(2) Attribute 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
RC	Local remote controller
SC	System controller (MJ)
FU	OA Processing
LL	Lossnay

[Description of registration/deletion/retrieval]

- The items of operation to be performed by the remote controller are given below. Please see the relating paragraph for detail.

1 Group registration of indoor unit
- The group of the indoor units and operating remote controller is registered.
- It is usually used for the group operation of indoor units with different refrigerant system.

2 Retrieval/identification of group registration information of indoor units
- The address of the registered indoor units in 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 the miss setting at test run, or due to the old memory remained at the alteration/modification of the group composition.

⚠ **Caution:**
When MELANS (MJ-103MTRA for example) is being connected, do not conduct the group/pair registration using the remote controller. The group/pair registration should be conducted by MELANS. (For detail, refer to the instruction exclusively prepared for MELANS.)

(3) Group registration of indoor unit

1) Registration method

- Group registration of indoor unit 1

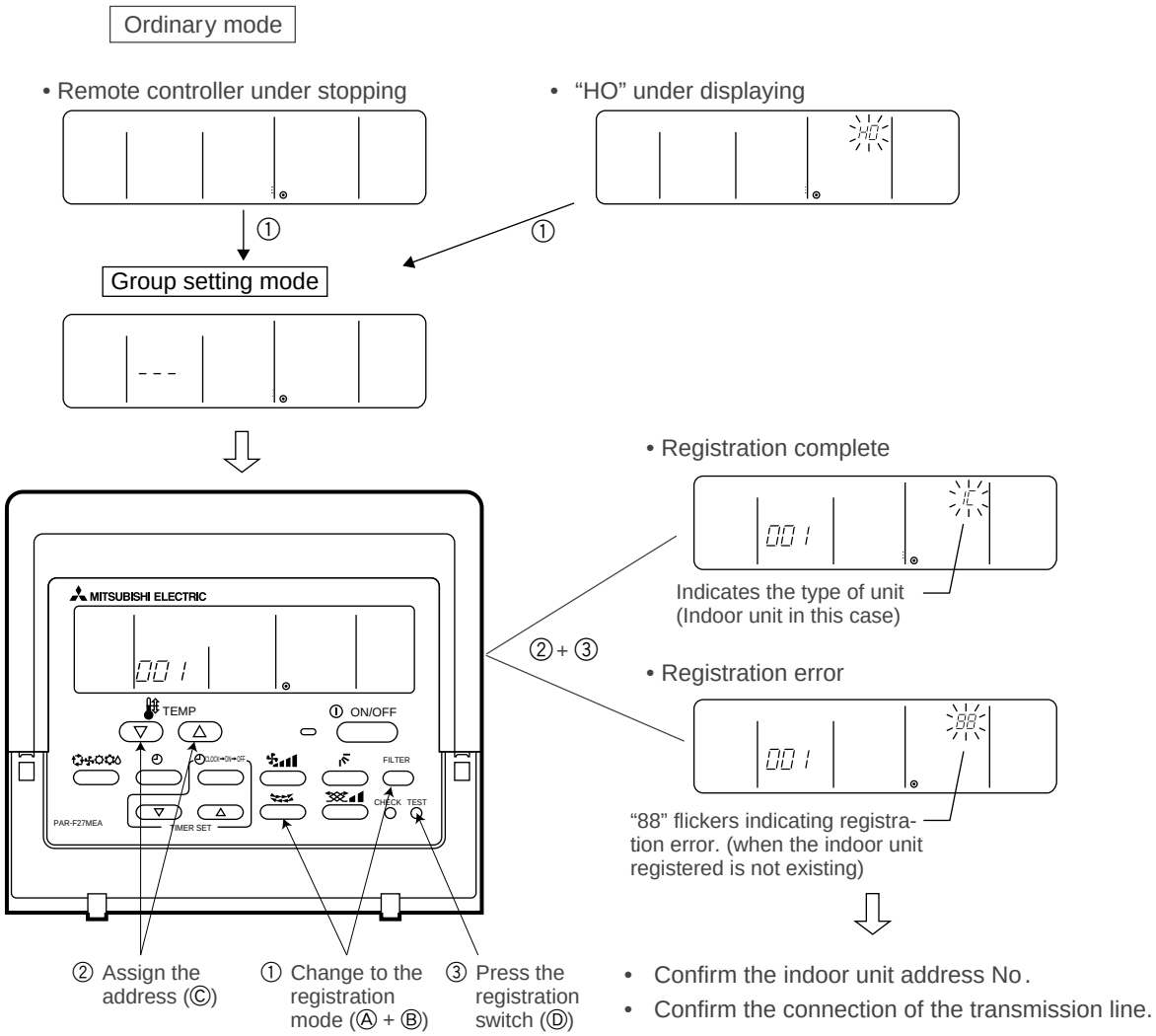
  The indoor unit to be controlled by a remote controller is registered on the remote controller.

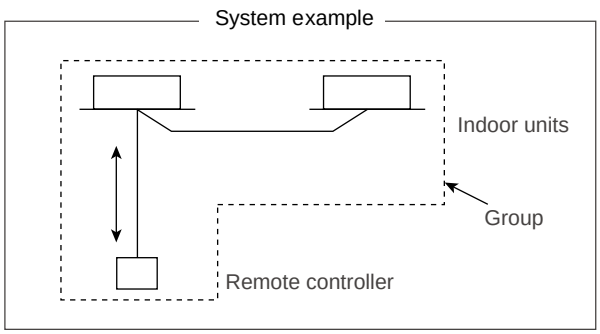
[Registration procedure]

1 With the remote controller under stopping or at the display of "HO", continuously press the (FILTER) + switch (Ⓐ + Ⓑ) at the same time for 2 seconds to change 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 being set to 001.

3 After completing the registration, press the (FILTER) + switch (Ⓐ +Ⓑ) at the same time for 2 seconds to change to the original ordinary mode (with the remote controller under stopping).





2) Method of retrieval/confirmation

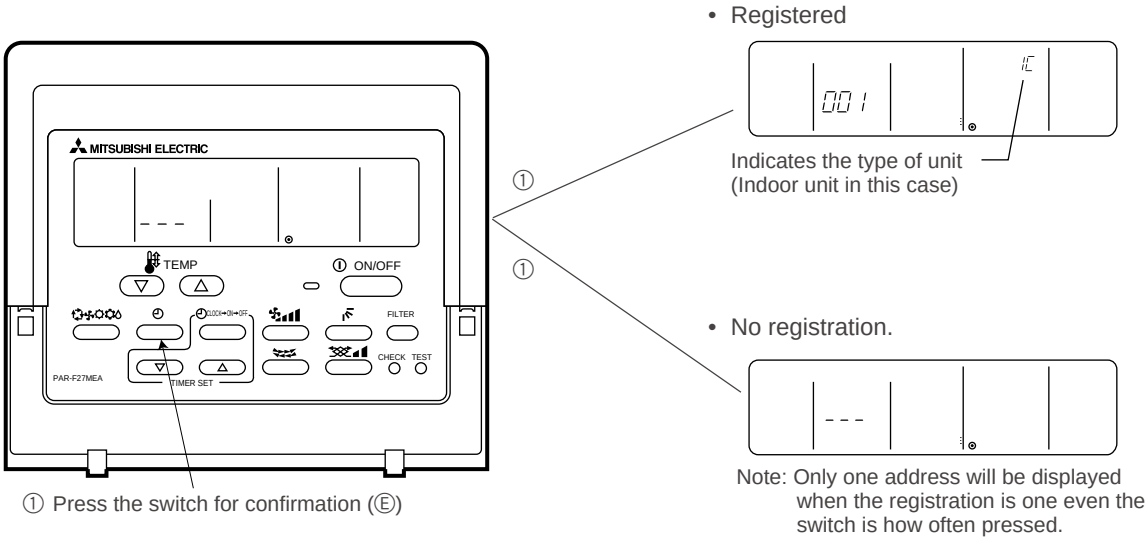
- Retrieval/confirmation of group registration information on indoor unit 2
  The address of the indoor unit being registered on the remote controller is displayed.

[Operation procedure]

① With the remote controller under stopping or at the display of “HO”, continuously press the FILTER + ≋ switch (Ⓐ + Ⓑ) at the same time for 2 seconds to change to the registration mode.

② In order to confirm the indoor unit address already registered, press ◴ switch (Ⓔ). (See figure below.) When the group of plural sets is registered, the addresses will be displayed in order at each pressing of ◴ switch (Ⓔ).

③ After completing the registration, continuously press the FILTER + ≋ switch (Ⓐ + Ⓑ) at the same time for 2 seconds to change to the original ordinary mode (with the remote controller under stopping).



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

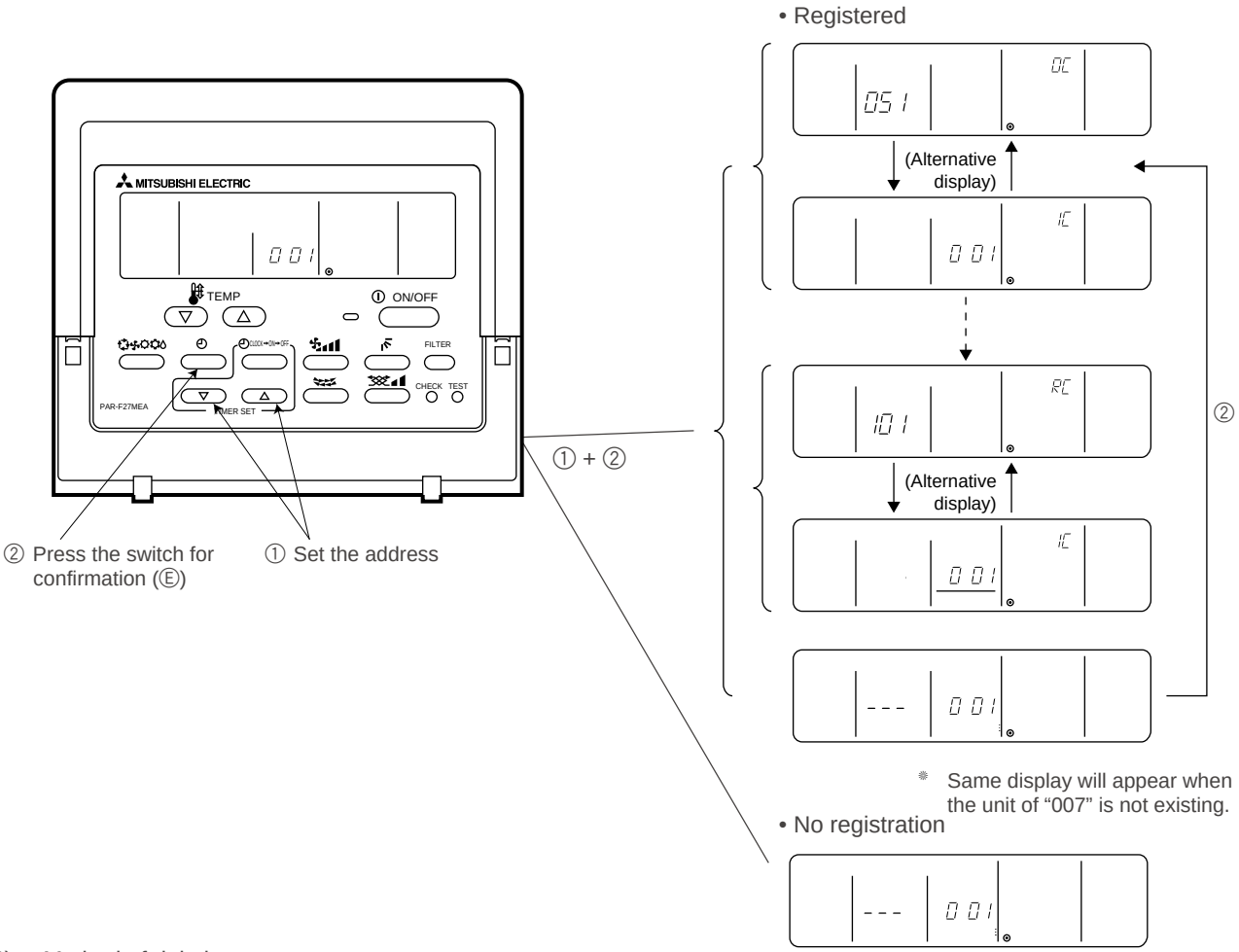
[Operation procedure]

① With the remote controller under stopping or at the display of “HO”, continuously press the FILTER + ≋ switch (Ⓐ + Ⓑ) at the same time for 2 seconds to change to the registration mode.

② Operate ▭ ✤ ☼ ☼ 💧 switch (Ⓖ) for the interlocked setting mode. (See figure below.)

③ Assign the unit address of which registration information is desired to confirm with the ▲ ▼ (TIMER SET) switch (Ⓗ). Then press the ◴ switch (Ⓔ) to display it on the remote controller. (See figure below.)
Each pressing of ◴ switch (Ⓔ) changes the display of registered content. (See figure below.)

④ After completing the retrieval/confirmation, continuously press the FILTER + ≋ switch (Ⓐ + Ⓑ) at the same time for 2 seconds to change to the original ordinary mode (with the remote controller under stopping).



3) Method of deletion

• Deletion of group registration information of indoor unit 4

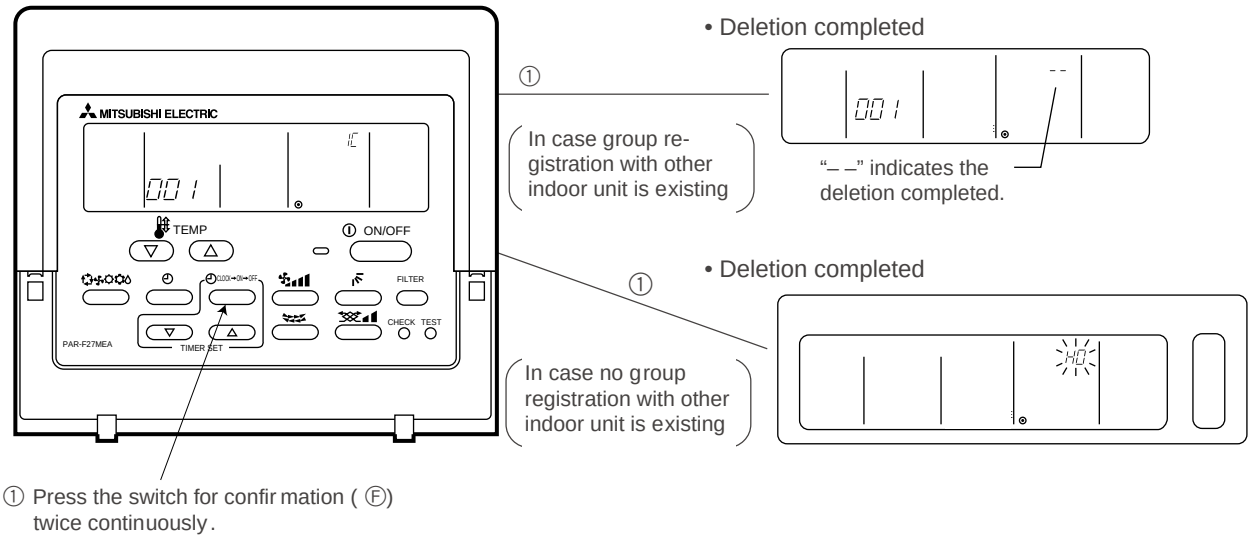
[Operation procedure]

① With the remote controller under stopping or at the display of "HO", continuously press the (FILTER) + switch (Ⓐ + Ⓑ) at the same time for 2 seconds to change to the registration mode.

② Press the switch (Ⓔ) to display the indoor unit address registered. (As same as 2)

③ In order to delete the registered indoor unit being displayed on the remote controller, press the CLOCK → ON → OFF (Ⓕ) switch two times continuously. At completion of the deletion, the attribute display section will be shown as "– – ".
(See figure below.)
Note: Completing the deletion of all indoor units registered on the remote controller returns to "HO" display.

④ After completing the registration, continuously press the (FILTER) + switch (Ⓐ + Ⓑ) at the same time for 2 seconds to change to the original ordinary mode (with the remote controller under stopping).



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 caused by the miss setting at test run, or due to the old memory remained at the alteration/modification of group composition, and the address not existing will be deleted.

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

An example to delete the system controller of “250” from the indoor unit of “007” is shown below.

[Operation procedure]

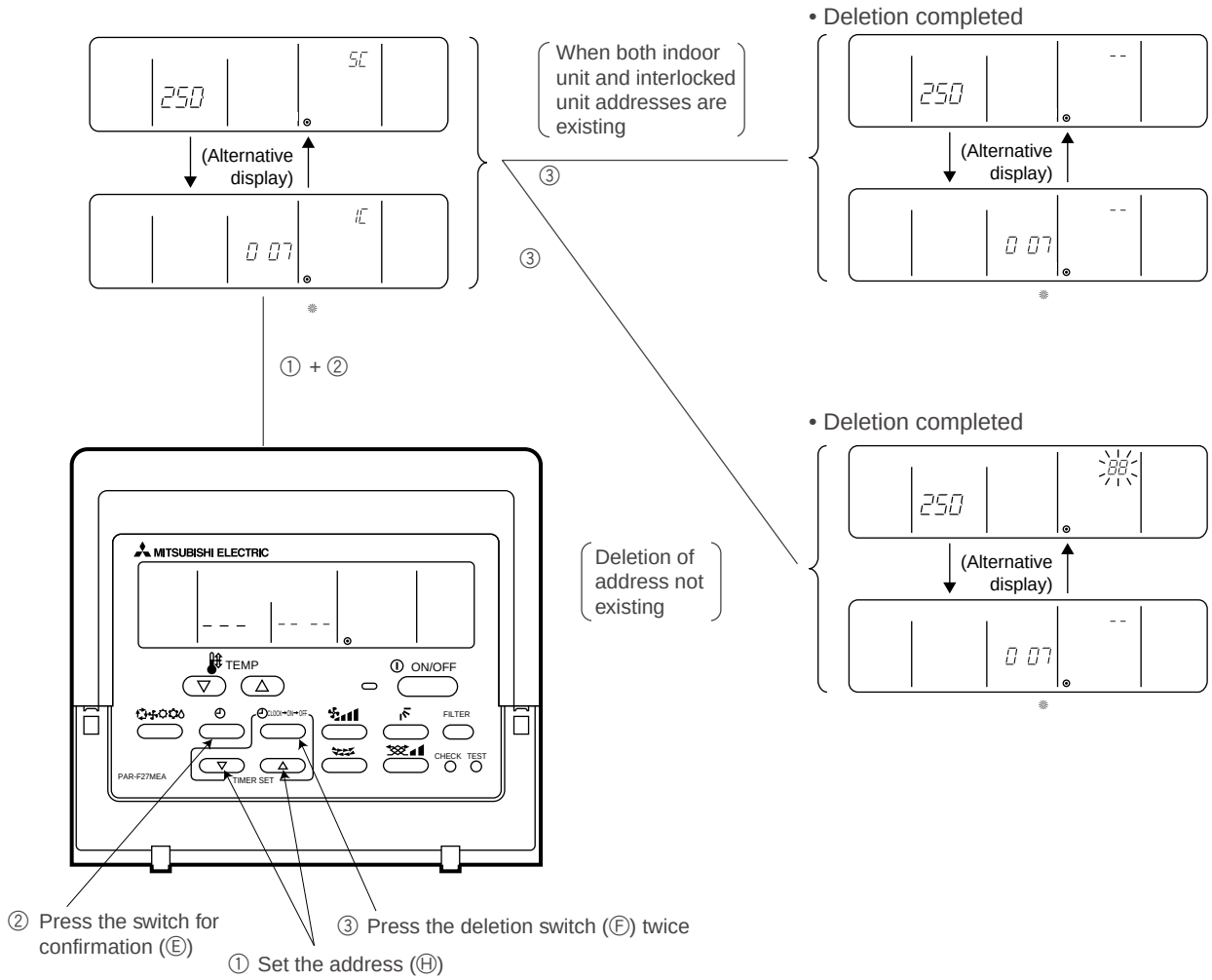
① With the remote controller under stopping or at the display of “HO”, continuously press the FILTER + switch (Ⓐ + Ⓑ) at the same time for 2 seconds to change to the registration mode.

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

③ Assign the unit address existing to “OA UNIT ADDRESS No.” with the (TIMER SET) switch (Ⓗ), and press switch (Ⓔ) to call 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 switch (Ⓕ) twice. (See the figure below.)

⑤ After completing the deletion, continuously press the FILTER + switch (Ⓐ + Ⓑ) at the same time for 2 seconds to return to the original ordinary mode (with the remote controller under stopping).



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. 2 minutes at the maximum.)

(2) Control at staring

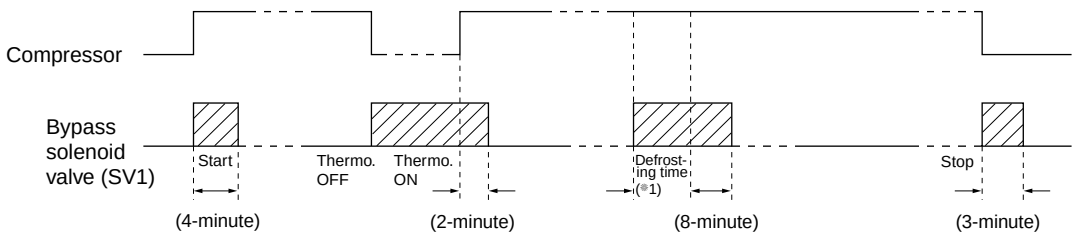
- For 3 minutes after starting, 60Hz is the upper frequency limit.

(3) Bypass, capacity control

- Solenoid valve consists of bypass solenoid valve (SV1, SV2) bypassing between high pressure side and low pressure sider. The following operation will be provided.

1) Bypass solenoid valves SV1 and SV2 (both “open” when turned on)

Item	SV1		SV2	
	ON (Open)	OFF (Close)	ON (Open)	OFF (Close)
When starting compressor	Turned on for 4 minutes		Turned on for 4 minutes	
After thermost “ON is returned and after 3 minutes restart	Turned on for 2 minutes		Turned on for 2 minutes	
When compressor stops in cooling or heating mode	Always turned on or until HPS and LPS is within 0.2MPa.		–	
After operation stops	Turned on for 3 minutes or until HPS and LPS is within 0.2 MPa		–	
During defrosting operations	Always turned on		Always turned on	
During oil recovery operations	Cooling operation normally OFF and heating operation normally ON when performing oil recovery after continuous operation at low frequency.			
During 20Hz operations, at fall in low pressure or low pressure saturation temperature. (3 minutes or more after starting)	–		When Ps is 0.15MPa or less	When Ps is 0.25MPa or more
When high pressure rises (Pd)	When Pd reaches 2.70MPa or more	When Pd is 2.35MPa or less 30 seconds	When Pd reaches 2.50MPa or more	When Pd is 2.25MPa or less after 30 seconds
When high pressure rises (Pd) during 20Hz operations (3 minutes after starting)	–		Turned on when high pressure (Pd) exceeds pressure limit	When high pressure (Pd) is 1.96MPa or less
When discharge temperature rises (3 minutes after starting)			When temp. exceeds 115°C and Pb reaches 1.47MPa or more	When discharge temp. is 100°C or less



(4) Frequency control

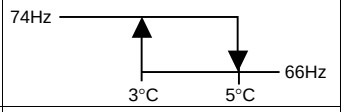
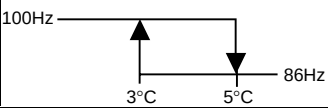
- Depending on capacity required, capacity control change and frequency change are performed to keep constant evaporation temperature in cooling operations, and high pressure saturation temperature in heating operation.
- Frequency change is performed at the rate of 3Hz/second as follows.

Cooling

Unit	Minimum※	Maximum
P200YREM-A	20Hz (28Hz)	61Hz
P250YREM-A	20Hz (28Hz)	79Hz

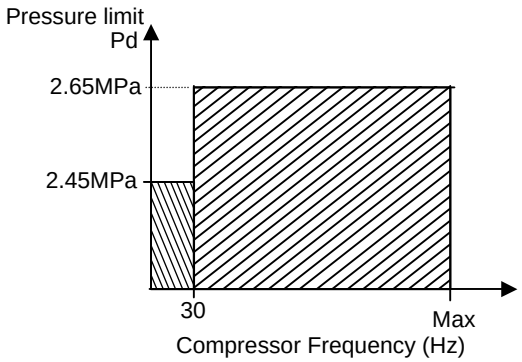
※ 20Hz···TH6≧20°C or TdSH≧10deg.
※ 28Hz···TH6≦20°C and TdSH≦10deg.

Heating

Unit	Minimum	Maximum
P200YREM-A	20Hz	
P250YREM-A	20Hz	

1) Frequency control starting
- 60Hz is the upper limit for 3 minutes after starting.

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



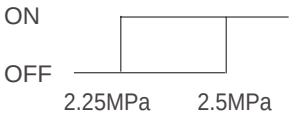
3) Discharge temperature control
Discharge temperature (Td) of compressor is detected during operation. If the upper limit is exceeded, the frequency is reduced. (Change rate : 5Hz of the present value)
- 30 seconds after starting compressor, control is performed every minute.
- Operation temperature is 110˚C : Td.

4) Periodical frequency control
Frequency controll is periodically performed except for the frequency controls at operation start, status change, and protection.

① Cycle of periodical frequency control
Periodical frequency control is performed every minute after the time specified below has passed.
- 60 sec after starting compressor or 30 seconds after finishing defrostoing operations
- 30 sec after frequency control by discharge temperature or pressure limit

② Amount of frequency change
The amount of frequency change is controlled corresponding to evaporation temperature and high pressure saturation temperature.

③-1 Back up of frequency control by bypass valve
During low frequency operation, frequency is backed up by turning on (opening) bypass valve (SV1).
- Cooling
  3 minutes after starting compressor, bypass valve is turned on when Discharge Pressure(Pd) is higher than 2.5 MPa , and turned off when Pd is less than 2.25MPa.
- Heating
  During low frequency operation, 3 minutes after starting compressor, SV1 turned on when high pressure (Pd) exceeds pressure limit of 2.5MPa and turned off when Pd falls to 2.25MPa or less .



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

- Oil return LEV (SLEV) opening is dependent on compressor frequency and ambient temperature.
- SLEV is closed (0) when compressor stops, and SLEV is set (64) for 10 minutes after starting compressor.

(6) Subcool coil control (electronic expansion valve <LEV1>)

- The amount of super heat detected from the bypass outlet temperature of subcool coil (TH8) is controlled to be within a certain range for each 30 seconds.
- The opening angle is corrected and controlled depending on the outlet/inlet temperature of subcool coil (TH5, TH7) and the discharge temperature.
- However, the valve will be closed (0) at heating and compressor stopping.
- It will fully open during defrosting.

(7) Defrost operation control

1) Starting of defrost operations
   - After integrated 39 minutes : The compressor operations, defrosting operations start when – 10˚C(R407C), – 6˚C (R22) piping temperature (TH5) is detected for 3 consecutive minutes.
   - Forcible defrosting operations start by turning on forcible defrost switch (SW2-7) if 10 minutes have already elapsed after compressor start or completion of defrosting operations and will last for 10 minutes.
   - Defrost prohibit timer
     Minimum consecutive running minutes to defrost can be increaced from 39 minutes to 90 minutes by setting SW2-8 “ON”.
     Defrost will last a maximum of 15 minutes. Then next defrost time will be 39 minutes.
2) Completion of defrosting operations
   Defrosting operations stop when 10 minutes : It has passed since start of defrosting operation, or piping temperature (TH5) reaches 10˚C or more.
   (Defrosting operations do not stop for 2 minutes after starting, except when piping temperature exceeds 25˚C.)
3) Defrosting prohibition
   Defrosting operations do not start during oil recovery, and for 10 minutes after starting compressor.
4) Trouble during defrosting operations
   When trouble is detected during defrosting operations, the defrosting operations stop, and defrosting prohibition time decided by integrated operation time of compressor is set to be 20 minutes.
5) Change in number of operating indoor units during defrosting operations
   - In case number of operating indoor units changes during defrosting operations, the defrosting operations continue, and control of unit number change is performed after the defrosting operations are finished.
   - Even in case all indoor units stop or thermostat is turned off during defrosting operations, the defrosting operations do not stop until expected defrosting activities are completed.

(8) Judgment of Refrigerant amount
Accumulator design

■Cooling

Compressor Frequency / TdSH	20~45Hz	46~70Hz	71Hz~Fmax
40≦TdSH	AL=0	AL=0	AL=0
35≦TdSH≦40	AL=1	AL=0	AL=0
20≦TdSH≦35	AL=1	AL=1	AL=0
10≦TdSH≦20	AL=1	AL=1	AL=1
TdSH≦10	AL=2	AL=2	AL=2

■Heating

TH5/TH7 / TdSH	TH5/TH7≦5°C	5°C≦TH5/TH7≦15°C	15°C≦TH5/TH7
80≦TdSH	AL=0	AL=0	AL=0
60≦TdSH≦80	AL=1	AL=0	AL=0
40≦TdSH≦60	AL=1	AL=1	AL=0
10≦TdSH≦40	AL=1	AL=1	AL=1
TdSH≦10	AL=2	AL=2	AL=2

Note 1 TH5 - Y-Series
2 TdSH=Discharge Super Heat.
=Td-Tsg (low pressure saturation temperature)

(9) Refrigerant Recovery Control

Refrigerant recovery is performed to prevent refrigerant from accumulating in the stopping unit, the unit under cooling mode and that with heating thermostat being turned off.

1) Start of Refrigerant recover in Heating

Refrigerant recovery is started when all of the items below are satisfied.

- 30 minutes has passed after finishing previous refrigerant recovery and compressor frequency is greater then 60Hz or Td less than 105°C or 15 minutes has passed since previous recovery was performed and frequency is less than 60Hz and Td is greater than 105°C.
- 15 minutes has passed from starting the compressor.
- A1 = 0 for 3 minutes.

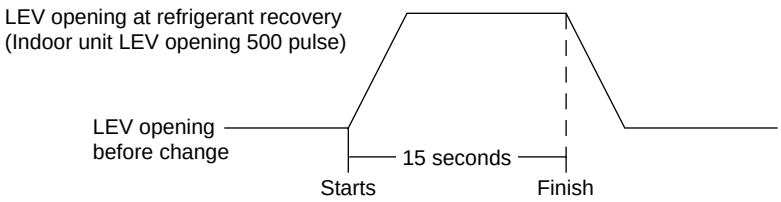
Start of Refrigerant recover is Cooling

Refrigerant recovery is started when all of the items below are satisfied.

- 30 minutes has passed after finishing previous refrigerant recovery.
- AI = 0 for 3 minutes.
- Td is greater than 105°C or Pd is greater than 2.45 HPa and SCO is greater than 10°C.

2) Refrigerant recovery operation in heating

- Refrigerant is recovered by opening LEV of the objective indoor units (indoor units under stop. fan, and cooling modes, and that with heating thermostat being turned off) for 15 seconds.



- The regular capacity control of the outdoor unit and the regular LEV control of the indoor unit are not applied during refrigerant recovery operation, but are fixed with the value before the recovery operation. These controls will be conducted one minute after finishing the recovery operation.
- Defrosting operation is prohibited during the recovery operation, and it will be conducted after finishing the recovery operation.

3) Refrigerant recovery operating in cooling

Refrigerant is recovered by the opening of the indoor LEV further than the operation position for 30 seconds.

Refrigerant Recovery Control

(10) Control of outdoor unit fan and outdoor unit heat exchanger capacity control

1) Control system

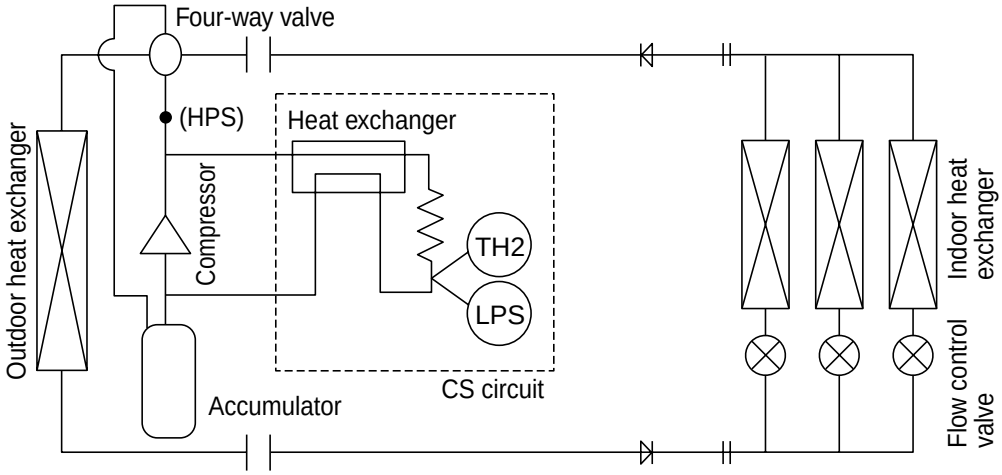
Depending on capacity required, control outdoor fan flow rate with phase control, for maintaining evaporation temperature (0˚C) in cooling operations, and high pressure saturated temperature (49˚C) in heating operations.

2) Control

- Outdoor unit fan stops when compressor stops.
- Fan is in full operation for 5 seconds after starting.
- Outdoor unit fan stops during defrosting operations.
- Lower the fan strength upper limit to approximately 50% when performing night mode settings.

(11) Circulating composition sensor (CS circuit)

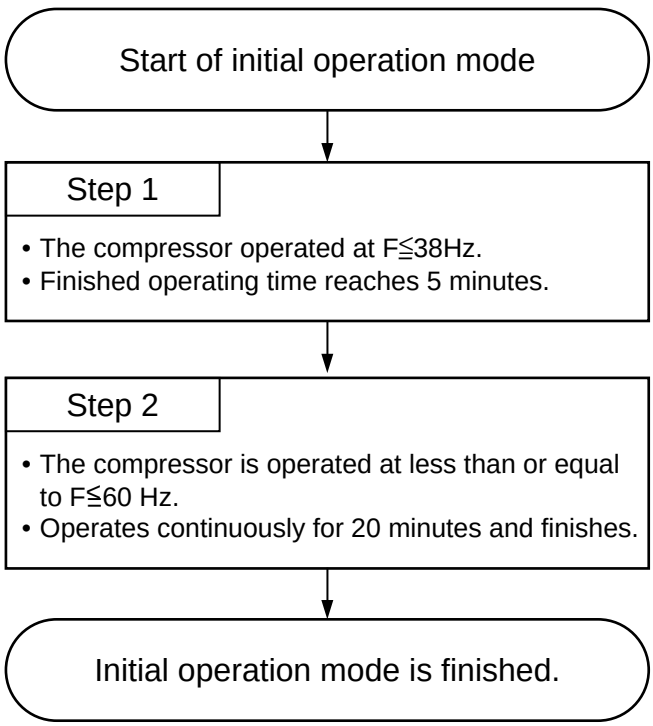
- As shown in the drawing below; the CS circuit has the structure to bypass part of the gas discharged from the compressor through the capillary tube to the suction side of the compressor, exchange heat before and after the capillary tube,and produce two phase (gaseous and liquid) refrigerant at the capillary tube outlet. The dryness fraction of refrigerant at the capillary tube outlet is estimated from the temperature of 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). In this series the high-pressure liquid refrigerant temperature is calculated based on the high pressure and ambient air temperature values. 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)



(12) Control at initial starting

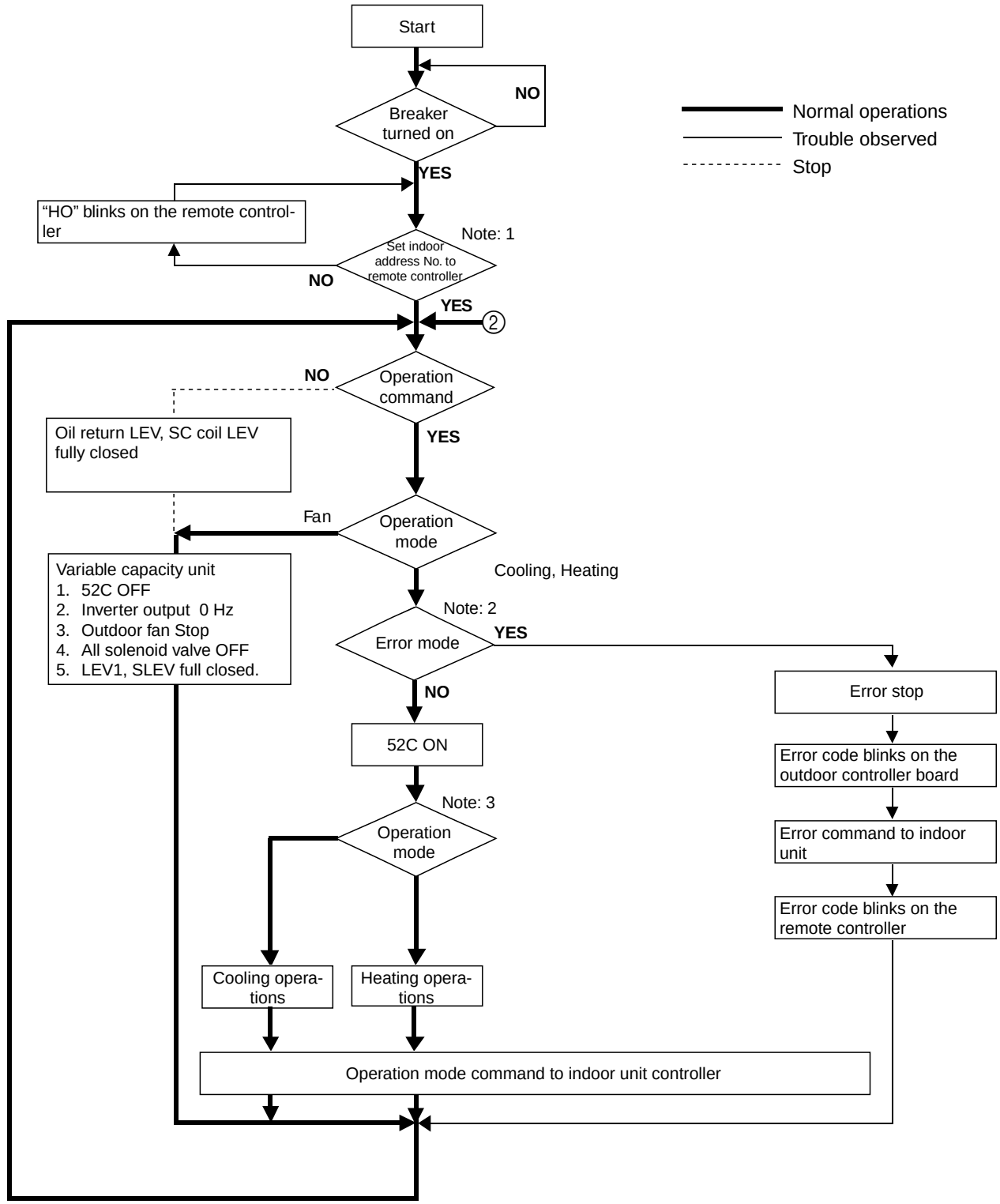
- The following initial start mode will be performed when the unit is started for the first time after the power has been turned on.

<Flow chart of initial start mode>



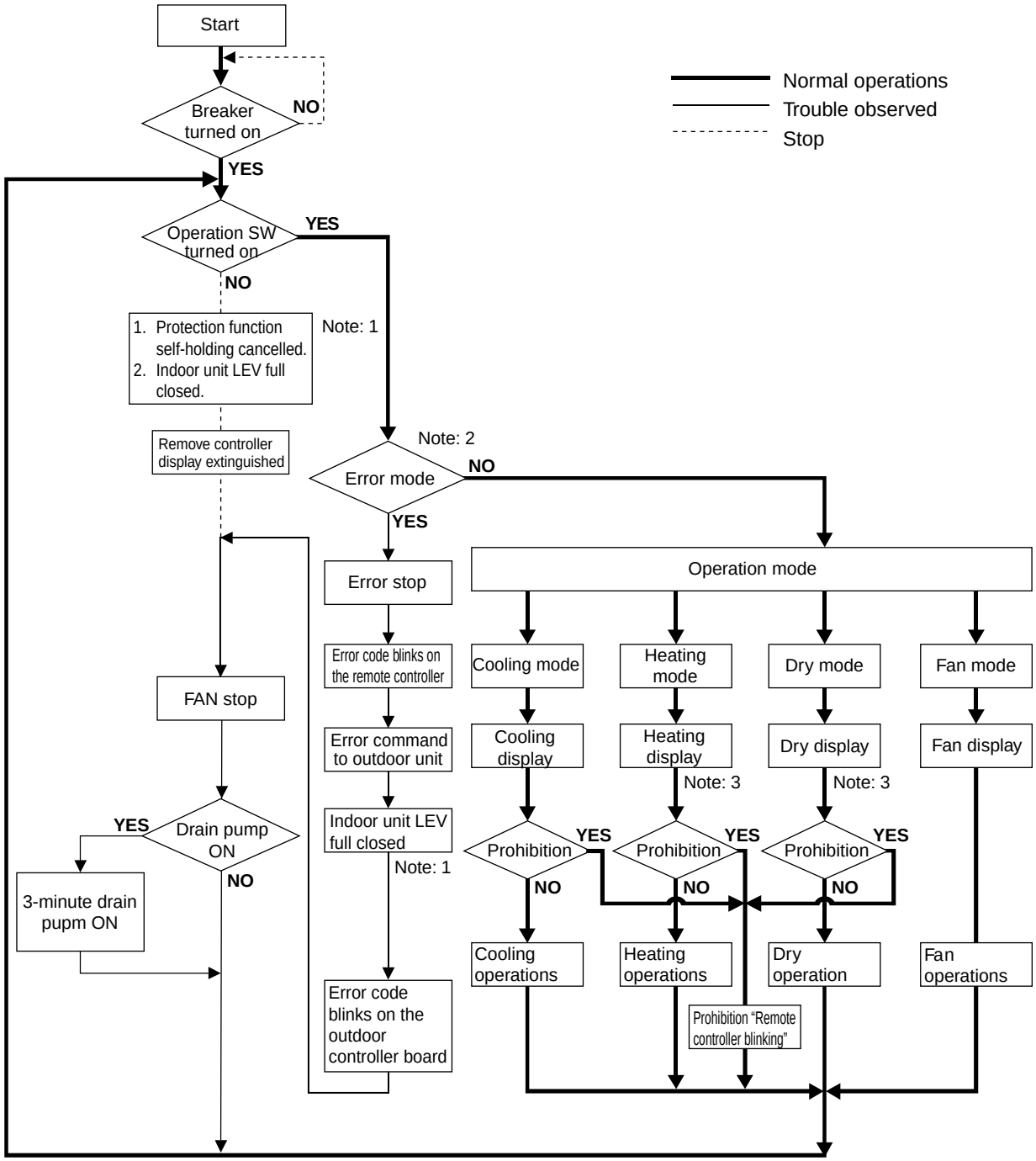
[2] Operation Flow Chart

(1) Outdoor unit



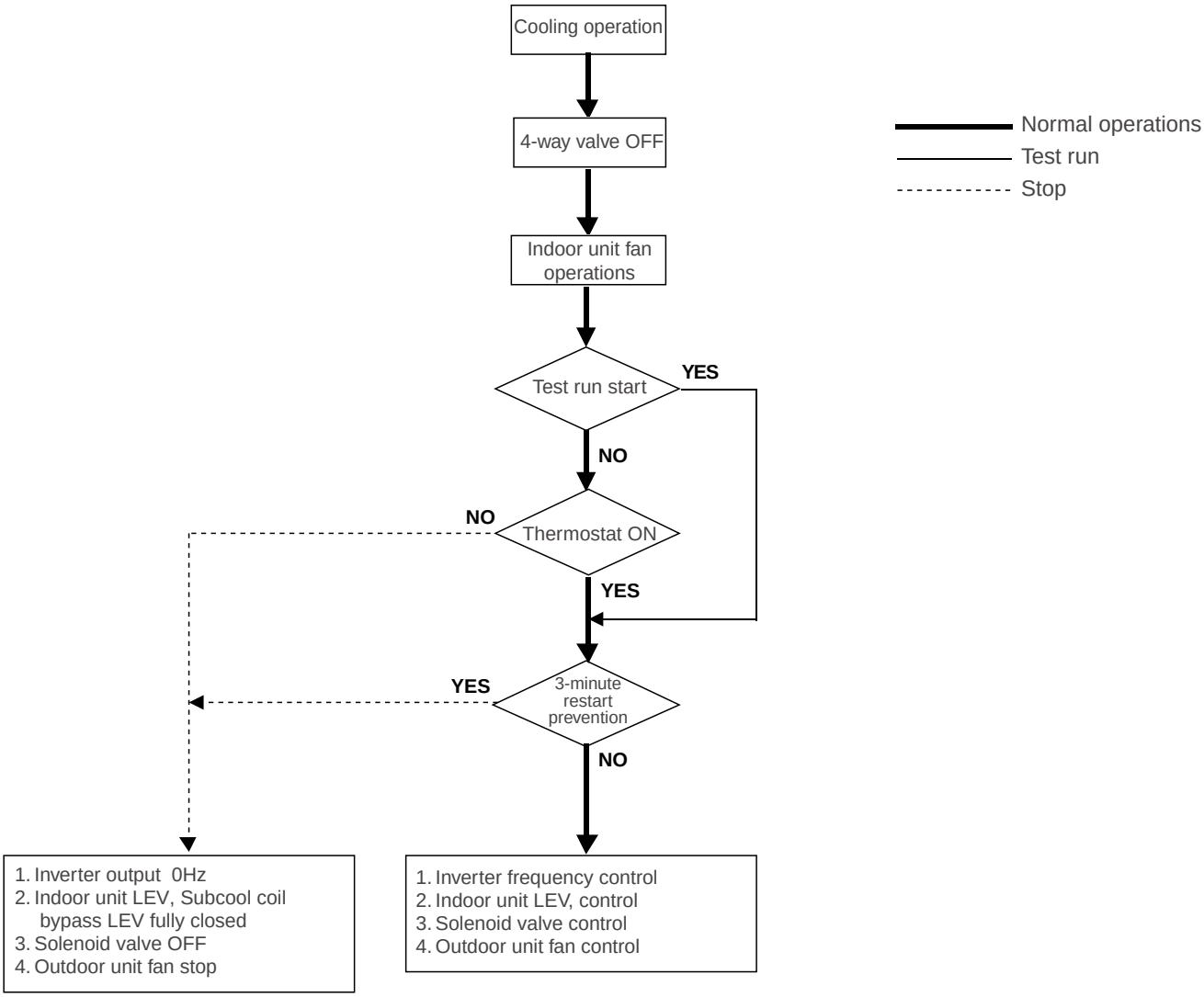
Note: 1	For about 2 minutes after turning on power source, address and group information of outdoor unit, indoor unit, and remote controller are retrieved by remote controller, during which "HO" blinks on and off on remote controller. In case indoor unit is not grouped to remote controller, "HO" display on remote controller continues blinking even after 2 minutes after turning on power source.
Note: 2	Two trouble modes included indoor unit side 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 indoor unit. However, when outdoor unit is in cooling operation, the operation of indoor unit will be prohibited even by setting a part of indoor units under operation, or indoor unit under stopping or fan mode to heating mode. Reversely when outdoor unit in heating operation, the same condition will be commenced.

(2) Indoor unit

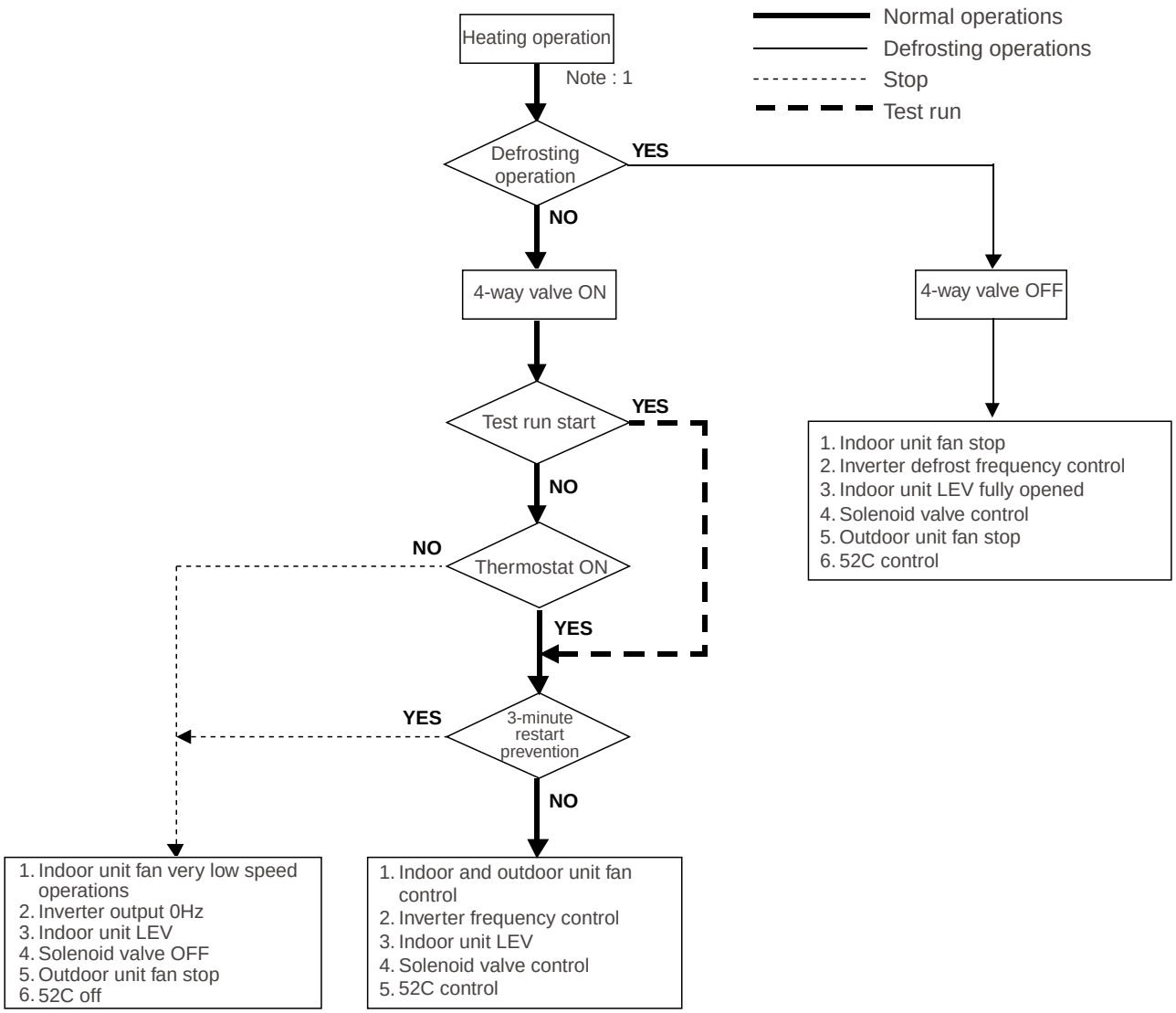


Note: 1	At indoor unit LEV full closed, the opening angle indicates 41.
Note: 2	The error code includes that of indoor unit and that of outdoor unit. In the former case, the indoor unit in question only stops in error mode, while in the later case, all indoor units connected to the outdoor unit stop in error mode.
Note: 3	The operation mode follows the mode command from the indoor unit. However, when the outdoor unit in cooling operation, the operation of the indoor unit will be prohibited even a part of indoor units or indoor unit under stopping or fan mode is put into heating mode. Reversily, when the outdoor unit is under heating operation, the same condition will be commenced.

(3) Cooling operation

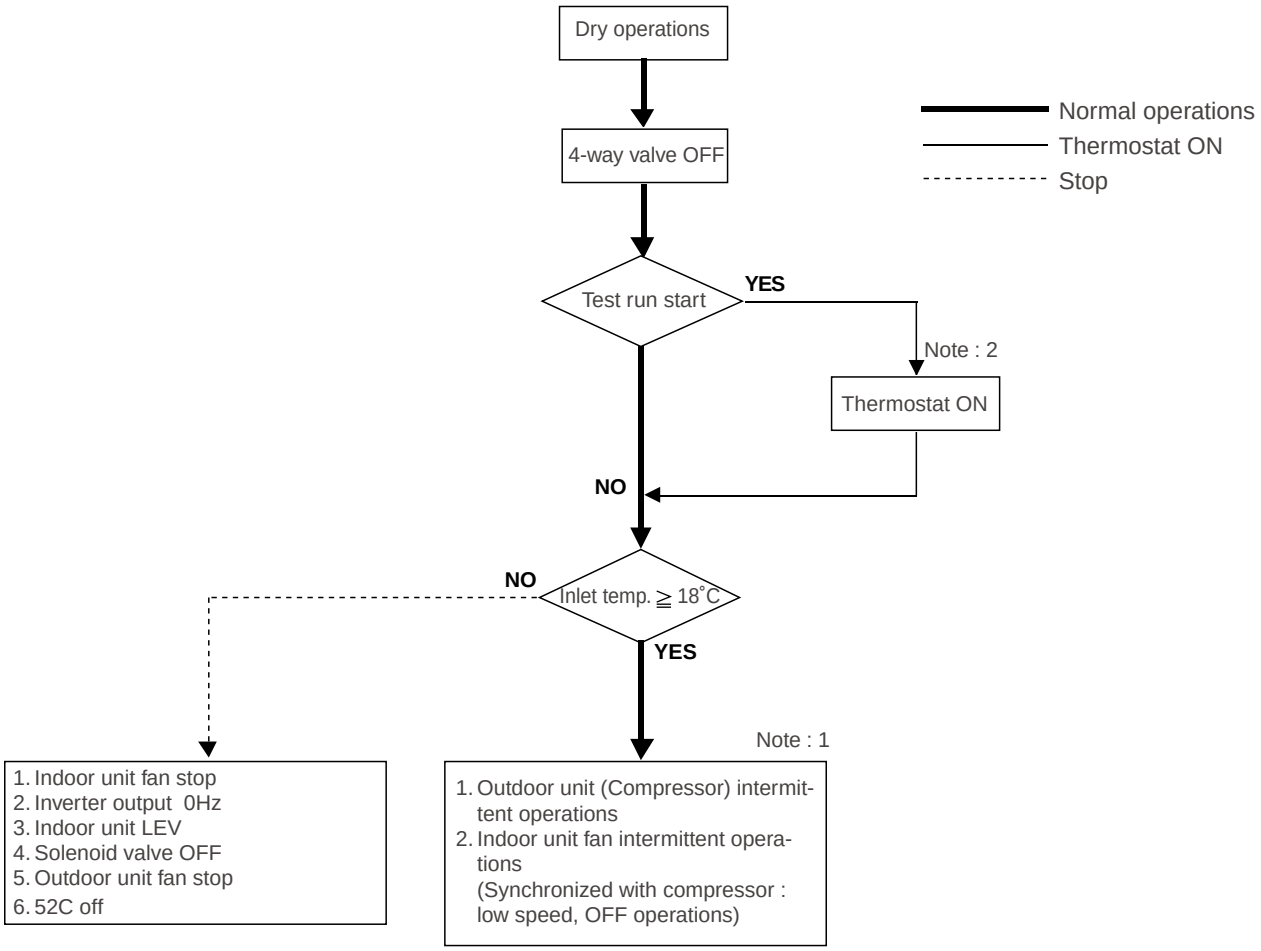


(4) Heating operation



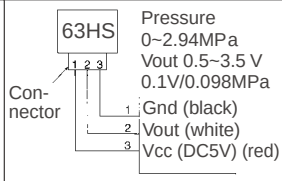
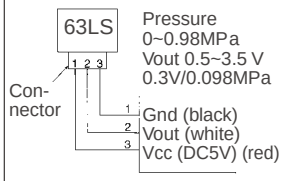
Note : 1	When outdoor unit starts defrosting, it transmits defrost operations command to indoor unit, and the indoor unit starts defrosting operations. Similarly when defrosting operation stops, indoor unit returns to heating operation after receiving defrost end command of outdoor unit.

(5) 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, 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.

[3] List of Major Component Functions

	Name	Symbol (function)	Application	Specification	Check method
Outdoor unit	Compressor	MC	Adjust refrigerant circulation by controlling operating frequency and capacity control valve with operating pressure.	Low pressure shell scroll type with capacity control mechanism Winding resistance: Each phase 0.583Ω (20˚C)	
	High pressure sensor	63HS	1) High press. detection. 2) 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	63H	1) High pressure detection 2) High pressure protection	Setting 2.94MPa OFF	Continuity check
	Thermistor	TH1 (discharge)	1) Discharge temperature detection 2) High pressure protection	R_{120}=7.465kΩ $B_{25/120}$=4057	Resistance value check
			20˚C : 250kΩ 70˚C : 34kΩ 30˚C : 160kΩ 80˚C : 24kΩ 40˚C : 104kΩ 90˚C : 17.5kΩ 50˚C : 70kΩ 100˚C : 13.0kΩ 60˚C : 48kΩ 110˚C : 9.8kΩ	$Rt = 7.465\exp\{4057(\frac{1}{273+t} - \frac{1}{273+120})\}$	
		TH2 (low pressure saturation temperature)	1) Detects the saturated vapor temperature. 2) Calculates the refrigerant circulation configuration. 3) Controls the compressor frequency. 4) Controls the outdoor unit's fan air volume.	R_0=33kΩ $B_{0/100}$=3965 $Rt = 33\exp\{3965(\frac{1}{273+t} - \frac{1}{273+0})\}$ -20˚C : 92kΩ -10˚C : 55kΩ 0˚C : 33kΩ 10˚C : 20kΩ 20˚C : 13kΩ 30˚C : 8.2kΩ	Resistance value check
		TH5 (piping temperature)	1) Frequency control 2) Defrost control and liquid level detection at heating	R_0=15kΩ $B_{0/100}$=3460 $Rt = 15\exp\{3460(\frac{1}{273+t} - \frac{1}{273+0})\}$	
		TH6 (outdoor air temperature)	1) Outdoor air temperature detection 2) Fan control, liquid level heater, and opening setting for oil return	0˚C : 15kΩ 10˚C : 9.7kΩ 20˚C : 6.4kΩ 25˚C : 5.3kΩ 30˚C : 4.3kΩ 40˚C : 3.1kΩ	
		TH7	Subcool coil bypass LEV (LEV1) control (subcool coil outlet temperature)		
			Heat exchenger inlet pipe temperature		
		TH8 (subcool coil bypass outlet temperature)	Subcool coil bypass LEV (LEV1) control		

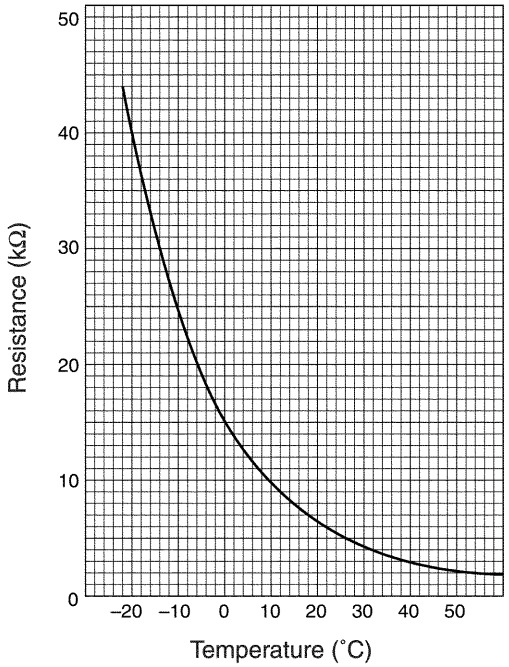
	Name	Symbol (function)	Application	Specification	Check method
Outdoor unit	Thermistor	THHS	1) Detects the inverter cooling fin temperature. 2) Provides inverter overheating protection. 3) Controls the control box cooling fan.	R_{50}=17kΩ $B_{25/50}$=4170 Rt = $17\exp\{4170(\frac{1}{273+t} - \frac{1}{273+50})\}$ -20˚C : 605.0kΩ 50˚C : 17.0kΩ -10˚C : 323.3kΩ 60˚C : 11.5kΩ 0˚C : 180.9kΩ 70˚C : 8.0kΩ 10˚C : 105.4kΩ 80˚C : 5.7kΩ 20˚C : 63.8kΩ 90˚C : 4.1kΩ 30˚C : 39.9kΩ 100˚C : 3.0kΩ 40˚C : 25.7kΩ	
	Solenoid valve	SV1 (discharge - suction bypass)	1) High/low press. bypass at starting/ stopping and capacity control at low load 2) Discharge press. rise suppression	AC 220~240V Open at energizing and close at deenergizing	• Continuity check by tester • Temperature of inlet and outlet
		SV2 (discharge - suction bypass)	Capacity control and high press. rise suppression (backup for frequency control)		
		SV3 ~ 4	Control of heat exchanger capacity.		
	Linear expansion valve	SLEV	Adjustment of liquid refrigerant (oil) return foam accumulator	DC12V stepping motor drive Valve opening 0~480 pulse	
		LEV1 (SC coil)	Adjustment bypass flow rate from outdoor unit liquid line at cooling.		
	21S4a	4-way valve	Changes for cooling and heating	AC220~240V on cooling off heating	Continuity check with tester
	CH1	Crank case heater	Heating of compressor refrigerant	Cord heater AC 220~240V MC.....1280Ω 45W	
Indoor unit	Linear expansion valve	LEV	1) Adjust superheat of outdoor unit heat exchanger outlet at cooling. 2) Adjust subcool of indoor unit heat exchanger at heating.	DC12V Opening of stepping motor driving valve 0~2,000 pulses	Continuity check with tester for white-red-orange yellow-brown-blue
	Thermistor	TH21 (inlet air temperature)	Indoor unit control (thermostat)	R_0 = 15kΩ $B_{0/100}$ = 3460 Rt = $15\exp\{3460(\frac{1}{273+t} - \frac{1}{273+0})\}$ 0°C : 15kΩ 10°C : 9.7kΩ 20°C : 6.4kΩ 25°C : 5.3kΩ 30°C : 4.3kΩ 40°C : 3.1kΩ	Resistance value check
		TH22 (piping temperature)	1) Indoor unit control (freeze prevention, hot adjust, etc.) 2) LEV control in heating operation (Subcool detection)		
		TH23 (gas side piping temperature)	LEV control in cooling operation (Superheat detector)		

[4] Resistance of Temperature Sensor

Thermistor for low temperature

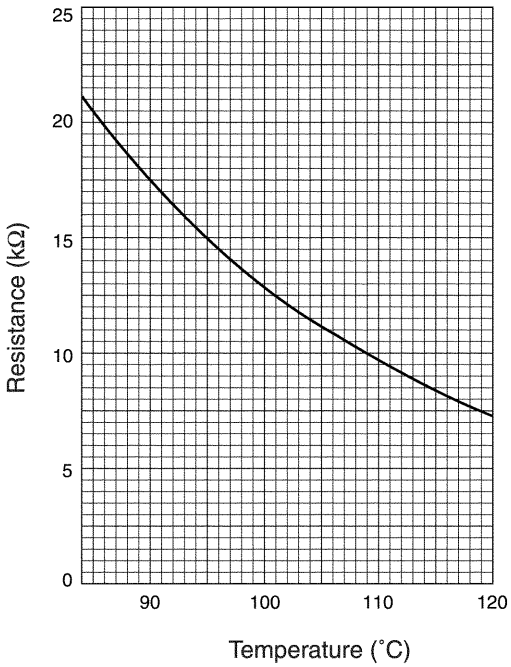
Thermistor R_o= 15kΩ ± 3% (TH3 ~ 9)

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



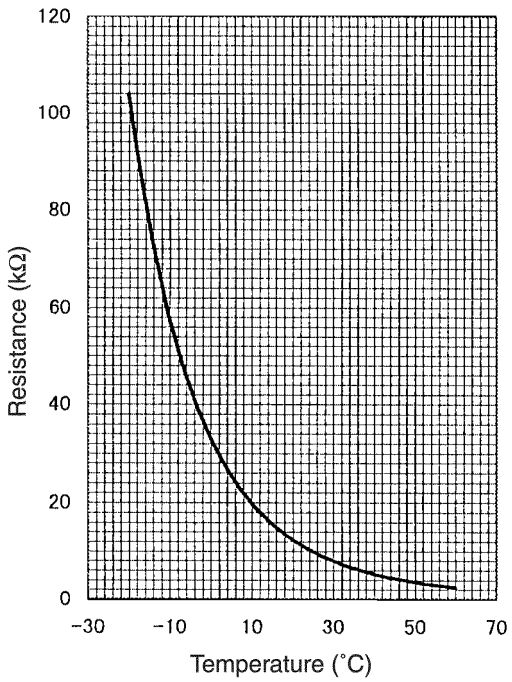
Thermistor R_{120} = 7.465kΩ ± 2% (TH1, 10)

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



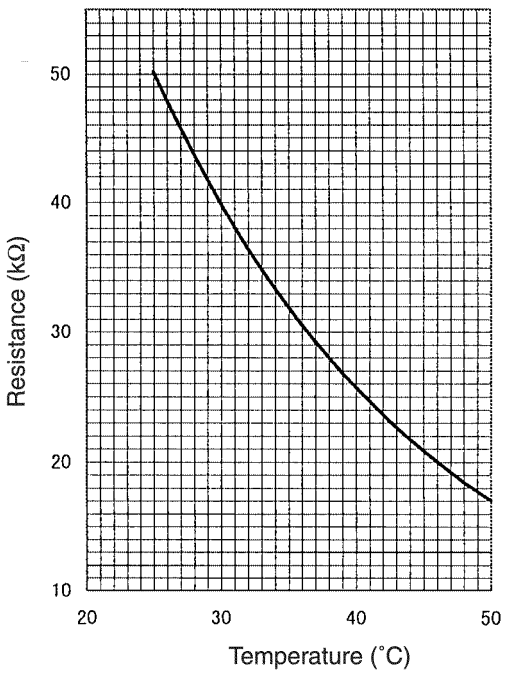
Thermistor R_o = 33kΩ ± 1% (TH2)

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



Thermistor R_{50} = 17kΩ ± 2% (THHS)

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



6 REFRIGERANT AMOUNT ADJUSTMENT

Clarify relationship between the refrigerant amount and operating characteristics of CITY MULTI, and perform service activities such as decision and adjustment of refrigerant amount on the market.

[1] Refrigerant Amount and Operating Characteristics

The followings are refrigerant amount and operating characteristics 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 operation at high ambient temperature the discharge temperature may rise.	Comparison including control system
		During heating operation at low ambient the discharge temperature may rise.	
		The lower operating frequency is, the higher discharge temperature tends to become of deteriorated compressor efficiency.	
5	Compressor shell temperature is 10~60 K higher than low pressure saturation temperature (Te) when refrigerant amount is appropriate. → Judged as over replenishment when temperature difference from low pressure saturation temperature (Te) is 5 K 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 refrigerant amount in refrigerant amount adjustment mode, by checking operation status, judging refrigerant amount, and performing selfdiagnosis with LED, for overall judgement of excess or lack of refrigerant amount.

1	Emergency 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	Emergency stop at 1102 remote controller display (discharge temperature trouble)	

(2) Refrigerant Volume

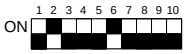
1) Checking the Operating Condition

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

Condition		Judgement
1	Outlet temperature is high. (100°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 K or lower).	
4	Shell bottom temperature is high (the difference with the low pressure saturation temperature is 60 K or greater)	
5	Shell temperature is low (the difference with the low pressure saturation temperature is 5 K or lower).	Rifrigerant volume tends toward overcharge.
6	Liquid level AL=2 (Determined based on the extent of overheating of discharged refrigerant)	

2) Check the refrigerant volume by self-diagnosis using the LED.
Set the self-diagnosis switch (SW1) as shown below and check the past information (history) concerning the refrigerant volume.

Set SW1 as shown in he figure at right.



If LD1 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 coolant shown in the following table, but since no extension piping is included, please carry out additional charging on-site.

Outdoor Unit Model Name	PUHY-P200	PUHY-P250
Refrigerant Charge Volume	13.0kg	13.0kg

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) = (0.16 × L_1) + (0.12 × L_2) + (0.06 × L_3) + (0.024 × L_4) + α

L_1: Length of ø19.05 liquid pipe (m)
L_2: Length of ø12.7 liquid pipe (m)
L_3: Length of ø9.52 liquid pipe (m)
L_4: Length of ø6.35 liquid pipe (m)
α : refer to the calculation table.

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	α
~160	1.5 kg
161~330	2.0
331~480	2.5

⚠ **Caution : (R407C unit)**

When charging with refrigerant, be sure to charge from the liquid side. If charging from the gas side, it will cause the refrigerant composition to change inside the unit and the composition of the refrigerant remaining in the canister will also change.

[3] Refrigerant Volume Adjustment Mode Operation

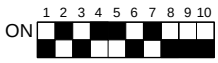
(1) Procedure

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 flow chart.

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.)

Operation	The outdoor unit LEV1 diverges more than usual during cooling operation.

2 Additionary, if the LED monitor display switch (SW1) on the outdoor unit's control board is set to the composition of refrigerant circulating in the refrigeration cycle (αOC).

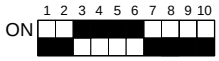


Note 1: Even if the refrigerant volume has reached a suitable level shortly after starting refrigerant volume adjustment mode, if left for a sufficient length of time (once the refrigeration system has stabilized), there are times when this level may become unsuitable.
1) The refrigerant volume is suitable.
When the refrigerant volume for TH5-TH7 is more than 5K at the outdoor unit, and 6 to 13K for SH at the indoor unit.
2) The current volume is suitable, however, may become unsuitable after a certain length of time.
When the refrigerant volume for TH5-TH7 is less than 5K at the outdoor unit, or less than 6K for SH at the indoor unit.

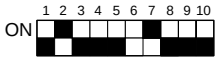
Note 2: There are times when it becomes difficult to determine the volume when performing refrigerant adjustments if the high pressure exceeds 1.37MPa.

Note 3: Based on the following flowchart, use TH1, TH5, TH7 and Tc to adjust the refrigerant volume. Use the self-diagnosis switch (SW1) on the outdoor unit main PCB to display TH1, TH5, TH7 and Tc.

TH1

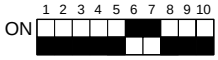


TH5



TH7

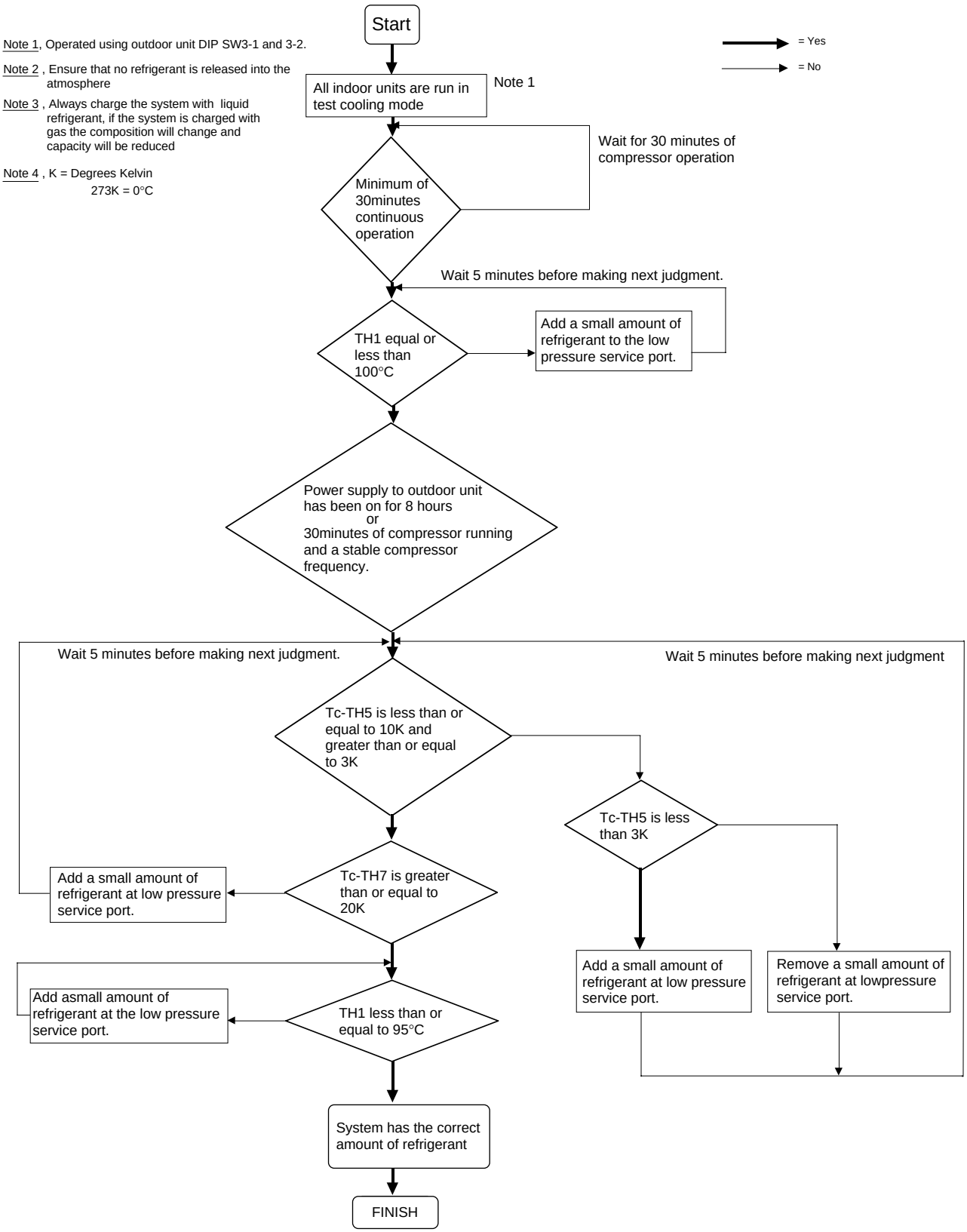
Tc



Using these, judge TH1, Tc - TH5 and Tc - TH7.

Measure	A	When running refrigerant volume adjustment mode in the cooling operation, if note 2 above applies, determine the suitable refrigerant volume after waiting until outdoor units TH 5-7 reach more than 5K, and the indoor unit SH is in the range of 6 to 9K.
	C	Turn on the outdoor unit self-diagnosis switch and then monitor the LED for the indoor unit SH.

Refrigerant adjustment method PUHY-P200·250



7 TROUBLESHOOTING

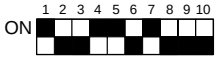
[1] Principal Parts

(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.
Set SW1 as shown below to display the high and low pressure sensor data displayed digitally by the light emitting diode LD1.

High Pressure 

(Units are kg/cm²G)

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 0~1 kg/cm²G (0.0098MPa), the internal pressure is dropping due to gas leakage.
(b) If the pressure according to the LD1 display is 0~1 kg/cm²G (0.0098MPa), there is a faulty contact at the connector, or it is disconnected. Proceed to 4.
(c) If the pressure according to the LD1 display is 32 kg/cm²G (3.14MPa) for high pressure 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 1 kg/cm²G (0.098MPa), for high pressure and 0.03MPa for low pressure both the affected pressure sensor and the main MAIN board are normal.
(b) If the difference between the two pressures exceeds 1 kg/cm²G (0.098MPa), for high pressure and 0.03MPa for low pressure 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.

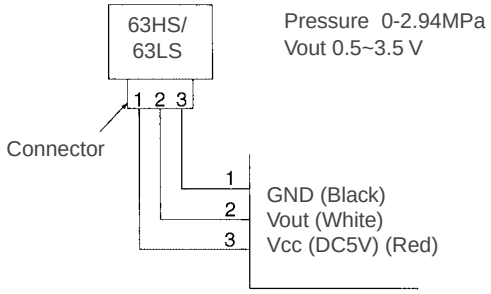
3 Disconnect the pressure sensor from the MAIN board and check the pressure according to the LD1 display.
(a) If the pressure is 0~1 kg/cm²G (0.098MPa) for low pressure on the LD1 display, the affected pressure sensor is faulty.
(b) If the pressure is 32 kg/cm²G (3.14MPa) for high pressure or higher, the MAIN board is faulty.
If ambient temperature is below 30°C, main board is faulty.
If ambient temperature is above 30°C, proceed to 5.

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 32 kg/cm²G (3.14MPa) for high pressure and 1.37MPa for low pressure , the affected pressure sensor is faulty.
(b) If other than (a), the MAIN board is faulty.

5 Disconnect the 63HS connector from the main board and replace it with the 63LS connector and check the LD1 display.
(a) If data is 1.37MPa or above then main board is faulty.
(b) If (a) is not the problem then the 63LS sensor 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.

Output power voltage high pressure 0.1 V per (0.098MPa)
Output power voltage low pressure 0.3 V per (0.098MPa)



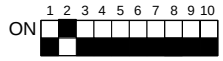
※ Connector connection specifications on the pressure sensor body side·
The connector's pin numbers on the pressure sensor body side differ from the pin numbers on the main circuit board side.

	Sensor Body Side	MAIN Board Side
Vcc	Pin 1	Pin 3
Vout	Pin 2	Pin 2
GND	Pin 3	Pin 1

(2) Solenoid Valve (SV1, 2, 3, 4)

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
	Comp operation	Comp operation			52C1			Lights for normal operation
	SV1	SV2				SV3	SV4	

1) In the case of SV1 (Bypass Valve)
   (a) When the compressor starts, SV1 is ON for 4 minutes, check operation by whether the solenoid valve is emitting an operating noise.
   (b) Changes in the operating condition by solenoid valve operation can be confirmed by the temperature of the bypass circuit and the sound of the refrigerant.
   (c) SV1 goes on in accordance with the rise in high pressure in the cooling and heating mode, check operation by LED display and the operating noise emitted by the solenoid valve.

2) In the case of SV2 (Bypass)
   (a) SV2 goes ON in accordance with the rise in the high pressure in the cooling mode and heating mode, so check its operation by the LED display and the operating noise emitted by the solenoid valve.
   (Conditions during operation: See **Control of Outdoor Unit.**)
   (b) Changes in the operating condition by solenoid valve operation can be confirmed by the temperature of the bypass circuit and the sound of the refrigerant.

3) SV3, 4 (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, 4 are turned on depending on conditions during cooling-only operations.

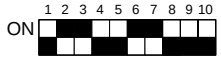
4) In the case of 21S4 (Multi-directional valve)

   Multi-directional valve features
   When power is OFF: Used as a conductor for the cooling circuit between the oil separator outlet and heat exchanger, and the gas-ball valve (BV1) and accumulator.
   When power is ON : Used as a conductor for the heating circuit between the oil separator and gas-ball valve, and the heat exchanger and accumulator.
   It is possible to determine whether the unit is functioning properly by checking from which point to which point the current is flowing by monitoring the LED display, or by checking the temperature at the time at both the inlet and outlet of the multi-directional valve. Do not to check the temperature of the oil separator by direct contact due to the high temperature of the piping.
   ※ Do not apply excessive external impact, as the valve will not function properly if the outer wall is deformed.

(3) Outdoor unit fan

- The outdoor unit fan is phase control and controls the number of fan rotations. Confirm the number of rotations while monitoring the output status of the phase control output at the LED. The fan rotates at approximately 600rpm at full speed.
- Refer to the outdoor unit control section for details on fan control.

The fan operates at 100% for 5 seconds and then alternates between high and low pressure control.

Turn the self-diagnosis switch ON to  , the phase control output status at the LED display.

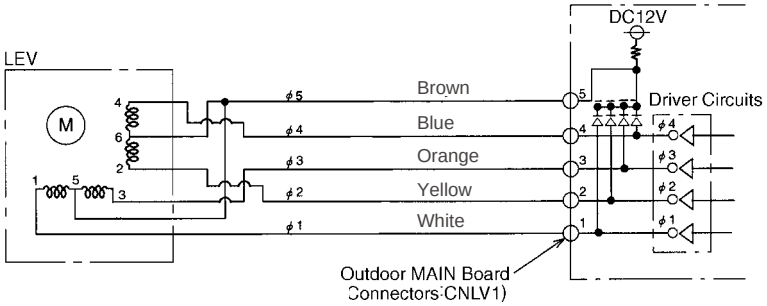
LED Display	0 ↔ 100
Fan	Stop Full speed

※ There are times when the AK does not go as high as 100 when in night mode etc.

(4) Outdoor LEV

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

(Connections between the outdoor unit's MAIN board and LEV1 (PUHY-P200·250))



Pulse Signal Output and Valve Operation

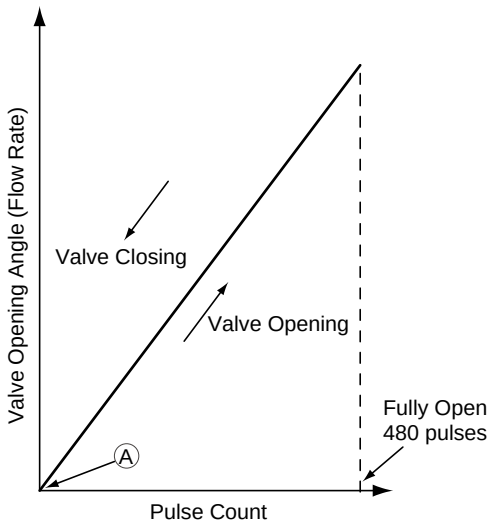
Output (phase)	Output states							
	1	2	3	4	5	6	7	8
ø1	ON	OFF	OFF	OFF	OFF	OFF	ON	ON
ø2	ON	ON	ON	OFF	OFF	OFF	OFF	OFF
ø3	OFF	OFF	ON	ON	ON	OFF	OFF	OFF
ø4	OFF	OFF	OFF	OFF	ON	ON	ON	OFF

Output pulses change in the following orders when the
Valve is Closed 1→2→3→4→5→6→7→8→1
Valve is Open 8→7→6→5→4→3→2→1→8

※1. When the LEV opening angle does not change, all the output phases are off.

2. When the output is out of phase or remains ON continuously, the motor cannot run smoothly, but move jerkily and vibrates.

LEV Valve Closing and Valve Opening Operations



※ When the power is switched ON, a 520 pulse valve opening signal is output to make sure the valve's position, so that it is definitely at point Ⓐ. Pulse signal is output for approximatly 17 seconds.

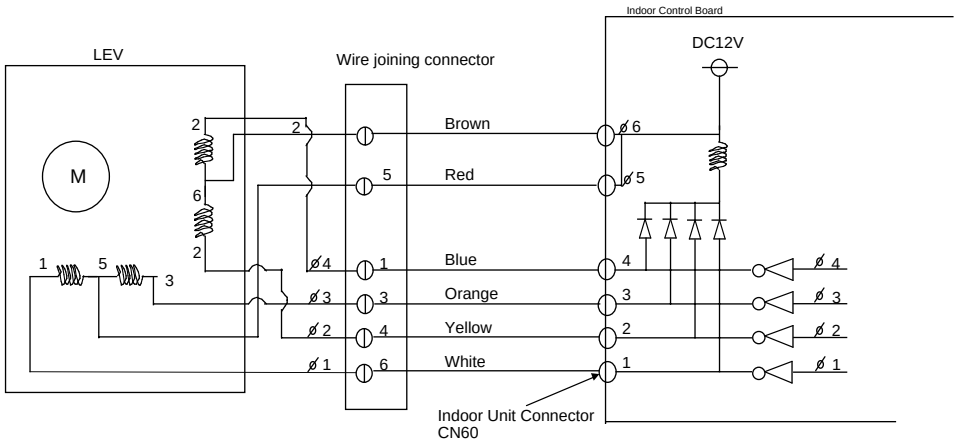
※ When the valve operates smoothly, there is no sound from the LEV and no vibration occurs, but when the valve is locked, it emits a noise.

※ Whether a sound is being emitted or not can be determined by holding a screwdriver, etc. against it, then placing your ear against the handle.

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

(5) Indoor LEV, BC LEV1 and 2

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

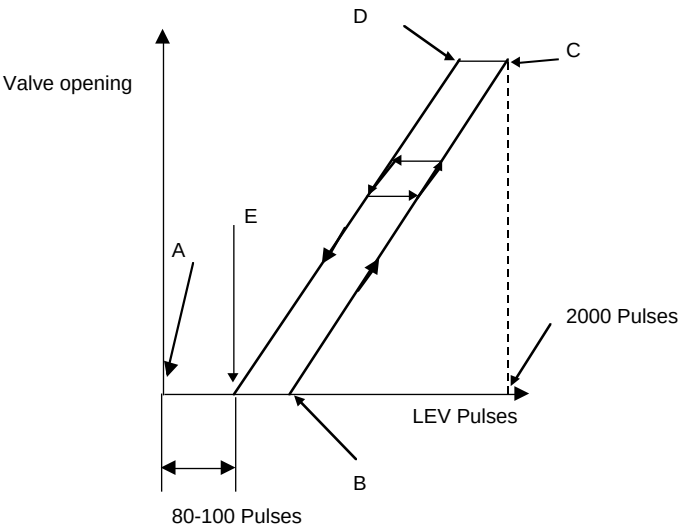
Indoor LEV Pulse Signal and Valve Operation

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

Output pulses change in the following orders when the
Valve is Closed 1→2→3→4→1
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 remains ON continuously, the motor cannot run smoothly, but move jerkily and vibrates.

LEV Valve Closing and Valve Opening Operations



* When the power is switched ON, a 2200 pulse valve opening signal is output to make sure the valve's position, so that it is definitely at point Ⓐ . (Pulse signal is output for approximatly 17 seconds.)

* When the valve operates smoothly, there is no sound from the LEV and no vibration occurs, but when the valve is locked or Ⓔ→Ⓐ , it emits a noise

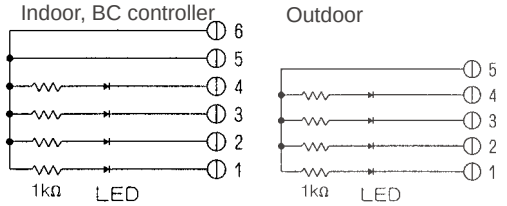
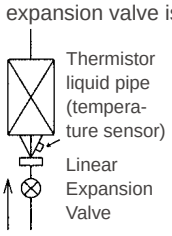
* Whether a sound is being emitted or not can be determined by holding a screwdriver, etc. against it, then placing your ear against the handle.

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

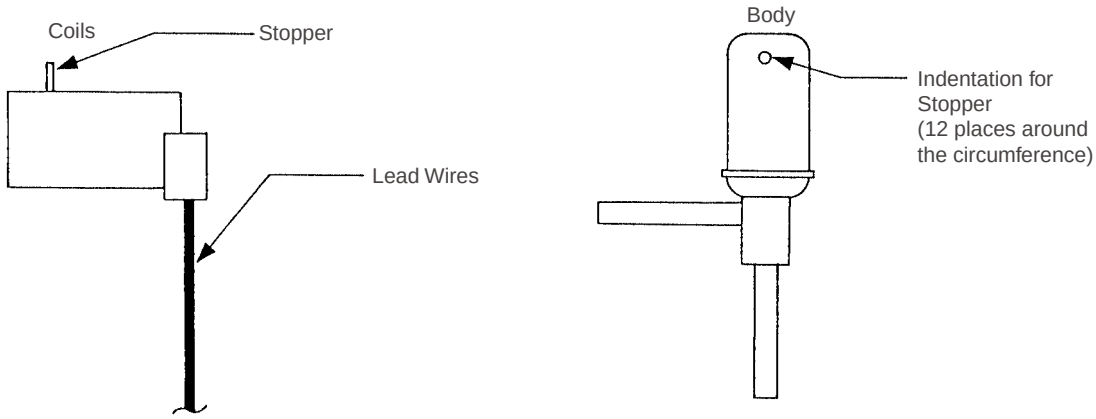
Judgment methods and likely failure mode

Caution:

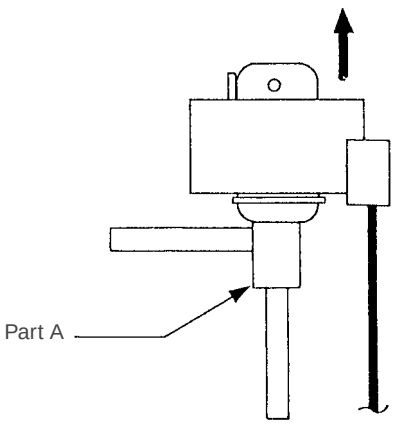
The specifications of the outdoor unit (outdoor LEV) and indoor unit (indoor LEV) differ. For this reason, there are cases where the treatment contents differ, so follow the treatment specified for the appropriate LEV as indicated in the right column.

Failure Mode	Judgment Method	Treatment	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 remains on, the driver circuit is abnormal.	In the case of driver circuit failure, replace the control board.	Indoor Outdoor
LEV mechanism is locked.	① If the LEV is locked up, the drive motor turns with no load and a small clicking sound is generated. Generation of this sound when the LEV is fully closed or fully open is abnormal.	Replace the LEV.	Indoor 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
	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 ± 10%.	Replace the LEV coils.	Outdoor
Fully closed failure (valve leaks)	① If you are 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 is 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 low compared to the remote control's intake temperature display, it can be judged that there is not a fully closed failure. In the case of minimal leakage, it is not necessary to replace the LEV if there are no other effects. 	If there is a large amount of leakage, replace the LEV.	Indoor
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 Outdoor

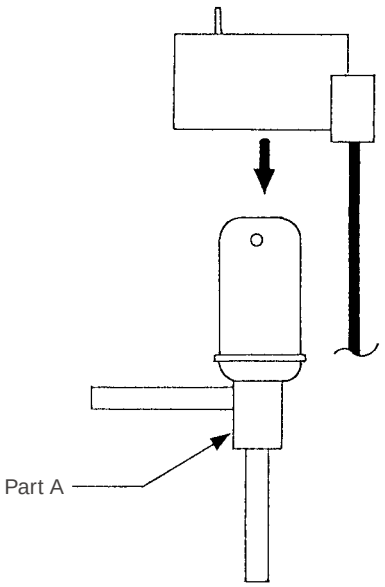
Outdoor LEV Coil Removal Procedure (configuration)
As shown in the figure, the outdoor LEV is made in such a way that the coils and the body can be separated.



<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 toward the top. If they catch on the stopper and are difficult to take out, turn the coils left and right until the stoppers are free from the stopper indentations, then pull the coils out.
If you take out the coils without gripping the body, undue force may be applied to the piping and the pipe may be bent, 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 it doesn't matter which indentation is used. However, be careful not to apply undue force to the lead wires or twist them around inside the body.) If the coils are inserted without gripping the body, it may exert undue force on the piping, causing it to become bent, so be sure to hold the body firmly so that it won't move when installing the coils.



(6) Inverter

a. **Replace only the compressor** if only the compressor is found to be defective.
(Overcurrent will flow through the inverter if the compressor is damaged, however, the power supply is automatically cut when overcurrent 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, 4220, 4230, 4240, 4250, 4260, 5110, 5301)	7 [7] Check the details of the inverter error in the error log at the outdoor PCB LED monitor display. 7 [6] 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 ground ed. 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 the neither the transmission line or external connection wiring run close to another power supply system or run through the same conduct pipe.
		※ Contact the factory for cases other than those listed above.

1. Due to a large capacity electrolytic capacitor used in the inverter, voltage still flows through even after cutting the main power, creating the possibility of electric shock. As a result, wait for a sufficient length of time (5-10 min) after cutting the main power and check the voltage at both terminals of the electrolytic capacitor to performing any checks on the inverter.
2. Damage will result to the components of IPM, etc. 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 without connecting to the PCB. Always insert connectors into the corresponding PCB when running the inverter.

2) Treatment of Inverter Output Related Troubles

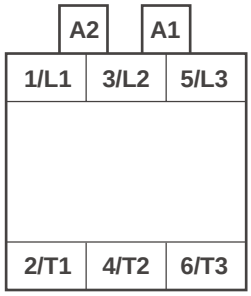
	Check item	Phenomena	Treatment
[1] Check the INV board error detection circuit.	Perform the following: ①Disconnect INV board CNDR2. After removing, turn on the outdoor unit and check the error status. (The compressor does not operate because CNDR2, which carries the IPM drive signal, has been disconnected.)	① IPM/overcurrent error. (4250 detailed No. 101, 102, 103, 104, 105, 106, 107)	• Replace INV board.
		② ACCT sensor circuit error. (5301 detailed No. 117)	See to 7 [1] (6) 4) "Current Sensor ACCT" Check the resistance and replace if erroneous. Replace the INV board if the ACCT status is normal.
		③ DCCT sensor circuit error. (5301 detailed No. 118)	• Replace DCCT Turn on the outdoor unit again after replacing the DCCT. If an error occurs: • Replace the INV PCB (The DCCT condition can be regarded as normal.)
		④ ACCT sensor circuit error. (5301 detailed No. 115)	• INV board error detection circuit is normal. Because IPM can not drive, 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 0.58Ω (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: ①Reconnect the connector removed at item [1]. ②Disconnect the compressor wiring. ③Turn on SW1-1 on the INV board. Operate the outdoor unit after above steps. Check the inverter output voltage. ※ It is recommend to use the tester used to determine the 7 [1] (6) 5) IPM troubleshooting when checking the inverter output voltage. ※ Measure when the inverter output frequency is stable.	① IPM/overcurrent error. (4250 detailed No. 101, 102, 103, 104, 105, 106, 107)	• Refer to item [5] for inverter circuit trouble.
		②There is a high possibility of an inverter circuit error if the voltage unbalance across all wiring is greater than 5% or 5V.	
		③No voltage unbalance across all wiring	See item [2]. Proceed to item [5] however if there is no problem at [2]. Replace the compressor if there is no problem at [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 recommend to use the tester used to determine the 7 [1] (6) 5) IPM troubleshooting when checking the inverter output voltage. ※ Measure when the inverter output frequency is stable.	①There is a high possibility of an inverter circuit error if the voltage unbalance across all wiring is greater than 5% or 5V.	• Refer to item [5] for inverter circuit trouble.
		②No voltage unbalance across all wiring	See item [2]. Proceed to item [5] however if there is no problem at [2]. Replace the compressor if there is no problem at [5].

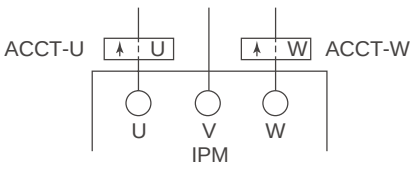
	Check item	Phenomena	Treatment
[5] Check the inverter circuit trouble.	①Check to see if the IPM screw terminal is loose.	①Screw terminal is loose.	• Check all IPM screw terminals and tighten.
	②Check the exterior of the IPM.	②IPM is cracked due to swelling.	• IPM replacement Check the operation in [3] 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] (6) 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) Trouble Measures when Main Power Breaker Tripped

	Check item	Phenomena	Treatment
[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 components 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 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 considered. Go to 2)-[2].

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

<table>
<tr><th>Part name</th><th>Judgement method</th></tr>
<tr><td>Diode Stack</td><td>Refer to "Determining Diode Stack Troubleshooting"</td></tr>
<tr><td>IPM
(Intelligent Power Module)</td><td>Refer to "Determining IPM interference"</td></tr>
<tr><td>Rush current protection resistor
R1, R5</td><td>Measure the resistance between terminals: 47Ω±10%</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: 280Ω±30Ω
1-2PIN (U-phase)
3-4PIN (W-phase)
 

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

5) Intelligent Power Module (IPM)

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

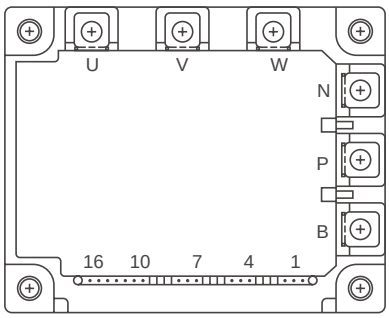
① Focus on whether there is a complete open (∞Ω) state or short-circuit (~0Ω).
The measured resistance value is a guideline and may deviate slightly.
Measure between several similar measurement points.
If the value does not differ by more than double or half from the other points, then judge the state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

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

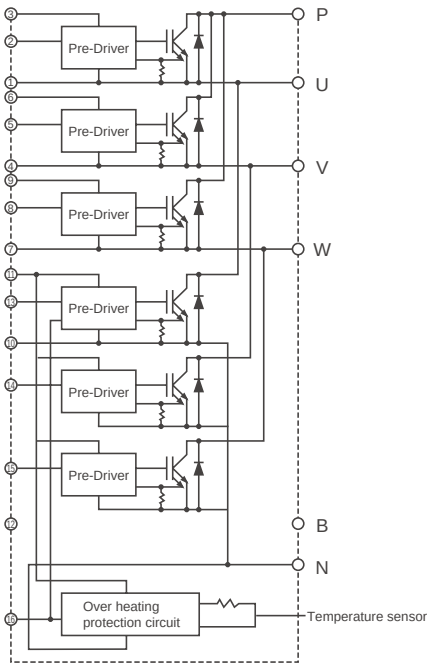
* Battery type tester
A card tester with button battery has a low applied voltage, so the resistance value of the diode characteristics cannot be measured correctly.
Use a measurement range that measures the low resistance when possible. An accurate measurement with less fluctuation will be possible.

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

• External view



• Internal circuit diagram

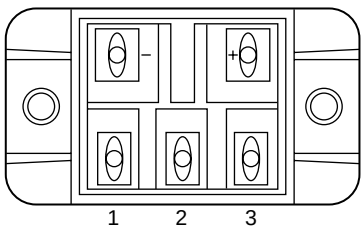


• Judged value

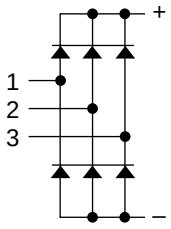
Tester Black / Tester Red	P	N	U	V	W
P			5~200Ω	5~200Ω	5~200Ω
N			∞	∞	∞
U	∞	5~200Ω			
V	∞	5~200Ω			
W	∞	5~200Ω			

6) Diode stack

Perform continuity check with tester. Judged as normal if the following characteristics are observed.
(Restrictions to applicable tester are the same as those of IPM)



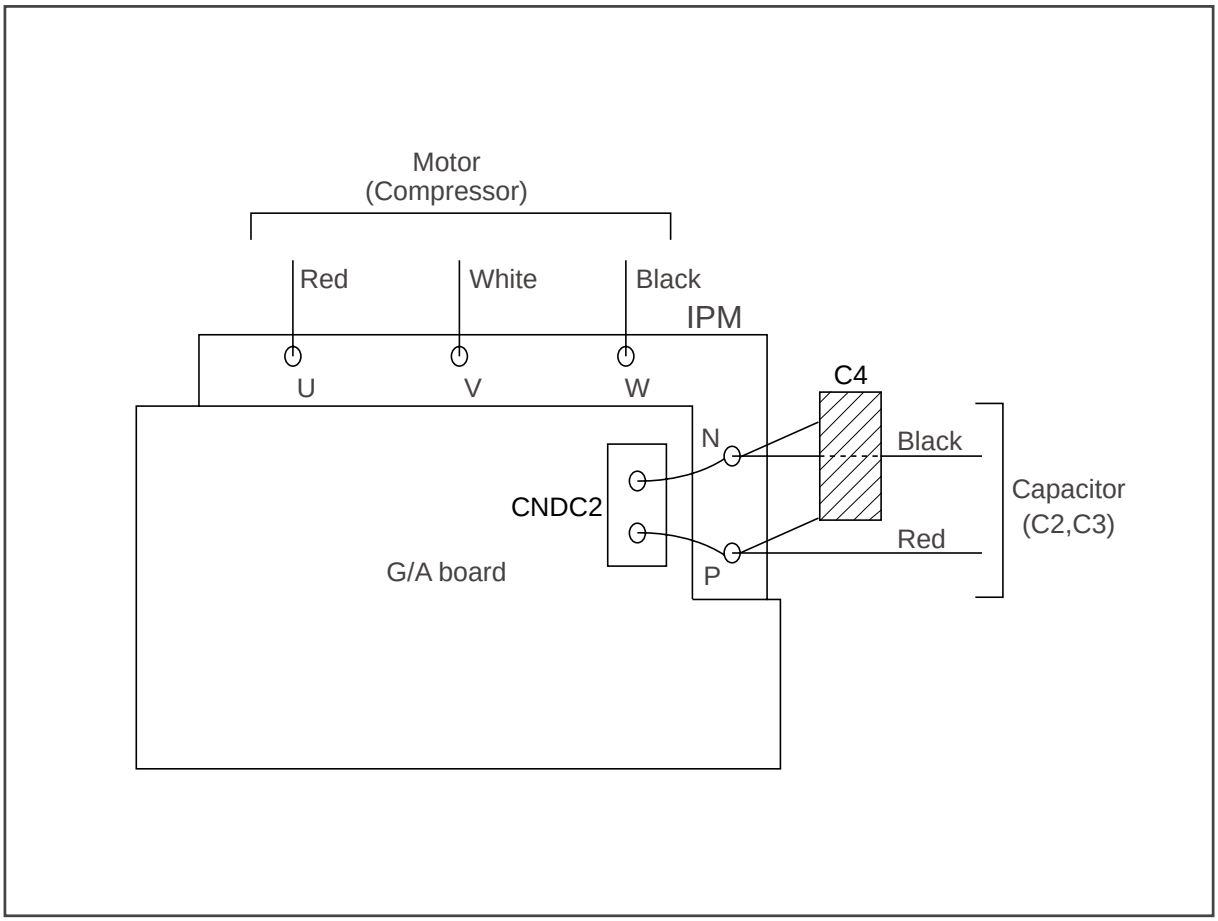
Tester Black / Tester Red	+	–	1	2	3
+			5~200Ω	5~200Ω	5~200Ω
–			∞	∞	∞
1	∞	5~200Ω			
2	∞	5~200Ω			
3	∞	5~200Ω			



7) Caution at replacement of inverter parts

① Fully check wiring for incorrect and loose connection.
The incorrect or loose connection of the power circuit part wiring like IPM and diode module causes to damage the IPM. Therefore, check the wiring fully. As the insufficient tightening of screws is difficult to find, tighten them together additionally after finishing other works. For the wiring of the base for IPM, observe the wiring diagram below carefully as it has many terminals.

② Coat the grease for radiation provided uniformly onto the radiation surface of IPM /diode modules.
Coat the grease for radiation on the full surface in a thin layer, 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 if attached.



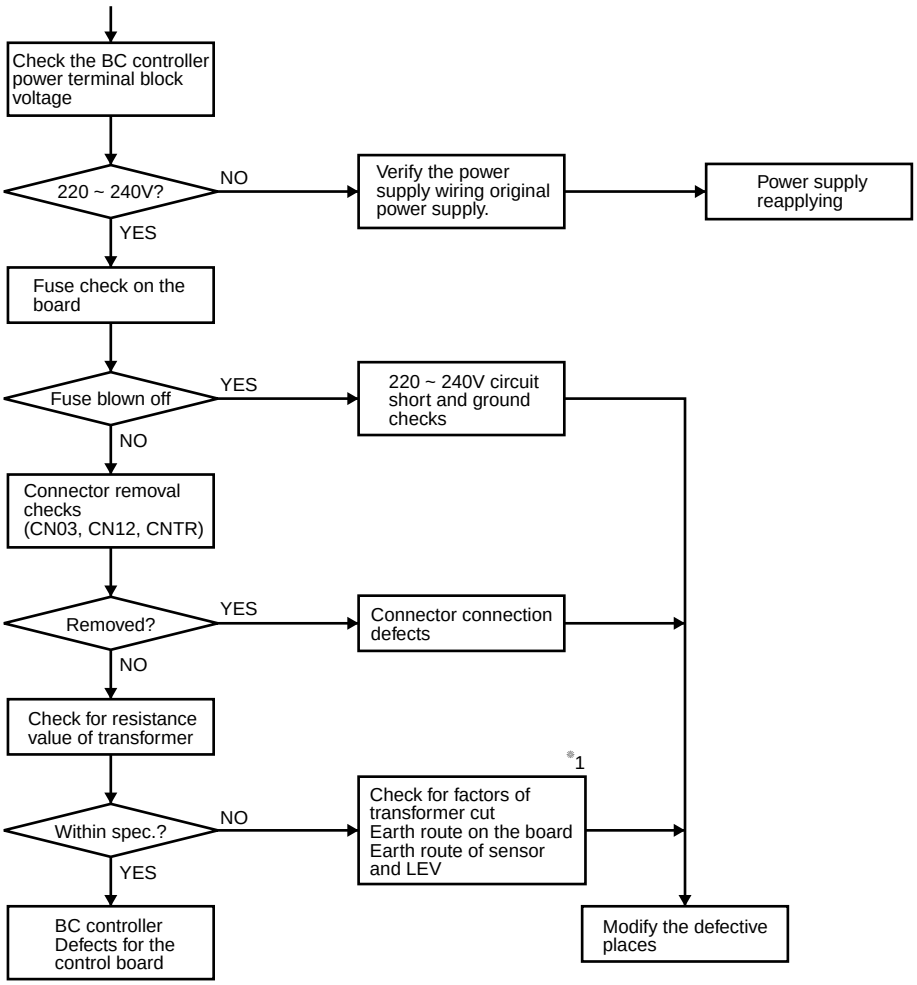
[2] Trouble and remedy of remote controller

(In the case of MA remote controller)

	Phenomena	Factors	Check method and handling
1	If pushing the remote control operation SW does not make a sound such as feep with the crystal display lamp out, and no operate is possible. (An appropriate display ◎ on the remote control is not on.)	1) Power supply from transformers is not turned on in Indoor Unit. ① The original power supply of Indoor Unit is not turned on. ② The connector (CND. CNT, CN3T) on the controller board in the room has come off. ③ Fuse on the control board in Indoor Unit has melting down. Transformer defects or damage to unit. 2) MA remote controller has been wired incorrectly. ① Break of the MA remote controller line and the connection to the terminals has come off. 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 one is unit exceeded (two units). 4) The wiring length of the MA remote line and the used electric wire diameter is out of 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	a) Check the MA remote control terminal voltage (between A and B). i) In the case of voltage DC8.5- 12V, the remote controller is defective. ii) In the case of voltage not available: • Check the left described 1) and 3), after checking , if these are factors, then modifications should be performed. • If there are no factors of the left described 1) and 3), move 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 DC9-12V Check the left described 2) and 4), if these are factors, then modifications should be performed. ii) In the case of voltage not available: • Recheck the left described 1) once again, if this is a factor, them modifications should be performed. • If there are no factors in the left described 1), check the wiring for the remote display (the relay polarity, etc.) • If there are no factors, 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.
2	When turning on the remote control operation SW, a temporary operation display is indicated, and the display lights out immediately, the unit stops.	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 Power supply circuit defects of the outdoor unit. (For detail, refer to Pages 127) • INV board defects • Blown fuse (F1 on INV Board) • Diode stack destruction • Prevention resistance of rush current (R1) damage 2) Transmission line short 3) Wiring mistakes of the M-NET transmission line on the side of the outdoor unit ① Break of transmission line, and removal of terminal block ② The room transmission line is wired to the transmission line terminal block (TB7) for the central control by mistakes. 4) M-NET transmission line break on the side of the room unit 5) Disconnection off wiring between the M-NET transmission terminal block (TB 5) and the room controller board CN2M and pulls off of connectors	In the case of factors 2) and 3) Indicated by 7102 error code on the self-diagnosis LED of the outdoor unit.

	Phenomena	Factors
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 Transformer defects of the BC controller and a malfunction. ⑤ Defects on the control board of the BC controller

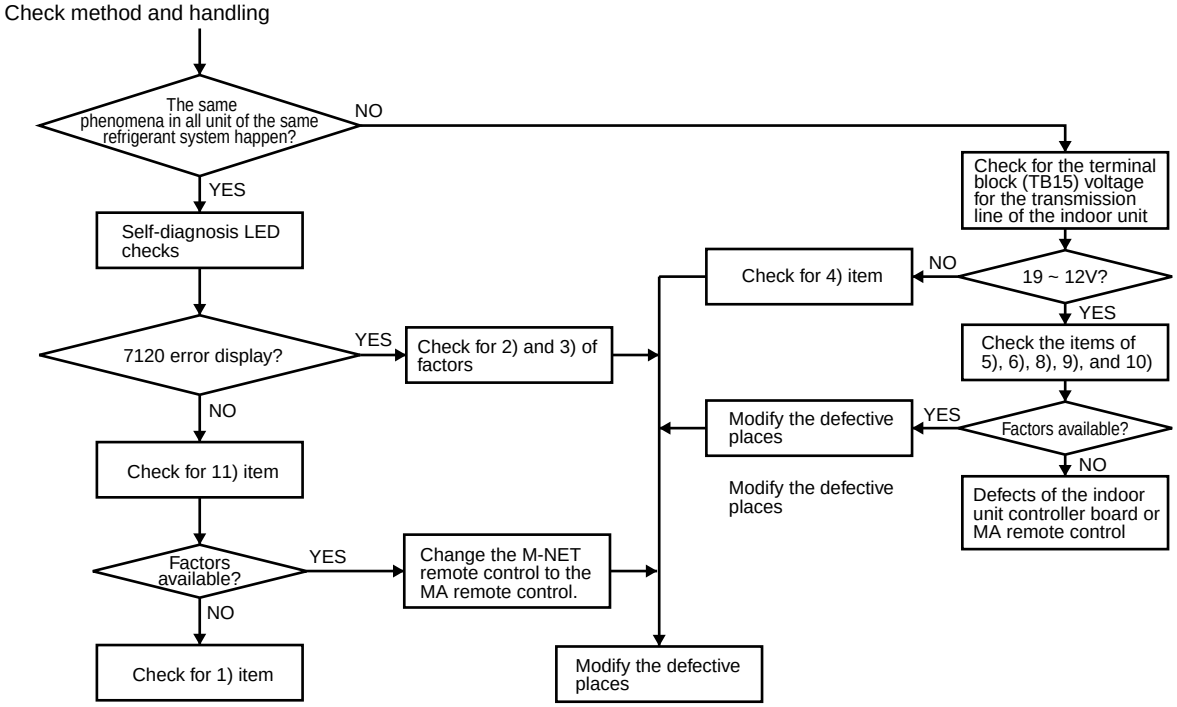
Check method and handling



※1 As for transformer checks, It is subject to the failure judgment method of main parts in 4.5.

	Phenomena	Factors	
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 form 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 Power supply circuit defects 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) Error wiring of the M-NET transmission line on the side of the outdoor unit ① A break of the 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 side of Indoor Unit (Short/ Open) 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) Error wiring of the MA remote control ① Short circuit of the MA remote wiring ② A break of the MA remote control line (No.2) and disconnection of the terminal block connection ③ Reversed wiring, cross-over in the group control ④ Wire by mistakes the MA remote control to the terminal block (TB5) for the transmission line ⑤ Connect by mistakes the 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 becomes 51 or more. 9) The master and slave setting of the MA remote control becomes the slave setting. 10) Use the M-NET remote control in spite of the automatic address. 11) Defects for the room controller board (MA remote communication circuits) 12) Defects for the remote controller	In the case of 2), 3) and 7) factors, indicate 7102 errors by the self-diagnosis LED of the outdoor unit.

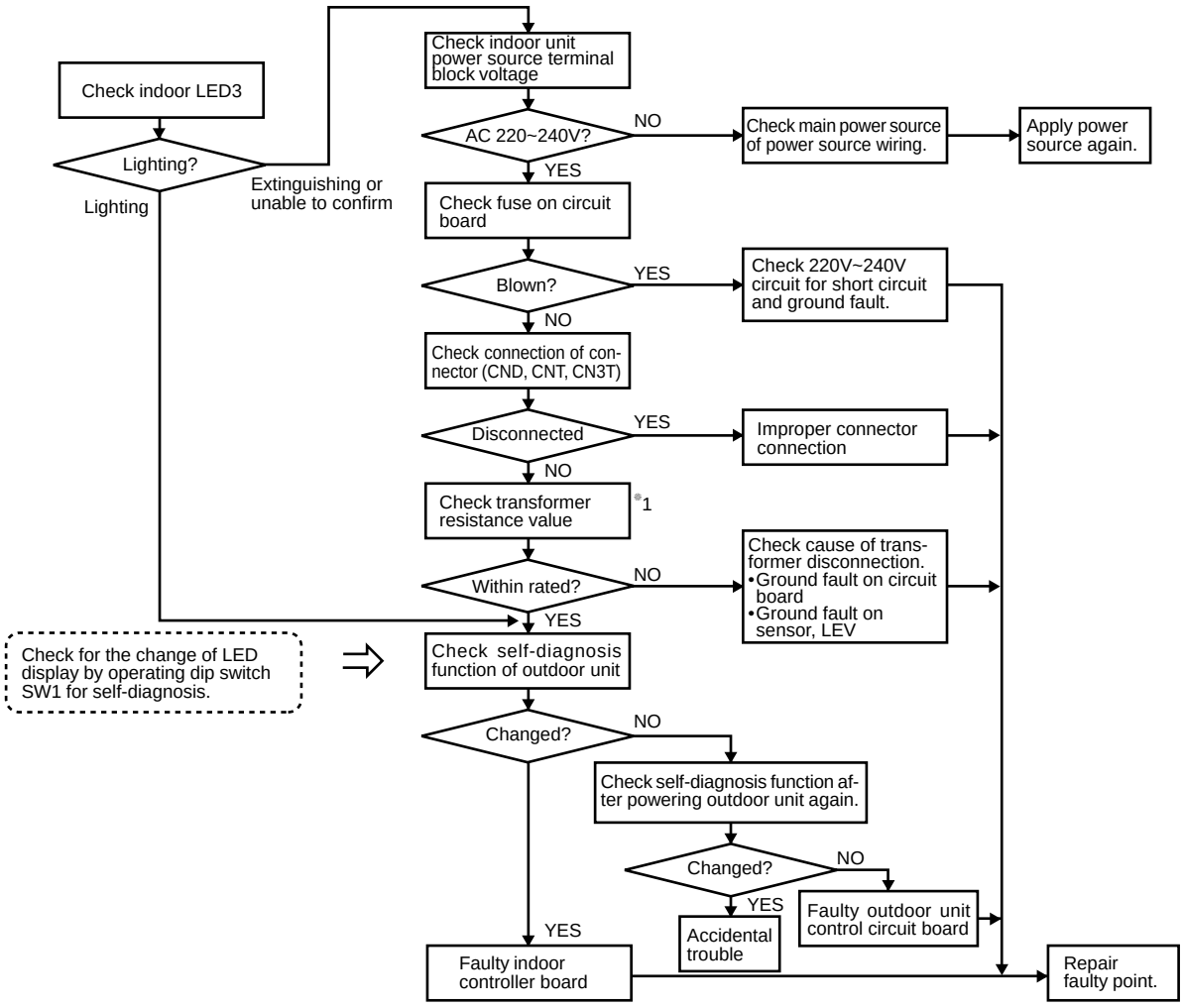
Check method and handling



(In the case of M-NET remote controller)

	Symptom	Cause	Checking method & countermeasure
1	Despite pressing of remote controller ON/OFF switch, operation does not start and there is no electronic sound. (No powering signal ◎ appears.)	1) M-NET transmission power source 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 at outdoor unit. ① Transmission line disconnection or slipping off 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.	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.
2	At about 10 seconds after turning remote controller operation switch ON, the display distinguishes and the operation stops.	1) Power source is not fed 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 uncontrolled. As normal transmission is fails between indoor and outdoor units, outdoor unit model can not be recognized.	

Checking method & countermeasure

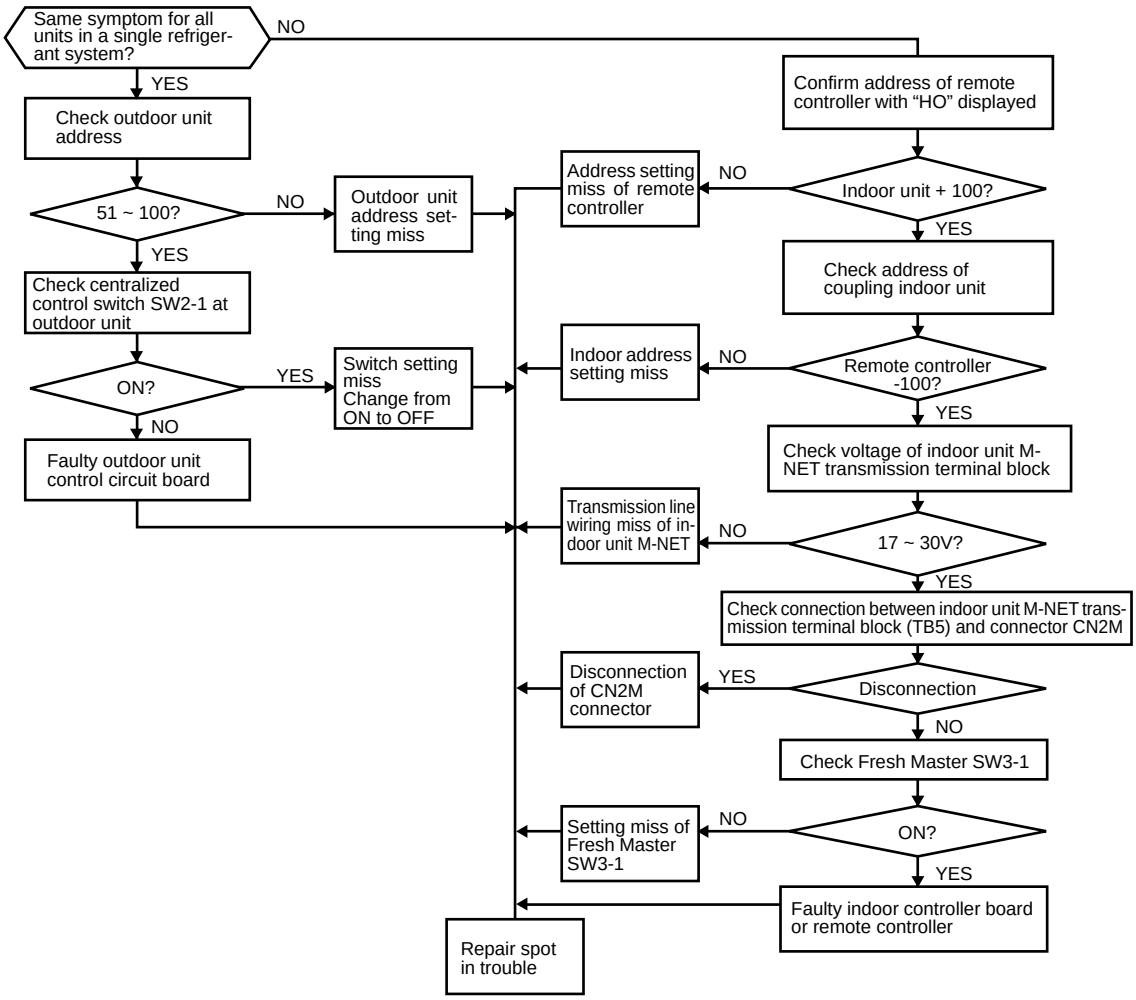


*1 Check the transformer in accordance with the “TROUBLE SHOOTING” in the indoor unit’s service handbook.

	Symptom	Cause
3	"HO" display 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	[Generates at 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 connector 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).

Transmission Power Circuit (30 V) Check Procedure

If "◎" is not displayed by the remote control, investigate the points of the trouble by the following procedure and correct it.

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	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 plate.
		Except the above-mentioned	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	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	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	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	to No. 7
		Except the above-mentioned	Replace R7.
7	Check the resistance at both ends of F01 on the INV board.	0Ω	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	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.

[3] Investigation of transmission wave shape/noise

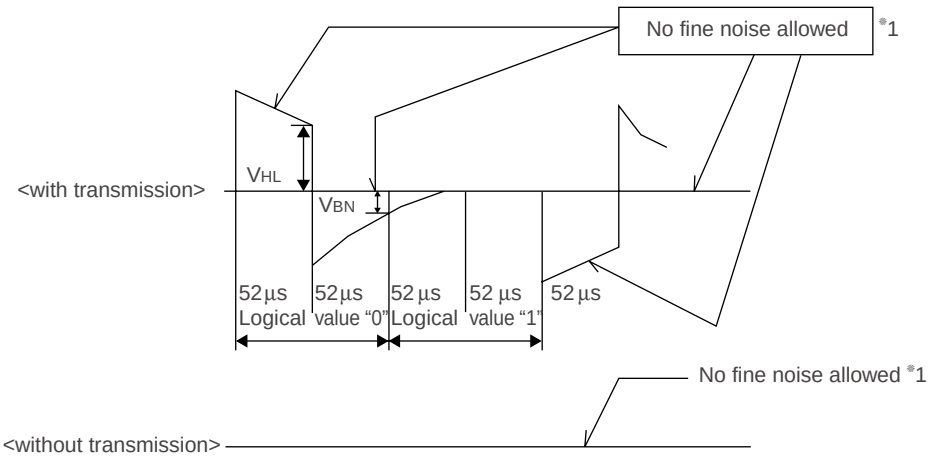
(1) M-NET transmission

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 can not be received normally thus providing no reply (ACK).	6607
	Transmission can not be made continuously due to the entry of fine noise.	6603
	Transmission can be made normally, but reply (ACK) or answer can not 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) Checking 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 a 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 Repeating of shield at the repeating of transmission line with indoor unit.	The transmission line is wired with 2-jumper system. Wire the shield with jumper system as same for transmission line. When the jumper wiring is not applied to the shield, the effect against noise will be reduced.
	⑤ Are the unit 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) Error is generated even though one point earth is being connected. Earth shield at all outdoor units. Connect to ground as shown in the user's manual.

(b) When the wave height value of transmission wave shape is low, 6607 error is generated, or remote controller is under the state of "HO."

Items to be checked	Measures to be taken
⑧ The farthest distance of transmission line is exceeding 200m.	Confirm that the farthest distance from outdoor unit to indoor unit/ remote controller is less than 200m.
⑨ The types of transmission lines are different.	Use the transmission wire specified. Type of transmission line : Shield wire CVVS/CPEVS Wire dia. of transmission line : 1.25mm^2 or more
⑩ No transmission power (30V) is being supplied to the indoor unit or the remote control.	a) Check 30V on CNS1, CNS2. b) Remove CNS1 and CNS2 and check resistance is 5-2, 6-2, if not this is a fault. Check main board R3 resistance is 1k±5%, if not this is a fault.
⑪ Faulty indoor unit/remote controller.	Replace outdoor unit circuit board or remote controller.

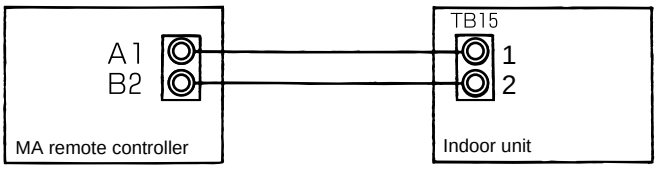
(2) MA remote control transmission

The MA remote control and indoor unit communicate with the current tone burst method.

1) Symptoms caused by infiltration of noise on transmission cable

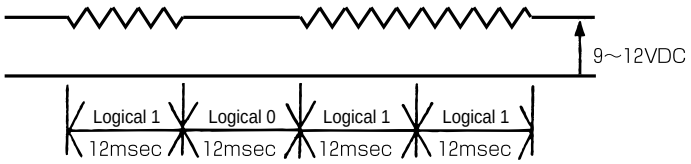
If noise, etc., infiltrates the transmission cable and the communication between the MA remote control and indoor unit is cut off for three consecutive minutes, a MA communication error (6831) will occur.

2) Confirmation of transmission specifications and waveform



A1, B2: No polarity
Across terminal No. 1-2 ··· Power supply (9V to 12VDC)

Transmission waveform (Across terminal No. 1-2)



①12msec/bit±5% must be satisfied
②Voltage across terminal No.1-2 must be within range shown on left.

3) Treatment of Fan Motor Related Troubles

Condition	Possible Cause	Check Method and Treatment
①It won't 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 1 2 3 4 5 6 7 8 9 10 ②The fan motor's vibration is large.	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 for grounding. TB1A~NF~TB1B~CNTR1~T01~CNTR TB1B~CNPOW, CNFAN~CN04~CNMF CNFC1~CNFC2 * Check if the wiring polarity is as shown on the wiring diagram plate.
	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 defective, 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) to 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, etc. securely.) ① Replace the FANCON board only. If it recovers, the FANCON board is defective. ② Replace the FANCON board and replace the MAIN board. If it recovers, the MAIN board is defective. ③ If the trouble continues even after 1 and 2 above, then both boards are defective.

[4] Self-diagnosis and countermeasures depending on the check code displayed

Check Code List

Check Code		Check Content	
0403		Serial transmission abnormality	
0900		Test run (ventilation)	
1102		Discharge temperature abnormality	
1111		Low pressure saturation temperature sensor abnormality (TH2)	
1301		Low pressure abnormality (OC)	
1302		High pressure abnormality (OC)	
1500		Overcharged refrigerant abnormality	
2500		Leakage (water) abnormality	
2502		Drain pump abnormality	
2503		Drain sensor abnormality	
4103		Reverse phase abnormality	
4115		Power supply sync signal abnormality	
4116		Fan speed abnormality (motor abnormality)	
4220	[108]	Bus Voltage drop abnormality (S/W detect)	
	[109]	Bus Voltage rise abnormality (S/W detect)	
	[110]	Vdc abnormality (H/W detect)	
	[111]	Logic circuit for H/W error detect abnormality	
4230		Heat sink overheating abnormality	
4240		Overload abnormality	
4250	[101]	IPM abnormality	
	[102]	ACCT overcurrent abnormality (H/W peak detect)	
	[103]	DCCT overcurrent abnormality (H/W peak detect)	
	[104]	IPM short/grounding abnormality	
	[105]	Load short abnormality	
	[106]	ACCT overcurrent abnormality (S/W detect peak current)	
	[107]	ACCT overcurrent abnormality (S/W detect effective current)	
4260		Cooling fan abnormality	
5301	[115]	IAC sensor abnormality	
	[116]	IDC sensor abnormality	
	[117]	IAC sensor/circuit abnormality	
	[118]	IDC sensor/circuit abnormality	
	[119]	IPM-open/ACCT connection abnormality	
	[120]	ACCT miss-wiring 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)
5105			Liquid pipe (TH5)
5106			Ambient temperature (TH6)
5107			SC coil outlet (TH7)
5108			SC coil bypass outlet (TH8)
5110			Heat sink (THHS)
5201		Pressure sensor abnormality (OC)	
5301		IAC sensor/circuit abnormality	
6600		Multiple address abnormality	
6602		Transmission processor hardware abnormality	
6603		Transmission circuit bus-busy abnormality	

[ ]: Error detail No.

Check Code	Check Content
6606	Communications with transmission processor abnormality
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 hardware 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 abnormality
7107	Connection number setting abnormality
7110	Transmission line power failure
7111	Remote control sensor abnormality
7113	Functional restriction error
7130	Different unit model error

Intermittent fault check code

Preliminary error code		Preliminary Error Content
1202 (1102)		Preliminary discharge temperature abnormality or preliminary discharge thermal sensor abnormality (TH1)
1205 (5105)		Preliminary liquid pipe temperature sensor abnormality (TH5)
1211 (1111)		Preliminary low pressure saturation abnormality or preliminary low pressure saturation sensor abnormality (TH2)
1214 (5110)		Preliminary THHS sensor/circuit abnormality
1216 (5107)		Preliminary sub-cool coil outlet thermal sensor abnormality (TH7)
1217 (5108)		Preliminary sub-cool coil bypass outlet thermal sensor abnormality (TH8)
1221 (5106)		Preliminary ambient temperature thermal sensor abnormality (TH6)
1402 (1302)		Preliminary high pressure abnormality or preliminary pressure sensor abnormality
1600 (1500)		Preliminary overcharged refrigerant abnormality
1605		Preliminary suction pressure abnormality
1607		CS circuit block abnormality
4300 (0403)	[121]	Preliminary serial transmission abnormality
4300 (5301)	[115]	Preliminary IAC sensor abnormality
	[116]	Preliminary IDC sensor abnormality
	[117]	Preliminary IAC sensor/circuit abnormality
	[118]	Preliminary IDC sensor/circuit abnormality
	[119]	Preliminary IPM-open/ACCT connection abnormality
	[120]	Preliminary ACCT miss-wiring abnormality
4320 (4220)	[108]	Preliminary bus voltage drop abnormality (S/W detect)
	[109]	Preliminary bus voltage rise abnormality (S/W detect)
	[110]	Preliminary Vdc abnormality (H/W detect)
	[111]	Preliminary logic circuit for H/W error detect abnormality
4330 (4230)		Preliminary heat sink overheating abnormality
4340 (4240)		Preliminary overload abnormality
4350 (4250)	[101]	Preliminary IPM abnormality
	[102]	Preliminary ACCT overcurrent abnormality (H/W peak detect)
	[103]	Preliminary DCCT overcurrent abnormality (H/W peak detect)
	[104]	Preliminary IPM short/grounding abnormality
	[105]	Preliminary load short abnormality
	[106]	Preliminary ACCT overcurrent abnormality (S/W detect peak current)
	[107]	Preliminary ACCT overcurrent abnormality (S/W detect effective current)
4360 (4260)		Preliminary cooling fan abnormality

* Please refer to ( ) check code. [ ] : Error detail No.

(1) Mechanical

Checking code		Meaning, detecting method	Cause	Checking method & Countermeasure
0403	Serial transmission abnormality	If serial transmission cannot be established between the MAIN and INV boards.	1) Wiring is defective.	Check 1, the connections, 2, contact at the connectors and 3, for broken wires in the following wiring. CNRS2 - CNRS3 CNAC2 - TB1B
			2) Switches are set wrong on the INV board.	SW1-4 on the INV board should be OFF.
			3) The fuse (F01) on the INV board is defective.	If the fuse is melted, (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 by the following procedure (when replacing the circuit board, be sure to connect all the connectors, ground wires, etc. securely). ① If serial transmission is restored after 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 1 and 2 above, replace both boards.

Checking code		Meaning, detecting method	Cause	Checking method & Countermeasure
1102	Discharge temperature abnormality (Outdoor unit)	1. When 110˚C for 8HP and 120°C for 10HP or more discharge temperature is detected during operations (the first time), outdoor unit stops once, mode is changed to restart mode after 3 minutes, then the outdoor unit restarts. 2. When 110°C for 8HP and 120 °C for 10HP or higher discharge is detected again (the second time) within 30 minutes after the first stop of outdoor unit, mode is changed to restart mode after 3 minutes, then the outdoor unit restarts. 3. When 110˚C for 8Hp and 120°C for 10Hp or more discharge is detected again (the third time) within 30 minutes after previous stop of outdoor unit, emergency stop is observed with code No. “1102” displayed. 4. When 110˚C for 8Hp and 120°C for 10Hp or more discharge is detected 30 or more minutes after previous stop of outdoor unit, the stop is regarded as the first time and the process shown in 1 is observed. 5. 30 minutes after stop of outdoor unit is intermittent fault check period with LED displayed (1202).	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 OC controller LEV: Cooling : LEV1	Check operation status by actually performing cooling or heating operations. Cooling : Indoor LEV LEV1 Heating : Indoor LEV See **Trouble check of LEV and solenoid valve.**
			5) Poor operations of ball valve.	Confirm that ball valve is fully opened.
			6) Outdoor unit fan block, motor trouble, poor operations of fan controller Heating (Heating-only, Heating-main). [3) ~ 6) : Rise in discharge temp. by low pressure drawing.]	Check outdoor fan. See **Trouble check of outdoor fan.**
			7) 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.
			8) Poor operation of solenoid valve SV1. [Bypass valve SV1 can not control rise in discharge temp.]	See **Trouble check of solenoid valve.**
			9) Thermistor trouble. (TH1)	Check resistance of thermistor.
			10) 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) 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 a temperature of -40°C or less is detected again (the second time) with in 30 minutes after the first stop of outdoor unit, mode is changed to restart mode after 3 minutes, then the outdoor unit restarts. 3. When -40˚C or less temp. is detected again (the third time) within 30 minutes after the second stop of outdoor unit, error stop is observed with code Nos "1111," "1112," or "1113" displayed. 4. When -40˚C or less 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. 5. 30 minutes after stop of outdoor unit is intermittent fault check period with LED 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 sensor before starting of compressor or within 10 minutes after starting of compressor, "1111" is displayed, too.	1) Gas leak, Gas shortage. 2) Insufficient load operations.	See **Refrigerant amount check.** Check operating conditions and operation status of outdoor unit.
				3) Poor operations of indoor LEV. 4) Poor operations of OC controller LEV: Cooling : LEV1	Check operation status by actually performing cooling-only or heating-only operations. Cooling : Indoor LEV LEV1 Heating : Indoor LEV See **Trouble check of LEV and solenoid valve.**
				5) Poor operations of ball valve.	Confirm that ball valve is fully opened.
				6) Short cycle of indoor unit. 7) Clogging of indoor unit filter. 8) Fall in air volume caused by dust on indoor unit fan. 9) Dust on indoor unit heat exchanger. 10) Indoor unit block, Motor trouble. [5)~9) : Fall in low pressure caused by evaporating capacity in cooling-only cooling-principal operation.]	Check indoor unit, and take measu-res to troube.
				11) Short cycle of outdoor unit. 12) Dust on outdoor heat exchanger.	Check outdoor unit, and take measures to trouble.
				13) Indoor unit fan block, motor trouble, and poor operations of fan controller. [14)~16) : Fall in low press. caused by lowered evaporating capa-city in heating-only heating-principal operation.]	Check outdoor unit fan. See **Trouble check of outdoor unit fan.**
				14) Poor operations of solenoid valve SV1. [Bypass valve (SV1) can not control low pressure drop.]	See **Trouble check of solenoid valve.**
				15) Thermistor trouble (TH2~TH6).	Check resistance of thermistor.
				16) Pressure sensor abnormality.	See **Trouble check of pressure sensor.**
				17) Control circuit board thermistor abnormality and pressure sensor input circuit abnormality.	Check inlet temp. and press. of sensor by LED monitor.
				18) Poor mounting of thermistor (TH2~TH6).	

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 press. sensor detects 2.74MPa or more during operations (the first time), outdoor unit stops once, mode is changed to restart mode after 3 minutes, then the outdoor unit restarts. 2. When a pressure of 2.74MPa or more is detected again (the second time) within 30 minutes after first stop of outdoor unit, mode is changed to restart mode after 3 minutes, then the outdoor unit restarts. 3. When 2.94MPa or more pressure is detected again (the third time) within 30 minutes after stop of outdoor unit,error stop is observed with code No. "1302" displayed. 4. When 2.74MPa or more 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. 5. 30 minutes after stop of outdoor unit is intermittent fault check period with LED displayed. 6. 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 outdoor LEV1	Check operations status by actually performing cooling or heating operations. Cooling : Indoor LEV LEV1 Heating : Indoor LEV See **Trouble check of LEV and solenoid valve.**
			3) Poor operations of ball valve.	Confirm that ball valve is fully open-ed.
			4) Short cycle of indoor unit. 5) Clogging of indoor unit filter. 6) Fall in air volume caused by dust on indoor unit fan. 7) Dust on indoor unit heat exchanger. 8) 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.
			9) Short cycle of outdoor unit. 10) Dust on outdoor unit heat exchanger.	Check outdoor unit and take measures to trouble.
			11) Outdoor unit fan block, motor trou-ble, 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.**
			12) Poor operations of solenoid valves SV1 (Bypass valves (SV1) can not control rise in high pressure).	See **Trouble check of solenoid valve**.
			13) Thermistor trouble (TH2, TH5, TH6).	Check resistance of thermistor.
			14) Pressure sensor trouble.	Check **Trouble check of pressure sensor.**
			15) 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) Coming 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.**
1500	Overcharged refrigerant abnormality	1. If the discharge SH≦10K is detected during operation (at first detection), the outdoor unit stops at once. The 3-minute restart prevention mode is entered. After three minutes, the outdoor unit starts up again. 2. If the discharge SH≦10K is detected again within 30 minutes after the outdoor unit stops (second detection), an abnormal stop is applied, and "1500" is displayed. 3. If discharge SH≦10K is detected more than 30 minutes after the outdoor unit stops, the state is the same as the first detection and the same operation as 1 above takes place. 4. The abnormal stop delay period is in effect for 30 minutes after the outdoor unit stops. The abnormal stop delay period LED turns ON during this time. 5. If the abnormality detection prohibit switch (SW2-4) is ON, the same operation as the first detection will apply for the second and following detections.	1) Excessive refrigerant charge.	Refer to the section on judging the refrigerant volume.
			2) Main circuit board thermistor input circuit trouble	Check the sensor detection temperature and pressure with the LED monitor.
			3) Thermistor mounting trouble (TH1, TH2)	
2500	Leakage (water) abnormality	When drain sensor detects flooding during drain pump OFF.	1) Water leak due to humidifier or the like in trouble.	Check water leaking of 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 is 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 40˚C : 3.1kΩ
			4) Indoor unit circuit board (detecting circuit) trouble.	Check contact of connector. Indoor port trouble if no other problem is 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 connect 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 melted, (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) to 5) is applicable, and if the trouble reappears 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 F2 is melted, (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) to 4) is applicable, and if the trouble reappears 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) Disconnection of fan speed detecting connector (CN33) of indoor controller board.	• Confirm disconnection of connector (CN33) on indoor controller board.
			2) Disconnection of fan output connector (FAN1) of indoor power board.	• Confirm disconnection 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 of 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 aboves have no trouble. 1) For trouble after operating fan. Replace indoor controller board. If not remedied, replace indoor power board. 2) For trouble without operating fan. Replace indoor power board.

Checking code		Meaning, detection procedure	Cause	Check method & Countermeasure
4220	Bus voltage drop protection (Error details No. 108.)	If Vdc ≦ 289V is detected during inverter operation.	1) Power environment	Check if an instantaneous stop or power failure, etc. has occurred. Check if the power supply voltage ≧ 289V across all phases.
			2) Voltage drop detected	Check the voltage between the G/A board P-N. → Go to 3) if there is no voltage drop. → Check the G/A board CNDC1 voltage. Replace the G/A board if a voltage drop is detected. Check the INV board connector CNDC2 voltage. → If there is a voltage drop, the wiring connection is defective. Check the INV board connector CNDC2 solder joints.
			3) INV board failure	Check that DC12V is being applied to the INV board connector CN52C during inverter operation.
			4) 52C failure	Refer to VII.4.5(4) -"52C coil resistance check" Check the voltage across the 52C points during inverter operation .
			5) Diode stack failure	Refer to VII.4.4(6). Check the diode stack resistance.
	Bus voltage rise protection (Error details No. 109.)	If Vdc ≧ 817V is detected during inverter operation.	1) Abnormal voltage connection	Check the voltage at the power terminal board (TB1).
			2) INV board failure	Replace the INV board if there is no problem with the power supply.
	VDC error (Error details No. 110.)	Bus voltage error If Vdc ≧ 772V or Vdc ≦ 308V is detected.	1) Same as error details No. 108 and 109 for 4220 error.	Same as error details No. 108 and 109 for 4220 error.
	Logic error (Error details No. 111.)	If only the H/W error logic circuit operates, and no identifiable error is detected.	1) External noise	Refer to 7 [1] (7) 1) [7] "Malfunction due to external noise".
			2) INV board failure	Replace the INV board if the error detects even after turning on again.

Checking code		Meaning, detection procedure	Cause	Check method & Countermeasure
4230	Heat sink overheat protection	If the cooling fan stays ON for 5 minutes or longer during inverter operation, and if THHS ≧ 95°C is detected.	1) Power supply environment	Check the power supply voltage. Ensure that the power supply voltage ≧342V across all phases.
			2) Air passage blockage	Check to make sure the air passage of the heat sink cooling is not blocked.
			3) Wiring defect	Check the cooling fan wiring.
			4) THHS failure	Check the THHS sensor resistance.
			5) INV board fan output failure	Ensure that the heat sink temperature is 55°C or more and that 220~240V is applied to the inverter PCB connector CNFAN when the inverter is on.
			6) Cooling fan failure	Check the cooling fan operation under the above operating conditions.
			7) IPM failure	Refer to 7 [1] (7) 2) [2] "Check for compressor ground fault or coil error" [5] "Check for inverter circuit trouble"
4240	Overload protection	The output current (Iac)≧ Imax(Amps) or THHS ≧ 85°C is detected continuously for 10 minutes during operation of the inverter. Imax=27Amps	1) Air passage short cycle	Ensure that a short cycle has not occurred at the unit fan exhaust.
			2) Air passage blockage	Check to make sure the air passage of the heat sink cooling is not blocked.
			3) Power supply	Check if the power supply voltage ≧342V.
			4) Wiring defect	Check the cooling fan wiring.
			5) THHS failure	Check the THHS sensor resistance.
			6) INV board fan output failure	Ensure that the heat sink temperature is 55°C or more and that 220~240V is applied to the inverter PCB connector CNFAN when the inverter is on.
			7) Cooling fan failure	Check the cooling fan operation under the above operating conditions.
			8) Current sensor (ACCT) failure	Refer to 7 [1] (7) 4) "Current sensor ACCT"
			9) Inverter circuit failure	Refer to 7 [1] (7) 2) [4] "Inverter damage check"
			10) Compressor failure	Check that the compressor has not overheated during operation. → Check the refrigerant circuit (oil return section). Replace the compressor if there are no problems with the refrigerant circuit.

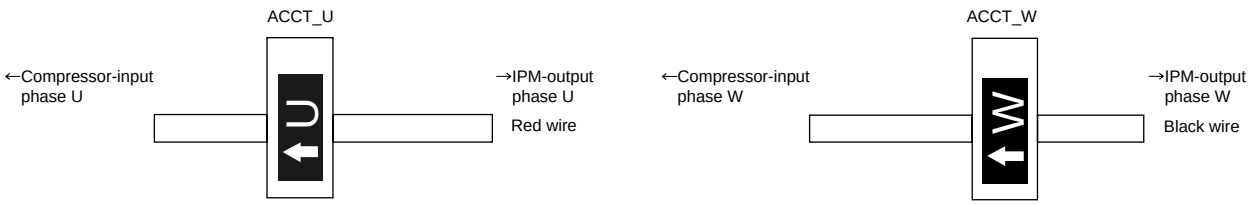
Checking code		Meaning, detection procedure	Cause	Check method & Countermeasure
4250	IPM error (Error details No. 101)	IPM error signal detected	1) Inverter output related	VII 4 5 (2) inverter output related trouble processing Refer to [1] - [5].
			2) Same as 4230 error	Same as 4230 error
	ACCT overcurrent break error (Error details No. 102) DCCT overcurrent break error (Error details No. 103) Overcurrent break error (Error details No. 106, 107)	Overcurrent break (94Apeak or 35Amps) detected by the current sensor.	1) Inverter output related	7 [1] (7) 2) inverter output related trouble processing Refer to [1] - [5].
	IPM short/grounding fault (Error details No. 104)	IPM short damage or grounding at the load side detected just before starting the inverter.	1) Compressor grounded	Refer to 7 [1] (7) 2) [2] "Check for compressor ground fault or coil error".
			2) Inverter output related	Refer to 7 [1] (7) 2) [5] "Check for inverter circuit trouble".
	Load short error (Error details No. 105)	Shorting at the load (compressor) side detected just before starting the inverter.	1) Compressor grounded	Refer to 7 [1] (7) 2) [2] "Check for compressor ground fault or coil error".
			2) Output wiring	Short circuit check
			3) Power supply	Check if the power supply voltage≧342V.
4260	Cooling fan error	If the heat sink temperature (THHS)≧95°C for 10 minutes or over when the inverter starts.	1) Same as 4230 error	Same as 4230 error

Checking code			Meaning, detecting method	Cause	Checking method & Countermeasure
5101	Thermal sensor abnormality (Outdoor Unit)	Discharge (TH1)	<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, restart-ing takes place. ② If a short or open circuit in the thermistor is detected just be-fore 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 de-frosting. <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.
5105		Heat exchanger inlet pipe (TH5)		3) Insulation is torn.	Check for tearing of the insulation.
5106		Ambient tempera-ture (TH6)		4) A connector pin is missing, or there is faulty contact.	Check if a pin is missing on the con-nector.
5107		Heat exchanger outlet pipe (TH7)		5) A wire is disconnected.	Check if a wire is disconnected.
5108		SC coil bypass outlet (TH8)		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 tem-perature is great, replace the MAIN cir-cuit board. (In the case of the THHS, replace the INV board.)
5110		Radiator panel (THHS)			

	Short Circuit Detection	Open Circuit Detection
TH1	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)
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)
THHS	–	-40°C or lower (2.5 MΩ)

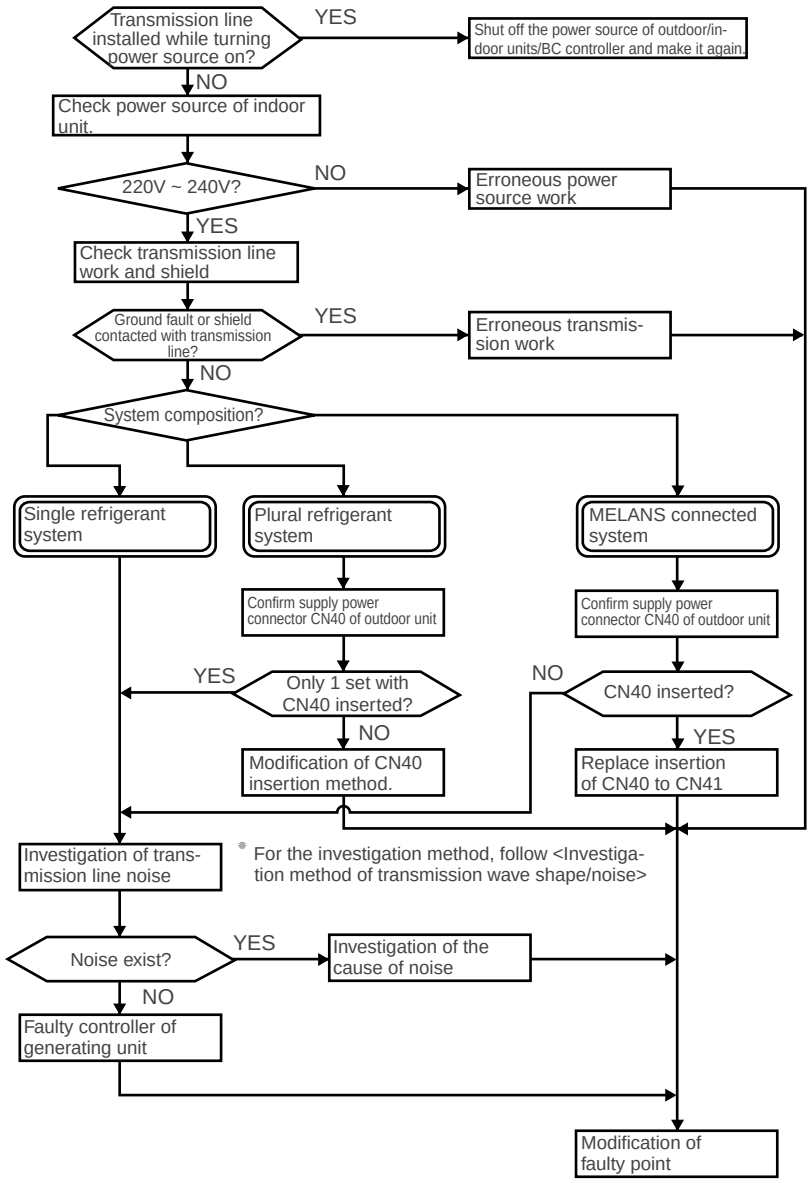
Checking code		Meaning, detecting method	Cause	Checking method & Countermeasure
5201	Pressure sensor abnormality (outdoor unit)	① When pressue sensor detects 0.098MPa or less during operation, outdoor unit once stops with 3 minutes restarting mode, and restarts if the detected pressure of pressure sensor exceeds 0.098 MPa 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.	See **Troubleshooting of pressure sensor**.
			2) Inner pressure drop due to a leakage. 3) Broken cover. 4) Coming off of pin at connector portion, poor contact. 5) Broken wire. 6) Faulty thermistor input circuit of MAIN board.	
5301	ACCT sensor error (Error details No. 115)	1.5Amps≦output current's effective value≦1.5Amps was detected during inverter operation.	1) Contact is faulty.	Check the INV board CNCT2 (ACCT) contact, CNDR2 and G/A Board CNDR1.
			2) ACCT sensor is faulty.	Replace the ACCT sensor
	DCCT sensor error (Error details No. 116)	The start current detected by DCCT is too low	1) Contact is faulty.	Check the connector connection on the INV board CNCT (DCCT), DCCT side.
			2) DCCT sensor incorrectly installed	Check DCCT installation direction
			3) DCCT sensor is faulty.	Replace the DCCT sensor
			4) INV board fault	Replace the INV board
	ACCT sensor circuit error (Error details No. 117)	An abnormal value was detected with the ACCT detection circuit just before the INV started.	1) INV board fault	Refer to 7 [1] (7) 2) [1]. [Check INV board error detection circuit]
			2) Compressor ground fault and IPM fault.	Refer to 7 [1] (7) 2) [2]. "Check compressor ground fault" and winding error". Refer to 7 [1] (7) 2) [5]. "Check inverter circuit fault".

Checking code		Meaning, detecting method	Cause	Checking method & Countermeasure
5301	DCCT sensor circuit error (Error details No. 118)	An abnormal value was detected with the DCCT detection circuit just before the INV started.	1) Contact is faulty.	Check the contacts around the INV board connector CNCT and DCCT side connector
			2) INV board fault	Refer to 7 [1] (7) 2) [1]. [Check INV board error detection circuit]
			3) DCCT is faulty.	If there is no problem up to step 2), replace DCCT and check the DCCT polarity.
			4) Compressor is faulty. Inverter circuit is fault.	Refer to 7 [1] (7) 2) [2]. "Check compressor ground fault" and winding error" Refer to 7 [1] (7) 2) [5]. "Check inverter circuit fault".
			5) Compressor ground fault and IMP fault.	Refer to 7 [1] (7) 2) [2]. "Check compressor ground fault" and winding error" Refer to 7 [1] (7) 2) [5]. "Check inverter circuit fault".
	IPM open/CNCT2 dislocation error (Error details No. 119)	IPM open damage or CNCT2 dislocation was detected just before INV started. (Sufficient current was not detected during self-diagnosis just before starting.)	1) ACCT sensor is dislocated	Check CNCT2 sensor connection (Check ACCT installation state)
			2) Wire connection is faulty.	Check CNDR2 connection on INV board, or CNDR1 connection on G/A board
			3) ACCT is faulty.	Refer to 7 [1] (7) 4) Check "current sensor ACCT" resistance value
			4) Compressor is disconnected	Refer to 7 [1] (7) 2) [2]. "Check compressor ground fault" and winding error"
			5) Inverter circuit is faulty.	Refer to 7 [1] (7) 2) [5]. "Check inverter circuit fault".
	Incorrect wiring detection error (Error details No. 120)	Improper installation of the ACCT sensor was detected.	1) ACCT sensor incorrectly installed.	Refer to 7 [1] (7) 4). "Current sensor ACCT"



(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) In the case that signal has changed due to noise entered into the transmission signal.	At the genration of 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 with that of the source of the trouble. When the same address is 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 on it again. b) When no trouble is generated 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) At 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 the 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.	

Checking code	Meaning, detecting method	Cause	Checking method & Countermeasure
6602	Transmission processor hardware error	Checking method and processing 	
6603	Transmission circuit bus-busy error 1 Collision of data transmission: Transmission can not be performed for 4~10 consecutive minutes due to collision of data transmission. 2 Data can not 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.	1) As the voltage of short frequency like noise is mixed in transmission line continuously, transmission processor can not transmit. 2) Faulty controller of generating unit.	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. → Noise if existed, check the noise.

Checking code	Meaning, detecting method	Cause	Checking method & Countermeasure
6606	Communications with transmission processor error 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 can not be restored.) → Controller trouble 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 in 6 continuous times with 30 second interval by transmission side controller, the transmission side detects error. Note: The address/attribute shown on remote controller indicates the controller not providing the answer (ACK).

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 BC transmission to OC	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 make it again. It will return to normal state at an accidental case. When normal state can not be recovered, check for the 1) ~ 4) of the cause.
	② BC controller (BC)	Remote controller (RC)	No reply (ACK) at IC transmission to BC	1) When Fresh Master address is changed or modified during operation. 2) Faulty or disconnection of transmission wiring of BC controller. 3) Disconnection of BC unit connector (CN02). 4) Faulty BC controller circuit board.	Shut down both OC and BC power sources simultaneously for 5 minutes or more, and make them again. It will return to normal state at an accidental case. When normal state can not be recovered, check for the 1) ~ 4) of the cause.
	③ Indoor unit (IC)	Remote controller (RC)	No reply (ACK) at RC transmission to IC	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 BC power sources simultaneously for 5 minutes or more, and make them again. It will return to normal state at an accidental case. When normal state can not be recovered, check for the 1) ~ 4) of the cause.
	④ Remote controller (RC)	Remote controller (RC)	No reply (ACK) at IC transmission to RC	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 OC power sources for 5 minutes or more, and make it again. It will return to normal state at an accidental case. When normal state can not be recovered, check for the 1) ~ 4) of the cause.

Checking code	Meaning, detecting method
6607 (continued)	No ACK error — When no ACK signal is detected in 6 continuous times with 30 second interval by transmission side controller, the transmission side detects error. Note: The address/attribute shown on remote controller indicates the controller not providing the answer (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 BC transmission to OC	As same that for single refrigerant system.	Same as measure for single refrigerant system.
	② BC controller (BC)	Remote controller (RC)	No replay (ACK) at IC transmission to BC	As same that for single refrigerant system.	Same as measure for single refrigerant system.
	③ Indoor unit (IC)	Remote controller (RC)	No reply (ACK) at RC transmission to IC	1) Cause of 1) ~ 5) of "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 of one re-frigerant system. 4) Neglecting insertion of 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 considered. • Total capacity error (7100) • Capacity code setting error (7101) • Connecting set number error (7102) • Address setting error (7105)	a) Shut down the power source of both IC and OC for over 5 minutes simultaneously, and make them again. Normal state will be returned incase of accidental trouble. b) Check for 1) ~ 5) of causes. If cause is found, remedy it. c) Check other remote controller or OC unit LED for troubleshooting for trouble. Trouble → Modify the trouble according to the content of check code. No trouble → Faulty indoor controller
	④ Remote controller (RC)	Remote controller (RC)	No reply (ACK) at IC transmission to RC	1) Cause of 1) ~ 3) of "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 of one refrigerant system. 4) Neglecting insertion of OC unit power supply connector (CN40). 5) Inserting more than 2 sets of power supply connector(CN40) for centralized control use. At generation after normal operation conducted once, the following causes can be considered. • Total capacity error (7100) • Capacity code setting error (7101) • Connecting set number error (7102) • Address setting error (7105)	a) Shut down the power source of OC for over 5 minute, and make it again. Normal state will be returned in case of accidental trouble. b) Check for 1) ~ 5) of causes. If cause is found, remedy it. When normal state can not be obtained, check 1) ~ 5) of causes.

Checking code	Meaning, detecting method
6607 (continued)	No ACK error — When no ACK signal is detected in 6 continuous times with 30 second interval by transmission side controller, the transmission side detects error. Note: The address/attribute shown on remote controller indicates the controller not providing the answer (ACK).

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 BC transmission to OC	As same that for single refrigerant system.	Same countermeasure as that for single refrigerant system.
	② BC controller (BC)	Remote controller (RC)	No reply (ACK) at RC transmission to IC	Same cause of that for grouping from plural refrigerants.	Same countermeasure as that for IC unit error in plural refrigerant system.
	③ Indoor unit (IC)	Remote controller (RC)	No reply (ACK) at transmission of SC to IC	Trouble of partial IC units: 1) Same cause as that for single refrigerant system.	→ Same countermeasure as that for single refrigerant system.
				Trouble of 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. → At trouble generation, check for the content according to check code. Check the content of 5)~7) shown left.
				Trouble of 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.
	④ Remote controller (RC)	Remote controller (RC)	No reply (ACK) at transmission of IC to RC	Same cause as that for plural refrigerant system.	Same countermeasure as that for plural refrigerant system.
			No reply (ACK) at transmission of MELANS to RC	Trouble of partial IC units: 1) Same cause of that for single refrigerant system.	→ Same countermeasure as that for single refrigerant system.
				Trouble of 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. → At trouble generation, check for the content according to check code. Check the content of 2)~4) shown left.
				Trouble of 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) left.

Checking code	Meaning, detecting method
6607 (continued)	No ACK error When no ACK signal is detected in 6 continuous times with 30 second interval by transmission side controller, the transmission side detects error. Note: The address/attribute shown on remote controller indicates the controller not providing the answer (ACK).

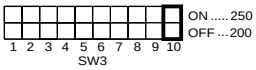
System composition	Generating unit address	Display of trouble	Detecting method	Cause	Checking method & countermeasure
(3) Connecting system with system controller (MELANS)	⑤ System controller (SC)	Remote controller (RC)	No reply (ACK) at transmission of IC to SC	Trouble of partial remote controller: 1) Faulty wiring of RC transmission line. 2) Disconnection or poor contact of RC trans-mission connector. 3) Faulty RC.	Check 1) ~ 3) left.
				Trouble of 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. → At trouble generation, check for the content according to check code. Check the content of 2) ~ 4) shown left.
				Trouble of all RC: 1) As same 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 which should not be existed	-	-	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.	As some IC units are keeping the memory of the address not existing, delete the information. Employ one of the deleting method among two below. 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. Be careful 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 Make 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.

(3) System error

<table>
<tr><th>Checking code</th><th>Meaning, detecting method</th><th>Cause</th><th>Checking method & Countermeasure</th></tr>
<tr><td>7100</td><td>Total capacity error

Total capacity of indoor units in the same refrigerant system exceeds limitations.

Trouble source:
Outdoor unit</td><td>1) Total capacity of indoor units in the same refrigerant system exceeds the following:
<table><tr><th>Model</th><th>Total capacity code</th></tr><tr><td>200</td><td>53</td></tr><tr><td>250</td><td>66</td></tr></table></td><td>a) Check for the model total (capacity cord total) of indoor units connected.
b) Check whether indoor unit capacity code (SW2) is wrongly set.

For erroneous switch setting, modify it, 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).</td></tr>
<tr><td></td><td></td><td>2) Erroneous setting of OC model selector switch (SW3-10).
 
</td><td>Check for the model selector switch (Dip switches SW3-10 on outdoor unit control circuit) of OC.</td></tr>
<tr><td>7101</td><td>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</td><td>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.</td><td>a) Check for the model name of the Indoor unit connected.

b) Check for 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.</td></tr>
<tr><td>7102</td><td>Connected unit count over

Number of units connected in the same refrigerant system exceeds limitations.

Trouble source:
Outdoor unit</td><td>1) Number of unit connected to terminal block (TB3) for outdoor/indoor transmission line exceeds limitations given be-lows:
<table><tr><th>Item</th><th>Limitation</th></tr><tr><td>Total of Indoor unit</td><td>200:1~13
250:1~16</td></tr><tr><td>Total of Indoor unit & RC</td><td>1~35</td></tr></table>2) The Outdoor unit address is being 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”.</td><td>a) Check whether the connection of units to the terminal block for indoor/outdoor transmission wiring (TB3) of outdoor unit is not exceeding the limitation.
b) Check for 2), 3), and 4).
c) Check for the connection of transmission wiring to the terminal block for centralized control is erroneously connected to the indoor/outdoor transmission wiring terminal block (TB3).
d) Check for the model total (capacity code total) of indoor units connected.</td></tr>
<tr><td>7105</td><td>Address setting error
• Erroneous setting of OC unit address

Trouble source :
Outdoor unit</td><td>1) Setting error of Outdoor unit address.
The address of Outdoor unit is not being set to 51~100.</td><td>Check that the address of OC unit is being set to 51~100.
Reset the address if it stays out of the range, while shutting the power source off.</td></tr>
</table>

<table>
<tr><th>Checking code</th><th>Meaning, detecting method</th><th>Cause</th><th colspan="2">Checking method & Countermeasure</th></tr>
<tr><td>7110</td><td>Transmission line power failure.</td><td>1) Transmission booster is faulty.
2) Power supply of transmission booster has been cut.</td><td colspan="2">Check transmission booster and power supply.</td></tr>
<tr><td>7111</td><td>Remote control sensor error
Error not providing the temperature designed to remote controller sensor.
Trouble source :
Indoor unit</td><td>1) In case when the old type remote controller for M-NET is used and the remote controller sensor is designed on indoor unit. (SW1-1 turned ON)</td><td colspan="2">a) Replace the old remote controller by the new remote controller.</td></tr>
<tr><td>7113</td><td>Main board connection failure.</td><td>Disconnection of plug on main board.</td><td colspan="2">Check all main board connectors and rectify faulty connection.</td></tr>
<tr><td rowspan="4">7130</td><td rowspan="4">Different unit model error</td><td rowspan="3">An exclusive R22 refrigerant indoor unit was connected to a R407C refrigerant outdoor unit.</td><td>1) An error was made in the MAIN board of the outdoor unit (replaced with the wrong circuit board).</td><td>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.</td></tr>
<tr><td>2) An error was made in selecting the indoor unit (installation error).</td><td>If the model name plate for the indoor unit is an exclusive R22 model, install a unit which can also operate with R407C</td></tr>
<tr><td>3) An error was made in the indoor unit’s circuit board (replaced with the wrong circuit board).</td><td>If the model name plate on the indoor unit indicates that it is also capable of operating with R407C, and error “7130” occurs , the indoor unit’s circuit board is for an exclusive R22 model, so replace it with the circuit board for a unit which is also capable of using R407C</td></tr>
<tr><td>The relation of the SWU3 and TH2 settings on the outdoor unit's main board establish the following errors.
Refrigerant model recognition table
<table>
<tr><th>SWU3 \ TH2</th><th>Exist</th><th>Not exist</th></tr>
<tr><td>R407C</td><td>R407C</td><td>Different unit model error (7130)</td></tr>
<tr><td>R22</td><td>Different unit model error (7130)</td><td>R22</td></tr>
</table>
</td><td colspan="2">If the refrigerant type shown on the model name plate on the outdoor unit and the settings shown in the refrigerant model recognition table do not match, change the settings so that they match.</td></tr>
</table>

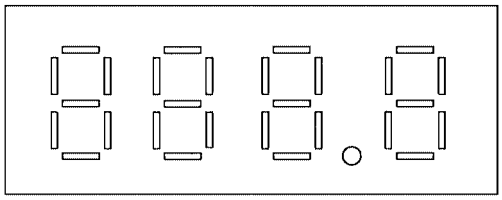
[5] LED Monitor Display

(1) How to read LED for service monitor

By setting of DIP SW1-1 ~ 1-8, the unit 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 figure below, the LED consist of 7 segments is put in 4 sets side by side for numerical and graphic display.

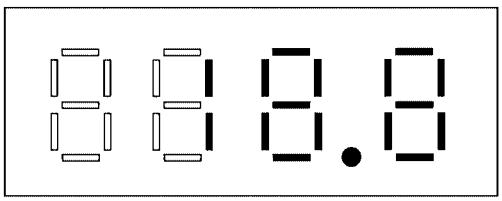
OC	:	Outdoor unit	SV	:	Solenoid valve	THHS	:	Inverter radiator panel
IC	:	Indoor unit	LEV	:	Electronic expansion valve	Th	:	Thermistor
			COMP	:	Compressor			
SW1	:	Outdoor unit control circuit board						
E	:	Memory storage for service activities (sampling per minute)						

7 seg LED

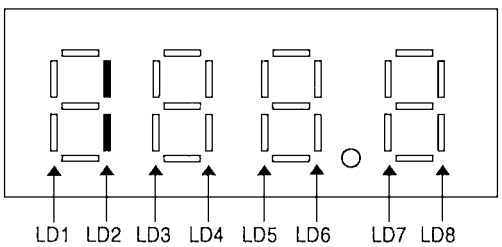


The numerical display includes that of pressure, temperature or the like, while the graphic display includes that of operating condition, solenoid valve ON/OFF state or the like.

• 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



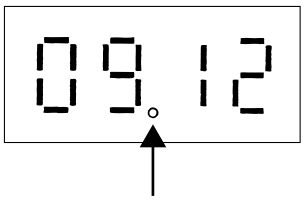
(2) Time data holding function

* **This function is not compatible with some units.**

The outdoor unit has a simple clock function to receive the time setting from the system controller, such as the G-50, and count the current time with an internal timer.
If an error (prediction) occurs, the error history data and the error detection time are saved in the service memory.
The error detection time saved in the service memory and the current time can be confirmed with the service LEDs.
Note 1) This is a simple clock function so the time should be used only for reference.
Note 2) The date and time data is all set to 00 as the default.
If a system controller that sets the time in the outdoor unit, such as the G-50, is not connected, the time and days elapsed from the first time the power was turned on will be displayed.
If the time setting has been received, the count will start from the set date and time.
Note 3) The time data is not updated when the outdoor unit's power is off. When the power is turned off and then on again, the count will resume from the time before the power was turned off. Thus, a time differing from the actual time will be saved.
(This also applies when a power failure occurs)
The system controller, such as the G-50, sets the time once a day. Thus, if this type of system controller is connected, the time will be updated to the correct time after the settings are received. (The data stored in the memory before the settings are received will not be corrected.)

Reading the time data

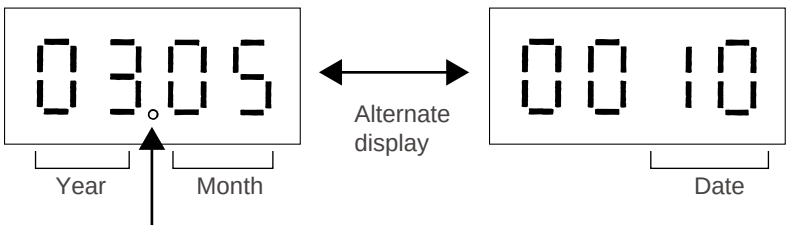
- For time display
  Example: 9 hours 12 minutes



"." disappears if the time data is deviated due to a power failure, or if a system controller for setting the time is not connected.

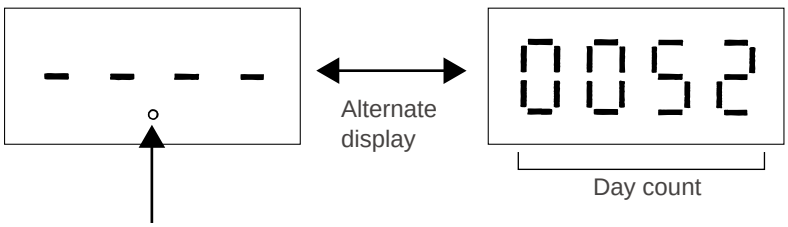
- Date display

① When upward controller that can set time is connected
Example: May 10, 2003



* The year and month display uses ".". The date display has no ".".

② When upward controller that can set time is not connected
Example: 52 days after power was turned ON



* The year and month display uses ".". The date display has no ".".

①PUHY-P200·250

No	SW	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
0	0000000000	Relay output display 1 (lighting to display)	Compressor operation	Compressor operation			52C1			Lights for norman operation	LD8 is a relay output which lights up at all times when the micro computers power is on. When sending off a monitering request to IC is terminated if there is no error "----" is displayed.
		Chech display 1OC Error	0000~9999					(Address and error code reversed)			
1	1000000000	Check display 2 (including the IC)	0000~9999					(Address and error code reversed)			If there is no Error, "--" is displayed.
2	0100000000	Relay output display 2 (lights up to display)	SV1	SV2				SV3	SV4		
3	1100000000	Relay output display 3 (lights up to display)						CH1			
4	0010000000	Relay output display 4 (lights up to display)			21S4a						
5	1010000000										
6	0110000000										
7	1110000000	Communication demand capacity	0000~9999								If no demand control, "--" is diaplayed.
8	0001000000	External signal	Comp ON/OFF	Night mode	Snow sensor			Active filter operation	Active filter preliminary error	Active filter error	
9	1001000000	Outdoor unit operation display		Warm up mode	3 minutes restart protection mode	Compressor operation	Preliminary error	error	3 minutes. restart after instantaneous power failure	Vacuum operation protection delayed	
10	0101000000	Indoor unit check	Unit No 1	Unit No2	Unit No3	Unit No4	Unit No5	Unit No6	Unit No7	Unit No8	Lights up if an abnormal stop has occurres in the IC. The indicator for unit No1 goes off when error reset is carried out.
11	1101000000		Unit No9	Unit No10	Unit No11	Unit No12	Unit No13	Unit No14	Unit No15	Unit No16	
12	0011000000										
13	1011000000										
14	0111000000	Indoor unit operation mode	Unit No 1	Unit No2	Unit No3	Unit No4	Unit No5	Unit No6	Unit No7	Unit No8	Lights up during cooling . Blinks during heating. Goes off during stop and blower mode.
15	1111000000		Unit No9	Unit No10	Unit No11	Unit No12	Unit No13	Unit No14	Unit No15	Unit No16	
16	0000100000										
17	1000100000										
18	0100100000	Indoor unit thermostat ON	Unit No 1	Unit No2	Unit No3	Unit No4	Unit No5	Unit No6	Unit No7	Unit No8	Lights up when thernostat is on.Goes off when thermostat is off.
19	1100100000		Unit No9	Unit No10	Unit No11	Unit No12	Unit No13	Unit No14	Unit No15	Unit No16	
20	0010100000										
21	1010100000										
22	0110100000										
23	1110100000	Outdoor unit operation mode	Permissable stop	Standby	Defrost	Cooling		Heating		Demand	
24	0001100000	Outdoor unit control mode	Initial start	Cooling Refrigerant	Heating Refrigerant	Defrost	Oil recovery	Low frequency oil collection			
25	1001100000	Outdoor unit preliminary error	High pressure error 1				Low pressure Error	Discharge temperature			
26	0101100000		Overcurrent protection			Heat sink thermostat operating			Overcurrent break	Inverter error	

No	SW	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	Corresponding flag lights during error delay.
27	1101100000		Excessive refrigerant charge	Configuration detection error	Oil temperature error						
28	0011100000		TH1			TH2			TH5		
29	1011100000		TH6		TH7		TH8				
30	0111100000										
31	1111100000		THHS						63HS	63LS	
32	0000010000	Outdoor unit preliminary error history	High pressure error 1				Low pressure Error	Discharge temperature error			Address and error code are reversed and displayed. "...." is displayed if there is no error.
33	1000010000		Overcurrent protection			Heatsink thermostat operating			Overeurrent break	Inverter error	
34	0100010000		Excessive refrigerant charge	Configuration detection error	Oil temperature error						
35	1100010000		TH1			TH2			TH5		
36	0010010000		TH6		TH7		TH8				
37	1010010000										
38	0110010000		THHS						63HS	63LS	
39	1110010000	Error history 1	0000~9999								
40	0001010000	Inverter error Datail	Inverter Error Detail (0~255)								"...." is displayed if there is no error.
41	1001010000	Error history 2	0000~9999								
42	0101010000	Inverter error Datail	Inverter Error Detail (0~255)								
43	1101010000	Error history 3	0000~9999								
44	0011010000	Inverter error Datail	Inverter Error Detail (0~255)								
45	1011010000	Error history 4	0000~9999								
46	0111010000	Inverter error Datail	Inverter Error Detail (0~255)								
47	1111010000	Error history 5	0000~9999								
48	0000110000	Inverter error Datail	Inverter Error Detail (0~255)								
49	1000110000	Error history 6	0000~9999								
50	0100110000	Inverter error Datail	Inverter Error Detail (0~255)								
51	1100110000	Error history 7	0000~9999								
52	0010110000	Inverter error Datail	Inverter Error Detail (0~255)								
53	1010110000	Error history 8	0000~9999								
54	0110110000	Inverter error Datail	Inverter Error Detail (0~255)								
55	1110110000	Error history 9	0000~9999								
56	0001110000	Inverter error Datail	Inverter Error Detail (0~255)								
57	1001110000	Error history 10	0000~9999								
58	0101110000	Inverter error Datail	Inverter Error Detail (0~255)								

No	SW	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
59	1101110000	Type of inverter preliminary Error (Details of the inverter error in 33)	0101~0121								
60	0011110000	TH1	−99.9~999.9								
61	1011110000										
62	0111110000										
63	1111110000	TH2	−99.9~999.9								
64	0000001000										
65	1000001000										
66	0100001000	TH5	−99.9~999.9								
67	1100001000										
68	0010001000	TH6	−99.9~999.9								
69	1010001000										
70	0110001000	TH7	−99.9~999.9								
71	1110001000										
72	0001001000	TH8	−99.9~999.9								
73	1001001000										
74	0101001000										
75	1101001000										
76	0011001000										
77	1011001000										
78	0111001000										
79	1111001000										
80	0000101000										
81	1000101000										
82	0100101000										
83	1100101000	THHS	−99.9~999.9								
84	0010101000										
85	1010101000										
86	0110101000										
87	1110101000										
88	0001101000	High pressure sensor data	−99.9~999.9								
89	1001101000	Low pressure sensor data	↑								
90	0101101000	αOC	0.000~9.999								
91	1101101000	αOC※	0.000~9.999								
92	0011101000	Acculumator level	0~9 ("AL=" is display)								
93	1011101000	Σ Qj	0000~9999								
94	0111101000	Target condensor temperature Tcm	−99.9~999.9								
95	1111101000	Target evaporator temperature Tem	↑								
96	0000011000	Condensor temperature Tc	↑								
97	1000011000	Evaporator temperature Te	↑								
98	0100011000	Compressor frequency (temporary)	0000~9999								
99	1100011000	Real compressor frequency	↑								
100	0010011000										
101	1010011000										
102	0110011000	AK	0000~9999								

No	SW	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
103	1110011000										
104	0001011000	SLEV	0000~9999								
105	1001011000	LEV1	↑								
106	0101011000										
107	1101011000										
108	0011011000	FACON output value (Toff%)	0000~9999								Displays the FANCON output value used for control.
109	1011011000										
110	0111011000	Compressor Current	–99.9~999.9								Arms
111	1111011000										
112	0000111000										
113	1000111000	Bus Voltage (VDC)	–99.9~999.9								
114	0100111000										
115	1100111000										
116	0010111000										
117	1010111000	OC Address	–99.9~999.9								
118	0110111000	IC1 Address / Capacity code	0000~9999				0000~9999				Displayed alternately every 5 seconds
119	1110111000	IC2 Address / Capacity code	↑				↑				
120	0001111000	IC3 Address / Capacity code	↑				↑				
121	1001111000	IC4 Address / Capacity code	↑				↑				
122	0101111000	IC5 Address / Capacity code	↑				↑				
123	1101111000	IC6 Address / Capacity code	↑				↑				
124	0011111000	IC7 Address / Capacity code	↑				↑				
125	1011111000	IC8 Address / Capacity code	↑				↑				
126	0111111000	IC9 Address / Capacity code	↑				↑				
127	1111111000	IC10 Address / Capacity code	↑				↑				
128	0000000100	IC11 Address / Capacity code	↑				↑				
129	1000000100	IC12 Address / Capacity code	↑				↑				
130	0100000100	IC13 Address / Capacity code	↑				↑				
131	1100000100	IC14 Address / Capacity code	↑				↑				
132	0010000100	IC15 Address / Capacity code	↑				↑				
133	1010000100	IC16 Address / Capacity code	↑				↑				
134	0110000100										
135	1110000100										
136	0001000100										
137	1001000100										
138	0101000100										
139	1101000100										
140	0011000100										

When there is an error stop with No.164~221, the data on error stops or the data immediately before the error postponement stop, which is stored in service memory, are displayed.

No	SW	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
141	1011000100										
142	0111000100										
143	1111000100										
144	0000100100										
145	1000100100										
146	0100100100										
147	1100100100										
148	0010100100										
149	1010100100										
150	0110100100	Compressor operating time upper 4 digits .	0000~9999								
151	1110100100	Lower 4 digits.	↑								
152	0001100100										
153	1001100100										
154	0101100100										
155	1101100100										
156	0011100100										
157	1011100100										
158	0111100100										
159	1111100100										
160	0000010100										
161	1000010100										
162	0100010100										
163	1100010100										
164	0010010100	Relay output display 1 (lighting to display)	Compressor operation	Compressor operation			52C			Lights for normal opetation	
165	1010010100	Relay output display 2 (lighting to display)	SV1	SV2				SV3	SV4		
166	0110010100	Relay output display 3 (lighting to display)						CH1			
167	1110010100	Relay output display 4 (lighting to display)			21S4a						
168	0001010100	TH1	−99.9~999.9								
169	1001010100										
170	0101010100										
171	1101010100	TH2	−99.9~999.9								
172	0011010100										
173	1011010100										
174	0111010100	TH5	−99.9~999.9								

No	SW	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
175	1111010100										
176	0000110100	TH6	−99.9~999.9								
177	1000110100										
178	0100110100	TH7	−99.9~999.9								
179	1100110100										
180	0010110100	TH8	−99.9~999.9								
181	1010110100										
182	0110110100										
183	1110110100										
184	0001110100										
185	1001110100										
186	0101110100										
187	1101110100										
188	0011110100										
189	1011110100										
190	0111110100										
191	1111110100	THHS	−99.9~999.9								
192	0000001100										
193	1000001100										
194	0100001100										
195	1100001100										
196	0010001100	High pressure sensor data	−99.9~999.9								
197	1010001100	Low pressure sensor data	↑								
198	0110001100	α OC	0.000~9.999								
199	1110001100	α OC®	↑								
200	0001001100	Acculumator level	0~9 ("AL=" is displayed)								
201	1001001100	ΣQj	0000~9999								
202	0101001100	Target condensor temperature Tcm	−99.9~999.9								
203	1101001100	Target evaporator temperature Tem	↑								
204	0011001100	Condensor temperature Tc	↑								
205	1011001100	Evaporator temperature Te	↑								
206	0111001100	Compressor frequency (Temporary)	0000~9999								
207	1111001100	Real compressor frequency	↑								
208	0000101100										
209	1000101100										
210	0100101100	AK	0000~9999								
211	1100101100										
212	0010101100	SLEV	0000~9999								
213	1010101100	LEV1	↑								

No	SW	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
214	0110101100										
215	1110101100										
216	0001101100	FANCON output value (Toff%)	0000~9999								
217	1001101100										
218	0101101100	Compressor Current	−99.9~999.9								
219	1101101100										
220	0011101100										
221	1011101100	Compressor Voltage	−99.9~999.9								
222	0111101100										
223	1111101100										
224	0000011100	Offset from target composition	−9.99~99.99								
225	1000011100	Elapsed time for CS circuit closed detection	0000~9999 (Values higher than 9999 are displayed as 9999.)								
226	0100011100	IC 1 Room temperature	−99.9~999.9								
227	1100011100	IC 2 Room temperature	↑								
228	0010011100	IC 3 Room temperature	↑								
229	1010011100	IC 4 Room temperature	↑								
230	0110011100	IC 5 Room temperature	↑								
231	1110011100	IC 6 Room temperature	↑								
232	0001011100	IC 7 Room temperature	↑								
233	1001011100	IC 8 Room temperature	↑								
234	0101011100	IC 9 Room temperature	↑								
235	1101011100	IC 10 Room temperature	↑								
236	0011011100	IC 11 Room temperature	↑								
237	1011011100	IC 12 Room temperature	↑								
238	0111011100	IC 13 Room temperature	↑								
239	1111011100	IC 14 Room temperature	↑								
240	0000111100	IC 15 Room temperature	↑								
241	1000111100	IC 16 Room temperature	↑								
242	0100111100										
243	1100111100										
244	0010111100										
245	1010111100										
246	0110111100										
247	1110111100										
248	0001111100										
249	1001111100										
250	0101111100										
251	1101111100										

No	SW	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
252	0011111100										
253	1011111100										
254	0111111100										
255	1111111100										
256	0000000010										
257	1000000010										
258	0100000010	IC 1 Liquid pipe temperature	−99.9~999.9								
259	1100000010	IC 2 Liquid pipe temperature	↑								
260	0010000010	IC 3 Liquid pipe temperature	↑								
261	1010000010	IC 4 Liquid pipe temperature	↑								
262	0110000010	IC 5 Liquid pipe temperature	↑								
263	1110000010	IC 6 Liquid pipe temperature	↑								
264	0001000010	IC 7 Liquid pipe temperature	↑								
265	1001000010	IC 8 Liquid pipe temperature	↑								
266	0101000010	IC 9 Liquid pipe temperature	↑								
267	1101000010	IC 10 Liquid pipe temperature	↑								
268	0011000010	IC 11 Liquid pipe temperature	↑								
269	1011000010	IC 12 Liquid pipe temperature	↑								
270	0111000010	IC 13 Liquid pipe temperature	↑								
271	1111000010	IC 14 Liquid pipe temperature	↑								
272	0000100010	IC 15 Liquid pipe temperature	↑								
273	1000100010	IC 16 Liquid pipe temperature	↑								
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	IC 1 gas pipe	−99.9~999.9								

No	SW	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
291	1100010010	IC 2 gas pipe	−99.9~999.9								
292	0010010010	IC 3 gas pipe	↑								
293	1010010010	IC 4 gas pipe	↑								
294	0110010010	IC 5 gas pipe	↑								
295	1110010010	IC 6 gas pipe	↑								
296	0001010010	IC 7 gas pipe	↑								
297	1001010010	IC 8 gas pipe	↑								
298	0101010010	IC 9 gas pipe	↑								
299	1101010010	IC 10 gas pipe	↑								
300	0011010010	IC 11 gas pipe	↑								
301	1011010010	IC 12 gas pipe	↑								
302	0111010010	IC 13 gas pipe	↑								
303	1111010010	IC 14 gas pipe	↑								
304	0000110010	IC 15 gas pipe	↑								
305	1000110010	IC 16 gas pipe	↑								
306	0100110010										
307	1100110010										
308	0010110010										
309	1010110010										
310	0110110010										
311	1110110010										
312	0001110010										
313	1001110010										
314	0101110010										
315	1101110010										
316	0011110010										
317	1011110010										
318	0111110010										
319	1111110010										
320	0000001010										
321	1000001010										
322	0100001010	IC 1 SH	−99.9~999.9								
323	1100001010	IC 2 SH	↑								
324	0010001010	IC 3 SH	↑								
325	1010001010	IC 4 SH	↑								
326	0110001010	IC 5 SH	↑								
327	1110001010	IC 6 SH	↑								
328	0001001010	IC 7 SH	↑								

No	SW	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
329	1001001010	IC 8 SH	−99.9~999.9								
330	0101001010	IC 9 SH	↑								
331	1101001010	IC 10 SH	↑								
332	0011001010	IC 11 SH	↑								
333	1011001010	IC 12 SH	↑								
334	0111001010	IC 13 SH	↑								
335	1111001010	IC 14 SH	↑								
336	0000101010	IC 15 SH	↑								
337	1000101010	IC 16 SH	↑								
338	0100101010										
339	1100101010										
340	0010101010										
341	1010101010										
342	0110101010										
343	1110101010										
344	0001101010										
345	1001101010										
346	0101101010										
347	1101101010										
348	0011101010										
349	1011101010										
350	0111101010										
351	1111101010										
352	0000011010										
353	1000011010										
354	0100011010	IC 1 SC	−99.9~999.9								
355	1100011010	IC 2 SC	↑								
356	0010011010	IC 3 SC	↑								
357	1010011010	IC 4 SC	↑								
358	0110011010	IC 5 SC	↑								
359	1110011010	IC 6 SC	↑								
360	0001011010	IC 7 SC	↑								
361	1001011010	IC 8 SC	↑								
362	0101011010	IC 9 SC	↑								
363	1101011010	IC 10 SC	↑								
364	0011011010	IC 11 SC	↑								
365	1011011010	IC 12 SC	↑								
366	0111011010	IC 13 SC	↑								

No	SW	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
367	1111011010	IC 14 SC	−99.9~999.9								
368	0000111010	IC 15 SC	↑								
369	1000111010	IC 16 SC	↑								
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										
385	1000000110										
386	0100000110	IC 1 LEV opening pulses	0000~9999								
387	1100000110	IC 2 LEV opening pulses	↑								
388	0010000110	IC 3 LEV opening pulses	↑								
389	1010000110	IC 4 LEV opening pulses	↑								
390	0110000110	IC 5 LEV opening pulses	↑								
391	1110000110	IC 6 LEV opening pulses	↑								
392	0001000110	IC 7 LEV opening pulses	↑								
393	1001000110	IC 8 LEV opening pulses	↑								
394	0101000110	IC 9 LEV opening pulses	↑								
395	1101000110	IC 10 LEV opening pulses	↑								
396	0011000110	IC 11 LEV opening pulses	↑								
397	1011000110	IC 12 LEV opening pulses	↑								
398	0111000110	IC 13 LEV opening pulses	↑								
399	1111000110	IC 14 LEV opening pulses	↑								
400	0000100110	IC 15 LEV opening pulses	↑								
401	1000100110	IC 16 LEV opening pulses	↑								
402	0100100110										
403	1100100110										
404	0010100110										

No	SW	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
405	1010100110										
406	0110100110										
407	1110100110										
408	0001100110										
409	1001100110										
410	0101100110										
411	1101100110										
412	0011100110										
413	1011100110										
414	0111100110										
415	1111100110										
416	0000010110										
417	1000010110										
418	0100010110	IC 1 Operation mode	00 : OFF 01 : Fan 02 : Cooling 03 : Heating 04 : Dry								
419	1100010110	IC 2 Operation mode									
420	0010010110	IC 3 Operation mode									
421	1010010110	IC 4 Operation mode									
422	0110010110	IC 5 Operation mode									
423	1110010110	IC 6 Operation mode									
424	0001010110	IC 7 Operation mode									
425	1001010110	IC 8 Operation mode									
426	0101010110	IC 9 Operation mode									
427	1101010110	IC 10 Operation mode									
428	0011010110	IC 11 Operation mode									
429	1011010110	IC 12 Operation mode									
430	0111010110	IC 13 Operation mode									
431	1111010110	IC 14 Operation mode									
432	0000110110	IC 15 Operation mode									
433	1000110110	IC 16 Operation mode									
434	0100110110										
435	1100110110										
436	0010110110										
437	1010110110										
438	0110110110										
439	1110110110										
440	0001110110										
441	1001110110										
442	0101110110										

No	SW	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
443	1101110110										
444	0011110110										
445	1011110110										
446	0111110110										
447	1111110110										
448	0000001110										
449	1000001110										
450	0100001110	IC 1 Filter	0000~9999								
451	1100001110	IC 2 Filter	↑								
452	0010001110	IC 3 Filter	↑								
453	1010001110	IC 4 Filter	↑								
454	0110001110	IC 5 Filter	↑								
455	1110001110	IC 6 Filter	↑								
456	0001001110	IC 7 Filter	↑								
457	1001001110	IC 8 Filter	↑								
458	0101001110	IC 9 Filter	↑								
459	1101001110	IC 10 Filter	↑								
460	0011001110	IC 11 Filter	↑								
461	1011001110	IC 12 Filter	↑								
462	0111001110	IC 13 Filter	↑								
463	1111001110	IC 14 Filter	↑								
464	0000101110	IC 15 Filter	↑								
465	1000101110	IC 16 Filter	↑								
466	0100101110										
467	1100101110										
468	0010101110										
469	1010101110										
470	0110101110										
471	1110101110										
472	0001101110										
473	1001101110										
474	0101101110										
475	1101101110										
476	0011101110										
477	1011101110										
478	0111101110										
479	1111101110										
480	0000011110										

No	SW	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
481	1000011110										
482	0100011110										
483	1100011110										
484	0010011110										
485	1010011110										
486	0110011110										
487	1110011110										
488	0001011110										
489	1001011110										
490	0101011110										
491	1101011110										
492	0011011110										
493	1011011110										
494	0111011110										
495	1111011110										
496	0000111110										
497	1000111110										
498	0100111110										
499	1100111110										
500	0010111110										
501	1010111110										
502	0110111110										
503	1110111110										
504	0001111110										
505	1001111110										
506	0101111110	INV output frequency	0000~9999								Data for mineral oil recovery operation displayed
507	1101111110	TH1 [TH11] data	−99.9~999.9								
508	0011111110										
509	1011111110	63HS data	−99.9~999.9								
510	0111111110	63LS data	↑								
511	1111111110	AK data	0000~9999								
512	0000000001										
513	1000000001										
514	0100000001										
515	1100000001										
516	0010000001										
517	1010000001										
518	0110000001										
519	1110000001										
520	0001000001	U phase current effective value 1	−99.9~999.9								

No	SW	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
521	1001000001	W phase current effective value 1	−99.9~999.9								
522	0101000001	Power factor phase angle 1(deg)	↑								
523	1101000001										
524	0011000001										
525	1011000001										
526	0111000001										
527	1111000001										
528	0000100001										
529	1000100001										
530	0100100001										
531	1100100001										
532	0010100001	Main circuit board WDT reset counter	0~255								
533	1010100001	INV circuit board WDT reset counter	↑								
534	0110100001										
535	1110100001										
536	0001100001	Instantaneous power failure counter	0~255								
537	1001100001	COMP1 ON/OFF counter	↑								
538	0101100001										
539	1101100001										
540	0011100001										
541	1011100001										
542	0111100001	WDT reset/power ON time after power recovery (time)	0~9999								
543	1111100001										
544	0000010001										
545	1000010001										
546	0100010001										
547	1100010001										
548	0010010001										
549	1010010001	Current time	Hour: Minute								
550	0110010001	Current date	Year/Month				Day				Display alternatly
551	1110010001	Error detection time 1	Hour: Minute								
552	0001010001	Error detection day 1	Year/Month				Day				Display alternatly
553	1001010001	Error detection time 2	Hour: Minute								
554	0101010001	Error detection day 2	Year/Month				Day				Display alternatly
555	1101010001	Error detection time 3	Hour: Minute								
556	0011010001	Error detection day 3	Year/Month				Day				Display alternatly
557	1011010001	Error detection time 4	Hour: Minute								
558	0111010001	Error detection day 4	Year/Month				Day				Display alternatly
559	1111010001	Error detection time 5	Hour: Minute								

No	SW 1234567890	Item	LED								Remarks
			LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
560	0000110001	Error detection day 5	Year/Month				Day				Display alternatly
561	1000110001	Error detection time 6	Hour: Minute								
562	0100110001	Error detection day 6	Year/Month				Day				Display alternatly
563	1100110001	Error detection time 7	Hour: Minute								
564	0010110001	Error detection day 7	Year/Month				Day				Display alternatly
565	1010110001	Error detection time 8	Hour: Minute								
566	0110110001	Error detection day 8	Year/Month				Day				Display alternatly
567	1110110001	Error detection time 9	Hour: Minute								
568	0001110001	Error detection day 9	Year/Month				Day				Display alternatly
569	1001110001	Error detection time 10	Hour: Minute								
570	0101110001	Error detection day 10	Year/Month				Day				Display alternatly
1023	1111111111	Request LED 7-segment LED mode									

8 PREPARATION, REPAIRS AND REFRIGERANT REFILLING WHEN REPAIRING LEAKS

[1] Location of Leaks: Extension Piping or Indoor Units (when Cooling)

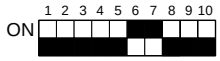
① Attach a pressure gage to the low-pressure servicing check joint (CJ2).
② Stop all of the indoor units. When the compressor has stopped, shut off the liquid ball valve (BV2) for the outdoor unit.
③ Stop all of the indoor units. When the compressor has stopped, turn the SW3-6 switch on the main board 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 at least 0.196 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 gage for the lowpressure servicing joint (CJ2) reads0.147 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)

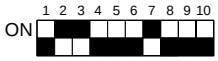
① Test run all indoor units in cooling mode.
1. With SW3-1 on the MAIN board of the outdoor unit set to ON and SW3-2 OFF → ON to test run all indoor units.
2. Change the remote controller settings so that all indoor units run in cooling mode.
3. Check that all indoor units are running in cooling mode.

② Check the Tc and TH7 data.
(The self-diagnosis switch (SW1) on the MAIIN board of the outdoor unit can be used to display this data on the LED.)
1. If Tc – TH7 is 10 degrees or more ..... Continue to step ③.
2. If Tc – TH7 is less than 10 degrees ..... After stopping the compressor, remove any refrigerant, repair the leak point, 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 self-diagnosis switch]



[TH7 self-diagnosis 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 leak point.
⑧ After the leak point is repaired, 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. Then, open both ball valves (BV1 and BV2), then adjust the refrigerant amount and verify that the refrigerant is circulating properly.

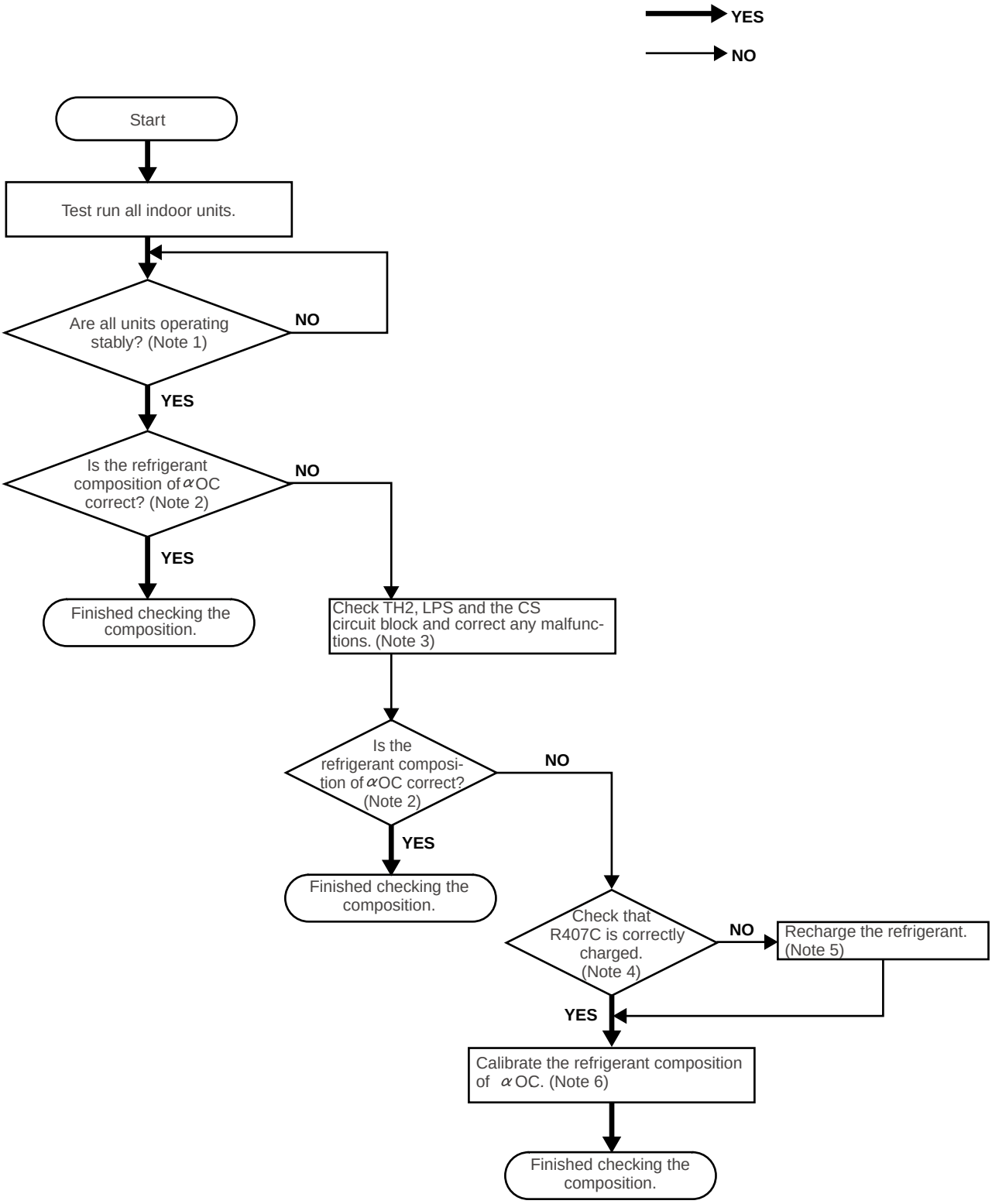
[4] Location of Leaks: Outdoor Unit (when Heating)

① Remove any refrigerant from the entire system (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, 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.

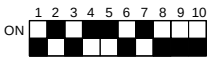
9 CHECK THE COMPOSITION OF THE REFRIGERANT



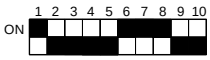
Note 1 Wait until the units stabilize as described in the refrigerant amount adjustment procedure in “Chapter 6”.

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 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, or LPS are malfunctioning, correct them, then set SW3-8 on the MAIN board of the outdoor unit from OFF to ON.
- If any number other than 0 is displayed and TH2, or LPS are not malfunctioning, replace the CS circuit if refrigerant is not flowing through it (while operating) and set SW3-8 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 large 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
For 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, change 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, change the switch 5 times.
ON (0.29) → OFF (0.32) → ON (0.35) → OFF (0.38) → ON (0.41) → OFF (0.23)

10 CAUTIONS WHEN REPLACING THE OUTDOOR UNIT MAIN BOARD

For specifications for operation, as Replace-Multi series has a characteristic that mineral oil recovery operation in the refrigerant pipe makes a diversion of existing pipe possible, normal operation can not be performed until the mineral oil recovery operation is completed. Information on the completion of mineral oil recovery operation is written in the memory of the main board for control accordingly. Therefore, in case of taking a wrong procedure for replacement of the main board, the following phenomenon may appear.
(When replacing only ROM, completion information of the main board is held.)

- An outdoor unit operates before mineral oil recovery operation, which may lead to a compressor trouble and shortened service life.
- Mineral oil operation can not be performed.
- After mineral oil recovery operation, an outdoor unit does not operate.

Consequently, be sure to carry out the work in the following descriptions when replacing the main board for outdoor unit.
In addition, please note that the descriptions are subject to change depending on the timing.

Timing for replacing the main board	Response procedure
• Before mineral oil recovery operation	Set the SW2-9 of main board to ON.
• After the completion of mineral oil recovery operation	Set the SW2-9 of main board to OFF