MITSUBISHI ELECTRIC

AIR TO WATER HEAT PUMP UNITS

June 2023

No. OCH816

SERVICE MANUAL R290

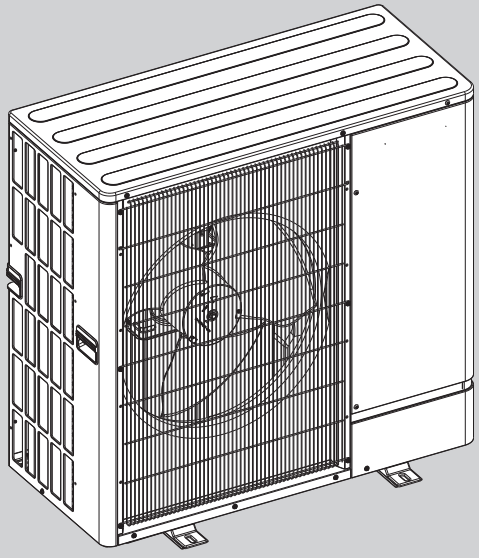
<Outdoor unit>

[Model Name]	[Service Ref.]
PUZ-WZ50VAA	PUZ-WZ50VAA.UK
PUZ-WZ60VAA	PUZ-WZ60VAA.UK
PUZ-WZ80VAA	PUZ-WZ80VAA.UK

Salt proof model

PUZ-WZ50VAA-BS	PUZ-WZ50VAA-BS.UK
PUZ-WZ60VAA-BS	PUZ-WZ60VAA-BS.UK
PUZ-WZ80VAA-BS	PUZ-WZ80VAA-BS.UK

Note:
- This manual describes service data of the outdoor units only.



PUZ-WZ50VAA.UK

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1 REFERENCE MANUAL

INDOOR UNIT SERVICE MANUAL
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2 SAFETY PRECAUTION

MEANINGS OF SYMBOLS DISPLAYED ON THE UNIT

	**WARNING** (Risk of fire)	This unit uses R290, a highly flammable refrigerant. If any refrigerant leaks or comes in contact with fire or a heated surface or environment, there is a risk of fire or explosion, and the installer and/or user is warned to take all possible safety precautions when handling the unit and R290, being sure to keep a safe distance at all times to any related fire or explosion and to notify the fire department immediately on becoming aware of such an outcome.
	Read the OPERATION MANUAL carefully before operation.	
	Service personnel are required to carefully read the OPERATION MANUAL and INSTALLATION MANUAL before operation.	
	Further information is available in the OPERATION MANUAL, INSTALLATION MANUAL, and the like.	

2-1. ALWAYS OBSERVE FOR SAFETY

Before obtaining access to terminal, all supply circuits must be disconnected.

2-2. CAUTIONS RELATED TO R290 REFRIGERANT

Cautions for units utilizing refrigerant R290

Preparations before the repair service

- Prepare the proper tools for R290.
- Prepare the proper protectors.
- Provide adequate space and ventilation.
- After stopping the operation of the air to water heat pump unit, turn off the power-supply breaker.
- Discharge the condenser before the work involving the electric parts.
- Make sure that there is no ignition sources in work area.
- Static electricity is also an ignition source. Anti-static measures (anti-static and static electricity elimination) should be taken.
- Make sure that there is no refrigerant in work area and by detector.
- Ensure that appropriate fire extinguishing equipment (e.g., fire extinguishers) is in place and ready for use.
- Make sure that the proper work procedures and methods.
- Make sure that unauthorised persons are restricted from entering the work area or protective zone of the unit during working.

Use a vacuum pump with a reverse flow check valve.

Vacuum pump oil may flow back into refrigerant cycle and that can cause deterioration of refrigerant oil, etc.

Use the following tools specifically designed for use with R290 refrigerant.

The following tools are necessary to use R290 refrigerant.
See Section 2.3 [5] "Service tools" for details.
If incorrect tools are used, a fire or explosion will occur.

Tools for R290	
Gauge manifold	Refrigerant recovery machine
Charge hose	Refrigerant cylinder
Gas leak detector	Vacuum pump

Do not use refrigerant other than R290.

If other refrigerant (R22, etc.) is used, chlorine in refrigerant can cause deterioration of refrigerant oil, etc.

The unit must only be installed/serviced/relocated/repaired/disposed, including any work undertaken on a related refrigerant circuit, by a competent electrician, with the requisite professional qualifications to install this unit and perform electrical works in your jurisdiction. Please contact your dealer for them.
Failure to conduct electric work, deal with the refrigerant circuit(s) and install/service/relocate/repair or dispose the unit correctly in accordance with the foregoing and all laws and regulations may lead to prosecution, water leakage, electric shock or fire.
Mitsubishi Electric does not accept responsibility for any direct, indirect, special or consequential loss, damage, liability or expense incurred or suffered which results from any works undertaken by an unqualified or third party installer, or any failure, claim, damage or deficiency caused to a unit by improper installation, servicing, relocation, repair or disposing.

Precautions during the repair service

- Do not perform the work involving the electric parts with wet hands.
- Do not pour water into the electric parts.
- Do not touch the refrigerant.
- Do not touch the hot or cold areas in the refrigerating cycle.
- When the repair or the inspection of the circuit needs to be done without turning off the power, exercise great caution not to touch the live parts.
- Make sure that there is no refrigerant leak during the service work.
- In the event of refrigerant leakage, to do as follows:
  - Evacuate any people from the danger zone.
  - From a safe position, switch off the electricity supply for all system components.
  - Remove ignition sources from the danger zone.
  - Do not operate the unit until repairs are completed.
- Do not remove the parts from the unit by flame such as brazing and by tools such as a hacksaw or mechanical cutting tools which can cause sparking.
- Do not braze the pipe and unit which contain refrigerant.

Use the specified refrigerant only.

Never use any refrigerant other than that specified.
Doing so may cause a burst, an explosion, or fire when the unit is being used, serviced, or disposed of.
Correct refrigerant is specified in the manuals and on the spec labels provided with our products.
We will not be held responsible for mechanical failure, system malfunction, unit breakdown or accidents caused by failure to follow the instructions.

Keep ignition source away from the R290 refrigerant.

The following are the ignition source in R290.

Source of ignition	Refrigerant	Security class
Flame	R290/R32	A3/A2L
Electric arc		
Hot surface (R290 : 370°C, R32 : 548°C)		
Electrical switch contacts (pressostats, relay, etc.)	R290	A3
Discharge of capacitors		
Electrical potential differences		
Mechanical impact of friction sparks(by tools)		
Static charge on non-earthed components (e.g. refrigerant hose)		
Static charge of work clothes		
Use of electric devices (smartphone, notebook, tablet)		

Handle tools with care.

If dirt, dust or moisture enters into refrigerant cycle, that can cause deterioration of refrigerant oil or malfunction of compressor.

[1] R290 Refrigerant Properties

(1) Properties of refrigerants.

R290 refrigerant is classified as class A3 in the safety group of ISO817 because it has low toxicity (class A) and higher flammability (class 3).
It is highly flammable and MUST be handled safely to prevent fire and explosion.

	R290	R32	R410A	R22
Chemical formula	C_3H_8	CH_2F_2	CH_2F_2/CHF_2CF_2	$CHICF_2$
Composition (blend ratio wt.%)	Single composition	Single composition	R32/R125R (50%/50%)	Single composition
Ozone depletion potential (ODP)	0	0	0	0.055
Global warming potential (GWP)*1	<3	675	2088	1810
Boiling point (°C)	-41.8	-51.7	-51.5	-40.8
Pressure (MPa)*2	1.71	3.14	3.07	1.94
Flammability*3	Higher Flammability (Class 3)	Lower Flammability (Class 2L)	No Flame Propagation (Class 1)	No Flame Propagation (Class 1)
Toxicity*3	Lower Chronic Toxicity (Class A)	Lower Chronic Toxicity (Class A)	Lower Chronic Toxicity (Class A)	Lower Chronic Toxicity (Class A)

*1 Values based on IPCC 4th assessment report
*2 Temperature condition Characteristic value at 50°C
*3 Data from ISO 817:2014

(2) Pressure[MPaG]

As shown in the following table, at the same refrigerant temperature, the saturated vapor pressure of R290 is lower than that of R32 and about as same as that of R22.
However the design pressure of R290 ATW is 3.2MPaG in order to raise the hot water temperature to 75°C (It is higher than R22).
So note that the pressure strength required for the tool which is used for R290 is not the same as that of R22.

Temperature (°C)	R290	R32	R410A	R22
-20	0.14	0.3	0.3	0.14
0	0.47	0.71	0.7	0.4
20	0.84	1.37	1.35	0.81
40	1.37	2.38	2.32	1.43
60	2.12	3.84	3.73	2.33
80	3.13	-	-	-

(3) Flammability

As shown in the following table, R290 ignites with much less concentration and energy than R32.
In addition, it burns explosively unlike R32. In other words, when handling the products and cylinders containing the R290, there is a higher probability of causing a larger explosion or fire than the R32.
Therefore, stricter safety measures are required than R32 refrigerant.

	R290	R32
Flammability*1	Higher Flammability (Class 3)	Lower Flammability (Class 2L)
LFL (Vol.%) Lower Flammable Limit	1.8	13.3
UFL (Vol.%) Upper Flammable Limit	9.5	29.3
Minimum ignition energy (mJ)	0.246	15
Burning velocity (cm/s)	38.7	6.7
Ignition temperature (°C)	470	648
Maximum allowable the temperature (°C) EN378-2:2018*2	370	548

*1 Data from ISO 817:2014
*2 Data from EN378-2:2018

(4) Smell

The propane for a gas stoves generally has an odour, but the propane used as a refrigerant for this products has NO smell.
In other words, it is not possible to notice by the odour whether or not the refrigerant is leaking, so you should always check it with a leak detector when working.

[2] Warning for service

(1) The user should never attempt to repair the unit or transfer it to another location. If the unit is installed incorrectly, water leakage, electric shock, fire or explosion may result. If the outdoor unit must be repaired or moved, ask a dealer or a competent electrician with the requisite professional qualifications in your jurisdiction.

(2) Do not alter the unit. Consult a dealer or authorised technician for repairs. If alterations or repairs are not performed correctly, water leakage, electric shock, fire or explosion may result.

(3) For installation and relocation work, follow the instructions in the Installation Manual.

(4) The unit must only be installed/serviced/relocated/repaired/disposed, including any work undertaken on a related refrigerant circuit, by a competent electrician, with the requisite professional qualifications to install this unit and perform electrical works in your jurisdiction. Please contact your dealer for them.
Failure to conduct electric work, deal with the refrigerant circuit(s) and install/service/relocate/repair or dispose the unit correctly in accordance with the foregoing and all laws and regulations may lead to prosecution, water leakage, electric shock or fire.
Mitsubishi Electric does not accept responsibility for any direct, indirect, special or consequential loss, damage, liability or expense incurred or suffered which results from any works undertaken by an unqualified or third party installer, or any failure, claim, damage or deficiency caused to a unit by improper installation, servicing, relocation, repair or disposing.

(5) The unit must be installed according to the Installation Manual in order to minimize the risk of damage from earthquakes, typhoons, or strong winds. An incorrectly installed unit may fall down and cause damage or injuries.
The unit must be securely installed on a structure that can sustain its weight. If the unit is mounted on an unstable structure, it may fall down and cause damage or injuries.

(6) Refrigerant pipes connection shall be accessible for maintenance purposes.

(7) If the outdoor unit is installed in a small room, measures must be taken to prevent the refrigerant concentration in the room from exceeding the safety limit in the event of refrigerant leakage.
Consult an installer regarding the appropriate measures to prevent the allowable concentration from being exceeded. Be sure to install it in an appropriate place according to section 2.4 "Choosing the outdoor unit installation location", 2.5 "Minimum installation area" and 2.6 "Protective Zone".
Should the refrigerant leak and cause the concentration limit to be exceeded, hazards due to lack of oxygen, fire, or explosion hazards in the room may result.
Ventilate the room if refrigerant leaks during operation. If refrigerant comes into contact with a flame, there is risk of fire or explosion.

(8) Keep gas-burning appliances, electric heaters, electrical switches and other ignition sources away from the around the outdoor unit, protective zone and the location where installation, repair, and other work will be performed.
If refrigerant comes into contact with a flame, a fire or explosion will occur.
Static electricity is also an ignition source. Anti-static measures (anti-static and static electricity elimination) should be taken before work.

(9) When servicing the heat pump unit, use only the specified refrigerant (R290) to charge the refrigerant lines.
Do not mix it with any other refrigerant and do not allow air to remain in the lines.
If air is mixed with the refrigerant, then it can be the cause of abnormal high pressure in the refrigerant line, and may result in an explosion and other hazards.
The use of any refrigerant other than that specified for the system will cause mechanical failure or system malfunction or unit breakdown. In the worst case, this could lead to a serious impediment to securing product safety.

(10) After installation or servicing has been completed, the installer or service provider must check for refrigerant leaks by using a professional leak detector tool. If refrigerant leaks into the room and comes into contact with the flame of a heater, or portable cooking range, sparks, static electricity or objects with high surface temperature (>370°C), a fire or explosion will occur, and all persons in close or adjacent vicinity of the leak must be immediately advised to move away to a safe distance in order for the area to be checked by a professional.

(11) Do not remove the parts from the unit by flame such as brazing and by tools such as a hacksaw or mechanical cutting tools which can cause sparking.

(12) Do not use low temperature solder alloy in case of brazing the refrigerant pipes.

(13) When the installer and the service provider is performing brazing work, be sure to ventilate the room sufficiently or work outside. Make sure that there are no hazardous or flammable materials nearby.
Do not brazing the pipe and unit which contain refrigerant. Make sure that the refrigerant has been removed completely before brazing.

(14) When performing the work in a closed room, small room, or similar location, provide adequate ventilation due to open the door or windows and using a fan compliant with R290.
If refrigerant leaks and accumulates, it may ignite and explosion.

(15) When performing the work, make sure that there are no refrigerant leaks by detector before and during performing the work.
In the event of refrigerant leakage, to do as follows:
- Evacuate any people from the danger zone.
- From a safe position, switch off the electricity supply for all system components.
- Remove ignition sources from the danger zone.
- Do not operate the unit until repairs are completed.

(16) **Do not install the unit in places where refrigerant may build-up or places with poor ventilation such as a semi-basement: Refrigerant is heavier than air, and inclined to fall away from the leak source.**
(17) **The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater).**
(18) **Do not pierce or burn.**
(19) **Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.**
(20) **Be aware that refrigerants may not contain an odour.**
(21) **Pipe-work shall be protected from physical damage.**
(22) **Compliance with national gas regulations shall be observed.**
(23) **Keep any required ventilation openings clear of obstruction.**
(24) **Servicing shall be performed only as recommended by the manufacturer.**
(25) **The appliance shall be stored in a well-ventilated area where the room size corresponds to the room area as specified for operation.**
(26) **Maintenance, service and repair operations shall be performed by authorised technician with required qualification.**
(27) **Work on the refrigerant circuit with flammable refrigerant in safety group A3 may only be carried out by authorised heating contractors. These heating contractors must be trained in accordance with EN 378 Part 4 or IEC 60335-2-40 Annex HH.**
(28) **Be sure to have appropriate ventilation in order to prevent ignition. Furthermore, be sure to carry out fire prevention measures that there are no dangerous or flammable objects in the surrounding area.**
(29) **When carrying out work on the refrigerant circuit or working in the protected area, a competent electrician with the requisite professional qualifications must use only the specified and appropriate tools.**
Use appropriate tools and equipment approved for R290 refrigerant.
(30) **Perform service after recovering the refrigerant left in unit completely.**
Refrigerant must only be released, recovered and disposed properly by an authorised competent person.
(31) **In order to not invalidate unit warranty and maintain the correct and safe functioning of the unit, please use only parts and accessories recommended by Mitsubishi Electric, to be installed by a competent electrician with the requisite professional qualifications in your jurisdiction. We accept no liability for damage or expenses caused by the incorrect installation of the unit and/or third party accessories, parts or components, which may result in water leakage, electric shock or fire.**
(32) **Make sure that unauthorised persons are restricted from entering the work area or protective zone of the unit during working. Restrict the work area and put up the warning signs.**

[3] Cautions for service

(1) After completing service, charge the cycle with specified amount of refrigerant.
(2) When performing service, install a filter drier simultaneously.
Be sure to use a filter drier for new refrigerant.

[4] Safety requirement and work procedure of the repair service for unit using R290 refrigerant.

Observe the following safety requirements, precautions, and work procedures to perform the repair services.

(1) Safety check before the repair services
For repair to the refrigerating systems, (1-1) to (1-7) shall be completed prior to conducting work on the systems.

(1-1) Checks on the Area
Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimized.

(1-2) Work Procedure and Tools
Work shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapor being present while the work is being performed.
Be sure to check this service manual before carrying out any work. In particular, the safety requirements, precautions and work procedures described in Section 2 "SAFETY PRECAUTION" and Section 11 "DISASSEMBLY PROCEDURE" must be followed.
Make sure that the tools and equipment used are approved for R290 refrigerant. Be sure to check the section "2.2.[5] Service tools" of this service manual.

(1-3) General Work Area
All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided. The area around the workspace shall be sectioned off. Ensure that the conditions within the area have been made safe by control of flammable material.

(1-4) Checking for Presence of Refrigerant
The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.
Check if R290 refrigerant leak to the secondary circuit (heating/cooling circuit) when refrigerant leaks occur.
In the event of refrigerant leakage, to do as follows:
- Evacuate any people from the danger zone.
- From a safe position, switch off the electricity supply for all system components.
- Remove ignition sources from the danger zone.
- Do not operate the unit until repairs are completed.

(1-5) Presence of Fire Extinguisher
If any hot work is to be conducted on the refrigeration equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand.
Have a dry powder or CO2 fire extinguisher adjacent to the charging area.

(1-6) No Ignition Sources
No person carrying out work in relation to a refrigeration system which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “No Smoking” signs shall be displayed.
The following are the ignition source in R290.

Source of ignition	Refrigerant	Security class
Flame	R290/R32	A3/A2L
Electric arc		
Hot surface (R290 : 370 °C, R32 : 548 °C)		
Electrical switch contacts (pressostats, relay, etc.)	R290	A3
Discharge of capacitors		
Electrical potential differences		
Mechanical impact of friction sparks (by tools)		
Static charge on non-earthed components (e.g. refrigerant hose)		
Static charge of work clothes		
Use of electric devices (smartphone, notebook, tablet)		

In particular, pay attention to the following points to eliminate ignition sources.
• Sparks due to tool friction also be a source of ignition. Work that sparks should be done away from the unit.
• Be sure to use the electrical tools compliant with R290.
• Do not install unit during turning on electricity. Turn off electricity and check by tester before installing R290 unit.
• Static electricity is also an ignition source.
Anti-static measures (anti-static and static electricity elimination) should be taken.
• Do not brazing the pipe and unit which contain refrigerant. Before brazing, refrigerant must be removed.
• When repairing the refrigerant parts, remove parts to be replaced by cutting with pipe cutter, NOT by flame nor by electric saw, etc.

• Keep ignition sources away from outdoor units containing R290 refrigerant. Even in a well ventilated environment, do not bring ignition sources into the Protected Zone described in section 2.7.
• Do not smoke during work and transportation.

(1-7) Ventilated Area

Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.
Do not install the unit and work in places where refrigerant may build-up or places with poor ventilation such as a semi-basement.
When performing the work in a closed room, small room, or similar location, provide adequate ventilation due to open the doors or windows and using a fan compliant with R290.

(1-8) Checks on the Refrigeration Equipment

Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer's maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer's technical department for assistance.
The following checks shall be applied to installations using flammable refrigerants:
• The charge size is in accordance with the room size within which the refrigerant containing parts are installed.
• The ventilation machinery and outlets are operating adequately and are not obstructed.
• Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected.
• Refrigeration pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being corroded.
• The secondary circuit (heating/cooling circuit) shall be checked for the presence of refrigerant.

(1-9) Checks on Electrical Devices

Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised.
Initial safety checks shall include that:
• capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;
- Make sure that LED on the outdoor controller circuit board goes out and wait for at least 1 minute.
- If there is a refrigerant leak, never touch the electrical components while leak detection is being carried out because spark may occur even if LED1 goes out.
• no live electrical components and wiring are exposed while charging, recovering or purging the system;
• there is continuity of earth bonding

(2) Repairs to Sealed Components

(2-1) During repairs to sealed components, all electrical supplies shall be disconnected from the equipment being worked upon prior to any removal of sealed covers, etc.
If it is absolutely necessary to have an electrical supply to equipment during servicing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.
Locate the detector close to sealed components and avoid concentration of R290 refrigerant around the sealed components by using a fan compliant with R290. If it detects a leak, immediately install the sealed cover and leave the area.

(2-2) Particular attention shall be paid to the following to ensure that by working on electrical components, the casing is not altered in such a way that the level of protection is affected. This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc.
Ensure that the apparatus is mounted securely.
Ensure that seals or sealing materials have not degraded to the point that they no longer serve the purpose of preventing the ingress of flammable atmospheres. If the sealing materials are degraded or damaged, replace it with a new one.
Replacement parts shall be in accordance with the manufacturer's specifications.

(3) Repair to intrinsically Safe Components

Do not apply any permanent inductive or capacitance loads to the circuit without ensuring that this will not exceed the permissible voltage and current permitted for the equipment in use.
Intrinsically safe components are the only types that can be worked on while live in the presence of a flammable atmosphere. The test apparatus shall be at the correct rating.
Replace components only with parts specified by the manufacturer. Other parts may result in the ignition of refrigerant in the atmosphere from a leak.

(4) Cabling

Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or pumps.
Use only specified cables for wiring. The wiring connections must be made securely with no tension applied on the terminal connections. Also, never splice the cables for wiring (unless otherwise indicated in the Installation Manual).Failure to observe these instructions may result in overheating or a fire.
If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid hazard.

Continued to the next page.

The appliance shall be installed in accordance with national wiring regulations.
The terminal block cover panel of the outdoor unit must be firmly attached. If the cover panel is mounted incorrectly and dust and moisture enter the unit, electric shock or fire may result.

(5) Detection of Flammable Refrigerants
Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.

(6) Leak Detection Methods
Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25% maximum) is confirmed.
Leak detection fluids are suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.
If a leak is suspected, all naked flames shall be removed/extinguished.
If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system.
For appliances containing flammable refrigerants, oxygen free nitrogen (OFN) shall then be purged through the system both before and during the brazing process.

(7) Removal and Evacuation of the R290 refrigerant
When breaking into the refrigerant circuit to make repairs or for any other purpose conventional procedures shall be used. However, for flammable refrigerants it is important that best practice is followed since flammability is a consideration. The following procedure shall be adhered to:
- remove refrigerant
- purge the circuit with inert gas for 5 min
- evacuate down the refrigerant circuit to a pressure of 30 kPa absolute or lower
- purge again with inert gas for 5 min
- open the circuit by cutting, not by flame

Do not remove the parts from the unit by flame such as brazing and by tools such as a hacksaw or mechanical cutting tools which can cause sparking.
The refrigerant charge shall be recovered into the correct recovery cylinders. For appliances containing flammable refrigerants, the system shall be “flushed” with OFN to render the unit safe. This process may need to be repeated several times.
Compressed air or oxygen shall not be used for purging refrigerant systems.
For appliances containing flammable refrigerants, flushing shall be achieved by breaking the vacuum in the system with OFN and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum. This process shall be repeated until no refrigerant is within the system. When the final OFN charge is used, the system shall be vented down to atmospheric pressure to enable work to take place. This operation is absolutely vital if brazing operations on the pipe-work are to take place.
Ensure that the outlet for the vacuum pump is not close to any ignition sources and that ventilation is available.
Be sure to use a vacuum pump and a recovery machine compliant with R290 that has been specially designed and tested not to be an ignition source of itself. It is deeply better to use the recovery machine that comply with explosion-proof standards such as ATEX and IECEx.

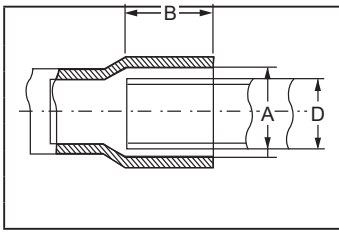
(8) Recovery
When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely. When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge are available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.
The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of all appropriate refrigerants including, when applicable, flammable refrigerants. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult manufacturer if in doubt.
The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders. If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.

Continued to the next page.

(9) Remove the repair parts of the outdoor unit
Be sure to work according to the section "11 DISASSEMBLY PROCEDURE" of this service manual.

(10) Brazing a new parts
• Processing brazing connections
Conduct appropriate brazing as shown in the following table.
<Minimum insertion depth and gap for copper pipe joints>

Unit: mm

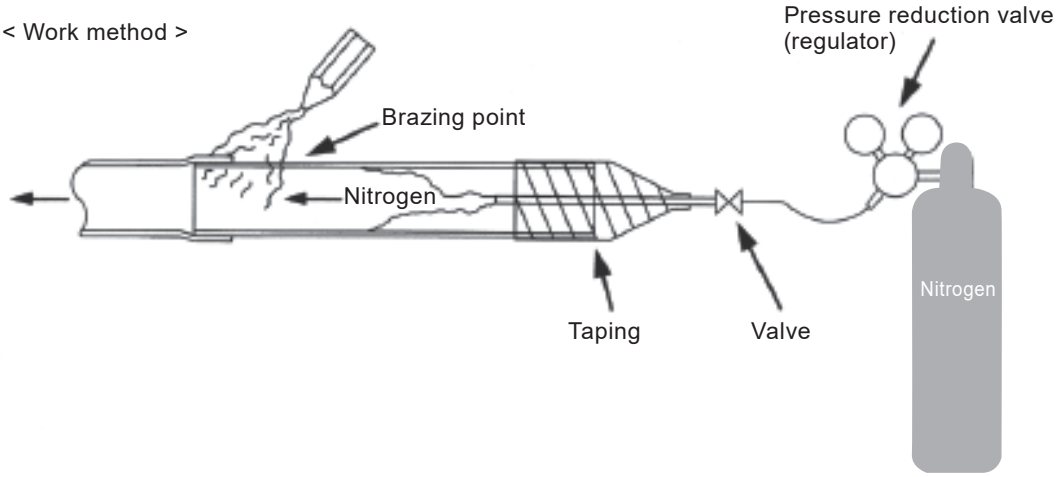


Pipe outer diameter (D)	Minimum insertion depth (B)	Gap* (A-D) × 1/2
More than 5, less than 8	6	0.05 ~ 0.35
More than 8, less than 12	7	
More than 12, less than 16	8	0.05 ~ 0.45
More than 16, less than 25	10	
More than 25, less than 35	12	0.05 ~ 0.55
More than 35, less than 45	14	
More than 45, less than 53	16	0.05 ~ 0.55

* When using silver solder, a gap of 0.05 - 0.1 mm provides the strongest connection.

• Non-oxidized brazing using nitrogen replacement method (nitrogen purging)
If nitrogen is not passed through the piping, a large oxide layer will form on the inner surface. This oxide layer may cause blockage of the electromagnetic valve, capillary tubes and accumulator oil-return hole, as well the oil pump suction opening inside the compressor.
This may prevent normal operation. As a preventative measure to stop this, it is necessary to replace the air inside the piping with nitrogen at the time of brazing. It is a very important task during the refrigerant piping brazing process.
Use nitrogen only. Do not use oxygen, carbon dioxide, HFCs, and HCs.
- The nitrogen gas pressure is to be 0.02 MPa or less.
- Oxygen: Causes refrigerant oil deterioration due to oxidation.
- Carbon dioxide: Degrades drying properties.
- HFCs: If contact with an open flame is made, toxic gas is generated. R32 is lower flammable, leakage may cause fire.
- HCs: If contact with an open flame, fire or explosion occur.
Be sure to use a pressure-reduction valve (regulator)

< Work method >



• Brazing work
Using the nitrogen replacement method is basic for brazing.
After brazing, remove the flux. (If the chlorine in the flux is left inside the piping, it will cause the refrigerant oil to deteriorate.)
Be sure there is appropriate ventilation and is not R290 refrigerant near the working area when performing brazing work. Before and during working, be sure to check the area for refrigerant leaks with a suitable refrigerant detector.
Do not braze the pipe and unit which contain refrigerant.
Do not use low temperature solder alloy in the case of brazing the refrigerant pipes.
When brazing, point the pipe horizontally or downward. Avoid pointing it upward as much as possible to prevent leakage.

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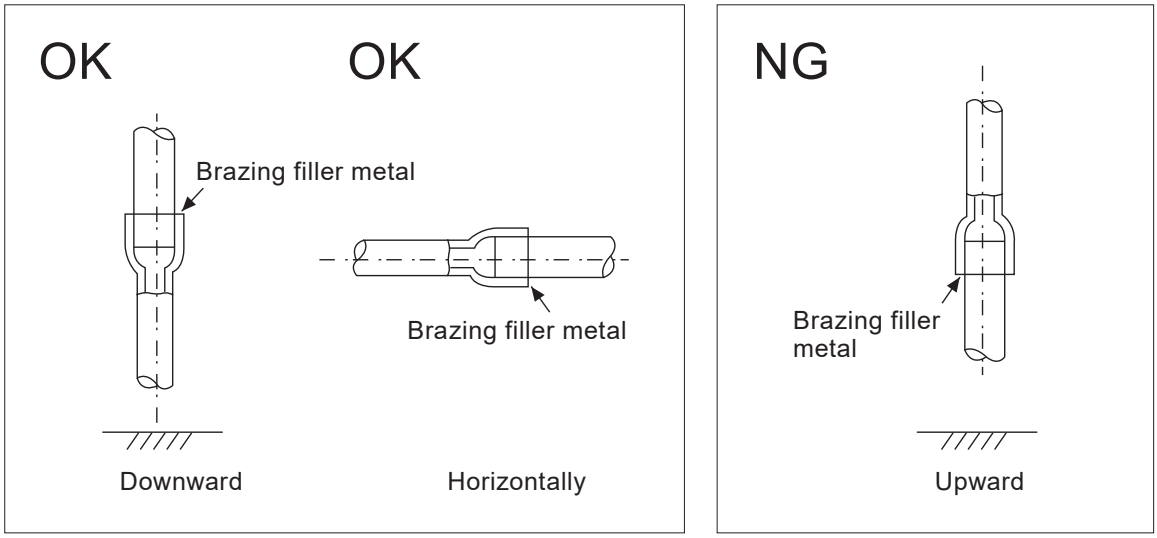
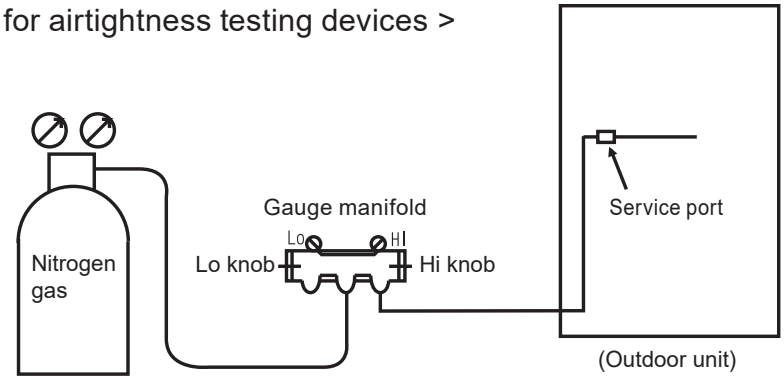


Make sure to prevent fire. (Cover area around brazing point and prepare fire extinguisher/water.)
Take care to avoid burning yourself.
Confirm that the pipe and joint gap is appropriate to prevent leakage.

(11) Airtightness Test

In order to pressurize the refrigerant piping to the air conditioner's designed pressure using nitrogen gas, connect equipment as shown in the following diagram.

< Connection diagram for airtightness testing devices >



Do not use chlorine-based refrigerant or oxygen/combustible gas as pressurized gas under any circumstances. (Using oxygen as pressurized gas will cause an explosion).
Do not pressurize to the designed pressure all at once. Instead, pressurize gradually in multiple steps.

STEP 1

Pressurize to 0.5 MPa (5 kgf/cm^2), stop pressurization, wait for at least five minutes, and confirm that there is no loss in pressure.

STEP 2

Pressurize to 1.5 MPa (15 kgf/cm^2), wait again for at least five minutes and confirm that there is no loss in pressure.

STEP 3

Next, increase pressure to the designed pressure of the air conditioner and record the ambient temperature and pressure. Leave for approximately one day at the designed pressure. If the pressure does not drop, the test is successful. Be careful to consider pressure increases and decreases based on ambient temperature.
If there is a loss in pressure, there is a leak. Find the leak and repair it.
If there is a leak, check welding points using soapy water, etc.

(12) Vacuum Drying

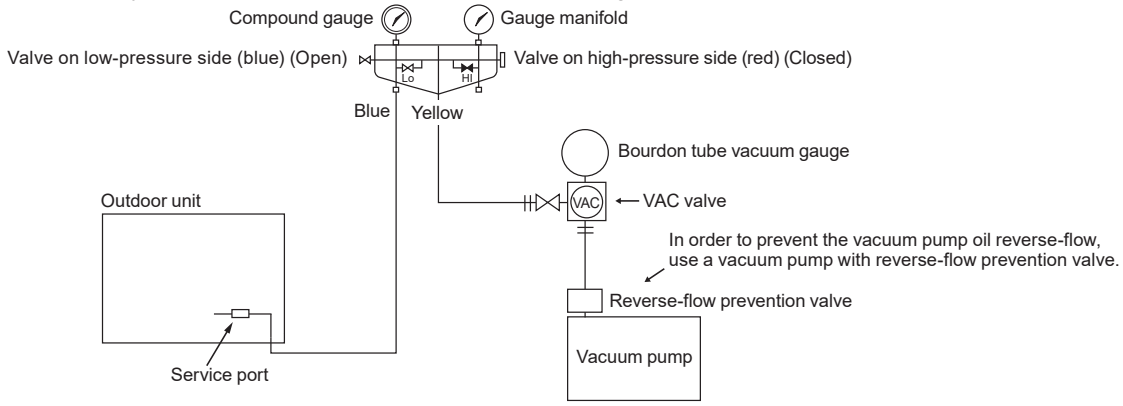
It needs to carry out vacuum drying to remove the air, moisture and nitrogen gas used during the airtightness test, etc. in the pipes.

- If the air is mixed into the refrigerant circuit, the pressure will rise to an abnormally high, which may cause compressor malfunction.
- If a small amount of moisture (atmospheric moisture) is mixed into the refrigerating circuit, this may cause air conditioner malfunction.
- If moisture is mixed into the refrigerant circuit, it may freeze in the expansion valve and cause air conditioner malfunction.

Connect equipments refer to the below diagram.
Remove a sufficient level of pressure using vacuum pump.
The refrigerant oil used in refrigerant circuit has high moisture absorbency, and has the characteristic of generating acidic

Continued to the next page.

substances even when a small amount of moisture is present.
It is necessary to remove a sufficient level of moisture using a vacuum pump (0.5 Torr or less).



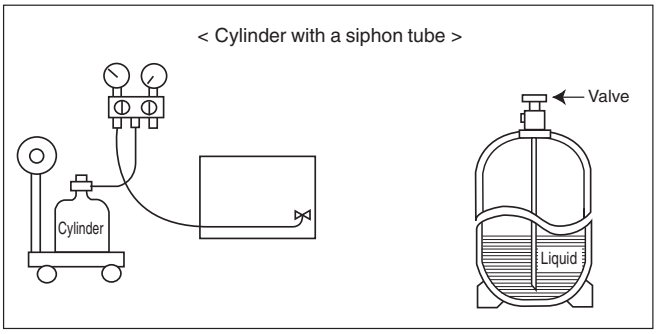
- If the vacuum pump oil reverse into the refrigerant circuit, it may cause air conditioner malfunction. Therefore, use a vacuum pump with a reverse-flow prevention device in order to prevent oil reverse-flow from the vacuum pump.
- Be sure to use a vacuum pump compliant with R290 that has been specially designed and tested not to be an ignition source of itself. It is deeply better to use the recovery machine that comply with explosion-proof standards such as ATEX and IECEx.

(13) Charging Procedures

Both liquid charging and gas charging are possible because R290 is a single refrigerant and its composition does not change. However it is difficult to change a sufficient amount by gas charging since R290 is a low pressure refrigerant.

Therefore, R290 refrigerant should be charged by liquid charging using a cylinder with a siphon tube.

Liquid charging of refrigerant all at once from the low pressure side may cause the compressor malfunction. Accordingly, make sure that charging is gradual.



Confirm the refrigerant name on the cylinder and conduct charging with the refrigerant specified for the air conditioner.

Using the wrong refrigerant may cause mechanical problems, malfunctions and faults, or seriously endanger safety. Be sure to conduct charging the correct refrigerant.
In addition to conventional charging procedures, the following requirements shall be followed:

- Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
- Cylinders shall be kept upright.
- Ensure that the refrigeration system is earthed prior to charging the system with refrigerant.
- Label the system when charging is complete (if not already).
- Extreme care shall be taken not to overfill the refrigeration system.

Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

(14) Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of reclaimed refrigerant. It is essential that electrical power is available before the task is commenced.
a) Become familiar with the equipment and its operation.
b)Isolate system electrically.
c)Before attempting the procedure, ensure that:

Continued to the next page.

• mechanical handling equipment is available, if required, for handling refrigerant cylinders;
• all personal protective equipment is available and being used correctly;
• the recovery process is supervised at all times by a competent person;
• recovery equipment and cylinders conform to the appropriate standards.

d)If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
e)Make sure that cylinder is situated on the scales before recovery takes place.
f) Start the recovery machine and operate in accordance with manufacturer's instructions.
g)Do not overfill cylinders. (No more than 80 % volume liquid charge).
h)Do not exceed the maximum working pressure of the cylinder, even temporarily.
i) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
j) Recovered refrigerant shall not be charged into another refrigeration system unless it has been cleaned and checked.

(15) Labelling

Equipment shall be labelled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. For appliances containing flammable refrigerants, ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.

(16) Recycling and disposal

Do not dispose of the unit with the household waste.

According to the laws and ordinances of each country, hand in the unit to a collection center for waste electrical or electronic equipment or to a recycler authorised by manufacturer.

Check the following condition of the unit before transporting for disposal. If there is deemed to be a risk of leakage during transport, it needs to be empty the machine of refrigerant.

-Strength

-corrosion

-refrigerant circuit status

-securing the load

Refrigerant must only be released, recovered and disposed properly by an authorised competent person.

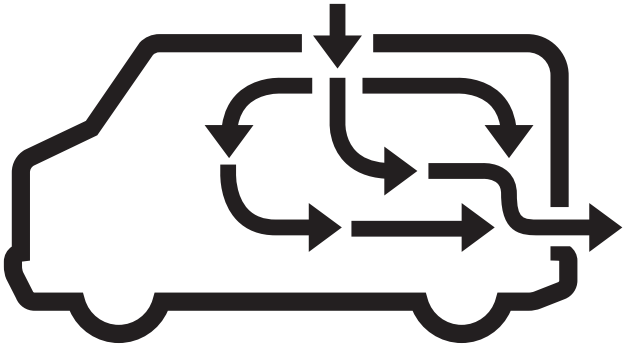
Be sure to observe the following safety requirements when transporting the unit.

1. Do not use a source of ignition during transportation, which includes: naked flames, sparks, static electricity, objects with high surface temperature (>370 °C).

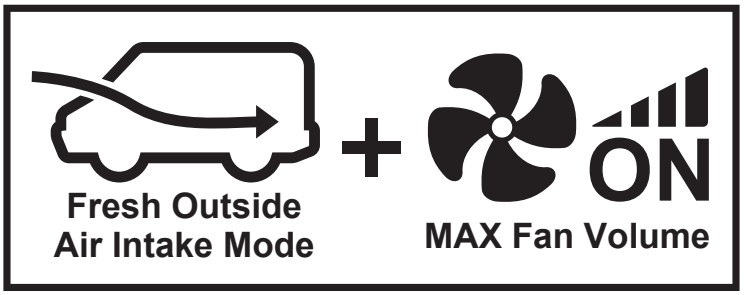
- Do not smoke.
- Do not use electric devices, heater, lights, etc.

2. Vehicles with ventilation in the cargo area should be used.

- Like below image.



- If vehicles are not equipped with a special ventilation system, fresh outside air intake mode and MAX fan volume operation are mandatory



3. Be sure to carry the R290 detector and keep it working properly.

(17) Parts inspection and regular replacement

In addition to annual servicing, it is necessary to replace or inspect some parts after a certain period of system operation.

Please see tables below for detailed instructions.

Replacement and inspection of parts should always be done by a competent person with relevant training and qualifications.

See Section 11 "DISASSEMBLY PROCEDURE" for how to access and remove the parts.

Parts which require regular inspection

Parts	Check every	Possible failures
Pressure relief valve (3 bar)	1 year (turning the knob manually)	PRV would be fixed and expansion vessel would burst

Parts which require regular replacement

Parts	Replace every	Possible failures
Pressure relief valve (PRV) Air Separator	6 years	Water leakage.

[5] Service tools

Use the below service tools for R290 refrigerant.

No.	Tool name	Specifications	Can other refrigerant tools be used?		
			R22	R410A	R32
①	Gauge manifold	Be sure to use a gauge manifold compliant with R290 Select it that can be used in the operating range of -0.1 to 3.2 MPaG Port size: 7/16 UNF 20 thread	×	×	×
②	Charge hose	Be sure to use a charge hose compliant with R290. Select it that can be used in the operating range of -0.1 to 3.2 MPaG Cap size: 7/16 UNF 20 thread	×	×	×
③	Charge valve	The charge valve prevents gas escaping from the hose and air conditioner when removing the charge hose. Be sure to use a charge valve compliant with R290. Connection diameter: UNF 7/16-20 (1/4 flare) × UNF 7/16-20 (1/4 flare)	×	×	×
④	Electronic weight scales	—	○	○	○
⑤	Electric leak tester (gas leak detector)	Before trying to use, confirm that the electronic leak tester can be used with R290. *Do not use a combustion-based leak tester R290.	△ Usable if the specifications on the left are satisfied	△	△
⑥	Vacuum pump	Be sure to use a vacuum compliant with R290 that has been specially designed and tested not to be an ignition source of itself. It is deeply better to use the vacuum pump that comply with explosion-proof standard such as ATEX and IECEx. Use a reverse-flow prevention adapter. If the vacuum pump oil (mineral oil) is mixed into the refrigerant circuit, sludge will be generated and damage the air conditioner.	△ Usable if the specifications on the left are satisfied	△	△
⑦	Vacuum pump adapter	It is necessary to install an electromagnetic valve to prevent the flow of vacuum pump oil back into the charge hose. If the vacuum pump oil (mineral oil) is mixed into the refrigerant circuit, sludge will be generated and damage the air conditioner.	○	○	○
⑧	Cutter/Reamer	Do not use the tool that generate sparks due to tool friction such as a saw.	○	○	○
⑨	Refrigerant cylinder	The cylinders are labeled according to the type of refrigerant.	×	×	×
⑩	Adapter for refrigerant cylinder	Use an adapter that is appropriate to a connection of refrigerant cylinder and a charge port. • Connection of refrigerant cylinder: depend on the refrigerant or the country • Charge port: UNF 7/16 - 20(1/4 flare) for R290	×	×	×
⑪	Refrigerant recovery equipment	Be sure to use a recovery machine compliant with R290 that has been specially designed and tested not to be an ignition source of itself. It is deeply better to use the recovery machine that comply with explosion-proof standards such as ATEX and IECEx.	△ Usable if the specifications on the left are satisfied	△	△
⑫	Refrigerant recovery cylinder	The cylinders are labeled according to the type of refrigerant.	×	×	×
⑬	Electrical tools	Do not use the electrical tools that generate sparks due to tool friction such as an electrical cutter, an electrical saw and a grinder. In case of use the electrical tools that drive with motor such as an electrical driver, be sure to use one with brushless motor.	△ Usable if the specifications on the left are satisfied	△	△
⑭	FAN	Be sure to use a fan compliant with R290 that has been specially designed and tested not to be an ignition source of itself. It is deeply better to use the fan that comply with explosion-proof standards such as ATEX and IECEx.	△ Usable if the specifications on the left are satisfied	△	△

× : Prepare a new tool. (Use the new tool as the tool exclusive for R290.)

△ : Tools for other refrigerants can be used under certain conditions.

○ : Tools for other refrigerants can be used.

2-3. PRECAUTIONS FOR SALT PROOF TYPE "-BS" MODEL

Although "-BS" model has been designed to be resistant to salt damage, observe the following precautions to maintain the performance of the unit.

1. Avoid installing the unit in a location where it will be exposed directly to seawater or sea breeze.
2. If the cover panel may become covered with salt, be sure to install the unit in a location where the salt will be washed away by rainwater. (If a sunshade is installed, rainwater may not clean the panel.)
3. To ensure that water does not collect in the base of the outdoor unit, make sure that the base is level, not at angle. Water collecting in the base of the outdoor unit could cause rust.
4. If the unit is installed in a coastal area, clean the unit with water regularly to remove any salt build-up.
5. If the unit is damaged during installation or maintenance, be sure to repair it.
6. Be sure to check the condition of the unit regularly.
7. Be sure to install the unit in a location with good drainage.

2-4. Choosing the outdoor unit installation location

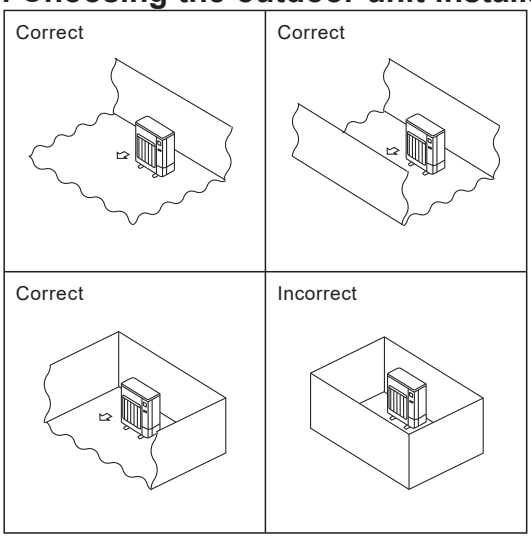


Fig. 2-1

○ R290 is heavier than air—as well as other refrigerants—so tends to accumulate at the base (in the vicinity of the floor). If R290 accumulates around base, it may reach a flammable concentration in case room is small. To avoid ignition, maintaining a safe work environment is required by ensuring appropriate ventilation. If a refrigerant leak is confirmed in a room or an area where there is insufficient ventilation, refrain from using of flames until the work environment can be improved by ensuring appropriate ventilation.

- Select a location from which noise emitted by the unit will not inconvenience neighbors.
- Select a location permitting easy wiring and pipe access to the power source and indoor unit.
- Avoid locations where combustible gases may leak, be produced, flow, or accumulate.
- Note that water may drain from the unit during operation.
- Select a level location that can bear the weight and vibration of the unit.
- Avoid locations where the unit can be covered by snow. In areas where heavy snow fall is anticipated, special precautions such as raising the installation location or installing a hood on the air intake must be taken to prevent the snow from blocking the air intake or blowing directly against it. This can reduce the airflow and a malfunction may result.
- Avoid locations exposed to oil, steam, or sulfuric gas.
- Use the transportation handles of the outdoor unit to transport the unit. If the unit is carried from the bottom, hands or fingers may be pinched.
- Refrigerant pipes connection shall be accessible for maintenance purposes.

○ Install outdoor units in a place where at least one of the four sides is open, and in a sufficiently large space without depressions. (Fig. 2-1)

- Define a protective zone close around the unit according to section “2-6. Protective zone”.

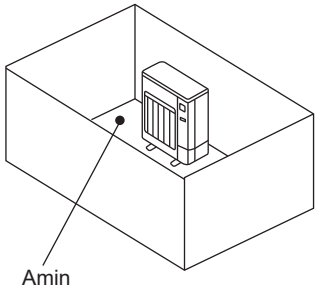
2-5. Minimum installation area

If you unavoidably install a unit in a space where all four sides are blocked or there are depressions, confirm that one of these situations (A, B or C) is satisfied.

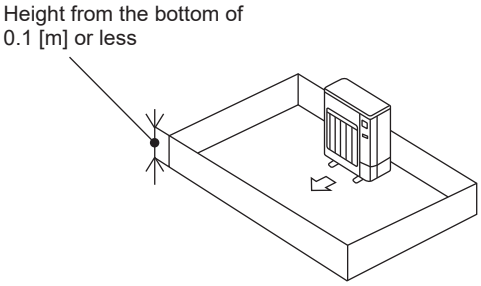
Note: These countermeasures are for keeping safety not for specification guarantee.

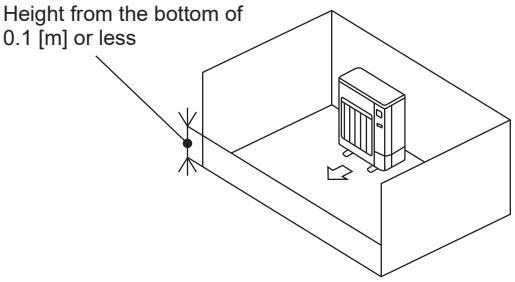
A) Secure sufficient installation space (minimum installation area Amin).
Install in a space with an installation area of Amin or more, corresponding to refrigerant amount M (factory-charged refrigerant + locally added refrigerant).

M [kg]	Amin [m²]
0.6	44
1.0	72
1.5	108
2.0	143
2.5	179
3.0	215
3.5	250
4.0	286
4.5	322
5.0	358

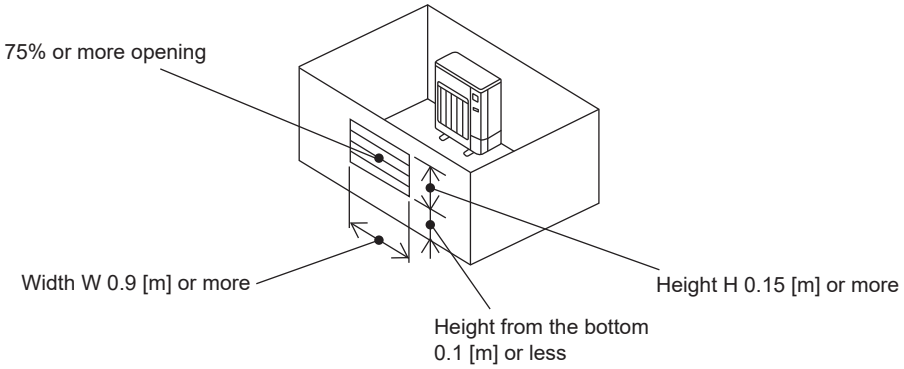


B) Install in a space with a depression height of ≤ 0.1 [m].





C) Create an appropriate ventilation open area.
Make sure that the width of the open area is 0.9 [m] or more and the height of the open area is 0.15 [m] or more. However, the height from the bottom of the installation space to the bottom edge of the open area should be 0.1 [m] or less.
Open area should be 75% or more opening.



2-6. Protective zone

⚠ CAUTION:

The unit contains R290 refrigerant which is highly flammable. Great care must be taken when installing and servicing the unit which must be installed/serviced by a competent electrician, with the requisite professional qualifications to install this unit in your jurisdiction. In the event of a refrigerant leak, the installer and/or person in possession of the unit must ensure that no person is endangered outdoors or in adjacent buildings and no refrigerant has the potential to travel from the unit into the building and drainage systems. If you are concerned about a possible refrigerant leak from your unit, please contact your installer/supplier immediately or contact Mitsubishi Electric in your region directly for more information.

A protective zone must be maintained around the area closest to the unit. See shaded in Fig. 2-2.

⚠ WARNING:

- There must not be any building openings, entrance to the basement, grooves or entrance into the waste-water system. (such as windows, doors, ventilation openings or similar opening, flat-roof windows, light shafts, subsidence or depressions in the ground, pump shafts, inlets in sewers and waste water shafts, downpipes etc.)
- The protective zone must not extend to adjacent buildings or public traffic areas. (such as property boundaries or neighboring properties, footpaths and driveways)
- Ignition sources must not be present in the protective zone, either permanently or for a short period of time. (such as open flame, electrical systems, sockets, lamps, light switches, electrical house connections, sparking tools, objects with high surface temperatures of 370°C or higher)

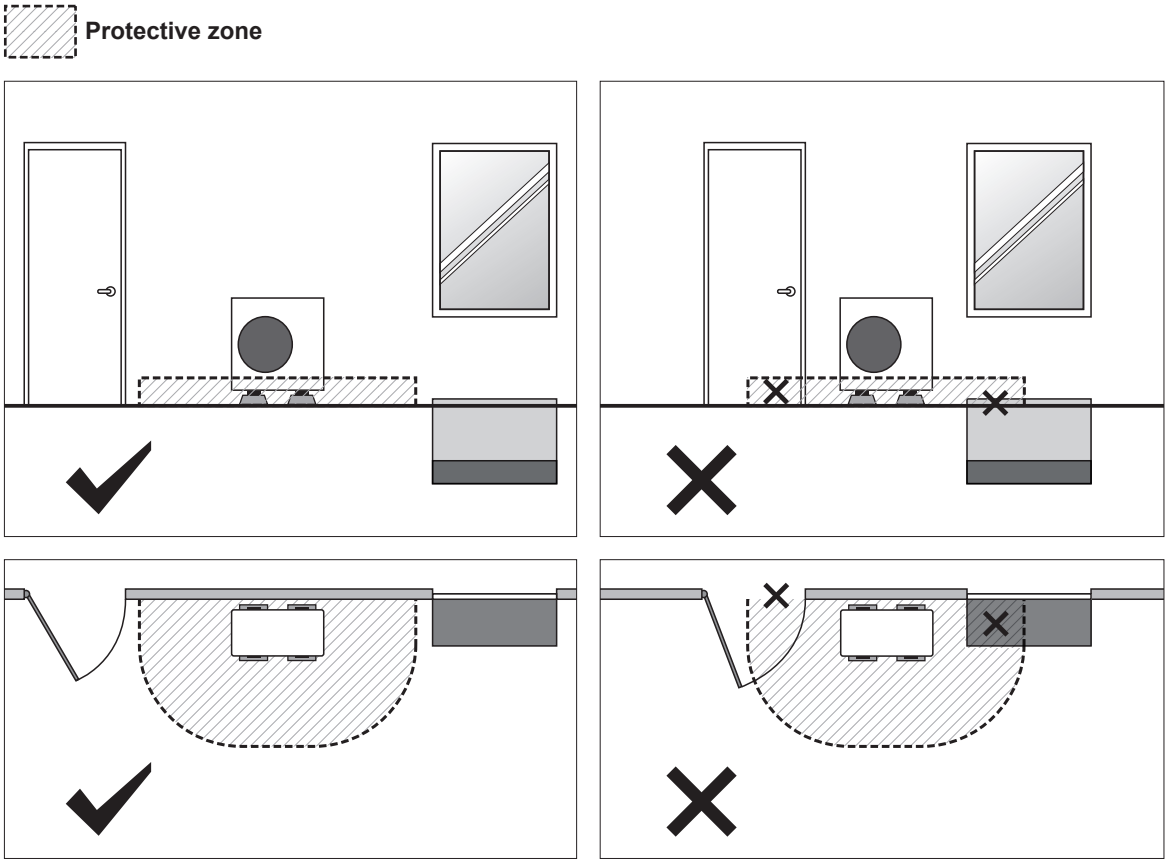


Fig. 2-2

- **Specific dimensions of the protective zone are specified for each installation condition. Refer to the figures for each case.**
  (1) When installed in a location with an open around (Fig. 2-3)
  Define the protective zone as follows:
  - 1 m around of the unit
  - 0.3 m from the ground.

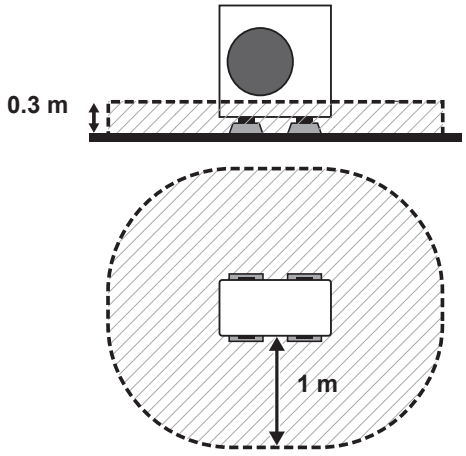


Fig. 2-3

(2) When installed in a location with 3 surfaces opened (in front of a building wall) (Fig. 2-4)
Define the protective zone as follows:
- 1 m to the sides and to the front of the unit
- the rear of the unit to the wall
- 0.3 m from the ground.

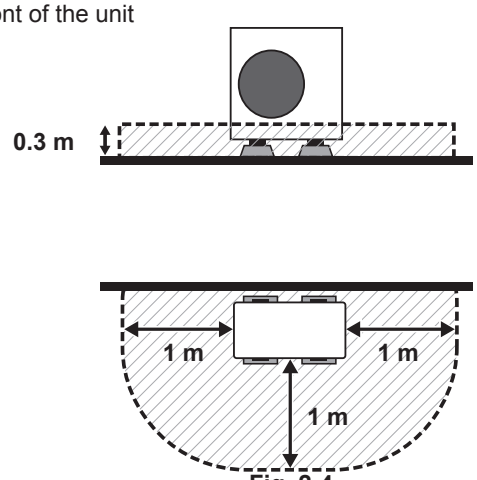


Fig. 2-4

(3) When installed in a location with 2 surfaces opened (where the distance between one side of the unit and the wall is less than 1 m, e.g. at the corner of a building wall) (Fig. 2-5)
Define the protective zone as follows:
- 1 m to the open side of the unit (A)
- 2.5 m to the front of the unit
- from the side of the unit to the wall (B)
- the rear of the unit to the wall
- 0.3 m from the ground.

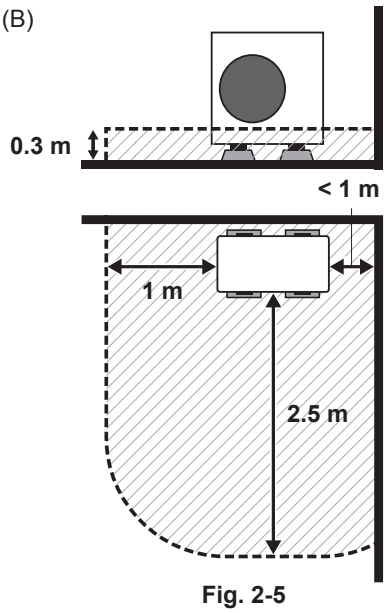


Fig. 2-5

(4) When installed in a location where only the front opened (building walls on both sides)
Where the distance between both sides of the unit and the wall is more than 1 m, define the protective zone as follows: (Fig. 2-6)
- 1 m to the sides and to the front of the unit
- the rear of the unit to the wall
- 0.3 m from the ground.

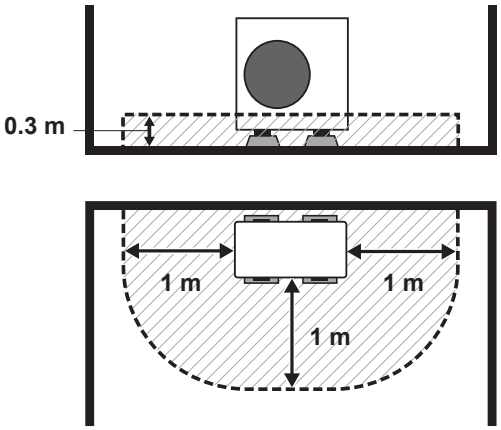


Fig. 2-6

Where the distance between both sides of the unit and the wall is less than 1 m, define the protective zone as follows: (Fig. 2-7)
- from the both sides of the unit to the wall
- 2.5 m to the front of the unit
- the rear of the unit to the wall
- 0.3 m from the ground.

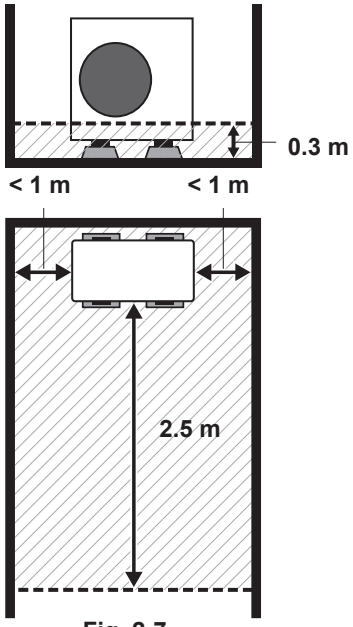


Fig. 2-7

Where the distance between one side of the unit and the wall is less than 1 m, same conditions as shown in Fig. 2-5 apply.

2-7. Water piping work

[1] Water piping connection (Fig. 2-8)

- Connect the water pipes to the outlet and inlet pipes.
  (Parallel male screw for 1-inch water pipe (ISO 228/1-G1B))
- Inlet and outlet pipes position is shown on the Fig. 2-8.
- Install the hydraulic filter at the water intake.
- Maximum allowable torque at the water piping connection is 50 N•m.
- Use 2 spanners to tighten piping connections.
- Check if water leaks after installation.
- Inlet water gauge pressure must be between 0-0.3 MPa.

Note:

- **The water velocity in pipes should be kept within certain limits of material to avoid erosion, corrosion and excessive noise generation.**
  Be aware, and take care of, that local velocities in small pipes, bends and similar obstructions can exceed the values above.
  e.g.) Copper : 1.5 m/s
- **When connecting metal pipes made of different materials, be sure to insulate the joint to prevent electrolytic etching.**
- **Set up a field system so that the inlet water temperature and water flow rate can be within the allowable range specified in our technical data, etc.**
  If the unit is used out of the allowable range, the parts of unit might be damaged.
- **All automatic air vents installed in indoor water circuits MUST be closed after the air is removed from the water circuit during commissioning.**

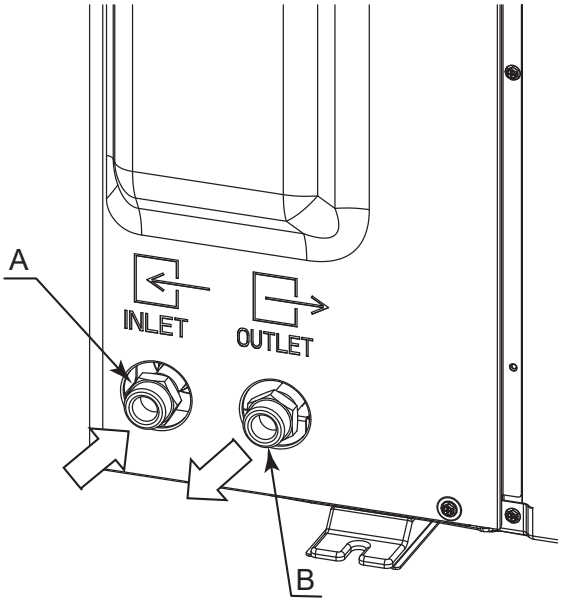
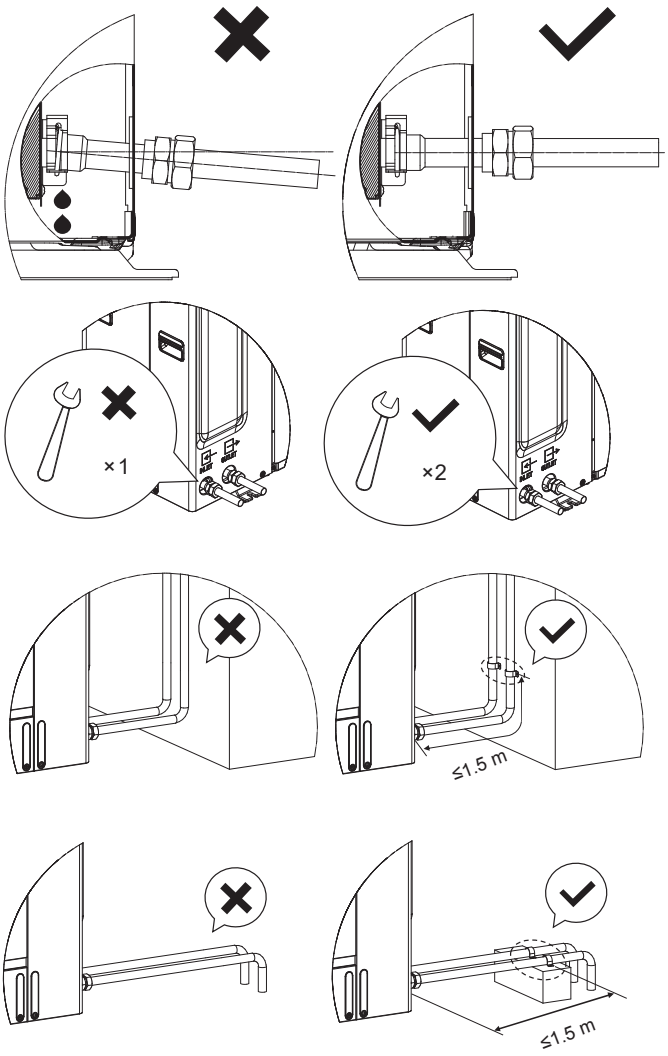


Fig. 2-8



[2] Water quality condition

- The water in a system should be clean and with a pH value of 6.5-8.0.
- The followings are the maximum values;
  Calcium : 100 mg/L
  Chlorine : 100 mg/L
  Iron/manganese : 0.5 mg/L

[Fig. 2-8]
A: Water inlet
B: Water outlet

[3] Minimum water quantity

Refer to the indoor unit Installation Manual

Note: Make sure to perform the frozen prevention measure for water pipe system. (Water piping insulation, back-up pump system, using of a certain% ethylene glycol instead of normal water)
Insulate the water piping properly. The performance can be poor if the insulation is insufficient.

⚠ WARNING:

As the outlet water temperature can reach 75°C at maximum, do not touch the water piping directly with a bare hand.

In addition to annual servicing it is necessary to replace or inspect some parts after a certain period of system operation.
Please see tables below for detailed instructions.
Replacement and inspection of parts should always be done by a competent person with relevant training and qualifications.

Note:

Parts which require regular inspection

Parts	Check every	Possible failures
Pressure relief valve (3 bar)	1 year (turning the knob manually)	PRV would be fixed and expansion vessel would burst

Parts which require regular replacement

Parts	Check every	Possible failures
Pressure relief valve (PRV) Air Separator	6 years	Water leakage

3 SPECIFICATIONS

3-1. SPECIFICATIONS

Service Ref.				PUZ-WZ50VAA.UK PUZ-WZ50VAA-BS.UK	PUZ-WZ60VAA.UK PUZ-WZ60VAA-BS.UK	PUZ-WZ80VAA.UK PUZ-WZ80VAA-BS.UK
OUTDOOR UNIT	Power source (Phase, cycle, voltage)			Single, 50 Hz, 230 V	Single, 50 Hz, 230 V	Single, 50 Hz, 230 V
		Max. current	A	13.0	13.0	22.0
	External finish			Munsell: N8.75 Munsell N2.75 (FRONT PANEL)		
	Refrigerant control			Linear Expansion Valve		
	Compressor			Hermetic twin rotary		Hermetic twin rotary/ Single rotary
		Model		SPB280FARMC		SPB280FARMC/KP173VGBC
		Motor output	kW	2.0		2.0/0.8
		Starter type		Inverter		Inverter/Fixed rotation
		Protection devices		HP switch, Comp. surface thermo, Discharge thermo, Over current detection		
	Crankcase heater		W	—		
	Heat exchanger			Plate fin coil		
	Fan	Fan (drive) × No.		Propeller fan x 1		
		Fan motor output	kW	0.074		
		Airflow	m^3/min (CFM)	44 (1,550)		
	Defrost method			Reverse cycle *1		Reverse cycle *1/Normal cycle *2
	Dimensions	W	mm	1050 (41-1/3)		
		D	mm	500 (+20) (19-8/7 + 4/5)		
		H	mm	1020 (40-1/6)		
	Weight		kg (lb)	89 (196)		117 (258)
	Refrigerant			R290 (3)		
		Charge	kg	0.6 (1.32)		0.6 (1.32)/0.4 (0.88)
		Oil (Model)	L	0.38 (PZ46M)		0.38 (PZ46M)/0.30 (PZ46M)
	Water pipe connection			G1B (WATER)		

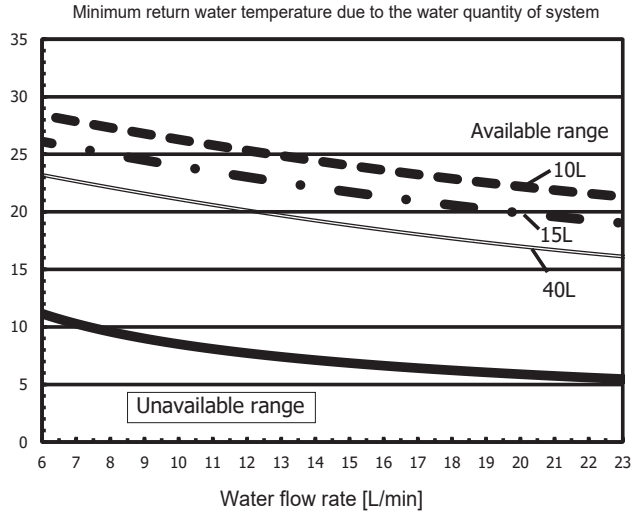
*1 Hot gas with 4-way valve *2 Hot gas without 4-way valve

3-2. AVAILABLE RANGE (WATER FLOW RATE, RETURN WATER TEMP.)

Note: If the value of water flow rate and return water temp. become lower than the available range, it could cause damage to the parts of unit.

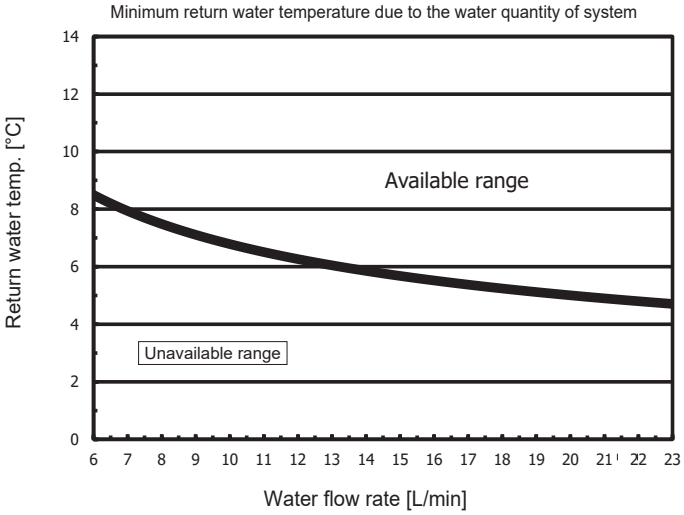
■ **Heating**

PUZ-WZ50VAA(-BS)
PUZ-WZ60VAA(-BS) PUZ-WZ80VAA(-BS)



■ **Cooling**

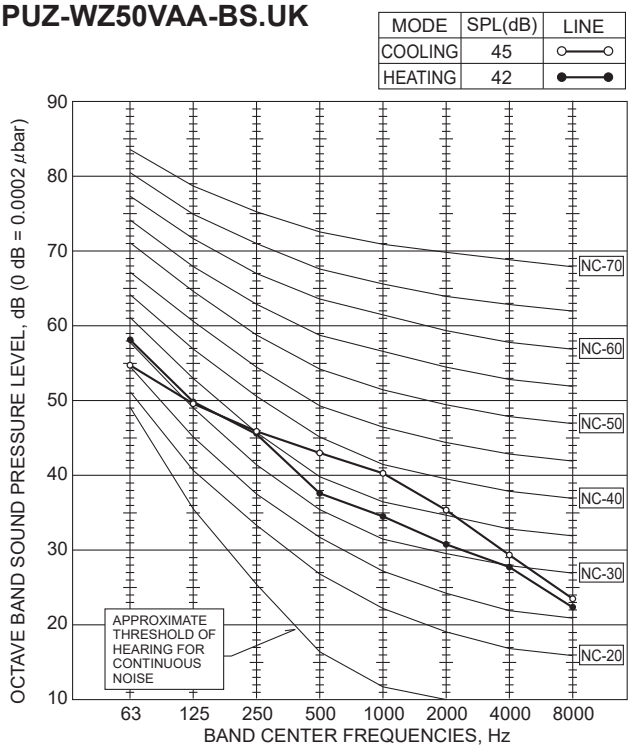
PUZ-WZ50VAA(-BS)
PUZ-WZ60VAA(-BS) PUZ-WZ80VAA(-BS)

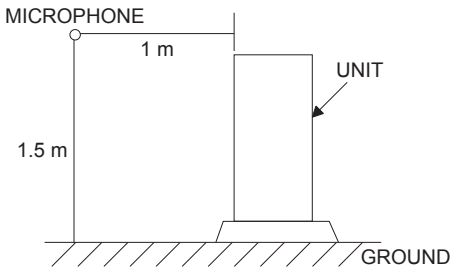


Note:
Be sure to avoid the unavailable range during defrosting.
Otherwise, the outdoor unit is insufficiently defrosted and/or the heat exchanger of the indoor unit may freeze.

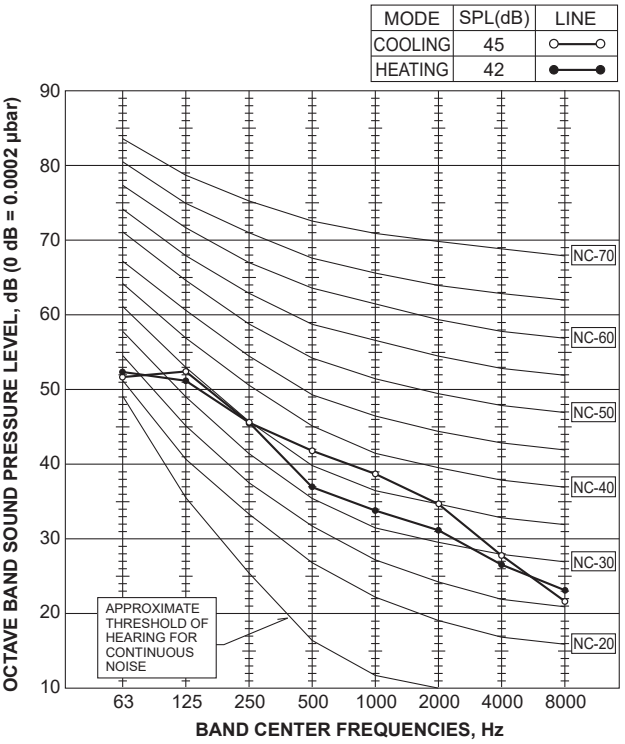
NOISE CRITERION CURVES

PUZ-WZ50VAA.UK
PUZ-WZ50VAA-BS.UK

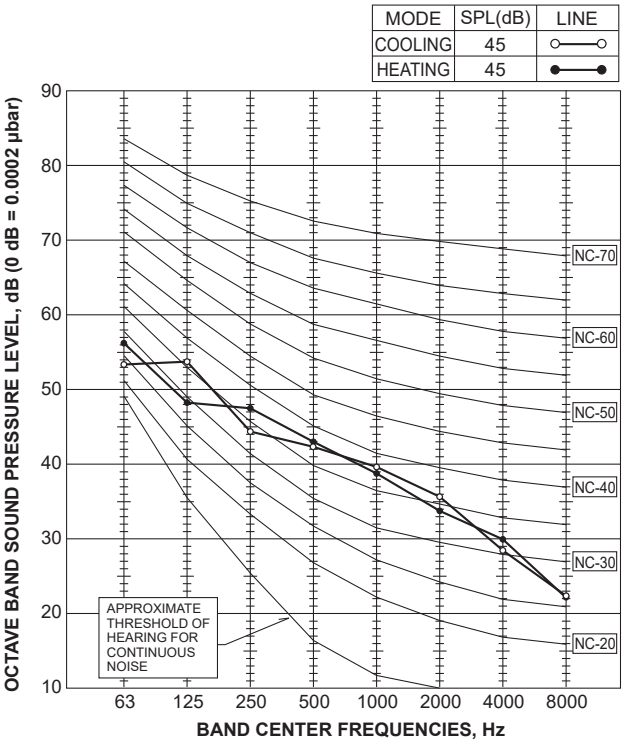




PUZ-WZ60VAA.UK
PUZ-WZ60VAA-BS.UK



PUZ-WZ80VAA.UK
PUZ-WZ80VAA-BS.UK

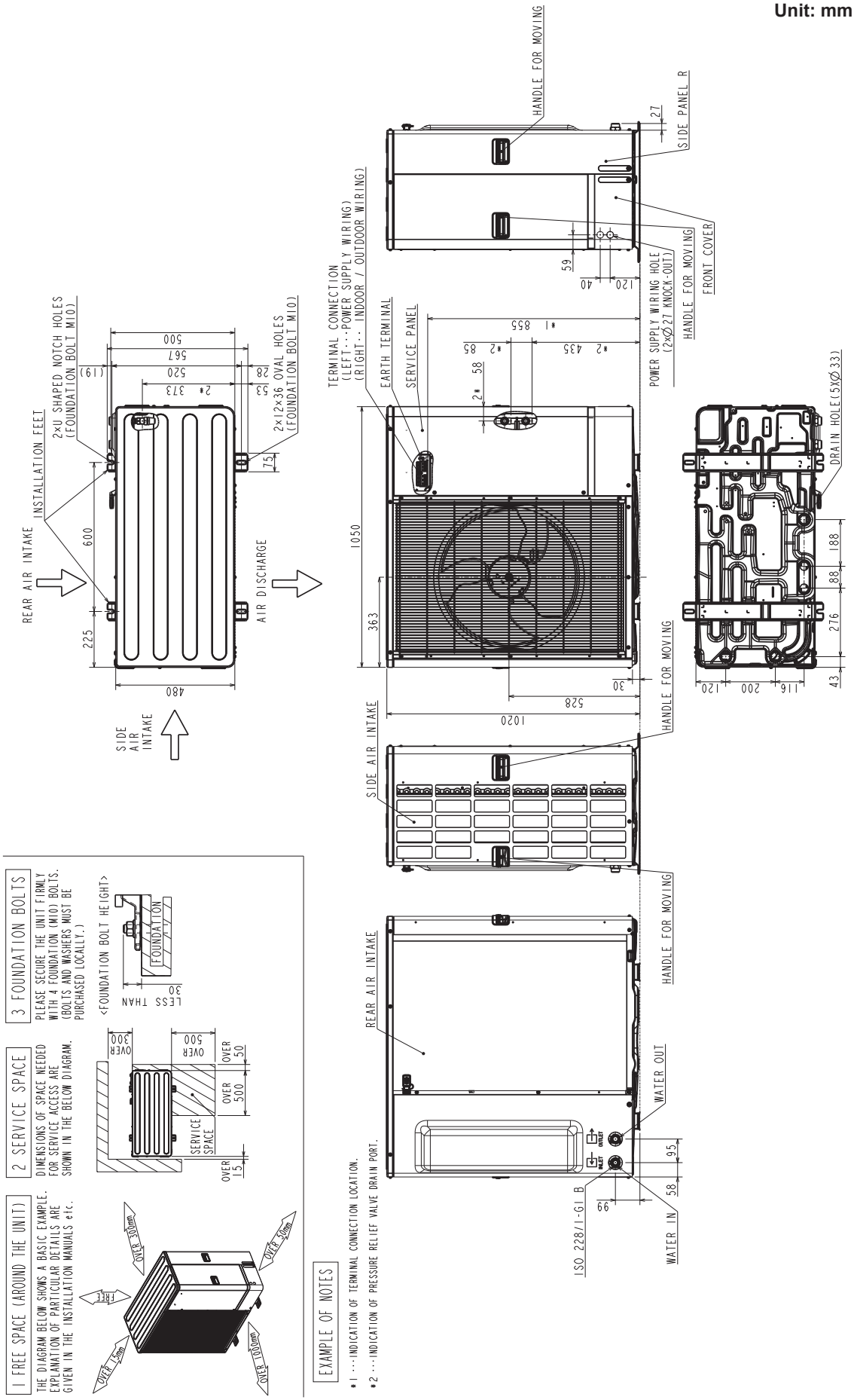


5 OUTLINES AND DIMENSIONS

PUZ-WZ50VAA.UK
PUZ-WZ50VAA-BS.UK

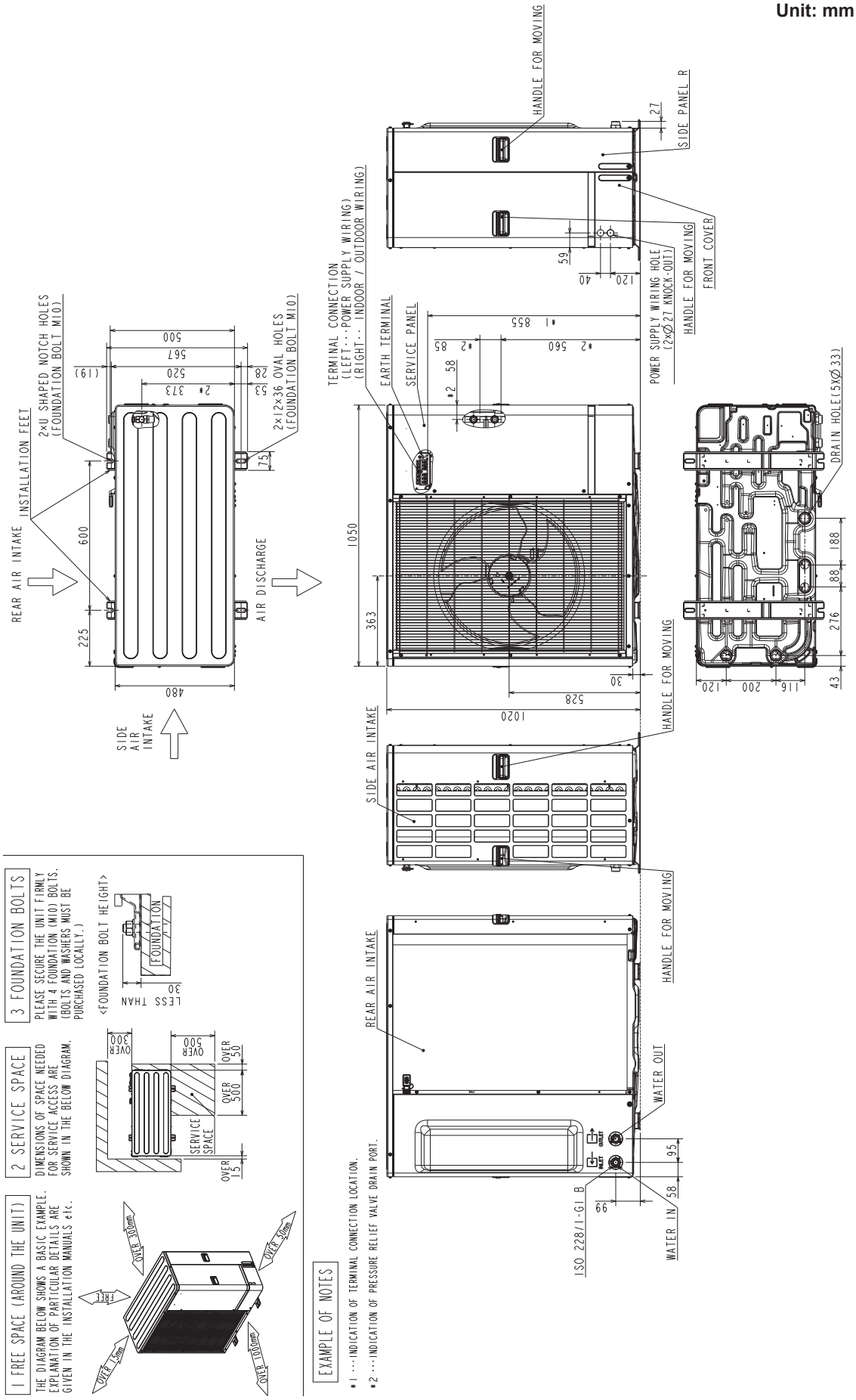
PUZ-WZ60VAA.UK
PUZ-WZ60VAA-BS.UK

Unit: mm



PUZ-WZ80VAA.UK **PUZ-WZ80VAA-BS.UK**

Unit: mm

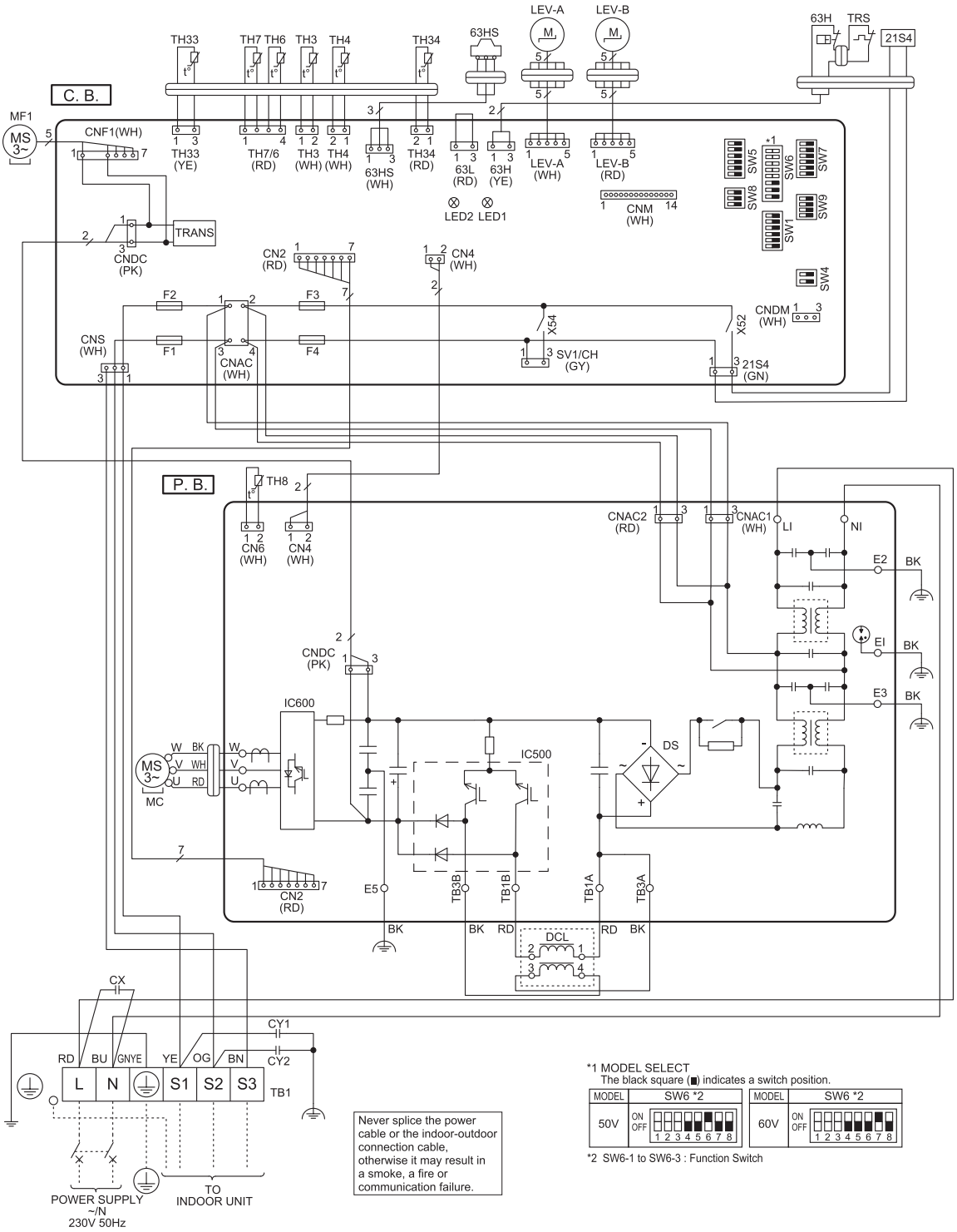


6 WIRING DIAGRAM

PUZ-WZ50VAA.UK **PUZ-WZ60VAA.UK**
PUZ-WZ50VAA-BS.UK **PUZ-WZ60VAA-BS.UK**

[LEGEND]

SYMBOL	NAME	SYMBOL	NAME
TB1	Terminal Block <Power Supply, Indoor/Outdoor>	CX	Capacitor
MC	Motor for Compressor	P. B.	Power Circuit Board
MF1	Fan Motor	C. B.	Controller Circuit Board
21S4	Solenoid Valve (4-Way Valve)	SW1	Switch <Manual Defrost, Defect History Record Reset, Refrigerant Address>
63H	High Pressure Switch	SW4	Switch <Function Switch>
63HS	Pressure Sensor	SW5	Switch <Function Switch>
TH3	Thermistor <Liquid>	SW6	Switch <Function Switch, Model Select>
TH4	Thermistor <Discharge>	SW7	Switch <Function Switch>
TH6	Thermistor <2-Phase Pipe>	SW8	Switch <Function Switch>
TH7	Thermistor <Ambient>	SW9	Switch <Function Switch>
TH8	Thermistor <Heat Sink>	CNDM	Connector <Connection for Option>
TH33	Thermistor <Comp. Surface>	SV1/CH	Connector <Connection for Option>
TH34	Thermistor <Plate Hex Liquid>	CNM	Connector <Connection for Option>
TRS	Thermal Protector	F1, F2	Fuse <T10AL250V>
LEV-A, LEV-B	Linear Expansion Valve	F3, F4	Fuse <T6.3AL250V>
DCL	Reactor		
CY1, CY2	Capacitor		



Never splice the power cable or the indoor-outdoor connection cable, otherwise it may result in a smoke, a fire or communication failure.

*1 MODEL SELECT
The black square (■) indicates a switch position.

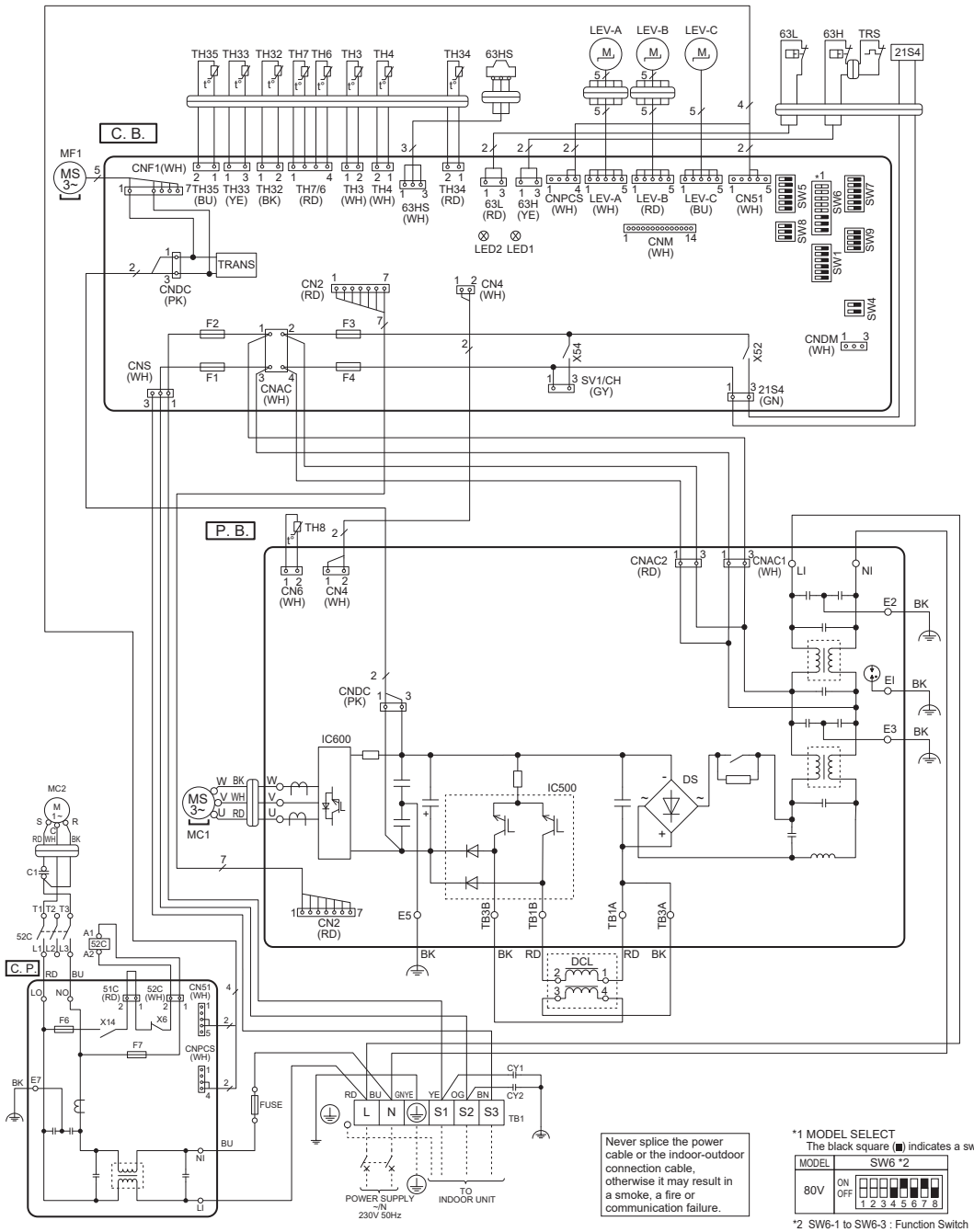
MODEL	SW6 *2
50V	ON / OFF 1 2 3 4 5 6 7 8
60V	ON / OFF 1 2 3 4 5 6 7 8

*2 SW6-1 to SW6-3 : Function Switch

PUZ-WZ80VAA.UK PUZ-WZ80VAA-BS.UK

[LEGEND]

SYMBOL	NAME	SYMBOL	NAME
TB1	Terminal Block<Power Supply, Indoor/Outdoor>	FUSE	Fuse <T20AL250V>
MC1	Motor for INV Compressor	C1	Run Capacitor
MC2	Motor for FIX Compressor	52C	Contactor
MF1	Fan Motor	P.B.	Power Circuit Board
21S4	Solenoid Valve(4-Way Valve)	C. B.	Controller Circuit Board
63H	High Pressure Switch INV	SW1	Switch <Manual Defrost, Defect History Record Reset, Refrigerant Address>
63L	High Pressure Switch FIX		
63HS	Pressure Sensor	SW4	Switch <Function Switch>
TH3	Thermistor <INV Liquid>	SW5	Switch <Function Switch>
TH4	Thermistor <Discharge>	SW6	Switch <Function Switch, Model Select>
TH6	Thermistor <2-Phase Pipe>	SW7	Switch <Function Switch>
TH7	Thermistor <Ambient>	SW8	Switch <Function Switch>
TH8	Thermistor <Heat Sink>	SW9	Switch <Function Switch>
TH32	Thermistor <FIX Liquid>	CNDM	Connector <Connection for Opition>
TH33	Thermistor <Comp. Surface>	SV1/CH	Connector <Connection for Opition>
TH34	Thermistor <Plate Hex Liquid>	CNM	Connector <Connection for Opition>
TH35	Thermistor <Suction Pipe>	F1,F2	Fuse <T10AL250V>
TRS	Thermal Protector	F3,F4	Fuse <T6.3AL250V>
LEV-A,LEV-B,LEV-C	Linear Expansion Valve	C.P.	Comp Protector Circuit Board
DCL	Reactor	F6, F7	Fuse <T6.3AL250V>
CY1,CY2	Capacitor		



7 WIRING SPECIFICATIONS

FIELD ELECTRICAL WIRING (power wiring specifications)

Outdoor unit model			WZ50V	WZ60V	WZ80V
Outdoor unit power supply			~/N (single), 50 Hz, 230 V		
Outdoor unit input capacity Main switch (Breaker) *1			16 A	16 A	25 A
Wiring Wire No. × size (mm2)	Outdoor unit power supply		3 × Min 1.5	3 × Min 2.5	3 × Min 2.5
	Indoor unit-Outdoor unit	*2	3 × 1.5 (polar)		
	Indoor unit-Outdoor unit earth	*2	1 × Min 1.5		
	Remote controller-Indoor unit		2 ×0.3 (Non-polar)		
Circuit rating	"Outdoor unit L-N (single) Outdoor unit L1-N, L2-N, L3-N (3 phase)"	*3	230 V AC		
	Indoor unit-Outdoor unit S1-S2	*3	230 V AC		
	Indoor unit-Outdoor unit S2-S3	*3	28 V DC		
	Remote controller-Indoor unit	*3	12 V DC		

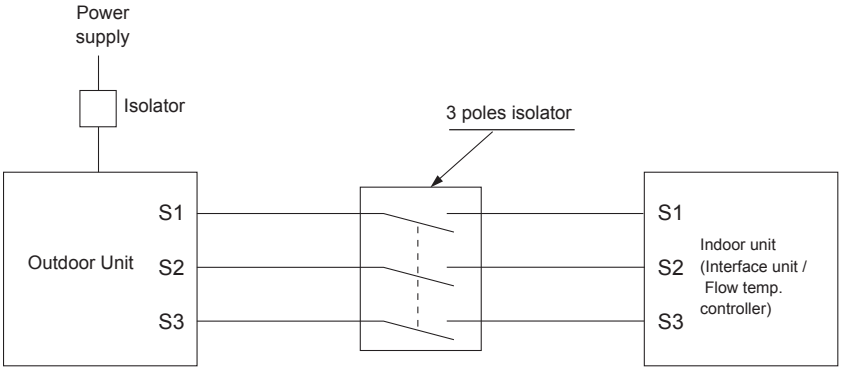
*1. A breaker with at least 3.0 mm contact separation in each pole shall be provided. Use earth leakage breaker (NV).
Make sure that the current leakage breaker is one compatible with higher harmonics.
Always use a current leakage breaker that is compatible with higher harmonics as this unit is equipped with an inverter.
The use of an inadequate breaker can cause the incorrect operation of inverter.

*2.Maximum 45 m
If 2.5 mm² is used, maximum 50 m.
If 2.5 mm² is used and S3 is separated, maximum 80 m.

*3. The figures are NOT always against the ground.
S3 terminal has 28 V DC against S2 terminal. However between S3 and S1, these terminals are NOT electrically insulated by the transformer or other device.

⚠ Caution: Be sure to install N-line. Without N-line, it could cause damage to the unit.

Notes: 1. Wiring size must comply with the applicable local and national codes.
2. Power supply cables and the cables between Interface unit/Flow temp. controller and outdoor unit shall not be lighter than polychloroprene sheathed flexible cables. (Design 60245 IEC 57)
3. Be sure to connect the cables between Interface unit/Flow temp. controller and outdoor unit directly to the units (no intermediate connections are allowed).
Intermediate connections may result in communication errors. If water enters at the intermediate connection point, it may cause insufficient insulation to ground or a poor electrical contact.
(If an intermediate connection is necessary, be sure to take measures to prevent water from entering the cables.)
4. Install an earth line longer than power cables.
5. Do not construct a system with a power supply that is turned ON and OFF frequently.
6. Use self-extinguishing distribution cable for power supply wiring.
7. Properly route wiring so as not to contact the sheet metal edge or screw tip.

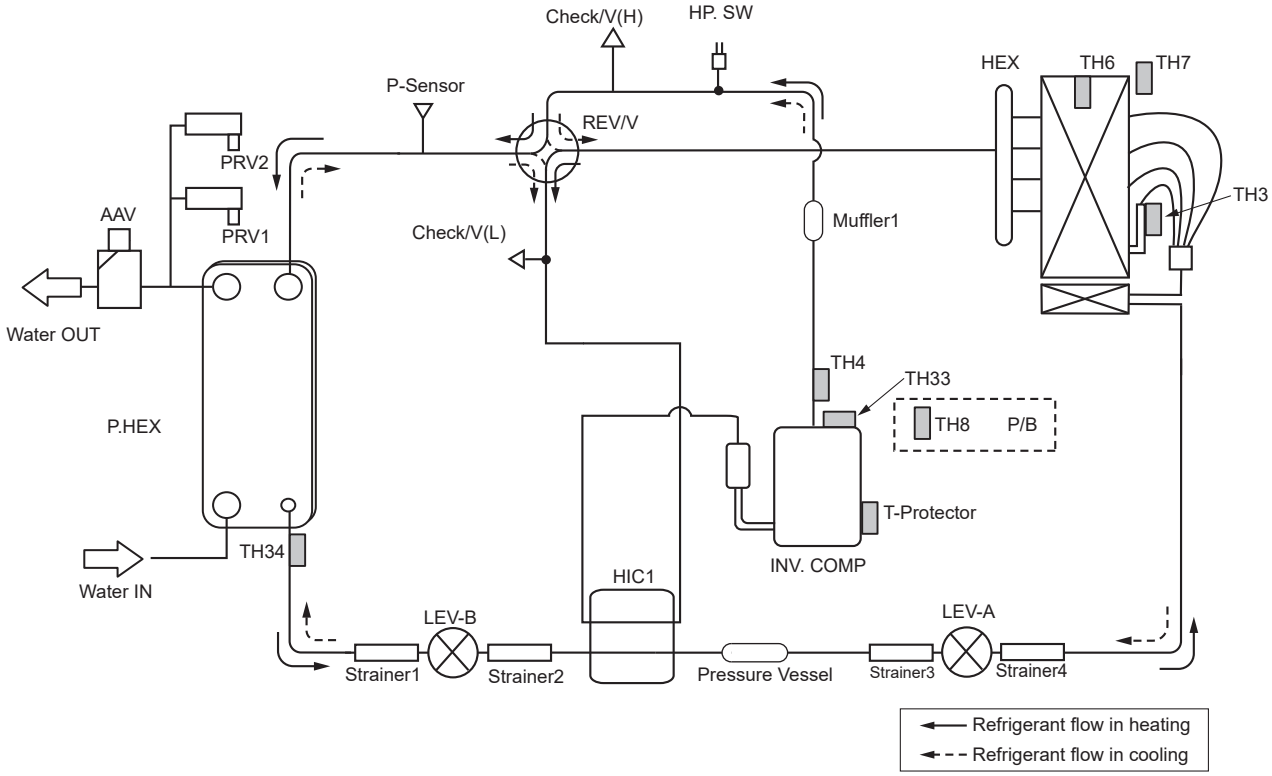


⚠ **Warning:**
・ **In case of A-control wiring, there is high voltage potential on the S3 terminal caused by electrical circuit design that has no electrical insulation between power line and communication signal line. Therefore, please turn off the main power supply when servicing. And do not touch the S1, S2, S3 terminals when the power is energized. If isolator should be used between indoor unit and outdoor unit, please use 3-pole type.**

Never splice the power cable or the Interface unit/Flow temp. controller-outdoor unit connection cable, otherwise it may result in smoke emission, a fire or communication failure.

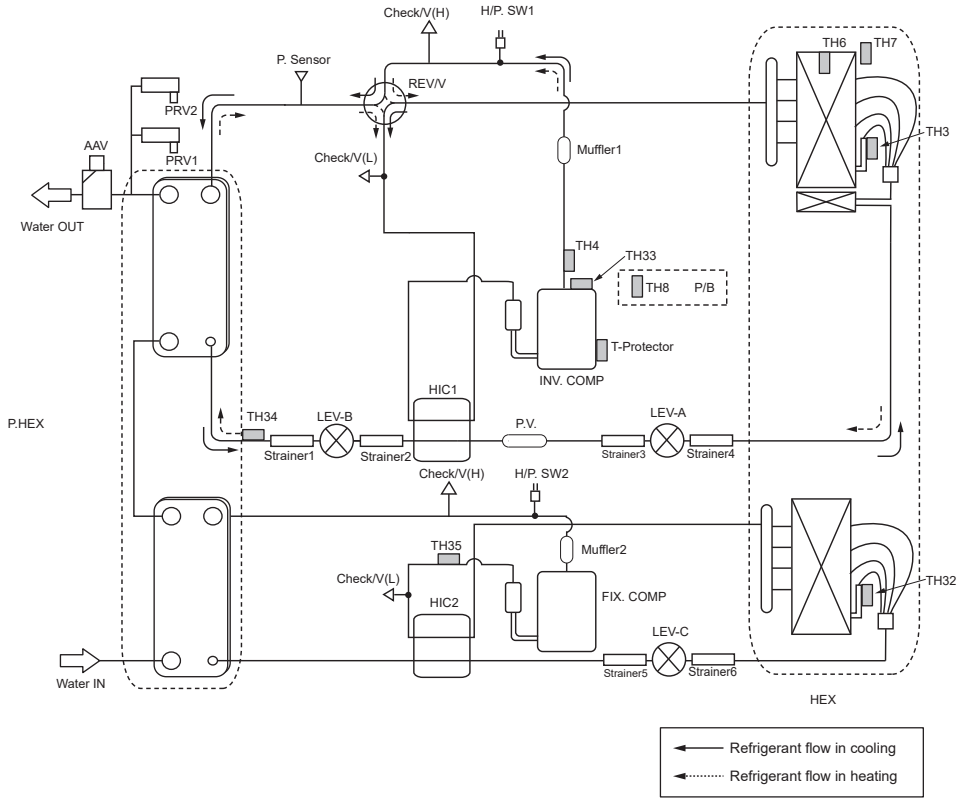
8 REFRIGERANT SYSTEM DIAGRAM

PUZ-WZ50VAA.UK **PUZ-WZ60VAA.UK**
PUZ-WZ50VAA-BS.UK **PUZ-WZ60VAA-BS.UK**



Symbol	Parts name	Detail
INV. Comp	Compressor	DC inverter scroll compressor (Mitsubishi Electric Corporation)
H/P SW	High pressure switch (63H)	For protection (OFF: 3.20MPa)
REV/V	Reversing (4-way) valve (21S4)	Change the refrigerant circuit (Heating / Cooling) and for Defrosting
Check/V	Charge plug	(H): High pressure/(L): Low pressure/(C): For production test use
P-Sensor	Refrigerant pressure sensor (63HS)	For calculation of the saturation temperature from refrigerant pressure
LEV-A	Linear expansion valve -A	Heating: Secondary LEV Cooling: Primary LEV
LEV-B	Linear expansion valve -B	Heating: Primary LEV Cooling: Secondary LEV
TH3	Liquid temperature thermistor	Heating: Evaporating temperature Cooling: Sub cool liquid temperature
TH4	Discharge temperature thermistor	For LEV control and for compressor protection
TH6	2-phase pipe temperature thermistor	Heating: Evaporating temperature Cooling: Condensing temperature
TH7	Ambient temperature thermistor	For fan control and for compressor frequency control
TH8	Heat sink temperature thermistor	For power board protection
TH33	Comp. surface temperature thermistor	For protection
TH34	Plate HEX liquid temperature thermistor	Heating: Sub cool liquid temperature Cooling: Evaporating temperature
T-protector	Thermal protector	For compressor protection
P.V.	Pressure Vessel	For accumulation of refrigerant
HIC	Heat inner exchanger	For compressor protection
P/B	Power circuit board	Inverter power board
P. HEX	Plate Heat Exchanger	MWA1-28DM (Mitsubishi Electric Corporation)
PRV1/2	Pressure relief valve	For water pressure protection and for protection of refrigerant leakage into the indoor (Discharge: 3bar)
AAV	Air separator (Auto air vent)	For air venting and for protection of refrigerant leakage into the indoor

PUZ-WZ80VAA.UK PUZ-WZ80VAA-BS.UK



Symbol	Part name	Detail
INV. Comp	Compressor	DC inverter twin rotary compressor (Mitsubishi Electric Corporation)
FIX. Comp	Compressor	Fixed speed single compressor (Mitsubishi Electric Corporation)
H/P SW1	High pressure switch (63H)	For protection (OFF: 3.20MPa)
H/P SW2	High pressure switch (63L)	For protection (OFF: 3.20MPa)
REV/V	Reversing (4-way) valve (21S4)	Change the refrigerant circuit (Heating/Cooling) and for Defrosting
Check/V	Check valve	(H): High pressure/(L): Low pressure/(C): For production test use
P-Sensor	Refrigerant pressure sensor (63HS)	For calculation of the saturation temperature from refrigerant pressure
P/B	Power circuit board	Inverter power board
LEV-A	Linear expansion valve -A	Heating: Secondary LEV Cooling: Primary LEV
LEV-B	Linear expansion valve -B	Heating: Primary LEV Cooling: Secondary LEV
LEV-C	Linear expansion valve -C	Heating only
TH3	Liquid temperature thermistor	Heating: Evaporating temperature Cooling: Sub cool liquid temperature
TH4	Discharge temperature thermistor	For LEV control and for compressor protection
TH6	2-phase pipe temperature thermistor	Heating: Evaporating temperature Cooling: Condensing temperature
TH7	Ambient temperature thermistor	For fan control and for compressor frequency control
TH8	Heat sink temperature thermistor	For power board protection
TH32	Liquid temperature thermistor	For defrost control
TH33	Comp.surface temperature thermistor	For compressor protection
TH34	Plate HEX liquid temperature thermistor	Heating: Sub cool liquid temperature Cooling: Evaporating temperature
TH35	Suction pipe temperature thermistor	For compressor protection
T-protector	Thermal protector	For compressor protection
P.V.	Pressure vessel	For accumulation of refrigerant
HIC1/2	Heat inner exchanger	For compressor protection
P. HEX	Plate Heat Exchanger	MWA3-44DM (Mitsubishi Electric Corporation)
PRV1/2	Pressure relief valve	For water pressure protection and for protection of refrigerant leakage into the indoor (Discharge: 3bar)
AAV	Air separator (Auto air vent)	For air venting and for protection of refrigerant leakage into the indoor

9 TROUBLESHOOTING

9-1. TROUBLESHOOTING

<Check code displayed by self-diagnosis and actions to be taken for service (summary)>

Present and past check codes are logged, and they can be displayed on the control board of outdoor unit. Actions to be taken for service, which depends on whether or not the trouble is reoccurring in the field, are summarized in the table below. Check the contents below before investigating details.

Unit conditions at service	Check code	Actions to be taken for service (summary)
The trouble is reoccurring.	Displayed	Judge what is wrong and take a corrective action according to “9-2. SELF-DIAGNOSIS ACTION TABLE”.
	Not displayed	Conduct troubleshooting and ascertain the cause of the trouble according to “9-3. TROUBLESHOOTING OF PROBLEMS”.
The trouble is not reoccurring.	Logged	①Consider the temporary defects such as the work of protection devices in the refrigerant circuit including compressor, poor connection of wiring, noise, etc. Re-check the symptom, and check the installation environment, refrigerant amount, weather when the trouble occurred, matters related to wiring, etc. ②Reset check code logs and restart the unit after finishing service. ③There is no abnormality in electrical component, controller board, remote controller, etc.
	Not logged	①Re-check the abnormal symptom. ②Conduct troubleshooting and ascertain the cause of the trouble according to “9-3. TROUBLESHOOTING OF PROBLEMS”. ③Continue to operate unit for the time being if the cause is not ascertained. ④There is no abnormality concerning of parts such as electrical component, controller board, remote controller, etc.

9-2. SELF-DIAGNOSIS ACTION TABLE

<Abnormalities detected when the power is turned on> Note: Refer to indoor unit section for code P, code E, and Code L.

Check code	Abnormal points and detection method	Cause	judgment and action
None	—	① No voltage is supplied to terminal block (TB1) of outdoor unit. a) Power supply breaker is turned off. b) Contact failure or disconnection of power supply terminal c) Open phase (L or N phase)	① Check following items. a) Power supply breaker b) Connection of power supply terminal block (TB1) c) Connection of power supply terminal block (TB1)
		② Electric power is not charged to power supply terminal of outdoor power circuit board. a) Contact failure of power supply terminal b) Open phase on the outdoor power circuit board	② Check following items. a) Connection of power supply terminal block (TB1) b) Connection of terminal on outdoor power circuit board Check connection of the connector LI or NI. Refer to "9-6.TEST POINT DIAGRAM".
		③ Electric power is not supplied to outdoor controller circuit board. a) Disconnection of connector (CNDC)	③ Check connection of the connector (CNDC) on the outdoor controller circuit board. Check connection of the connector, CNDC on the outdoor power circuit board(V)/the noise filter(Y). Refer to "9-6.TEST POINT DIAGRAM".
		④ Disconnection of reactor (DCL or ACL)	④ Check connection of reactor. (DCL or ACL) Refer to "9-6.TEST POINT DIAGRAM".
		⑤ Disconnection of outdoor noise filter circuit board or parts failure in outdoor noise filter circuit board	⑤ a) Check connection of outdoor noise filter circuit board. b) Replace outdoor noise filter circuit board. Refer to "9-6.TEST POINT DIAGRAM".
		⑥ Defective outdoor power circuit board	⑥ Replace outdoor power circuit board.
		⑦ Open of rush current protect resistor(RS)(Y)	⑦ Replace rush current protect resistor(RS). Power circuit board might be short-circuit. Check the power circuit board.(Refer to "9-6. TEST POINT DIAGRAM".)
		⑧ Defective outdoor controller circuit board	⑧ Replace controller board (When items above are checked but the units cannot be repaired).
F5 (5201)	**63H connector open** Abnormal if 63H connector circuit is open for 3 minutes continuously after power supply. 63H: High pressure switch	① Disconnection or contact failure of 63H connector on outdoor controller circuit board ② Disconnection or contact failure of 63H ③ 63H is working due to defective parts. ④ Defective outdoor controller circuit board	① Check connection of 63H connector on outdoor controller circuit board. Refer to "9-6.TEST POINT DIAGRAM". ② Check the 63H side of connecting wire. ③ Check continuity by tester. Replace the parts if the parts are defective. ④ Replace outdoor controller circuit board.

Check code	Abnormal points and detection method	Cause	judgment and action
EA (6844)	**Indoor/outdoor unit connector miswiring, excessive number of units (2 units or more)** 1. Outdoor controller circuit board can automatically check the number of connected indoor units. Abnormal if the number cannot be checked automatically due to miswiring of indoor/outdoor unit connecting wire and etc. after power is turned on for 4 minutes. 2. Abnormal if outdoor controller circuit board recognizes the number of connected indoor units as “2 units or more”.	① Contact failure or miswiring of indoor/outdoor unit connecting wire ② Diameter or length of indoor/outdoor unit connecting wire is out of specified capacity. ③ 2 or more indoor units are connected to one outdoor unit. ④ Defective transmitting receiving circuit of outdoor controller circuit board ⑤ Defective transmitting receiving circuit of indoor controller board ⑥ Defective indoor power board ⑦ Do NOT use refrigerant address 0, as 0 is used for FTC (Master). The address range is 1 to 6. (In case of multiple outdoor units control.) ⑧ Noise has entered into power supply or indoor/outdoor unit connecting wire.	① Check disconnection or looseness or polarity of indoor/outdoor unit connecting wire of indoor and outdoor units. ② Check diameter and length of indoor/outdoor unit connecting wire. Total wiring length: 80 m (including wiring connecting each indoor unit and between indoor and outdoor unit) Also check if the connection order of flat cable is S1, S2, S3. ③ Check the number of indoor units that are connected to one outdoor unit. (If EA is detected) ④–⑥ Turn the power off once, and on again to check. Replace outdoor controller circuit board, indoor controller board or indoor power board if abnormality occurs again. ⑦ Check if refrigerant addresses (SW1-3 to SW1-6 on outdoor controller circuit board) are overlapping in case of multiple outdoor units control. ⑧ Check transmission path, and remove the cause. Note: The descriptions above, 1–8, are for EA, Eb and EC.
Eb (6845)	**Miswiring of indoor/outdoor unit connecting wire (reverse wiring or disconnection)** Outdoor controller circuit board can automatically set the unit number of indoor units. Abnormal if the indoor unit number cannot be set within 4 minutes after power on because of miswiring (reverse wiring or disconnection) of indoor/outdoor unit connecting wire.	① Contact failure or miswiring of indoor/outdoor unit connecting wire ② Diameter or length of indoor/outdoor unit connecting wire is out of specified capacity. ④ Defective transmitting receiving circuit of outdoor controller circuit board ⑤ Defective transmitting receiving circuit of indoor controller board ⑥ Defective indoor power board ⑦ Do NOT use refrigerant address 0, as 0 is used for FTC (Master). The address range is 1 to 6. (In case of multiple outdoor units control.) ⑧ Noise has entered into power supply or indoor/outdoor unit connecting wire.	
EC (6846)	**Startup time over** The unit cannot finish startup process within 4 minutes after power on.	① Contact failure of indoor/outdoor unit connecting wire ② Diameter or length of indoor/outdoor unit connecting wire is out of specified capacity. ③ Do NOT use refrigerant address 0, as 0 is used for FTC (Master). The address range is 1 to 6. (In case of multiple outdoor units control.) ④ Noise has entered into power supply or indoor/outdoor unit connecting wire.	
EE	**Incorrect connection** The outdoor unit does not receive the signals of I/F or FTC.	① A device other than Interface unit or Flow temp. controller unit is connected to the unit.	① Connect I/F or FTC to the unit.

Check code	Abnormal points and detection method	Cause	judgment and action
U1 (INV:1302 FIX:1402)	**High pressure (High pressure switch 63H operated)** Abnormal if high pressure switch 63H operated (3.2 MPa) during compressor operation. 63H: High pressure switch (INV) 63L: High pressure switch (FIX)	① Short cycle of indoor unit ② Clogged filter of indoor unit ③ Decreased airflow caused by dirt of indoor fan ④ Dirt of indoor heat exchanger ⑤ Locked indoor fan motor ⑥ Malfunction of indoor fan motor ⑦ Clogged or broken pipe ⑧ Locked outdoor fan motor ⑨ Malfunction of outdoor fan motor ⑩ Short cycle of outdoor unit ⑪ Dirt of outdoor heat exchanger ⑫ Decreased airflow caused by defective inspection of outside temperature thermistor (It detects lower temperature than actual temperature.) ⑬ Disconnection or contact failure of connector (63H/63L) on outdoor controller board ⑭ Disconnection or contact failure of 63H/63L connection ⑮ Defective outdoor controller board ⑯ Defective action of linear expansion valve ⑰ Malfunction of fan driving circuit	①–⑥ Check indoor unit and repair defect. ⑦ Check outdoor unit and repair defect. ⑧ Check outdoor unit and repair defect. ⑨–⑪ Check outdoor unit and repair defect. ⑫ Check the detected temperature of outside temperature thermistor on LED display. (SW2 on A-Control Service Tool: Refer to "9-7. FUNCTION OF SWITCHES, CONNECTORS AND JUMPERS".) ⑬–⑮ Turn the power off and check F5 is displayed when the power is turned again. When F5 is displayed, refer to “Judgment and action” for F5. ⑯ Check linear expansion valve. Refer to "9-4. HOW TO CHECK THE PARTS". ⑰ Replace outdoor controller board.
U2 (INV:1102 FIX:1232)	**High discharge temperature** (1) Abnormal if TH4 exceeds 125°C or 110°C continuously for 5 minutes. Abnormal if TH4 exceeds 110°C or more continuously for 30 seconds after 90 seconds have passed since the defrosting operation started. (2) Abnormal if discharge superheat (Cooling: TH4−TH6 / Heating: TH4−T63HS) exceeds 70°C continuously for 10 minutes. TH4: Thermistor <Discharge> temperature TH6: Thermistor <2-phase temp.> temperature T63HS: Plate HEX cond./eva. temperature **High comp. surface temperature** Abnormal if TH33 exceeds 120°C. In the case of high comp. surface temperature error, compressor does not restart unless the thermistor (TH33) becomes less than 95°C. TH33: Thermistor <Comp. surface> **High comp. surface temperature of Fixed speed compressor** Abnormal if inner protector exceeds 160°C. surface temperature error, compressor does not restart unless the inner protector becomes less than 90°C. Inner protector: protective device internally mounted in Fixed speed compressor.	① Overheated compressor operation caused by shortage of refrigerant ② Defective thermistor ③ Defective outdoor controller board ④ Defective action of linear expansion valve ⑤ Clogging with foreign objects in refrigerant circuit Note: Clogging occur in the parts which become below freezing point when water enters in refrigerant circuit. ⑥ In the case of the unit does not restart: Detection temp. of thermistor (TH33) ≥ 95°C	① Check intake superheat. Check leakage of refrigerant. ②③ Turn the power off and check if U3 is displayed when the power is turned on again. When U3 is displayed, refer to “Judgment and action” for U3. ④ Check linear expansion valve. Refer to "9-4. HOW TO CHECK THE PARTS" ⑤ After recovering refrigerant, remove water from entire refrigerant circuit under vacuum more than 1 hour.
U3 (5104)	**Open/short circuit of outdoor unit temperature thermistor (TH4, TH33)** Abnormal if open (-20°C or less) or short (217°C or more) is detected during compressor operation. (Detection is inoperative for 10 minutes of compressor starting process and for 10 minutes after and during defrosting.) TH4: Thermistor <Discharge> TH33: Thermistor <Comp. surface>	① Disconnection or contact failure of connectors (TH4, TH33) on the outdoor controller circuit board ② Defective thermistor ③ Defective outdoor controller circuit board	① Check connection of connector (TH4, TH33) on the outdoor controller circuit board. Check breaking of the lead wire for TH4, TH33. Refer to "9-6.TEST POINT DIAGRAM". ② Check resistance value of TH4, TH33 or temperature by microprocessor. (Thermistor/TH4, TH33: Refer to "9-4. HOW TO CHECK THE PARTS".) (SW2 on A-Control Service Tool: Refer to "9-7. FUNCTION OF SWITCHES, CONNECTORS AND JUMPERS".) ③ Replace outdoor controller board.

Check code	Abnormal points and detection method	Cause	judgment and action
U4 (TH3:5105) (TH6:5107) (TH7:5106) (TH8:5110) (TH32:5105) (TH34:5105) (TH35:5105)	**Open/short of outdoor unit thermistors (TH3, TH34, TH6, TH7, TH8, TH32 and TH35)** Abnormal if open or short is detected during compressor operation. Open detection of TH3, TH34 and TH6 is inoperative for 10 seconds to 10 minutes after compressor starting and 10 minutes after and during defrosting. Note: Check which unit has abnormality in its thermistor by switching the mode of SW2. (PAC-SK52ST) (Refer to "9-7. FUNCTION OF SWITCHES, CONNECTORS AND JUMPERS".)	① Disconnection or contact failure of connectors (Outdoor controller circuit board: TH3, TH34, TH7/6 Outdoor power circuit board: CN3) ② Defective thermistor ③ Defective outdoor controller circuit board	① Check connection of connector (TH3, TH34, TH7/6, TH32, TH35) on the outdoor controller circuit board. Check connection of connector (CN3) on the outdoor power circuit board. Check breaking of the lead wire for TH3, TH34, TH6, TH7, TH8, TH32, TH35. Refer to "9-6.TEST POINT DIAGRAM". ② Check resistance value of TH3, TH34, TH6, TH7, TH8, TH32, TH35 or check temperature by microprocessor. (TH3,TH34,TH6,TH7,TH8, TH32, TH35: Refer to "9-6.TEST POINT DIAGRAM".) (SW2 on A-Control Service Tool: Refer to "9-7. FUNCTION OF SWITCHES, CONNECTORS AND JUMPERS".) ③ Replace outdoor controller circuit board. Note: Emergency operation is available in case of abnormalities of TH3, TH34, TH6 and TH7.

Thermistors		Open detection	Short detection
Symbol	Name		
TH3	Thermistor <Liquid>	−40 °C or below	90 °C or above
TH6	Thermistor <Two-phase>	−40 °C or below	90 °C or above
TH7	Thermistor <Ambient>	−40 °C or below	90 °C or above
TH8	Thermistor <Heat sink>	−35 °C or below	102 °C or above
TH32	Thermistor <Liquid>	−40 °C or below	90 °C or above
TH34	Thermistor <Plate hex liquid>	−40 °C or below	90 °C or above
TH35	Thermistor <Suction pipe>	−40 °C or below	90 °C or above

U5 (4230)	**Temperature of heat sink** Abnormal if TH8 detects temperature indicated below. WZ50V, WZ60V, WZ80V ····· 78°C TH8: Thermistor <Heat sink>	① The outdoor fan motor is locked. ② Failure of outdoor fan motor ③ Airflow path is clogged. ④ Rise of ambient temperature ⑤ Defective thermistor ⑥ Defective input circuit of outdoor power circuit board ⑦ Failure of outdoor fan drive circuit	①② Check outdoor fan. ③ Check airflow path for cooling. ④ Check if there is something which causes temperature rise around outdoor unit. (Upper limit of ambient temperature is 46°C.) Turn off power, and on again to check if U5 is displayed within 30 minutes. If U4 is displayed instead of U5, follow the action to be taken for U4. ⑤ Check resistance value of TH8 or temperature by microprocessor. (TH8: Refer to "9-4. HOW TO CHECK THE PARTS".) (SW2 on A-Control Service Tool: Refer to "9-7. FUNCTION OF SWITCHES, CONNECTORS AND JUMPERS".) ⑥ Replace outdoor power circuit board. ⑦ Replace outdoor controller circuit board.
U6 (4250)	**Power module** Check abnormality by driving power module in case overcurrent is detected. (UF or UP error condition)	① Decrease of power supply voltage ② Looseness, disconnection or reverse of compressor wiring connection ③ Defective compressor ④ Defective outdoor power circuit board	① Check facility of power supply. ② Correct the wiring (U·V·W phase) to compressor. Refer to "9-6.TEST POINT DIAGRAM" (Outdoor power circuit board). ③ Check compressor referring to "9-4. HOW TO CHECK THE PARTS". ④ Replace outdoor power circuit board.
U7 (1502)	**Too low superheat due to low discharge temperature** Abnormal if discharge superheat is continuously detected less than or equal to −15°C for 3 minutes even though linear expansion valve has minimum open pulse after compressor starts operating for 10 minutes.	① Disconnection or loose connection of discharge temperature thermistor (TH4) ② Defective holder of discharge temperature thermistor ③ Disconnection or loose connection of linear expansion valve's coil ④ Disconnection or loose connection of linear expansion valve's connector ⑤ Defective linear expansion valve	①② Check the installation conditions of discharge temperature thermistor (TH4). ③ Check the coil of linear expansion valve. Refer to "9-5. HOW TO CHECK THE COMPONENTS". ④ Check the connection or contact of LEV-A and LEV-B on outdoor controller circuit board. ⑤ Check linear expansion valve. Refer to "9-4. HOW TO CHECK THE PARTS".

Check code	Abnormal points and detection method		Cause	judgment and action
U8 (4400)	**Outdoor fan motor** Abnormal if rotational frequency of the fan motor is not detected during DC fan motor operation. Fan motor rotational frequency is abnormal if; • 100 rpm or below detected continuously for 15 seconds at 20°C or more outside air temperature. • 50 rpm or below or 1500 rpm or more detected continuously for 1 minute.		① Failure in the operation of the DC fan motor ② Failure in the outdoor circuit controller board	① Check or replace the DC fan motor. ② Check the voltage of the outdoor circuit controller board during operation. (When the failure is still indicated even after performing the action 1 above.)
U9 (4220)	Detailed codes	To find out the detail history (latest) about U9 error, turn ON SW2-1, 2-2 and 2-6. Refer to "9-7. FUNCTION OF SWITCHES, CONNECTORS AND JUMPERS".		
	01	**Overvoltage error** • Increase in DC bus voltage to WZ50/WZ60/80V : 430V	① Abnormal increase in power source voltage ② Disconnection of compressor wiring ③ Defective outdoor power circuit board ④ Compressor has a ground fault.	① Check the field facility for the power supply. ② Correct the wiring (U·V·W phase) to compressor. Refer to "9-7. FUNCTION OF SWITCHES, CONNECTORS AND JUMPERS". (Outdoor power circuit board). ③ Replace outdoor power circuit board. ④ Check compressor for electrical insulation. Replace compressor.
	02	**Undervoltage error** • Instantaneous decrease in DC bus voltage to WZ50/60/80V : 200V	① Decrease in power source voltage, instantaneous stop ② Defective converter drive circuit in outdoor power circuit board (WZ50V,WZ60V,WZ80V) ③ Defective 52C drive circuit in outdoor power circuit board ④ Disconnection or loose connection of CN2 on the outdoor power circuit board /controller circuit board (WZ50V,WZ60V,WZ80V) ⑤ Power circuit failure on DC supply for 15 V DC output on outdoor controller circuit board (WZ50V,WZ60V,WZ80V)	① Check the field facility for the power supply. ② Replace outdoor power circuit board. (WZ50V,WZ60V,WZ80V) ③ Replace outdoor power circuit board. ④ Check CN2 wiring. (WZ50V,WZ60V,WZ80V) ⑤ Replace outdoor controller circuit board. (WZ50V,WZ60V,WZ80V)
	04	**Input current sensor error** • Decrease in input current through outdoor unit to 0.1A only if operation frequency is more than or equal to 40Hz or compressor current is more than or equal to 6A.	① Defective ACCT (AC current trans) on the outdoor power circuit board ② Defective input current detection circuit in outdoor power circuit board ③ Defective outdoor controller circuit board	① Replace outdoor power circuit board. ② Replace outdoor power circuit board. ③ Replace outdoor controller circuit board.
	08	**Abnormal power synchronous signal** • No input of power synchronous signal to power circuit board • Power synchronous signal of 44 Hz or less, or 65 Hz or more is detected on power circuit board.	① Distortion of power source voltage, noise superimposition. ② Disconnection or loose connection of earth wiring ③ Disconnection or loose connection of CN2 on the outdoor power circuit board /controller circuit board ④ Defective power synchronous signal circuit in outdoor controller circuit board ⑤ Defective power synchronous signal circuit in outdoor power circuit board	① Check the field facility for the power supply. ② Check earth wiring. ③ Check CN2 wiring. ④ Replace outdoor controller circuit board. ⑤ Replace outdoor power circuit board.

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Check code	Abnormal points and detection method		Cause	judgment and action
U9 (4220)	Detailed codes 10	**PFC error (Overvoltage/ Undervoltage/Overcurrent)** • PFC detected any of the following a) Increase of DC bus voltage to 430 V. (Without WZ50V) b) Decrease in PFC control voltage to 12 V DC or lower c) Increase in input current (WZ50V,WZ60V,WZ80V)	① Abnormal increase in power source voltage ② Decrease in power source voltage, instantaneous stop ③ Disconnection of compressor wiring ④ Misconnection of reactor ⑤ Defective outdoor power circuit board ⑥ Defective reactor ⑦ Disconnection or loose connection of CN2 on the outdoor power circuit board/controller circuit board	①② Check the field facility for the power supply. ③ Correct the wiring (U•V•W phase) to compressor. Refer to "9-6. TEST POINT DIAGRAM". (Outdoor power circuit board). ④ Correct the wiring of reactor ⑤ Replace outdoor power circuit board. ⑥ Replace reactor ⑦ Check CN2 wiring.
	20	**PFC/IGBT error (Undervoltage)** • When Compressor is running, DC bus voltage stays at 310 V or lower for consecutive 10 seconds (WZ50V,WZ60V,WZ80V)	① Incorrect switch settings on the outdoor controller circuit board for model select ② Defective outdoor power circuit board ③ Defective outdoor controller circuit board	① Correction of a model select ② Replace outdoor power circuit board. ③ Replace outdoor controller circuit board.
Ud (1504)	**Overheat protection** Abnormal if TH3, condensing temperature T_{63HS} detects 70°C or more during compressor operation. TH3: Thermistor <Liquid>		① Defective outdoor fan (fan motor) or short cycle of outdoor unit during cooling operation ② Defective TH3, condensing temperature T_{63HS} ③ Defective outdoor controller board	① Check outdoor unit air passage. ②③ Turn the power off and on again to check the check code. If U4 is displayed, follow the U4 processing direction.
UE (1509)	**Abnormal pressure of 63HS** Abnormal if 63HS detects 0.1 MPa or less. Detection is inoperative for 3 minutes after compressor starting and 3 minutes after and during defrosting. 63HS: Pressure sensor		① Disconnection or contact failure of connector (63HS) on the outdoor controller circuit board ② Defective pressure sensor ③ Defective outdoor controller circuit board	① Check connection of connector (63HS) on the outdoor controller circuit board. Check breaking of the lead wire for 63HS. ② Check pressure by microprocessor. (Pressure sensor/ 63HS) (SW2: Refer to "9-7. FUNCTION OF SWITCHES, CONNECTORS AND JUMPERS".) ③ Replace outdoor controller board.
UF (4100)	**Compressor overcurrent interruption (When compressor locked)** Abnormal if overcurrent of DC bus or compressor is detected within 30 seconds after compressor starts operating.		① Decrease of power supply voltage ② Looseness, disconnection or converse of compressor wiring connection ③ Defective compressor ④ Defective outdoor power board ⑤ DIP switch setting difference of outdoor controller circuit board	① Check facility of supply. ② Correct the wiring (U•V•W phase) to compressor. Refer to "9-6.TEST POINT DIAGRAM". (Outdoor power circuit board). ③ Check compressor. Refer to "9-4. HOW TO CHECK THE PARTS". ④ Replace outdoor power circuit board. ⑤ Check the DIP switch setting of outdoor controller circuit board.
UH (5300)	**Current sensor error or input current error** • Abnormal if current sensor detects –1.0A to 1.0A during compressor operation. (This error is ignored in case of test run mode.) • Abnormal if 40A (WZ50V,WZ60V,WZ80V) of input current is detected or 37A (WZ50V,WZ60V,WZ80V) or more of input current is detected for 10 seconds continuously.		① Disconnection of compressor wiring ② Defective circuit of current sensor on outdoor power circuit board ③ Decrease of power supply voltage ④ Leakage or shortage of refrigerant	① Correct the wiring (U·V·W phase) to compressor. Refer to "9-6.TEST POINT DIAGRAM" (Outdoor power circuit board). ② Replace outdoor power circuit board. ③ Check the facility of power supply. ④ Check leakage of refrigerant.

Check code	Abnormal points and detection method	Cause	judgment and action
UL (INV:1300 FIX:1400)	**Low pressure (INV)** Abnormal if following conditions are detected after compressor starts heating operating for 3 minutes. TH33 - TH4 ≥ 20°C and TH33 ≥ 80°C Thermistor TH33: Thermistor<Comp. surface> temperature TH4 : Thermistor <Discharge> temperature **Low pressure (FIX)** Abnormal if following conditions are detected after compressor starts heating operating for 3 minutes. TH35 - TH32 ≥ 65°C Thermistor TH35: Thermistor <Suction pipe> temperature TH32: Thermistor <Liquid (FIX)> temperature	① Leakage or shortage of refrigerant ② Malfunction of linear expansion valve ③ Clogging with foreign objects in refrigerant circuit Note: If water enters in refrigerant circuit, clogging may occur where the part becomes below freezing point.	① Check intake superheat. Check leakage of refrigerant. ② Check linear expansion valve. Refer to "9-4. HOW TO CHECK THE PARTS". ③ After recovering refrigerant, remove water from entire refrigerant circuit under vacuum more than 1 hour.
UP (INV: 4210 FIX: 4150)	**Compressor overcurrent interruption (INV)** Abnormal if overcurrent DC bus or compressor is detected after compressor starts operating for 30 seconds. **Compressor overcurrent interruption (FIX)** Abnormal if over current of Fixed speed compressor is detected.	① Decrease of power supply voltage ② Looseness, disconnection or converse of compressor wiring connection ③ Defective fan of indoor/outdoor units ④ Short cycle of indoor/outdoor units ⑤ Defective input circuit of outdoor controller board ⑥ Defective compressor ⑦ Defective outdoor power circuit board ⑧ DIP switch setting difference of outdoor controller circuit board	① Check facility of power supply. ② Correct the wiring (INV: U·V·W phase, FIX: S·C·R phase) to compressor. Refer to "9-6.TEST POINT DIAGRAM" (Outdoor power circuit board). ③ Check indoor/outdoor fan. ④ Solve short cycle. ⑤ Replace outdoor controller circuit board. Note: Before the replacement of the outdoor controller circuit board, disconnect the wiring to compressor from the outdoor power circuit board and check the output voltage among phases, INV: U·V·W, FIX: S·C·R, during test run. No defect on board if voltage among phases (INV: U-V, V-W and FIX: W-U, S-C, C-R and R-S) is the same. Make sure to perform the voltage check with the same performing frequency. ⑥ Check compressor. Refer to "9-4. HOW TO CHECK THE PARTS". ⑦ Replace outdoor power circuit board. ⑧ Check the DIP switch setting of outdoor controller circuit board.
E0 or E4 (6831 or 6834)	**Remote controller transmission error (E0)/ signal receiving error (E4)** ① Abnormal if main remote controller cannot receive normally any transmission from indoor unit of refrigerant address “0” for 3 minutes. (Check code: E0) ① Abnormal if indoor controller board cannot receive normally any data from remote controller board or from other indoor controller board for 3 minutes. (Check code: E4) ② Indoor controller board cannot receive any signal from remote controller for 2 minutes. (Check code: E4)	① Contact failure at transmission wire of remote controller ② Miswiring of remote controller ③ Defective transmitting receiving circuit of remote controller ④ Defective transmitting receiving circuit of indoor controller board of refrigerant address “0” ⑤ Noise has entered into the transmission wire of remote controller.	① Check disconnection or looseness of indoor unit or transmission wire of remote controller. ② Check wiring of remote controller. • Total wiring length: Max. 500 m (Do not use cable × 3 or more.) • The number of connecting indoor units: Max. 6 units • The number of connecting remote controller: Max. 1 unit If the cause of trouble is not in above ①–②, ③-⑤ Diagnose remote controller (PAC-IF011B-E only). a) When “RC OK” is displayed, Remote controllers have no problem. Turn the power off, and on again to check. If abnormality generates again, replace indoor controller board. b) When “RC NG” is displayed, Replace remote controller. c) When "RCE3" or "ERC00-66" is displayed, noise may be causing abnormality. Note: If the unit is not normal after replacing indoor controller board in group control, indoor controller board of address “0” may be abnormal. For the controllers other than PAC-IF011B-E, refer to Installation Manual or Service Handbook of the indoor unit.

Check code	Abnormal points and detection method	Cause	judgment and action
E1 or E2 (6201 or 6202)	**Remote controller control board** ① Abnormal if data cannot be normally read from the nonvolatile memory of the remote controller control board. (Check code: E1) ② Abnormal if the clock function of remote controller cannot be normally operated. (Check code: E2)	① Defective remote controller	① Replace remote controller.
E3 or E5 (6832 or 6833)	**Remote controller transmission error (E3)/ signal receiving error (E5)** ① Abnormal if remote controller could not find blank of transmission path for 6 seconds and could not transmit. (Check code: E3) ② Remote controller receives transmitted data at the same time, compares the data, and when detecting it, judges different data to be abnormal 30 continuous times. (Check code: E3) ① Abnormal if indoor controller board could not find blank of transmission path. (Check code: E5) ② Indoor controller board receives transmitted data at the same time, compares the data, and when detecting it, judges different data to be abnormal 30 continuous times. (Check code: E5)	① Duplication of refrigerant address ② Defective transmitting receiving circuit of remote controller ③ Defective transmitting receiving circuit of indoor controller board ④ Noise has entered into transmission wire of remote controller.	① The address changes to a separate setting. ②–④ Diagnose remote controller (PAC-IF011B-E only). a) When “RC OK” is displayed, remote controllers have no problem. Turn the power off, and on again to check. When becoming abnormal again, replace indoor controller board. b) When “RC NG” is displayed, replace remote controller. c) When “RC E3” or “ERC 00-66” is displayed, noise may be causing abnormality. Note: For the controllers other than PAC-IF011B-E, refer to Installation Manual or Service Handbook of the indoor unit.
E6 (6840)	**Indoor/outdoor unit communication error (Signal receiving error)** ① Abnormal if indoor controller board could not receive any signal normally for 6 minutes after turning the power on. ② Abnormal if indoor controller board could not receive any signal normally for 3 minutes. ③ Consider the unit as abnormal under the following condition. When 2 or more indoor units are connected to an outdoor unit, indoor controller board could not receive a signal for 3 minutes from outdoor controller circuit board, a signal which allows outdoor controller circuit board to transmit signals.	① Contact failure, short circuit or miswiring (reversed wiring)of indoor/outdoor unit connecting wire. ② Defective transmitting receiving circuit of outdoor controller circuit board. ③ Defective transmitting receiving circuit of indoor controller circuit board. ④ Noise has entered into indoor/outdoor unit connecting wire. ⑤ High pressure(High pressure switch 63H operated) or High compressor temperature (Thermal protector TRS operated) ⑥ Defective fan motor ⑦ Defective rush current resistor of outdoor power circuit board	Check LED display on outdoor controller circuit board. (Connect A-Control service tool (PAC-SK52ST)) Refer to EA-EC item if LED displays EA-AC. ① Check disconnecting or looseness of indoor/outdoor unit connecting wire of indoor unit or outdoor unit. Check all the units in the case of twin/triple/quadruple indoor unit. ②–⑤ Turn the power off, wait 10 minutes and on again to check. If abnormality occurs again, replace indoor controller board or outdoor controller circuit board. Note: Other indoor controller board may have defect in the case of twin/triple/quadruple indoor unit system. ⑥ Turn the power off, and detach fan motor from connector (CNF1, 2). Then turn the power on again. If abnormality is not displayed, replace fan motor. If abnormality is displayed, replace outdoor controller circuit board. ⑦ Check the rush current resistor on outdoor power circuit board with tester. If open is detected, replace the power circuit board.
E7	**Indoor/outdoor unit communication error (Transmitting error)** Abnormal if "1" receiving is detected 30 times continuously though indoor controller board has transmitted "0".	① Defective transmitting receiving circuit of indoor controller board ② Noise has entered into power supply ③ Noise has entered into outdoor control wire	①–③ Turn the power off, and on again to check. If abnormality occurs again, replace indoor controller board.

Check code	Abnormal points and detection method	Cause	judgment and action
E8 (6840)	**Indoor/outdoor unit communication error (Signal receiving error) (Outdoor unit)** Abnormal if outdoor controller circuit board could not receive anything normally for 3 minutes.	① Contact failure of indoor/ outdoor unit connecting wire ② Defective communication circuit of outdoor controller circuit board ③ Defective communication circuit of indoor controller board ④ Noise has entered into indoor/ outdoor unit connecting wire.	① Check disconnection or looseness of indoor/ outdoor unit connecting wire of indoor or outdoor units. ②–④ Turn the power off, and on again to check. Replace indoor controller board or outdoor controller circuit board if abnormality is displayed again.
E9 (6841)	**Indoor/outdoor unit communication error (Transmitting error) (Outdoor unit)** ① Abnormal if “0” receiving is detected 30 times continuously though outdoor controller circuit board has transmitted “1”. ② Abnormal if outdoor controller circuit board could not find blank of transmission path for 3 minutes.	① Indoor/ outdoor unit connecting wire has contact failure. ② Defective communication circuit of outdoor controller circuit board ③ Noise has entered power supply. ④ Noise has entered indoor/ outdoor unit connecting wire.	① Check disconnection or looseness of indoor/ outdoor unit connecting wire. ②–④ Turn the power off, and on again to check. Replace outdoor controller circuit board if abnormality is displayed again.
EF (6607 or 6608)	**Non defined check code** This code is displayed when non defined check code is received.	① Noise has entered transmission wire of remote controller. ② Noise has entered indoor/ outdoor unit connecting wire. ③ Outdoor unit is not inverter models.	①② Turn the power off, and on again to check. Replace indoor controller board or outdoor controller circuit board if abnormality is displayed again. ③ Replace outdoor unit with inverter type outdoor unit.
Ed (0403)	**Serial communication error** ① Abnormal if serial communication between outdoor controller circuit board and outdoor power circuit board is defective.	① Breaking of wire or contact failure of connector CN2 between the outdoor controller circuit board and the outdoor power circuit board ② Breaking of wire or contact failure of connector CN4 between the outdoor controller circuit board and the outdoor power circuit board ③ Defective communication circuit of outdoor power circuit board ④ Defective communication circuit of outdoor controller circuit board for outdoor power circuit board	①② Check connection of each connector CN2 and CN4 between the outdoor controller circuit board and the outdoor power circuit board. ③ Replace outdoor power circuit board. ④ Replace outdoor controller circuit board.

Check code	Abnormal points and detection method	Cause	judgment and action
P8	**Pipe temperature** Abnormal if the following conditions are detected for continuously 3 minutes after compressor starts operating for 10 minutes. 1. Cooling mode TH6–TH7 ≤ 2°C and TH3–TH7 ≤ 4°C or TH6−TH3 < 0°C and THW2(Indoor)-TH34 ≤ 0°C and Compressor operation frequency is 61 Hz or more. 2. Heating mode T_{63HS}–THW2(Indoor) ≤ 2°C and TH6–THW2(Indoor) ≤ 1°C and TH7–TH3 ≤ 1°C and Compressor operation frequency is 61 Hz or more. T_{63HS}: Condensing temperature of pressure sensor (63HS) Thermistor TH3: Liquid temperature TH34: Plate HEX Liquid temperature TH7: Ambient temperature THW2(Indoor):Return water temp from Indoor unit thermistor	① Leakage or shortage of refrigerant ② Malfunction of linear expansion valve ③ Refrigerant circuit is clogged with foreign objects. Note: Clogging occurs in the parts which become below freezing point when water enters in refrigerant circuit. ④ Disconnection of thermistor holder.	① Check intake superheat. Check leakage of refrigerant. ② Check linear expansion valve. ③ After recovering refrigerant, remove water from entire refrigerant circuit under vacuum more than 1 hour. ④ Check temperature display on outdoor controller circuit board. Temperature display is indicated by setting SW2 of outdoor controller circuit board. Check the holder of thermistor.
P6	**Freezing/overheating protection is working** (1) Freezing protection Plate HEX Liquid temperature(TH34) or refrigerant saturation temperature is 10 seconds smaller than the threshold.The threshold is dynamically calculated by inner operation using the operating time of the compressor and the water temperature.	(1) Freezing protection <Cooling mode> ① Reduced water flow · Clogged filter · Leakage of water ② Low temperature · Low-load · Inlet water is too cold. ③ Defective water pump ④ Defective outdoor fan control ⑤ Leakage or shortage of refrigerant ⑥ Defective refrigerant circuit (clogs) ⑦ Malfunction of linear expansion valve <Heating mode> ① Reduced water flow · Clogged filter · Leakage of water ② Low temperature · Low-load · Inlet water is cold. ③ Defective water pump ④ Leakage or shortage of refrigerant ⑤ Malfunction of linear expansion valve	(1) Freezing protection <Cooling mode> ①② Check water piping. ③ Check water pump. ④ Check outdoor fan motor. ⑤⑥ Check operating condition of refrigerant circuit. ⑦ Check linear expansion valve. <Heating mode> ①② Check water piping. ③ Check water pump. ④ Correct to proper amount of refrigerant. ⑤ Check linear expansion valve. Refer to "9-5. HOW TO CHECK THE COMPONENTS".
PE	**Inlet water temperature** Abnormal if the following conditions are detected for continuously 10 seconds. 1. Cooling mode During compressor operation THW2(Indoor) < 3°C 2. Heating mode (exclude defrosting) During compressor operation THW2(Indoor) < −10°C 3. Defrosting mode During compressor operation THW2(Indoor) < 0°C Thermistor THW2(Indoor): Return water temp from Indoor unit thermistor	① Reduced water flow · Clogged filter · Leak of water ② Low temperature · Low-load · Low temperature inlet water ③ Defective water pump ④ Leakage or shortage of refrigerant	①② Check water piping. ③ Check water pump. ④ Check intake superheat. Check leakage of refrigerant.

9-3. TROUBLESHOOTING OF PROBLEMS

Phenomena	Factor	Countermeasure
1. Remote controller display does not work.	①12 V DC is not supplied to remote controller.	① Check LED2 on indoor controller board. (1) When LED2 is lit. Check the remote controller wiring for breaking or contact failure. (2) When LED2 is blinking. Check short circuit of remote controller wiring. (3) When LED2 is not lit. Refer to No.3 below.
	②12–15 V DC is supplied to remote controller, however, no display is indicated. • "PLEASE WAIT" is not displayed. • "PLEASE WAIT" is displayed.	② Check the following. • Failure of remote controller if "PLEASE WAIT" is not displayed • Refer to No.2 below if "PLEASE WAIT" is displayed.
2. "PLEASE WAIT" display is remained on the remote controller.	① At longest 2 minutes after the power supply "PLEASE WAIT" is displayed to start up. ② Communication error between the remote controller and indoor unit ③ Communication error between the indoor and outdoor unit	① Normal operation ② Self-diagnosis of remote controller ③ "PLEASE WAIT" is displayed for 6 minutes at most in case of indoor/outdoor unit communication error. Check LED3 on indoor controller board. (1) When LED3 is not blinking. Check indoor/outdoor connecting wire for miswiring. (Reverse wiring of S1 and S2, or break of S3 wiring.) (2) When LED3 is blinking. Indoor/outdoor connecting wire is normal.
	④ Outdoor unit protection device connector is open.	④ Check LED display on outdoor controller circuit board. Refer to "9-6.TEST POINT DIAGRAM". Check protection device connector (63L and 63H) for contact failure.
3. When pressing the remote controller operation switch, the OPERATION display is appeared but it will be turned off soon.	① After cancelling to select function from the remote controller, the remote controller operation switch will be not accepted for approx. 30 seconds.	① Normal operation
4. Remote controller display works normally and the unit performs cooling operation, however, the capacity cannot be fully obtained.	① Refrigerant shortage	① If refrigerant leaks, discharging temperature rises and LEV opening increases. Inspect leakage by checking the temperature and opening. Check pipe connections for gas leakage.
	② Filter clogging	② Clean the filter of water piping.
5. Remote controller display works normally and the unit performs heating operation, however, the capacity cannot be fully obtained.	① Linear expansion valve fault Opening cannot be adjusted well due to linear expansion valve fault.	① Discharging temperature and indoor heat exchanger temperature does not rise. Inspect the failure by checking discharging pressure. Replace linear expansion valve.
	② Refrigerant shortage	② If refrigerant leaks, discharging temperature rises and LEV opening increases. Inspect leakage by checking the temperature and opening. Check pipe connections for gas leakage.
	③ Lack of insulation for refrigerant piping	③ Check the insulation.
	④ Filter clogging	④ Clean the filter of water piping.
	⑤ Bypass circuit of outdoor unit fault	⑤ Check refrigerant system during operation.
6. ① For 3 minutes after temperature adjuster turns off, the compressor will not start operating even if temperature adjuster is turned on. ② For 3 minutes after temperature adjuster turns on, the compressor will not stop operating even if temperature adjuster is turned off. (Compressor stops operating immediately when turning off by the remote controller.)	①② Normal operation (For protection of compressor)	①② Normal operation

Phenomena	Factor	Countermeasure
7. A large amount of water is drained from the outdoor unit.	1 Water is drained from PRV because of the pressure rise in water circuit. 2 Water leakage due to the breakdown of PRV	1 Check the below items following the indoor unit manual to suppress the pressure rise in water circuit. (1) Check the expansion tank. (2) Follow the trouble shooting when the water temperature rises abnormally 2 Check the water pressure and flush with manual drainage water of PRV.
8. Compressor does not work after the breaker switched on.	Normal operation (For protection of compressor)	Start operating after 12 hours of power-on. (Refer to the Install manual.)

Phenomena	Countermeasure
A flowing water sound or occasional hissing sound is heard.	■ These sounds can be heard when refrigerant and/or water is (are) flowing in the indoor unit or refrigerant pipe, or when the refrigerant and/or water is (are) chugging.
Water does not heat or cool well.	■ Clean the filter of water piping. (Flow is reduced when the filter is dirty or clogged.) ■ Check the temperature adjustment and adjust the set temperature. ■ Make sure that there is plenty of space around the outdoor unit.
Water is dripping or vapour is emitted from the outdoor unit.	■ During cooling mode, water may form and drip from the cool pipes and joints. ■ During heating mode, water may form and drip from the heat exchanger of outdoor unit. ■ During defrosting mode, water on the heat exchanger of outdoor unit evaporates and water vapour may be emitted.
When restarting the outdoor unit soon after stopping it, it does not operate even though the ON/OFF button is pressed.	■ Wait approximately 3 minutes. (Operation has stopped to protect the outdoor unit.)
FTC operates without the ON/OFF button being pressed.	■ Is the on timer set? Press the ON/OFF button to stop operation. ■ Is the FTC connected to an external signal? Consult the concerned people who control the FTC. ■ Does "⊠" appear in the remote controller display? Consult the concerned people who control the FTC. ■ Has the auto recovery feature from power failures been set? Press the ON/OFF button to stop operation.
"PLEASE WAIT" appears in the remote controller display.	■ The initial settings are being performed. Wait approximately 3 minutes. ■ If the remote controller is not only for FTC, change it.
A check code appears in the remote controller display.	■ The protection devices have operated to protect the FTC and outdoor unit. ■ Do not attempt to repair this equipment by yourself. Turn off the power switch immediately and consult your dealer. Be sure to provide the dealer with the model name and information that appeared in the remote controller display.

• If the unit cannot be operated properly after test run, refer to the following table to find the cause.

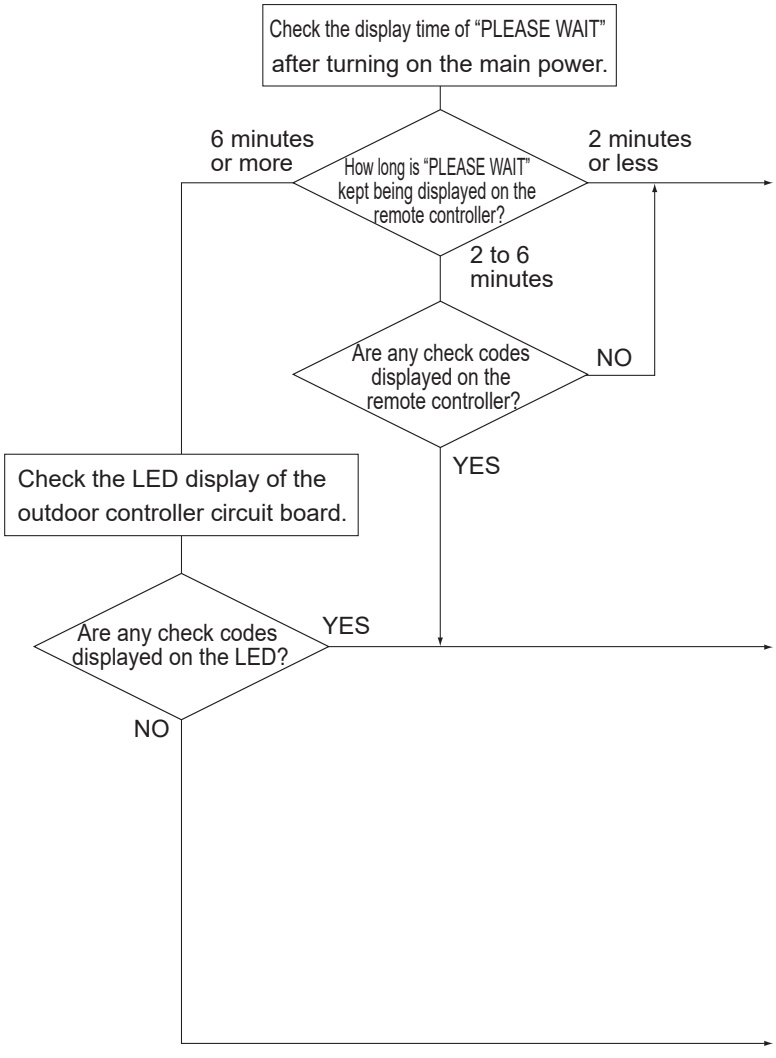
Symptom		Cause
Wired remote controller		
PLEASE WAIT	For about 2 minutes after power-on	• For about 2 minutes following power-on, operation of the remote controller is not possible due to system startup. (Correct operation)
PLEASE WAIT → Check code	Subsequent to about 2 minutes after power-on	• Connector for the outdoor unit's protection device is not connected. • Reverse or open phase wiring for the outdoor unit's power terminal block (L1, L2, L3)
Display messages do not appear even when operation switch is turned ON (operation lamp does not light up).		• Incorrect wiring between FTC and outdoor (incorrect polarity of S1, S2, S3) • Remote controller wire short

Note: Operation is not possible for about 30 seconds after cancellation of function selection. (Correct operation)

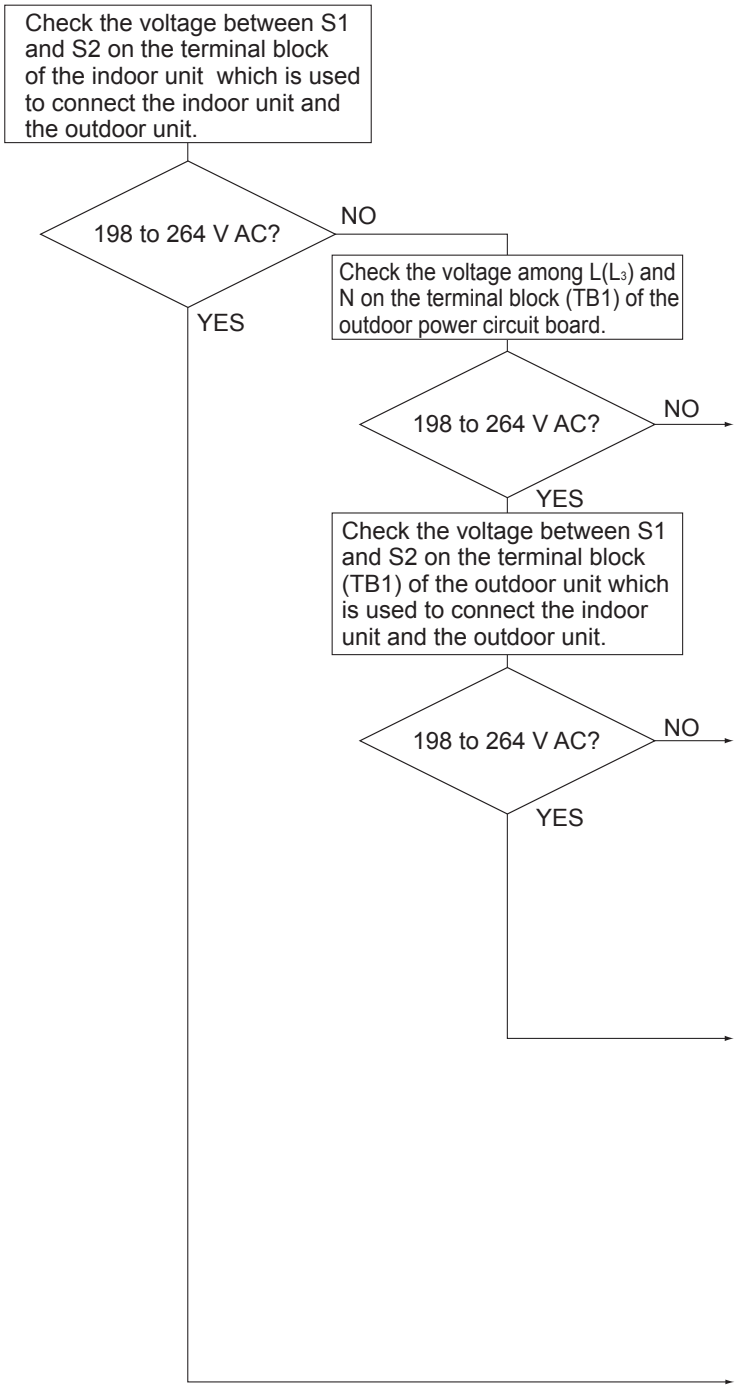
For description of each LED (LED1, 2, 3) provided on the FTC, refer to the following table.

LED1 (power for microprocessor)	Indicates whether control power is supplied. Make sure that this LED is always lit.
LED2 (power for remote controller)	Indicates whether power is supplied to the remote controller. This LED lights only in the case of the FTC which is connected to the outdoor unit refrigerant addresses "0".
LED3 (communication between FTC and outdoor units)	Indicates state of communication between the FTC and outdoor units. Make sure that this LED is always blinking.

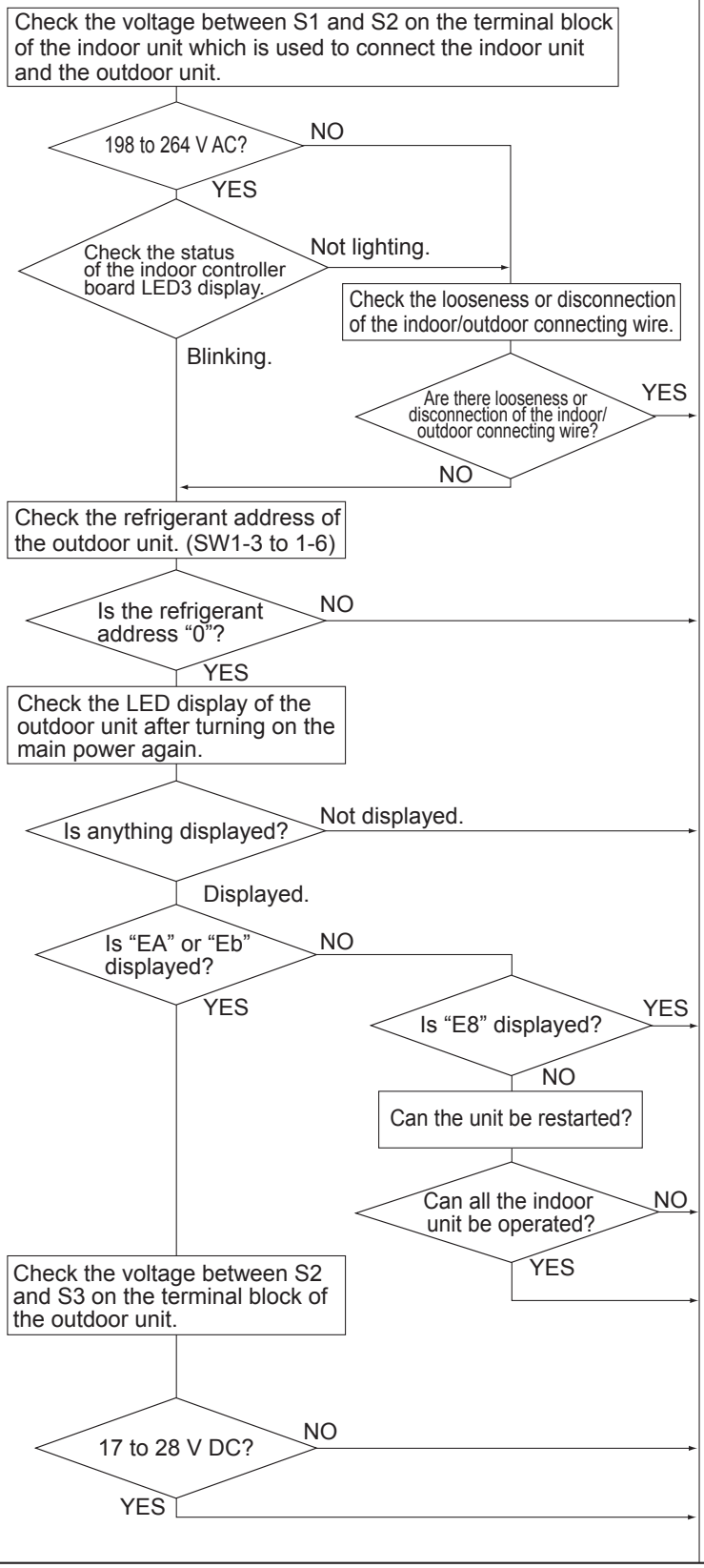
Symptoms: “PLEASE WAIT” is kept being displayed on the remote controller.

Diagnosis flow	Cause	Inspection method and troubleshooting
	• “PLEASE WAIT” will be displayed during the startup diagnosis after turning on the main power. • Miswiring of indoor/ outdoor connecting wire • Breaking of indoor/ outdoor connecting wire (S3) • Defective indoor controller board • Defective outdoor controller circuit board • Defective indoor controller board • Defective remote controller	• Normal. The startup diagnosis will be over in around 2 minutes. • Refer to “9-2. SELF-DIAGNOSIS ACTION TABLE” in order to solve the trouble. • In case of communication errors, the display of remote controller may not match the LED display of the outdoor unit.

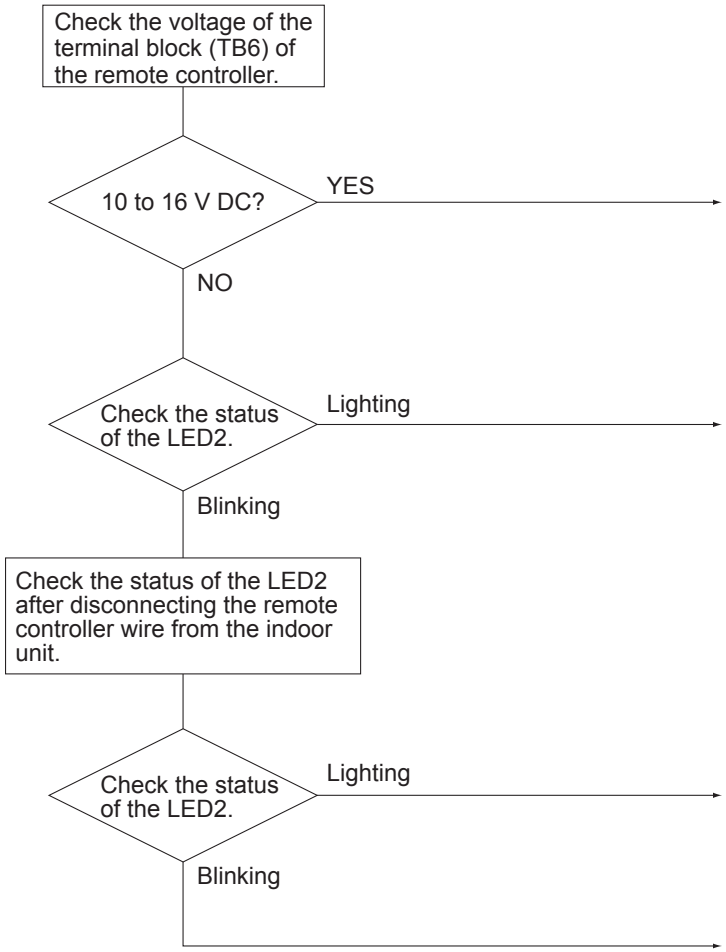
Symptoms: Nothing is displayed on the remote controller. ①	LED display of the indoor controller board LED1 : ○ LED2 : ○ LED3 : ○

Diagnosis flow	Cause	Inspection method and troubleshooting
	• Troubles concerning power supply • Bad wiring of the outdoor controller board • The fuses on the outdoor controller circuit board are blown. • Bad wiring of the outdoor controller board • The fuses on the outdoor controller circuit board are blown. • The fuses on the indoor controller circuit board are blown. • Defective indoor controller board	• Check the power wiring to the outdoor unit. • Check the breaker. • Check the wiring of the outdoor unit. • Check if the wiring is bad. Check if the fuses are blown. The fuses on the outdoor controller circuit board will be blown when the indoor /outdoor connecting wire short-circuits. • Check if miswiring, breaking or poor contact is causing this problem. Indoor/outdoor connecting wire is polarized 3-core type. Connect the indoor unit and the outdoor unit by wiring each pair of S1, S2 and S3 on the both side of indoor/outdoor terminal blocks. • Check if the fuses are blown. • Replace the indoor controller board.

Symptoms: Nothing is displayed on the remote controller. ②	LED display of the indoor controller board LED1 : ☀ LED2 : ○ LED3 : ○ or ◐

Diagnosis flow	Cause	Inspection method and troubleshooting
	• Breaking or poor contact of the indoor/ outdoor connecting wire • Normal Only the unit which has the refrigerant address “0” supplies power to the remote controller • Defective outdoor controller circuit board • Defective outdoor controller circuit board • Defective indoor controller board • Influence of electromagnetic noise • Defective outdoor power circuit board • Defective indoor power board	• Fix the breaking or poor contact of the indoor/outdoor connecting wire. • Set the refrigerant address to “0”. In case of the multiple outdoor units control, recheck the refrigerant address again. • Replace the outdoor controller circuit board. • Replace the outdoor controller circuit board. • Replace the indoor controller board of the indoor unit which does not operate. • Not abnormal. There may be the influence of electromagnetic noise. Check the transmission wire and get rid of the causes. • Replace the outdoor power circuit board. • Replace the indoor power board.

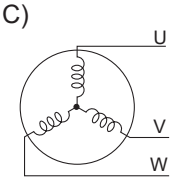
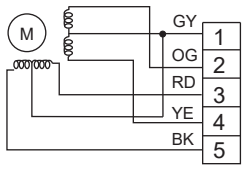
Symptoms: Nothing is displayed on the remote controller. ③	LED display of the indoor controller board LED1 : ☀ LED2 : ◐ or ☀ LED3 : —

Diagnosis flow	Cause	Inspection method and troubleshooting
	• Defective remote controller • Breaking or poor contact of the remote controller wire • The remote controller wire short-circuits • Defective indoor controller board	• Replace the remote controller. • Check if there is breaking or poor contact of the remote controller wire. Check the voltage of the remote controller wire. If it is not between 10 and 16 V DC, the indoor controller board must be defective. • Check if the remote controller wire is short-circuited. • Replace the indoor controller board.

Symptoms: LED display is kept being blinked on the remote controller	LED display of the remote controller

Diagnosis flow	Cause	Inspection method and troubleshooting
Check the abnormal code by connecting an optional part “A-Control Service Tool (PAC-SK52ST)” to connector CNM on outdoor controller board. Check code display? No	• Troubles at Indoor unit.	• Check trouble conditions by referring to service manual of indoor unit.
YES	• Abnormality at Fixed speed circuit.	• Refer to “9-2. SELF-DIAGNOSIS ACTION TABLE”.

9-4. HOW TO CHECK THE PARTS

<table>
<tr><th>Parts name</th><th>Checkpoints</th></tr>
<tr><td>Thermistor (TH3)
<Liquid>
Thermistor (TH4)
<Discharge>
Thermistor (TH6)
<Two-phase pipe>
Thermistor (TH7)
<Ambient>
Thermistor (TH8)
<Heat sink>
Thermistor (TH33)
<Comp. surface>
Thermistor (TH32)
<Liquid>
Thermistor (TH34)
<Plate hex liquid>
Thermistor (TH35)
<Suction Pipe></td><td>Disconnect the connector then measure the resistance with a tester.
(At the ambient temperature 10 to 30˚C)
<table>
<tr><th></th><th>Normal</th><th>Abnormal</th></tr>
<tr><td>TH4
TH33</td><td>160 to 410 kΩ</td><td rowspan="3">Open or short</td></tr>
<tr><td>TH3
TH6
TH7
TH32
TH34
TH35</td><td>4.3 to 9.6 kΩ</td></tr>
<tr><td>TH8</td><td>39 to 105 kΩ</td></tr>
</table></td></tr>
<tr><td>Fan motor
(MF1)</td><td>Refer to the next page.</td></tr>
<tr><td>Solenoid valve coil
<4-way valve>
(21S4)</td><td>Measure the resistance between the terminals with a tester.
(At the ambient temperature 20℃)
<table>
<tr><th colspan="2">Normal</th><th>Abnormal</th></tr>
<tr><td>WZ50</td><td>WZ60-80</td><td rowspan="2">Open or short</td></tr>
<tr><td>1725 ± 173 Ω</td><td>1435 ± 150 Ω</td></tr>
</table></td></tr>
<tr><td>Motor for compressor
(MC)
 
</td><td>Measure the resistance between the terminals with a tester.
(Winding temperature 20℃)
<table>
<tr><th>WZ50VAA</th><th>WZ60VAA</th><th>WZ80VAA</th><th>Abnormal</th></tr>
<tr><td>0.98 Ω</td><td>0.95 Ω</td><td>0.95 Ω</td><td>Open or short</td></tr>
</table></td></tr>
<tr><td>Linear expansion valve
(LEV-A/LEV-B)
 
</td><td>Disconnect the connector then measure the resistance with a tester.
(Winding temperature 20℃)
<table>
<tr><th colspan="4">Normal</th><th>Abnormal</th></tr>
<tr><td>Gray - Black</td><td>Gray - Red</td><td>Gray - Yellow</td><td>Gray - Orange</td><td rowspan="2">Open or short</td></tr>
<tr><td colspan="4">46 ± 3Ω</td></tr>
</table></td></tr>
</table>

Check method of DC fan motor (fan motor/outdoor controller circuit board)

① Notes
- · High voltage is applied to the connector (CNF1) for the fan motor. Pay attention to the service.
- · Do not pull out the connector (CNF1) for the motor with the power supply on.
  (It causes trouble of the outdoor controller circuit board and fan motor.)

② Self check
Symptom: The outdoor fan cannot rotate.

Fuse check
Check the fuse (F5) on outdoor controller board.

↓

Did the fuse blow? → Yes → Replace the outdoor controller board (C.B) and the defective fan motor (MF1).

↓ No

Wiring contact check
Contact of fan motor connector (CNF1)

↓

Is there contact failure?

↓ No

Fan motor check (CNF1)

UNIT	WZ50/WZ60/WZ80
FAN MOTOR	BH61J064
Measuring points	Resistance
pin1–pin4	∞
pin5–pin4	1.1MΩ
pin6–pin4	40kΩ
pin7–pin4	∞

↓

Is the resistance abnormal? → Yes → Replace the defective fan motor.

↓ No

Power supply check (Remove the connector (CNF1))
Measure the voltage in the outdoor controller circuit board.
TEST POINT ① : V_{DC} (between 1 (+) and 4 (−) of the fan connector): V_{DC} 280–380 V DC
TEST POINT ② : V_{CC} (between 5 (+) and 4 (−) of the fan connector): V_{CC} 15 V DC

↓

Is the voltage normal? → Yes → Replace the defective fan motor.

↓ No

Replace outdoor controller board.

↓

Check the operation. → OK → Complete.

↓ Fail

Replace the defective fan motor.

Replace the defective fan motor. ↓ Yes

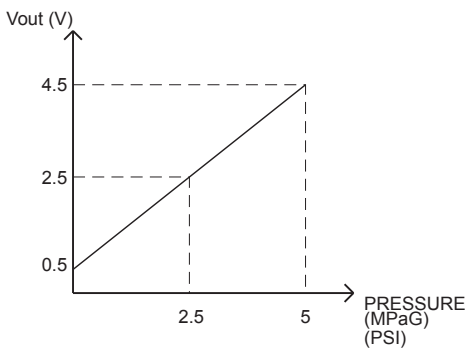
Check the operation of fan. → OK → Complete.

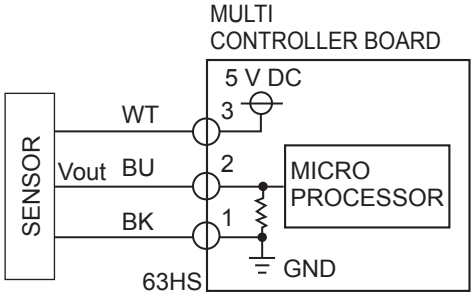
↓ Fail

Replace the outdoor controller board.

9-5. HOW TO CHECK THE COMPONENTS

<PRESSURE SENSOR>





③-① : 5 V (DC)
②-① : Output Vout (DC)

<Thermistor feature chart>

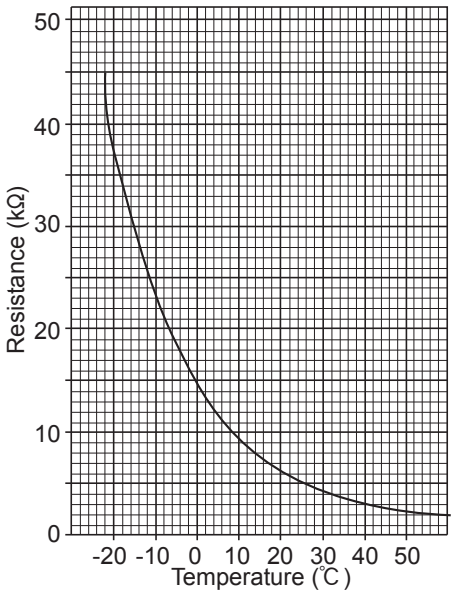
Low temperature thermistors

- Thermistor <Liquid> (TH3)
- Thermistor <Two-phase pipe> (TH6)
- Thermistor <Ambient> (TH7)
- Thermistor <Liquid> (TH32)
- Thermistor <Plate hex liquid>(TH34)
- Thermistor <Suction pipe> (TH35)

Thermistor R0 = 15 kΩ ± 3 %
B constant = 3480 ± 2 %

$$R_t = 15\exp\{3480\left(\frac{1}{273+t} - \frac{1}{273}\right)\}$$

0 °C	15 kΩ	30°C	4.3 kΩ
10 °C	9.6 kΩ	40°C	3.0 kΩ
20 °C	6.3 kΩ		
25 °C	5.2 kΩ		



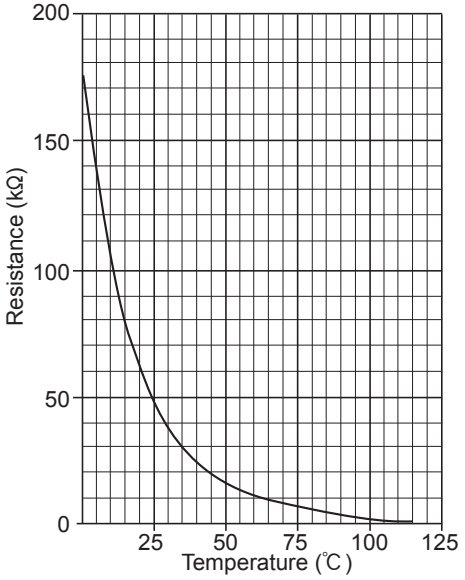
Medium temperature thermistor

- Thermistor <Heat sink> (TH8)

Thermistor R50 = 17 kΩ ± 2 %
B constant = 4150 ± 3 %

$$R_t = 17\exp\{4150\left(\frac{1}{273+t} - \frac{1}{323}\right)\}$$

0 °C	180 kΩ
25 °C	50 kΩ
50 °C	17 kΩ
70 °C	8 kΩ
90 °C	4 kΩ



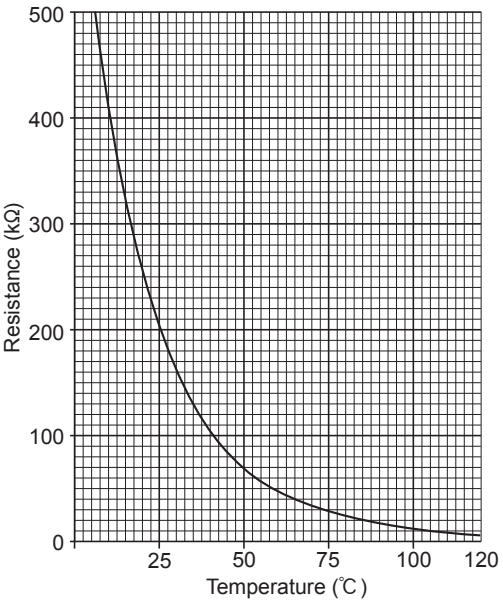
High temperature thermistors

- Thermistor <Discharge> (TH4)
- Thermistor <Comp. surface> (TH33)

Thermistor R120 = 7.465 kΩ ± 2 %
B constant = 4057 ± 2 %

$$R_t = 7.465\exp\{4057\left(\frac{1}{273+t} - \frac{1}{393}\right)\}$$

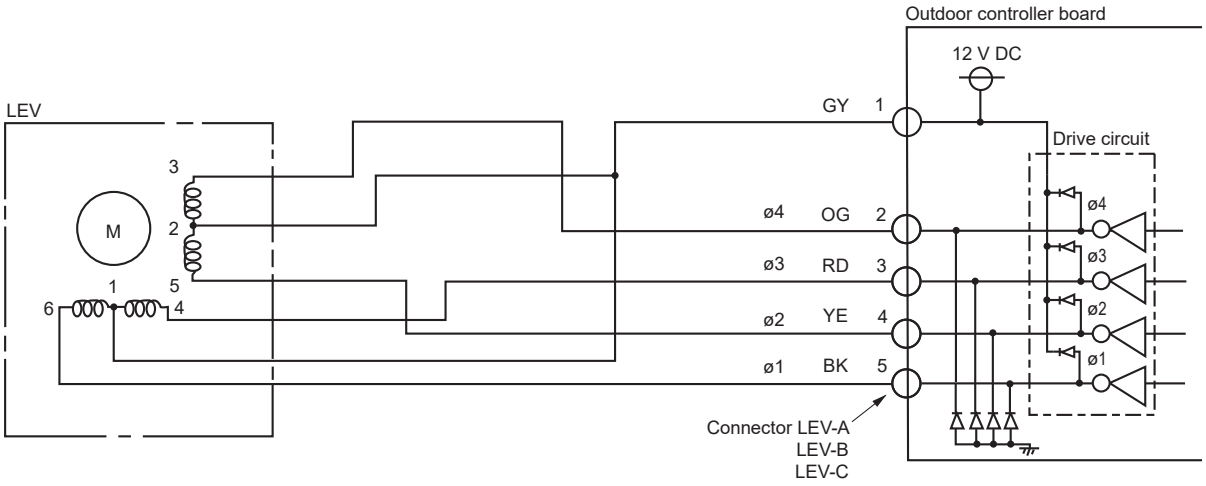
20 °C	250 kΩ	70 °C	34 kΩ
30 °C	160 kΩ	80 °C	24 kΩ
40 °C	104 kΩ	90 °C	17.5 kΩ
50 °C	70 kΩ	100 °C	13.0 kΩ
60 °C	48 kΩ	110 °C	9.8 kΩ



Linear expansion valve

(1) Operation summary of the linear expansion valve

• Linear expansion valve opens/closes through stepping motor after receiving the pulse signal from the outdoor controller board.
• Valve position can be changed in proportion to the number of pulse signal.
<Connection between the outdoor controller board and the linear expansion valve>



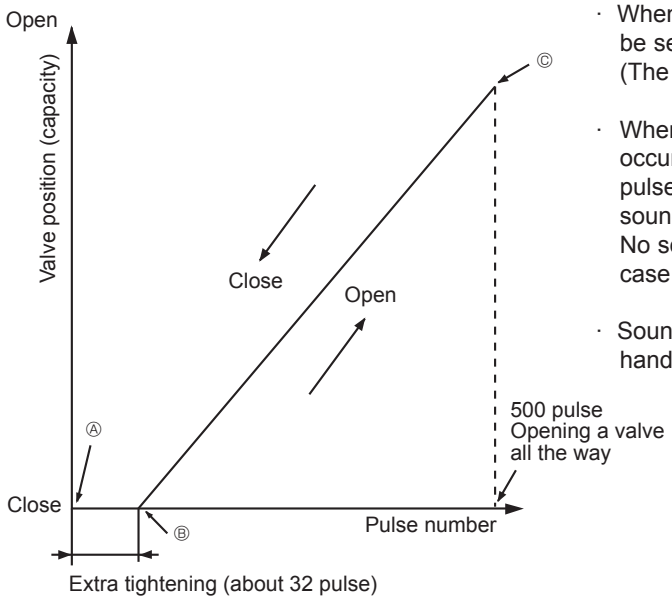
<Output pulse signal and the valve operation>

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

The output pulse shifts in the following order.
Opening a valve : 8 → 7 → 6 → 5 → 4 → 3 → 2 → 1 → 8
Closing a valve : 1 → 2 →3 → 4 → 5 → 6 → 7 → 8 → 1

· When linear expansion valve operation stops, all output phases become OFF.

(2) Linear expansion valve operation



· When the power is turned on, 700 pulse closing valve signal will be sent till it goes to Ⓐ point in order to define the valve position. (The pulse signal is being sent for about 20 seconds.)

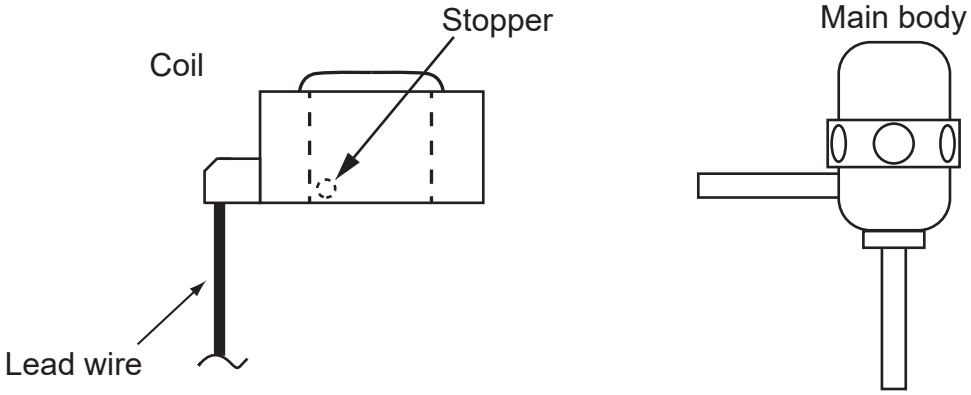
· When the valve moves smoothly, there is no sound or vibration occurring from the linear expansion valve : however, when the pulse number moves from Ⓑ to Ⓐ or when the valve is locked, sound can be heard.
No sound is heard when the pulse number moves from Ⓑ to Ⓐ in case coil is burnt out or motor is locked by open-phase.

· Sound can be detected by placing the ear against the screw driver handle while putting the screw driver to the linear expansion valve.

(3) How to attach and detach the coil of linear expansion valve

<Composition>

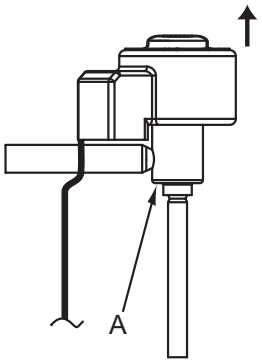
Linear expansion valve is separable into the main body and the coil as shown in the diagram below.



<How to detach the coil>

Hold the lower part of the main body (shown as A) firmly so that the main body does not move and detach the coil by pulling it upward.

Be sure to detach the coil holding main body firmly. Otherwise pipes can bend due to stress.

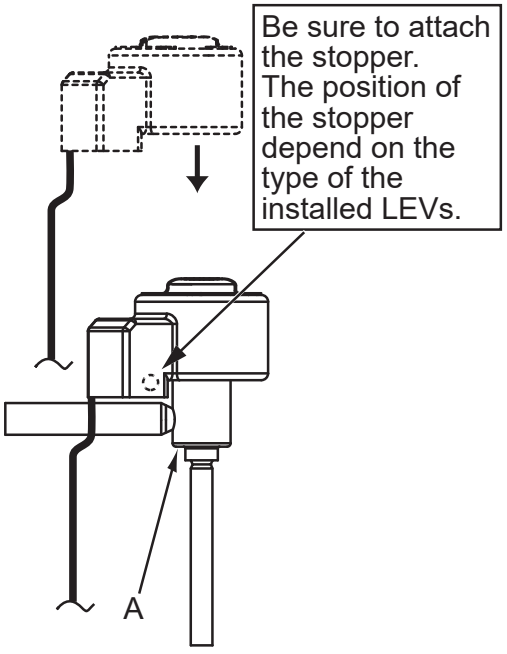


<How to attach the coil>

Hold the lower part of the main body (shown as A) firmly so that the main body does not move and attach the coil by inserting it downward into the main body. Then securely attach the coil stopper to main body. (At this time, be careful that stress is not added to lead wire and main body is not wound by lead wire.)

If the stopper is not firmly attached to main body, coil may be detached from the main body and that can cause defective operation of linear expansion valve.

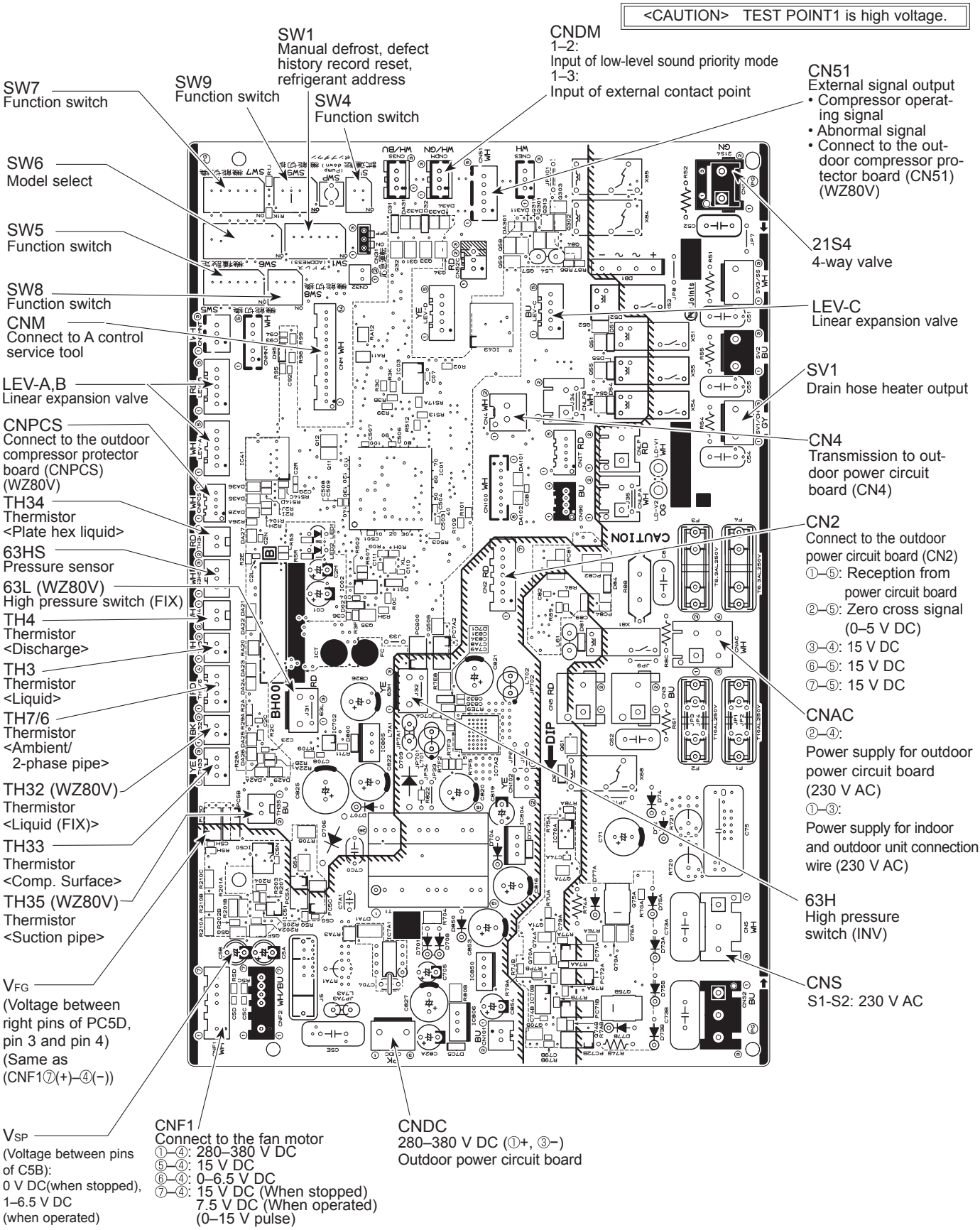
To prevent piping stress, be sure to attach the coil holding the main body of linear expansion valve firmly. Otherwise pipe may break.



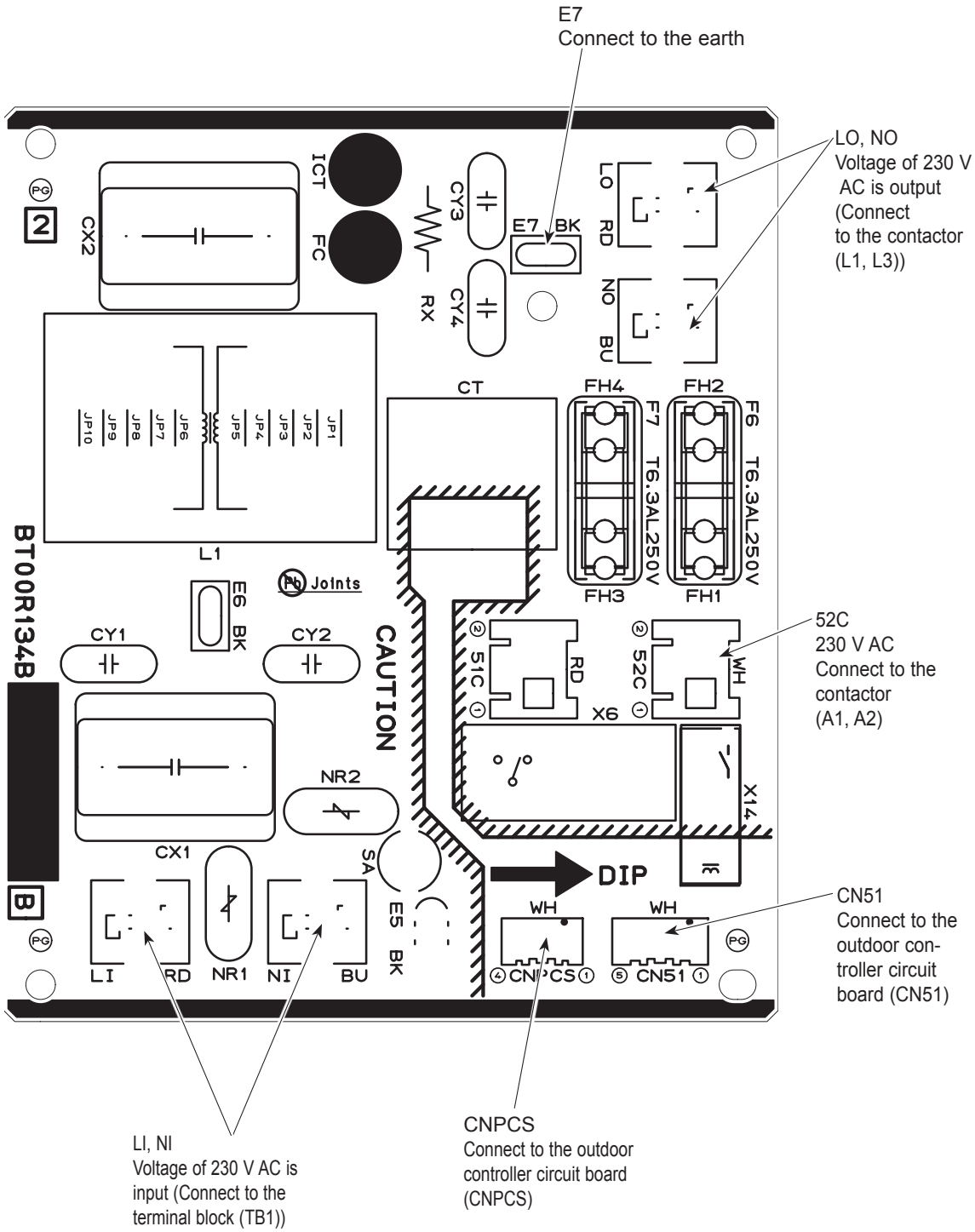
9-6. TEST POINT DIAGRAM

Outdoor controller circuit board

PUZ-WZ50VAA.UK **PUZ-WZ60VAA.UK** **PUZ-WZ80VAA.UK**
PUZ-WZ50VAA-BS.UK **PUZ-WZ60VAA-BS.UK** **PUZ-WZ80VAA-BS.UK**



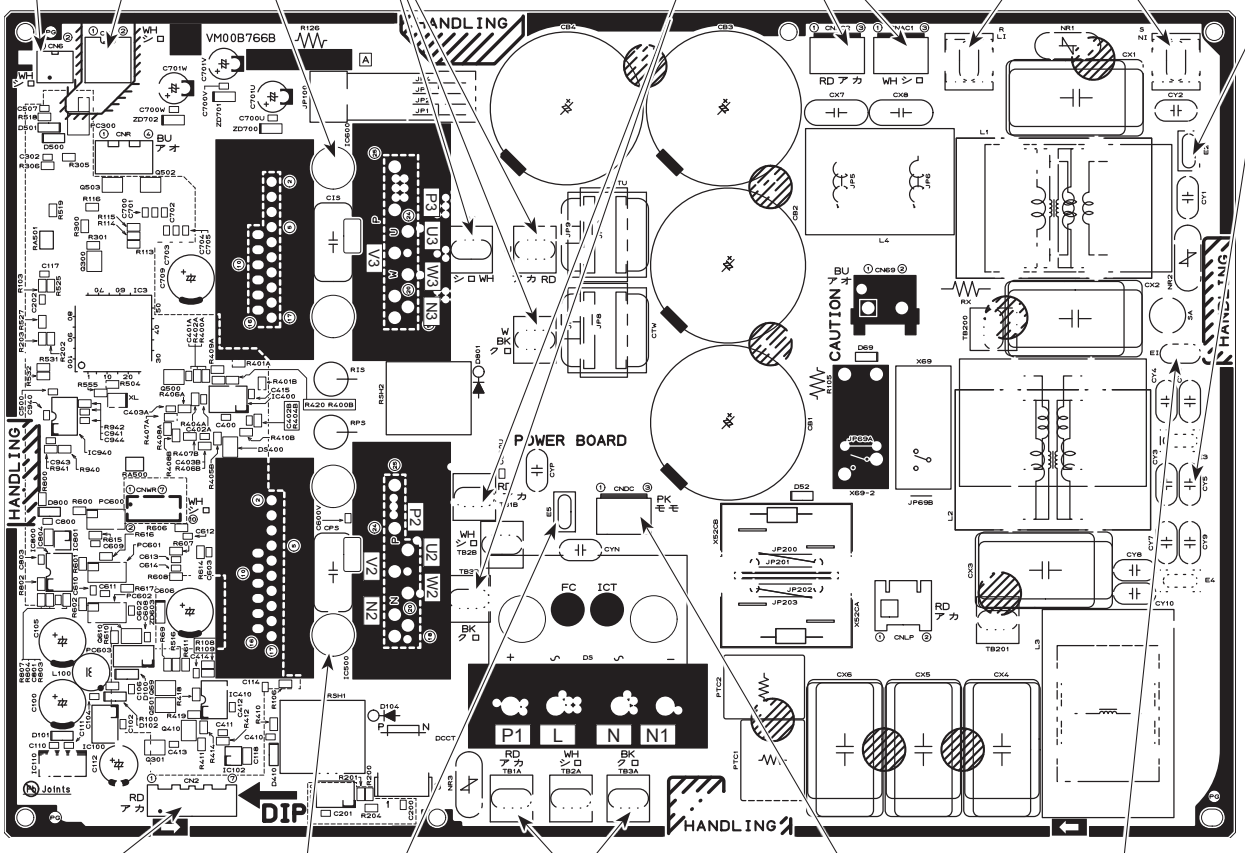
Outdoor compressor protector board
PUZ-WZ80VAA.UK
PUZ-WZ80VAA-BS.UK



Outdoor power circuit board
PUZ-WZ50VAA.UK
PUZ-WZ50VAA-BS.UK
PUZ-WZ60VAA.UK
PUZ-WZ60VAA-BS.UK
PUZ-WZ80VAA.UK
PUZ-WZ80VAA-BS.UK

Brief Check of DIP-IPM and DIODE MODULE
If they are short-circuited, it means that they are broken.
Measure the resistance in the following points (connectors, etc.).
1. Check of DIP-IPM
   P2 - U2, P2 - V2, P2 - W2, N2 - U2, N2 - V2, N2 - W2
   P3 - U3, P3 - V3, P3 - W3, N3 - U3, N3 - V3, N3 - W3
2. Check of DIODE MODULE
   P1 - L, P1 - N, L - N1, N - N1

Note: The marks, L, N, N1, N2, N3, P1, P2, P3, U2, U3, V2, V3, W2, and W3 shown in the diagram are not actually printed on the board.



CN6
Thermistor
<Heat sink>
(TH8)

CN4
Connect to the outdoor controller circuit board (CN4)

IC600
DIP-IPM

U/V/W
Connect to the compressor (MC) Voltage among phases: 10–180 V AC

CNAC1, CNAC2
230 V AC
Connect to the outdoor controller circuit board (CNAC)

NI, LI
Voltage of 230 V AC is input (Connect to the terminal block (TB1))

E2, E3
Connect to the earth

TB1B, TB3B
Connect to DCL

IC500
DIP-IPM

E5
Connect to the earth

TB1A,TB3A,
Connect to DCL

CNDC
280–380 V DC (①+, ③−)
Connect to the outdoor controller circuit board (CNDC)

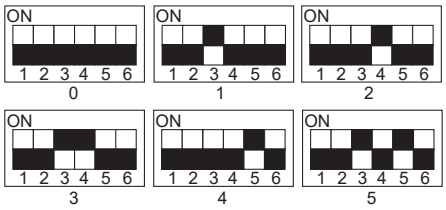
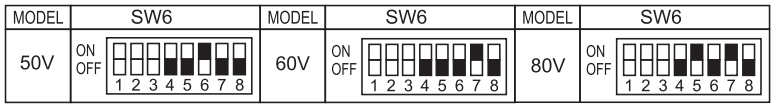
EI
Connect to the earth

CN2
Connect to the outdoor controller circuit board (CN2)
①–⑤: Transmitting signal to outdoor controller circuit board (0–5 V DC)
②–⑤: Zero cross signal (0–5 V DC)
③–④: 15 V DC
⑥–⑤: 15 V DC
⑦–⑤: 15 V DC

9-7. FUNCTION OF SWITCHES, CONNECTORS AND JUMPERS

(1) Function of switches

The black square (■) indicates a switch position.

Type of Switch	Switch	No.	Function	Action by the switch operation		Effective timing
				ON	OFF	
DIP switch	SW1	1	Manual defrost *1	Start	Normal	When compressor is working in heating operation.*1
		2	Abnormal history clear	Clear	Normal	off or operating
		3	Refrigerant address setting			When power supply ON
		4				
		5				
		6				
	SW4	1	No function	—	—	—
		2	No function	—	—	—
	SW8	1	No function	—	—	—
		2	No function	—	—	—
		3	Separate indoor/outdoor unit power supplies	Used	Not used	When power supply ON
	SW5	1	No function	—	—	—
		2	Power failure automatic recovery*2	Auto recovery	No auto recovery	When power supply ON
		3,4,5,6	No function	—	—	—
	SW7*3	1,2,3	No function	—	—	—
		4	No function	—	—	—
		5	No function	—	—	—
		6	Defrost setting	For high humidity	Normal	Always
	SW9	1	No function	—	—	—
		2	No function	—	—	—
		3,4	No function	—		—
	SW6	1	Model select	PUZ-WZ50/60/80VAA 		
		2				
		3				
		4				
		5				
		6				
		7				
		8				

*1 Manual defrost should be done as follows.
① Change the DIP SW1-1 on the outdoor controller board from OFF to ON.
② Manual defrost will start by the above operation 1 if all these conditions written below are satisfied.
• Heat mode setting
• 10 minutes have passed since compressor started operating or previous manual defrost finished.
• Pipe temperature is less than or equal to 8°C.
Manual defrost will finish if certain conditions have been satisfied.
Manual defrost can be done if above conditions have been satisfied when DIP SW1-1 is changed from OFF to ON.
After DIP SW1-1 is changed from OFF to ON, there is no problem if DIP SW1-1 is left ON or changed to OFF again. This depends on the service conditions.

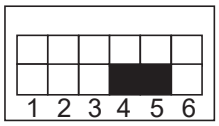
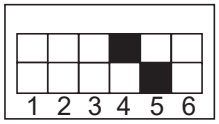
*2 “Power failure automatic recovery” can be set by either remote controller or this DIP SW. If one of them is set to ON, “Auto recovery” activates. Please set “Auto recovery” basically by remote controller because all units do not have DIP SW. Please refer to the indoor unit installation manual.

*3 Please do not use SW7-3, 6 usually. Trouble might be caused by the usage condition.

Set DIP switch SW7-4, 5 in the following case.

- (for WZ80 only) Current supply to the outdoor unit or power consumption in the outdoor unit is limited.

The black square (■) indicates a switch position.

SW7 Setting	Current limitation /power consumption limitation
ON OFF 	(Default setting) No limitation
ON OFF 	20 A / 4.6 kW (for WZ80 only)

<Display function of inspection for outdoor unit>

The blinking patterns of both LED1 (green) and LED2 (red) indicate the types of abnormality when it occurs. Types of abnormality can be indicated in detail by connecting an optional part “A-Control Service Tool (PAC-SK52ST)” to connector CNM on outdoor controller board.

The blinking patterns are applied excepted for abnormality of Fixed compressor circuit.

[Display]

(1)Normal condition

Unit condition	Outdoor controller board		A-Control Service Tool	
	LED1 (Green)	LED2 (Red)	Check code	Indication of the display
When the power is turned on	Lit	Lit	—⇔—	Alternately blinking display
When unit stops	Lit	Not	00, etc.	Operation mode
When compressor is warming up	Lit	Not	08, etc.	
When unit operates	Lit	Lit	C5, H7, etc.	

(2)Abnormal condition

Indication		Error			
Outdoor controller board		Contents	Check code*	Inspection method	Detailed reference page
LED1 (Green)	LED2 (Red)				
1 blinking	2 blinking	Connector(63L) is open.	F3	①Check if connector (63H or 63L) on the outdoor controller board is not disconnected. ②Check continuity of pressure switch (63H or 63L) by tester.	**
		Connector(63H) is open.	F5		P.32
		2 connectors are open.	F9		**
2 blinking	1 blinking	Miswiring of indoor/outdoor unit connecting wire, excessive number of indoor units (4 units or more)	—	①Check if indoor/outdoor connecting wire is connected correctly. ②Check if 4 or more indoor units are connected to outdoor unit. ③Check if noise entered into indoor/outdoor connecting wire or power supply. ④Re-check error by turning off power, and on again.	P.33 (EA)
		Miswiring of indoor/outdoor unit connecting wire (converse wiring or disconnection)	—		P.33 (Eb)
		Startup time over	—		P.33 (EC)
	2 blinking	Indoor/outdoor unit communication error (signal receiving error) is detected by indoor unit.	E6	①Check if indoor/outdoor connecting wire is connected correctly. ②Check if noise entered into indoor/outdoor connecting wire or power supply. ③Check if noise entered into indoor/outdoor controller board. ④Re-check error by turning off power, and on again.	**
		Indoor/outdoor unit communication error (transmitting error) is detected by indoor unit.	E7		**
		Indoor/outdoor unit communication error (signal receiving error) is detected by outdoor unit.	—		P.40 (E8)
		Indoor/outdoor unit communication error (transmitting error) is detected by outdoor unit.	—		P.40 (E9)
	3 blinking	Remote controller signal receiving error is detected by remote controller.	E0	①Check if connecting wire of indoor unit or remote controller is connected correctly. ②Check if noise entered into transmission wire of remote controller. ③Re-check error by turning off power, and on again.	P.38
		Remote controller transmitting error is detected by remote controller.	E3		P.39
		Remote controller signal receiving error is detected by indoor unit.	E4		P.38
		Remote controller transmitting error is detected by indoor unit.	E5		P.39
	4 blinking	Check code is not defined.	EF	①Check if noise entered into transmission wire of remote controller. ②Check if noise entered into indoor/outdoor connecting wire. ③Re-check error by turning off power, and on again.	P.40
		Incorrect connection	EE	①Connect I/F or FTC to the unit.	P.33
	5 blinking	Serial communication error <Communication between outdoor controller board and outdoor power board>	Ed	①Check if connector (CN4) on outdoor controller board and outdoor power board is not disconnected.	P.40

* Check code displayed on remote controller.

** Refer to service manual for indoor unit.

Indication		Error			
Outdoor controller board		Contents	Check code*	Inspection method	Detailed reference page
LED1 (Green)	LED2 (Red)				
3 blinking	1 blinking	Abnormality of discharging temperature (TH4) and Comp. surface temperature (TH33)	U2	①Check if stop valves are open. ②Check if connectors (TH4, LEV-A, and LEV-B) on outdoor controller board are not disconnected. ③Check if unit is filled with specified amount of refrigerant. ④Measure resistance values among terminals on indoor valve and outdoor linear expansion valve using a tester.	P.34
		Abnormality of superheat due to low discharge temperature	U7		P.35
	2 blinking	Abnormal high pressure (High pressure switch 63H operated.)	U1	①Check if indoor/outdoor units have a short cycle on their air ducts. ②Check if connector(63H)(63L) on outdoor controller board is not disconnected. ③Check if heat exchanger and filter is not dirty. ④Measure resistance values among terminals on linear expansion valve using a tester.	P.34
		Abnormal low pressure (Low pressure switch 63L operated.)	UL		P.38
	3 blinking	Abnormality of outdoor fan motor rotational speed	U8	①Check the outdoor fan motor. ②Check if connector (TH3) (63HS) on outdoor controller board is disconnected.	P.36
		Protection from overheat operation (TH3)	Ud		P.37
	4 blinking	Compressor overcurrent breaking(Start-up locked)	UF	①Check if stop valves are open. ②Check looseness, disconnection, and converse connection of compressor wiring. ③Measure resistance values among terminals on compressor using a tester. ④Check if outdoor unit has a short cycle on its air duct. ⑤Check leakage of refrigerant.	P.37
		Compressor overcurrent breaking	UP		P.38
		Abnormality of current sensor (P.B.)	UH		P.37
		Abnormality of power module	U6		P.35
	5 blinking	Open/short of outdoor thermistors (TH4, TH33)	U3	①Check if connectors (TH3, TH32, TH4, TH33 and TH7/6) on outdoor controller board and connector (CN3) on outdoor power board are not disconnected. ②Measure resistance value of outdoor thermistors.	P.34
		Open/short of outdoor thermistors (TH3, TH32, TH6, TH7 and TH8)	U4		P.35
	6 blinking	Abnormality of heat sink temperature	U5	①Check if indoor/outdoor units have a short cycle on their air ducts. ②Measure resistance value of outdoor thermistor(TH8).	P.35
	7 blinking	Abnormality of voltage	U9	①Check looseness, disconnection, and converse connection of compressor wiring. ②Measure resistance value among terminals on compressor using a tester. ③Check if power supply voltage decreases. ④Check the wiring of CN52C. ⑤Check the wiring of CNAF.	P.36–P.37
4 blinking	1 blinking	Abnormality of room temperature thermistor (TH1)	P1	①Check if connectors on indoor controller board are not disconnected. ②Measure resistance value of indoor thermistors.	**
		Abnormality of pipe temperature thermistor /Liquid (TH2)	P2		**
		Abnormality of tank temperature thermistor	P9		**
	4 blinking	Abnormality of pipe temperature	P8	①Check if indoor thermistors(TH2 and TH5) are not disconnected from holder. ②Check if stop valve is open. ③Check converse connection of extension pipe. (on plural units connection) ④Check if indoor/outdoor connecting wire is connected correctly. (on plural units connection)	P.41

* Check code displayed on remote controller
** Refer to service manual for indoor unit.

<Outdoor unit operation monitor function>

[When optional part 'A-Control Service Tool (PAC-SK52ST)' is connected to outdoor controller board (CNM)]

Digital indicator LED1 displays 2 digit number or code to inform operation condition and the meaning of check code by controlling DIP SW2 on "'A-Control Service Tool'".

Operation indicator SW2 : Indicator change of self diagnosis

The black square (■) indicates a switch position.

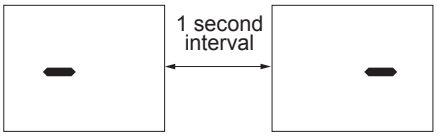
SW2 setting	Display detail	Explanation for display	Unit
ON 1 2 3 4 5 6			

<Digital indicator LED1 working details>

(Be sure that 1 to 6 in the SW2 are set to OFF.)

(1) Display when the power supply ON
When the power supply ON, blinking displays by turns.
Wait for 4 minutes at the longest.

(2) When the display lights (Normal operation)
1 Operation mode display.



LED1 (Lighting)

SW2 ON 1 2 3 4 5 6 (Initial setting)

The tens digit : Operation mode

Display	Operation Model
O	OFF / FAN
C	COOLING / DRY
H	HEATING
d	DEFROSTING

The ones digit : Relay output

Display	Warming-up Compressor	Compressor	4-way valve	Solenoid valve
0	—	—	—	—
1	—	—	—	ON
2	—	—	ON	—
3	—	—	ON	ON
4	—	ON	—	—
5	—	ON	—	ON
6	—	ON	ON	—
7	—	ON	ON	ON
8	ON	—	—	—
A	ON	—	ON	—

2 Display during error postponement
Postponement code is displayed when compressor stops due to the work of protection device.
Postponement code is displayed while error is being postponed.

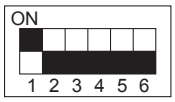
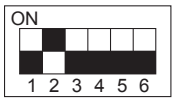
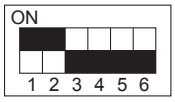
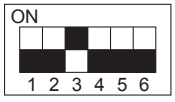
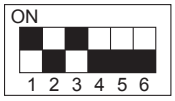
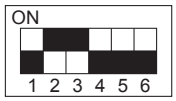
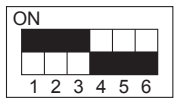
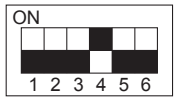
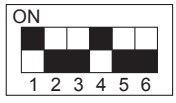
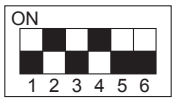
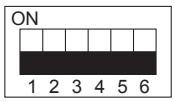
(3) When the display blinks
Inspection code is displayed when compressor stops due to the work of protection devices.

Display	Contents to be inspected (During operation)
U1	Abnormal high pressure (63H operated)
U2	Abnormal high discharge temperature, high comp. surface temperature, shortage of refrigerant
U3	Open/short of outdoor unit thermistors (TH4, TH33)
U4	Open/short of outdoor unit thermistors (TH3, TH6, TH7, TH8 and TH34)
U5	Abnormal temperature of heat sink
U6	Abnormality of power module
U7	Abnormality of superheat due to low discharge temperature
U8	Abnormality in outdoor fan motor
Ud	Overheat protection
UF	Compressor overcurrent interruption (When Comp. locked)
UH	Current sensor error
UL	Abnormal low pressure (63L operated)
UP	Compressor overcurrent interruption
P1–P8	Abnormality of indoor units

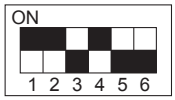
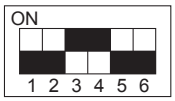
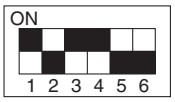
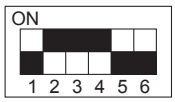
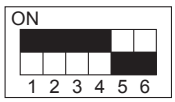
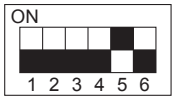
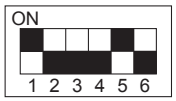
Display	Inspection unit
0	Outdoor unit
1	Indoor unit 1
2	Indoor unit 2

Display	Contents to be inspected (When power is turned on)
F3	63L connector(red) is open.
F5	63H connector(yellow) is open.
F9	2 connectors(63H/63L) are open.
E8	Indoor/outdoor communication error (Signal receiving error) (Outdoor unit)
E9	Indoor/outdoor communication error (Transmitting error) (Outdoor unit)
EA	Miswiring of indoor/outdoor unit connecting wire, excessive number of indoor units (4 units or more)
Eb	Miswiring of indoor/outdoor unit connecting wire(reverse wiring or disconnection)
EC	Startup time over
EE	Incorrect connection
E0–E7	Communication error except for outdoor unit

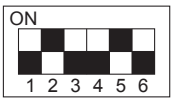
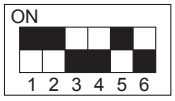
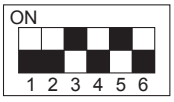
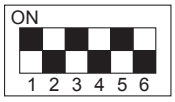
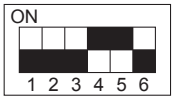
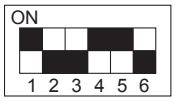
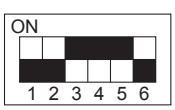
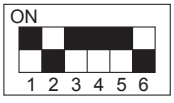
The black square (■) indicates a switch position.

SW2 setting	Display detail	Explanation for display	Unit
	Pipe temperature/Liquid (TH3) −40 to 90	−40 to 90 (When the coil thermistor detects 0°C or below, "–" and temperature are displayed by turns.) (Example) When −10°C; 0.5 s 0.5 s 2 s -□ →10 →□□	°C
	Discharge temperature (TH4) -20 to 217	-20 to 217 (When the discharge thermistor detects 100°C or more, hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 105°C; 0.5 s 0.5 s 2 s □1 →05 →□□	°C
	Output step of outdoor FAN 0 to 16	0 to 16	Step
	The number of ON/OFF times of compressor 0 to 9999	0 to 9999 (When the number of times is 100 or more, hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 42500 times (425 ×100 times); 0.5 s 0.5 s 2 s □4 →25 →□□	100 times
	Compressor integrating operation times 0 to 9999	0 to 9999 (When it is 100 hours or more, hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 2450 hours (245 ×10 hours); 0.5 s 0.5 s 2 s □2 →45 →□□	10 hours
	Compressor operating current 0 to 50	0 to 50 Note: Value after the decimal point will be truncated.	A
	Compressor operating frequency 0 to 225	0 to 255 (When it is 100 Hz or more, hundreds digit, tens digit and ones digit are displayed by turns. (Example) When 125 Hz; 0.5 s 0.5 s 2 s □1 →25 →□□	Hz
	Primary LEV opening pulse 0 to 500 Heating: LEV-B Cooling: LEV-A	0 to 500 (When it is 100 pulse or more, hundreds digit, tens digit and ones digit are displayed by turns. (Example) When 150 pulse; 0.5 s 0.5 s 2 s □1 →50 →□□	Pulse
	Error postponement code history (1) of outdoor unit	Postponement code display Blinking: During postponement Lighting: Cancellation of postponement "00" is displayed in case of no postponement.	Code display
	Operation mode on error occurring	Operation mode of when operation stops due to error is displayed by setting SW2 like below. (SW2) 	Code display

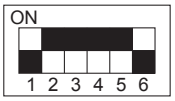
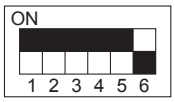
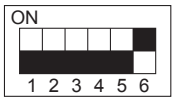
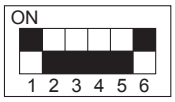
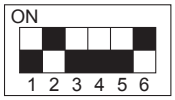
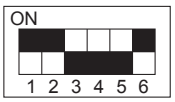
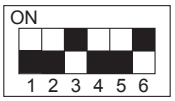
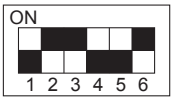
The black square (■) indicates a switch position.

SW2 setting	Display detail	Explanation for display	Unit
	Pipe temperature/Liquid (TH3) on error occurring −40 to 90	−40 to 90 (When the coil thermistor detects 0°C or below, "–" and temperature are displayed by turns.) (Example) When −15°C; 0.5 s 0.5 s 2 s -□ →15 →□□	°C
	Discharge temperature (TH4) on error occurring -20 to 217	-20 to 217 (When the temperature is 100°C or more, the hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 130°C; 0.5 s 0.5 s 2 s □1 →30 →□□	°C
	Compressor operating current on error occurring 0 to 50	0 to 50	A
	Error history (1) (latest) Alternate display of abnormal unit number and code	When no error history, " 0 " and "– –" are displayed by turns.	Code display
	Error history (2) Alternate display of error unit number and code	When no error history, " 0 " and "– –" are displayed by turns.	Code display
	Thermo ON time 0 to 999	0 to 999 (When it is 100 minutes or more, the hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 245 minutes; 0.5 s 0.5 s 2 s □2 →45 →□□	Minute
	Test run elapsed time 0 to 120	0 to 120 (When it is 100 minutes or more, the hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 105 minutes; 0.5 s 0.5 s 2 s □1 →05 →□□	Minute
	Water flow rate	0 to 100	Unit

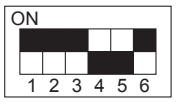
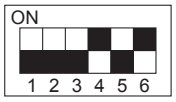
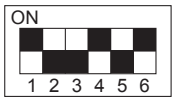
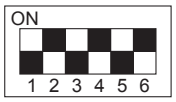
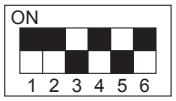
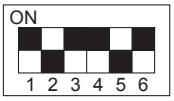
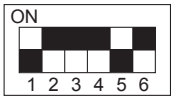
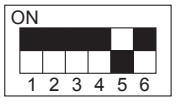
The black square (■) indicates a switch position.

<table>
<tr><th>SW2 setting</th><th>Display detail</th><th>Explanation for display</th><th>Unit</th></tr>
<tr><td>  </td><td>Capacity setting display</td><td>Displayed as an outdoor capacity code.
<table><tr><th>Capacity</th><th>Code</th></tr><tr><td>WZ50</td><td>9</td></tr><tr><td>WZ60</td><td>11</td></tr><tr><td>WZ80</td><td>14</td></tr></table></td><td>Code display</td></tr>
<tr><td>  </td><td>Outdoor unit setting information</td><td>• The tens digit (Total display for applied setting)
<table><tr><th>Setting details</th><th>Display details</th></tr><tr><td>H·P / Cooling only</td><td>0 : H·P 1 : Cooling only</td></tr><tr><td>Single phase / 3 phase</td><td>0 : Single phase 2 : 3 phase</td></tr></table>• The ones digit
<table><tr><th>Setting details</th><th>Display details</th></tr><tr><td>Defrosting switch</td><td>0 : Normal 1 : For high humidity</td></tr></table>(Example) When heat pump, 3 phase and defrosting (normal) are set up, “20” is displayed.</td><td>Code display</td></tr>
<tr><td>  </td><td>Plate HEX liquid pipe temperature (TH34)
−40 to 90</td><td>−40 to 90
(When the temperature is 0°C or less, “–” and temperature are displayed by turns.)</td><td>°C</td></tr>
<tr><td>  </td><td>Condensing temperature (T63HS)
−39 to 88</td><td>−39 to 88
(When the temperature is 0°C or less, “–” and temperature are displayed by turns.)</td><td>°C</td></tr>
<tr><td>  </td><td>Return water temperature
0 to 100</td><td>0 to 100</td><td>°C</td></tr>
<tr><td>  </td><td>Flow water temperature
0 to 100</td><td>0 to 100</td><td>°C</td></tr>
<tr><td>  </td><td>2-phase pipe temperature thermistor (TH6)
-40 to 90</td><td>−40 to 90
(When the temperature is 0°C: or less, “–” and temperature are displayed by turns.)</td><td>°C</td></tr>
<tr><td>  </td><td>Outdoor outside temperature (TH7)
−40 to 90</td><td>−40 to 90
(When the temperature is 0°C or less, “–” and temperature are displayed by turns.)</td><td>°C</td></tr>
</table>

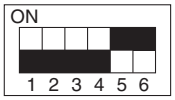
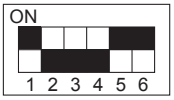
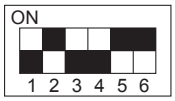
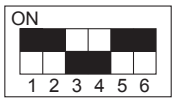
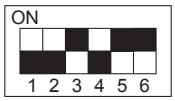
The black square (■) indicates a switch position.

SW2 setting	Display detail	Explanation for display	Unit
	Outdoor heat sink temperature (TH8) −40 to 200	−40 to 200 (When the temperature is 0°C or less, "–" and temperature are displayed by turns.) (When the thermistor detects 100°C or more, hundreds digit, tens digit and ones digit are displayed by turns.)	°C
	Input current of Fixed speed compressor	0 to 500 (When it is 100 or more, hundreds digit, tens digit and ones digit are displayed by turns)	0.1 A
	Number of defrost cycles 0 to FFFE	0 to FFFE (in hexadecimal notation) (When more than FF in hex (255 in decimal), the number is displayed in order of 16^3's and 16^2's, and 16^1's and 16^0's places. (Example) When 5000 cycles; 0.5 s 0.5 s 2 s □9 → C4 → □□	2 cycles
	Input current of outdoor unit	0 to 500 (When it is 100 or more, hundreds digit, tens digit and ones digit are displayed by turns.)	0.1 A
	Secondary LEV opening pulse 0 to 500 Heating: LEV-A Cooling: LEV-B	0 to 500 (When it is 100 pulse or more, hundreds digit, tens digit and ones digit are displayed by turns.)	Pulse
	U9 error detail history (latest)	Description / Display Normal: 00 Overvoltage error: 01 Undervoltage error: 02 Input current sensor error / L_1-phase open error: 04 Abnormal power synchronous signal: 08 PFC/IGBT error (W-VAA) / Undervoltage: 20 • Display examples for multiple errors: Overvoltage (01) + Undervoltage (02) = 03 Undervoltage (02) + Power-sync signal error (08) = 0A L_1 phase open error (04) + PFC/IGBT error (20) = 24	Code display
	DC bus voltage 180 to 370	180 to 370 (When it is 100 V or more, hundreds digit, tens digit and ones digit are displayed by turns.)	V
	Error postponement code history (2) of outdoor unit	Postponement code display Blinking: During postponement Lighting: Cancellation of postponement "00" is displayed in case of no postponement.	Code display

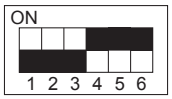
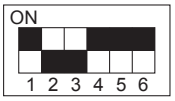
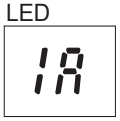
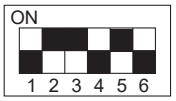
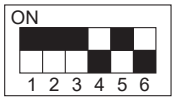
The black square (■) indicates a switch position.

SW2 setting	Display detail	Explanation for display	Unit
	Error postponement code history (3) of outdoor unit	Postponement code display Blinking: During postponement Lighting: Cancellation of postponement “00” is displayed in case of no postponement.	Code display
	Error history (3) (Oldest) Alternate display of abnormal unit number and code	When no error history, “0” and “– –“ are displayed by turns.	Code display
	Error thermistor display [When there is no error thermistor, “–“ is displayed.]	3: Liquid pipe temperature (TH3) 4: Discharge pipe temperature (TH4) 6: Two phase pipe (TH6) 7: Ambient temperature (TH7) 8: Heat sink temperature (TH8) 33: Comp. surface temperature (TH33) 34: Plate hex liquid (TH34)	Code display
	Operation frequency on error occurring 0 to 255	0 to 255 (When it is 100 Hz or more, hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 125 Hz; 0.5 s 0.5 s 2 s □1 →25 →□□	Hz
	Fan step on error occurring 0 to 16	0 to 16	Step
	Return water temperature on error occurring 0 to 100	0 to 100	°C
	Plate HEX Liquid temperature (TH34) on error occurring −40 to 90	−40 to 90 (When the temperature is 0°C or less, “–” and temperature are displayed by turns.) (Example) When −15°C; 0.5 s 0.5 s 2 s -□ →15 →□□	°C
	Pressure saturation temperature (T_{63HS}) on error occurring −39 to 88	−39 to 88 (When the temperature is 0°C or less, “–” and temperature are displayed by turns.) (Example) When −15°C; 0.5 s 0.5 s 2 s -□ →15 →□□	°C

The black square (■) indicates a switch position.

SW2 setting	Display detail	Explanation for display	Unit
	2-phase pipe temperature thermistor (TH6) -40 to 90	−40 to 90 (When the temperature is 0°C or less, "–" and temperature are displayed by turns.) (Example) When −15°C; 0.5 s 0.5 s 2 s -□ →15 →□□	°C
	Outdoor outside temperature (TH7) on error occurring −40 to 90	−40 to 90 (When the temperature is 0°C or less, "–" and temperature are displayed by turns.) (Example) When −15°C; 0.5 s 0.5 s 2 s -□ →15 →□□	°C
	Outdoor heat sink temperature (TH8) on error occurring −40 to 200	−40 to 200 (When the temperature is 0°C or less, "–" and temperature are displayed by turns.) (When the temperature is 100°C or more, hundreds digit, tens digit and ones digit are displayed by turns.)	°C
	Input current of Fixed speed compressor on error occurring	0 to 500 (When it is 100 or more, hundreds digit, tens digit and ones digit are displayed by turns)	0.1 A
	Sub cool on error occurring SC 0 to 130 [Cooling = T_{63HS}−TH3 Heating = T_{63HS}−TH2]	0 to 130 (When the temperature is 100°C or more, hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 115°C; 0.5 s 0.5 s 2 s □1 →15 →□□	°C
	Thermo-on time until error stops 0 to 999	0 to 999 (When it is 100 minutes or more, hundreds digit, tens digit and ones digit are displayed by turns.) (Example) When 415 minutes; 0.5 s 0.5 s 2 s □4 →15 →□□	Minute

The black square (■) indicates a switch position.

SW2 setting	Display detail	Explanation for display	Unit
	Comp. surface temperature (TH33) −52 to 221	−52 to 221 (When the temperature is 0°C or less, "–" and temperature are displayed by turns.) (When the discharge thermistor detects 100°C or more, hundreds digit, tens digit, and ones digit are displayed by turns.) (Example) When 105°C; 0.5 s 0.5 s 2 s □1 →05 →□□	°C
	Controlling status of compressor operating frequency	The following code will be a help to know the operating status of unit. •The tens digit Display: 1 — Primary current control; 2 — Secondary current control •The ones digit (In this digit, the total number of activated control is displayed.) Display: 1 — Preventive control for excessive temperature rise of discharge temperature; 2 — Preventive control for excessive temperature rise of condensing temperature; 4 — Frosting preventing control; 8 — Preventive control for excessive temperature rise of radiator panel (Example) The following controls are activated. • Primary current control • Preventive control for excessive temperature rise of condensing temperature • Preventive control for excessive temperature rise of heat sink LED 	Code display
	Pipe temperature/Liquid of Fixed speed compressor circuit (TH32) −40 to 90	-40 to 90 (When the coil thermistor detects 0°C or below, "-" and temperature are displayed by turns.) (Example) When -15°C; 0.5 s 0.5 s 2 s -□ →15 →□□	°C
	Suction pipe of Fixed speed compressor circuit (TH35) -40 to 90	-40 to 90 (When the coil thermistor detects 0°C or below, "-" and temperature are displayed by turns.) (Example) When -15°C; 0.5 s 0.5 s 2 s -□ →15 →□□	°C

10 MONITORING THE OPERATION DATA BY THE REMOTE CONTROLLER

10-1. Request code list

Certain indoor/outdoor combinations do not have the request code function; therefore, no request codes are displayed.
Refer to indoor unit service manual for how to use the controllers and request codes for indoor unit.

Request code	Request content	Description (Display range)	Unit	Remarks
0	Operation state	Refer to 10-1-1. Detail Contents in Request Code.	–	
1	Compressor-Operating current (rms)	0–50	A	
2	Compressor-Accumulated operating time	0–9999	10 hours	
3	Compressor-Number of operation times	0–9999	100 times	
4	Discharge temperature (TH4)	-20–217	°C	
5	Outdoor unit -Liquid pipe 1 temperature (TH3)	-40–90	°C	
6				
7				
8				
9	Outdoor unit-Outside air temperature (TH7)	-40–90	°C	
10	Outdoor unit-Heat sink temperature (TH8)	-40–200	°C	
11				
12	Discharge superheat (SHd)	0–255	°C	
13	Sub-cool (SC)	0–130	°C	
14	Condensing temperature (T_{63HS})	-39–88	°C	
15				
16	Compressor-Operating frequency	0–255	Hz	
17	Compressor-Target operating frequency	0–255	Hz	
18	Outdoor unit-Fan output step	0–16	Step	
19	Outdoor unit-Fan 1 speed (Only for air conditioners with DC fan motor)	0–9999	rpm	
20	Outdoor unit-Fan 2 speed (Only for air conditioners with DC fan motor)	0–9999	rpm	"0" is displayed if the air conditioner is a single-fan type.
21				
22	LEV (A) opening	0–500	Pulses	
23	LEV (B) opening	0–500	Pulses	
24				
25	Primary current	0–50	A	
26	DC bus voltage	180–370	V	
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48	Thermostat ON operating time	0–999	Minutes	
49				

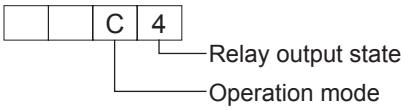
Request code	Request content	Description (Display range)	Unit	Remarks
50				
51	Outdoor unit-Control state	Refer to 10-1-1.Detail Contents in Request Code.	–	
52	Compressor-Frequency control state	Refer to 10-1-1.Detail Contents in Request Code.	–	
53	Outdoor unit-Fan control state	Refer to 10-1-1.Detail Contents in Request Code.	–	
54	Actuator output state	Refer to 10-1-1.Detail Contents in Request Code.	–	
55	Error content (U9)	Refer to 10-1-1.Detail Contents in Request Code.	–	
56				
57				
58				
59				
60				
61				
62				
63				
64				
65				
66				
67				
68				
69				
70	Outdoor unit-Capacity setting display	Refer to 10-1-1.Detail Contents in Request Code.	–	
71	Outdoor unit-Setting information	Refer to 10-1-1.Detail Contents in Request Code.	–	
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
80				
86				
87				
88				
89				
90	Outdoor unit-Microprocessor version information	Examples) Ver 5.01 → "0501"	Ver	
91	Outdoor unit-Microprocessor version information (sub No.)	Auxiliary information (displayed after version information) Examples) Ver 5.01 A000 →"A000"	–	
92				
93				
94				
95				
96				
97				
98				
99				
100	Outdoor unit - Error postponement history 1 (latest)	Displays postponement code. (" - - " is displayed if no postponement code is present)	Code	
101	Outdoor unit - Error postponement history 2 (previous)	Displays postponement code. (" - - " is displayed if no postponement code is present)	Code	
102	Outdoor unit - Error postponement history 3 (last but one)	Displays postponement code. (" - - " is displayed if no postponement code is present)	Code	

Request code	Request content	Description (Display range)	Unit	Remarks
103	Error history 1 (latest)	Displays error history. (" --" is displayed if no history is present.)	Code	
104	Error history 2 (second to last)	Displays error history. (" --" is displayed if no history is present.)	Code	
105	Error history 3 (third to last)	Displays error history. (" --" is displayed if no history is present.)	Code	
106	Abnormal thermistor display (TH3/TH6/TH7/TH8)	3 : TH3 6 : TH6 7 : TH7 8 : TH8 0 : No thermistor error	Sensor number	
107	Operation mode at time of error	Displayed in the same way as request code "0".	–	
108	Compressor-Operating current at time of error	0–50	A	
109	Compressor-Accumulated operating time at time of error	0–9999	10 hours	
110	Compressor-Number of operation times at time of error	0–9999	100 times	
111	Discharge temperature at time of error	-20–217	°C	
112	Outdoor unit -Liquid pipe 1 temperature (TH3) at time of error	−40–90	°C	
113				
114				
115				
116	Outdoor unit-Outside air temperature (TH7) at time of error	−40–90	°C	
117	Outdoor unit-Heat sink temperature (TH8) at time of error	−40–200	°C	
118	Discharge superheat (SHd) at time of error	0–255	°C	
119	Sub-cool (SC) at time of error	0–130	°C	
120	Compressor-Operating frequency at time of error	0–255	Hz	
121	Outdoor unit at time of error • Fan output step	0–16	Step	
122	Outdoor unit at time of error • Fan 1 speed (Only for air conditioners with DC fan)	0–9999	rpm	
123	Outdoor unit at time of error • Fan 2 speed (Only for air conditioners with DC fan)	0–9999	rpm	"0" is displayed if the air conditioner is a single fan type.
124				
125	LEV (A) opening at time of error	0–500	Pulses	
126				
127				
128				
129				
130	Thermostat ON time until operation stops due to error	0–999	Minutes	

10-1-1. Detail Contents in Request Code

[Operation state] (Request code :" 0")

Data display



Operation mode

Display	Operation mode
0	STOP • FAN
C	COOL • DRY
H	HEAT
d	DEFROST

Relay output state

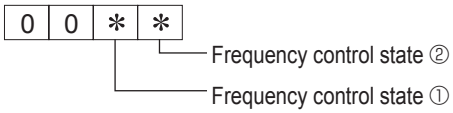
Display	Power currently supplied to compressor	Compressor	Four-way valve	Solenoid valve
0	–	–	–	–
1				ON
2			ON	
3			ON	ON
4		ON		
5		ON		ON
6		ON	ON	
7		ON	ON	ON
8	ON			
A	ON		ON	

[Outdoor unit – Control state] (Request code :" 51")

Data display				State
0	0	0	0	Normal
0	0	0	1	Preparing for heat operation
0	0	0	2	Defrost

[Compressor – Frequency control state] (Request code :" 52")

Data display



Frequency control state ①

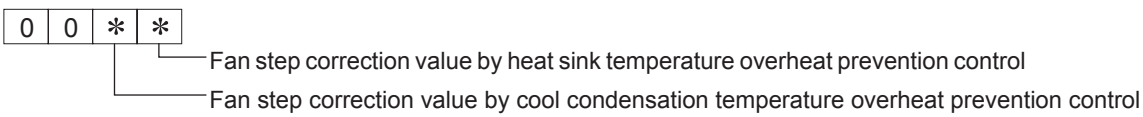
Display	Current limit control
0	No current limit
1	Primary current limit control is ON.
2	Secondary current limit control is ON.

Frequency control state ②

Display	Discharge temperature overheat prevention	Condensation temperature overheat prevention	Anti-freeze protection control	Heat sink temperature overheat prevention
0				
1	Controlled			
2		Controlled		
3	Controlled	Controlled		
4			Controlled	
5	Controlled		Controlled	
6		Controlled	Controlled	
7	Controlled	Controlled	Controlled	
8				Controlled
9	Controlled			Controlled
A		Controlled		Controlled
b	Controlled	Controlled		Controlled
C			Controlled	Controlled
d	Controlled		Controlled	Controlled
E		Controlled	Controlled	Controlled
F	Controlled	Controlled	Controlled	Controlled

[Fan control state] (Request code :" 53")

Data display



Display	Correction value
− (minus)	−1
0	0
1	+1
2	+2

[Actuator output state] (Request code :"54")

Data display 0 0 * *

Actuator output state ①

Actuator output state ②

Actuator output state ①

Display	SV1	Four-way valve	Compressor	Compressor is warming up
0				
1	ON			
2		ON		
3	ON	ON		
4			ON	
5	ON		ON	
6		ON	ON	
7	ON	ON	ON	
8				ON
9	ON			ON
A		ON		ON
b	ON	ON		ON
C			ON	ON
d	ON		ON	ON
E		ON	ON	ON
F	ON	ON	ON	ON

Actuator output state ②

Display	52C	SV2	SS
0			
1	ON		
2		ON	
3	ON	ON	
4			ON
5	ON		ON
6		ON	ON
7	ON	ON	ON

[Error content (U9)] (Request code :"55")

Data display 0 0 * *

Error content ①

Error content ②

Error content ① ●: Detected

Display	Overvoltage error	Undervoltage error	L_1-phase open error	Power synchronizing signal error
0				
1	●			
2		●		
3	●	●		
4			●	
5	●		●	
6		●	●	
7	●	●	●	
8				●
9	●			●
A		●		●
b	●	●		●
C			●	●
d	●		●	●
E		●	●	●
F	●	●	●	●

Error content ② ●: Detected

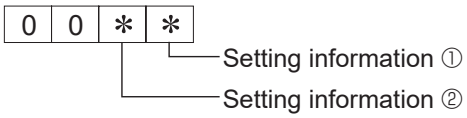
Display	Converter Fo error	PAM error
0		
1	●	
2		●
3	●	●

[Outdoor unit – Capacity setting display] (Request code : "70")

Data display	Capacity
9	35
10	50
11	60
14	71
20	100
25	125
28	140
40	200
50	250

[Outdoor unit – Setting information] (Request code : "71")

Data display



Setting information ①

Display	Defrost mode
0	Standard
1	For high humidity

Setting information ②

Display	Single-/ 3-phase	Heat pump/ cooling only
0	Single-phase	Heat pump
1		Cooling only
2	3-phase	Heat pump
3		Cooling only

11 DISASSEMBLY PROCEDURE

PUZ-WZ50VAA.UK **PUZ-WZ60VAA.UK**
PUZ-WZ50VAA-BS.UK **PUZ-WZ60VAA-BS.UK**

OPERATING PROCEDURE

1. Removing the service, top and cover panels

Note: Be sure to read Section 2 "Safety precaution" of this manual and perform the work in compliance with this safety requirement before starting the work. Be sure to check that there are no leakage of R290 refrigerant and no source of ignition.

(1) Remove the service panel fixing screws (3 for front *2 and 1 for right/ 5 × 12), then slide the service panel downward to remove it. (The service panel is fixed to the side panel (R) with a hook on the right side.)
(2) Remove the top panel fixing screws (3 for front, 3 for rear and 1 for right/ 5 × 12) to remove the top panel. *1
(3) Remove the cover panel fixing screws (1 for front and 1 for right side/ 5 × 12), then slide the cover panel upward to remove it. (See Photo 1-1)

***1 When removing service panel and top panel at the same time, count 2 less screws since they share screws.**

***2 The 3 screws for front of the service panel are the hex-alobular internal screws. Please use the tools which can fit those screws. (see photo 1-2)**

PHOTOS/FIGURES

Photo 1-1

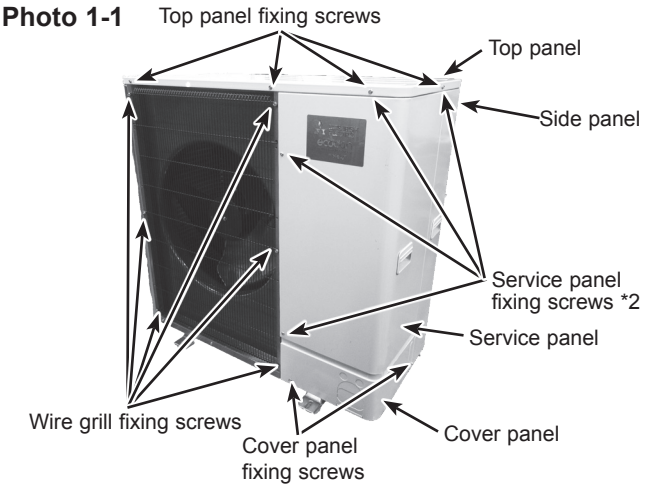


Photo 1-2

2. Removing the electrical parts box

(1) Remove the service panel. (See Photo 1-1)
(2) Remove the top panel. (See Photo 1-1)
(3) Disconnect the power supply cable from terminal block.
(4) Disconnect the indoor/outdoor connecting wire from terminal block.
(5) Disconnect the connectors CNF1 (WH) from the controller circuit board.
<Symbols on the board>
• Fan motor (CNF1)
• Thermistor <Liquid> (TH3)
• Thermistor <Discharge> (TH4)
• Thermistor <Ambient/ 2-Phase pipe> (TH7/6)
• Thermistor <Comp. Surface> (TH33)
• Thermistor <Plate Hex Liquid> (TH34)
• High pressure switch (63H)
• Pressure sensor (63HS)
• 4-way valve (21S4)
• LEV (LEV-A, LEV-B)
(6) Disconnect the following relay connectors. (See Photo2-2)
- TH3, TH4, TH7/6, TH33, TH34 (WHITE)
- 63HS (WHITE)
- LEV-A (WHITE)
- LEV-B (RED)
- 63H, 21S4(WHITE)
- COMP INV (WHITE)
(7) Loosen the clamp and the clip for the lead wire of the fan motor. (See Photo 2-3)
(8) Remove the front panel fixing screw (1 for front/ 5 × 12) and the panel hook fixing screws (2 for front/ 5 × 12)to remove the electrical parts box. (See Photo 2-1, 2-4, 2-5)
(9) Lift the electrical parts box up to remove it.*1

***1 Be careful not to hit the surrounding piping when removing the electrical parts box.**

Photo 2-5

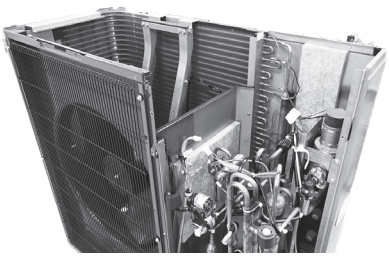


Photo 2-1

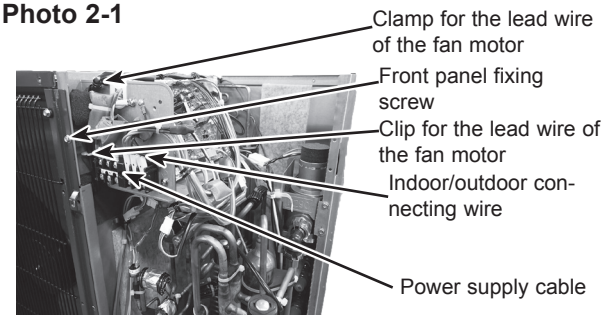


Photo 2-2

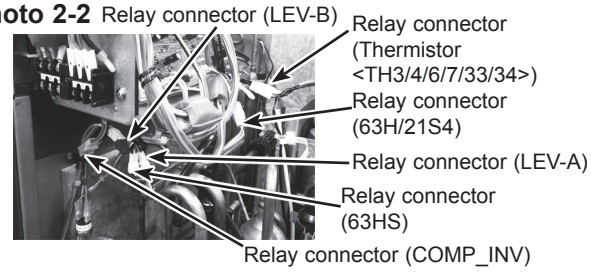


Photo 2-3

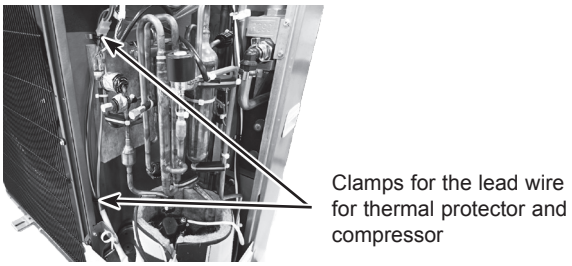
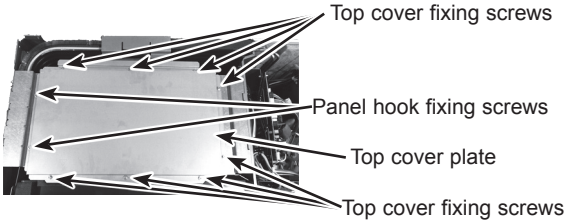


Photo 2-4



OPERATING PROCEDURE

3. Removing the fan motor (MF1)

(1) Remove the service panel. (See Photo 1-1)
(2) Remove the top panel. (See Photo 1-1)
(3) Remove the cover panel fixing screws (1 for front and 1 for right side/ 5 × 12), then slide the cover panel upward to remove it. (See Photo 1-1)
(4) Remove the wire grill fixing screws (6 for front/ 5 × 12), then slide the wire grill upward to remove it. (See Photo 1-1)
(5) Remove the screw of nut (1 for front/ M6), then slide the propeller fan forward to remove it. *2 (See Photo 3-1)
(6) Remove the electrical parts box. (See Photo 2-1, 2-2, 2-4, 2-5)
(7) Remove the front panel fixing screws (4 for front/ 5 × 12), then slide the front panel forward to remove it. (See Photo 3-1)
(8) Loosen the clamps for the lead wire on motor support and separator. (See Photo 3-2)
(9) Remove the insulation which attached over the edge cover. (See Photo 3-2)
(10) Remove the fan motor fixing screws (4 for front/ 5 × 25) to remove the fan motor.*1 (See Photo 3-3)

Note 1: When attaching the fan motor, make sure to route the cable through the hook below the fan motor and fix firmly with the clamp.
Note 2: Tighten the propeller fan with a torque of 5.7 ± 0.3 N·m.

PHOTOS/FIGURES

Photo 3-1

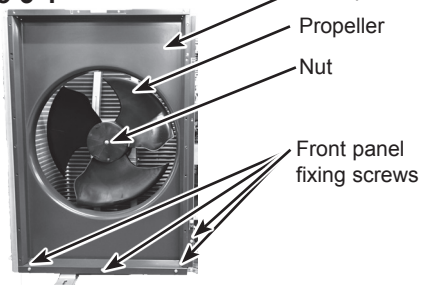


Photo 3-2

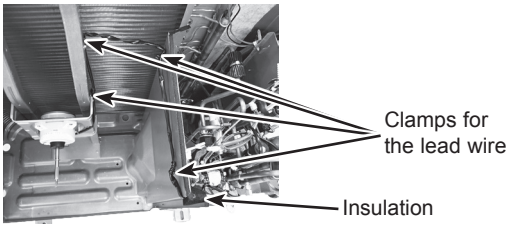
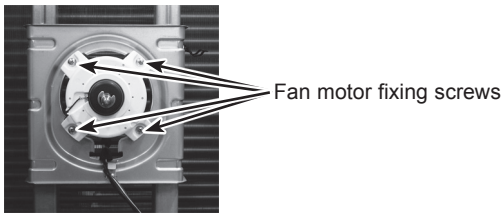


Photo 3-3



4. Disassembling the electrical parts box

(1) Remove the electrical parts box. (See Photo 2-1, 2-2, 2-4, 2-5)

[Power Board]

(2) Remove the top cover fixing screws (8 for top/ 5×12), then remove the top cover of the electrical parts box. (See Photo 2-4, 4-1)
(3) Disconnect all the connectors on the power circuit board. (See Photo 4-3)
(4) Remove the power board fixing screws (5 for front/ 3×12), then remove the mold casing of the power board. (See Photo 4-4)
(5) Remove the IPM fixing screws (4 for front/ 3×12, 2 for front/ 4×12). (See Photo 4-4)
(6) Slide the power circuit board to remove it.

[THERMISTOR (HEAT SINK)]

(7) Remove the thermistor <Heat sink> (TH8) fixing screw (1 for front/ 3 × 12) to remove the thermistor <Heat sink>(TH8).(See Photo 4-5)

[Control Circuit Board]

(8) Disconnect the all lead wires from the clamps and the all connectors on the controller circuit board. (See Photo 4-6)
(9) To remove the circuit board, release it from the support.

[TERMINAL BLOCK]

(10) Remove the lead wire L/N, CX, Earth, CNS on the terminal block. (See Photo 4-7)
(11) Remove the terminal block fixing screw. (See Photo 4-7)

[REACTOR]

(12) Disconnect the lead wire L/N, CNDC, CNAC from edge cover. (Photo 4-8)
(13) Remove the insulation from the electrical box. (See Photo 4-9)
(14) Remove the screws on the electrical box. (4 for right/ 4×10) , then slide the plate upward to remove it. (See Photo 4-10, 4-11)
(15) Remove the all connectors of the reactor. (See Photo 4-12)
(16) Remove the reactor fixing screws (4 for right/ 4×10). (See Photo 4-12)

Note 1: When reassembling the electrical parts box, make sure the wirings are correct.
Note 2: When reassembling the electrical parts box, make sure whether the sealing materials of top cover degraded or are damaged. If the sealing materials degraded or are damaged, replace it with a new one.(See photo 4-2)

Photo 4-1

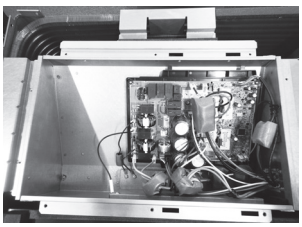


Photo 4-2

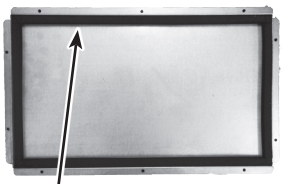


Photo 4-3

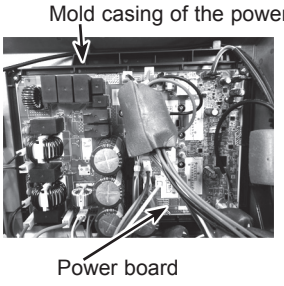


Photo 4-4

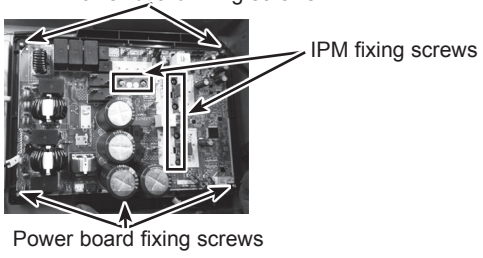
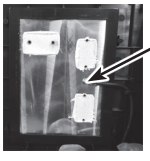


Photo 4-5



Continued to the next page.

OPERATING PROCEDURE	PHOTOS/FIGURES

Photo 4-6

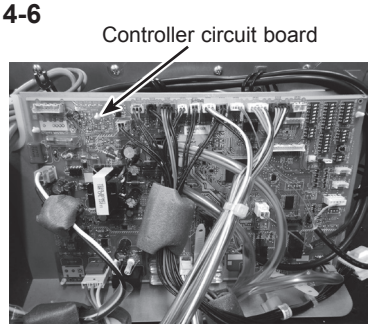


Photo 4-7

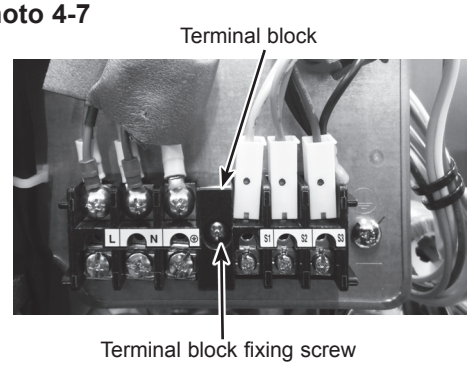


Photo 4-8

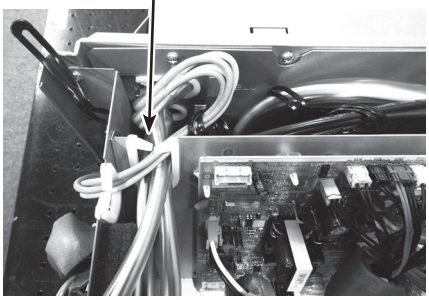


Photo 4-9

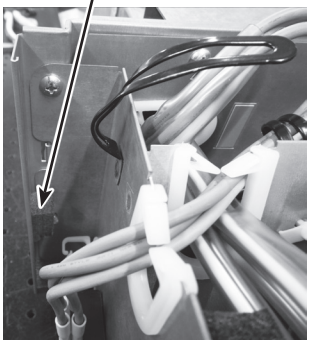


Photo 4-10

Photo 4-11

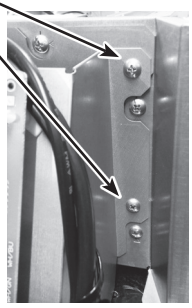
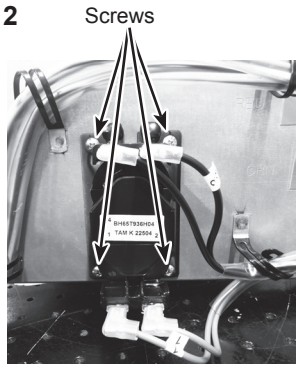


Photo 4-12



5. Removing the side panel (R)

(1) Remove the service panel. (See Photo 1-1)
(2) Remove the top panel. (See Photo 1-1)
(3) Remove the cover panel. (See Photo 1-1)
(4) Remove the inlet and outlet water pipe.*1 (See Photo 5-1)
(5) Remove the side panel (R) fixing screws (2 for front, 1 for right side, 2 for rear/ 5 ×12), then slide the cover panel forward to remove it. (See Photo 5-1, 5-2)

***1 Drain the water in outdoor unit before removing the water piping**

Photo 5-1

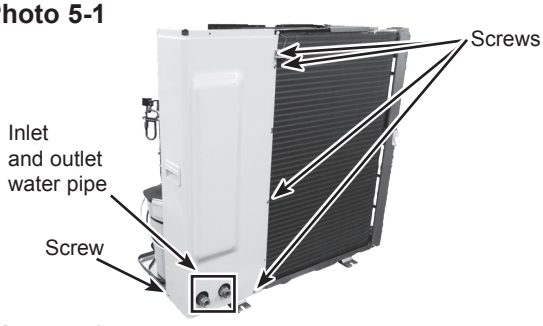
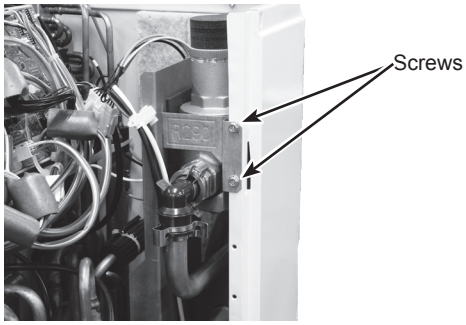


Photo 5-2



OPERATING PROCEDURE

6. Removing the thermistors

(1) Remove the service panel and cover panel. (See Photo 1-1)
(2) Remove the side panel (R). (See Photo 5-1, 5-2)
(3) Remove the lid of the soundproof cover.*1 (See Photo 6-1)
(4) Remove the thermistors.*2 (See Photo 6-2, 6-3, 6-4)
- Thermistor <Liquid> (TH3)
- Thermistor <Discharge> (TH4)
- Thermistor <Ambient/ 2-Phase pipe> (TH7/6)
- Thermistor <Comp. Surface> (TH33)
- Thermistor <Plate Hex Liquid> (TH34)

(5) Remove the cable traps. (See Photo 6-4)
(6) Remove the relay connector .(See Photo 2-2)

Note 1: When replacing the soundproof lid, fit the lid to the wrapped cover without making a gap.
Note 2: All thermistors must be replaced at the same time as they are combined by the relay connector.

PHOTOS/FIGURES

Photo 6-1

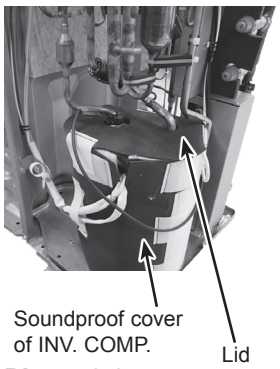


Photo 6-2

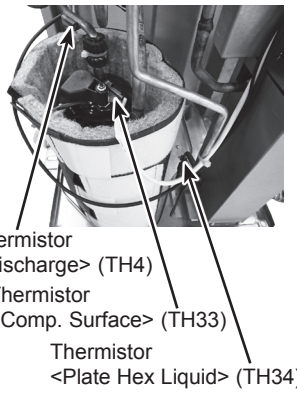


Photo 6-3

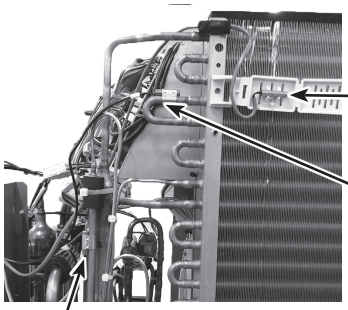
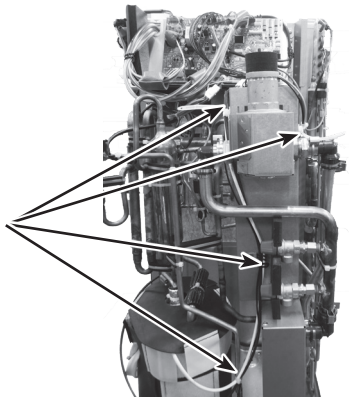


Photo 6-4



7. Removing the 4-way valve coil with wiring of H.P. Switch, LEV coil (LEV-A, LEV-B), Thermal protector

(1) Remove the service panel. (See Photo 1-1)

[Removing the 4-way valve coil with wiring of H.P. Switch]

(2) Remove the 4-way valve coil fixing screw (1 for front/ M5) to remove the 4-way valve coil. (See Photo 7-1)
(3) Slide the 4-way valve coil forward to remove it.
(4) Disconnect the wiring of H.P.SWITCH (63H). (See Photo 7-1)
(5) Remove the two relay connectors. (for thermal protector, for the set of 4 way valve coil and high pressure switches) (See Photo 2-2, 7-1)

[Removing the LEV coil]

(2) Remove the band of LEV coil. (See Photo 7-2)
(3) Remove the relay connector of LEV coil. (See Photo 2-2)

[Removing the thermal protector]

(2) Remove the relay connector of thermal protector. (See Photo 7-1)
(3) Loosen the two clamps for the lead wire of the thermal protector. (See Photo 2-3)
(4) Remove the lid of the soundproof cover. *1 (See Photo 6-1)
(5) Remove the nut of terminal cover, then open the terminal cover. (See Photo 7-3)
(6) Remove thermal protector. (See Photo 7-4)

***1 When replacing the soundproof lid, fit the lid to the wrapped cover without making a gap.**

Photo 7-1

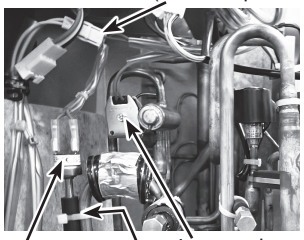


Photo 7-2

Photo 7-3

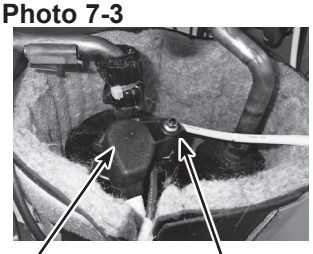
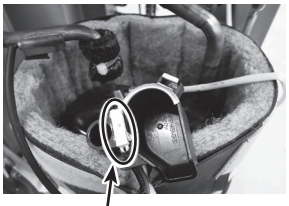


Photo 7-4



OPERATING PROCEDURE

8. Removing the 4-way valve, LEV (LEV-A, LEV-B), high pressure switch and pressure sensor

Note:

Be sure to perform the work in compliance with Section 2 "safety precaution" of this manual and check the following.

- **The power-supply breaker of the appliance is turned off.**
- **There is no refrigerant leak from the unit.**
- **There is no ignition sources in work area.**
- **The work area is provided adequate space and ventilation.**

(1) Remove the inlet and outlet water pipe. *1 (See Photo 5-1)
(2) Remove the service panel, top panel and cover panel. (See Photo 1-1)
(3) Recover refrigerant in accordance with the following procedure. *2
• Remove the refrigerant
• Purge the circuit with inert gas for 5 min
• Evacuate down the refrigerant circuit to a pressure of 30 kPa absolute or lower
• Purge again with inert gas for 5 min
(4) Remove the side panel (R). (See Photo 5-1, 5-2)

[Removing the 4-way valve]

(5) Remove the 4-way valve coil. (See Photo 7-1)
(6) Cutting the pipe inside the welded part of 4-way valve (4 positions) to remove the 4-way valve. *3 (See Photo 8-1)
(7) Remove the remaining pipe welded part of 4-way valve (4 positions).

[Removing the LEV]

(5) Remove the LEV coil. (See Photo 7-2)
(6) Remove the LEV fixed to the pipe with a band and rubber mount. (See Photo 7-2)
(7) Cutting the pipe inside the welded part of LEV (2 positions) to remove the LEV. *3 (See Photo 8-2)
(8) Remove the remaining pipes welded part of the LEV. (See Photo 8-2)

[Removing the high pressure switch]

(5) Disconnect the lead wire from the high pressure switch. (See Photo 7-1)
(6) Remove the high pressure switch fixed to the pipe with a band and rubber tube.(See Photo 7-1)
(7) Cutting the pipe inside the welded part of high pressure switch (1 position) to remove high pressure switch. *3 (See Photo 8-3)
(8) Remove the remaining pipe welded part of the high pressure switch. (See Photo 8-3)

[Removing the pressure sensor]

(5) Disconnect the relay connector of pressure sensor. (See Photo 2-2)
(6) Remove the pressure sensor fixed to the pipe with a band, rubber mount and rubber tube. (See Photo 8-4)
(7) Cutting the pipe inside the welded part of pressure sensor (1 position) to remove the pressure sensor. *3 (See Photo 8-5)
(8) Remove the remaining pipe welded part of the pressure sensor. (See Photo 8-5)

***1 Drain the water in outdoor unit before removing the water piping.**

***2 Work on the refrigerant circuit with flammable refrigerant in safety group A3 may only be carried out by authorised heating contractors. These heating contractors must be trained in accordance with EN 378 Part 4 or IEC 60335-2-40 Annex HH.**

***3 Be sure to remove parts to be replaced by cutting with pipe cutter, NOT by flame nor by electric saw, etc.**

***4 When installing the following parts, cover it with a wet cloth to prevent it from heating as the temperature below, then braze the pipes so that the inside of pipes are not oxidized:**

- **4-way valve; 120°C or more**
- **LEV; 120°C or more**
- **High pressure switch; 100°C or more**
- **Pressure sensor; 100°C or more**

PHOTOS/FIGURES

Photo 8-1

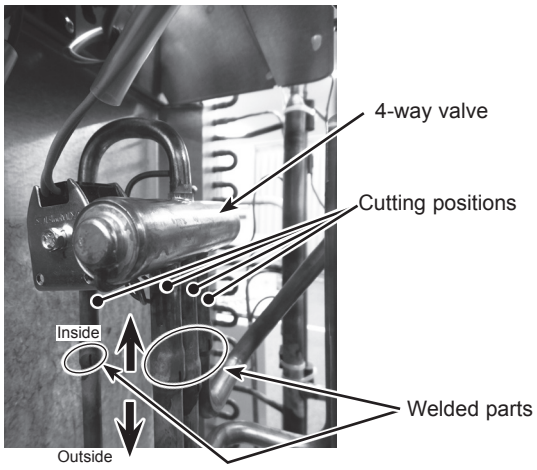


Photo 8-2

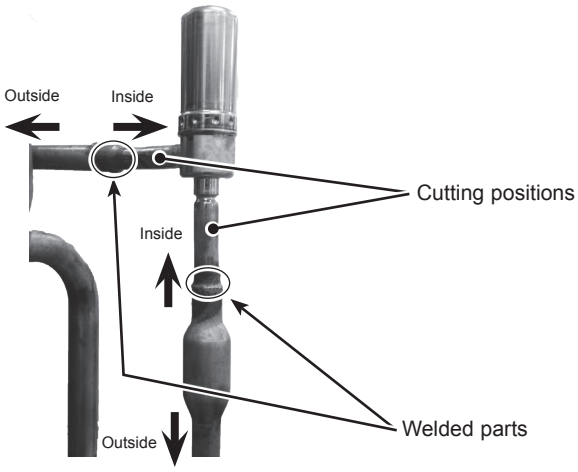


Photo 8-3

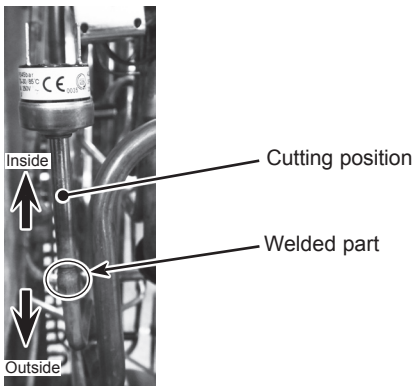
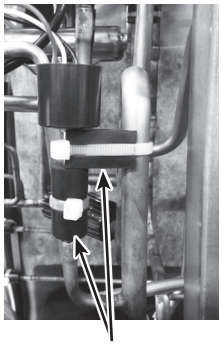
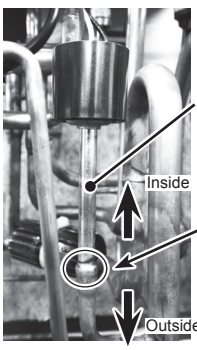


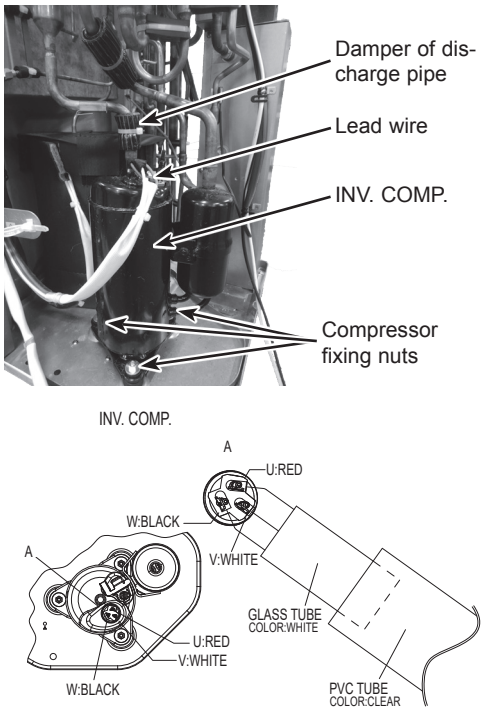
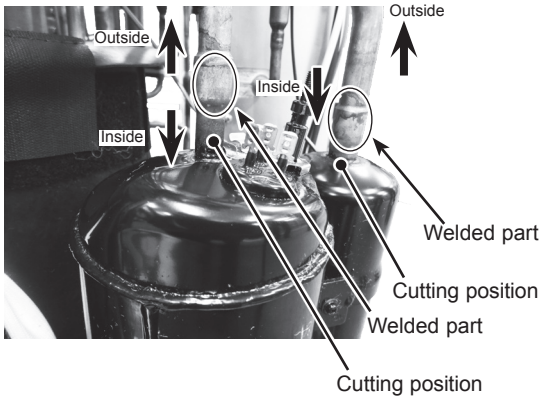
Photo 8-4

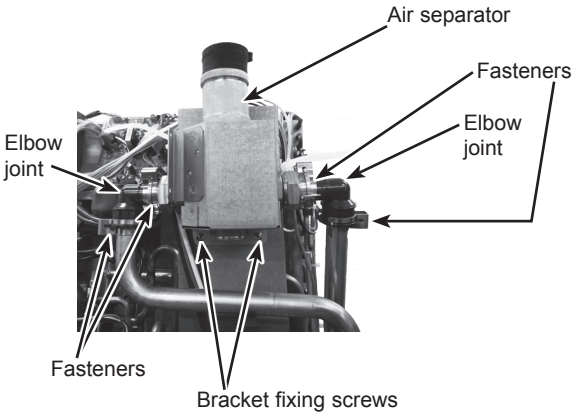
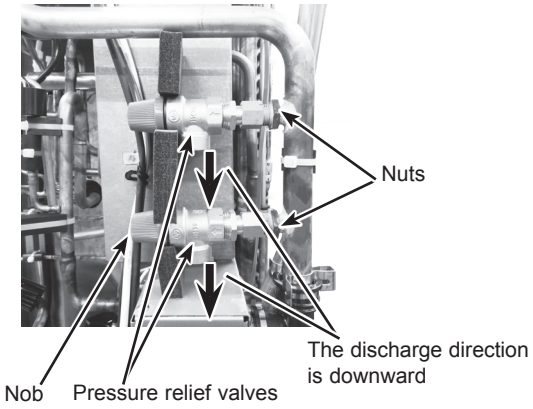


Bands, rubber mount and rubber tube

Photo 8-5



OPERATING PROCEDURE	PHOTOS/FIGURES
9. Removing the compressor (MC) **Note:** **Be sure to perform the work in compliance with Section 2 "Safety precaution" of this manual and check the following.** **• The power-supply breaker of the appliance is turned off.** **• There is no refrigerant leak from the unit.** **• There is no ignition sources in work area.** **• The work area is provided adequate space and ventilation.** (1) Remove the inlet and outlet water pipe. *1 (See Photo 5-1) (2) Remove the service panel, top panel and cover panel. (See Photo 1-1) (3) Recover refrigerant in accordance with the following procedure. *2 • Remove the refrigerant • Purge the circuit with inert gas for 5 min • Evacuate down the refrigerant circuit to a pressure of 30 kPa absolute or lower • Purge again with inert gas for 5 min (4) Remove the side panel (R). (See Photo 5-1, 5-2) **[In case of INV. COMP]** (5) Remove the soundproof cover and lid. *4 (See Photo 6-1) (6) Remove the two thermistors <Discharge> (TH4), <Comp. Surface> (TH33). (See Photo 6-2) (7) Remove the terminal cover and thermal protector. (See Photo 7-3, 7-4) (8) Remove the lead wire for compressor. *6 (See Photo 9-1) (9) Remove the damper of discharge pipe. (See Photo 9-1) (10) Remove the 3 points of the compressor fixing nuts using a spanner or an adjustable wrench. *5 (See Photo 9-1) (11) Cutting the pipe inside the welded parts of the compressor (2 positions) to remove the compressor. *3 (See Photo 9-2) (12) Remove the remaining pipe welded part of the compressor. (See Photo 9-2) ***1 Drain the water in outdoor unit before removing the water piping.** ***2 Work on the refrigerant circuit with flammable refrigerant in safety group A3 may only be carried out by authorised heating contractors. These heating contractors must be trained in accordance with EN 378 Part 4 or IEC 60335-2-40 Annex HH.** ***3 Be sure to remove parts to be replaced by cutting with pipe cutter, NOT by flame nor by electric saw, etc.** ***4 When replacing the soundproof lid, fit the lid to the wrapped cover without making a gap.** ***5 Tighten the nuts of compressor with a torque of 4 ± 0.4 N·m.**	**Photo 9-1**  **Photo 9-2** 

OPERATING PROCEDURE	PHOTOS/FIGURES
10. Removing the air separator (1) Remove the inlet and outlet water pipe.*1 (See Photo 5-1) (2) Remove the service panel, top panel and cover panel. (See Photo 1-1) (3) Remove the side panel (R). (See Photo 5-1, 5-2) (4) Remove the fasteners of the air separator. *2 (See Photo 10) (5) Remove the bracket fixing screws (2 for right/ 4×10) (See Photo 10) (6) Slide the air separator and bracket upward to remove the air separator. (7) Remove the fasteners and elbow joints. *2 (See Photo 10) ***1 Drain water in the outdoor unit before removing the water piping.** ***2 When reinstalling the fastener, use a new O-ring.**	**Photo 10** 
11. Removing the pressure relief valve (1) Remove the inlet and outlet water pipe. *1 (See Photo 5-1) (2) Remove the service panel, top panel and cover panel. (See Photo 1-1) (3) Remove the side panel (R). (See Photo 5-1, 5-2) (4) Loosen the nut of the pressure relief valve by a spanner (flat across width: 19 mm). (See Photo 11) (5) Remove the pressure relief valve and the gasket.*2*3*4*5 (See Photo 11) ***1 Drain water in the outdoor unit before removing the water piping.** ***2 The water may spout if the pressure relief valve is removed while the water is still inside the plate heat exchanger.** ***3 Tightening torque of the nut: 15 ± 1 N.m.** ***4 When reinstalling the G3/8" nut, use a new G3/8"gasket.** ***5 When reinstalling the PRV, be sure to install the discharge direction of the PRV downward. (See photo 11)** **If it is installed in the wrong direction, there is a risk of an explosion due to the refrigerant and water splashing onto the electrical equipment.**	**Photo 11** 

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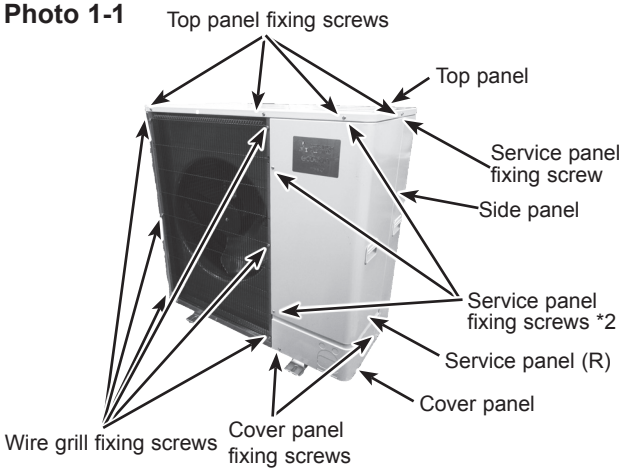
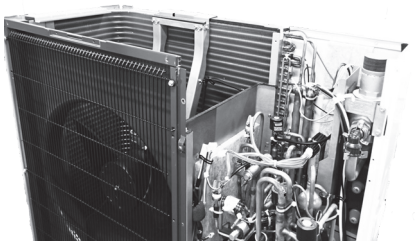
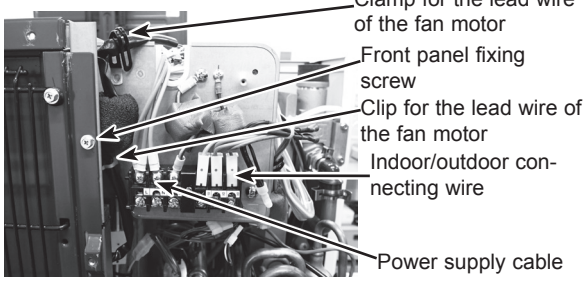
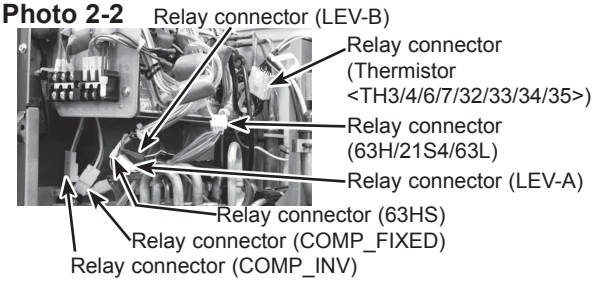
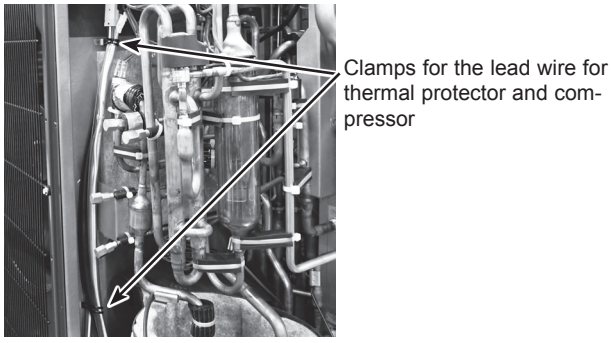
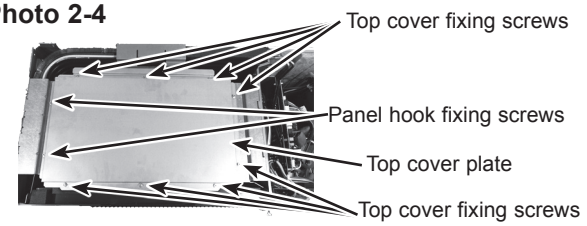
OPERATING PROCEDURE	PHOTOS/FIGURES
1. Removing the service, top and cover panels **Note: Be sure to read Section 2 "Safety precaution" of this manual and perform the work in compliance with this safety requirement before starting the work. Be sure to check that there are no leakage of R290 refrigerant and no source of ignition.** (1) Remove the service panel fixing screws (3 for front *2 and 1 for right/ 5 × 12), then slide the service panel downward to remove it. (The service panel is fixed to the side panel (R) with a hook on the right side.) (2) Remove the top panel fixing screws (3 for front, 3 for rear and 1 for right/ 5 × 12) to remove the top panel. *1 (3) Remove the cover panel fixing screws (1 for front and 1 for right side/ 5 × 12), then slide the cover panel upward to remove it. (See Photo 1-1) ***1 When removing service panel and top panel at the same time, count 2 less screws since they share screws.** ***2 The 3 screws for front of the service panel are the hex-alobular internal screws. Please use the tools which can fit those screws. (see photo 1-2)**	**Photo 1-1**  **Photo 1-2** 
2. Removing the electrical parts box (1) Remove the service panel. (See Photo 1-1) (2) Remove the top panel. (See Photo 1-1) (3) Disconnect the power supply cable from terminal block. (4) Disconnect the indoor/outdoor connecting wire from terminal block. (5) Disconnect the connectors CNF1 (WH), LEV-C (BU) from the controller circuit board. <Symbols on the board> • Fan motor (CNF1) • Thermistor <Liquid> (TH3) • Thermistor <Discharge> (TH4) • Thermistor <Ambient/ 2-Phase pipe> (TH7/6) • Thermistor <Comp. Surface> (TH33) • Thermistor <Plate Hex Liquid> (TH34) • Thermistor <Fix Suction Pipe> (TH35) • Thermistor <Fix Liquid> (TH32) • High pressure switch (63H, 63L) • Pressure sensor (63HS) • 4-way valve (21S4) • LEV (LEV-A, LEV-B, LEV-C) (6) Disconnect the following relay connectors. (See Photo2-2) - TH35, TH32, TH3, TH4, TH7/6, TH33, TH34 (WHITE) - 63HS (WHITE) - LEV-A (WHITE) - LEV-B (RED) - 63H, 21S4, 63L (WHITE) - COMP INV (WHITE) - COMP FIXED (WHITE) (7) Loosen the clamp and the clip for the lead wire of the fan motor. (See Photo 2-1) (8) Remove the front panel fixing screw (1 for front/ 5 × 12) and the panel hook fixing screws (2 for front/ 5 × 12) to remove the electrical parts box. (See Photo 2-1, 2-4, 2-5) (9) Lift the electrical parts box up to remove it.*1 ***1 Be careful not to hit the surrounding piping when removing the electrical parts box.** **Photo 2-5** 	**Photo 2-1**  **Photo 2-2**  **Photo 2-3**  **Photo 2-4** 

OPERATING PROCEDURE

3. Removing the fan motor (MF1)

(1) Remove the service panel. (See Photo 1-1)
(2) Remove the top panel. (See Photo 1-1)
(3) Remove the cover panel fixing screws (1 for front and 1 for right side/5 × 12), then slide the cover panel upward to remove it. (See Photo 1-1)
(4) Remove the wire grill fixing screws (6 for front/ 5 × 12), then slide the wire grill upward to remove it. (See Photo 1-1)
(5) Remove the screw of nut (1 for front/ M6), then slide the propeller fan forward to remove it. *2 (See Photo 3-1)
(6) Remove the electrical parts box. (See Photo 2-1, 2-2, 2-4, 2-5)
(7) Remove the front panel fixing screws (4 for front/ 5 × 12), then slide the front panel forward to remove it. (See Photo 3-1)
(8) Loosen the clamps for the lead wire on motor support and separator. (See Photo 3-2)
(9) Remove the insulation which attached over the edge cover. (See Photo 3-2)
(10) Remove the fan motor fixing screws (4 for front/ 5 × 25) to remove the fan motor.*1 (See Photo 3-3)

Note 1: When attaching the fan motor, make sure to route the cable through the hook below the fan motor and fix firmly with the clamp.
Note 2: Tighten the propeller fan with a torque of 5.7 ± 0.3 N·m.

PHOTOS/FIGURES

Photo 3-1

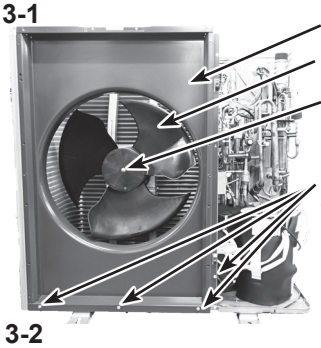


Photo 3-2

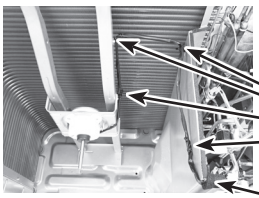
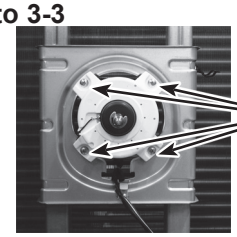


Photo 3-3



4. Disassembling the electrical parts box

(1) Remove the electrical parts box. (See Photo 2-1, 2-2, 2-4, 2-5)

[Power Board]

(2) Remove the top cover fixing screws (8 for top/ 5×12), then remove the top cover of the electrical parts box. (See Photo 2-4, 4-1)
(3) Disconnect all the connectors on the power circuit board. (See Photo 4-3)
(4) Remove the power board fixing screws (5 for front/ 3×12), then remove the mold casing of the power board. (See Photo 4-4)
(5) Remove the IPM fixing screws (4 for front/ 3×12, 2 for front/ 4×12). (See Photo 4-4)
(6) Slide the power circuit board to remove it.

[THERMISTOR (HEAT SINK)]

(7) Remove the thermistor <Heat sink> (TH8) fixing screw (1 for front/ 3 × 12) to remove the thermistor <Heat sink>(TH8).(See Photo 4-5)

[COMP PROTECTOR BOARD]

(8) Disconnect all the connectors on the comp protector board. (See Photo 4-6)
(9) To remove the comp protector board, release it from the support.

[Fuse]

(10) To remove the fuse, release it from the fuse holder. (See Photo 4-6)

[Contactor]

(11) Remove the contactor fixing screw (1 for front/ 4×16). (See Photo 4-7)
(12) Remove the three covers and lead wire fixing screws, then release the lead wires from the contactor. (See Photo 4-7, 4-8)

[Run Capacitor]

(13) Disconnect all the connectors of the run capacitor.
(14) Remove the run capacitor fixing screw (1 for front/ 4×10). (See Photo 4-9)
(15) To remove the run capacitor, release it from the band.

[Control Circuit Board]

(16) Disconnect the all lead wires from the clamps and the all connectors on the controller circuit board. (See Photo 4-10)
(17) To remove the circuit board, release it from the support.

Photo 4-1

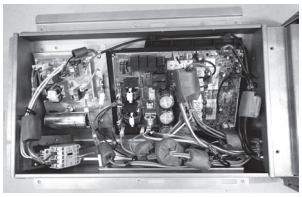


Photo 4-2

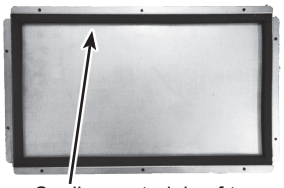


Photo 4-3

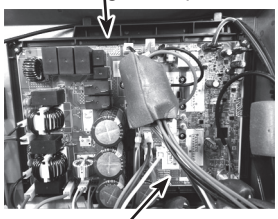


Photo 4-4

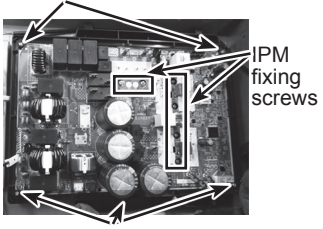


Photo 4-5

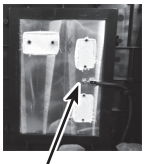
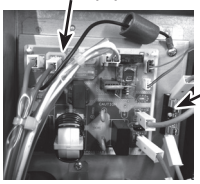


Photo 4-6



Continued to the next page.

OPERATING PROCEDURE

[TERMINAL BLOCK]

(19) Remove the lead wire L/N, Earth, CNS on the terminal block. (See Photo 4-11)

(20) Remove the terminal block fixing screw. (See Photo 4-11)

[REACTOR]

(21) Disconnect the lead wire L/N, CNDC, CNAC from edge cover. (Photo 4-12)

(22) Remove the insulation from the electrical box. (See Photo 4-13)

(23) Remove the screws on the electrical box (4 for right/ 4×10), then slide the plate upward to remove it. (See Photo 4-14, 4-15)

(24) Remove the all connectors of the reactor. (See Photo 4-16)

(25) Remove the reactor fixing screws (4 for right/ 4×10). (See Photo 4-16)

Note 1: When reassembling the electrical parts box, make sure the wirings are correct.

Note 2: When reassembling the electrical parts box, make sure whether the sealing materials of top cover degraded or are damaged. If the sealing materials degraded or are damaged, replace it with a new one. (See photo 4-2)

PHOTOS/FIGURES

Photo 4-7

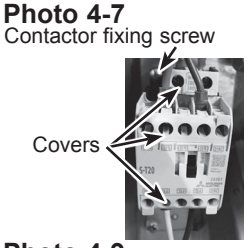


Photo 4-8

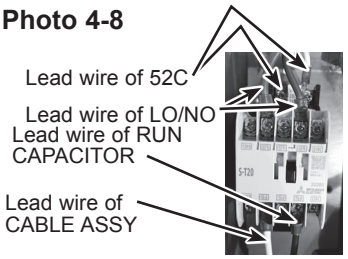


Photo 4-9

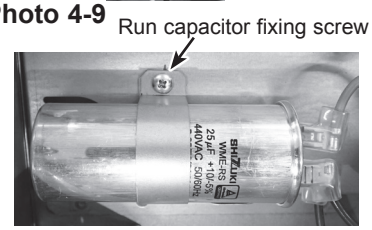


Photo 4-10

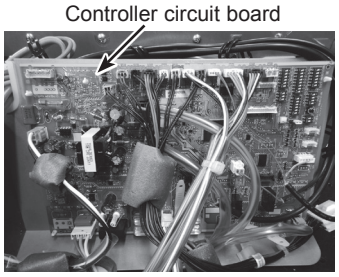


Photo 4-11

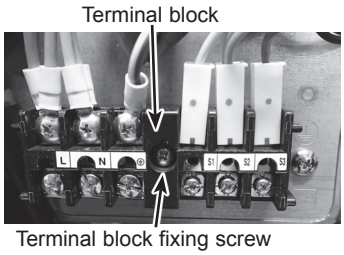


Photo 4-12

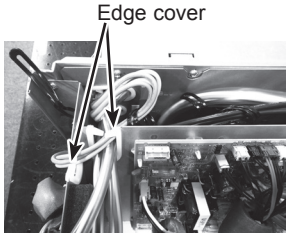


Photo 4-13

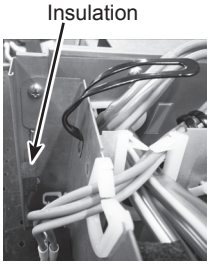


Photo 4-14

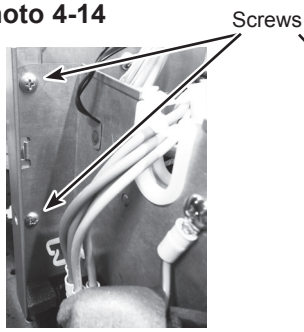


Photo 4-15

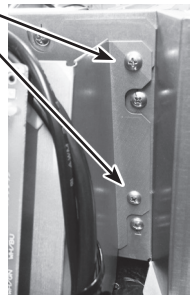
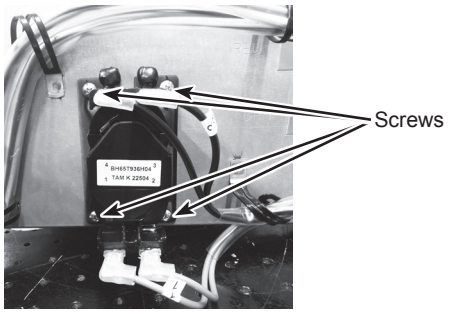


Photo 4-16



5. Removing the side panel (R)

(1) Remove the service panel. (See Photo 1-1)

(2) Remove the top panel. (See Photo 1-1)

(3) Remove the cover panel. (See Photo 1-1)

(4) Remove the inlet and outlet water pipe.*1 (See Photo 5-1)

(5) Remove the side panel (R) fixing screws (2 for front, 1 for right side, 2 for rear/ 5 ×12), then slide the cover panel forward to remove it. (See Photo 5-1, 5-2)

***1 Drain the water in outdoor unit before removing the water piping.**

Photo 5-1

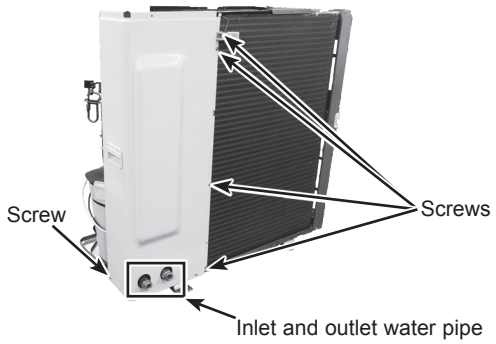
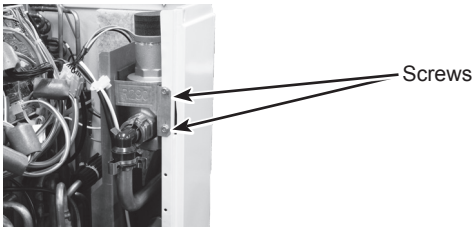


Photo 5-2



OPERATING PROCEDURE

6. Removing the thermistors

(1) Remove the service panel and cover panel. (See Photo 1-1)
(2) Remove the side panel (R). (See Photo 5-1, 5-2)
(3) Remove the lid of the soundproof cover.*1 (See Photo 6-1)
(4) Remove the thermistors.*2 (See Photo 6-2, 6-3, 6-4)
- Thermistor <Liquid> (TH3)
- Thermistor <Discharge> (TH4)
- Thermistor <Ambient/ 2-Phase pipe> (TH7/6)
- Thermistor <Comp. Surface> (TH33)
- Thermistor <Plate Hex Liquid> (TH34)
- Thermistor <Fix Suction Pipe> (TH35)
- Thermistor <Fix Liquid> (TH32)

(5) Remove the cable traps. (See Photo 6-5)
(6) Remove the relay connector. (See Photo 2-2)

Note 1: When replacing the soundproof lid, fit the lid to the wrapped cover without making a gap.
Note 2: All thermistors must be replaced at the same time as they are combined by the relay connector.

PHOTOS/FIGURES

Photo 6-1

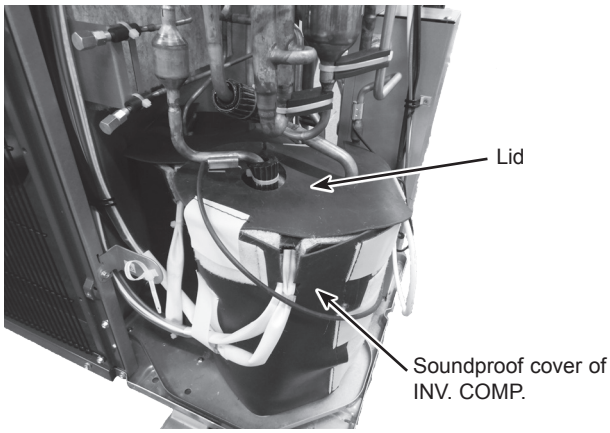


Photo 6-2

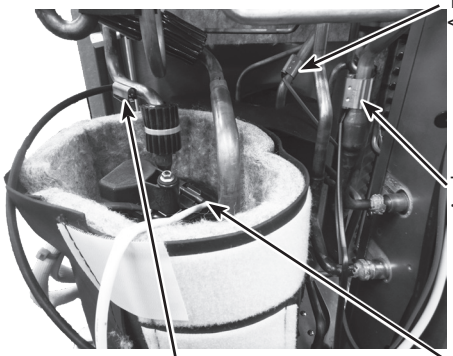


Photo 6-3

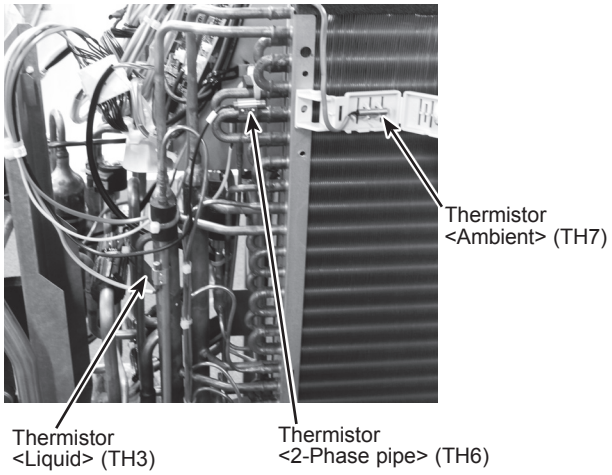


Photo 6-4

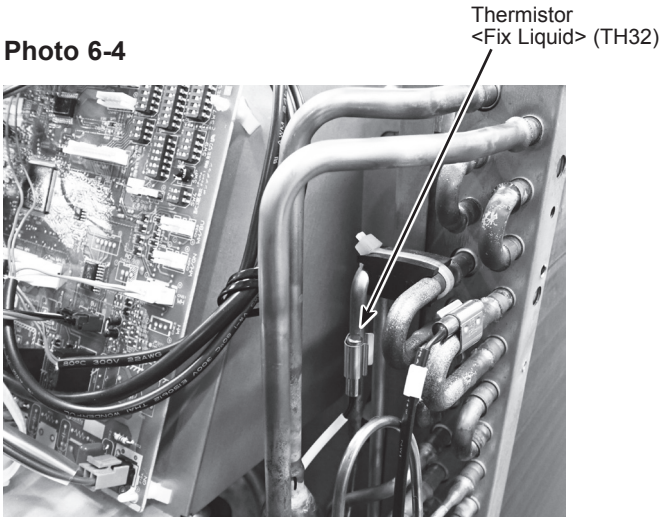
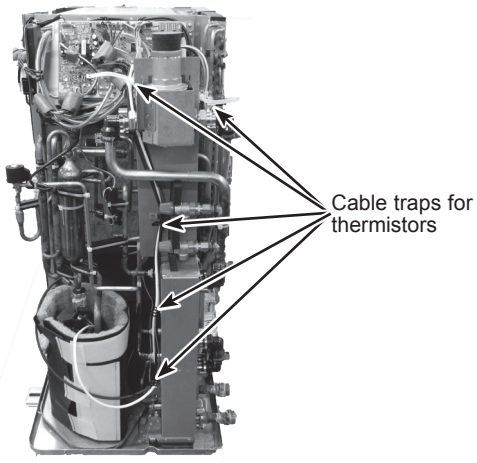
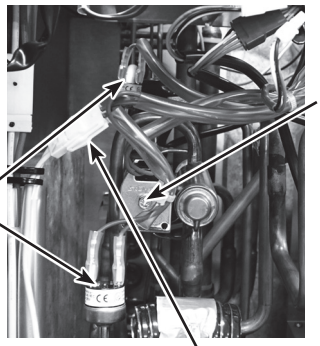
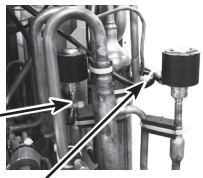
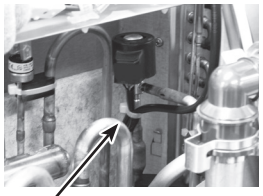
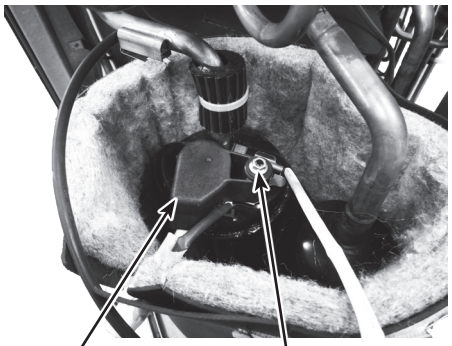
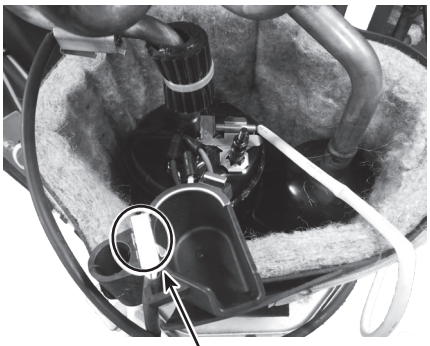


Photo 6-5



OPERATING PROCEDURE	PHOTOS/FIGURES
7. Removing the 4-way valve coil with wiring of H.P. Switch, LEV coil(LEV-A, LEV-B, LEV-C) and Thermal protector (1) Remove the service panel. (See Photo 1-1) **[Removing the 4-way coil with wiring of H.P. Switch]** (2) Remove the 4-way valve coil fixing screw (1 for front/ M5) to remove the 4-way valve coil. (See Photo 7-1) (3) Slide the 4-way valve coil forward to remove it. (4) Disconnect the wiring of H.P. SWITCH (63H and 63L). (See Photo 7-1) (5) Remove the two relay connectors (for thermal protector, for the set of 4-way valve coil and two high pressure switches). (See Photo 2-2, 7-1) **[Removing the LEV coil]** (2) Remove the band of LEV coil. (See Photo 7-2, 7-3) (3-1) Remove the relay connector of LEV coil. (In case of LEV-A, LEV-B) (See Photo 2-2) (3-2) Remove the connector of LEV coil on the circuit board. (In case of LEV-C) **[Removing the thermal protector]** (2) Remove the relay connector of thermal protector. (See Photo 7-1) (3) Loosen the two clamps for the lead wire of the thermal protector. (See Photo 2-3) (4) Remove the lid of the soundproof cover. *1 (See Photo 6-1) (5) Remove the nut of terminal cover, then open the terminal cover. (See Photo 7-4) (6) Remove the thermal protector. (See Photo 7-5) ***1 When replacing the soundproof lid, fit the lid to the wrapped cover without making a gap.**	**Photo 7-1**  **Photo 7-2**  **Photo 7-3**  **Photo 7-4**  **Photo 7-5** 

OPERATING PROCEDURE

8. Removing the 4-way valve, LEV (LEV-A, LEV-B, LEV-C) and high pressure switch and pressure sensor

Note:

Be sure to perform the work in compliance with Section 2 "Safety precaution" of this manual and check the following.

- **The power-supply breaker of the appliance is turned off.**
- **There is no refrigerant leak from the unit.**
- **There is no ignition sources in work area.**
- **The work area is provided adequate space and ventilation.**

(1) Remove the inlet and outlet water pipe. *1 (See Photo 5-1)
(2) Remove the service panel, top panel and cover panel. (See Photo 1-1)
(3) Recover refrigerant from two refrigerant circuit (INV and FIXED) in accordance with the following procedure. *2
• Remove the refrigerant
• Purge the circuit with inert gas for 5 min
• Evacuate down the refrigerant circuit to a pressure of 30 kPa absolute or lower
• Purge again with inert gas for 5 min
(4) Remove the side panel (R). (See Photo 5-1, 5-2)

[Removing the 4-way valve]

(5) Remove the 4-way valve coil. (See Photo 7-1)
(6) Cutting the pipe inside the welded part of 4-way valve (4 positions) to remove the 4-way valve. *3 (See Photo 8-1)
(7) Remove the remaining pipe welded part of 4-way valve (4 positions).

[Removing the LEV]

(5) Remove the LEV coil. (See Photo 7-2, 7-3)
(6) Remove the LEV fixed to the pipe with a band and rubber mount. (See Photo 7-2, 7-3)
(7) Cutting the pipe inside the welded part of LEV (2 positions) to remove the LEV. *3 (See Photo 8-3)
(8) Remove the remaining pipes welded part of the LEV. (See Photo 8-3)

[Removing the high pressure switch]

(5) Disconnect the lead wire from the high pressure switch. (See Photo 7-1)
(6) Remove the high pressure switch fixed to the pipe with a band, rubber mount and rubber tube. (See Photo 8-4)
(7) Cutting the pipe inside the welded part of high pressure switch (1 position) to remove high pressure switch. *3 (See Photo 8-5)
(8) Remove the remaining pipe welded part of the high pressure switch. (See Photo 8-5)

[Removing the pressure sensor]

(5) Disconnect the relay connector of pressure sensor. (See Photo 2-2)
(6) Remove the pressure sensor fixed to the pipe with a band, rubber mount and rubber tube. (See Photo 8-6)
(7) Cutting the pipe inside the welded part of pressure sensor (1 position) to remove the pressure sensor. *3 (See Photo 8-7)
(8) Remove the remaining pipe welded part of the pressure sensor. (See Photo 8-7)

***1 Drain the water in outdoor unit before removing the water piping.**

***2 Work on the refrigerant circuit with flammable refrigerant in safety group A3 may only be carried out by authorised heating contractors. These heating contractors must be trained in accordance with EN 378 Part 4 or IEC 60335-2-40 Annex HH.**

***3 Be sure to remove parts to be replaced by cutting with pipe cutter, NOT by flame nor by electric saw, etc.**

***4 When installing the following parts, cover it with a wet cloth to prevent it from heating as the temperature below, then braze the pipes so that the inside of pipes are not oxidized:**

- **4-way valve; 120°C or more**
- **LEV; 120°C or more**
- **High pressure switch; 100°C or more**
- **Pressure sensor; 100°C or more**

PHOTOS/FIGURES

Photo 8-1

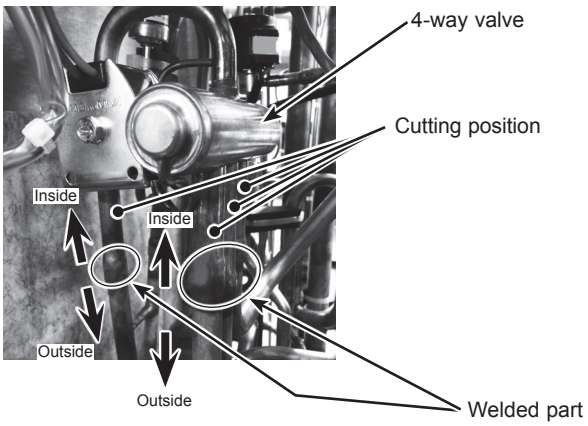


Photo 8-2

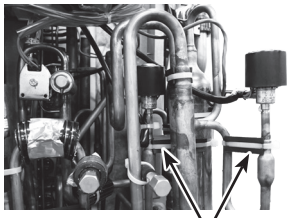


Photo 8-3

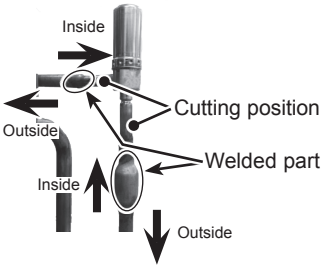


Photo 8-4

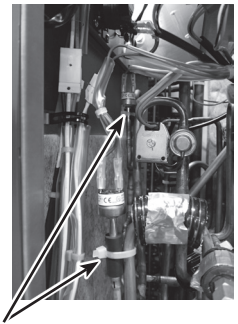


Photo 8-5

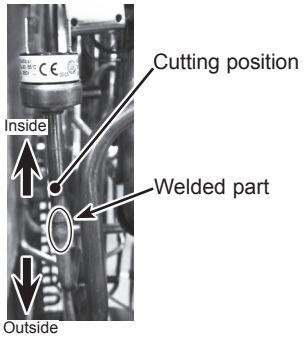


Photo 8-6

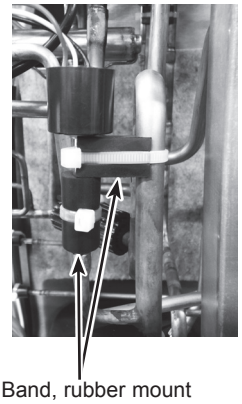
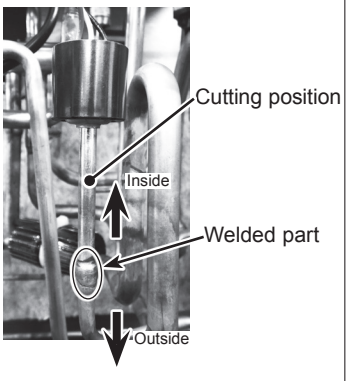


Photo 8-7



OPERATING PROCEDURE

9. Removing the compressor (MC)

Note:

Be sure to perform the work in compliance with Section 2 "Safety precaution" of this manual and check the following.

- **The power-supply breaker of the appliance is turned off.**
- **There is no refrigerant leak from the unit.**
- **There is no ignition sources in work area.**
- **The work area is provided adequate space and ventilation.**

(1) Remove the inlet and outlet water pipe. *1 (See Photo 5-1)

(2) Remove the service panel, top panel and cover panel. (See Photo 1-1)

(3) Recover refrigerant from two refrigerant circuit (INV and FIXED) in accordance with the following procedure. *2
- Remove the refrigerant
- Purge the circuit with inert gas for 5 min
- Evacuate down the refrigerant circuit to a pressure of 30 kPa absolute or lower
- Purge again with inert gas for 5 min

(4) Remove the side panel (R). (See Photo 5-1, 5-2)

[In case of INV. COMP]

(5) Remove the soundproof cover and lid. *4 (See Photo 6-1)

(6) Remove the two thermistors <Discharge> (TH4), <Comp. Surface> (TH33). (See Photo 6-2)

(7) Remove the terminal cover and thermal protector. (See Photo 7-4,7-5)

(8) Remove the lead wire for compressor. *6 (See Photo 9-1)

(9) Remove the damper of discharge pipe. (See Photo 9-1)

(10) Remove the 3 points of the compressor fixing nut using a spanner or an adjustable wrench. *5 (See Photo 9-1)

(11) Cutting the pipes inside the welded part of the compressor (2 positions) to remove the compressor. *3 (See Photo 9-2)

(12) Remove the remaining pipe welded part of the compressor. (See Photo 9-2)

[In case of FIXED. COMP]

(5) Remove the fixing screw (1 for right / 5×12) to remove the metal plate for the cable traps. (See Photo 9-3)

(6) Remove the soundproof cover and lid. *4 (See Photo 9-4)

(7) Remove the thermistor <Fix Suction Pipe> (TH35). (See Photo 6-2)

(8) Remove the nut of terminal cover, then open the terminal cover. (See Photo 9-5)

(9) Remove the lead wire for compressor. *6 (See Photo 9-6)

(10) Remove the 3 points of the compressor fixing nut using a spanner or an adjustable wrench. *5 (See Photo 9-6)

(11) Cutting the pipes inside the welded part of the compressor (2 positions) to remove the compressor. *3 (See Photo 9-7)

(12) Remove the remaining pipe welded part of the compressor. (See Photo 9-7)

***1 Drain the water in outdoor unit before removing the water piping.**

***2 Work on the refrigerant circuit with flammable refrigerant in safety group A3 may only be carried out by authorised heating contractors. These heating contractors must be trained in accordance with EN 378 Part 4 or IEC 60335-2-40 Annex HH.**

***3 Be sure to remove parts to be replaced by cutting with pipe cutter, NOT by flame nor by electric saw, etc.**

***4 When replacing the soundproof lid, fit the lid to the wrapped cover without making a gap.**

***5 Tighten the nuts of compressor with a torque of 4 ± 0.4 N·m.**

***6 Be careful not to mistake the lead wires for "INV.COMP." and "FIEXD. COMP.".**
-The color of the read wire tube for INV.COMP.: Transparent
-The color of the read wire tube for FIXED.COMP.: Black

PHOTOS/FIGURES

Photo 9-1

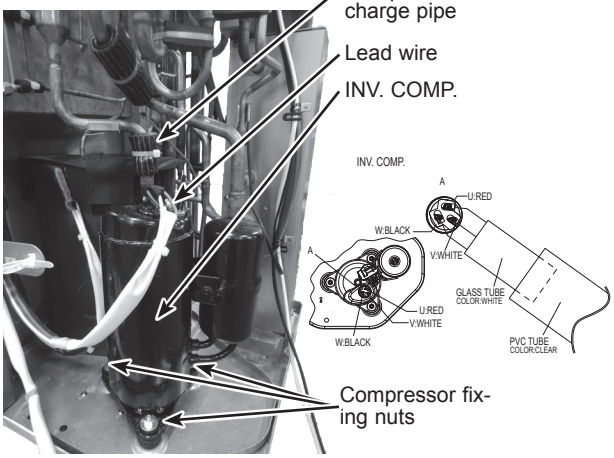


Photo 9-2

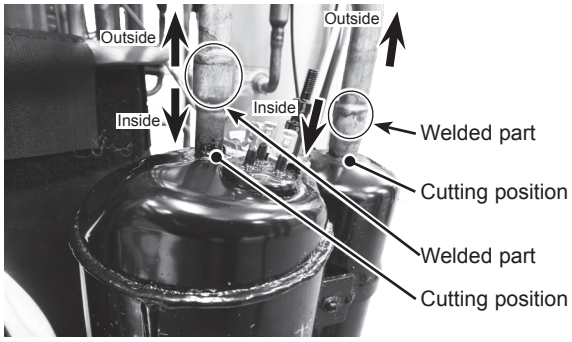


Photo 9-3

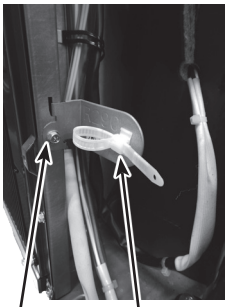


Photo 9-4

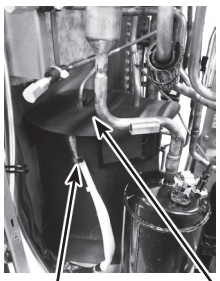


Photo 9-5

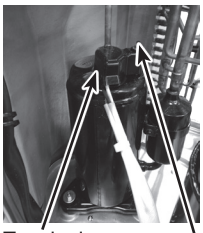


Photo 9-6

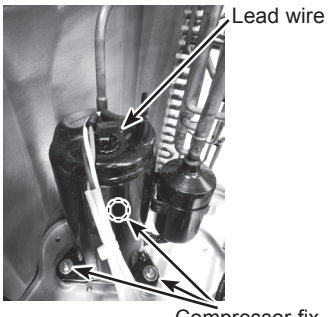
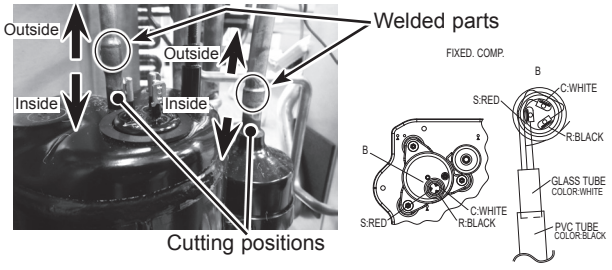
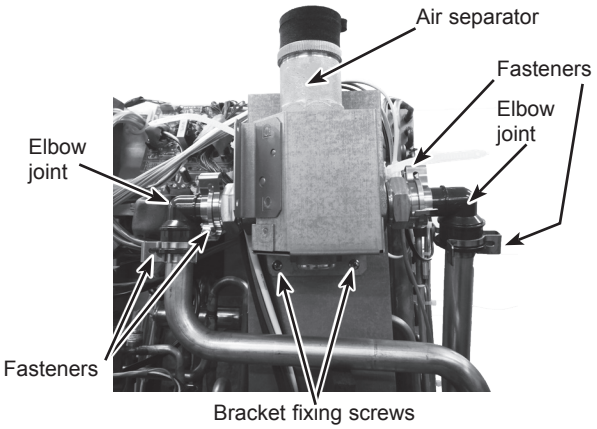
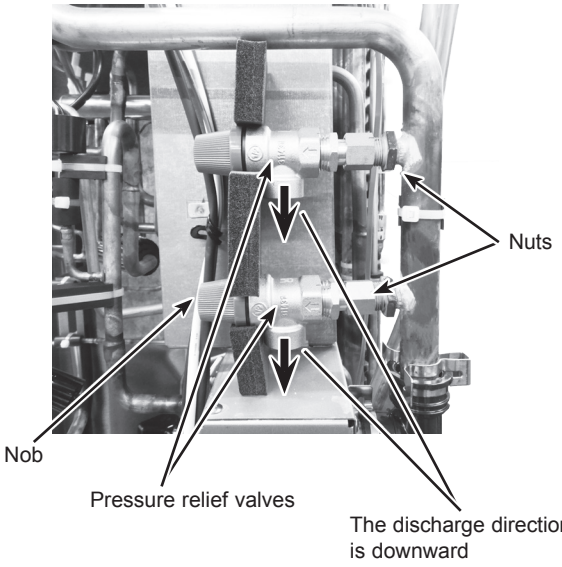


Photo 9-7



OPERATING PROCEDURE	PHOTOS/FIGURES
10. Removing the air separator (1) Remove the inlet and outlet water pipe.*1 (See Photo 5-1) (2) Remove the service panel, top panel and cover panel. (See Photo 1-1) (3) Remove the side panel R. (See Photo 5-1, 5-2) (4) Remove the fasteners of the air separator. *2 (See Photo 10) (5) Remove the bracket fixing screws (2 for right/ 4×10) (See Photo 10) (6) Slide the Air separator and bracket upward to remove the air separator. (7) Remove the fastener and elbow joints. *2 (See Photo 10) ***1 Drain water in the outdoor unit before removing the water piping.** ***2 When reinstalling the fastener, use a new O-ring.**	**Photo 10** 
11. Removing the pressure relief valve (1) Remove the inlet and outlet water pipe. *1 (See Photo 5-1) (2) Remove the service panel, top panel and cover panel. (See Photo 1-1) (3) Remove the side panel (R). (See Photo 5-1, 5-2) (4) Loosen the nut of the pressure relief valve by a spanner (flat across width: 19mm). (See Photo 11) (5) Remove the pressure relief valve and the gasket. *2 *3 *4 (See Photo 11) ***1 Drain water in the outdoor unit before removing the water piping.** ***2 The water may spout if the pressure relief valve is removed while the water is still inside the plate heat exchanger.** ***3 Tightening torque of the nut: 15 ± 1 N.m.** ***4 When reinstalling the G3/8" nut, use a new G3/8"gasket.** ***5 When reinstalling the PRV, be sure to install the discharge direction of the PRV downward. (See photo 11)** **If it is installed in the wrong direction, there is a risk of an explosion due to the refrigerant and water splashing onto the electrical equipment.**	**Photo 11** 

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