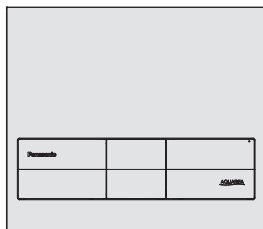


Service Manual

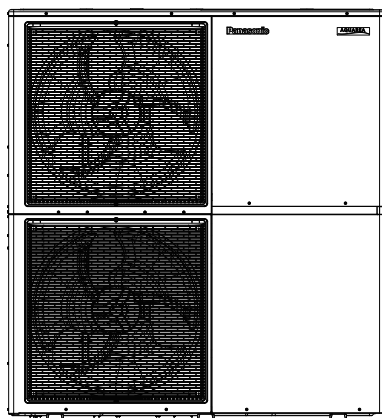
Air-to-Water Heatpump



Indoor Unit
WH-CME8L

Outdoor Unit
WH-WXG20ME8
WH-WXG25ME8
WH-WXG30ME8

Destination
Europe



WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the products dealt with in this service information by anyone else could result in serious injury or death.

IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are marked by  in the Schematic Diagrams, Circuit Board Diagrams, Exploded Views and Replacement Parts List. It is essential that these critical parts should be replaced with manufacturer's specified parts to prevent shock, fire or other hazards. Do not modify the original design without permission of manufacturer.

PRECAUTION OF LOW TEMPERATURE

In order to avoid frostbite, be assured of no refrigerant leakage during the installation or repairing of refrigerant circuit.

CAUTION

R290 REFRIGERANT

This AIR-TO-WATER HEATPUMP contains and operates with refrigerant R290.
THIS PRODUCT MUST ONLY BE INSTALLED OR SERVICED BY QUALIFIED PERSONNEL
Refer to National, State, Territory and local legislation, regulations, codes, installation & operation manuals,
before the installation, maintenance and/or service of this product.

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1. Safety Precautions

- Read the following “SAFETY PRECAUTIONS” carefully before installation of Air-To-Water Heat Pump Indoor Unit.
- This AIR-TO-WATER HEAT PUMP INDOOR UNIT operates in combination with an outdoor unit containing refrigerant R290. This product and the outdoor unit must only be installed or serviced by qualified personnel. Refer to National, State, Territory and local legislation, regulations, codes, installation & operation manuals, before the installation, maintenance and/or service of these products.
- Electrical works and water installation works must be done by licensed electrician and licensed water system installer respectively. Be sure to use the correct rating and main circuit for the model to be installed.
- The caution items stated here must be followed because these important contents are related to safety. The meaning of each indication used is as below. Incorrect installation due to ignorance or negligence of the instructions may cause harm or damage, and the seriousness is classified by the following indications.

 WARNING	This indication shows the possibility of causing death or serious injury.
 CAUTION	This indication shows the possibility of causing injury or damage to properties only.

The items to be followed are classified by the symbols:

	Symbols with white background indicate prohibited items.
	Symbols with dark background must be executed.

- Carry out test run to confirm that no abnormality occurs after the installation. Then explain to the user how to operate, care and maintain the product as described in the operating instructions.
- This installation manual should be handed over with the unit after installation.
- Please remind the customer to keep the installation manual for future reference.
- If there is any doubt about the installation procedure or operation, always contact the authorized dealer for advice and information.

 WARNING		
1.	Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer. Any unfit method or using incompatible material may cause product damage, burst or serious injury.	
2.	Do not install outdoor unit near balcony railings. If the outdoor unit is installed on the balcony of a high-rise building, small children may climb onto the outdoor unit and climb over the railing, which may lead to an accident.	
3.	Do not use unspecified, modified, jointed or extension cable for power supply cable. Do not share the single outlet with other electrical appliances. Poor contact, poor insulation or over current may cause electrical shock or fire.	
4.	Do not use unspecified cable or joint cable for power supply cable. Do not share the single outlet with other electrical appliances. Poor contact, poor insulation or over current will cause electrical shock or fire.	
5.	Do not tie up the power supply cable into a bundle by band. Abnormal temperature rise on power supply cable may happen.	
6.	Do not insert your fingers or other objects into the unit, high speed rotating fan may cause injury. 	
7.	Do not sit on or step on the unit, you may fall down accidentally. 	
8.	Do not purchase unauthorized electrical parts for installation, service, maintenance and etc.. They might cause electrical shock or fire.	
9.	Do not modify wires of Outdoor Unit for installation of other components (such as heaters). Overloading of wires or wire connection points may cause electrical shock or fire.	
10.	Do not pierce or burn as the appliance is pressurized. Do not expose the appliance to heat, flame, sparks, or other sources of ignition. Else, it may explode and cause injury or death.	
11.	Do not pierce or burn as the appliance is pressurized. Do not expose the appliance to heat above 360°C, flame, sparks, or other sources of ignition. Else, it may explode and cause injury or death.	
12.	Do not add or replace refrigerant other than specified type. It may cause product damage, burst and injury etc.	
13.	Do not place containers of liquid on top of the indoor unit. Leakage or spillage of liquid into the indoor unit may cause damage to the indoor unit or cause a fire.	
14.	Do not install the indoor unit where flammable gases may leak. If gas leaks and accumulates around the unit, it may cause a fire.	
15.	Keep plastic bag (packaging material) away from small children, it may cling to nose and mouth and prevent breathing. (Outdoor unit only)	
16.	Keep plastic bag (packaging material) away from small children, it may cling to nose and mouth and prevent breathing. (Indoor unit only)	

 WARNING		
17.	Do not use joint cable for outdoor connection cable. For outdoor connections, use the specified outdoor connection cable. Refer to instruction "11.4.6 Connect to the cable to the outdoor unit" and connect tightly. Clamp the cable so that no external force will be acted on the terminal. If connection or fixing is not perfect, it will cause heat up or fire at the connection.	
18.	Use the specified connection cables for the indoor unit and outdoor unit, and connect the indoor unit and outdoor unit securely, referring to "11.1.3 Connect the Cable to the Indoor Unit" . Tighten the cable so that no external force is applied to the terminal. Incomplete connection or fixing may cause heat generation or ignition of the connection.	
19.	For electrical work, follow the national regulation, legislation and this installation manual. An independent circuit and single outlet must be used. If electrical circuit capacity is not enough or defect found in the electrical work, it may cause electrical shock or fire.	
20.	For electrical work, follow local wiring standards and regulations and this installation instructions. An independent circuit and single outlet must be used. If electrical circuit capacity is not enough or defect found in the electrical work, it will cause electrical shock or fire.	
21.	For water circuit installation work, follow to relevant European and national regulations (including EN61770) and local plumbing and building regulation codes.	
22.	Engage authorized dealer or specialist for installation. If installation done by the user is incorrect, it will cause electrical shock or fire.	
23.	Engage authorized dealer or specialist for installation. If installation done by the user is incorrect, it will cause water leakage, electrical shock or fire.	
24.	• The refrigerant cycle is completed inside the outdoor unit. • No refrigerant pipework is required. • Also, no pump-down operation is required.	
25.	For installation of refrigeration system, strictly follow this installation procedures. Incorrect installation may cause water leakage, which may lead to electrical shock or fire.	
26.	Install at a strong and firm location which is able to withstand weight of the set. If the strength is not enough or installation is not properly done, the set will drop and cause injury.	
27.	Comply with national wiring rules or country-specific safety measures in terms of residual current (Installing Residual Current Device (RCD) is strongly recommended).	
28.	This outdoorunit must be installed with Residual Current Device(RCD) on power-line(grid) according to the respective national wiring rules or country-specific safety measures in terms of residual current.	
29.	Wiring must be properly routed to ensure that the control board cover is correctly secured. If the control board cover is not fully secured, it will cause fire or electrical shock.	
30.	After installation is complete, make sure that there is no refrigerant gas leak. There is a risk of fire or explosion if the refrigerant contacts fire.	
31.	If refrigerant gas leaks during operation, ventilate the room. Extinguish all sources of fire, if any. If the refrigerant contacts fire, there is a possibility of fire / explosion.	
32.	Only use supplied or specified parts for installation. Other parts may cause the equipment to drop, vibrate, leak, catch fire or cause an electrical shock.	
33.	Only use the supplied or specified installation parts. Else, it may cause unit vibrate, fall, water leakage, electrical shock, or fire.	
34.	If there is any doubt about the installation procedure or operation, always contact the authorized dealer for advice and information.	
35.	When installing electrical equipment at wooden building of metal lath or wire lath, in accordance with electrical facility standard, no electrical contact between equipment and building is allowed. Insulator must be installed in between.	
36.	Any work carried out on the Indoor Unit after removing any panels which is secured by screws, must be carried out under the supervision of authorized dealer and licensed installation contractor.	
37.	Any work carried out on the outdoor unit after removing any panels which is secured by screws, must be carried out under the supervision of authorized dealer and licensed installation contractor.	
38.	All power circuits must be disconnected before accessing the unit terminals.	
39.	This installation may be subjected to building regulation approval applicable to respective country that may require to notify the local authority before installation.	
40.	Be aware that R290 Refrigerant is odourless and flammable.	
41.	Ensure that all wiring polarity is correct. Otherwise, this may cause electrical shock or fire.	
42.	This equipment must be properly earthed. Earth line must not be connected to gas pipe, water pipe, earth of lightning rod and telephone. Otherwise, it may cause electrical shock in case of equipment breakdown or insulation breakdown.	
43.	This equipment must be properly earthed. Electrical earth must not be connected to gas pipe, water pipe, earth of lightning rod and telephone. Otherwise, it may cause electrical shock in case of insulation breakdown or earth fault of the outdoor unit.	

**CAUTION**

 CAUTION								
1.	Do not install the outdoor unit at place where leakage of flammable gas may occur. In case gas leaks and accumulates at surrounding of the unit, it may cause fire.							
2.	Do not release refrigerant while repairing refrigeration components. Be careful of liquid refrigerants as it can cause frostbite.							
3.	Do not install in humid areas such as laundry rooms. This may cause rust and damage to the unit.							
4.	Make sure the insulation of power supply cable does not contact hot part (i.e. refrigerant piping) to prevent from insulation failure (melt).							
5.	Do not touch the sharp aluminium fins. Sharp edges may cause injury. 							
6.	Do not apply excessive force to the water pipes as this may damage them. Water leaks may cause flooding and damage to other property.							
7.	Prevent liquid or vapour from entering sumps or sewers since vapour is heavier than air and may form suffocating atmospheres.							
8.	Ensure that the insulation of the power cable does not come into contact with hot areas (e.g. water pipes) to prevent insulation failure (melting) of the power cable.							
9.	Select an installation location which is easy for maintenance. Incorrect installation, service or repair of this Indoor Unit may result in loss damage or injury and/or property.							
10.	Select an installation location which is easy for maintenance. Incorrect installation, service or repair of this outdoor unit may increase the risk of rupture and this may result in loss, damage or injury and/or property.							
11.	Connection of power supply to the Indoor Unit • Power supply point should be in easily accessible place for power disconnection in case of emergency. • Comply with local national wiring standard, regulation, and this installation manual. • It should be to make permanent connection to circuit breaker. - Power supply: use an approved 4-poles circuit breaker with a minimum contact gap of 3.0 mm. Its rated current depends on the capacity of external heater. Refer to below table. <table><tr><th>EXTERNAL HEATER Capacity a [kW]</th><th>Breaker rated current</th></tr><tr><td>a ≤ 9kW</td><td>20 A</td></tr><tr><td>9kW < a ≤ 18kW</td><td>40 A</td></tr></table>	EXTERNAL HEATER Capacity a [kW]	Breaker rated current	a ≤ 9kW	20 A	9kW < a ≤ 18kW	40 A	
EXTERNAL HEATER Capacity a [kW]	Breaker rated current							
a ≤ 9kW	20 A							
9kW < a ≤ 18kW	40 A							
12.	Connection of power supply to the Outdoor Unit • It should be to make permanent connection to circuit breaker. -Power supply : use an approved 4-poles circuit breaker with a minimum contact gap of 3.0mm. Its rated current is 50A.							
13.	Ensure the correct polarity is maintained throughout all wiring. Otherwise, it will cause electrical shock or fire.							
	Installation work.							
14.	It may need two or more people to carry out the installation work. The weight of outdoor unit might cause injury if carried by one person.							
15.	Ensure that the required ventilation openings are free from obstacles.							
16.	Water piping in the occupied space should be installed in such a way as to prevent accidental damage during operation and service.							
17.	Be careful not to subject the water piping to excessive vibration or pulsation.							
18.	Protect water piping from accidental burst that may be caused by moving furniture or rebuilding activities.							
19.	• The water piping should be routed to the shortest possible length. Avoid using dented pipes and avoid sharp bending. • It must be ensured that water piping is protected from physical damage.							

2. Precautions for Use of R290 Refrigerant

- Pay close attention to the following points:

 WARNING		
1.	Mixing different types of refrigerants in the system is prohibited.	
2.	Do not place any part of the refrigeration circuit (evaporator, air cooler, AHU, condenser, or liquid receiver) or pipework near heat source, naked flame, or gas appliance or electric heater in operation.	
3.	Operation, maintenance, repair and recovery of refrigerants must be carried out by personnel trained and certified in the use of flammable refrigerants and in accordance with the manufacturer's recommendations. Personnel who operate, service or maintain the relevant parts of the system or equipment must be trained and certified.	
4.	The user, owner or their authorised representative shall, where required by national regulations, regularly check alarms, mechanical ventilation, and detectors at least once a year to ensure they are functioning correctly.	
5.	A logbook shall be maintained. The results of these checks shall be recorded in the logbook.	
6.	In case of occupied space ventilation, it must be ensured that there are no obstacles.	
7.	Before operating a new refrigeration system, the person responsible for operating the system must ensure that trained and certified operators are instructed in the construction, supervision, operation and maintenance of the refrigeration system, as well as the safety measures to be observed and the properties and handling of the refrigerants used in accordance with the operating manual.	
8.	The general requirements for trained and certified personnel are as follows: a) Knowledge of legislation, regulations and standards relating to flammable refrigerants. b) Detailed knowledge and skills in handling flammable refrigerants, personal protective equipment, refrigerant leak prevention, cylinder handling, charging, leak detection, recovery, and disposal. c) Able to understand and apply in practice the requirements of national laws, regulations and standards. d) Continuously undergoing regular and further training to maintain the expertise.	
9.	Ensure that protective devices, refrigeration circuits and accessories are adequately protected against adverse environmental effects (e.g. risk of water freezing in the relief pipe or accumulation of dirt and debris).	



CAUTION

Installation

1.
 - Must comply with national gas regulations, state and local laws and regulations. Notify the relevant authorities in accordance with all applicable regulations.
 - It must be ensured that the mechanical connections are accessible for maintenance.
 - If mechanical ventilation is required, the ventilation openings must be kept free from obstacles.
 - For disposal of the product, follow the precautions in #12 and comply with national regulations.
 - Always contact your local municipal office for appropriate handling.



Servicing

2-1. Service personnel

- Qualified personnel engaged in work or entry into refrigerant circuits must have a valid qualification from an industry recognised assessment body. This assessment body certifies the ability to safely handle refrigerants according to the industry-accepted assessment specifications.
- Maintenance should only be carried out in accordance with the equipment manufacturer's recommendations. Maintenance and repairs requiring the assistance of other skilled persons shall be carried out under the supervision of persons competent in the use of flammable refrigerants.
- Maintenance should only be carried out in accordance with the manufacturer's recommendations.
- The system is inspected, regularly supervised, and maintained by trained and certified service personnel employed by the user or responsible party.
- Make sure that the charged refrigerant do not leak.

2-2. Work procedures

- As the system contains flammable refrigerant, a safety inspection is required before commencing work on the system to ensure that the risk of ignition has been minimised. When repairing refrigeration unit, follow the precautions in 2-2 through 2-8.
- To minimise the risk of flammable gas or vapour being present during the execution of the work, the work must be carried out under controlled procedures.
- All maintenance and other staff working on site shall be instructed and supervised as to the nature of the work being carried out.
- Avoid working in enclosed spaces. Always keep away from the source, and maintain a safety distance of at least 2 metres or perform zoning of open space areas of at least a 2-metre radius.
- Wear suitable protective equipment, including respiratory protection, depending on the situation.
- Keep ignition sources and hot metal surfaces away.

2-3. Checking for presence of refrigerant

2.
 - The area should be checked with a suitable refrigerant detector before and during the work to ensure that the technician is aware of potential flammable atmosphere.
 - Ensure that the leak detection device used is suitable for use with flammable refrigerants, i.e. that it is not producing sparks, properly sealed or intrinsically safe.
 - If a leak/spill occurs, ventilate the area immediately and stay upwind and away from the leak/spill.
 - In the event of a leak/spill, notify persons downwind of the leak/spill, isolate the imminent danger area and ensure that unauthorised persons do not enter the area.



2-4. Availability of fire extinguishers

- When performing high-temperature work on refrigeration unit or related components, suitable fire extinguishing equipment must be prepared at hand.
- Provide a powder fire extinguisher or CO2 extinguisher near the charging area.

2-5. No ignition sources

- Personnel carrying out work related to refrigeration systems must not use ignition sources in such a way as to create a fire or explosion hazard. Smoking is not allowed when carrying out such work.
- All possible ignition sources, including cigarette smoking, must be kept well away from the site of installation, repair or removal. While performing such works, flammable refrigerants may be released into the surrounding space.
- Before carrying out any work, check the surroundings of the equipment to ensure that there are no flammability and/or ignition hazards.
- "No Smoking" signs must be displayed.

2-6. Well-ventilated areas

- Before work into refrigerant circuit or working with fire, ensure that the area is outdoor or adequately ventilated.
- Some degree of ventilation shall be maintained while the work is being carried out.
- Ventilation must safely disperse the released refrigerant, preferably to the outside atmosphere.

2-7. Checking refrigeration equipment

- In case of change of electrical components, the changed components must be fit for the purpose and to the correct specification.
- Always follow the manufacturer's maintenance and service guidelines.
- If there is any doubt, contact the manufacturer's technical department.
- The following checks must be applied to equipment using flammable refrigerants:
 - Ventilators and exhaust vents are in good working order and free from obstacles.
 - If an indirect refrigeration circuit is used, the presence of refrigerant in the secondary circuit should be checked.
 - Keep equipment markings remain visible and legible. Any illegible signs or markings should be corrected.
 - Refrigeration piping and components are installed in a position where they are less exposed to substances that may corrode the refrigerant, unless the components are made of inherently corrosion-resistant materials or are adequately protected against corrosion.



CAUTION

2-8. Checking electrical equipment

- Repair and maintenance of electrical components must include initial safety checks and component inspection procedures.
 - Initial safety checks must include, but are not limited to:
 - Capacitor has been discharged: This check must be carried out in a safe manner to avoid the possibility of sparks.
 - No live electrical components or wiring are exposed during charging, recovery or purging of the system.
 - Earth connection is continuous.
2.
 - Always follow the manufacturer's maintenance and service guidelines.
 - If there is any doubt, contact the manufacturer's technical department.
 - If a fault exists that could compromise safety, power supply must not be connected to the circuit until the problem has been resolved.
 - If the fault cannot be corrected immediately but the operation needs to continue, a suitable temporary solution should be used.
 - Then, the owner of the equipment must be notified or reported so that all parties are subsequently informed.



Repairing sealed components

- During repair of sealed components, all power supply must be disconnected from the equipment being worked on before removing sealed covers, etc.
 - If it is absolutely necessary to supply power to equipment during servicing, a permanently operating form of leak detection should be located at the most critical points to warn of potentially hazardous situations.
 - Particular attention must be paid to the following points to ensure that work on electrical components does not alter the casing in such a way as to affect the level of protection: These include damaged cables, excessive numbers of connections, terminals that differ from the original specifications, damaged seals and improperly fitted glands.
3.
 - Ensure that the equipment is securely fitted.
 - Ensure that seals and sealing materials have not deteriorated to such an extent that they no longer serve the purpose of preventing the ingress of flammable atmosphere.
 - Replacement parts shall be in accordance with the manufacturer's specifications.



Note: Use of silicone sealant may inhibit the effectiveness of some types of leak detection equipment. Intrinsically safe explosion-proof components do not need to be isolated before work.

Repairing intrinsically safe components

- Do not apply any permanent inductive or capacitive loads to the circuit without ensuring that this will not exceed the permissible voltage and current for the equipment in use.
4.
 - Intrinsically safe components are the only type that can work in the presence of a flammable atmosphere.
 - The test equipment must be at the correct rating.
 - Replace components only with parts specified by the manufacturer. Use of parts not specified by the manufacturer may result in refrigerant leakage and ignition of the refrigerant in the atmosphere.



Cabling

- Ensure that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or other adverse environmental effects.
 - The checks should also take into account the effects of ageing and continuous vibration from sources such as compressors and fans.
- 5.



Detection of flammable refrigerants.

- Under no circumstances should potential ignition sources be used to search for or detect refrigerant leaks.
 - Do not use halide torches (or other detectors that use naked flames).
- 6.



The following leak detection methods are considered acceptable for all refrigerant systems

- No leakage shall be detected if a detection device with a sensitivity of 5 grams or more of refrigerant per year is used under a pressure of at least 0.25 times the maximum permissible pressure (>0.98 MPa, max 3.90 MPa). An example is universal sniffer.
 - Electronic leak detectors can be used to detect flammable refrigerants, but the sensitivity may not be adequate, or may need recalibration.
(Calibration of the detector should be carried out in an area free from refrigerant.)
7.
 - Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used.
 - Leak detection device must be set to a percentage of the LFL of the refrigerant, calibrated to the refrigerant used, and the appropriate percentage of gas (up to 25%) is confirmed.
 - Leak detection fluids are also suitable for use with most refrigerants, including bubble and fluorescent agents. Avoid using detergents containing chlorine, as chlorine may react with refrigerants and corrode copper tubes.
 - If a leak is suspected, all ignition sources must be removed or extinguished.
 - If a refrigerant leak which requires brazing is found, all refrigerant must be recovered from the system.
- To remove the refrigerant, precautions #8 must be followed.





CAUTION

Removal and evacuation

- Conventional procedures shall be used when working into the refrigerant circuit for repair or for any other purpose. However, it is important to follow best practice since flammability is a consideration. The following procedures must be followed:

• Remove refrigerant → • Purge the circuit with inert gas → • Create vacuum → • Purge with inert gas →
 • Open the circuit by cutting.
 Do not use brazing.

8.
 - The charged refrigerant shall be recovered in the correct recovery cylinder.
 - The system must be purged with OFN to secure the appliance safe. (Remarks: OFN = oxygen-free nitrogen, a type of inert gas)
 - This process may need to be repeated several times.
 - Do not use compressed air or oxygen for this task.
 - Purging must be achieved by breaking the vacuum in the system with OFN, continuing to fill until the working pressure is reached, then venting to atmosphere, and finally reducing the pressure to vacuum.
 - This process must be repeated until there is no refrigerant in the system. (until the purge gas concentration detected by the leak detector is below 0.25 LFL) * 0.25 LFL = 0.525 Vol%
 - When the final OFN charge is used, the system must be vented to atmospheric pressure to allow work to be carried out.
 - This operation is absolutely essential when brazing pipes.
 - Ensure that the outlet of the vacuum pump is not near an ignition source and that ventilation is available.



Charging procedures

9.
 - In addition to conventional charging procedures, the following requirements must be followed:
 - When charging equipment is used, ensure that contamination of different refrigerants does not occur.
 - Hoses and lines should be as short as possible to minimise the amount of refrigerant contained in them.
 - Cylinders must be stored in the appropriate position according to instructions.
 - Ensure that the refrigeration system is earthed before charging refrigerant into the system.
 - Label the system, once the charging is complete. (if not yet completed)
 - Extreme care must be taken not to overfill the cooling system.
 - Before refilling the system, a pressure test must be carried out with OFN. (See #8)
 - The system must be leak tested after completion of charging and before commissioning.
 - A follow-up leak test must be carried out before leaving the site.
 - Static build-up may occur while charging and purging refrigerant and it can cause hazardous conditions. To avoid fire and/or explosion, earth the containers and equipment before charging/releasing to dissipate static electricity during transport.



Decommissioning

10.
 - Before carrying out this procedure, it is important that the technician is familiar with the equipment and all its details.
 - It is recommended to recover all refrigerants safely.
 - Reuse of recovered refrigerants is prohibited.
 - It is important that electrical power is available before commencing the work.
 - a) Become familiar with the equipment and its operation.
 - b) Electrically isolate the system.
 - c) Before carrying out the procedure, ensure that:

- If required, mechanical handling equipment can be used for handling refrigerant cylinders.
 - All personal protective equipment and leak detectors are available and used correctly.
 - The recovery process is always supervised by a competent person.
 - Recovery devices and cylinders comply with appropriate standards.
 - d) Make sure that the cylinder is placed on the scale before commencing recovery.
 - e) Start the recovery machine and operate it according to the instructions.
 - f) Do not overfill the cylinder. (No more than 80 % volume liquid charge)
 - g) Do not exceed the maximum working pressure of the cylinder, even temporarily.
 - h) Once the cylinder has been correctly filled and the process completed, ensure that the cylinder and equipment are promptly removed from the site and that all shut-off valves on the equipment are closed.
 - Static build-up may occur while charging and purging refrigerant and it can cause hazardous conditions. To avoid fire and explosion, earth the containers and equipment before charging/releasing to dissipate static electricity during transport.



Labelling

11.
 - The equipment shall be labelled to indicate that it has been decommissioned and empty of refrigerant.
 - Labels shall be dated and signed.
 - Ensure that a label is attached to the equipment indicating that the equipment contains flammable refrigerants.





CAUTION

Recovery

- When removing refrigerant from a system for maintenance or decommissioning, it is recommended to remove all refrigerant safely.
- When transferring refrigerant into cylinders, always use only suitable refrigerant recovery cylinders.
- Ensure that the correct number of cylinders are available to accommodate the total charge of the system.
- All cylinders used are designated for recovered refrigerants and labelled for that refrigerant. (i.e. special cylinders for recovery of refrigerant)
- The cylinder must be equipped with a pressure relief valve and associated shut-off valve in good working order.
- Before recovery is commenced, the recovery cylinder is vented and, if possible, cooled.
- Recovery equipment must have a set of instructions on the equipment at hand, be in good working order and be suitable for the recovery of flammable refrigerants.
- 12. • Ensure that the recovery equipment is not a potential source of ignition and is suitable for the refrigerant being used.
- In addition, a set of calibrated scales must be available and in good working order.
- Hoses must be in good condition with leak-free disconnect couplings.
- Before using the recovery machine, make sure that it is fully operational and properly maintained, and that relevant electrical components are sealed to prevent ignition in the event of a refrigerant release. If there is any doubt, contact the manufacturer.
- The recovered refrigerant should be returned to the refrigerant supplier in a suitable recovery cylinder and the relevant waste transfer note should be prepared.
- Do not mix refrigerants in the recovery unit, especially in the cylinder.
- When removing compressor or compressor oil, ensure that it is exhausted to an acceptable level so that no flammable refrigerant remains in the lubricant.
- The exhaust process must be carried out before the compressor is returned to the supplier.
- To facilitate this process, only electrical heating to the compressor body is used.
- Any draining of oil from the system must be carried out safely.



3. Specifications

3.1 WH-CME8L WH-WXG20ME8

Item		Unit	Outdoor Unit		
Performance Test Condition			EN14511 / EN14825		
Cooling Capacity	Condition (Ambient/Water)		A35W7		
	kW		15.00		
	BTU/h		51200		
Cooling EER	W/W		3.61		
Heating Capacity	Condition (Ambient/Water)		A7W35	A2W35	
	kW		20.00	20.00	
	BTU/h		68200	68200	
Heating COP	W/W		4.80	3.39	
Heating ErP	Low Temperature Application (W35)		Warmer	Average	Colder
	Application	Climate			
	Pdesign	kW	20.0	20.0	20.0
	Tbivalent / TOL	°C	2/2	-10/-10	-15/-22
	SCOP / ns	(W/W) / %	5.37/212	4.36/171	3.07/120
	Annual Consumption	kWh	4973	9483	16056
	Class		A+++	A++	A
	Medium Temperature Application (W55)		Warmer	Average	Colder
	Application	Climate			
	Pdesign	kW	20.0	20.0	20.0
	Tbivalent / TOL	°C	2/2	-10/-10	-15/-22
	SCOP / ns	(W/W) / %	4.07/160	3.59/141	2.57/100
	Annual Consumption	kWh	6557	11496	19167
	Class		A+++	A++	A+
Noise Level	dB(A) *1		Cooling: -		Heating: -
	Power Level dB *2		Cooling: 69		Heating: 64
	dB *3		-		Heating: 55
Air Flow	m³/min (ft³/min)		Cooling: 148 (5227) Heating: 98 (3461)		
Refrigeration Control Device			Expansion Valve		
Refrigeration Oil	cm³		PZ68S (1600)		
Refrigerant (R290) Precharge / Maximum	kg (oz)		3.00 (106) / (-)		
F-GAS	GWP		3		
	CO ₂ eq (ton) (Precharged / Maximum)		0.009 / (-)		
Dimension	Height	mm	1645		
	Width	mm	1500		
	Depth	mm	460		
Net Weight	kg		240		
Water Piping O/D	Outdoor Water Pipe Connector	(inch)	(1-1/2)		
Compressor	Type		Hermetic Motor Compressor (Involute Scroll)		
	Motor Type		Synchronous Electric Motor (6-poles)		
	Rated Output	kW	5.00		

Item		Unit	Outdoor Unit		
Fan	Type		Propeller Fan		
	Material		ASG20		
	Motor Type		DC (8-poles)		
	Input Power	W	-		
	Output Power	W	270×2		
	Fan Speed	rpm	Cooling: 520 Heating: 460		
Heat Exchanger	Fin material		Aluminium (Pre Coat)		
	Fin Type		Corrugated Fin		
	Row × Stage × FPI		3X62X17		
	Size (W × H × L)	mm	66 × 1574.8 × 1171/1136/1101		
Hot Water Coil	Type		Braze Plate		
	No. of Plates		72		
	Size (W × H × L)	mm	142.48X524X117		
	Water Flow Rate	l/min (m ³ /h)	Cooling: 43.0 (2.6) Heating: 57.3 (3.4)		
Pump	Motor Type		Brushless DC Motor (Sensorless vector control system)		
	No. of Speed		Variable speed		
	Input Power	W	230		
Flow Sensor	Type		Vortex (Piezoelectric sensor)		
	Measuring range	l/min	7 ~ 150		
Power Source (Phase, Voltage, Cycle)		Ø	Three		
		V	400		
		Hz	50		
Input Power		Condition (Ambient/Water)	A35W7	A7W35	A2W35
		kW	Cooling: 4.16	Heating: 4.17	Heating: 5.90
Maximum Input Power For Heatpump System		kW	15.1		
Outdoor Power Supply : Phase (Ø) / Max. Current (A) / Max. Input Power (W)			3Ø / 24.0 / 15.1k		
Indoor Power Supply : Phase (Ø) / Max. Current (A) / Max. Input Power (W)			3Ø / 28.0 / 18.5k		
Power Supply 3 : Phase (Ø) / Max. Current (A) / Max. Input Power (W)			- / - / -		
Starting Current		A	6.4		
Running Current		Condition (Ambient/Water)	A35W7	A7W35	A2W35
		A	Cooling: 6.7	Heating: 7.0	Heating: 9.4
Maximum Current For Heatpump System		A	24.0		
Power Factor Power factor means total figure of compressor and outdoor fan motor.		%	Cooling: 90	Heating: 86	Heating: 91
Power Cord	Number of core		-		
	Length	m (ft)	-		
Thermostat			Electronic Control		
Protection Device			Electronic Control		
Pressure Relief Valve Water Circuit		kPa	Open: 400 Close: 280 or higher		
Operation Range	Outdoor Ambient	°C (min. / max.)	Cooling: 10 / 43 Heating (Tank): -25 / 43 Heating (Circuit): -25 / 35		
	Water Outlet	°C (min. / max.)	Cooling: 7/20 Heating (Tank): - / 70 *5 Heating (Circuit): 25 / 55 (Below Ambient -20°C) *4 Heating (Circuit): 25 / 65 (Below Ambient -15°C) *4 Heating (Circuit): 25 / 70 (Below Ambient -7°C) Heating (Circuit): 25 / 75 (Below Ambient 15°C)		
Internal Pressure Differential		kPa	Cooling: 18.1 Heating: 27.8		

Item		Unit	Indoor Unit	
Performance Test Condition			EN14511 / EN14825	
Noise Level		dB(A) *1	Cooling: 22	Heating: 22
		Power Level dB *2	Cooling: 35	Heating: 35
Dimension	Height	mm	454	
	Width	mm	520	
	Depth	mm	116	
Net Weight		kg (lbs)	7(15)	

Note:

- * In case it is necessary to indicate the air flow volume in (l/s),the value in (m3/min.) shall be multiplied by 16.7 and rounded down the decimal point.
- * If the EUROVENT Certified models can be operated under the "extra-low" temperature condition, -7°C DB and -8°C WB temperature with rated voltage 230V shall be used.
- * Capacity is measured at outdoor temperature 7°C DB and 6°C WB with controlled water inlet 30°C and water outlet 35°C (EN 14511-2)
- * Flowrate indicated are based on nominal capacity adjustment of leaving water temperature (LWT) 35°C and $\Delta T=5^{\circ}\text{C}$.
- * EER and COP classification is at 230V only in accordance with EU directive 2003/32/EC.
- *1. The sound pressure level is measured with distance 1.0m from the unit and height at 1.5m. (Test carry out for cooling at ambient 35°C DB and Water Out 7°C, heating at ambient 7°C DB / 6°C WB and water out 55°C)
- *2. The sound power level is measured with accordance to EN12102 under full load conditions. (Test carry out for cooling at ambient 35°C DB and Water Out 7°C, heating at ambient 7°C DB / 6°C WB and water out 55°C)
- *3. The sound power level is measured with accordance to EN12102 under conditions of the EN14825.
- *4. Between outdoor ambient -15°C and -20°C, the water outlet temperature gradually decreases from 65°C to 55°C

3.2 WH-CME8L WH-WXG25ME8

Item		Unit	Outdoor Unit		
Performance Test Condition			EN14511 / EN14825		
Cooling Capacity	Condition (Ambient/Water)		A35W7		
	kW		15.00		
	BTU/h		51200		
Cooling EER	W/W		3.61		
Heating Capacity	Condition (Ambient/Water)		A7W35	A2W35	
	kW		25.00	25.00	
	BTU/h		85300	85300	
Heating COP	W/W		4.50	2.80	
Heating ErP	Low Temperature Application (W35)		Warmer	Average	Colder
	Application	Climate			
	Pdesign	kW	25.0	25.0	25.0
	Tbivalent / TOL	°C	2/2	-10/-10	-15/-22
	SCOP / ns	(W/W) / %	5.22/206	4.25/167	3.16/123
	Annual Consumption	kWh	6397	12152	19528
	Class		A+++	A++	A+
	Medium Temperature Application (W55)		Warmer	Average	Colder
	Application	Climate			
	Pdesign	kW	25.0	25.0	25.0
	Tbivalent / TOL	°C	2/2	-10/-10	-15/-22
	SCOP / ns	(W/W) / %	4.14/163	3.57/140	2.71/105
	Annual Consumption	kWh	8063	14462	22759
	Class		A+++	A++	A+
Noise Level		dB(A) *1	Cooling: -		Heating: -
		Power Level dB *2	Cooling: 69		Heating: 69
		dB *3	-		Heating: 58
Air Flow		m³/min (ft³/min)	Cooling: 148 (5227) Heating: 138 (4873)		
Refrigeration Control Device			Expansion Valve		
Refrigeration Oil		cm³	PZ68S (1600)		
Refrigerant (R290) Precharge / Maximum		kg (oz)	3.00 (106) / (-)		
F-GAS	GWP		3		
	CO ₂ eq (ton) (Precharged / Maximum)		0.009 / (-)		
Dimension	Height	mm	1645		
	Width	mm	1500		
	Depth	mm	460		
Net Weight		kg	240		
Water Piping O/D	Outdoor Water Pipe Connector	(inch)	(1-1/2)		
Compressor	Type		Hermetic Motor Compressor (Involute Scroll)		
	Motor Type		Synchronous Electric Motor (6-poles)		
	Rated Output	kW	5.00		

Item		Unit	Outdoor Unit		
Fan	Type		Propeller Fan		
	Material		ASG20		
	Motor Type		DC (8-poles)		
	Input Power	W	-		
	Output Power	W	270×2		
	Fan Speed	rpm	Cooling: 550 Heating: 520		
Heat Exchanger	Fin material		Aluminium (Pre Coat)		
	Fin Type		Corrugated Fin		
	Row × Stage × FPI		3X62X17		
	Size (W × H × L)	mm	66 × 1574.8 × 1171/1136/1101		
Hot Water Coil	Type		Braze Plate		
	No. of Plates		72		
	Size (W × H × L)	mm	142.48X524X117		
	Water Flow Rate	l/min (m ³ /h)	Cooling: 43.0 (2.6) Heating: 71.6 (4.3)		
Pump	Motor Type		Brushless DC Motor (Sensorless vector control system)		
	No. of Speed		Variable speed		
	Input Power	W	230		
Flow Sensor	Type		Vortex (Piezoelectric sensor)		
	Measuring range	l/min	7 ~ 150		
Power Source (Phase, Voltage, Cycle)		Ø	Three		
		V	400		
		Hz	50		
Input Power		Condition (Ambient/Water)	A35W7	A7W35	A2W35
		kW	Cooling: 4.16	Heating: 5.55	Heating: 8.93
Maximum Input Power For Heatpump System		kW	17.6		
Outdoor Power Supply : Phase (Ø) / Max. Current (A) / Max. Input Power (W)			3Ø / 27.0 / 17.6k		
Indoor Power Supply : Phase (Ø) / Max. Current (A) / Max. Input Power (W)			3Ø / 28.0 / 18.5k		
Power Supply 3 : Phase (Ø) / Max. Current (A) / Max. Input Power (W)			- / - / -		
Starting Current		A	7.6		
Running Current		Condition (Ambient/Water)	A35W7	A7W35	A2W35
		A	Cooling: 6.7	Heating: 8.7	Heating: 13.8
Maximum Current For Heatpump System		A	27.0		
Power Factor Power factor means total figure of compressor and outdoor fan motor.		%	Cooling: 90	Heating: 93	Heating: 94
Power Cord	Number of core		-		
	Length	m (ft)	-		
Thermostat			Electronic Control		
Protection Device			Electronic Control		
Pressure Relief Valve Water Circuit		kPa	Open: 400 Close: 280 or higher		
Operation Range	Outdoor Ambient	°C (min. / max.)	Cooling: 10 / 43 Heating (Tank): -25 / 43 Heating (Circuit): -25 / 35		
	Water Outlet	°C (min. / max.)	Cooling: 7/20 Heating (Tank): - / 70 *5 Heating (Circuit): 25 / 55 (Below Ambient -20°C) *4 Heating (Circuit): 25 / 65 (Below Ambient -15°C) *4 Heating (Circuit): 25 / 70 (Below Ambient -7°C) Heating (Circuit): 25 / 75 (Below Ambient 15°C)		
Internal Pressure Differential		kPa	Cooling: 18.1 Heating: 39.2		

Item		Unit	Indoor Unit	
Performance Test Condition			EN14511 / EN14825	
Noise Level		dB(A) *1	Cooling: 22	Heating: 22
		Power Level dB *2	Cooling: 35	Heating: 35
Dimension	Height	mm	454	
	Width	mm	520	
	Depth	mm	116	
Net Weight		kg (lbs)	7(15)	

Note:

- * In case it is necessary to indicate the air flow volume in (l/s),the value in (m3/min.) shall be multiplied by 16.7 and rounded down the decimal point.
- * If the EUROVENT Certified models can be operated under the "extra-low" temperature condition, -7°C DB and -8°C WB temperature with rated voltage 230V shall be used.
- * Capacity is measured at outdoor temperature 7°C DB and 6°C WB with controlled water inlet 30°C and water outlet 35°C (EN 14511-2)
- * Flowrate indicated are based on nominal capacity adjustment of leaving water temperature (LWT) 35°C and $\Delta T=5^{\circ}\text{C}$.
- * EER and COP classification is at 230V only in accordance with EU directive 2003/32/EC.
- *1. The sound pressure level is measured with distance 1.0m from the unit and height at 1.5m. (Test carry out for cooling at ambient 35°C DB and Water Out 7°C, heating at ambient 7°C DB / 6°C WB and water out 55°C)
- *2. The sound power level is measured with accordance to EN12102 under full load conditions. (Test carry out for cooling at ambient 35°C DB and Water Out 7°C, heating at ambient 7°C DB / 6°C WB and water out 55°C)
- *3. The sound power level is measured with accordance to EN12102 under conditions of the EN14825.
- *4. Between outdoor ambient -15°C and -20°C, the water outlet temperature gradually decreases from 65°C to 55°C

3.3 WH-CME8L WH-WXG30ME8

Item		Unit	Outdoor Unit		
Performance Test Condition			EN14511 / EN14825		
Cooling Capacity	Condition (Ambient/Water)		A35W7		
	kW		15.00		
	BTU/h		51200		
Cooling EER	W/W		3.61		
Heating Capacity	Condition (Ambient/Water)		A7W35	A2W35	
	kW		30.00	30.00	
	BTU/h		102300	102300	
Heating COP	W/W		4.40	2.50	
Heating ErP	Low Temperature Application (W35)		Warmer	Average	Colder
	Application	Climate			
	Pdesign	kW	30.0	30.0	30.0
	Tbivalent / TOL	°C	2/2	-7/-10	-15/-22
	SCOP / ns	(W/W) / %	4.93/194	3.95/155	3.20/125
	Annual Consumption	kWh	8129	15702	23111
	Class		A+++	A++	A+
	Medium Temperature Application (W55)		Warmer	Average	Colder
	Application	Climate			
	Pdesign	kW	30.0	30.0	30.0
	Tbivalent / TOL	°C	2/2	-10/-10	-15/-22
	SCOP / ns	(W/W) / %	4.01/158	3.46/135	2.71/105
	Annual Consumption	kWh	9986	17931	27313
	Class		A+++	A++	A+
Noise Level		dB(A) *1	Cooling: -		Heating: -
		Power Level dB *2	Cooling: 69		Heating: 69
		dB *3	-		Heating: 60
Air Flow	m³/min (ft³/min)		Cooling: 148 (5227) Heating: 158 (5580)		
Refrigeration Control Device			Expansion Valve		
Refrigeration Oil	cm³		PZ68S (1600)		
Refrigerant (R290) Precharge / Maximum	kg (oz)		3.00 (106) / (-)		
F-GAS	GWP		3		
	CO ₂ eq (ton) (Precharged / Maximum)		0.009 / (-)		
Dimension	Height	mm	1645		
	Width	mm	1500		
	Depth	mm	460		
Net Weight	kg		240		
Water Piping O/D	Outdoor Water Pipe Connector	(inch)	(1-1/2)		
Compressor	Type		Hermetic Motor Compressor (Involute Scroll)		
	Motor Type		Synchronous Electric Motor (6-poles)		
	Rated Output	kW	5.00		

Item		Unit	Outdoor Unit		
Fan	Type		Propeller Fan		
	Material		ASG20		
	Motor Type		DC (8-poles)		
	Input Power	W	-		
	Output Power	W	270×2		
	Fan Speed	rpm	Cooling: 550 Heating: 550		
Heat Exchanger	Fin material		Aluminium (Pre Coat)		
	Fin Type		Corrugated Fin		
	Row × Stage × FPI		3X62X17		
	Size (W × H × L)	mm	66 × 1574.8 × 1171/1136/1101		
Hot Water Coil	Type		Braze Plate		
	No. of Plates		72		
	Size (W × H × L)	mm	142.48X524X117		
	Water Flow Rate	l/min (m ³ /h)	Cooling: 43.0 (2.6) Heating: 86.0 (5.2)		
Pump	Motor Type		Brushless DC Motor (Sensorless vector control system)		
	No. of Speed		Variable speed		
	Input Power	W	230		
Flow Sensor	Type		Vortex (Piezoelectric sensor)		
	Measuring range	l/min	7 ~ 150		
Power Source (Phase, Voltage, Cycle)		Ø	Three		
		V	400		
		Hz	50		
Input Power		Condition (Ambient/Water)	A35W7	A7W35	A2W35
		kW	Cooling: 4.16	Heating: 6.82	Heating: 12.00
Maximum Input Power For Heatpump System		kW	19.8		
Outdoor Power Supply : Phase (Ø) / Max. Current (A) / Max. Input Power (W)			3Ø / 30.0 / 19.8k		
Indoor Power Supply : Phase (Ø) / Max. Current (A) / Max. Input Power (W)			3Ø / 28.0 / 18.5k		
Power Supply 3 : Phase (Ø) / Max. Current (A) / Max. Input Power (W)			- / - / -		
Starting Current		A	9.7		
Running Current		Condition (Ambient/Water)	A35W7	A7W35	A2W35
		A	Cooling: 6.7	Heating: 10.5	Heating: 18.4
Maximum Current For Heatpump System		A	30.0		
Power Factor Power factor means total figure of compressor and outdoor fan motor.		%	Cooling: 90	Heating: 94	Heating: 95
Power Cord	Number of core		-		
	Length	m (ft)	-		
Thermostat			Electronic Control		
Protection Device			Electronic Control		
Pressure Relief Valve Water Circuit		kPa	Open: 400 Close: 280 or higher		
Operation Range	Outdoor Ambient	°C (min. / max.)	Cooling: 10 / 43 Heating (Tank): -25 / 43 Heating (Circuit): -25 / 35		
	Water Outlet	°C (min. / max.)	Cooling: 7/20 Heating (Tank): - / 70 *5 Heating (Circuit): 25 / 55 (Below Ambient -20°C) *4 Heating (Circuit): 25 / 65 (Below Ambient -15°C) *4 Heating (Circuit): 25 / 70 (Below Ambient -7°C) Heating (Circuit): 25 / 75 (Below Ambient 15°C)		
Internal Pressure Differential		kPa	Cooling: 18.1 Heating: 51.4		

Item		Unit	Indoor Unit	
Performance Test Condition			EN14511 / EN14825	
Noise Level		dB(A) *1	Cooling: 22	Heating: 22
		Power Level dB *2	Cooling: 35	Heating: 35
Dimension	Height	mm	454	
	Width	mm	520	
	Depth	mm	116	
Net Weight		kg (lbs)	7(15)	

Note:

- * In case it is necessary to indicate the air flow volume in (l/s),the value in (m3/min.) shall be multiplied by 16.7 and rounded down the decimal point.
- * If the EUROVENT Certified models can be operated under the "extra-low" temperature condition, -7°C DB and -8°C WB temperature with rated voltage 230V shall be used.
- * Capacity is measured at outdoor temperature 7°C DB and 6°C WB with controlled water inlet 30°C and water outlet 35°C (EN 14511-2)
- * Flowrate indicated are based on nominal capacity adjustment of leaving water temperature (LWT) 35°C and $\Delta T=5^{\circ}\text{C}$.
- * EER and COP classification is at 230V only in accordance with EU directive 2003/32/EC.
- *1. The sound pressure level is measured with distance 1.0m from the unit and height at 1.5m. (Test carry out for cooling at ambient 35°C DB and Water Out 7°C, heating at ambient 7°C DB / 6°C WB and water out 55°C)
- *2. The sound power level is measured with accordance to EN12102 under full load conditions. (Test carry out for cooling at ambient 35°C DB and Water Out 7°C, heating at ambient 7°C DB / 6°C WB and water out 55°C)
- *3. The sound power level is measured with accordance to EN12102 under conditions of the EN14825.
- *4. Between outdoor ambient -15°C and -20°C, the water outlet temperature gradually decreases from 65°C to 55°C
- *5. When outdoor ambient is under -15°C, only the backup heater operate above 55°C. (Outdoor unit don't have backup heater.)

4. Features

- **Inverter Technology**
 - Energy saving
- **High Efficiency**
- **A-class energy efficiency pump**
 - Water pump speed can be set by selection at control panel
- **Improved deice cycle**
- **Protection Feature**
 - Random auto restart after power failure for safety restart operation
 - Gas leakage protection
 - Prevent compressor reverse cycle
 - Inner protector to protect compressor
- **Serviceability Feature**
 - Breakdown Self Diagnosis function
 - System Status Check Buttons for servicing purpose
 - Front maintenance design for outdoor unit

5. Location of Controls and Components

5.1 Indoor Unit

5.1.1 Remote Controller buttons and display

The LCD display as shown in this manual are for instructional purpose only, and may differ from the actual unit.

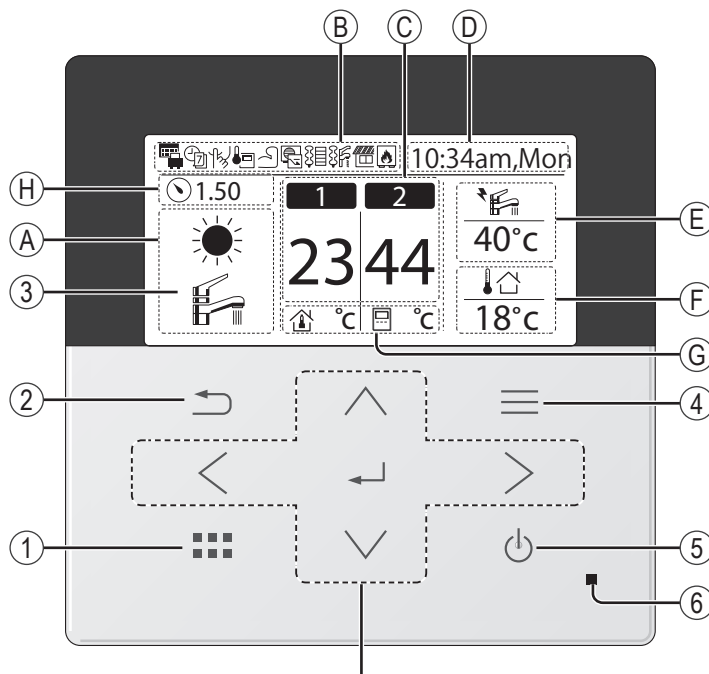
Buttons / Indicator

- | | |
|---|--|
| ① | Quick Menu button |
| ② | Back button
Returns to the previous screen |
| ③ | LCD Display
(Actual - Dark background with white icons) |
| ④ | Main Menu button
For function setup |
| ⑤ | ON/OFF button
Starts/Stops operation |
| ⑥ | Operation indicator
Illuminates during operation, blinks during alarm. |

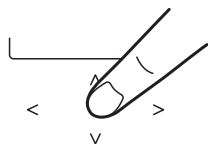
When the backlight is off, press any button to turn it on.

(Do not press button ⑤)

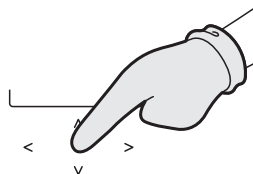
The time until the backlight turns off can be changed in the Menu (Personal setup)



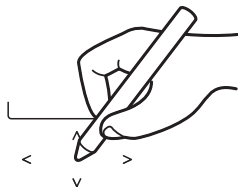
! Press centre



No glove

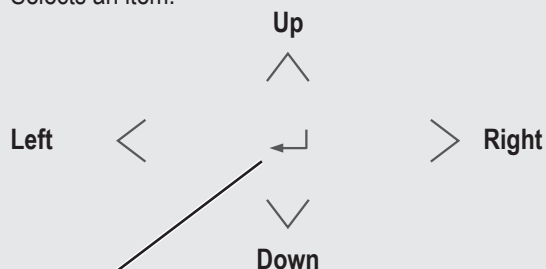


No pen



Cross key buttons

Selects an item.

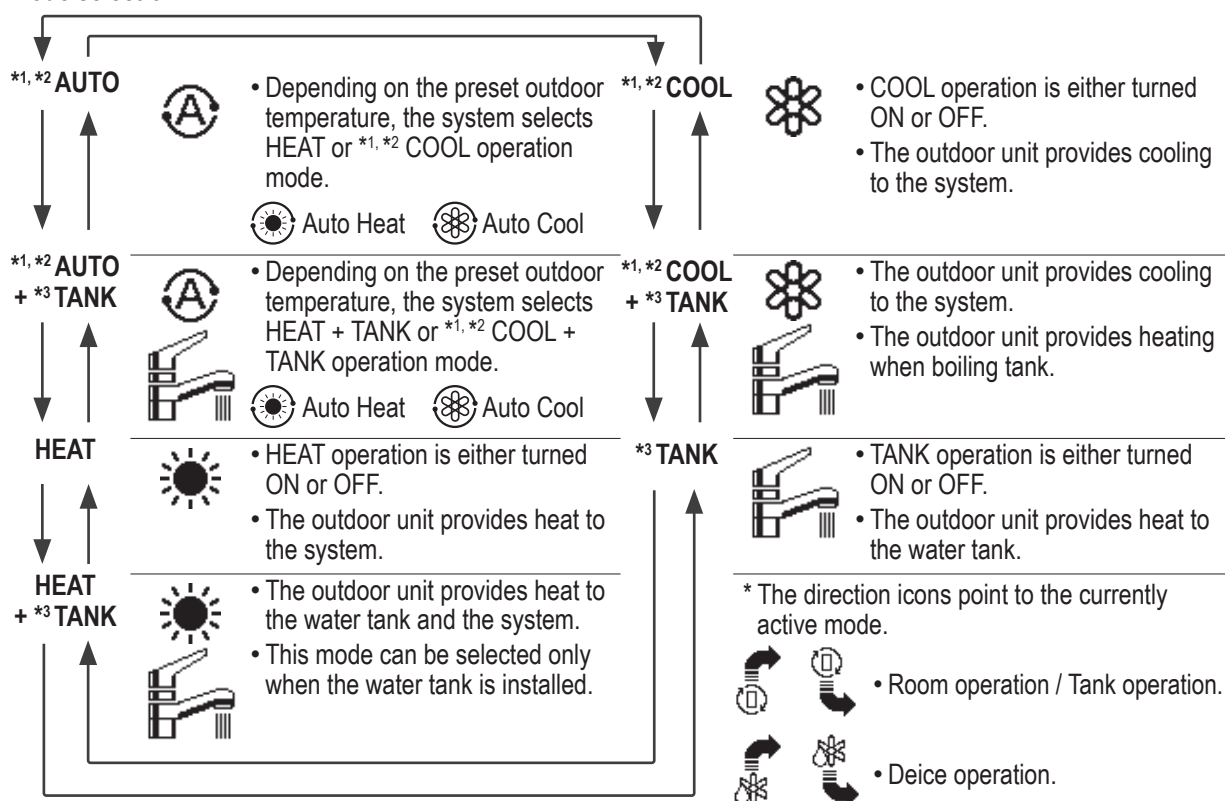


Enter button

Fixes the selected content.

Display

(A) Mode selection



(B) Operation icons

The status of operation is displayed.

Icon will not display (under operation OFF screen) whenever operation is OFF except weekly timer.

	Holiday operation status		Weekly Timer operation status		Quiet operation status
	Zone:Room Thermostat ->Internal sensor status		Powerful operation status		Demand Control or SG ready or SHP status
	Room Heater status		Tank Heater status		Solar status
	Bivalent status (Boiler)				

(C) Temperature of each zone

(D) Time and day

(E) Water Tank temperature (with electric anode operation icon)

(F) Outdoor temperature

(G) Sensor type/Set temperature type icons

	Water Temperature ->Compensation curve		Water Temperature ->Direct		Pool only
	Room Thermostat ->External		Room Thermostat ->Internal		Room Thermistor

(H) Water pressure (bar)

*1 The system is locked to operate without COOL mode. It can be unlocked only by authorised installers or our authorised service partners.
 *2 Only displayed when COOL mode is unlocked (This means when COOL mode is available).
 *3 Only displayed when Tank connection is Yes.

5.1.2 Initialization

Before starting to install the various menu settings, please initiate the Remote Controller by selecting the language of operation and installing the date and time correctly.

When power is turned on for the first time, it becomes the setting screen automatically. It can also be set from personal setting of the menu.

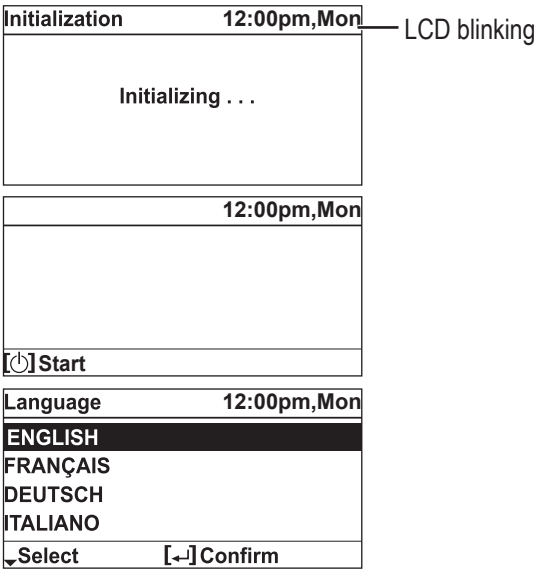
Selecting the language

Wait while the display is initializing.

When initializing screen ends, it turns to normal screen.

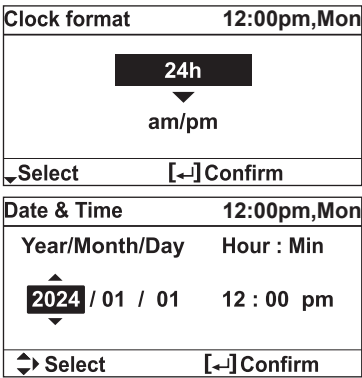
When any button is pressed, language setting screen appears.

- ① Scroll with $\swarrow$ and $\searrow$ to select the language.
- ② Press $\leftarrow$ to confirm the selection.



Setting the clock

- ① Select with $\swarrow$ or $\searrow$ how to display the time, either 24h or am/pm format (for example, 15:00 or 3:00pm).
- ② Press $\leftarrow$ to confirm the selection.
- ③ Use $\swarrow$ and $\searrow$ to select year, month, day, hour and minutes. (Select and move with $\rightarrow$ and press $\leftarrow$ to confirm.)
- ④ Once the time is set, time and day will appear on the display even if the Remote Controller is turned OFF.



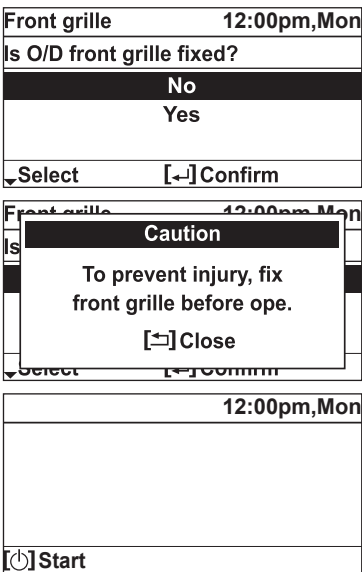
Checking the front grilles

Final precaution step to check and confirm whether outdoor front grille is fixed before operating the unit for safety purpose.

Select Yes if outdoor front grille is already fixed. Then it will proceed to main screen.

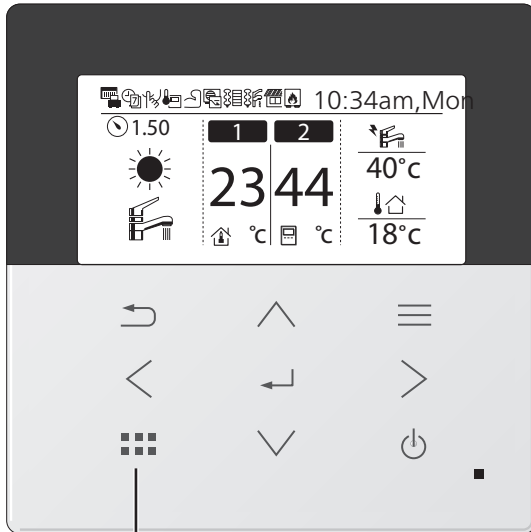
Select No if outdoor front grille is not yet fixed. A caution message will pop up to remind on the installation.

*The display will not appear once you set it.

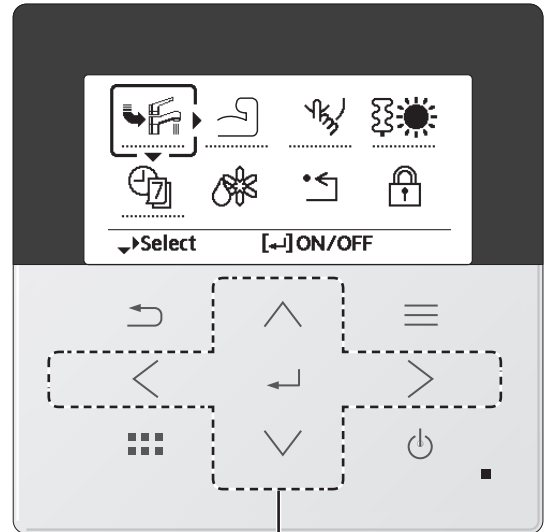


5.1.3 Quick Menu

After the initial settings have been completed, you can select a quick menu from the following options and edit the setting.



① Press to display the quick menu.



② Use to select menu.

③ Press to turn on/off the select menu.

Quick Menu

^{*1} Force DHW	Powerful	Quiet	^{*2} Force Heater
Weekly Timer	Force Defrost	Error Reset	R/C Lock

Select
[←] ON/OFF

Select each setting and confirm the setting according to the instructions displayed at the bottom of the screen.
(The icons refer to each selection key.)

To return to the Main Screen,

Press or .

^{*1} Only displayed when Tank connection is Yes.

^{*2} It is not displayed when the outdoor unit is used alone. When the indoor unit has the heater, it is displayed even if set not to operate the heater.

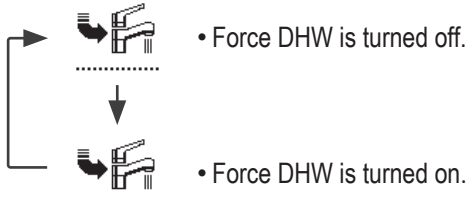
5.1.4 How to use the Quick Menu



Force DHW

Select this icon to turn the Tank DHW on or off.

Press  to confirm your selection.



Note:

- Force DHW is disabled when Force Heater is turned on.
- When Force DHW is turned off, operation & mode should change back to the previous memorized status.

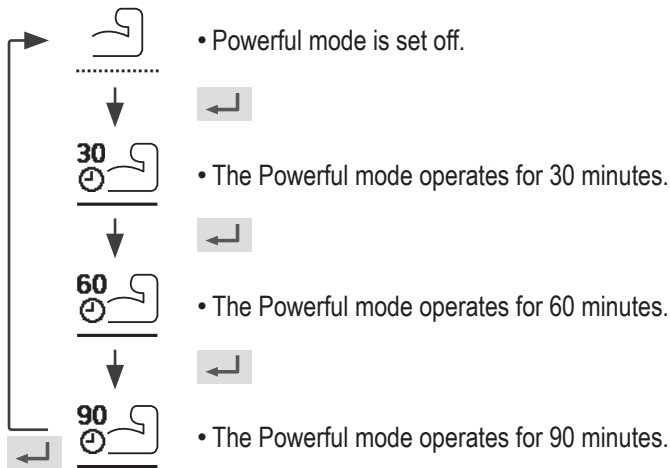


Powerful

Select this icon to operate the heating system powerfully.

Press  to confirm your selection.

(The powerful operation starts approximately 1 minute after  is pressed.)



Note:

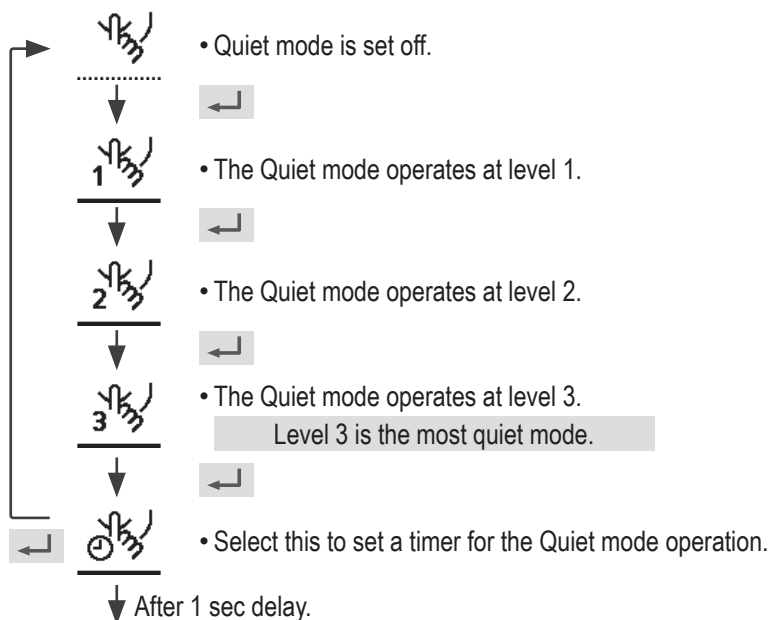
- Powerful is disabled when operation is turned OFF.

Quiet

Select this icon to operate quietly.

Press  to confirm your selection.

(The quiet operation starts approximately 1 minute after  is pressed.)



Do you want to edit
Quiet timer pattern?

Yes  No 

Select "Yes".

• Select "Yes" using   buttons.

Pattern	Time	Level
1	6:00 am	2
2	8:00 pm	1
3	10:00 pm	0

Select pattern "1" ~ "6".

Edit

Delete

Select "Edit".

• If you select "Delete", the timer setting of the selected pattern will be deleted.

12 : 00 pm

Set the hour and minutes.



Select the level of Quiet.

Set time is overlapped!

[>]Close

Note:

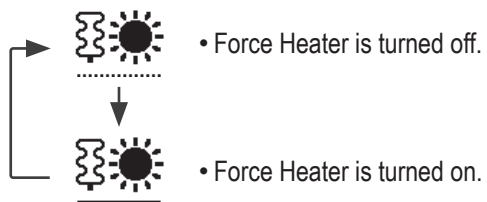
• If the time overlaps with another pattern, "Set time is overlapped!" will appear on the screen.

Force Heater

Select to force the Heater on.

Press  to confirm your selection.

(The Force Heater mode starts approximately 1 minute after  is pressed.)



Note:

- Force Heater is disabled whenever operation is already on and “Disabled due to operation ON!” will be displayed.
- It is not displayed when the outdoor unit is used alone, and when the heater is set to OFF even if the indoor unit is connected.

**Disabled due to
operation ON!**

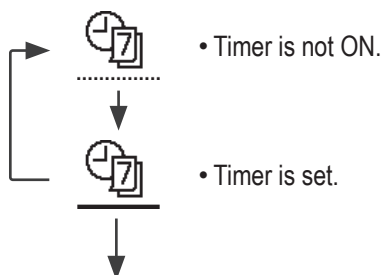
 Close



Weekly Timer

Select this icon to delete (cancel) or change the pre-set Weekly Timer.

Press to confirm your selection.



Do you want to edit
Weekly timer pattern?

Yes No

Select "Yes".

• If you select "No", the screen will return to the Main Screen.

Timer setup
Timer copy

• Timer setup: Select Timer setup to edit the Weekly Timer.

• Timer copy: Select to copy a timer setting.

Sun	Mon	Tue	Wed	Thu	Fri	Sat
—	✓	✓	✓	✓	✓	—

[Example of a Timer setup]

Select the day(s) which you wish to edit using buttons.

All 6 patterns are not set!
Do you want to edit?

Yes No

If all 6 patterns are not preset, this screen will be displayed.

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1. 12:00am ON 25/20°C 40°C	2. 2:00am ON 25/25°C 40°C	3. 4:00am ON 30/20°C 40°C				
①	②	③	④	⑤	⑥	

① Select pattern "1" ~ "6".

② Set the hour and minutes of the Timer.

③ Select ON/OFF of the Timer.

④ Select the operation mode.

/ / / / / /

• Select mode using buttons.

⑤ Set the temperature for both Zone 1 and 2 (if your system has the 2-Zone setting).

Saturday: Pattern 1: Set Temp					
Zone1		Zone2			
ON	25 °C	ON	25 °C	45 °C	

⑥ Set the Tank temperature.

Note:

- Timer is disabled when Force Heater is turned on or Heat-Cool SW is enabled.
- If you have preset the Weekly Timer on 2 zones, you must repeat the same procedure with Zone 2.



Force Defrost

Select to defrost the frozen pipes.

Press  to confirm your selection.

(When the mode is accepted, below screen will be displayed.)

Request accepted!

[↵]Close



Error Reset

Select to restore the previous settings when error has occurred.

Press  to confirm your selection.

(When the mode has been accepted, below screen will be displayed.)

Request accepted!

[↵]Close

- Make sure all units are turned off before selecting this mode which restores the whole system to the previous settings.



R/C Lock

Select to lock the Remote Controller.

Press  to confirm your selection.

(When the mode has been accepted, below screen will be displayed.)

Do you want to
lock remote control?

Yes



No

Select "Yes".

(The Main Screen will be locked.)

- If "No" is selected, the screen will return to the Main Screen.

To unlock the Remote Controller

Press any key.

(When the mode has been accepted, below screen will be displayed.)



* * *

Enter any 4 digits of number (if the number is correct, the screen will be unlocked).

To reset forgotten password (under operation OFF screen)

Press ,  and  continuously for 5 seconds.

(When the mode has been accepted, below screen will be displayed.)

Reset password

Reset

Select "Reset".

- 1.Password is reset to 0000
- 2.Remote control is unlocked

(The screen will be off after 3 seconds.)

5.1.5 Menus (For user)

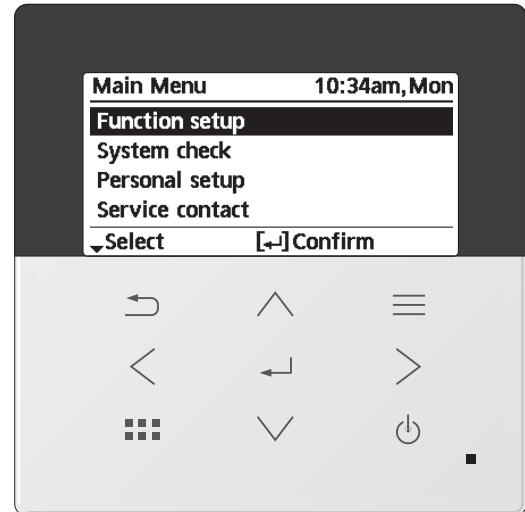
Select menus and determine settings according to the system available in the household. All initial settings must be done by an authorised dealer or a specialist. It is recommended that all alterations of the initial settings are also done by an authorised dealer or a specialist.

- After initial installation, you may manually adjust the settings.
- The initial setting remains active until the user changes it.
- The Remote Controller can be used for multiple installations.
- Ensure the operation indicator is OFF before setting.
- The system may not work properly if set wrongly.
Please consult an authorised dealer/specialist.

To display <Main Menu>: 

To select menu:    

To confirm the selected content: 



Menu	Default Setting	Setting Options / Display
1 Function setup		
1.1 > Weekly timer		
Once the weekly timer is set up, User can edit from Quick Menu. To set up to 6 patterns of operation on a daily basis. • Disabled if Heat-Cool SW is select “Yes” or if Force Heater is on.	Timer setup Select day of the week and set the patterns needed (Time / Operation ON/OFF / Mode)	Weekly timer 10:34am, Mon Sun Mon Tue Wed Thu Fri Sat 1. 8:00am ON 40°C 2. 12:00pm ON 24/28°C 40°C 3. 1:00pm ON 12/10°C ◀Day ▼Pattern [↔]Edit
	Timer copy Select day of the week	
1.2 > Holiday timer		
To save energy, a holiday period may be set to either turn OFF the system or lower the temperature during the period. • Weekly timer setting may be temporarily disabled during Holiday timer setting but it will be restored once the Holiday timer is completed.	OFF	ON ▲ OFF
	> ON	
	Holiday start and end. Date and time	Holiday: End 10:34am, Mon
	OFF or lowered temperature	Year/Month/Day Hour : Min 2024 / 01 / 01 10 : 34 am
	◀Select [↔]Confirm	
1.3 > Quiet timer		
To operate quietly during the preset period. 6 patterns may be set. Level 0 means the mode is off.	Time to start Quiet : Date and time	Quiet 10:34am, Mon Pattern Time Level 1 8:00am 0 2 5:00pm 1 3 11:00pm 3 ▼Select [↔]Edit
	Level of quietness: 0 ~ 3	

Menu	Default Setting	Setting Options / Display
1.4 > Quiet priority		
- To select priority during Quiet mode between Sound and Capacity. - If Sound priority is selected, unit will operate in quiet condition only. - If Capacity priority is selected, unit will operate in quiet condition but it will prioritize on providing required capacity at the same time.	Sound	Sound ▼ Capacity
1.5 > *1 Room heater		
To set the room heater ON or OFF.	OFF	ON ▲ OFF
1.6 > *2 Tank heater		
To set the tank heater ON or OFF.	OFF	ON ▲ OFF
1.7 > *2 Sterilization		
To set the auto sterilization ON or OFF.	ON	ON ▼ OFF
- Do not use the system during sterilization in order to prevent scalding with hot water, or overheating of shower. - Ask an authorised dealer/specialist to determine the level of sterilization function field settings according to the local laws and regulations.		
1.8 > *3 DHW mode (Domestic Hot Water)		
To set the DHW mode to Standard or Smart. Standard mode have faster DHW Tank heat up time. Meanwhile Smart mode take longer time to heat up DHW time with lower energy consumption.	Standard	Standard ▼ Smart
To set the tank sensor to Top or Center. Selection of the tank sensor to top slow down the start of boiling up the tank and reduce power consumption. Please change this selection to "Center" when the hot water becomes insufficient.	Top	Top ▼ Center

*1 It is not displayed when the outdoor unit is used alone or depending on the settings.

*2 Only displayed when Tank connection is Yes.

*3 Only displayed when connect Panasonic AIR-TO-WATER CONTROL MODULE+TANK.

Menu		Default Setting	Setting Options / Display
2 System check			
2.1 > Energy monitor			
Present or historical chart of energy consumption, generation or COP.	Present Select and retrieve	Total consumption (1year) 0.0 kWh 1year 1 2 3 4 5 6 7 8 9 10 11 12 CMth Jan, 2024: 0.0 kWh Approx. MonthMode *6	
	Historical chart Select and retrieve		
• COP= Coefficient of Performance. • For historical chart, the period is selected from 1 day/1 week/1year. • Energy consumption (kWh) of heating, *1,*2 cooling, *5 tank and total may be retrieved. • The total power consumption is an estimated value based on AC 230 V and may differ from value measured by precise equipment.			
2.2 > *3 System information			
Shows all system information in each area.	Actual system information of 11 items: Inlet / Outlet / Zone 1 / Zone 2 / Tank / Buffer tank / Solar / Pool / COMP frequency / Pump flowrate / Water pressure *7 Select and retrieve	System information 10:34am, Mon 1. Inlet : 0°C 2. Outlet : 0°C 3. Zone 1 : 0°C 4. Zone 2 : 0°C Page	
2.3 > Error history			
• Refer to Troubleshooting for error codes. • The most recent error code is displayed at the top.	Select and retrieve	Error history 10:34am, Mon 1. -- 2. -- 3. -- 4. -- Clear history	
2.4 > Compressor			
Shows the compressor performance.	Select and retrieve	Compressor 10:34am, Mon 1. Current frequency : 0 Hz 2. (OFF-ON) counter : 0 3. Total ON time : 0 h Back	
2.5 > Heater			
Total hours of ON time for *4 Room heater/ *5 Tank heater.	Select and retrieve	Heater 10:34am, Mon Total ON time : 0h : 0h Back	

*1 The system is locked to operate without COOL mode. It can be unlocked only by authorised installers or our authorised service partners.

*2 Only displayed when COOL mode is unlocked (This means when COOL mode is available).

*3 The items displayed differ depending on the Appliance and connected units.

*4 It is not displayed when the outdoor unit is used alone.

*5 Only displayed when Tank connection is Yes.

*6 If [Approx.] is shown on Energy Monitor display, data displayed on the remote controller is obtained through heat pump's internal calculation.

If [Approx.] is NOT shown on Energy Monitor display, data displayed on the remote controller is obtained by External Meters.

Data stored on the Aquaregia unit can be mixed between internal calculation and External Meters.

In order to know the exact consumption or generation, please use as reference always the External Meters' data.

*7 Only displayed when each connection is Yes.

Menu		Default Setting	Setting Options / Display
3 Personal setup			
3.1	> Remote control No.		
- To display remote control number of a particular remote controller so that installer and end user are well informed. - Main remote controller is displayed as RC-1. Second remote controller is displayed as RC-2.		Select and retrieve	RC No. 10:34am, Mon RC-1 [↵] Confirm
3.2	> Touch sound		
Turns the operation sound.		3	OFF / 1 / 2 / 3 / 4 Touch sound 9:53am, Mon Level 3 ⬆ Select [↵] Confirm
3.3	> LCD contrast		
Sets the screen contrast.		3	LCD contrast 10:34am, Mon Low High ⬅ Select [↵] Confirm
3.4	> Backlight		
Sets the duration of screen backlight.		1 min	Backlight 10:34am, Mon 15 secs 5 mins 1 min 10 mins ⤴ Select [↵] Confirm
3.5	> Backlight intensity		
Sets screen backlight brightness.		4	Backlight intensity 10:34am, Mon Dark Bright ⬅ Select [↵] Confirm
3.6	> *1 Clock format		
Sets the type of clock display.		am/pm	Clock format 10:34am, Mon 24h am/pm ⤴ Select [↵] Confirm
3.7	> Date & Time		
Sets the present date and time.		Year / Month / Day / Hour / Min	Date & Time 10:34am, Mon Year/Month/Day Hour : Min 2024 / 01 / 01 10 : 34 am ⤴ Select [↵] Confirm
*1 The default setting is am/pm, but 24h is displayed on the selection screen.			

Menu		Default Setting	Setting Options / Display
3.8 > Language			
Sets the display language for the top screen.	ENGLISH / FRANÇAIS / DEUTSCH / ITALIANO / ESPAÑOL / DANISH / SWEDISH / NORWEGIAN / POLISH / CZECH / NEDERLANDS / TÜRKÇE / SUOMI / MAGYAR / SLOVENŠČINA / HRVATSKI / LIETUVIŲ / PORTUGUÊS / БЪЛГАРСКИ / EESTI / LATVIEŠU / ROMÂNĂ / SHQIP / SLOVENČINA / МАКЕДОНСКИ / УКРАЇНСЬКА / ΕΛΛΗΝΙΚΑ	Language10:34am, Mon ENGLISH FRANÇAIS DEUTSCH ITALIANO ↕Select [↵] Confirm	
3.9 > Unlock password			
4 digit password for all the settings.	0000	Unlock password10:34am, Mon 0000 ↕Select [↵] Confirm	
4 Service contact			
4.1 > Contact 1 / Contact 2			
Preset contact number for installer.	Select and retrieve	Service setup10:34am, Mon Contact 1 Name : Bryan Adams  : 08812345678 ↕Select	

5.1.6 Menus (For installer)

Menu	Default Setting	Setting Options / Display
5 Installer setup > System setup		
5.1 > *1 Optional PCB connectivity		
To connect to the external PCB required for servicing.	No	Yes ▲ No
• If the external PCB is connected (optional), the system will have following additional functions: ① Control over 2 zones (including the swimming pool and the function to heat water in it). ② Solar function (the solar thermal panels connected to either the DHW (Domestic Hot Water) Tank or the Buffer Tank. • DHW is not applicable for WH-ADC *models. ③ External compressor switch. ④ External error signal. ⑤ SG ready control. ⑥ Demand control. ⑦ Heat-Cool SW		
5.2 > Zone & Sensor		
To select the sensors and to select either 1 zone or 2 zone system.	Zone • After selecting 1 or 2 zone system, proceed to the selection of room or swimming pool. • If the swimming pool is selected, the temperature must be selected for ΔT temperature between 0°C ~ 10 °C.	Zone & Sensor 10:34am, Mon Zone 1 Zone system 2 Zones system ▼Select [↵] Confirm
	Sensor * For room thermostat, there is a further selection of external or internal. • If select internal, there is a further selection of RC-1 or RC-2 (only available when Zone selection is 1 zone system). Select RC-1 if main remote controller's thermistor is to be used for room temperature control and vice versa.	Zone & Sensor 10:34am, Mon Sensor Water temperature Room thermostat Room thermistor ▼Select [↵] Confirm

*1 It is not displayed when the outdoor unit is used alone.

*2 It is not displayed when connect Panasonic AIR-TO-WATER CONTROL MODULE+TANK.

Menu	Default Setting	Setting Options / Display
5.3-1 > *1 Heater capacity		
To reduce the heater power if unnecessary.* if selected 18kW or less in 5.29-2, 6 kW / 12 kW / 18 kW * Options of kW vary depending on the model. * Please use a separate power supply when connecting heaters over 18kW. * When using the SG-ready function, use a heater with a capacity less than the required value.		Heater capacity 10:17pm, Mon 6 kW 12 kW 18 kW ^Select [->] Confirm
5.3-2 > *1 Heater capacity		
To reduce the heater power if unnecessary.* if selected over 18kW in 5.29-2, 1heater / 2heater / 3heater * Options of heater number vary depending on the model. * Please use a separate power supply when connecting heaters over 18kW.		Heater capacity 10:18pm, Mon 1 Heater 2 Heater 3 Heater ↓Select [->] Confirm
5.4 > Anti freezing		
To activate or deactivate the water freeze prevention when the system is OFF	Yes	Yes ↓ No
5.5 > *2 Tank connection		
To connect tank to the system.	No	Yes ↑ No

*1 It is not displayed when the outdoor unit is used alone.

*2 It is not displayed when connect Panasonic AIR-TO-WATER CONTROL MODULE+TANK.

Menu	Default Setting	Setting Options / Display
5.6 > *1 DHW capacity		
To select tank heating capacity to variable or standard. Variable capacity heat up tank with fast mode and keep the tank temperature with efficient mode. While standard capacity heat up tank with rated heating capacity.	Variable	Variable Standard
5.7 > *2 Buffer tank connection		
To connect tank to the system and if selected YES, to set ΔT temperature.	No	Yes No
	> Yes	
	5 °C	Buffer tank 10:34am, Mon ΔT for Buffer tank Range: (0°C~10°C) Steps: $\pm 1^\circ\text{C}$ 5 °C ↕Select [↔] Confirm
5.8 > *1 Tank heater		
To select external or internal tank heater and if External is selected, set a timer for the heater to come on. * This option is available if Tank connection is selected (YES).	External	Tank heater 10:34am, Mon External Internal ↕Select [↔] Confirm
	> External	
	1:30	Tank heater 10:34am, Mon Tank heater: ON time Range: (0:20~3:00) Steps: $\pm 0:05$ 1:30 ↕Select [↔] Confirm
5.9 > Base pan heater		
To select whether or not optional base pan heater is connected. * Type A - The base pan heater activates only during deice operation. * Type B - The base pan heater activates when outdoor ambient temperature is 5 °C or lower.	No	Yes No
	> Yes	
	A	Base pan heater type 10:34am, Mon A B ↕Select [↔] Confirm
5.10 > *3 Alternative outdoor sensor		
To select an alternative outdoor sensor.	No	Yes No

*1 Only displayed when Tank connection is Yes.

*2 It is not displayed when the outdoor unit is used alone and Panasonic AIR-TO-WATER CONTROL MODULE+TANK 2Zone model.

*3 It is not displayed when the outdoor unit is used alone.

Menu	Default Setting	Setting Options / Display
5.11 > Bivalent connection		
To select to enable or disable bivalent connection.	No	Yes No
> Yes		
To select either auto control pattern or SG ready input control pattern or smart control pattern. * This selection only display to select when optional pcb connection set to Yes.	Auto	Auto SG ready Smart
To select a bivalent connection to allow an additional heat source such as a boiler to heat-up the buffer tank and domestic hot water tank when heatpump capacity is insufficient at low outdoor temperature. The bivalent feature can be set-up either in alternative mode (heatpump and boiler operate alternately), or in parallel mode (both heatpump and boiler operate simultaneously), or in advance parallel mode (heatpump operates and boiler turns on for buffer-tank and/or domestic hot water depending on the control pattern setting options).	> Yes > Auto	
	-5 °C	Set outdoor temperature for turn ON Bivalent connection. Bivalent connection 10:34am, Mon Turn ON: Outdoor temp Range: (-15°C~35°C) Steps: ±1°C -5 °C ↕Select [←] Confirm
	Yes > After selecting the outdoor temperature	
	Control pattern	
	Alternative / Parallel / Advanced parallel	Bivalent connection 10:34am, Mon Control pattern Alternative Parallel Advanced parallel ^Select [←] Confirm
	• Select advanced parallel for bivalent use of the tanks.	
	Control pattern > Alternative	
	OFF	Option to set external pump either ON or OFF during bivalent operation. Set to ON if system is simple bivalent connection. Bivalent connection 10:34am, Mon External pump ON OFF ^Select [←] Confirm
	Control pattern > Advanced parallel	
	Heat	Selection of the tank Bivalent connection 10:34am, Mon Advanced parallel Heat DHW ↕Select [←] Confirm
	• "Heat" implies Buffer Tank and "DHW" implies Domestic Hot Water Tank.	

Menu		Default Setting	Setting Options / Display																		
Control pattern > Advanced parallel > Heat > Yes																					
• Buffer Tank is activated only after selecting “Yes”.			Bivalent connection 10:34am, Mon Advanced parallel: Heat Yes No Select [←] Confirm																		
-8 °C	Set the temperature threshold to start the bivalent heat source.		Bivalent connection 10:34am, Mon Heat start: Target temp. Range: (-10°C~0°C) Steps: ±1°C -8 °C Select [←] Confirm																		
0:30	Delay timer to start the bivalent heat source (in hour and minutes).		Bivalent connection 10:34am, Mon Heat start: Delay time Range: (0:00~1:30) Steps: ±0:05 0:30 Select [←] Confirm																		
-2 °C	Set the temperature threshold to stop the bivalent heat source.		Bivalent connection 10:34am, Mon Heat stop: Target temp. Range: (-10°C~0°C) Steps: ±1°C -2 °C Select [←] Confirm																		
0:30	Delay timer to stop the bivalent heat source (in hour and minutes).		Bivalent connection 10:34am, Mon Heat stop: Delay time Range: (0:00~1:30) Steps: ±0:05 0:30 Select [←] Confirm																		
Control pattern > Advanced parallel > DHW > Yes																					
• DHW Tank is activated only after selecting “Yes”.			Bivalent connection 10:34am, Mon Advanced parallel: DHW Yes No Select [←] Confirm																		
0:30	Delay timer to start the bivalent heat source (in hour and minutes).		Bivalent connection 10:34am, Mon DHW: Delay time Range: (0:30~1:30) Steps: ±0:05 0:30 Select [←] Confirm																		
> Yes > SG ready																					
SG ready input control for bivalent system follow below input condition.																					
<table><tr><th colspan="2">SG signal</th><th>Operation pattern</th></tr><tr><th>Vcc-bit1</th><th>Vcc-bit2</th><th></th></tr><tr><td>Open</td><td>Open</td><td>Heat Pump OFF, Boiler OFF</td></tr><tr><td>Short</td><td>Open</td><td>Heat Pump ON, Boiler OFF</td></tr><tr><td>Open</td><td>Short</td><td>Heat Pump OFF, Boiler ON</td></tr><tr><td>Short</td><td>Short</td><td>Heat Pump ON, Boiler ON</td></tr></table>		SG signal		Operation pattern	Vcc-bit1	Vcc-bit2		Open	Open	Heat Pump OFF, Boiler OFF	Short	Open	Heat Pump ON, Boiler OFF	Open	Short	Heat Pump OFF, Boiler ON	Short	Short	Heat Pump ON, Boiler ON	OFF	Option to set external pump either ON or OFF during bivalent operation. Set to ON if system is simple bivalent connection.
SG signal		Operation pattern																			
Vcc-bit1	Vcc-bit2																				
Open	Open	Heat Pump OFF, Boiler OFF																			
Short	Open	Heat Pump ON, Boiler OFF																			
Open	Short	Heat Pump OFF, Boiler ON																			
Short	Short	Heat Pump ON, Boiler ON																			
			Bivalent connection 10:34am, Mon External pump ON OFF Select [←] Confirm																		

Menu	Default Setting	Setting Options / Display
To do settings related to electricity and boiler so that unit is able to determine whether to operate heat pump or boiler at a particular period depends on operating cost of both heat sources. These settings are electricity price, boiler price, season, schedule etc.	> Yes > Smart	
	OFF	Option to set external pump either ON or OFF during bivalent operation. Set to ON if system is simple bivalent connection. Bivalent connection 10:34am, Mon External pump ON OFF ↶Select [↶] Confirm
	> Yes > Smart > After selecting for the external pump > Energy price	
	- Select Electricity to set on electricity price. - Select Boiler to set on boiler price and its efficiency.	Bivalent connection 10:34am, Mon Energy price Electricity Boiler ↵Select [↶] Confirm
	> Yes > Smart > After selecting for the external pump > Energy price > Electricity	
	0.0 * / kWh - There are total 10 different prices can be set for Electricity: - Electricity price 1 ~ Electricity price 10 - Range is 0 ~ 999.9 * / kWh - Press $\wedge$ or $\vee$ to enter a setting screen as shown in Figure 1. Then start setting the value of electricity price. - After finish setting a particular electricity price (eg. Electricity price 1), press $\leftarrow$ or $\rightarrow$ to go and set for other electricity price. * Set the price according to value provided by electrical supply company.	Bivalent connection 10:34am, Mon Electricity price 1 Range: (0~999.9 * / kWh) Steps: ± 0.1 * / kWh 0.0 ↔Select Figure 1 Bivalent connection 10:34am, Mon 0 0 0.0 ↔Select [↶] Confirm
	> Yes > Smart > After selecting for the external pump > Energy price > Boiler	
	0.0 * / kWh - Refer to method of Electricity price setting above for setting of boiler price. - After finish setting of boiler price, set the boiler efficiency (Range : 0 ~ 99%).	Bivalent connection 10:34am, Mon Boiler price Range: (0~999.9 * / kWh) Steps: ± 0.1 * / kWh 0.0 ↕Select [↶] Confirm
	0% * Set the price according to value provided by boiler or gas supply company.	Bivalent connection 10:34am, Mon Boiler efficiency Range: (0~99%) Steps: ± 1 % 0 ↕Select [↶] Confirm

Remark : * Currency setting depends on where you use this product.

Menu	Default Setting	Setting Options / Display
	> Yes > Smart > After selecting for the external pump > Schedule > Season setting Season 1 : Dec (Refers to Winter season) Season 2 : Mar (Refers to Spring season) Season 3 : Jun (Refers to Summer season) Season 4 : Oct (Refers to Autumn season) - There are total 4 seasons to be set - Set the starting month for each season. (Eg. when Season 1 is set to Dec and Season 2 is set to Mar, month of December to February will be treated as Season 1).	Bivalent connection 10:34am, Mon Schedule Season setting Schedule setting ▼Select [←] Confirm Bivalent connection 10:34am, Mon Season 1: Start month Range: (Jan~Dec) Steps: ±1month Dec ↕Select [←] Confirm
	> Yes > Smart > After selecting for the external pump > Schedule > Schedule setting Start time (Pattern 1) : 3:00am Start time (Pattern 2) : 9:00am Start time (Pattern 3) : 4:00pm Start time (Pattern 4) : 9:00pm - For each season, there are total 4 patterns can be set. Price (Pattern 1/2/3/4) : 1 - Set the target start time and the appropriate electricity price for each pattern. - Select "1" to edit both start time and electricity price. Select "2" to edit electricity price only.	Bivalent connection 10:34am, Mon Schedule setting Season 1 Season 2 Season 3 ▼Select [←] Confirm Season 1 10:34am, Mon Start time Price(*./kWh) 1. 3:00am 0.0 2. 9:00am 0.0 3. 4:00pm 0.0 ▼Select [←] Edit Bivalent connection 10:34am, Mon S Select 1: To edit time & price 2: To edit price only 1 ▶ 2 ▼Select [←] Confirm

Menu	Default Setting	Setting Options / Display
	- Range of start time displayed can be in "24h" or "am/pm" format depend on setting of "Clock format". - Range of electricity price is 0 ~ 10 which refers back to the 10 different electricity price set previously (under "Energy price > Electricity": Electricity price 1 ~ Electricity price 10). The price displayed on the upper right corner indicates the previous set value of Electricity price 1 to Electricity price 10. * When the price is set to "0", the electricity price will be treated as 0.0 * / kWh. It is for the convenience of installer when 0.0 is the desired setting value for a particular time.	Season 1 10:34am, Mon Pattern 1: Start time Range: (0.00~23.00) Steps: ±1hour 3.00 ↕Select [←] Confirm Season 1 10:34am, Mon Pattern 1: Price Range: (0~10) Steps: ±1 0.0 */kWh 0 ↕Select [←] Confirm
5.12	> *1 External SW	
	No	Yes No
5.13	> *1 Solar connection	
- The optional PCB connectivity must be selected YES to enable the function. - If the optional PCB connectivity is not selected, the function will not appear on the display. - DHW is not applicable for WH-ADC models.	No	Yes No
	> Yes	
	Buffer tank	Selection of the tank Solar connection 10:34am, Mon Buffer tank DHW tank ↕Select [←] Confirm
	> Yes > After selecting the tank	
	10 °C	Solar connection 10:34am, Mon ΔT Turn ON Range: (6°C~15°C) Steps: ±1°C 10 °C ↕Select [←] Confirm
	> Yes > After selecting the tank > ΔT ON temperature	
	5 °C	Solar connection 10:34am, Mon ΔT Turn OFF Range: (2°C~9°C) Steps: ±1°C 5 °C ↕Select [←] Confirm

*1 It is not displayed when the outdoor unit is used alone.

Menu	Default Setting	Setting Options / Display
	> Yes > After selecting the tank > ΔT ON temperature > ΔT OFF temperature	
	5 °C	Solar connection 10:34am, Mon Anti freeze Range: (-20°C~10°C) Steps: ±1°C 5 °C ↕Select [←] Confirm
	> Yes > After selecting the tank > ΔT ON temperature > ΔT OFF temperature > After setting the antifreeze temperature	
	80 °C	Solar connection 10:34am, Mon Hi limit Range: (70°C~90°C) Steps: ±5°C 80 °C ↕Select [←] Confirm
5.14	> *1 External error signal	
	No	Yes No
5.15	> *1 Demand control	
	No	Yes No
5.16	> *1 SG ready	
	No	Yes No
	> Yes > After selecting Capacity	
	120 %	SG ready 10:34am, Mon Capacity [1-0]: DHW Range: (50%~150%) Steps: ±5% 120 % ↕Select [←] Confirm
	> Yes > After selecting Power consumption > *HPU stop consumption	
	*2, *4 3.6kW	SG ready 10:34am, Mon HPU stop consumption Range: (0.5kW~10.0kW) Steps: ±0.1kW 3.6 ↕Select [←] Confirm
	> Yes > After selecting *HPU stop consumption > Consumption	
	*3 3.6kW	SG ready 10:34am, Mon Consumption [1-0]: DHW Range: (0.5kW~10.0kW) Steps: ±0.1kW 3.6 ↕Select [←] Confirm

Remark : * HPU means Heat pump unit (Outdoor unit).

*1 It is not displayed when the outdoor unit is used alone.

*2 Depending on the model, it may be less than 3.6kW.

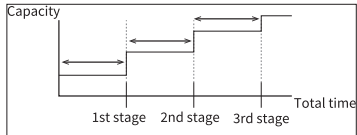
*3 Depending on the model, it may be less than 3.0kW or more than 3.6kW.

*4 Even though the setting value is lower than 3.0kW, actual power consumption can be 3.0kW caused by back-up heater operation.

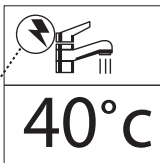
Menu	Default Setting	Setting Options / Display
5.17 > *1 External compressor SW		
	No	Yes ▲ No
	> Yes	
	Heat source	Ext. compressor SW 11:34am, Mon Heater ▲ Heat source ▲Select [↵] Confirm
5.18 > Circulation liquid		
To select whether to circulate water or glycol in the system.	Water	Circulation liquid 10:34am, Mon Water ▼ Glycol ▼Select [↵] Confirm
5.19 > *1, *2 Heat-Cool SW		
	No	Yes ▲ No
5.20 > *1 Force heater		
To turn on Force heater either manually (by default) or automatically.	Manual	Force heater 10:34am, Mon Auto ▲ Manual ▲Select [↵] Confirm
5.21 > Force defrost		
If auto selection is set, outdoor unit will start defrost operation if long heating hour operate during low outdoor temperature.	Manual	Auto ▲ Manual
5.22 > *1 Defrost signal		
To turn on defrost signal to stop fan coil during defrost operation. (If defrost signal set to yes, bivalent function will not available to use)	No	Yes ▲ No

*1 It is not displayed when the outdoor unit is used alone.

*2 Only displayed when COOL mode is unlocked. (This mean when COOL mode is available)

Menu	Default Setting	Setting Options / Display
5.23 > Pump flowrate		
To set variable flow pump control or fix pump duty control.	ΔT	ΔT Max. Duty
5.24 > DHW Defrost		
Allow system to run defrost by using hot water instead of room unit for better room comfort.	Yes	Yes No
5.25 > Heating control		
To select unit operation condition whether to achieve set temperature faster or to save energy. When "Efficiency" is selected, the time setting will transition to 1st, 2nd, and 3rd stage. Increasing the time will slowly increase the capacity.	Comfort	Comfort Efficiency
	> Efficiency	
	0:20	Heating control 10:34am, Mon Efficiency: Stage 1 Range: (0:00~1:00) Steps: $\pm 0:05$ 0:20 ↕Select [←] Confirm 
5.26 > External meter		
To set which external meter to be used depends on meter connection. There are generation meters and various types of electricity meters. For generation meters, there are two connection systems :- a) One generation meter system : Heat-cool meter only b) Two generation meter system : Heat-cool meter and Tank meter	Heat-cool meter : No * Tank meter : No Elec. meter HP : No Elec. meter 1 (PV) : No Elec. meter 2 (Building) : No Elec. meter 3 (Reserve) : No * Only available if both Heat-cool meter and Tank connection are set to Yes.	External meter 10:34am, Mon Heat-Cool meter Tank meter Elec. meter HP Elec. meter 1 (PV) ↕Select [←] Confirm External meter 10:34am, Mon Elec. meter HP Elec. meter 1 (PV) Elec. meter 2 (Building) Elec. meter 3 (Reserve) ^Select [←] Confirm
	> Heat-cool meter	
	- Set Heat-cool meter to Yes when this generation meter is connected. - It is to measure energy generation of heat pump unit during heating and cooling only operation (one generation meter system) or during heating, cooling and DHW operation (two generation meter system).	Yes No

Remark : Elec. means "Electricity"
HP means "Heat pump"

Menu	Default Setting	Setting Options / Display
	> Tank meter - Set Tank meter to Yes when this generation meter is connected. - It is to measure energy generation of heat pump unit during DHW operation*. * Only available if both Heat-cool meter and Tank connection are set to Yes. Only set Tank meter to Yes when the connection is two generation meter system.	Yes ▲ No
	> Elec. meter HP - Set Elec. meter HP to Yes when this electricity meter is connected. - It is to measure energy consumption of heat pump unit.	Yes ▲ No
	> Elec. meter 1 (PV) - Set Elec. meter 1 (PV) to Yes when this electricity meter is connected. - It is to measure energy generation of solar system. This data will be displayed only on Cloud system.	Yes ▲ No
	> Elec. meter 2 (Building) - Set Elec. meter 2 (Building) to Yes when this electricity meter is connected. - It is to measure energy consumption of the building. This data will be displayed only on Cloud system.	Yes ▲ No
	> Elec. meter 3 (Reserve) - Set Elec. meter 3 (Reserve) to Yes when this electricity meter is connected. - It is to measure energy consumption. This data will be displayed only on Cloud system.	Yes ▲ No
5.27	> Electrical anode	
To enable or disable operation of electrical anode.	Yes (for -AN models) No (for non -AN models) Yes : display No : no display error : blinking	 Yes ▲ No

Remark : Elec. means "Electricity"
 HP means "Heat pump"

Menu	Default Setting	Setting Options / Display	
5.28 > *1 Extra pump			
Selects whether the extra pump is used in the circulation circuit for heating or in the circulation circuit for DHW, or it is not used. If set to “No”, the pump is not used. If set to “Heat”, the extra pump is used as a pump for the circulation circuit (for heating/cooling). If set to “DHW”, the extra pump circulates domestic hot water in the circuit for DHW to prevent the domestic hot water from getting cold. - If set to “Comfort”, hot water is continuously circulated during DHW operation. - If set to “Efficiency”, the extra pump turns ON and OFF alternatively following ON/OFF time setting. *This is for the extra pump connected to the indoor unit, and is not related to the extra pump connected to the outdoor unit. *Extra pump connected to the outdoor unit can't be controlled by the remote controller.	No	No Heat DHW	
	> DHW		
	8:00 am / 8:00	Set Pump ON time	DHW11:34pm, Mon Pump ON time 8:00 am ↕ Select [↔] Confirm
	8:00 pm / 20:00	Set Pump OFF time	DHW11:34pm, Mon Pump OFF time 8:00 pm ↕ Select [↔] Confirm
	Efficiency	Select Comfort or Efficiency	DHW11:34pm, Mon Comfort Efficiency ^Select [↔] Confirm
	> DHW > After selecting Efficiency		
	0:15	Set ON time	DHW11:34pm, Mon ON time Range: (0:05~1:00) Steps: ±0:05 0:15 ↕ Select [↔] Confirm
	0:15	Set OFF time	DHW11:34pm, Mon OFF time Range: (0:05~1:00) Steps: ±0:05 0:15 ↕ Select [↔] Confirm
	5.29-1 > External heater		
	Set to “YES” after an external heater is installed. (This menu is only displayed for the Control Module model (indoor unit))	No	Yes No
5.29-2 > External heater			
18kW threshold Set to whether the total heater capacity is 18kW or less, or over 18kW. ※Please use a separate power supply when connecting heaters over 18kW.	Default setting =<18kW	Ext. heater9:34pm, Mon ≤18kW >18kW ^Select [↔] Confirm	

Menu	Default Setting	Setting Options / Display
5.30 > Static pressure		
If set to "No", the fans in the outdoor unit rotate at a normal speed. If set to "YES", the fans in the outdoor unit rotate at a higher speed than normal for response to high static pressure.	No	Yes ▲ No
5.31 > *1 Cooling capacity		
Selects the cooling capacity. If set to "Efficiency", the cooling operation is performed at rated capacity for efficient cooling. If set to "Comfort", the cooling operation is performed at maximum capacity.	Efficiency	Comfort ▲ Efficiency

*1 Only displayed when COOL mode is unlocked (This means when COOL mode is available).

Menu	Default Setting	Setting Options / Display
6 Installer setup > Operation setup		
To access to the four major functions or modes.	4 main modes Heat / * ¹ Cool / * ¹ , * ² Auto / * ³ Tank	Operation setup 10:34am, Mon Heat Cool Auto Tank ↙Select [↔] Confirm
6.1 > Heat		
To set various water & ambient temperatures for heating.	Water temp. for heating ON / Outdoor temp. for heating OFF / ΔT for heating ON / Heater ON/OFF	Operation setup 10:34am, Mon Heat Water temp. for heating ON Outdoor temp. for heating OFF ΔT for heating ON ↙Select [↔] Confirm
> Water temp. for heating ON		
Compensation curve	Heating ON temperatures in compensation curve or direct input.	Operation setup 10:34am, Mon Heat ON: Water temp. Compensation curve Direct ↙Select [↔] Confirm
> Water temp. for heating ON > Compensation curve		
X axis: -5 °C, 15 °C Y axis: 55 °C, 35 °C	Input the 4 temperature points (2 on horizontal X axis, 2 on vertical Y axis).	Heat ON: Water temp.:Zone1 ↔Select [↔] Confirm
• Temperature range: X axis: -20 °C ~ 15 °C, Y axis: See below • Temperature range for the Y axis input: WH-WXG model: 25 °C ~ 75 °C Regardless of the above setting, there is a limit to the water temperature. Refer to Operation Range in Sec3 specifications. • If 2 zone system is selected, the 4 temperature points must also be input for Zone 2. • "Zone 1" and "Zone 2" will not appear on the display if only 1 zone system.		
> Water temp. for heating ON > Direct		
35 °C	Temperature for heating ON	Operation setup 10:34am, Mon Heat ON: Water temp.:Zone2 Range: (25°C~75°C) Steps: ±1°C ↕Select [↔] Confirm
• Min. ~ Max. range is 25 °C ~ 75 °C: WH-WXG model: 25 °C ~ 75 °C Regardless of the above setting, there is a limit to the water temperature. Refer to Operation Range in Sec3 specifications. • If 2 zone system is selected, temperature set point must input for Zone 2. • "Zone 1" and "Zone 2" will not appear on the display if only 1 zone system.		

*¹ The system is locked to operate without COOL mode. It can be unlocked only by authorised installers or our authorised service partners.

*² Only displayed when COOL mode is unlocked (This means when COOL mode is available).

*³ Only displayed when Tank connection is Yes.

Menu	Default Setting	Setting Options / Display
	> Outdoor temp. for heating OFF	
	> Outdoor temp. for heating OFF > Heat OFF outdoor temp.	
24 °C	Set outdoor temp to stop heating. Setting range is 6°C~35°C	Operation setup 10:34am, Mon Heat OFF: Outdoor temp. Range: (6°C~35°C) Steps: ±1°C 24 °C ⬆Select [↔] Confirm
	> Outdoor temp. for heating OFF > Heat ON outdoor temp.	
23 °C	Set outdoor temp to start heating. Setting range is 5°C~X°C (X is heating OFF temp. -1)	Operation setup 10:34am, Mon Heat ON: Outdoor temp. Range: (5°C~23°C) Steps: ±1°C 23 °C ⬇Select [↔] Confirm
	> Outdoor temp. for heating OFF > Heat ON Delay time.	
0:30 min	Set delay time from heating OFF to heating ON.	Operation setup 10:34am, Mon Heat ON: Delay time Range: (0:30~24:00) Steps: ±0:30 0:30 ⬆Select [↔] Confirm
	> ΔT for heating ON	
5 °C	Set ΔT for heating ON. * This setting will not available to set when pump flowrate set to Max. duty.	Operation setup 10:34am, Mon Heat ON: ΔT Range: (1°C~15°C) Steps: ±1°C 5 °C ⬆Select [↔] Confirm
	> *1 Heater ON/OFF	
	> Heater ON/OFF > Outdoor temp. for heater ON	
0 °C	Temperature for heater ON	Operation setup 10:34am, Mon Heater ON: Outdoor temp. Range: (-20°C~15°C) Steps: ±1°C 0 °C ⬆Select [↔] Confirm
	> Heater ON/OFF > Delay time for heater ON	
0:30 min	Delay time for heater to turn on	Operation setup 10:34am, Mon Heater ON: Delay time Range: (0:10~1:00) Steps: ±0:10 0:30 ⬆Select [↔] Confirm
	> Heater ON/OFF > Water temperature for heater ON	
-4 °C	Setting of water temperature to turn on from water set temperature.	Operation setup 10:34am, Mon Heater ON: ΔT of target Temp. Range: (-10°C~-2°C) Steps: ±1°C -4 °C ⬆Select [↔] Confirm

*1 It is not displayed when the outdoor unit is used alone.

Menu	Default Setting	Setting Options / Display
> Heater ON/OFF > Water temperature for heater OFF		
	-2 °C	Operation setup 10:34am, Mon Heater OFF: ΔT of target Temp. Range: (-8°C~0°C) Steps: $\pm 1^\circ\text{C}$ -2 °C ⬆Select [↔] Confirm
6.2 > *1, *2 Cool		
To set various water & ambient temperatures for cooling.	Water temperatures for cooling ON and ΔT for cooling ON.	Operation setup 10:34am, Mon Cool Water temp. for cooling ON ΔT for cooling ON ⬇Select [↔] Confirm
	> Water temp. for cooling ON	
	Compensation curve	Operation setup 10:34am, Mon Cool ON: Water temp. Compensation curve Direct ⬇Select [↔] Confirm
	> Water temp. for cooling ON > Compensation curve	
	X axis: 20 °C, 30 °C Y axis: 15 °C, 10 °C	Input the 4 temperature points (2 on horizontal X axis, 2 on vertical Y axis) Cool ON: Water temp: Zone1 ⬆Select [↔] Confirm
	• If 2 zone system is selected, the 4 temperature points must also be input for Zone 2. • "Zone 1" and "Zone 2" will not appear on the display if only 1 zone system.	
	> Water temp. for cooling ON > Direct	
	10 °C	Operation setup 10:34am, Mon Cool ON: Water temp.: Zone2 Range: (5°C~20°C) Steps: $\pm 1^\circ\text{C}$ 10 °C ⬆Select [↔] Confirm
• If 2 zone system is selected, temperature set point must input for Zone 2. • "Zone 1" and "Zone 2" will not appear on the display if only 1 zone system.		
> ΔT for cooling ON		
	5 °C	Operation setup 10:34am, Mon Cool ON: ΔT Range: (1°C~15°C) Steps: $\pm 1^\circ\text{C}$ 5 °C ⬆Select [↔] Confirm

*1 The system is locked to operate without COOL mode. It can be unlocked only by authorised installers or our authorised service partners.

*2 Only displayed when COOL mode is unlocked (This means when COOL mode is available).

Menu	Default Setting	Setting Options / Display
6.3 > *1, *2 Auto		
Automatic switch from Heat to Cool or Cool to Heat.	Outdoor temperatures for switching from Heat to Cool or Cool to Heat.	Operation setup 10:34am, Mon Auto Outdoor temp. for (Heat to Cool) Outdoor temp. for (Cool to Heat) Select [↔] Confirm
	Outdoor temp. for (Heat to Cool) / Outdoor temp. for (Cool to Heat)	
	> Outdoor temp. for (Heat to Cool)	
	15 °C Set outdoor temperature for switching from Heat to Cool.	Operation setup 10:34am, Mon Auto: Outdoor temp.(Heat to Cool) Range: (11°C~25°C) Steps: ±1°C 15 °C Select [↔] Confirm
	> Outdoor temp. for (Cool to Heat)	
	10 °C Set outdoor temperature for switching from Cool to Heat.	Operation setup 10:34am, Mon Auto: Outdoor temp.(Cool to Heat) Range: (5°C~14°C) Steps: ±1°C 10 °C Select [↔] Confirm
6.4 > *3 Tank		
Setting functions for the tank.	Floor operation time (max) / Tank heat up time (max) / Tank re-heat temp. / Sterilization	Operation setup 10:34am, Mon Tank Floor operation time (max) Tank heat up time (max) Tank re-heat temp. Select [↔] Confirm
	• The display will show 3 functions at a time.	
	> Floor operation time (max)	
	8:00 Maximum time for floor operation (in hours and minutes)	Operation setup 10:34am, Mon Tank: Floor op. time (max) Range: (0:30~10:00) Steps: ±0:30 8:00 Select [↔] Confirm
	> Tank heat up time (max)	
	1:00 Maximum time for heating the tank (in hours and minutes)	Operation setup 10:34am, Mon Tank: Heat up time (max) Range: (0:05~4:00) Steps: ±0:05 1:00 Select [↔] Confirm
	> Tank re-heat temp.	
	-8 °C Set temperature to perform reboil of tank water.	Operation setup 10:34am, Mon Tank: Re-heat temp. Range: (-12°C~-2°C) Steps: ±1°C -8 °C Select [↔] Confirm

*1 The system is locked to operate without COOL mode. It can be unlocked only by authorised installers or our authorised service partners.

*2 Only displayed when COOL mode is unlocked (This means when COOL mode is available).

*3 Only displayed when Tank connection is Yes.

Menu	Default Setting	Setting Options / Display														
	> Sterilization															
	Monday	Sterilization may be set for 1 or more days of the week. Sun / Mon / Tue / Wed / Thu / Fri / Sat Operation setup10:34am, Mon Sterilization: Day <table><tr><td>Sun</td><td>Mon</td><td>Tue</td><td>Wed</td><td>Thu</td><td>Fri</td><td>Sat</td></tr><tr><td>—</td><td>✓</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td></tr></table> ⏮Day⏭☑/☐[↩] Confirm	Sun	Mon	Tue	Wed	Thu	Fri	Sat	—	✓	—	—	—	—	—
	Sun	Mon	Tue	Wed	Thu	Fri	Sat									
	—	✓	—	—	—	—	—									
	> Sterilization: Time															
	12:00	Time of the selected day(s) of the week to sterilize the tank 0:00 ~ 23:59 Operation setup10:34am, Mon Sterilization: Time 12:00 pm ⏮Select[↩] Confirm														
> Sterilization: Boiling temp.																
65 °C	Set boiling temperatures for sterilize the tank. *1 Range: (55°C~65°C) Steps: ±1°C Operation setup10:34am, Mon Sterilization: Boiling temp. 65 °C ⏮Select[↩] Confirm															
> Sterilization: Ope. time (max)																
0:10	Set sterilizing time (in hours and minutes) Range: (0:05~1:00) Steps: ±0:05 Operation setup10:34am, Mon Sterilization: Ope. time (max) 0:10 ⏮Select[↩] Confirm															
7 Installer setup > Service setup																
7.1 > Pump maximum speed																
To set the maximum speed of the pump.	Setting the flow rate, max. duty and operation ON/OFF of the pump. Flow rate: XX.X L/min Max. Duty: 0x40 ~ 0xFE, Pump: ON/OFF/Air Purge	Service setup10:34am, Mon Flow rateMax. DutyOperation 46.0 L/min0xCEOFF ⏮Select														
7.2 > *2 Zone2 pump speed																
To set the zone2 pump speed.	Flow rate: XX.X L/min Max. Duty: 0x46 ~ 0xC5, Pump: ON/OFF	Service setup11:34pm, Mon Flow rateMax. DutyOperation 0.0 L/min0x50OFF ⏮Select[↩] Confirm														

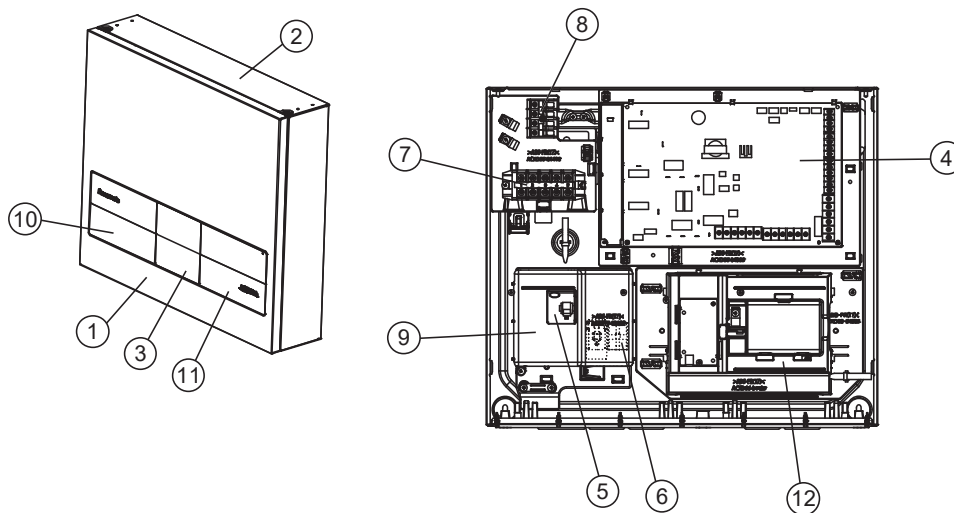
*1 When using external heater, 55°C ~ 75°C.

*2 Only displayed when Panasonic AIR-TO-WATER CONTROL MODULE+TANK 2Zone model.

Menu	Default Setting	Setting Options / Display
7.3 > Dry concrete		
To dry the concrete (floor, walls, etc.) during construction. Do not use this menu for any other purposes and in period other than during construction	Edit to set the temperature of dry concrete. ON / Edit	Service setup 10:34am, Mon Dry concrete ON Edit ↙Select [↵] Confirm
	> Edit	
	Stages: 1 Temperature: 25 °C	Heating temperature for drying the concrete. Select the desired stages: 1 ~ 10, range: 1 ~ 99 Service setup 10:34am, Mon Dry concrete: 1/10 Range: (25°C~55°C) Steps: ±1°C 25 °C ↖Select [↵] Confirm
	> ON	
	Confirm the setting temperatures of dry concrete for each stage.	Service setup 10:34am, Mon Dry concrete: Status Stage : 1/10 Water set temp. : 25°C Actual water temp. : 25°C/25°C [⏻] OFF
7.4 > Service contact		
To set up to 2 contact names and numbers for the User.	Service engineer's name and contact number. Contact 1 / Contact 2	Service setup 10:34am, Mon Service contact: Contact 1 Contact 2 ↙Select [↵] Confirm
	> Contact 1 / Contact 2	
	Contact name or number. Name / phone icon	Service contact 10:34am, Mon Contact 1 Name : Bryan Adams ☎ : 08812345678 ↙Select [↵] Edit
	Input name and number Contact name: alphabet a ~ z. Contact number: 1 ~ 9	Contact-1 ABC/abc 0-9/Other ABCDEFGHIJKLMN OPQR Space STUVWXYZ abcdefghi BS jklmnopqrstuvw xyz Conf ↵↙Select [↵] Enter Number: 1 2 3 (4 5 6) 7 8 9 - BS * 0 # _ Conf ↵↙Select [↵] Enter

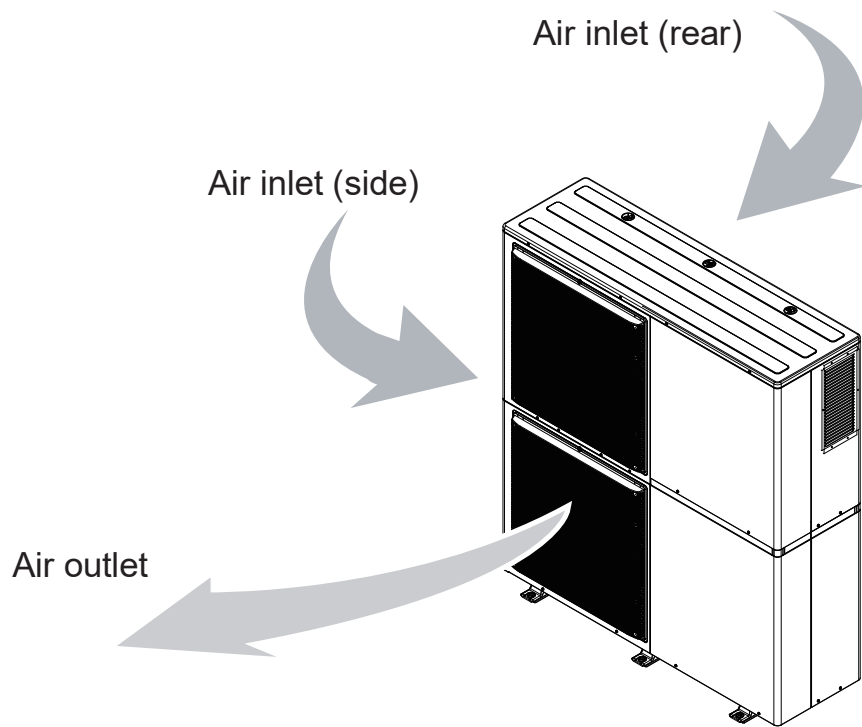
Menu	Default Setting	Setting Options / Display
8 Installer setup > Remote control setup		
- To select whether to use one remote controller or two remote controllers. - Select Single when one remote controller is connected. Select Dual when two remote controllers are connected. Second remote controller can be used for zone 2 room temperature control.	Single	Selection of one or two remote controllers. Single ▼ Dual
		When Dual is selected, Main remote controller (RC-1) will start to communicate with second remote controller (RC-2) and display "RC-1 & RC-2 sync. in progress". They are ready to be used after this pop up screen disappears. RC-1 & RC-2 sync. in progress!
		When both remote controllers have communication failure, it will display "Communication with RC-2 failed". Communication with RC-2 failed! [↵] Close

5.1.7 Main Components



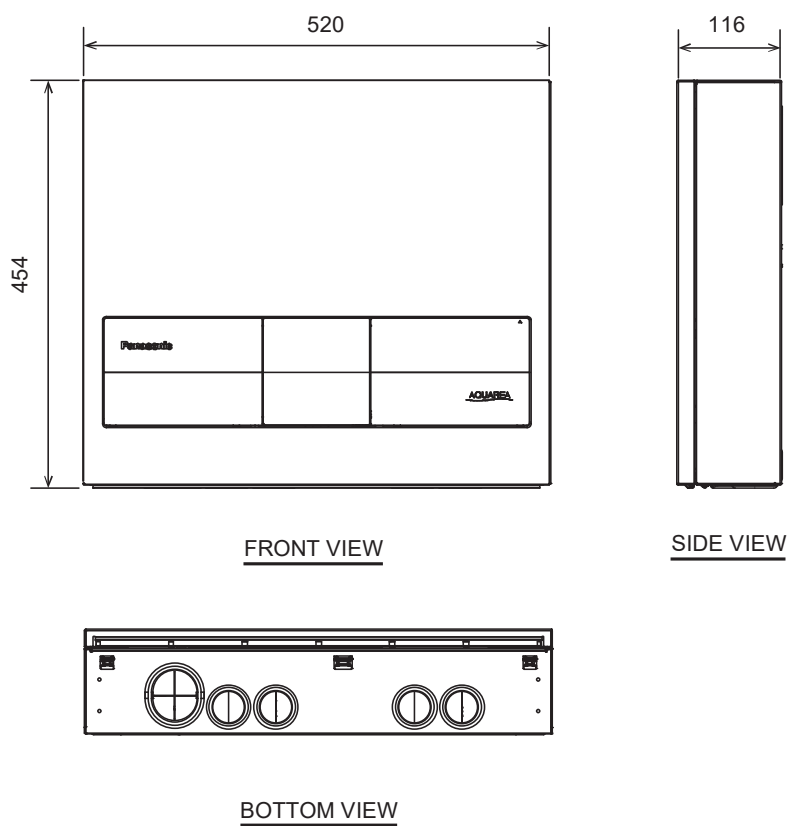
- ① Front cover
- ② Enclosure
- ③ Remote controller
- ④ PCB
- ⑤ RCCB/ELCB
- ⑥ Terminal 1 (ID-OD Communication)
- ⑦ Terminal 2 (For Heater)
- ⑧ Terminal 3 (For Heater OLP (Bi metal thermostat) & sensor)
- ⑨ Terminal Cover
- ⑩ Left decoration panel
- ⑪ Right decoration panel
- ⑫ Network adaptor holder

5.2 Outdoor Unit



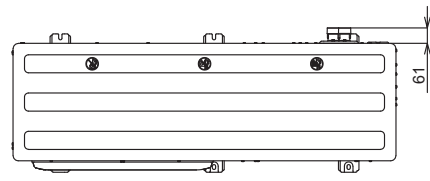
6. Dimensions

6.1 Indoor Unit

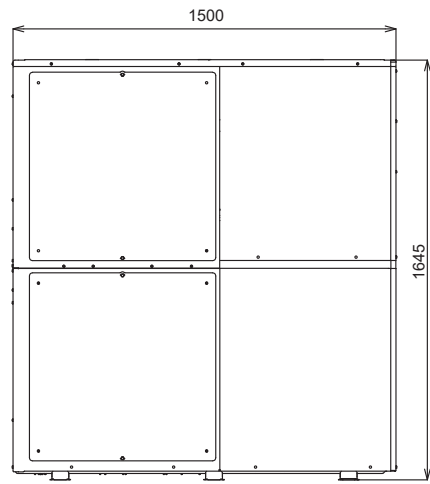


Unit: mm

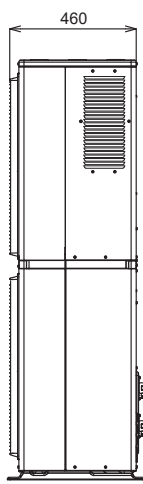
6.2 Outdoor Unit



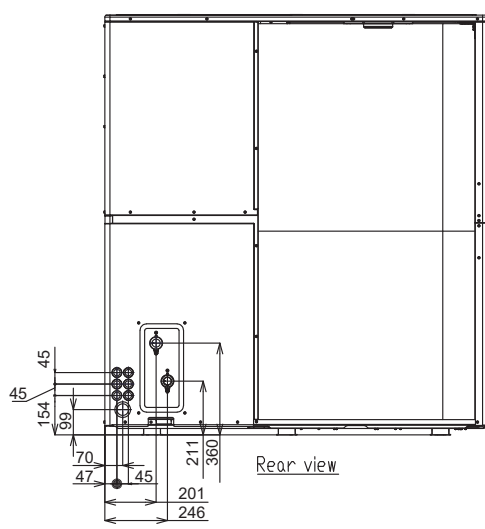
Top view



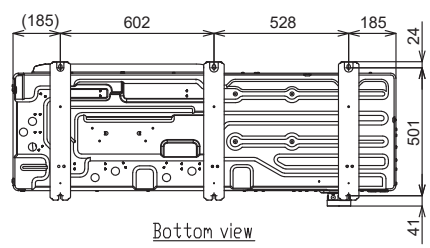
Front view



Side view



Rear view

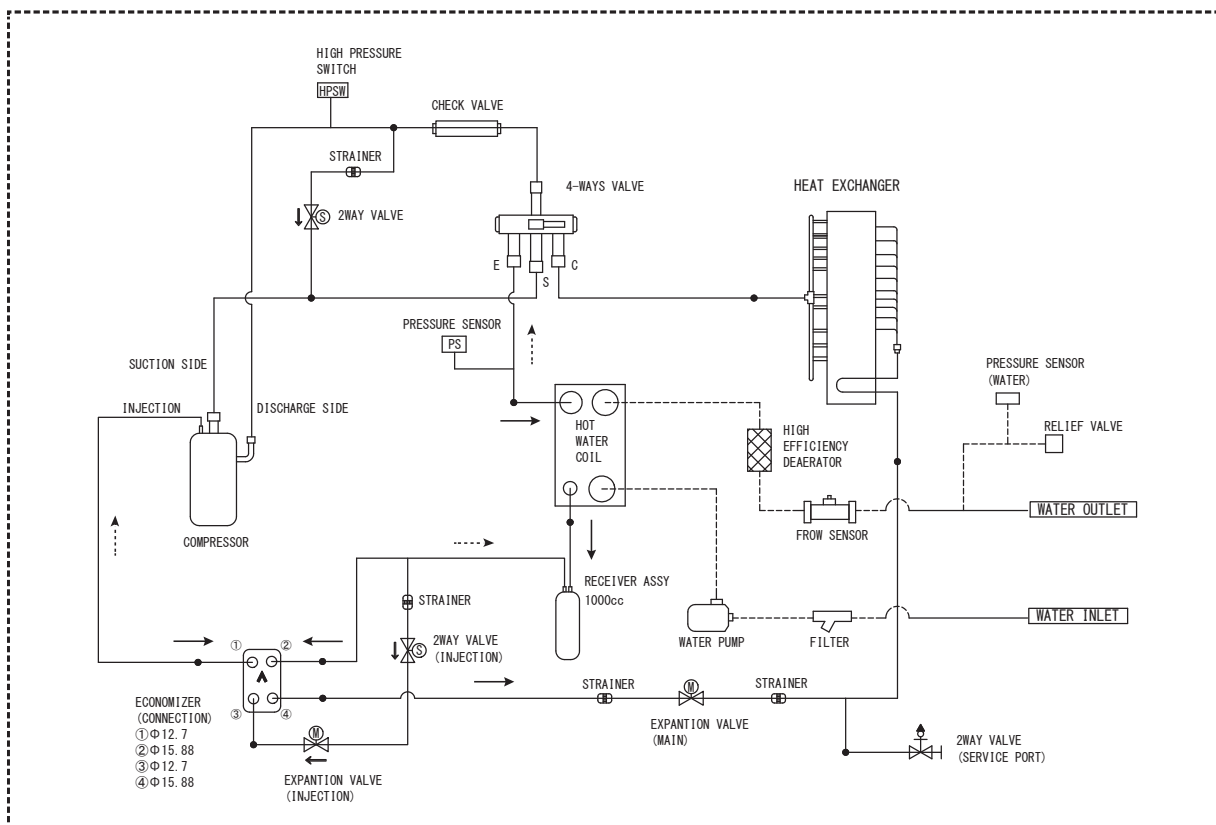


Bottom view

Unit: mm

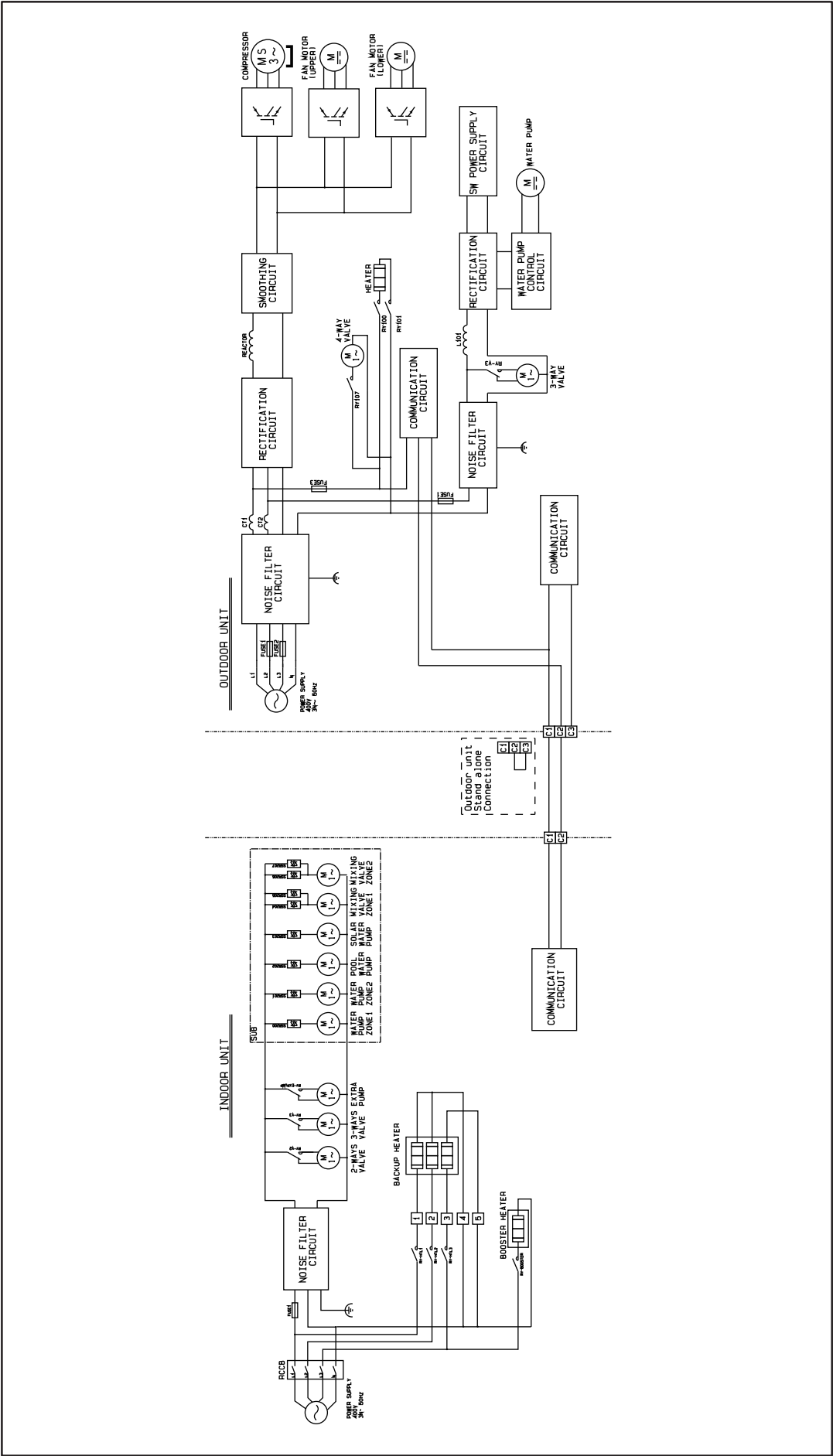
7. Refrigeration and Water Cycle Diagram

OUTDOOR UNIT



TH1	Outdoor discharge sensor
TH2	-
TH3	Outdoor heat exchanger sensor
TH4	Outdoor ambient sensor
TH5	Evaporator outlet sensor
TH6	Refrigerant sensor
TH7	Water inlet 2 sensor
TH8	Water outlet sensor 2
TH9	Outdoor heat exchanger middle sensor
TH10	Bypass outlet sensor
TH11	Bypass inlet sensor
TH12	Economizer outlet sensor

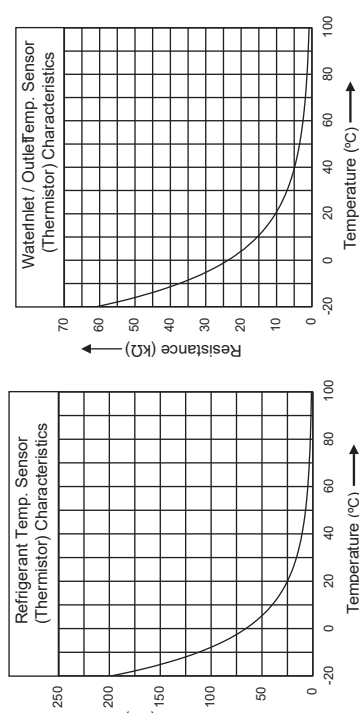
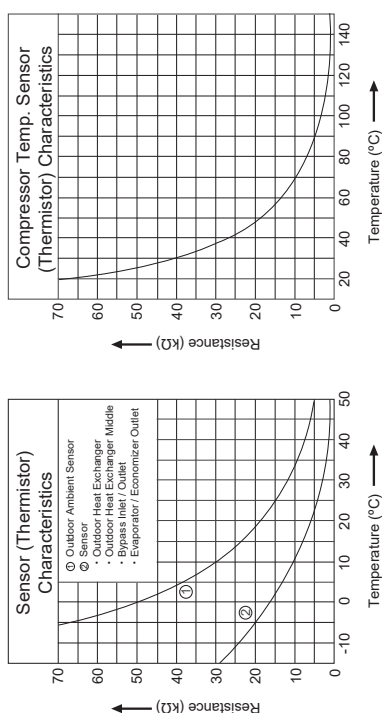
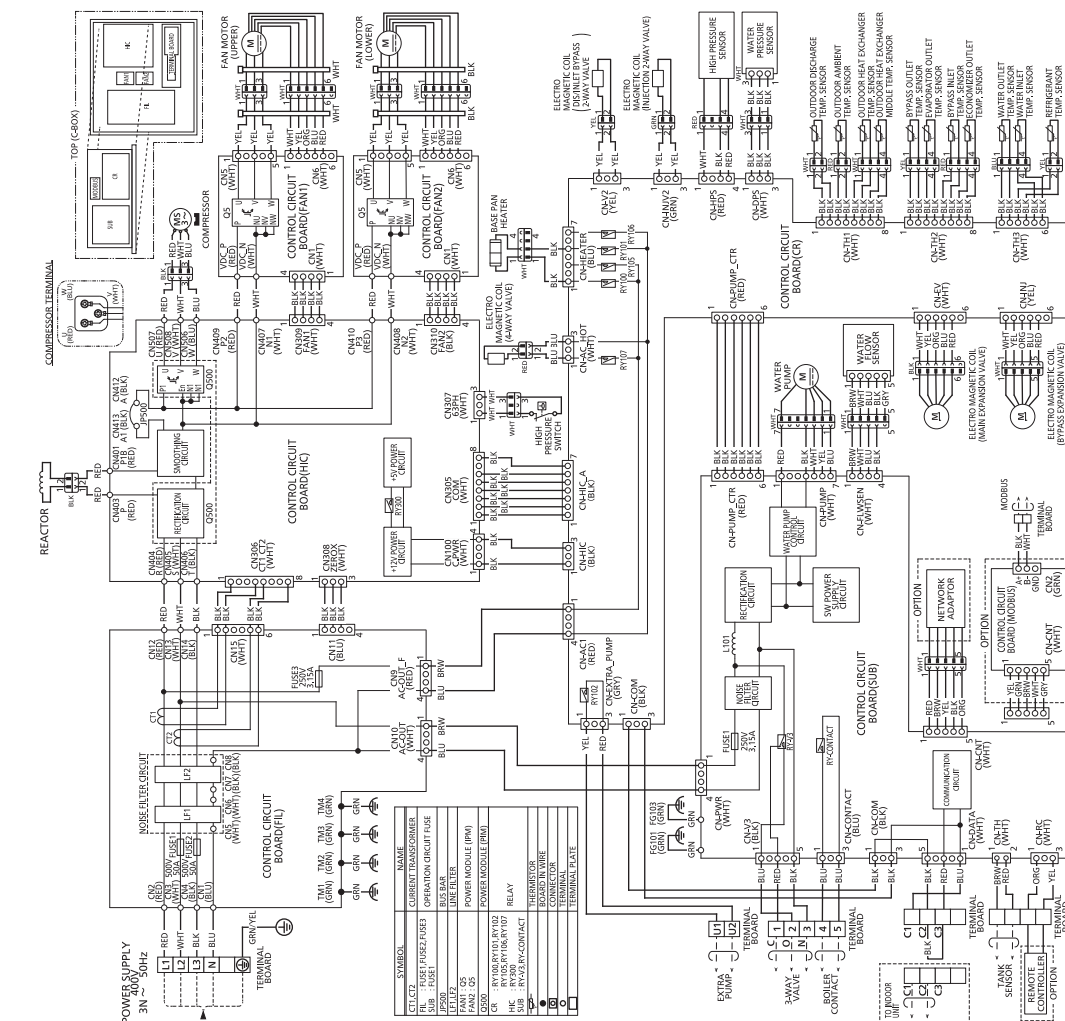
8. Block Diagram



9.1 Indoor Unit



9.2 Outdoor Unit



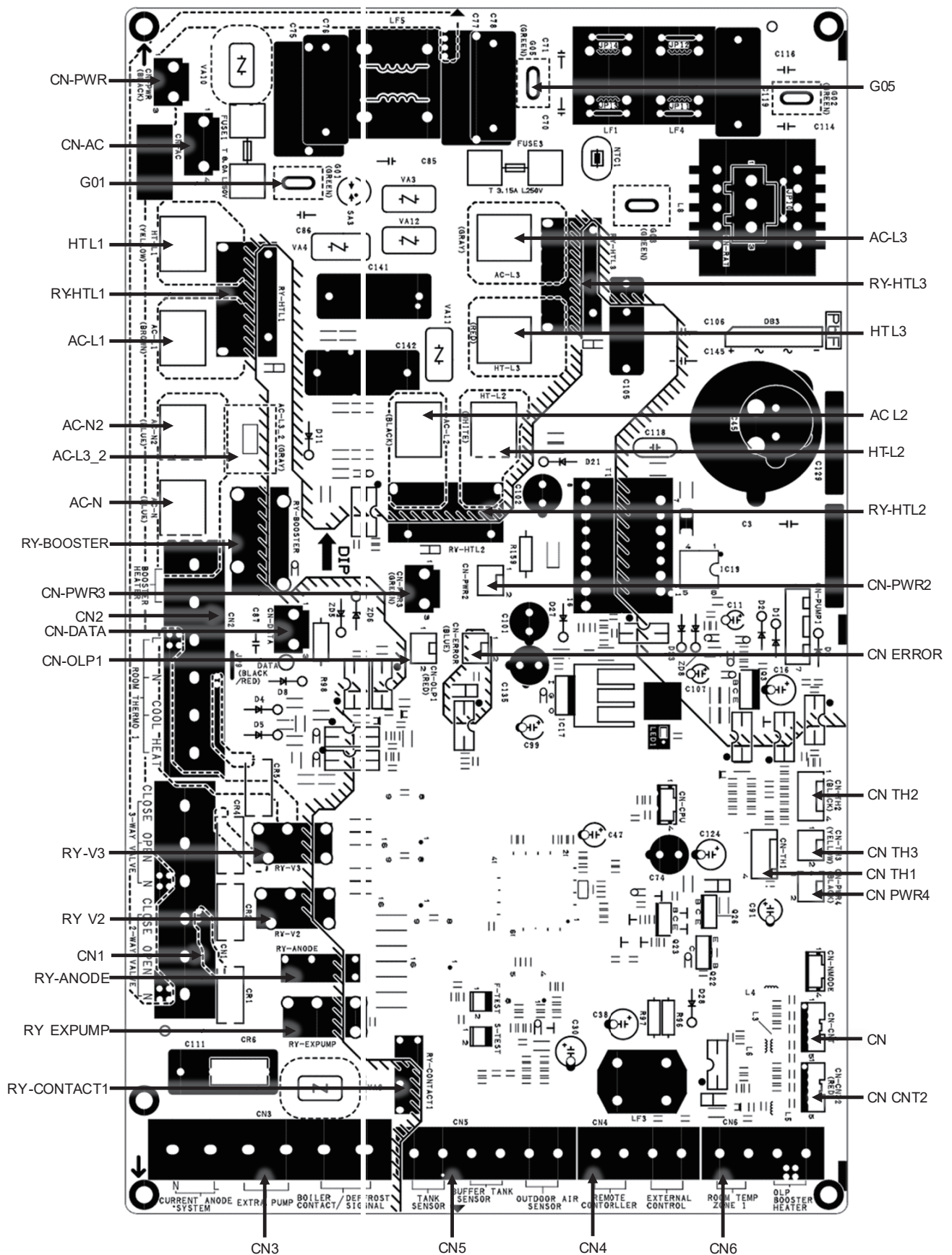
Resistance of Compressor Windings	
MODEL	WH-WXG20ME8 / WH-WXG25ME8 / WH-WXG30ME8
CONNECTION	7CD120ZA02
U - V	0.122 Ω
V - W	0.122 Ω
U - W	0.122 Ω

Note: Resistance at 20°C of ambient temperature.

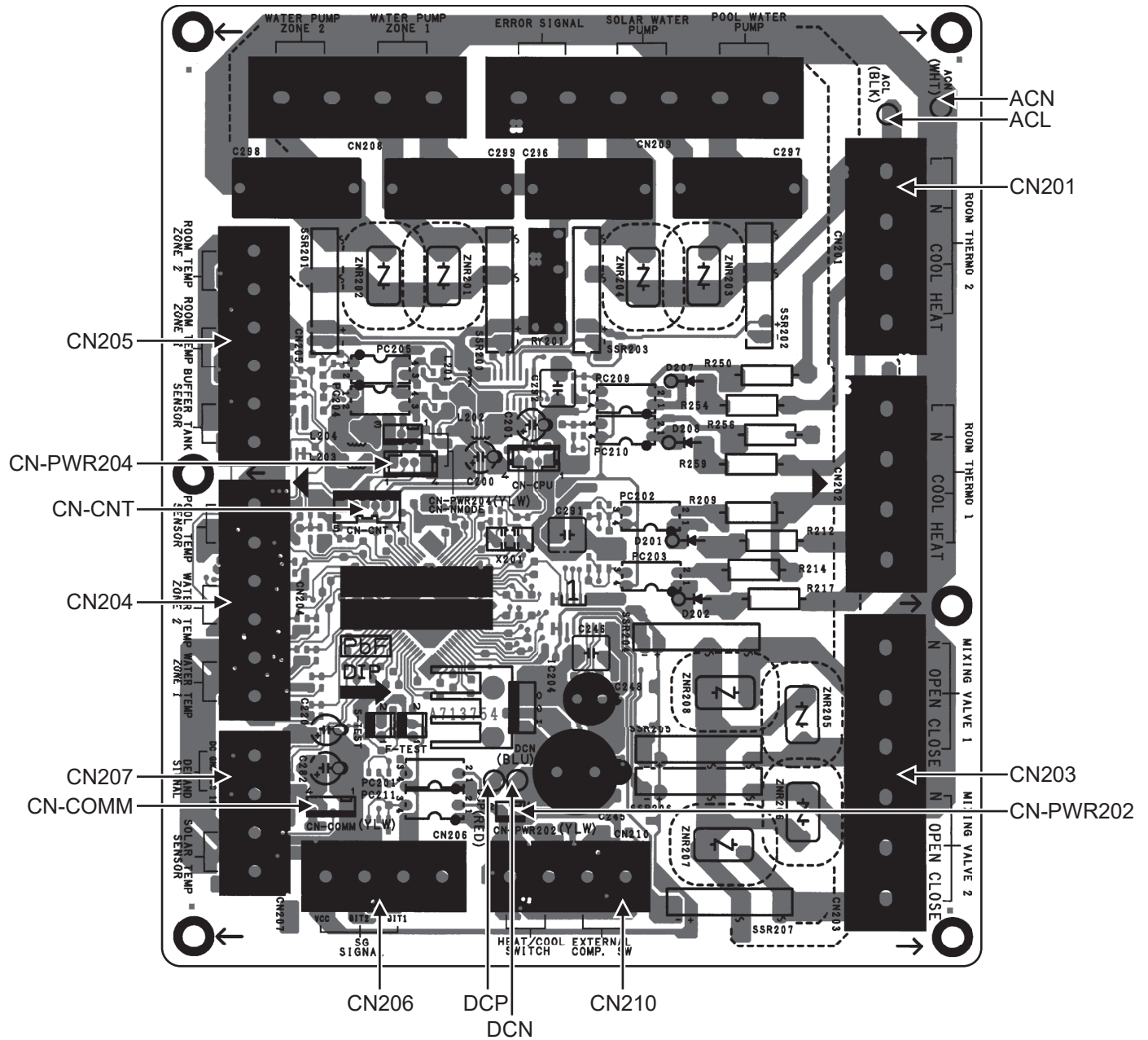
10. Printed Circuit Board

10.1 Indoor Unit

10.1.1 Main Printed Circuit Board



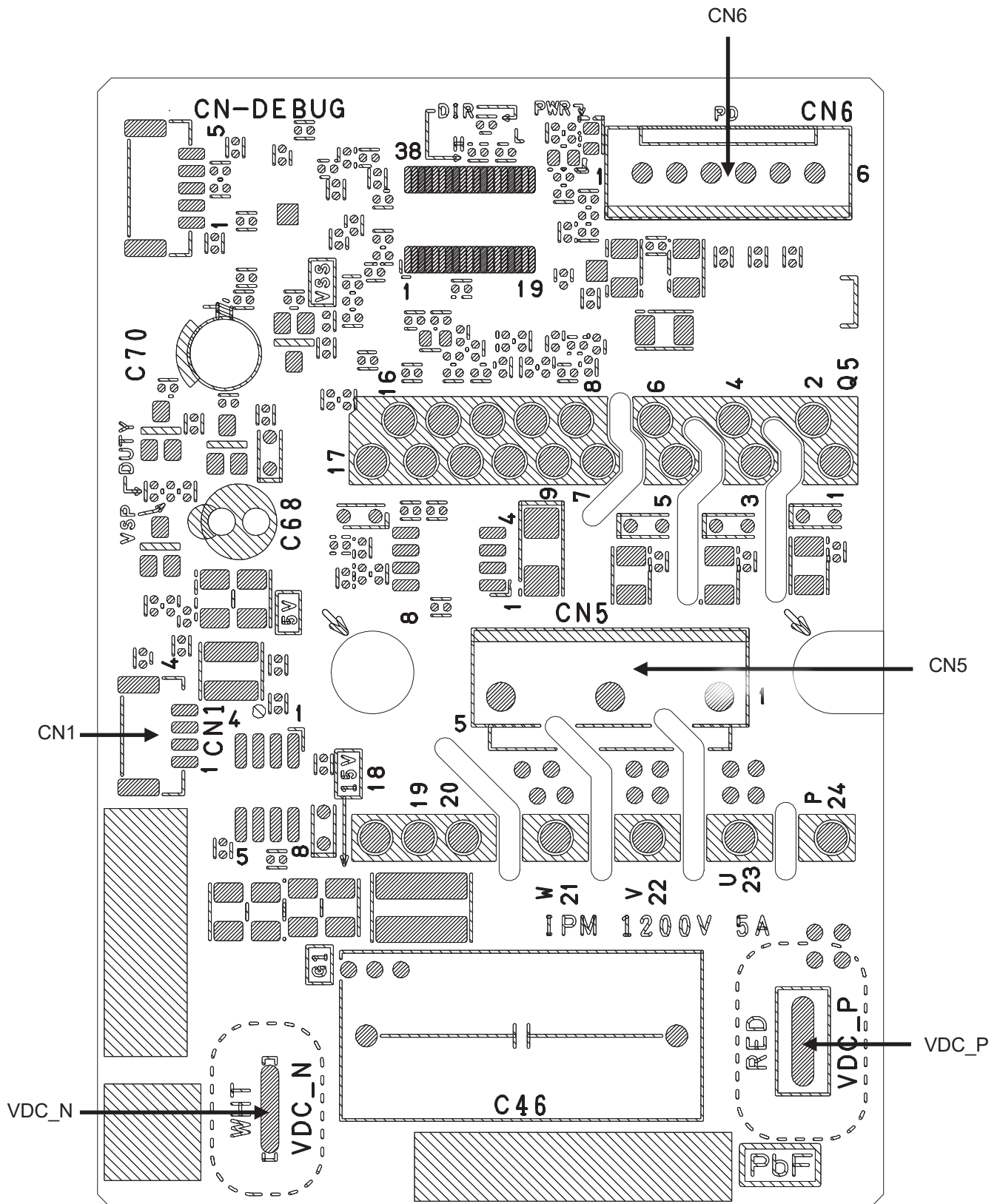
10.1.2 Sub Printed Circuit Board (Optional)



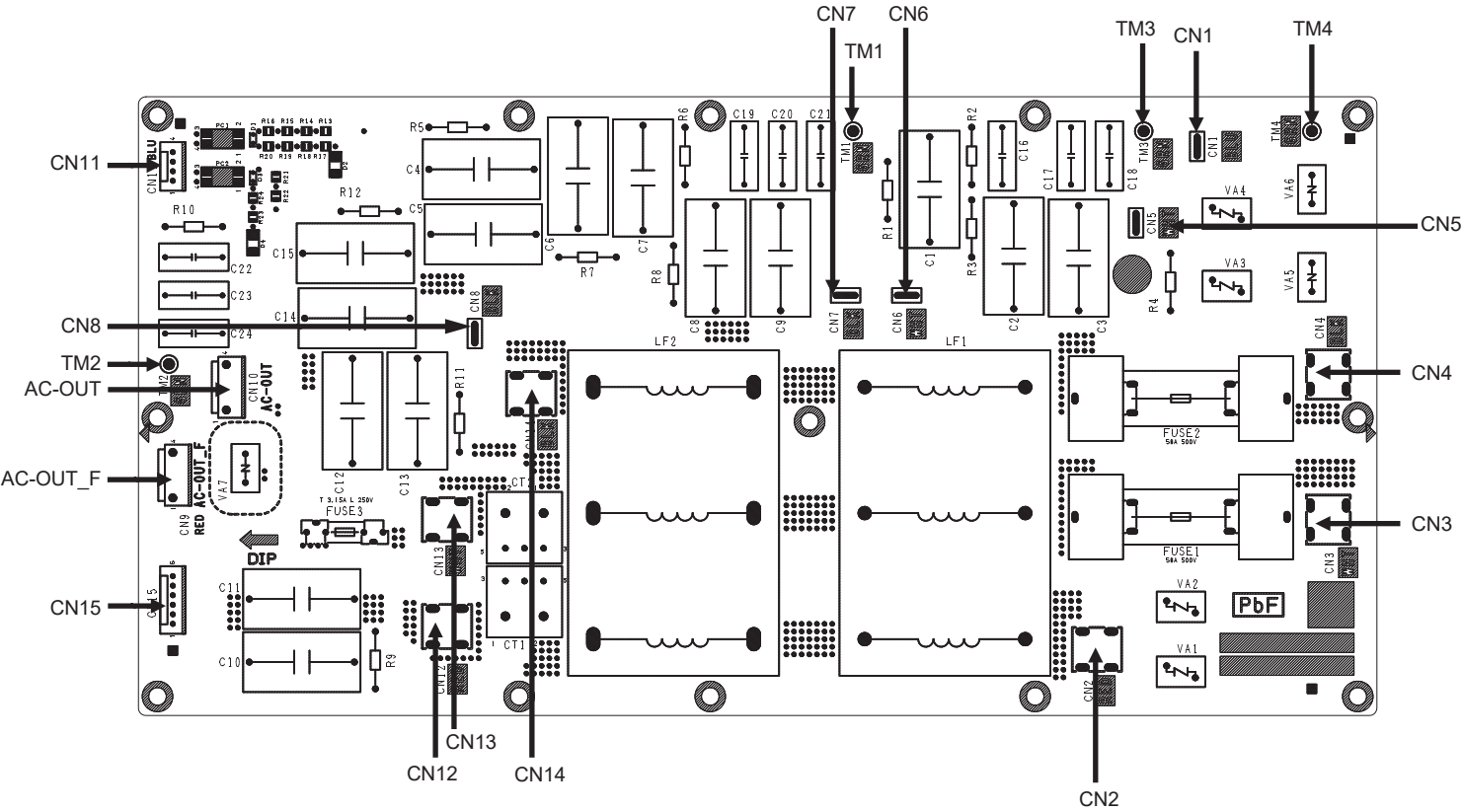
10.2.1 Main Printed Circuit Board



10.2.3 FAN Printed Circuit Board



10.2.4 Noise Filter Printed Circuit Board



11. Installation Instruction

Attached Accessories

No.	Accessories part	Qty.
1	Installation plate	1
2	Network adaptor (CZ-TAW*)	1

Optional Accessories

No.	Accessories part	Qty.
3	Remote controller Case (PAW-A2W-COV-KL)	1
4	Extension Cable (CZ-TAW1-CBL)	1
5	Optional PCB (CZ-NS7P)	1
6	Remote controller (CZ-RTW2-1)*1	1

*1 If you need the 2nd remote controller, buy [6] and set it up.

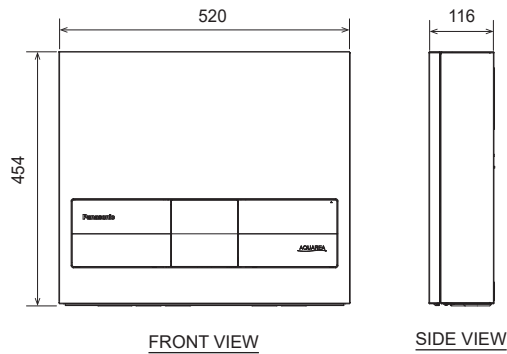
Field Supply Accessories (Optional)

No.	Part		Model	Specification
i	2-way valve kit *Cooling model	Electromotoric Actuator	—	AC230V, 12 VA
		2-port Valve	—	—
ii	3-way valve kit	Electromotoric Actuator	—	AC230V, 12 VA
		3-port Valve	—	—
iii	Room thermostat	Wired	PAW-A2W-RTWIRED	AC 230V, 0.6 A max
		Wireless	PAW-A2W-RTWIRELESS	
iv	Pump	—	—	AC 230V, 3.0 A max
v	Buffer tank sensor	—	PAW-A2W-TSBU	—
vi	Outdoor sensor	—	PAW-A2W-TSOD	—
vii	Zone water sensor	—	PAW-A2W-TSHC	—
viii	Zone room sensor	—	PAW-A2W-TSRT	—
ix	Solar sensor	—	PAW-A2W-TSSO	—
x	Outlet sensor	—	PAW-A2W-TSBH	—

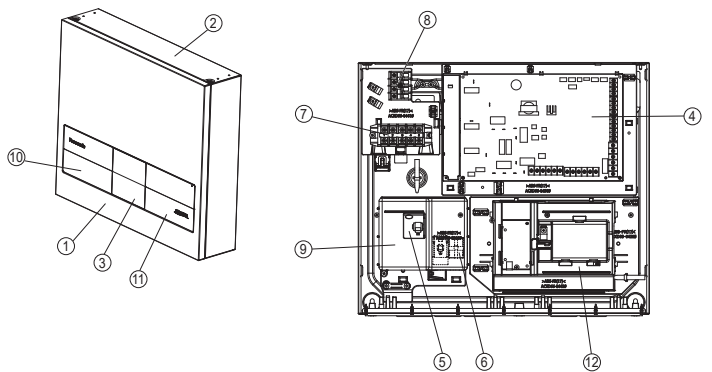
■ It is recommended to purchase the field supply accessories listed in above table.

Dimension Diagram

Unit: mm



Main Components Diagram



- ① Front cover
- ② Enclosure
- ③ Remote controller
- ④ PCB
- ⑤ RCCB/ELCB
- ⑥ Terminal 1 (ID-OD Communication)
- ⑦ Terminal 2 (For Heater)
- ⑧ Terminal 3 (For Heater OLP (Bi metal thermostat) & sensor)
- ⑨ Terminal Cover
- ⑩ Left decoration panel
- ⑪ Right decoration panel
- ⑫ Network adaptor holder

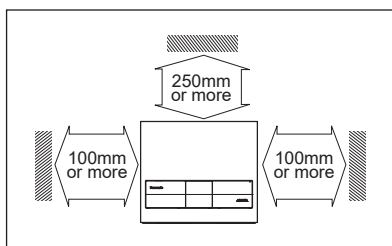
11.1 Indoor Unit

11.1.1 Select the Best Location

Obtain customer's approval before deciding the installation location.

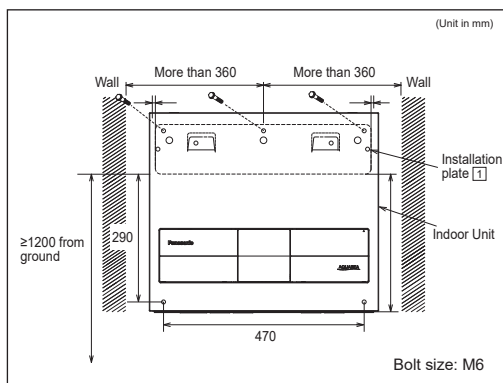
- ☐ Ensure that there are no heat sources or vapours near the Indoor Unit.
- ☐ Good air circulation in the room.
- ☐ Ensure to keep distance of spaces as illustrated below from walls ceilings, or other obstacles.
- ☐ A place where flammable gas leaking might not occur.
- ☐ The Indoor Unit must be installed on a vertical wall.
- ☐ When installing electrical equipment in a wooden building of metal lath or wire lath, according to electrical facility technical standards, no electrical contact between equipment and building is allowed. An insulator must be installed in between them.
- ☐ Do not install the Indoor Unit at outdoor. This is designed for indoor installation only.

Required space for installation



Installation position

The mounting wall is strong and solid enough to prevent it from vibration



The centre of the installation plate should be more than 360 mm from the right and left of the wall.

The distance from the installation plate edge to the ground should be more than 1200 mm.

- Always mount the installation plate horizontally by aligning the marking thread and using a level gauge.
- Mount the installation plate on the wall with 3 sets of plug, screw and washer with size M6 (field supply). The combined thickness of the screw head and washer must be less than 6 mm.

11.1.2 Install the indoor unit and open the front cover

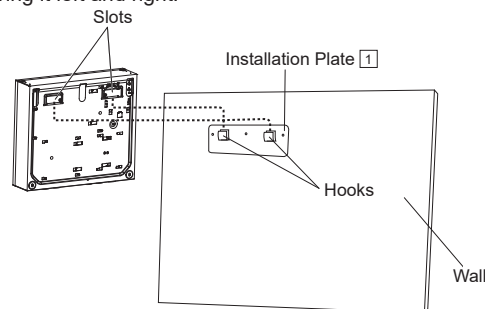
WARNING

- ! This section is for authorized and licensed electrician only. Work behind the front cover ① secured by screws must only be carried out under the supervision of a qualified contractor, installation engineer, or service person.

Hang the Indoor Unit on the installation plate

1. Engage the slots on the Indoor Unit to the hooks of installation plate ①.

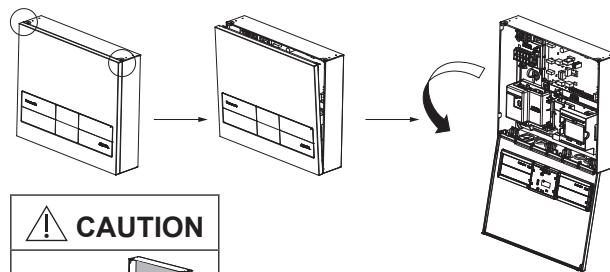
2. Ensure the hooks are properly seated on the installation plate by moving it left and right.



Open the front cover

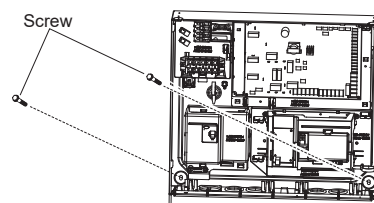
Before opening the front cover ① of the Indoor Unit, always switch off all power supplies (e.g. the Indoor Unit power supply, the outdoor unit power supply, and the heater power supply).

1. Remove the 2 mounting screws located at the top of the enclosure ②.
2. Gently pull the upper section of the front cover ① towards you. (The front cover will stop once it has opened about 2 degrees.)
3. Gently rotate the front cover ① to open 180 degrees.

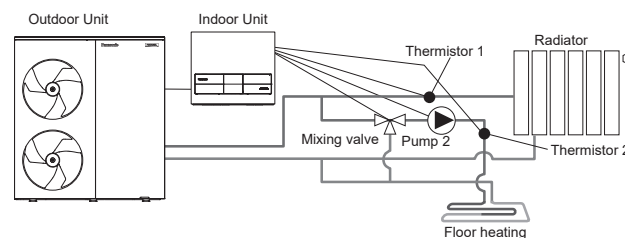


Fix the Indoor Unit

Fasten two screws (M6) at the bottom holes of the Indoor Unit.



An example of system installation



11.1.3 Connect the cable to the indoor unit

WARNING

This section is for authorized and licensed electrician only. Work behind the front cover ① (secured by screws) must only be carried out under the supervision of a qualified contractor, installation engineer, or service person.

1. Remove the terminal cover.
Remove one screw from the terminal cover ⑨, and move it upward.
2. Connect the power supply cable.

The specification of the power supply cable must be as follows:

- Cable size depends on the capacity of external heater. Refer to below table.

EXTERNAL HEATER Capacity a [kW]	Cable size
$a \leq 12\text{kW}$	5 x min 2.5 mm ²
$12\text{kW} < a \leq 15\text{kW}$	5 x min 4.0 mm ²
$15\text{kW} < a \leq 18\text{kW}$	5 x min 6.0 mm ²

- Cable type: 60245 IEC 57 or heavier, with an approved polychloroprene sheath.
- The earth wire must be longer than other wires.

The specification of the isolating device (disconnecting means) and RCD must be as follows:

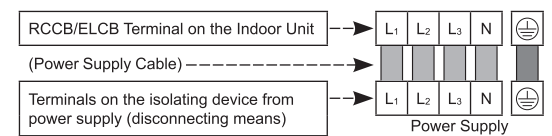
- Its rated current depends on the capacity of external heater. Refer to below table.

EXTERNAL HEATER Capacity a [kW]	Isolating device
$a \leq 9\text{kW}$	20 A
$9\text{kW} < a \leq 18\text{kW}$	40 A

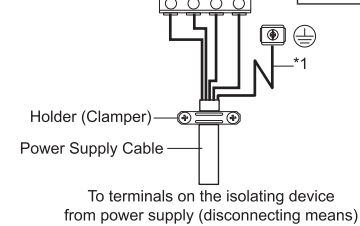
- Recommended RCD: 30mA, 4P, type A
- The isolating device must be connected to the power supply cable.
- The isolating device must have a contact gap of at least 3.0 mm.

The method of wiring a cable is shown below.

Go through the cable from the left squared bushing hole.



Terminal screw	Tightening torque cN•m {kgf•cm}
M4	157~196 {16~20}
M5	196~245 {20~25}



- *1 - Earth wire should be longer than other cables for safety reasons

Terminals of RCCB/ELCB tightening torque cN•m {kgf•cm}	160~200 {16.3~20.4}
Holder tightening torque cN•m {kgf•cm}	70~130 {7.1~13.3}

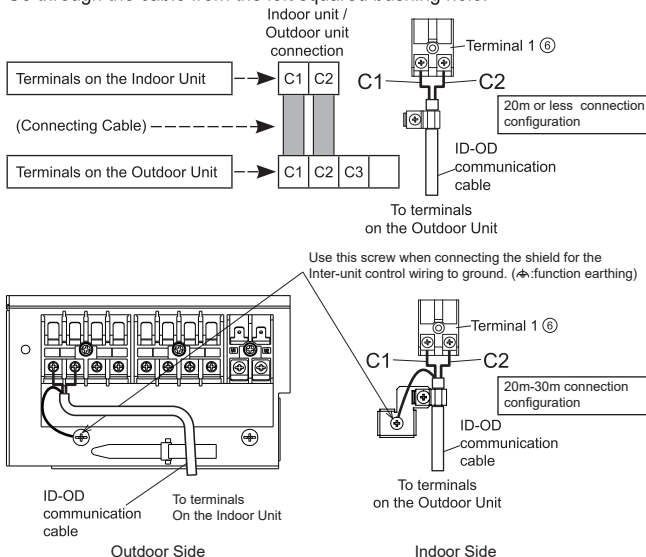
3. Connect the ID-OD communication cable.

The specification of the ID-OD communication cable must be as follows:

- Cable size: 2 x min 0.75mm²
- Cable type
 - 20m or less : 60245 IEC 57 or heavier, with a double-insulated approved polychloroprene sheath.
 - 20-30m : IEC 60227-5 or heavier(PVC or rubber)with a double insulation sheathed and shielded cable.

The method of wiring a cable is shown below.

Go through the cable from the left squared bushing hole.



Terminal screw	Tightening torque cN•m {kgf•cm}
M4	157~196 {16~20}
M5	196~245 {20~25}

4. Assemble the terminal cover.

Reverse step 1.

Tightening torque cN•m {kgf•cm}	98.1 {10.2}
---------------------------------	-------------

Compliance with IEC/EN 61000-3-2, 3, 11, 12

- 3 kW back up heater per phase and below: The power supply of this Indoor Unit complies with IEC/EN 61000-3-2 and IEC/EN 61000-3-3. It can be connected to the current supply network.
- More than 3 kW back up heater per phase: The power supply of this Indoor Unit complies with IEC/EN 61000-3-12 and IEC/EN 61000-3-11. It must be connected to a suitable supply network with a maximum impedance of $Z_{max} = 0.4037 \text{ Ohm}$. Please liaise with the supply authority to ensure that the maximum impedance of the supply network is sufficient for the installation of the equipment.

EXTERNAL HEATER

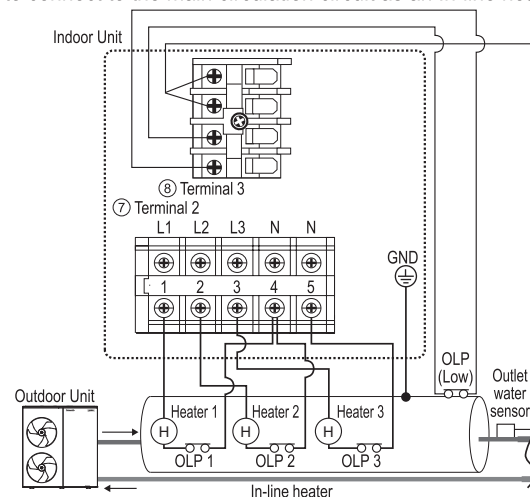
External heater can be used as an In-line heater or a buffer tank heater.

- Connect a heater of 18kW (6kW x 3) or less.
- Each heater shall be equipped with an 85°C OLP that can directly turn OFF the power supply. The OLP shall be non-automatic return type.
- The external heater shall be equipped with an 85°C OLP for signal line. The OLP can be either automatic or non-automatic return type.
- Using it as an In-line heater, be sure to install Optional outlet water sensor (PAW-A2W-TSBH) at the heater outlet.
- Using it as a buffer tank heater, be sure to install Optional Buffer tank sensor (PAW-A2W-TSBU).
- Ground the In-line heater body or buffer tank body in case of electrical leakage. (See illustration below)

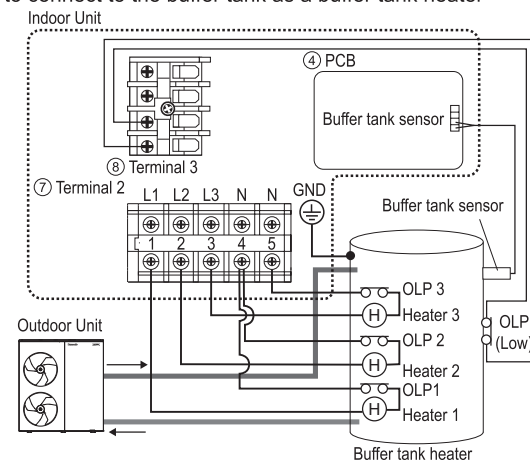
WARNING

Incorrect electrical work may result in electric shock or fire.
Please follow this installation manual.

How to connect to the main circulation circuit as an In-line heater



How to connect to the buffer tank as a buffer tank heater



The connecting cable between the external heater (in-line heater or buffer tank heater) and the Indoor Unit should be a double-insulated approved polychloroprene sheathed cord with type designation 60245 IEC 57 or heavier. Cable size depends on the capacity of external heater. Refer to below table.

EXTERNAL HEATER Capacity a [kW]	Cable size	Maximum cable length
$a \leq 9\text{kW}$	1.5 mm ² or more	30m
$9\text{kW} < a \leq 12\text{kW}$	2.5 mm ² or more	
$12\text{kW} < a \leq 15\text{kW}$	4.0 mm ² or more	
$15\text{kW} < a \leq 18\text{kW}$	6.0 mm ² or more	

Maximum cable length of OLP for signal and outlet water sensor: 30m

The specification of the OLP for signal cable must be as follows:

- Cable size: 2 x 2.0 mm²
- Cable type: Double insulation layer of PVC-sheathed or rubber-sheathed cable

The tightening torque for the terminals are as shown in the table below.

Terminal screw	Tightening torque cN•m {kgf•cm}
M4	157~196 {16~20}
M5	196~245 {20~25}

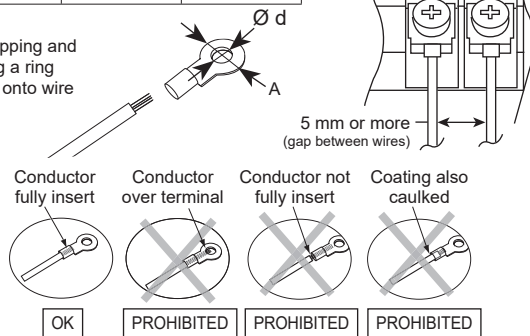
- The heater capacity is designed to be 6kW per element.
- For example, if the heater specification is 1kW or 2kW, the display will be worse than the actual COP. (2kW is 1/3 COP of 6kW)

Note: The data calculated by Energy Monitor or COP may be different from the actual value if the capacity is different from 6kW.

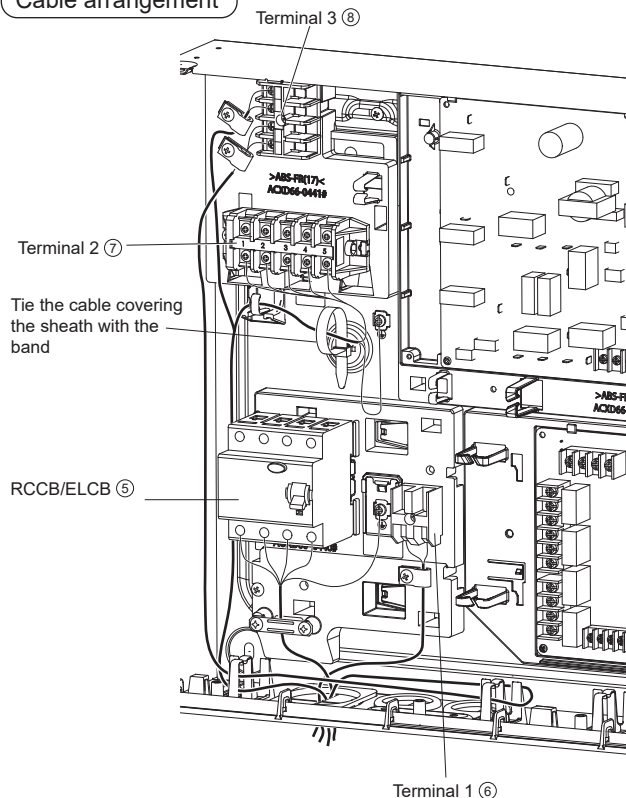
WIRE STRIPPING AND CONNECTING REQUIREMENT

Terminal size	Ø d [mm]	A [mm]
M4	4.2 or more	10.0 or less
M5	5.2 or more	12.5 or less

Wire stripping and Crimping a ring terminal onto wire



Cable arrangement



11.1.4 Connect to external device

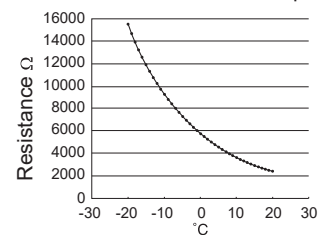
⚠ WARNING

This section is for authorized and licensed electrician only. Work behind the front cover ① secured by screws must only be carried out under the supervision of a qualified contractor, installation engineer, or service person.

Cable specification

- All connections shall be followed the local national wiring standard.
 - It is strongly recommended to use manufacturer-recommended parts or accessories for installation.
 - Connection to PCB ④.
1. 2-way valve shall be spring and electronic type. Refer to "Field Supply Accessories" table for details. Valve cable shall be 3 x min 1.5 mm² of type designation 60245 IEC 57 or heavier, or similarly double insulation sheathed cable.
*Note: - It shall be CE marking compliance component.
- Maximum load for the valve is 12VA.
 2. 3-way valve shall be spring and electronic type. Valve cable shall be 3 x min 1.5 mm² of type designation 60245 IEC 57 or heavier, or similarly double insulation sheathed cable.
*Note: - It shall be CE marking compliance component.
- It shall be directed to heating mode when it is OFF.
- Maximum load for the valve is 12VA.
 3. Room thermostat zone 1 cable must be 4 or 3 x min 0.5 mm² of type designation 60245 IEC 57 or heavier, or similarly double insulation sheathed cable.
 4. Maximum output power of booster heater shall be 3 kW. Booster heater cable must be 3 x min 1.5 mm² of type designation 60245 IEC 57 or heavier.
 5. Extra pump cable shall be 2 x min 1.5 mm² of type designation 60245 IEC 57 or heavier.
 6. Boiler contact cable/ defrost signal cable shall be 2 x min 0.5 mm² of type designation 60245 IEC 57 or heavier.
 7. External control shall be connected to 1-pole switch with min 3.0 mm contact gap. Its cable must be 2 x min 0.5 mm² double insulation layer of PVC-sheathed or rubber-sheathed cable.
*Note: - The switch shall be CE compliance component.
- Maximum operating current shall be 3Arms.
 8. Tank sensor shall be resistance type. See the graph below for the characteristic and details of sensor. Its cable shall be 2 x min 0.3 mm² double insulation layer (with insulation strength of min 30V) of PVC-sheathed or rubber-sheathed cable.

Tank Sensor Resistance Vs Temperature



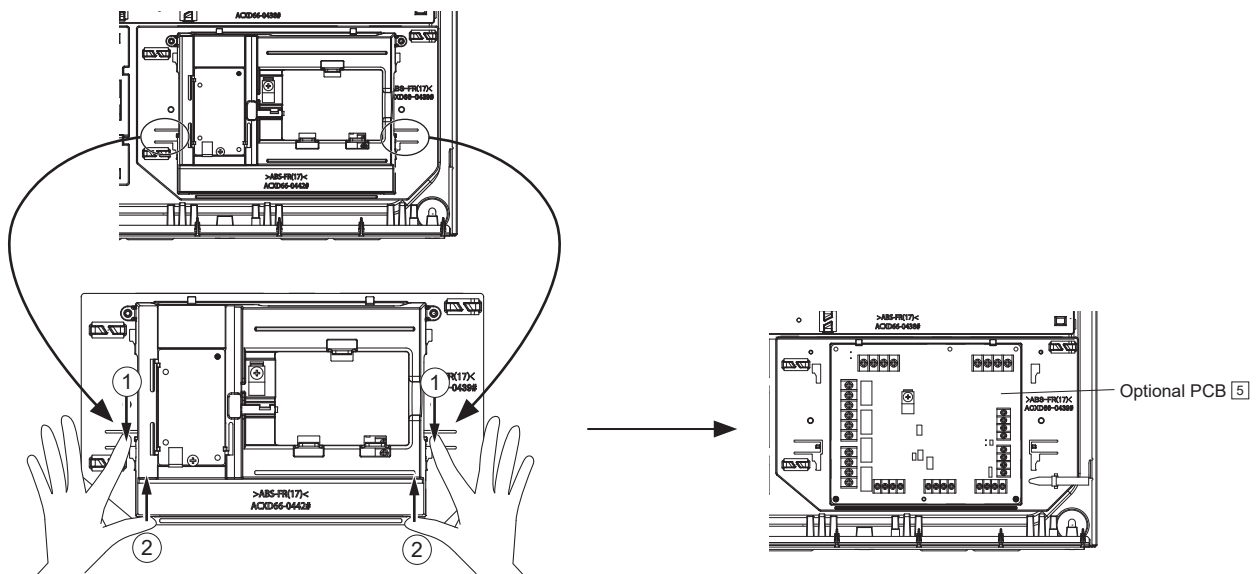
Tank sensor characteristic

9. Room sensor zone 1 cable shall be 2 x min 0.3 mm² double insulation layer of PVC-sheathed or rubber-sheathed cable.
10. Outdoor air sensor cable shall be 2 x min 0.3 mm² double insulation layer of PVC-sheathed or rubber-sheathed cable.
11. OLP cable must be 2 x min 0.5 mm² double insulation layer of PVC-sheathed or rubber-sheathed cable.
12. Buffer tank sensor cable shall be 2 x min 0.3 mm² double insulation layer of PVC-sheathed or rubber-sheathed cable.

• Connection to Optional PCB [5].

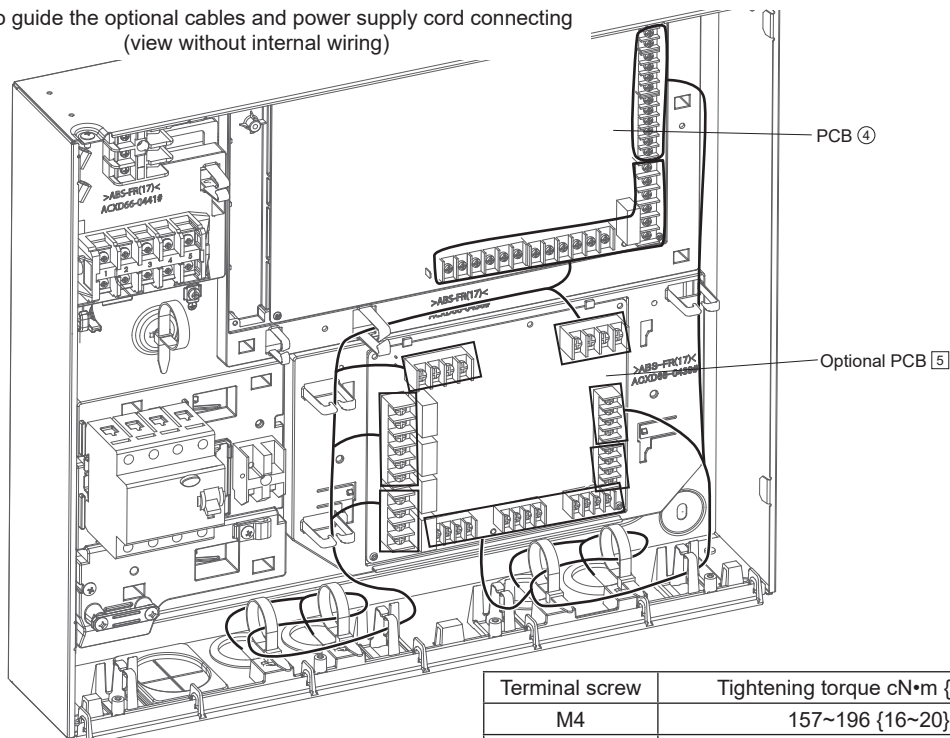
1. Before connecting the cables to Optional PCB, remove the network adaptor holder ⑫ (Refer to the installation manual of CZ-NS7P for details).
2. Pump zone 1 and zone 2 cable shall be 2 x min 1.5 mm² of type designation 60245 IEC 57 or heavier.
3. Solar pump cable shall be 2 x min 1.5 mm² of type designation 60245 IEC 57 or heavier.
4. Pool pump cable shall be 2 x min 1.5 mm² of type designation 60245 IEC 57 or heavier.
5. Room thermostat zone 2 cable shall be 4 x min 0.5 mm² of type designation 60245 IEC 57 or heavier.
6. Mixing valve zone 1 and zone 2 cable shall be 3 x min 1.5 mm² of type designation 60245 IEC 57 or heavier.
7. Room sensor zone 1 and zone 2 cable shall be 2 x min 0.3 mm² double insulation layer (with insulation strength of minimum 30V) of PVC-sheathed or rubber-sheathed cable.
8. Pool water sensor and solar sensor cable shall be 2 x min 0.3 mm² double insulation layer (with insulation strength of minimum 30V) of PVC-sheathed or rubber-sheathed cable.
9. Water sensor zone 1 and zone 2 cable shall be 2 x min 0.3 mm² double insulation layer of PVC-sheathed or rubber-sheathed cable.
10. Demand signal cable shall be 2 x min 0.3 mm² double insulation layer of PVC-sheathed or rubber-sheathed cable.
11. SG signal cable shall be 3 x min 0.3 mm² double insulation layer of PVC-sheathed or rubber-sheathed cable.
12. Heat/Cool switch cable shall be 2 x min 0.3 mm² double insulation layer of PVC-sheathed or rubber-sheathed cable.
13. External compressor switch cable shall be 2 x min 0.3 mm² double insulation layer of PVC-sheathed or rubber-sheathed cable.

• How to access the Optional PCB [5].

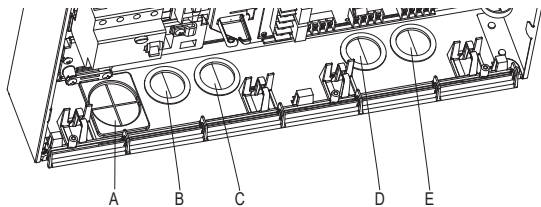


Cable arrangement

How to guide the optional cables and power supply cord connecting
(view without internal wiring)



Terminal screw	Tightening torque cN•m {kgf•cm}
M4	157~196 {16~20}
M5	196~245 {20~25}



■ Bushing hole A is used for power supply cable (including external heater power supply), outlet water sensor cable, OLP for signal line cable and ID-OD communication cable

■ Bushing hole B and C are used for

- Pump zone 1 cable
- Pump zone 2 cable
- Solar pump cable
- Pool pump cable
- Room thermostat zone 1 cable
- Room thermostat zone 2 cable
- Booster heater cable
- Mixing valve zone 1 cable
- Mixing valve zone 2 cable
- 2-way valve cable
- 3-way valve cable
- Extra pump cable
- Boiler contact cable
- Defrost signal cable

■ Bushing hole D and E are used for

- External control cable
- Outdoor air sensor cable
- Remote controller cable
- Room sensor zone 1 cable
- Room sensor zone 2 cable
- Buffer tank sensor cable
- Pool water sensor cable
- OLP for booster heater cable
- Tank sensor
- Water sensor zone 1 cable
- Water sensor zone 2 cable
- Demand signal cable
- Solar sensor cable
- SG signal cable
- Heat/Cool switch cable
- External compressor switch cable

■ Ensure all sensor cables are not in touching the front panel.

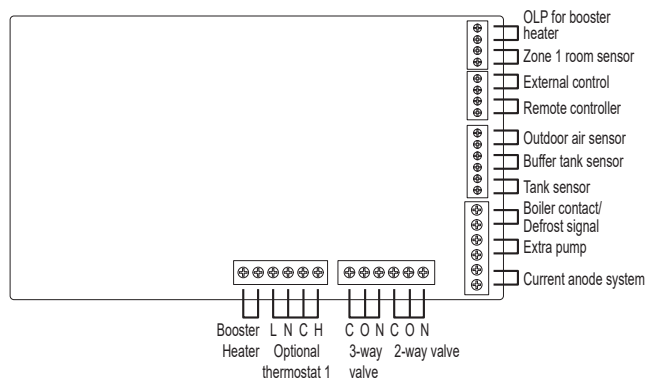
■ Once all wiring work is done, tie the cable with the banding strap (field supply).

Cable length

When connecting cables between the Indoor Unit and external devices, the length of the cables must not exceed the maximum length as shown in the table below.

External device	Maximum cable length [m]
2-way valve, 3-way valve, Mixing valve, Room Thermostat, Booster heater, Extra pump, Solar pump, Pool pump, Zone pump, Boiler contact/Defrost signal, External control, Demand signal, SG signal, Heat/Cool switch, External compressor switch, OLP for booster heater	50
Room sensor, Outdoor air sensor, Buffer tank sensor, Pool water sensor, Solar sensor, Zone water sensor, Tank sensor	30

Connection of PCB



Signal inputs

Optional thermostat	L N=AC230V, Heat, Cool=Thermostat heat, Cool terminal
OLP for booster heater	Dry contact Vcc-Bit1, Vcc-Bit2 open/short (System setup necessary) It is connected to the safety device (OLP) of DHW tank.
External control	Dry contact Open=not operate, Short=operate (System setup necessary) Able to turn ON/OFF the operation by external switch
Remote controller	Connected (Use 2 cores wire for relocation and extension. Total cable length shall be 50m or less.)

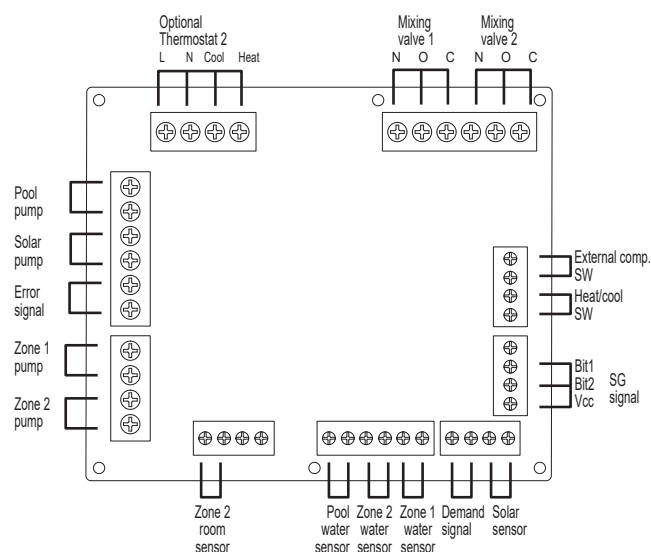
Thermistor inputs

Zone 1 room sensor	PAW-A2W-TSRT
Outdoor air sensor	PAW-A2W-TSOD
Tank sensor	Use Panasonic specified part
Buffer tank sensor	PAW-A2W-TSBU

Outputs

3-way valve	AC230V N=Neutral Open, Close=direction (For circuit switching when connected to DHW tank)
2-way valve	AC230V N=Neutral Open, Close (Prevent water circuit pass through during cooling mode)
Extra pump	AC230V (Used when Indoor Unit pump capacity is insufficient)
Booster heater	AC230V (Used when using booster heater in DHW tank)
Boiler contact/Defrost signal	Dry contact (System setup necessary)

Connection of Optional PCB (CZ-NS7P)



■ Signal inputs

Optional Thermostat	L N =AC230V, Heat, Cool=Thermostat heat, Cool terminal
SG signal	Dry contact Vcc-Bit1, Vcc-Bit2 open/short (System setup necessary) Switching SW (Connect to the 2 contacts controller)
Heat/Cool SW	Dry contact Open=Heat, Short=Cool (System setup necessary)
External comp. SW	Dry contact Open=Comp.OFF, Short=Comp.ON (System setup necessary)
Demand signal	DC 0~10V (System setup necessary) Connect to the DC 0~10V controller.

■ Thermistor inputs

Zone room sensor	PAW-A2W-TSRT
Pool water sensor	PAW-A2W-TSHC
Zone water sensor	PAW-A2W-TSHC
Solar sensor	PAW-A2W-TSSO

■ Outputs

Mixing valve	AC230V N=Neutral Open, Close=mixture direction Operating time: 30s~120s	AC230V, 6 VA
Pool pump	AC230V	AC230V, 0.6 A max.
Solar pump	AC230V	AC230V, 0.6 A max.
Zone pump	AC230V	AC230V, 0.6 A max.

Recommended External Device Specification

This section explains about the external devices (optional) recommended by Panasonic. Always ensure to use the correct external device during system installation.

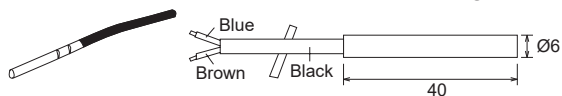
• Optional sensor.

1. Buffer tank sensor: PAW-A2W-TSBU

Use it to measure the buffer tank temperature.

Insert the sensor into the sensor pocket on the tank.

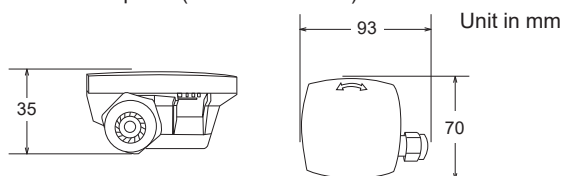
Unit in mm



2. Zone water sensor: PAW-A2W-TSHC

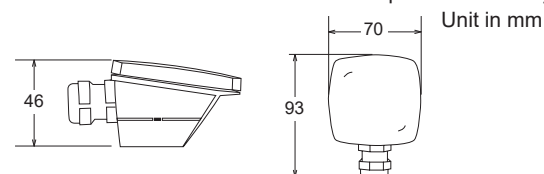
Use it to measure the control zone temperature.

Mount it on the water piping by using the stainless steel metal strap and contact paste (both are included).



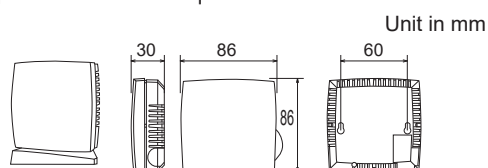
3. Outdoor air sensor: PAW-A2W-TSOD

If the installation location of the outdoor unit is exposed to direct sunlight, the outdoor air temperature sensor will be unable to measure the actual outdoor ambient temperature correctly.



4. Room sensor: PAW-A2W-TSRT

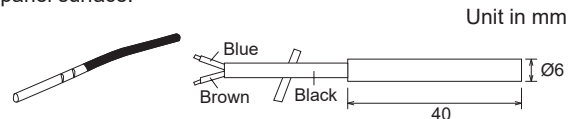
Install the room temperature sensor to the room where the temperature control is required.



5. Solar sensor: PAW-A2W-TSSO

Use it to measure the solar panel temperature.

Insert the sensor into the sensor pocket and paste it on the solar panel surface.



See the table below for the characteristic of the sensors (No. 1 to 5).

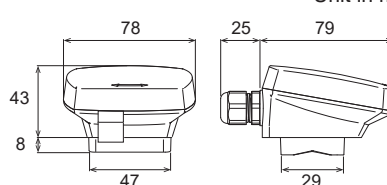
Temperature (°C)	Resistance value (kΩ)	Temperature (°C)	Resistance value (kΩ)
30	5.326	150	0.147
25	6.523	140	0.186
20	8.044	130	0.236
15	9.980	120	0.302
10	12.443	110	0.390
5	15.604	100	0.511
0	19.70	90	0.686
-5	25.05	80	0.932
-10	32.10	70	1.279
-15	41.45	65	1.504
-20	53.92	60	1.777
-25	70.53	55	2.106
-30	93.05	50	2.508
-35	124.24	45	3.003
-40	167.82	40	3.615
		35	4.375

6. Outlet water sensor: PAW-A2W-TSBH

Use it to detect the water temperature of the In-line heater outlet water.

Mount it on the water piping by using the stainless steel metal strap and contact paste (both items are included).

Unit in mm

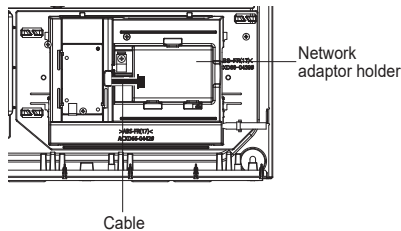
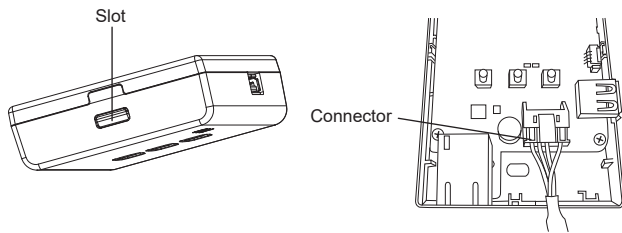


See the table below for the characteristic of the outlet water sensor (No. 6).

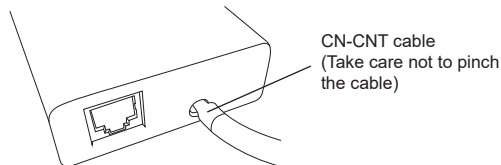
Temperature (°C)	Resistance value (kΩ)	Temperature (°C)	Resistance value (kΩ)
30	16.07	150	0.40
25	20.00	140	0.50
20	25.07	130	0.63
15	31.67	120	0.81
10	40.35	110	1.06
5	51.85	100	1.40
0	67.24	90	1.87
-5	88.05	80	2.54
-10	116.49	70	3.52
-15	155.80	65	4.17
-20	210.77	60	4.97
-25	288.63	55	5.96
-30	400.41	50	7.18
-35	563.15	45	8.70
-40	803.72	40	10.60
		35	13.01

Network Adaptor 2 Installation

1. Insert a flathead screwdriver into the slot on the network adaptor and remove the cover.
2. Connect cable coming out from the left side of the network adaptor holder to the connector inside the network adaptor.



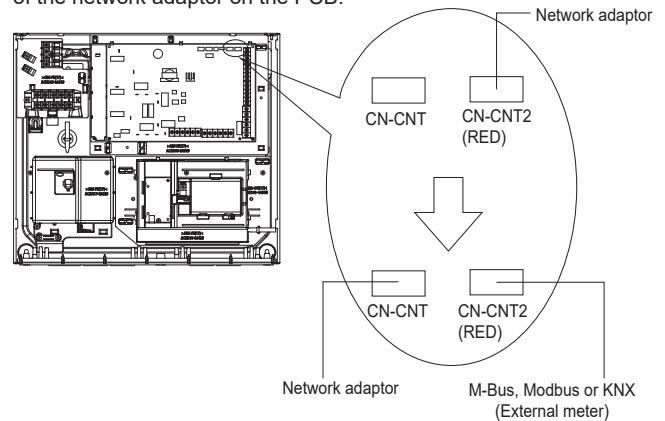
3. Pull the CN-CNT cable through the hole in the bottom of the network adaptor and re-attach the front cover to the back cover.



4. Fix the network adaptor 2 to network adaptor holder. Guide the cable as shown in the diagram so that external forces cannot act on the connector in the network adaptor.

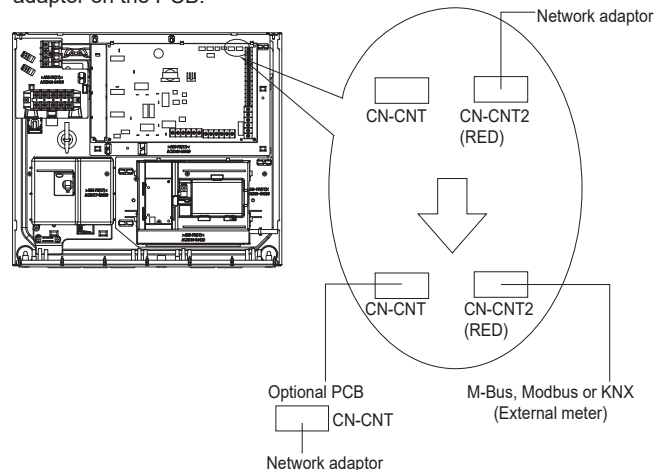
Connection of M-Bus, Modbus or KNX

When connecting devices such as Panasonic A2W compatible M-Bus or Modbus, it is necessary to change the connection position of the network adaptor on the PCB.



1. Replace the lead wire connector of the network adaptor connected to CN-CNT2 with CN-CNT.
2. Insert the M-Bus or Modbus, etc. lead wire connector into CN-CNT2.

When connecting Optional PCB to devices such as M-Bus or Modbus, it is necessary to change the connection position of the network adaptor on the PCB.



1. Insert the Optional PCB lead wire connector into CN-CNT.
2. Replace the lead wire connector of the network adaptor connected to CN-CNT2 with CN-CNT on Optional PCB.
3. Insert the M-Bus or Modbus, etc. lead wire connector into CN-CNT2.

11.1.5 Install Remote Controller as Room Thermostat

⚠ WARNING

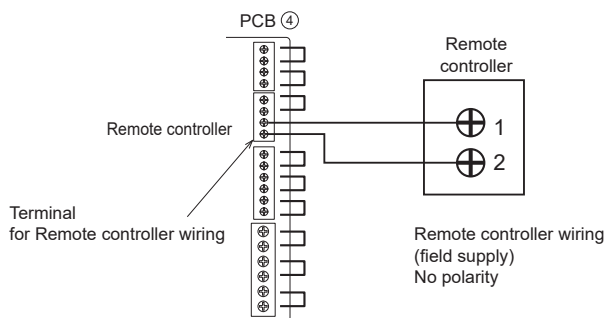
This section is for authorized and licensed electrician only. Work behind the front cover ① secured by screws must only be carried out under the supervision of a qualified contractor, installation engineer, or service person.

- Remote controller ③ mounted to the indoor unit can be moved to the room and serve as a Room Thermostat.

INSTALLATION LOCATION

- Install at the height of 1 to 1.5 m from the floor where average room temperature can be detected properly.
- Install vertically against the wall.
- Avoid the following locations for installation.
 - Location exposed to direct sunlight or direct air.
 - In the shadow or backside of objects deviated from the room airflow.
 - Location where condensation occurs (The remote controller is not moisture proof or drip proof.)
 - Location near heat source.
 - Uneven surface.
- Keep distance of 1 m or more from the TV, radio and PC. (Cause of fuzzy image or noise)

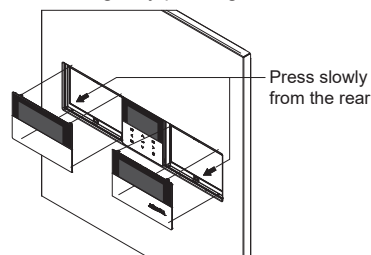
Remote Controller Wiring



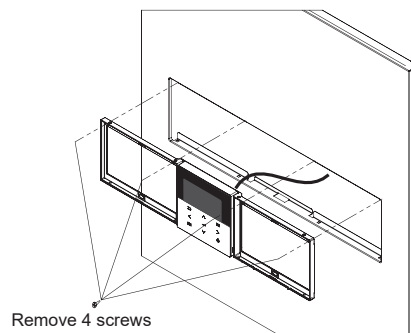
- Remote controller cable shall be 2 x min 0.3 mm², of double insulation PVC-sheathed or rubber sheathed cable. Total cable length shall be 50 m or less.
- Do not connect cables to other terminals of Indoor Unit (e.g. power source wiring terminal); malfunction be caused.
- Do not bundle together with the power supply cable or store in the same metal tube; operation error may be caused.

Remove the remote controller from the Indoor Unit

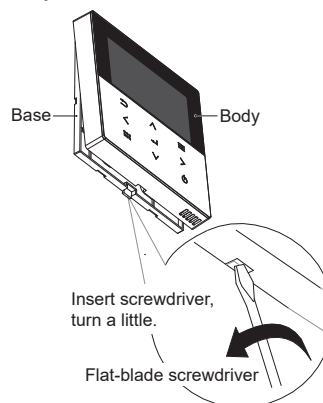
- Remove both left and right decoration panel (⑩ and ⑪) from the front cover ① while gently pushing them from the behind.



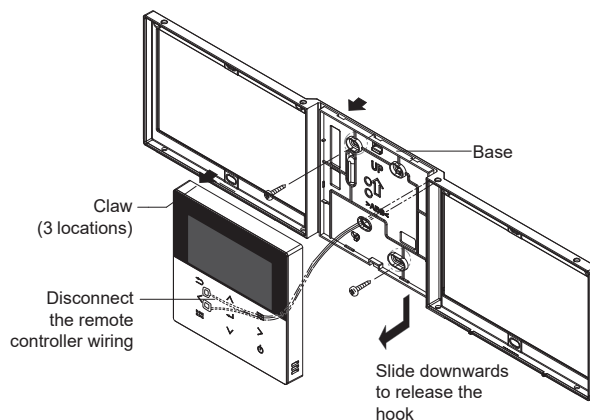
- Remove the 4 screws and take out the holder with remote controller ③.



- Remove the body from the base.



- Remove the cable between remote controller ③ and Indoor Unit terminal.

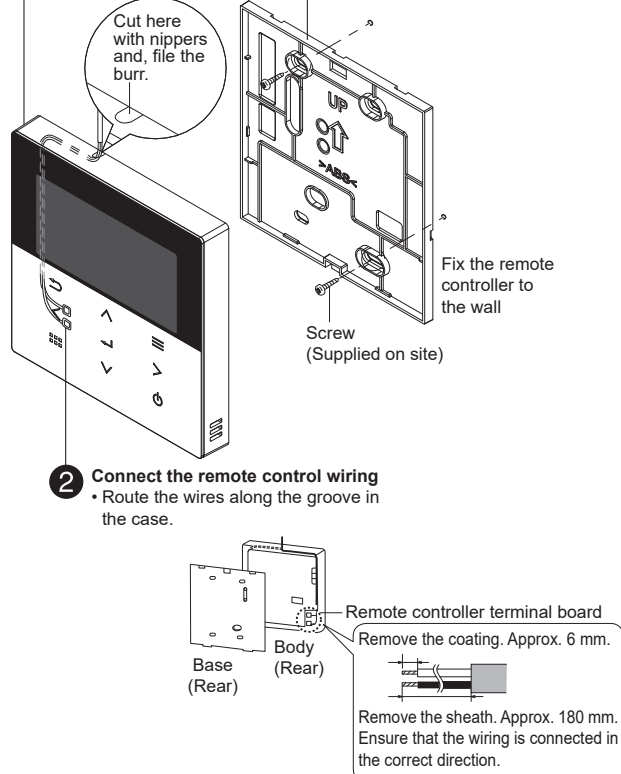


Mounting the remote controller

For exposure type

Preparation: Drill 2 holes for screws with a screwdriver.

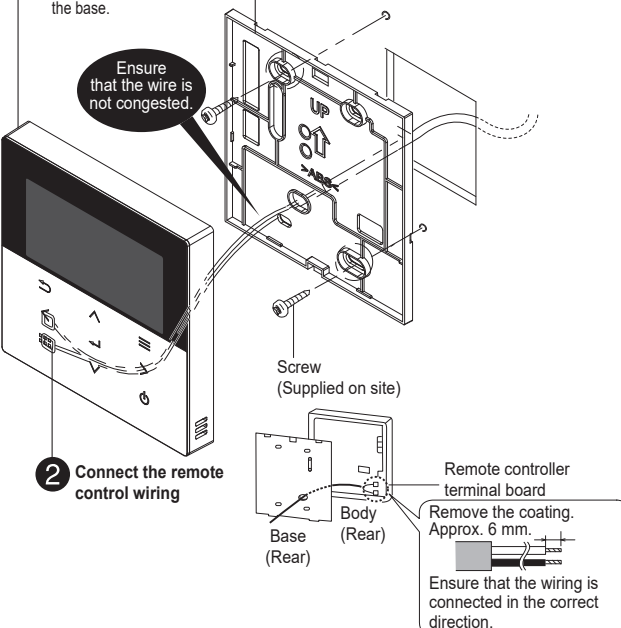
- 3 **Attach the body.**
 - Align the claws of the body and then the claws of the base.
- 1 **Mount the base on the wall.**
 - Fix the remote controller to the wall
- 2 **Connect the remote control wiring**
 - Route the wires along the groove in the case.



For embedded type

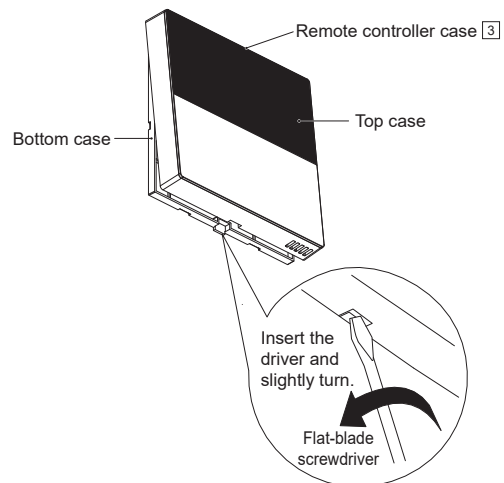
Preparation: Drill 2 holes for screws with a screwdriver.

- 3 **Attach the body.**
 - Align the claws of the body and then the claws of the base.
- 1 **Mount the base on the wall.**
 - Thread the wire through the hole in the centre of the base.
- 2 **Connect the remote control wiring**



Replace The Remote Controller Cover

- Replace the existing remote controller with remote controller Case 3 to close the hole left after removing it.
 1. Refer to Section "Remove The remote controller From Indoor Unit".
 2. Remove the top case from the bottom case of remote controller Case 3.



3. Reverse the steps 1 to 4 of section "Remove The remote controller From Indoor Unit" to fix remote controller Case 3.

11.1.6 Check RCCB/ELCB

1. Ensure the RCCB/ELCB set to "ON" condition before check RCCB/ELCB.
 2. Turn ON the power supply to the Indoor Unit.
- This check can only be done when power is supplied to the Indoor Unit.

⚠ WARNING

Be careful not to touch parts other than RCCB/ELCB test button when the power is supplied to Indoor Unit. Otherwise, electrical shock may be caused. Before obtaining access to terminals, all supply circuits must be disconnected.

3. Push the "TEST" button on the RCCB/ELCB. The lever would turn down, if it works properly.
4. Contact authorized dealer if the RCCB/ELCB malfunction.
5. Turn OFF the power supply to the Indoor Unit.
6. If RCCB/ELCB functions normal, set the lever to "ON" again.

11.1.7 Close front cover

Gently close the front cover and fix with 2 screws.

Tightening torque cN•m {kgf•cm}

147.1~245.2 {15~25}

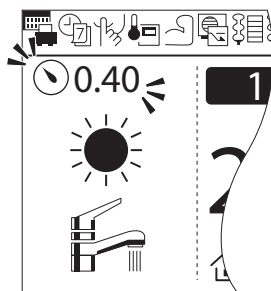
11.1.8 Check water circuit

CHECK WATER PRESSURE

* (0.50 bar = 0.05 MPa)

Water pressure must not be lower than 0.50 bar. (Check the water pressure by the remote controller.) If it is lower, fill Space Heating/Cooling pipes with water through the tube connector on the outdoor unit.

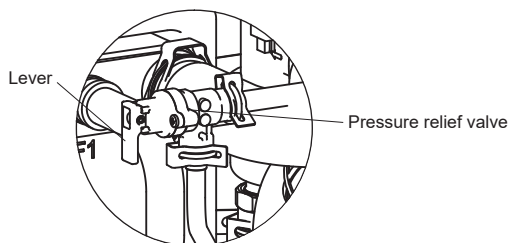
Icon flashes if dropped below "0.50 bar"



CHECK PRESSURE RELIEF VALVE

*Pressure relief valve is located on outdoor unit.

1. Pull the lever in the horizontal direction and confirm that the pressure relief valve works properly.
2. Release the lever when water comes out of the drain pipe of the pressure relief valve. While the air continues to come out of the drain pipe, keep raising the lever to completely discharge the air.
3. Confirm that the water from the drain pipe stops.
4. If water is leaking, pull the lever several times and return it to make sure the water stops.
5. If water keeps coming out of the drain, turn OFF the system and contact your local authorized dealer.



CHECK AIR ACCUMULATION

- Open the air vent plugs on the heating panel, fan convector, etc., and remove the air accumulated in the equipment and piping.

EXPANSION VESSEL PRE PRESSURE CHECKING

- The system where the Indoor Unit is installed is equipped with an expansion vessel with the capacity of 10 L and the initial pressure of 1 bar.
- The total volume of water in the system should not exceed 200 L.
- If the total water volume exceeds 200 L, add an expansion vessel. (Supplied on site)
- The installed height difference of the water circuit of the system should not exceed 30 m. (Extra pump may be required).

*In case of 30 m, set the pressure in the circulation circuit to 0.5~1.0 bar. Higher than 1.0 bar may cause water leakage due to component breakage.

11.1.9 Test run

1. Check the items below before the test run.
 - a) Pipework are properly done.
 - b) Electric cable connecting work are properly done.
 - c) Water circuit unit is filled up with water and trapped air is released.
 - d) Turn ON the power supply after filling the indoor unit full.
2. Turn ON the power supply for the Indoor, and RCCB/ELCB in the Indoor Unit. Then, refer to the Operation Instruction for operation of remote controller ③.

Note:

During winter, turn ON the power supply and standby the unit for at least 15 minutes before test run. To allow sufficient time to warm up refrigerant and prevent wrong error code judgement.

3. For normal operation, the water pressure reading should be in between 0.50 bar and 4.00 bar (0.05 MPa and 0.4 MPa). If not, adjust the speed of the water pump to bring it into the aforementioned pressure operating range. If this procedure does not solve the problem, contact a local authorized dealer.
4. After test run, clean the magnetic water filter set with reference to "Maintenance for magnetic water filter" in the Installation Manual of the AIR-TO-WATER HEAT PUMP OUTDOOR UNIT and reinstall it. After the cleaning is finished.

CHECK WATER FLOW OF THE WATER CIRCUIT

Select Installer setup → Service setup → Pump maximum speed → Air purge.

Confirm that the maximum water flow rate is not less than 25 l/min when the main pump is in operation.

- * Water flow can be checked in Service setup (Pump maximum speed)
[Heating operation at low water temperature with lower flow rate may cause "H75" during defrost process.]
- * If there is no water flow or H62 is displayed, stop pump operation and release the air (See "CHECK AIR ACCUMULATION").

11.1.10 Maintenance

- To ensure the safety and optimum performance of the indoor unit, seasonal inspections of the indoor unit and functional checks of RCCB/ELCB, field wiring and pipe should be carried out on a regular basis. This maintenance and scheduled inspection should be carried out by authorized dealer.
- Regular maintenance of the expansion vessel (at least once a year) is recommended and should be performed by authorized dealer. First, make sure that the expansion or pressure tank is completely drained of water, that the system is switched off, and that there are no live electrical components. If you need to reset the preload pressure, set 1bar.

CHECK ITEMS

- | | |
|--------------------------|--|
| ☐ | Is there any water leakage at water piping connections? |
| ☐ | Has the heat insulation been carried out at water piping connection? |
| ☐ | Is water pressure higher than 0.5 bar? |
| ☐ | Is the water drainage work properly done? |
| ☐ | Is the power supply voltage within the rated voltage range? |
| ☐ | Are the cables being fixed to RCCB/ELCB, terminal and PCB firmly? |
| ☐ | Are the cables being clamped firmly by holder (clamper)? |
| ☐ | Is the earth wire connection properly done? |
| ☐ | Is the RCCB/ELCB operation normal? |
| ☐ | Is the remote controller ③ LCD operation normal? |
| ☐ | Is there any abnormal sound? |
| ☐ | Is the heating operation normal? |

11.2 Appendix

11.2.1 Variation of system

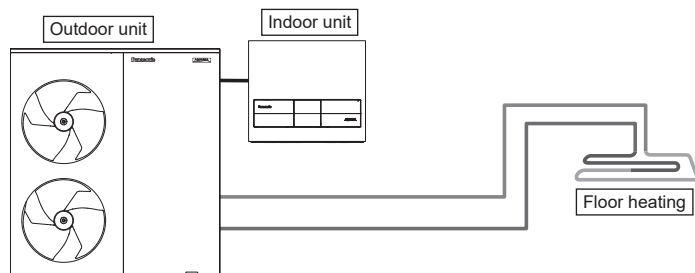
This section introduces some variation of systems using Air-To-Water Heat pump and actual setting method.

For this model, the Zone 1 external room thermistor and Zone 1 external room thermostat must be always connected to the main room board, irrespective of whether they are connected to a board (CZ-NS7P) sold separately.

11.2.1.1 Introduce applications related to temperature setting

Temperature setting variation for heating

1. Remote controller

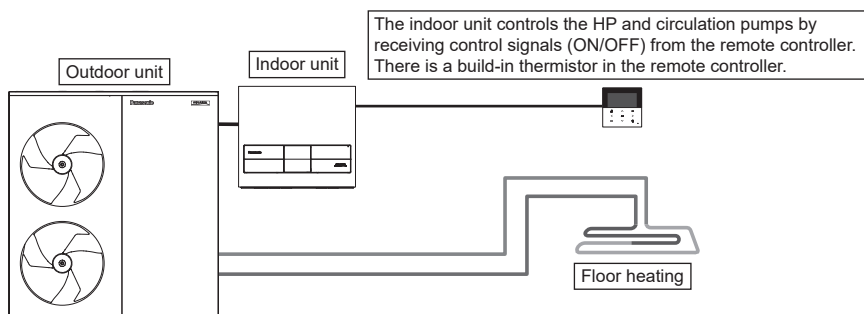


- Connect floor heating and radiators directly to the outdoor unit.
- The remote controller is located on the indoor unit.
- This is the simplest system.

Setting of remote controller

Installer setup
System setup
Optional PCB connectivity - No
Zone & Sensor:
Water temperature

2. Room thermostat

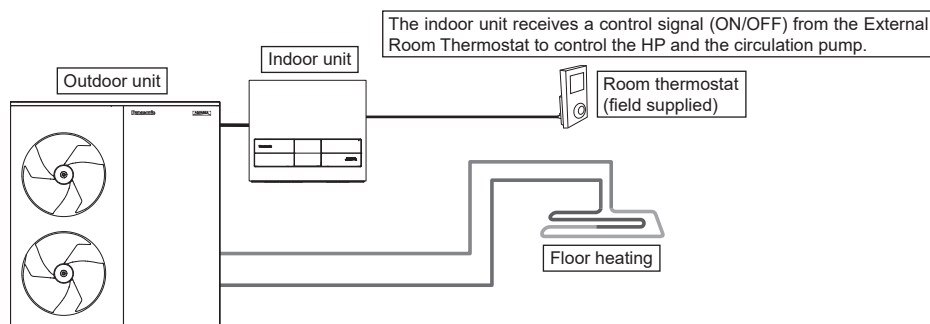


Connect floor heating and radiators directly to the outdoor unit.
Remove the remote controller from the indoor unit and install it in the room where the floor heating is installed.
This is an application that uses remote controller.
Refer to 11.1.5 Install Remote Controller as Room Thermostat (Optional).

Setting of remote controller

Installer setup
System setup
Optional PCB connectivity - No
Zone & Sensor:
Room Thermostat
Internal

3. External room thermostat

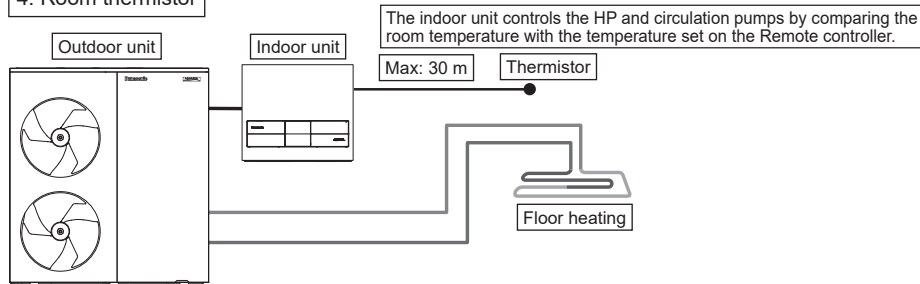


Connect floor heating and radiators directly to the outdoor unit.
The remote controller is located on the indoor unit.
Install separate External Room Thermostat (field supply) in the room where floor heating is installed.
This is an application that uses External Room Thermostat.

Setting of remote controller

Installer setup
System setup
Optional PCB connectivity - No
Zone & Sensor:
Room Thermostat
(External)

4. Room thermistor



Setting of remote controller

Installer setup
System setup
Optional PCB connectivity - No

Zone & Sensor:
Room thermistor

Connect floor heating or radiator directly to the outdoor unit.

The remote controller is located on the indoor unit.

An external room thermistor (specified by Panasonic) is installed in the room where the floor heating is installed.

This is an application that uses an external room thermistor.

There are two ways of setting the circulating water temperature.

Direct: Sets the circulating water temperature directly (fixed value).

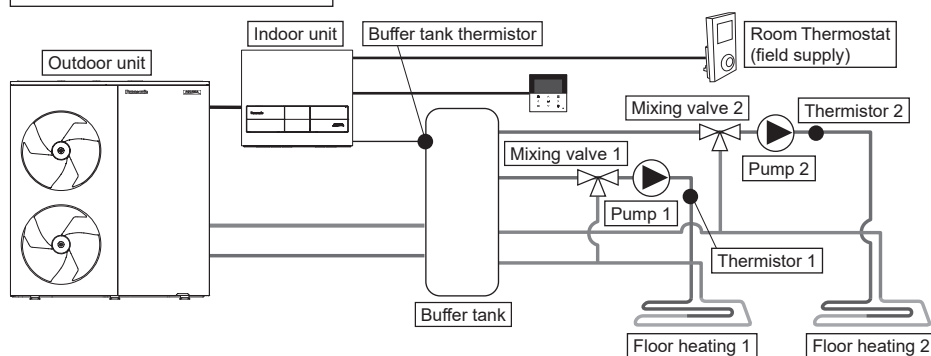
Correction curve: sets the circulating water temperature according to the outside temperature.

In case of Room thermistor, the compensation curve is shifted according to the thermo ON/OFF situation.

- (Example) If room temperature increasing speed is;
Very slow → Shift the compensation curve upwards
Very fast → Shift compensation curve downwards

Examples of installations

Floor heating 1 + Floor heating 2



Setting of remote controller

Installer setup
System setup
Optional PCB connectivity - Yes

Zone & Sensor: - 2-zone system
Zone 1: Sensor
Room thermostat
Internal
Zone 2: Sensor
Room
Room thermostat
(External)

Connect Floor heating to the 2 circuits via buffer tank as shown in the figure.

Install mixing valves, pumps and thermistors (specified by Panasonic) on both circuits.

Remove the remote controller from the indoor unit and attach it to either circuit to use as a Room Thermostat.

Install an external Room Thermostat (field-supply) on a another circuit.

Both circuits can set the circulating water temperature independently.

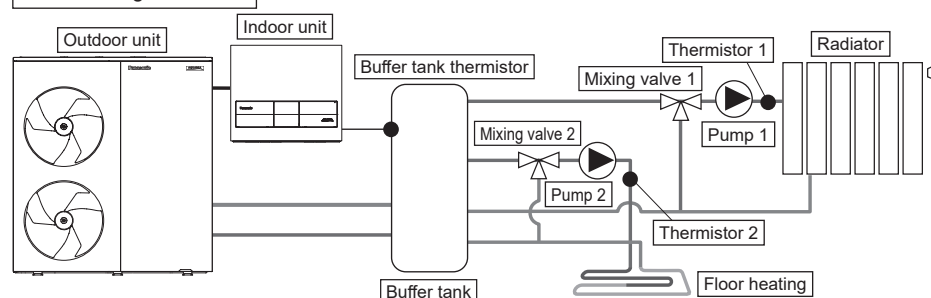
Install the buffer tank thermistor on the buffer tank.

The buffer tank connection settings and the ΔT temperature settings for heating operation are required separately.

This system requires an Optional PCB (CZ-NS7P).

Note: Buffer tank thermistor must be connected to PCB ④.

Floor heating + Radiator



Setting of remote controller

Installer setup
System setup
Optional PCB connectivity - Yes

Zone & Sensor: - 2-zone system
Zone 1: Sensor
Water temperature
Zone 2: Sensor
Room
Water temperature

Connect Floor heating and radiators to the 2 circuits via buffer tank, as shown in the figure above. Install pumps and thermistors (specified by Panasonic) on both circuits.

Install a mixing valve in the circuit with lower temperature among the 2 circuits. (Generally, where floor heating and radiator circuits are installed in 2 zones, install mixing valve in the floor heating circuit.)

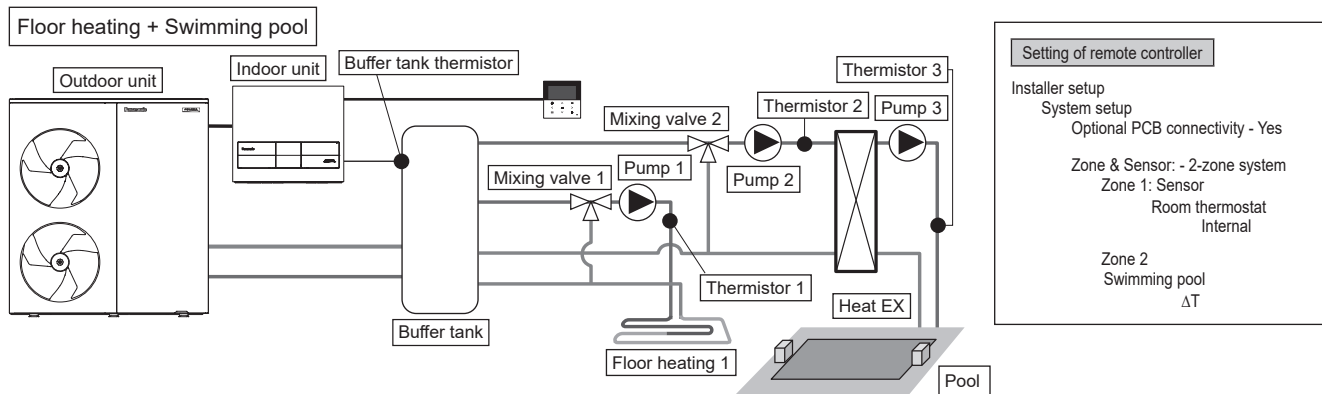
The remote controller is located on the indoor unit.

The temperature setting selects the circulating water temperature for both circuits. Both circuits can be set the circulating water temperature independently.

Install thermistor on the buffer tank. The buffer tank connection settings and the ΔT temperature settings for heating operation are required separately.

This system requires the Optional PCB (CZ-NS7P). Note: if there is no mixing valve on the secondary side, the circulating water temperature may be higher than the set temperature.

Note: Buffer tank thermistor must be connected to PCB ④.



Connect floor heating and swimming pool to the 2 circuits via buffer tank, as shown in the figure above.

Install mixing valves, pumps and thermistors (specified by Panasonic) on both circuits.

Additional pool heat exchanger, pool pumps and pool sensor are installed in the pool circuit.

Remove the remote controller from the indoor unit and install it in the room where the floor heating is installed. The floor heating and the pool circulation water temperatures can be set separately.

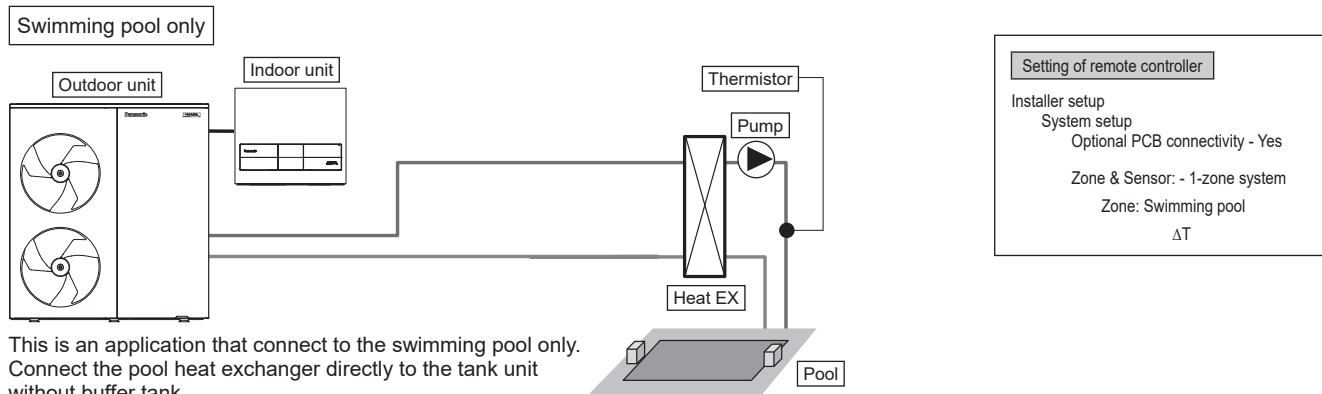
Install thermistor on the buffer tank.

The buffer tank connection settings and the ΔT temperature settings for heating operation are required separately. This system requires the Optional PCB (CZ-NS7P).

※ Be sure to connect the pool to "Zone 2".

When connected to a swimming pool, operating in 'Cool' will stop the pool operation.

Note: Buffer tank thermistor must be connected to PCB ④.



This is an application that connect to the swimming pool only.

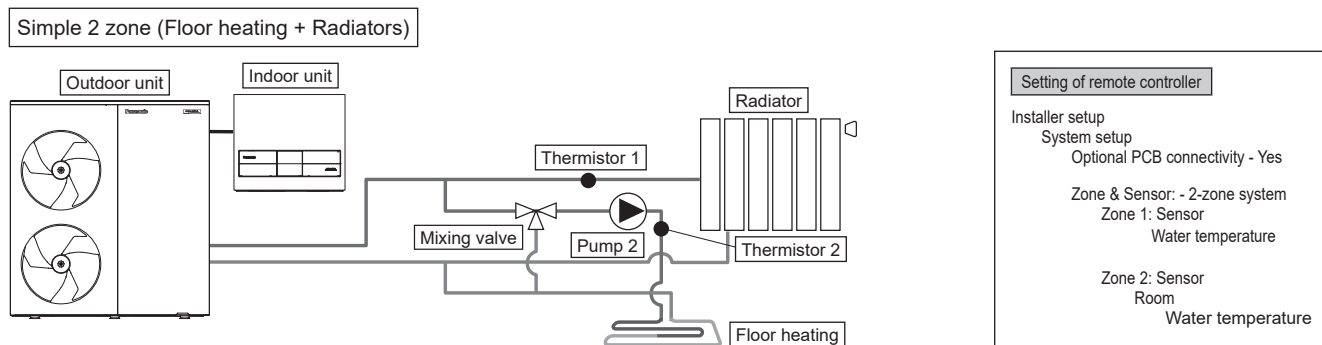
Connect the pool heat exchanger directly to the tank unit without buffer tank.

Install a pool pump and pool thermistor (specified by Panasonic) at the secondary side of the pool heat exchanger.

The pool temperature can be set with a remote controller.

This system requires the Optional PCB (CZ-NS7P).

The cooling mode cannot be selected for this application. (Not displayed on the remote controller).



This is an example of simple 2 zone control without buffer tank.

The built-in pump in the Outdoor unit acts as the pump for zone 1.

Install mixing valve, pump and thermistor (specified by Panasonic) at zone 2 circuit.

The temperature in Zone 1 is not adjustable, so always assign the hot side to Zone 1.

To display the temperature of zone 1 on the remote controller, zone 1 thermistor is required.

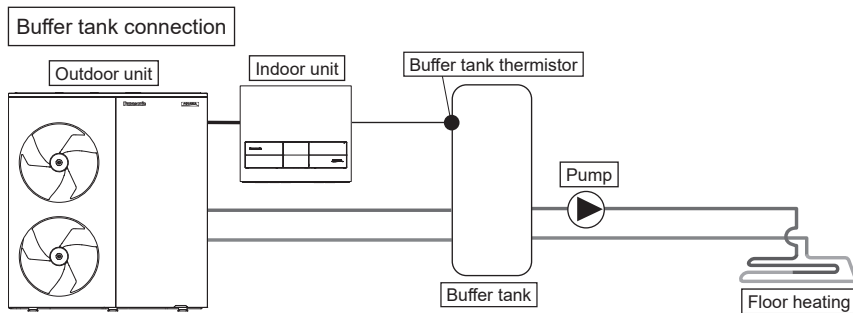
The circulating water temperature for both circuits can be set independently.

(However, the temperature of high temperature side and low temperature side cannot be reversed.)

This system requires the Optional PCB (CZ-NS7P).

Note:

- Thermistor 1 has no direct influence on the operation. However, if thermistor 1 is not installed, an error will occur.
- Adjust the flow rate so that zone 1 and zone 2 are balanced. If not correctly adjusted, performance may be affected.
(If the pump flow rate in zone 2 is too high, hot water may not flow to zone 1)
The flow rate can be checked from "Actuator Check" under maintenance menu.

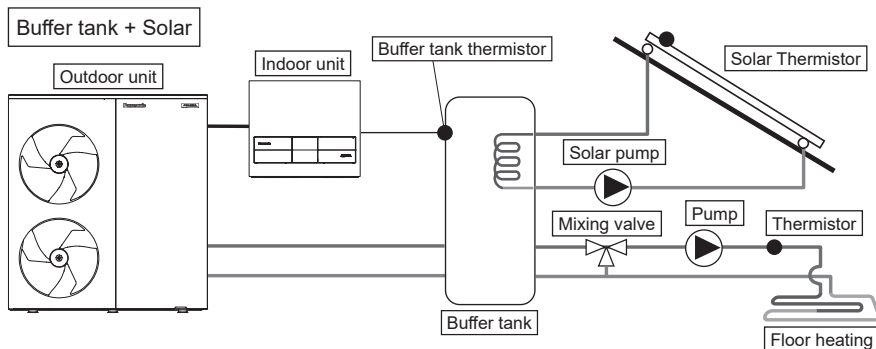


Setting of remote controller

Installer setup
System setup
Optional PCB connectivity - No

Buffer tank connection - Yes
 ΔT for Buffer tank

This is an application that connects the buffer tank to the indoor unit.
The temperature of the buffer tank is detected by a buffer tank thermistor (specified by Panasonic).
If Optional PCB is not connected, external pump can be used for circulation in the floor heating circuit.
Note: Buffer tank thermistor must be connected to PCB ④.



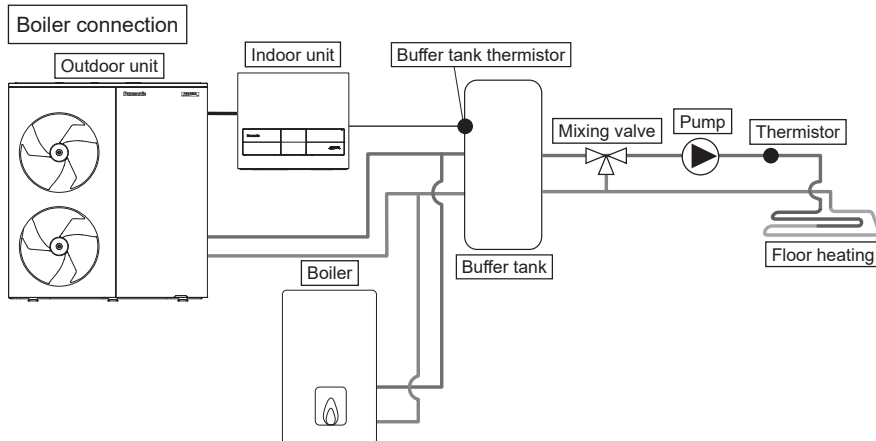
Setting of remote controller

Installer setup
System setup
Optional PCB connectivity - Yes

Buffer tank connection - Yes
 ΔT for Buffer tank

Solar connection - Yes
Buffer tank
 ΔT turn ON
 ΔT turn OFF
Anti freeze
Hi limit

This is an application that connect the buffer tank unit to the indoor unit and then to the solar water heater to heat the buffer tank.
The temperature of the buffer tank is detected by a buffer tank thermistor (specified by Panasonic).
The temperature of the solar panel is detected by a solar thermistor (specified by Panasonic).
Buffer tanks are stand-alone tanks with built-in solar heat exchange coils.
During winter season, solar pump for circuit protection will be activated continuously. If you wish not to activate the solar pump operation, use glycol and set the anti-freezing operation start temperature to -20°C .
Heat accumulation operates automatically by comparing the temperature of tank thermistor and solar thermistor.
This system requires the Optional PCB (CZ-NS7P).
Note: Buffer tank thermistor must be connected to PCB ④.



Setting of remote controller

Installer setup
System setup
Optional PCB connectivity - Yes

Bivalent - Yes
Turn ON: outdoor temp
Control pattern

This is an application that connects the boiler to the buffer tank, to compensate for insufficient capacity by operate boiler when outdoor temperature drops & heat pump capacity is insufficient.
Boiler is connected parallel with heat pump and used as heating circuit.
The boiler output can be controlled either by SG-ready input from a board (sold separately) or by automatic control via three mode selection patterns. (Operation setting of boiler shall be responsible by installer.)
This system requires the Optional PCB (CZ-NS7P) for SG-ready input control.
Depending on the settings of the boiler, it is recommended to install buffer tank as temperature of circulating water may get higher. (In particular, if the advanced parallel setting is selected, it must be connected to a buffer tank.)
Note: Buffer tank thermistor must be connected to PCB ④.

⚠ WARNING

Panasonic is NOT responsible for incorrect or unsafe situation of the boiler system.

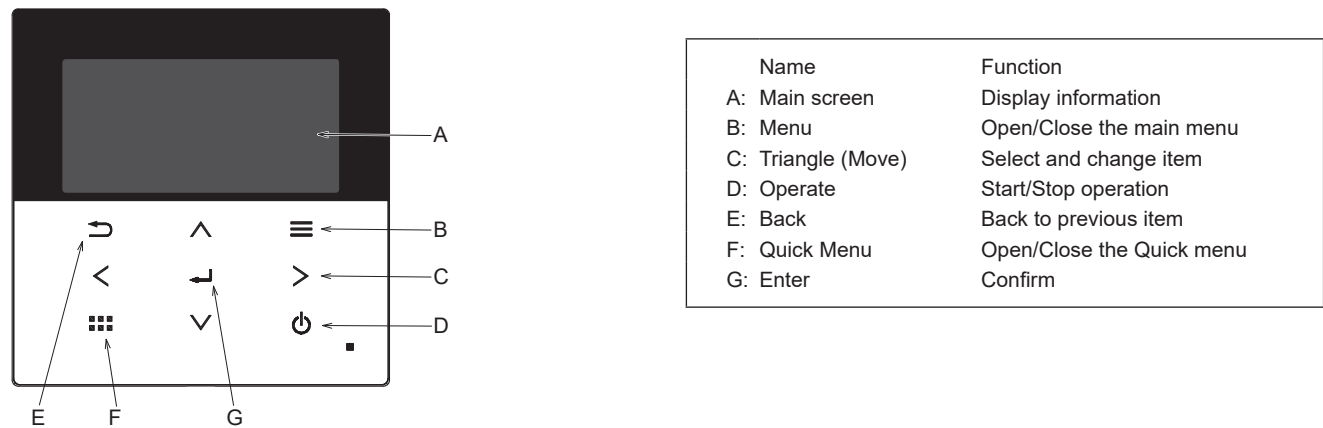
⚠ CAUTION

Make sure the boiler and its integration in the system complies with applicable legislation.
Ensure that the return water temperature from the heating circuit to the indoor unit does not exceed 70°C .
Boiler is turned off by safety control when the water temperature of the heating circuit exceed 85°C .

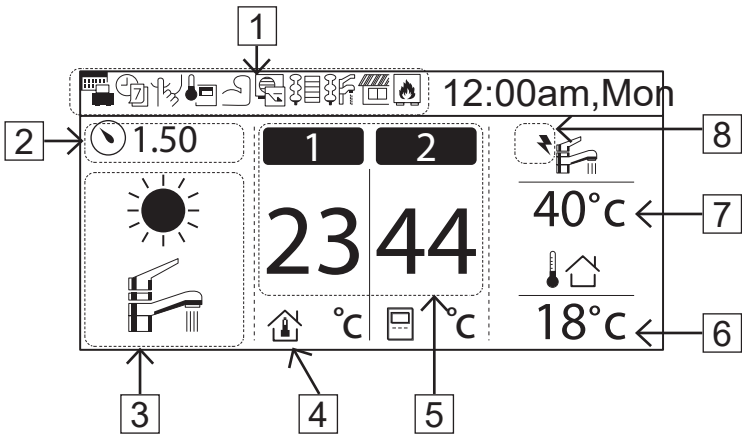
11.2.2 System Installation

11.2.2.1 Remote Controller Outline

The LCD display as shown in this manual are for instructional purpose only, and may differ from the actual unit.



LCD Display
(Actual - Dark background with white icons).



Name	Function
1: Function icon	Displays the set functions/status. Holiday mode Weekly timer Quiet mode Remote controller room thermostat Powerful mode Demand control Room heater Tank heater Solar Boiler

First time of power ON (Start of installation)

Initialization	12:00 pm, Mon
Initializing	

When the power is ON, firstly the initialization screen appears (approx. 10 sec)

↓ Approx, 10 sec later.

12:00 pm, Mon
[⏻] Start

When the initialization screen ends, it turns to normal screen.

↓ Press any key

Language	12:00 pm, Mon
ENGLISH	
FRANÇAIS	
DEUTSCH	
ITALIANO	
▼ Select	[↵] Confirm

When any button is pressed, language setting screen appears.
Note: If initial setting is not performed, it does not go into menu.
When there are two remote controllers installed from the beginning, the first remote controller used to set and confirm language will be recognised as the main remote controller.

↓ Set language and press confirm

Clock format	12:00 pm, Mon
24h	
▼	
am/pm	
▼ Select	[↵] Confirm

When language is set, setting screen of time display appears (24h/am/pm)

↓ Set time display and press confirm

Date & time	12:00 pm, Mon
Year/Month/Day	Hour : Min
2024 / 01 / 01	12 : 00
⬆⬆ Select	[↵] Confirm

YYYY/MM/DD/Time setup screen appears

↓ Set YY/MM/DD/Time & confirm

Front grille	12:00 pm, Mon
Is O/D front grille fixed?	
No	
Yes	
▼ Select	[↵] Confirm

Select 'No' to confirm, before continuing with the operation, a caution message confirming the installation of the outdoor front grille will be displayed.

Caution
To prevent injury, fix front grille before ope.
[↵] Close

↓ Set Yes & confirm if outdoor front grille has been installed

12:00 pm, Mon
[⏻] Start

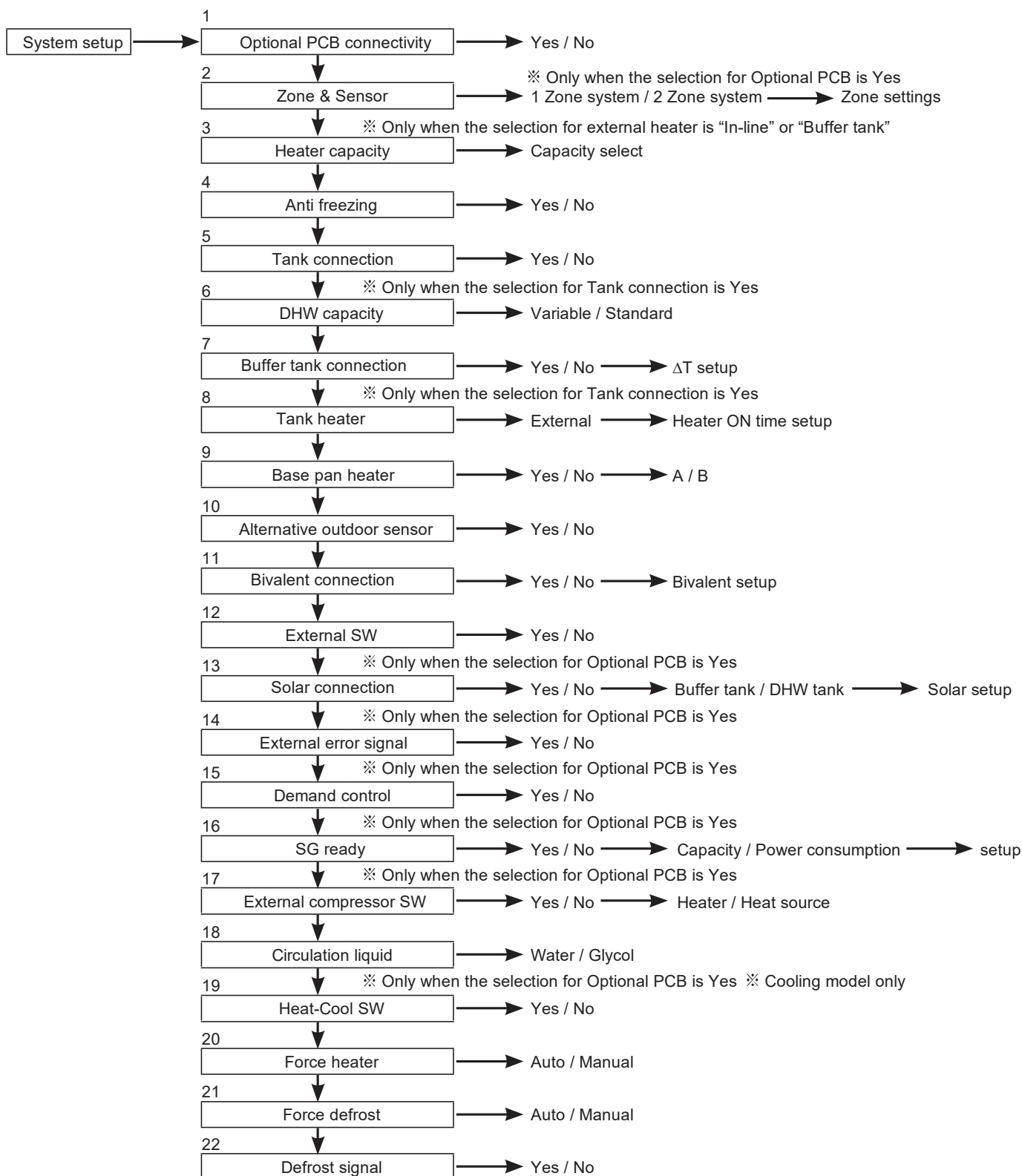
Back to initial screen

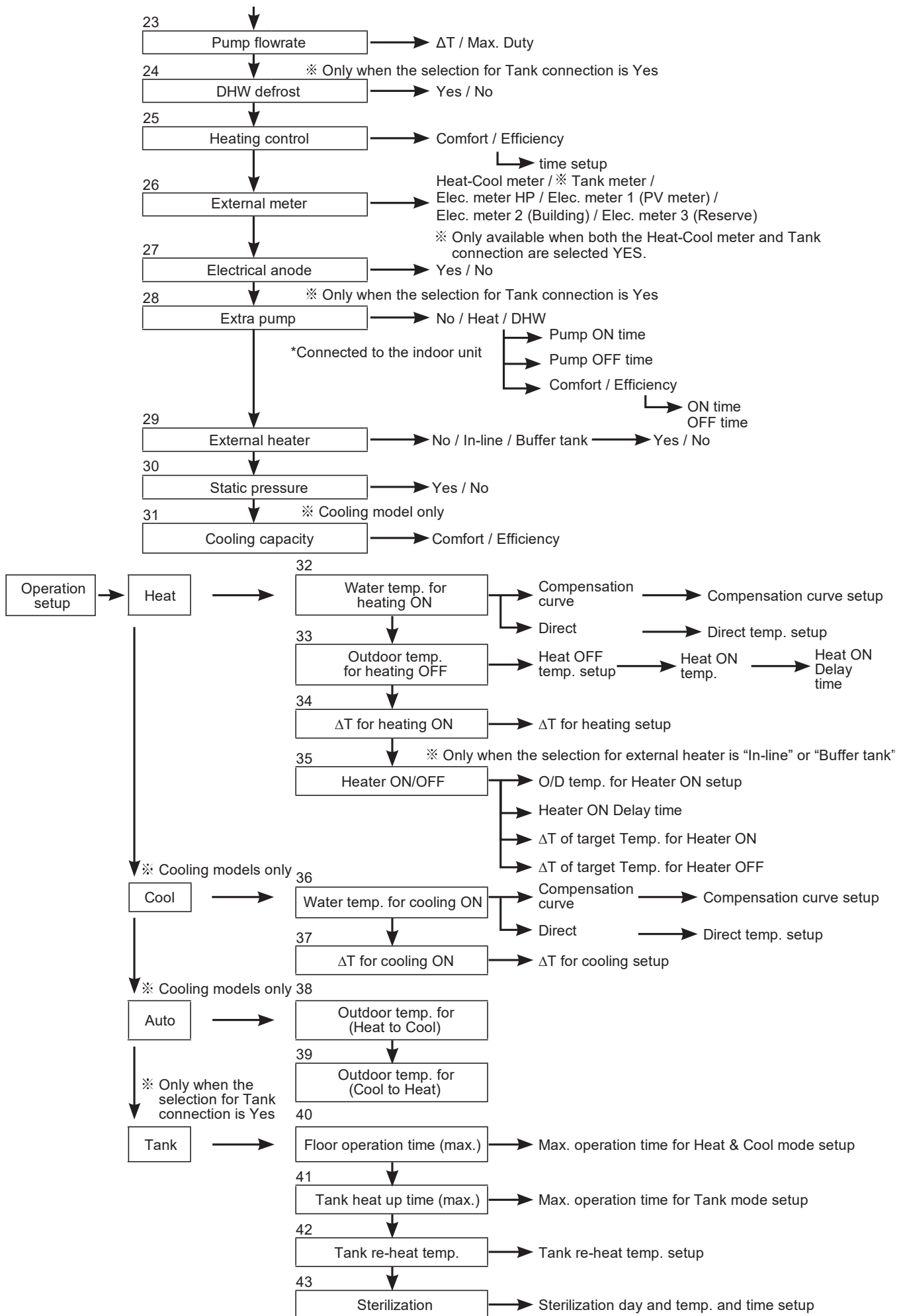
↓ Press Menu and select Installer setup

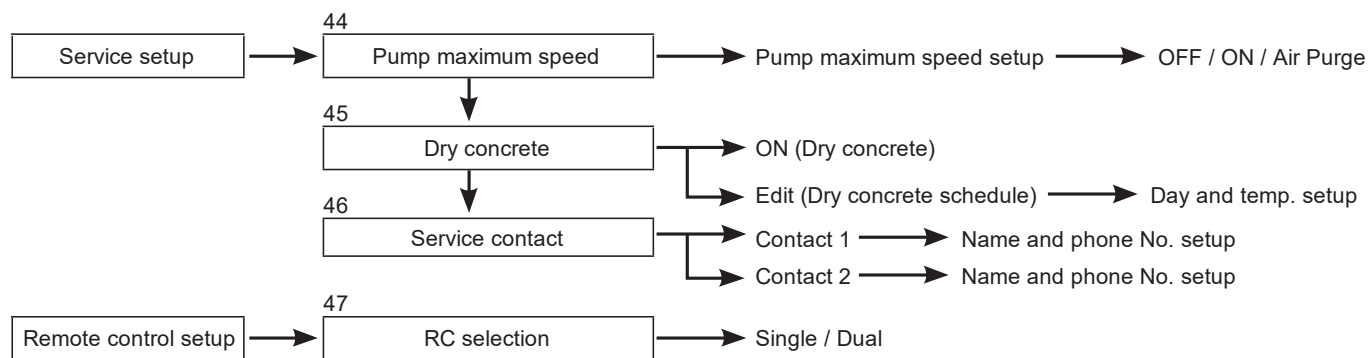
Main menu	12:00 pm, Mon
System check	
Personal setup	
Service contact	
Installer setup	
▲ Select	[←] Confirm

↓ Confirm to go into Installer setup

11.2.2.2 Installer Setup







11.2.2.3 System Setup

1. Optional PCB connectivity

Initial setting: No

If any functions below is necessary, purchase and install (CZ-NS7P).
Select Yes after installing it.

- 2-zone control
- Pool
- Solar
- External error signal output
- Demand control
- SG ready
- Stop heat source unit by external SW
- Heat-Cool SW

System setup 12:00 pm, Mon

Optional PCB connectivity

Zone & Sensor

Heater capacity

Anti freezing

▼ Select [↩] Confirm

2. Zone & Sensor

Initial setting: Room and Water temp.

If there is no Optional PCB

Select sensor of room temperature control from the following 3 items

- ① Water temperature (circulation water temperature)
- ② Room thermostat (Internal or External)
- ③ Room thermistor

If there is Optional PCB

- ① Select either 1-zone control or 2 zone control.
For 1-zone, select either room or pool, select sensor
For 2-zone, select the sensor in zone 1, then the either room or pool for zone 2
and select the sensor

Note: In 2-zone system, pool function can be set to zone 2 only.

System setup 12:00 pm, Mon

Optional PCB connectivity

Zone & Sensor

Heater capacity

Anti freezing

⬆ Select [↩] Confirm

3. Heater capacity

Initial setting: Depend on model

If there is external heater, set the heater capacity.

Note: Some heaters cannot select the capacity.

Note: When using the SG-ready function, use a heater with a capacity less than the required value.

System setup 12:00 pm, Mon

Optional PCB connectivity

Zone & Sensor

Heater capacity

Anti freezing

⬆ Select [↩] Confirm

4. Anti freezing

Initial setting: Yes

Operate anti-freezing of water circulation circuit.

If set to yes, the pump will start when the water temperature reaches its freezing temperature.

If the temperature does not reach the pump stop temperature, heat pump will be activated.

Note: If set to No, when the water temperature reaches its freezing temperature or below, the water circulation circuit may freeze and cause malfunction.

System setup 12:00 pm, Mon

Optional PCB connectivity

Zone & Sensor

Heater capacity

Anti freezing

⬆ Select [↩] Confirm

5. Tank connection

Initial setting: No

Select whether it is connected to hot water tank or not.

If set to Yes, it enables the hot water function settings.

Hot water temperature of the tank can be set from main screen.

System setup 12:00 pm, Mon

Zone & Sensor

Heater capacity

Anti freezing

Tank connection

⬆ Select [↩] Confirm

6. DHW capacity

Initial setting: Variable

Variable DHW capacity setting normally run with efficient boiling which is energy saving heating. However while hot water usage high and tank water temperature low, variable DHW mode run with fast heat up which heat up the tank with high heating capacity.

If standard DHW capacity setting is selected, heat pump run with heating rated capacity at tank heat up operation.

System setup	12:00 pm, Mon
Heater capacity	
Anti freezing	
Tank connection	
DHW capacity	
⬆ Select ⬆	[←] Confirm

7. Buffer Tank connection

Initial setting: No

Select whether it is connected to buffer tank for heating or not.

If buffer tank is used, set to Yes.

Connect buffer tank thermistor and set ΔT (ΔT use to increase primary side temperature against secondary side target temperature).

If the buffer tank capacity is not so large, set larger value for ΔT .

System setup	12:00 pm, Mon
Anti freezing	
Tank connection	
DHW capacity	
Buffer tank connection	
⬆ Select ⬆	[←] Confirm

8. Tank heater

Initial setting: External

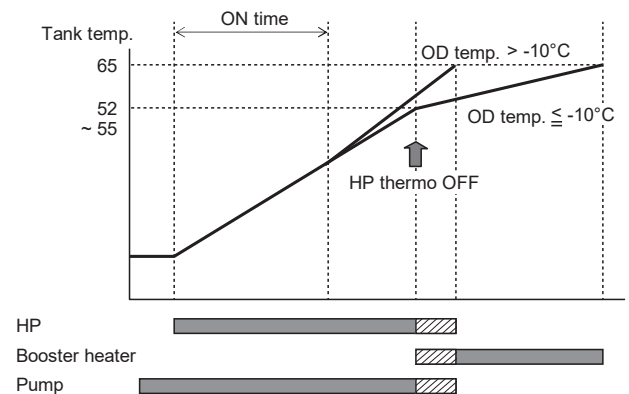
Note: Does not display if there is no tank for hot water supply.

Set "Tank heater" to "ON" in the "Function setup" from remote controller when using heater to boil the tank.

External A setting which is using booster heater installed on DHW tank to boil the tank.
The permissible heater capacity is 3kW and below.
The operation to boil the tank with heater is as below.
In addition, set the "Tank heater: ON time" appropriately.

System setup	12:00 pm, Mon
Tank connection	
DHW capacity	
Buffer tank connection	
Tank heater	
⬆ Select ⬆	[←] Confirm

For 65°C setting



9. Base pan heater

Initial setting: No

Select whether Base pan heater is installed or not.
If set to Yes, select to use either heater A or B.

A: Turn ON Heater when heating with defrost operation only

B: Turn ON Heater at heating

System setup	12:00 pm, Mon
DHW capacity	
Buffer tank connection	
Tank heater	
Base pan heater	
⬆ Select ⬆	[←] Confirm

10. Alternative outdoor sensor

Initial setting: No

Set to Yes if outdoor sensor is installed.

Controlled by optional outdoor sensor without reading the outdoor sensor of heat pump unit.

System setup	12:00 pm, Mon
Buffer tank connection	
Tank heater	
Base pan heater	
Alternative outdoor sensor	
⬆ Select	[↩] Confirm

11. Bivalent connection

Initial setting: No

Set if heat pump linked with boiler operation.

Connect the start signal of the boiler in boiler contact terminal (PCB).

Set Bivalent connection to YES.

After that, begin setting according to remote controller instruction.

Boiler icon will be displayed on remote controller top screen.

System setup	12:00 pm, Mon
Tank heater	
Base pan heater	
Alternative outdoor sensor	
Bivalent connection	
⬆ Select	[↩] Confirm

After Bivalent connection set YES, there are three options of control pattern (Auto / SG Ready / Smart).

1) Auto

There are 3 different modes in the boiler auto pattern operation. Movement of each modes are shown below.

- ② Alternative (switch to boiler operation when drops below setting temperature)
- ③ Parallel (allow boiler operation when drops below setting temperature)
- ④ Advanced Parallel (able to slightly delay boiler operation time of parallel operation)

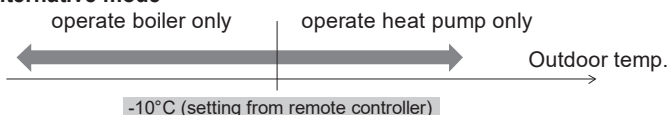
When the boiler operation is "ON", "boiler contact" is "ON", " _ "(underscore) will be displayed below the boiler icon.

Set target temperature of boiler to be the same as heat pump temperature.

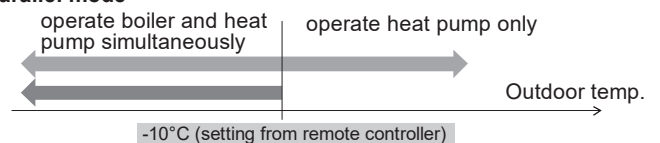
When boiler temperature is higher than heat pump temperature, zone temperature cannot be achieved if mixing valve is not installed.

This product only allows one signal to control the boiler operation. Operation setting of boiler shall be responsible by installer.

Alternative mode

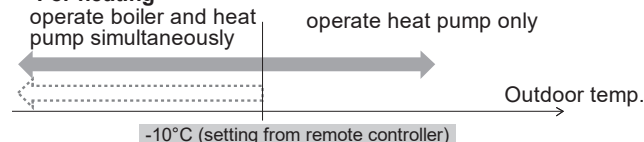


Parallel mode

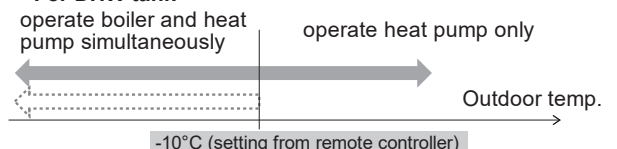


Advanced Parallel mode

For heating

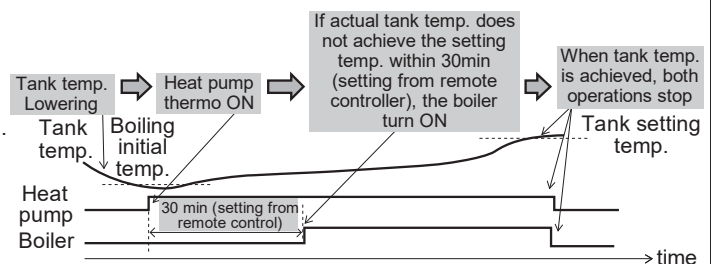
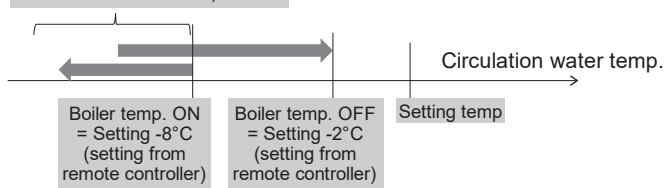


For DHW tank



AND

Although heat pump operates but water temperature does not reach this temperature for more than 30 mins (setting from remote controller)



In Advanced Parallel mode, setting for both heating and tank can be made simultaneously. During operation of "Heating/Tank" mode, when each time the mode is switched, the boiler output will be reset to OFF. Please have a good understanding on the boiler control characteristic in order to select the optimal setting for the system.

2) SG ready (Only available to set when optional PCB set to YES)

- SG Ready input from optional PCB terminal control ON/OFF of boiler and heat pump as below condition

SG signal		Operation pattern
Vcc-bit1	Vcc-bit2	
Open	Open	Heat pump OFF, Boiler OFF
Short	Open	Heat pump ON, Boiler OFF
Open	Short	Heat pump OFF, Boiler ON
Short	Short	Heat pump ON, Boiler ON

* This bivalent SG ready input is sharing same terminal as [16. SG ready] connection. Only one of these two setting can be set at the same time.

When one is set, another setting will reset to not set.

3) Smart

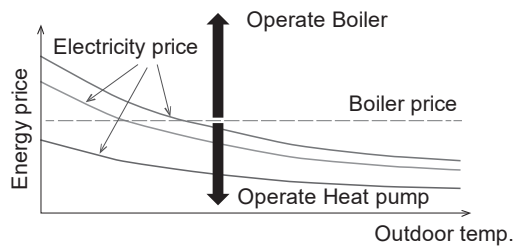
There are Energy price (both electricity and boiler) and Schedule to be set on remote controller.

Operation setting of Energy price and Schedule shall be responsible by installer.

Based on these settings, system will calculate the final price for both electricity and boiler.

When final price of Electricity is lower than Boiler's, heat pump will operate.

When final price of Electricity is higher than Boiler's, boiler will operate.



12. External SW

Initial setting: No

Able to turn ON/OFF the operation by external switch.

System setup	12:00 pm, Mon
Base pan heater	
Alternative outdoor sensor	
Bivalent connection	
External SW	
⬆ Select	[↩] Confirm

13. Solar connection

Initial setting: No

Set when solar water heater is installed.

Setting include items below.

- ① Set either buffer tank or DHW tank for connection with solar water heater.
- ② Set temperature difference between solar panel thermistor and buffer tank or DHW tank thermistor to operate the solar pump.
- ③ Set temperature difference between solar panel thermistor and buffer tank or DHW tank thermistor to stop the solar pump.
- ④ Anti-freezing operation start temperature (change setting based on usage of glycol.)
- ⑤ Solar pump stop operation when it exceeds high limit temperature (when tank temperature exceed designated temperature (70~90°C))

Note: Does not display if there is no Optional PCB.

System setup	12:00 pm, Mon
Alternative outdoor sensor	
Bivalent connection	
External SW	
Solar connection	
⬆ Select	[↩] Confirm

14. External Error Signal

Initial setting: No

Set when external error display unit is installed.

Turn ON Dry Contact SW when error happened.

Note: Does not display if there is no Optional PCB.

When error occurs, error signal will be ON.

After turn OFF "close" from the display, error signal will still remain ON.

System setup	12:00 pm, Mon
Bivalent connection	
External SW	
Solar connection	
External error signal	
⬆ Select	[↩] Confirm

15. Demand control

Initial setting: No

Set when there is demand control.
Adjust terminal voltage within 1 ~ 10 V to change the operating current limit.

Note: Does not display if there is no Optional PCB.

System setup	12:00 pm, Mon
External SW	
Solar connection	
External error signal	
Demand control	
⬆ Select	[↵] Confirm

Analog input [V]	Rate [%]
0.0	not activate
0.1 ~ 0.6	not activate
0.7	10
0.8	not activate
0.9 ~ 1.1	10
1.2	15
1.3	10
1.4 ~ 1.6	15
1.7	20
1.8	15
1.9 ~ 2.1	20
2.2	25
2.3	20
2.4 ~ 2.6	25
2.7	30
2.8	25
2.9 ~ 3.1	30
3.2	35
3.3	30
3.4 ~ 3.6	35
3.7	40
3.8	35

Analog input [V]	Rate [%]
3.9 ~ 4.1	40
4.2	45
4.3	40
4.4 ~ 4.6	45
4.7	50
4.8	45
4.9 ~ 5.1	50
5.2	55
5.3	50
5.4 ~ 5.6	55
5.7	60
5.8	55
5.9 ~ 6.1	60
6.2	65
6.3	60
6.4 ~ 6.6	65
6.7	70
6.8	65
6.9 ~ 7.1	70
7.2	75
7.3	70

Analog input [V]	Rate [%]
7.4 ~ 7.6	75
7.7	80
7.8	75
7.9 ~ 8.1	80
8.2	85
8.3	80
8.4 ~ 8.6	85
8.7	90
8.8	85
8.9 ~ 9.1	90
9.2	95
9.3	90
9.4 ~ 9.6	95
9.7	100
9.8	95
9.9 ~	100

*A minimum operating current is applied on each model for protection purpose.

*0.2 voltage hysteresis is provided.

*The value of voltage after 2nd decimal point are cut off.

16. SG Ready

Initial setting: No

Switch operation of heat pump by open-short of 2 terminals.
 The following settings are possible.
 Capacity: limit by capacity.
 Power consumption: limit by power consumption.

SG signal		Operation pattern
Vcc-bit1	Vcc-bit2	
Open	Open	Normal
Short	Open	Heat pump/heater OFF
Open	Short	Capacity 1
Short	Short	Capacity 2

Select Capacity**Capacity setting 1**

- DHW capacity ____%.
- Heating capacity ____%.
- Cooling capacity ____°C

Capacity setting 2

- DHW capacity ____%.
- Heating capacity ____%.
- Cooling capacity ____°C

} SG ready - Yes - Capacity setting

Select Power consumption

HPU stop consumption ____kW

HPU stop consumption value never exceeded

If the value is exceeded, heating is provided by the heater only.

Power consumption setting 1

- Power consumption of DHW ____kW
- Heating power consumption ____kW
- Cooling power consumption ____kW

Power consumption setting 2

- Power consumption of DHW ____kW
- Heating power consumption ____kW
- Cooling power consumption ____kW

} SG ready - Yes - Power consumption setting

(If SG ready is set to 'Yes', Bivalent control pattern is set to 'Auto').

Note: Does not display if there is no Optional PCB.

Note: Be sure to use a heater with a capacity below the value set by "HP stop consumption"

System setup

12:00 pm, Mon

Solar connection

External error signal

Demand control

SG Ready

⬆ Select

[↵] Confirm

17. External compressor SW

Initial setting: No

Set when external compressor SW is connected.

SW is connected to external devices to control power consumption, Open Signal will stop compressor's operation. (Heating operation etc. are not cancelled).

Note: Does not display if there is no Optional PCB.

System setup

12:00 pm, Mon

External error signal

Demand control

SG Ready

External compressor SW

⬆ Select

[↵] Confirm

18. Circulation Liquid

Initial setting: Water

Set circulation of heating water.

There are 2 types of settings, water and glycol.

Note: Set glycol when using anti-freeze liquid.
 It may cause error if setting is wrong.

System setup

12:00 pm, Mon

Demand control

SG Ready

External compressor SW

Circulation liquid

⬆ Select

[↵] Confirm

19. Heat-Cool SW

Initial setting: Disable

Able to switch (fix) heating & cooling by external switch.

(Open) : Fix at Heating (Heating + DHW)

(Short) : Fix at Cooling (Cooling + DHW)

Note: This setting is disabled for model without Cooling.

Note: Does not display if there is no Optional PCB.

Timer function cannot be used. Cannot use Auto mode.

System setup	12:00 pm, Mon
SG Ready	
External compressor SW	
Circulation liquid	
Heat-Cool SW	
⬆ Select	[↵] Confirm

20. Force Heater

Initial setting: Manual

Under manual mode, user can turn ON force heater through quick menu.

If selection is 'auto', force heater mode will turn automatically if pop up error happen during operation.

Note: When external heater is No and tank heater is OFF, force heater does not turn ON even if selection is 'auto'.

Force heater operation follows the latest mode selection. Mode selection is disable under force heater operation.

Heater source will ON during force heater mode.

System setup	12:00 pm, Mon
External compressor SW	
Circulation liquid	
Heat-Cool SW	
Force heater	
⬆ Select	[↵] Confirm

21. Force Defrost

Initial setting: Manual

Under manual mode, user can turn ON force defrost through quick menu.

If selection is 'auto', outdoor unit will run defrost operation once if heat pump have long hour of heating without any defrost operation before at low ambient condition. (Even if auto is selected, user still can turn ON force defrost through quick menu)

System setup	12:00 pm, Mon
Circulation liquid	
Heat-Cool SW	
Force heater	
Force defrost	
⬆ Select	[↵] Confirm

22. Defrost signal

Initial setting: No

Defrost signal and bivalent connection have the same connection port in the main PCB. When defrost signal set to YES, bivalent connection reset to NO. Only one function can be set between defrost signal and bivalent.

When defrost signal set to YES, during defrost operation is running at outdoor unit defrost signal contact turn ON. Defrost signal contact turn OFF after defrost operation end.

(Purpose of this contact output is to stop indoor fan coil or water pump during defrost operation).

System setup	12:00 pm, Mon
Heat-Cool SW	
Force heater	
Force defrost	
Defrost signal	
⬆ Select	[↵] Confirm

23. Pump flowrate

Initial setting: ΔT

If pump flowrate setting is ΔT, unit adjust pump duty to get different of water inlet and outlet base on setting on * ΔT for heating ON and * ΔT for cooling ON in operation setup menu during room side operation.

If pump flowrate setting is set to Max. duty, unit will set the pump duty to the set duty at *Pump maximum speed in service setup menu during room side operation.

System setup	12:00 pm, Mon
Force heater	
Force defrost	
Defrost signal	
Pump flowrate	
⬆ Select	[↵] Confirm

24. DHW defrost

Initial setting: Yes

When DHW defrost set to YES, hot water of domestic hot water tank will be used during defrost cycle.
When DHW defrost set to NO, hot water of floor heating circuit will be used during defrost cycle.

System setup	12:00 pm, Mon
Force defrost	
Defrost signal	
Pump flowrate	
DHW Defrost	
◀ Select	[↵] Confirm

25. Heating control

Initial setting: Comfort

Compressor frequency control can be selected from two modes: Comfort and Efficiency.

Select "Comfort"

- The compressor operates at the maximum frequency at the upper zone limit and reaches the set temperature faster.

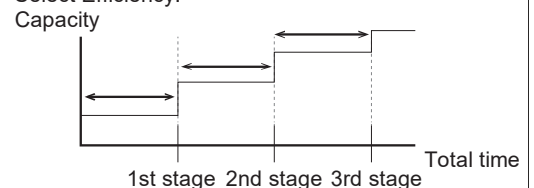
Select "Efficiency"

- The compressor frequency is gradually increased to reduce power consumption. The system have 3 steps to achieve maximum compressor frequency. You can set period time of each stage on R/C.

(compressor frequency for each stage)
1st stage: 50% of the maximum frequency
2nd stage: 66% of the maximum frequency
3rd stage: 83% of the maximum frequency

System setup	12:00 pm, Mon
Defrost signal	
Pump flowrate	
DHW Defrost	
Heating control	
◀ Select	[↵] Confirm

Select Efficiency.



26. External meter

Initial setting: [Heat-cool meter : No]
[Tank meter : No] *only available when
Heat-cool meter select Yes
[Elec. meter HP : No]
[Elec. meter 1 (PV meter) : No]
[Elec. meter 2 (Building) : No]
[Elec. meter 3 (Reserve) : No]

System setup	12:00 pm, Mon
Pump flowrate	
DHW Defrost	
Heating control	
External meter	
◀ Select	[↵] Confirm

There are two systems for generation meter connection : one generation meter system (Heat-cool meter) or two generation meter system (Heat-cool meter and Tank meter)

Both systems can provide all generation data of heating, cooling and DHW directly from external meter.

If Heat-cool meter is set to Yes, it will read from external meter for heat pump's energy generation data during heating, cooling and DHW operation^{*1}.

If Heat-cool meter is set to No, it will base on unit's calculation for heat pump's energy generation data during heating, cooling and DHW operation.

If Tank meter is set to Yes, it will read from external meter for heat pump's energy generation data during DHW operation^{*1}.

If Elec. meter HP is set to Yes, it will read from external meter for heat pump's energy consumption data.

If Elec. meter HP is set to No, it will base on unit's calculation for heat pump's energy consumption data.

If Elec. meter 1 (PV meter) is set to Yes, it will read from external meter for energy generation data of solar system and display it on Cloud system.

If Elec. meter 2 (Building) is set to Yes, it will read from external meter for energy consumption data of the building and display it on Cloud system.

If Elec. meter 3 (Reserve) is set to Yes, it will read from external meter for energy consumption data obtained from reserved electricity meter and display it on Cloud system.

^{*1} Set Heat-cool meter to Yes and set Tank meter to No when 1 generation meter system is installed.

Set Heat-cool meter to Yes and set Tank meter to Yes when 2 generation meter system is installed.

Remark : Elec. meter HP refers to Electricity meter that measures Heat Pump unit's consumption.

Elec. meter 1 / 2 / 3 refers to Electricity meter no. 1 / no. 2 / no. 3

27. Electrical anode

Initial setting: No

Power can be supplied from the indoor unit when an electric anode is attached to an external tank.

System setup	12:00 pm, Mon
DHW Defrost	
Heating control	
External meter	
Electrical anode	
◀ Select	[↵] Confirm

28. Extra pump

Initial setting: Heat

Selects whether the extra pump is used in the circulation circuit for heating or in the circulation circuit for DHW, or it is not used.
If select for DHW, make choices such as the pump ON/OFF time and whether Comfort or Efficiency is a priority.

Select DHW

- Pump ON time 8:00
- Pump OFF time 20:00

Select Comfort (Exit extra pump settings)

Select Efficiency

- ON time 0:15 (0:05 ~ 1:00)
- OFF time 0:15 (0:05 ~ 1:00)

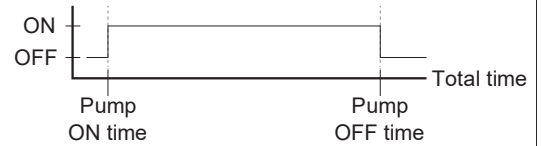
*This is for the extra pump connected to the indoor unit, and is not related to the extra pump connected to the outdoor unit.

*Extra pump connected to the outdoor unit can't be controlled by the remote controller.

System setup	12:00 pm, Mon
Heating control	
External meter	
Electrical anode	
Extra pump	
◀ Select	[↵] Confirm

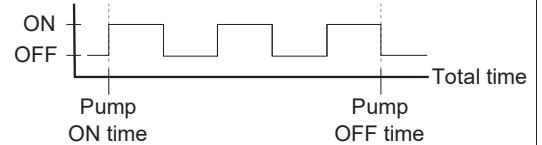
Select DHW

Select Comfort



Select DHW

Select Efficiency

**29. External heater**

Initial setting: No

Select the type of external heater.

"In-line": Select this if you're using the external heater as an In-line heater.

"Buffer tank": Select this if you're using the external heater as a buffer tank heater.

Please refer to 11.1.3 Connect the Cable to the Indoor Unit "how to install external heater" for details.

System setup	12:00 pm, Mon
External meter	
Electrical anode	
Extra pump	
External heater	
◀ Select	[↵] Confirm

30. Static pressure

Initial setting: No

If set to No, the outdoor fan motor operates at a normal speed.

If set to YES, the outdoor fan motor operates at a higher speed than normal in response to high static pressure.

System setup	12:00 pm, Mon
Electrical anode	
Extra pump	
External heater	
Static pressure	
◀ Select	[↵] Confirm

31. Cooling capacity

Initial setting: Efficiency

Select the cooling capacity.

If set to "Efficiency", the unit performs cooling operation efficiently at rated capacity.

If set to "Comfort", the cooling operation is performed at maximum capacity.

System setup	12:00 pm, Mon
Extra pump	
External heater	
Static pressure	
Cooling capacity	
▲ Select	[↵] Confirm

11.2.2.4 Operation Setup

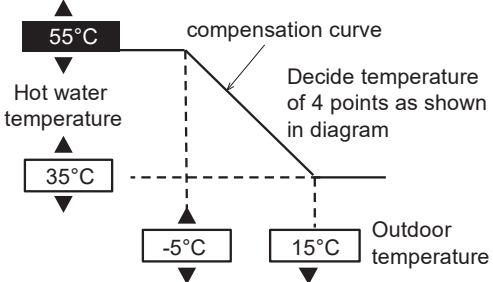
Heat

32. Water temp. for heating ON

Initial setting: compensation curve

Set target water temperature to operate heating operation.
Compensation curve: Target water temperature change in conjunction with outdoor ambient temperature change.
Direct: Set direct circulation water temperature.

In 2 zone system, zone 1 and zone 2 water temperature can be set separately.



33. Outdoor temp. for heating OFF

If the operation of the outdoor unit is frequently switched on and off depending on the outdoor air temperature, the following settings can be used to reduce the frequency.

a. Outdoor temp. for heating OFF

Initial setting: 24°C

Set outdoor temp. to stop heating
Setting range is 6°C~35°C

b. Outdoor temp. for heating ON

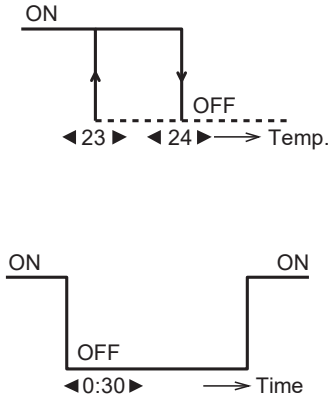
Initial setting: 23°C

Set outdoor temp. to start heating.
Setting range is 5°C~X°C (X is heating OFF temp. -1)

c. Heating ON delay time

Initial setting: 0:30min

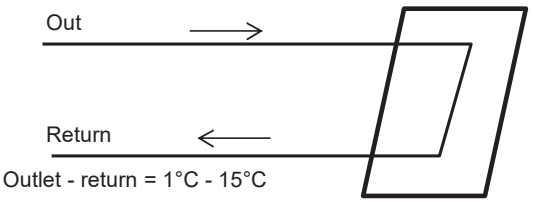
Set delay time from heating OFF to heating ON.



34. ΔT for heating ON

Initial setting: 5°C

Set temp difference between out temp & return temp of circulating water of Heating operation.
When temp gap is enlarged, it is energy saving but less comfort. When the gap gets smaller, energy saving effect gets worse but it is more comfortable.
Setting range is 1°C ~ 15°C



35. Heater ON/OFF

a. Outdoor temp. for heater ON

Initial setting: 0°C

Set outdoor temp when back-up heater starts to operate.
Setting range is -20°C ~ 15°C

User shall set whether to use or not to use heater.

b. Heater ON delay time

Initial setting: 30 minutes

Set delay time from compressor ON for heater to turn ON if not achieve water set temperature.
Setting range is 10 minutes ~ 60 minutes

c. Heater ON: ΔT of target Temp

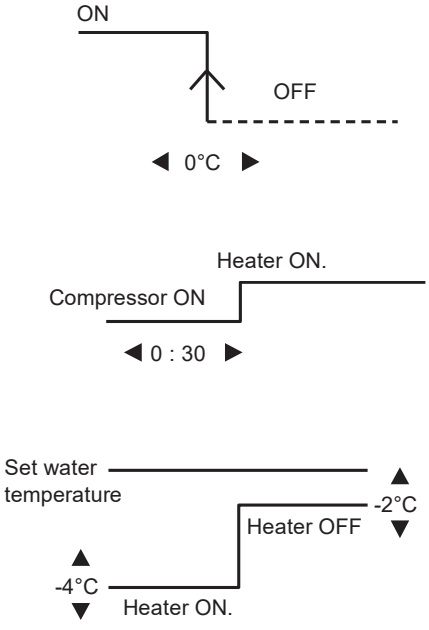
Initial setting: -4°C

Set water temperature for heater to turn ON at heat mode.
Setting range is -10°C ~ -2°C

d. Heater OFF: ΔT of target Temp

Initial setting: -2°C

Set water temperature for heater to turn OFF at heat mode.
Setting range is -3°C ~ 0°C



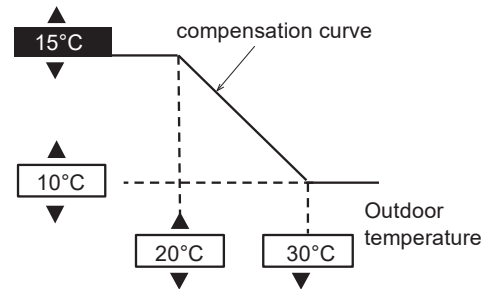
Cool

36. Water temp. for cooling ON

Initial setting: compensation curve

Set target water temperature to operate cooling operation.
Compensation curve: Target water temperature change in conjunction with outdoor ambient temperature change.
Direct: Set direct circulation water temperature.

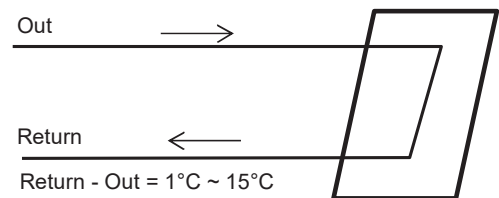
In 2 zone system, zone 1 and zone 2 water temperature can be set separately.



37. ΔT for cooling ON

Initial setting: 5°C

Set temp difference between out temp & return temp of circulating water of Cooling operation.
When temp gap is enlarged, it is energy saving but less comfort. When the gap gets smaller, energy saving effect gets worse but it is more comfortable.
Setting range is 1°C ~ 15°C



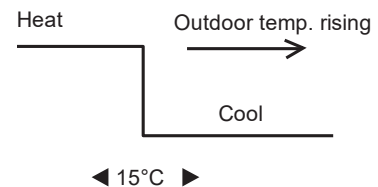
Auto

38. Outdoor temp. for (Heat to Cool)

Initial setting: 15°C

Set outdoor temp that switches from heating to cooling by Auto setting.
Setting range is 11°C ~ 25°C

Timing of judgement is every 1 hour

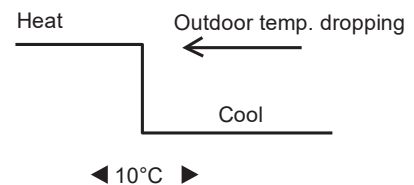


39. Outdoor temp. for (Cool to Heat)

Initial setting: 10°C

Set outdoor temp that switches from Cooling to Heating by Auto setting.
Setting range is 5°C ~ 14°C

Timing of judgement is every 1 hour



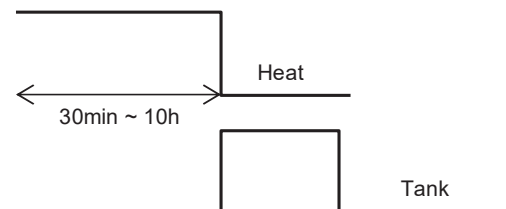
Tank

40. Floor operation time (max)

Initial setting: 8h

Set max operating hours of heating.
When max operation time is shortened, it can boil the tank more frequently.

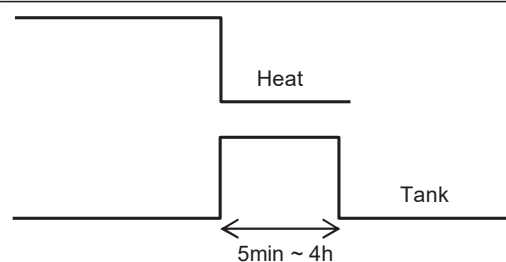
It is a function for Heating + Tank operation.



41. Tank heat up time (max)

Initial setting: 60min

Set max boiling hours of tank.
When max boiling hours are shortened, it immediately returns to Heating operation, but it may not fully boil the tank.

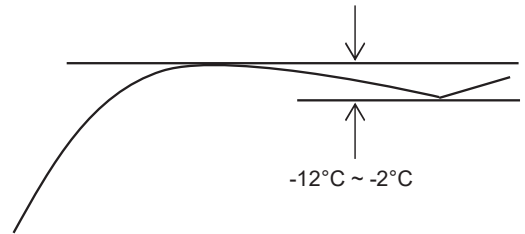


42. Tank re-heat temp.

Initial setting: -8°C

Set the temperature to re-boil the tank water.

Setting range is -12°C ~ -2°C

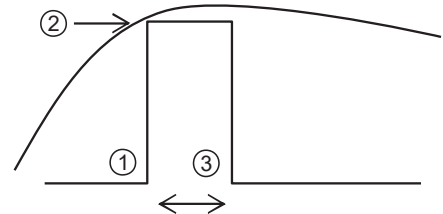
**43. Sterilisation**

Initial setting: 65°C 10 mins.

Set timer to perform sterilization.

- ① Set operating day & time. (Weekly timer format)
- ② Sterilization temperature (55~75°C)
- ③ Operation time (Time to run sterilization when it reached setting temperature. 5 ~ 60 minutes)

User shall set whether to use or not to use sterilization mode.

**11.2.2.5 Service Setup****44. Pump maximum speed**

Initial setting: Varies according to model

Normally setting is not necessary.

Adjust when needed to reduce the pump sound, etc.

Besides that, the unit has Air Purge function.

When the Pump flow setting is Max. Duty, this duty setting is the duty of fixed pump that runs during operation.

Service setup		12:00 pm, Mon
Flow rate	Max Duty	Operation
45.6 L/min.	0xCE	Air Purge
◀ Select		

45. Dry concrete

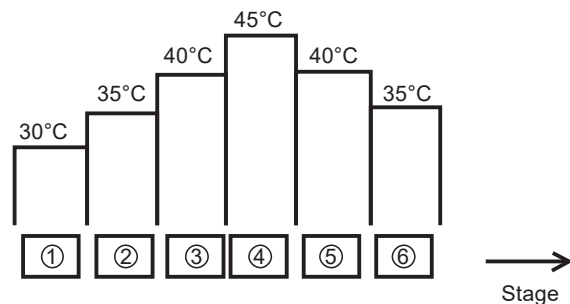
Operate concrete curing operation.

Select Edit and set the temperature for every stage (1~99 1 is for 1 day).

Setting range is 25~55°C

When it is turned ON, dry concrete starts.

In the case of 2 zones, it dries both zones.

**46. Service contact**

Able to set the name & telephone no. of contact person when there is breakdown etc. or client has trouble. (2 items)

Service setup	12:00 pm, Mon
Service contact:	
Contact 1	
Contact 2	
▲ Select	[←] Confirm

Contact - 1: Brian Adams	
ABC/ abc	0-9/ Other
ABCDEFGHIJKLMNOPQRSTUVWXYZ	abcdefghijklmnopqrstuvwxyz
▼ Select	[←] Confirm

11.2.2.6 Remote Control Setup**47. RC selection**

Initial setting: Single

If there is only one remote controller, set to "Single".
If two remote controllers are installed, set to "Dual".

For details on the Dual setting, refer to the instruction manual of the optional remote controller.

RC selection	12:00 pm, Mon
Single	
▼	
Dual	
▼ Select	[←] Confirm

11.3 Service and Maintenance

If forget Password and cannot operate remote controller

↶ + ↵ + ➤ Press for 5 seconds.
Password unlock screen appears, press Confirm and it shall reset.
Password will become 0000. Please reset it again.
Note: This is displayed only when the remote controller is password-locked.

11.3.1 Maintenance Menu

How to set up the Maintenance menu

Maintenance menu	12:00 pm, Mon
Actuator check	
Test mode	
Sensor setup	
Reset password	
▼ Select	[↵] Confirm

↶ + ↵ + ➤ Press for 5 seconds.

Items that can be set

- ① Actuator check (Manual ON/OFF all functional parts)
Note: As there is no protection action, be careful not to cause any error when operating each part (do not turn ON pump when there is no water etc.)
- ② Test mode (Test run)
Normally it is not used.
- ③ Sensor setup (offset gap of detected temp of each sensor can be set within -3~3°C range)
Note: Use only when sensor is deviated. It affects temperature control.
- ④ Reset password (password reset)

11.3.2 Custom Menu

How to set up a Custom menu

Custom menu	12:00 pm, Mon
Cool mode	
Back-up heater	
Reset energy monitor	
Reset operation history	
▼ Select	[↵] Confirm

Custom menu	12:00 pm, Mon
Back-up heater	
Reset energy monitor	
Reset operation history	
Anti-stick mode	
▲ Select	[↵] Confirm

≡ + ∨ + < Press for 5 seconds.

Items that can be set

- ① Cool mode (Select Cooling function: Enable/Disable) Default is Disable.
Note: As Enable/Disable Cool mode may affect electricity application, be careful and do not simply change it. In Cool mode, be careful if piping is not insulated properly, dew may form on pipe and water may drip on the floor and damage the floor.
- ② Back-up heater (Select Back-up heater: Enable/Disable)
Note: This back-up heater refers to the Extra heater. Differs from the use/non-use of back-up heater that is set by the customer. (This setting should only be used if requested by the utility company.) Installation must be carried out under the responsibility of the person in charge of installation.
- ③ Reset energy monitor (delete memory of Energy monitor). Use this when moving house and handover the unit.
- ④ Reset operation history (delete memory of operation history) Use this when moving house and handover the unit.
- ⑤ Anti-stick mode (select Anti-stick mode: Enable/Disable) Default is Anti-stick mode Enable.
The actuator is regularly activated every Monday at 3:00 am to prevent the actuating parts from sticking together. Select Disable if wish to stop the mode being activated periodically.
Parts and other components that may not operate if Disable is selected may stick if not operated for a long period of time.

11.4 Outdoor Unit

Attached accessories

No.	Accessories part	Qty.
[1]	Drain Elbow 	1
[2]	Rubber Cap 	6
[3]	Rubber Cap 	15

Optional Accessories

No.	Accessories part	Qty.
[4]	Remote Controller set (CZ-RTW2TAW1C) *Include Remote Controller + Network adapter with 10m cable	1
[5]	Remote Controller (CZ-RTW2)	1
[6]	Base Pan Heater CZ-NE5P	1
[7]	Mod Bus	1

- When you purchase an indoor unit, the remote controller and network adapter are included.
- When the outdoor unit is used alone, either [4] or [5] is always required.
- If you need the 2nd remote controller, purchase [5] and set it up as the 2nd remote controller.
- When installing the outdoor units in cold climates, it is strongly recommended to install a base pan heater (optional). For installation details, refer to the installation manual of the base pan heater (optional).

11.4.1 Select The Best Location (Outdoor Unit)

- ☐ If an awning is placed over the unit to avoid direct sunlight or rain, be careful not to disturb the heat dissipation from the capacitor.
- ☐ Avoid installation where the ambient temperature may fall below -25°C.
- ☐ A protective zone is defined in the area close to the perimeter of the product. Refer to 11.4.2 Protective Zone section.
- ☐ Do not place obstacles that could short-circuit the discharge air.
- ☐ The lifespan of Outdoor Unit may be shorter if it is installed near the sea, in areas with high sulphur content or high oil content (e.g. machine oil).
- ☐ For maximum length and elevation between outdoor unit and Tank, refer to "Cooling/Heating Pipework" in 11.4.5 Piping Installation.
- ☐ Must be installed at an altitude of 2000m or less

11.4.2 Protective Zone

This outdoor unit is filled with R290(Extremely flammable gas, safety A3 group per ISO 817). Note that this refrigerant has a higher density than air. In case of a refrigerant leak, the leaked refrigerant may accumulate near the ground.

Prevent accumulation of refrigerant in any way that is potentially dangerous, explosive or risk suffocation. Prevent refrigerant from entering the building through building openings. Prevent accumulation of refrigerant in the drain grooves.

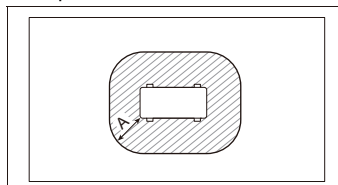
A protective zone is defined around this outdoor unit. There must be no building openings, windows, doors, light shafts, cellar entrances, escape hatches, flat-roof windows or ventilation openings in the protective zone.

There must be no ignition sources, such as heat above 360°C, sparks, open flame, plug sockets, light switches, lamps, electrical switches or other permanent ignition sources, in the protective zone.

The protective zone must not extend to adjacent buildings or public traffic areas (boundaries of neighbors, the public road, neighbor's private roads, subsidence area, depressions, pump shafts, sewers intakes, waste water shafts and so on.).

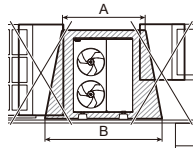
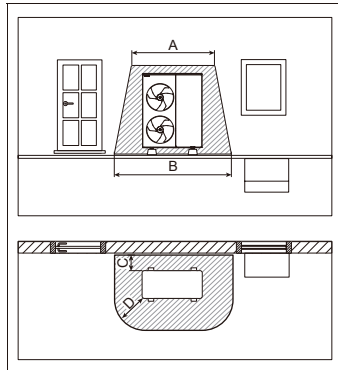
In the protective zone, you are not permitted to make any subsequent structural alterations which infringe the stated rules for the protective zone.

1) Protective zone for ground installation (or flat-roof installation) at the open areas



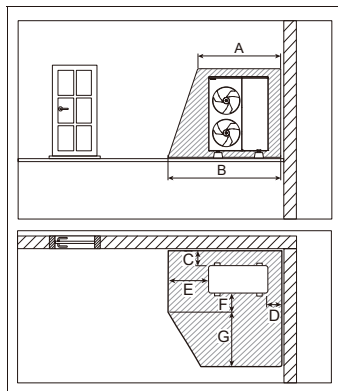
A 1500mm

2) Protective zone for ground installation in front of a building wall



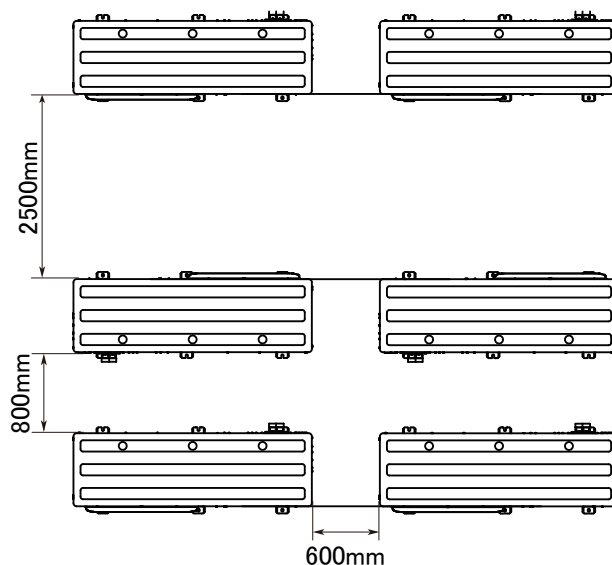
A 2400 mm
B 4500 mm
C 500 mm
D 1500 mm

3) Protective zone for ground installation in a building corner



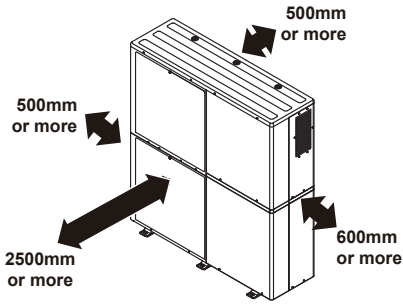
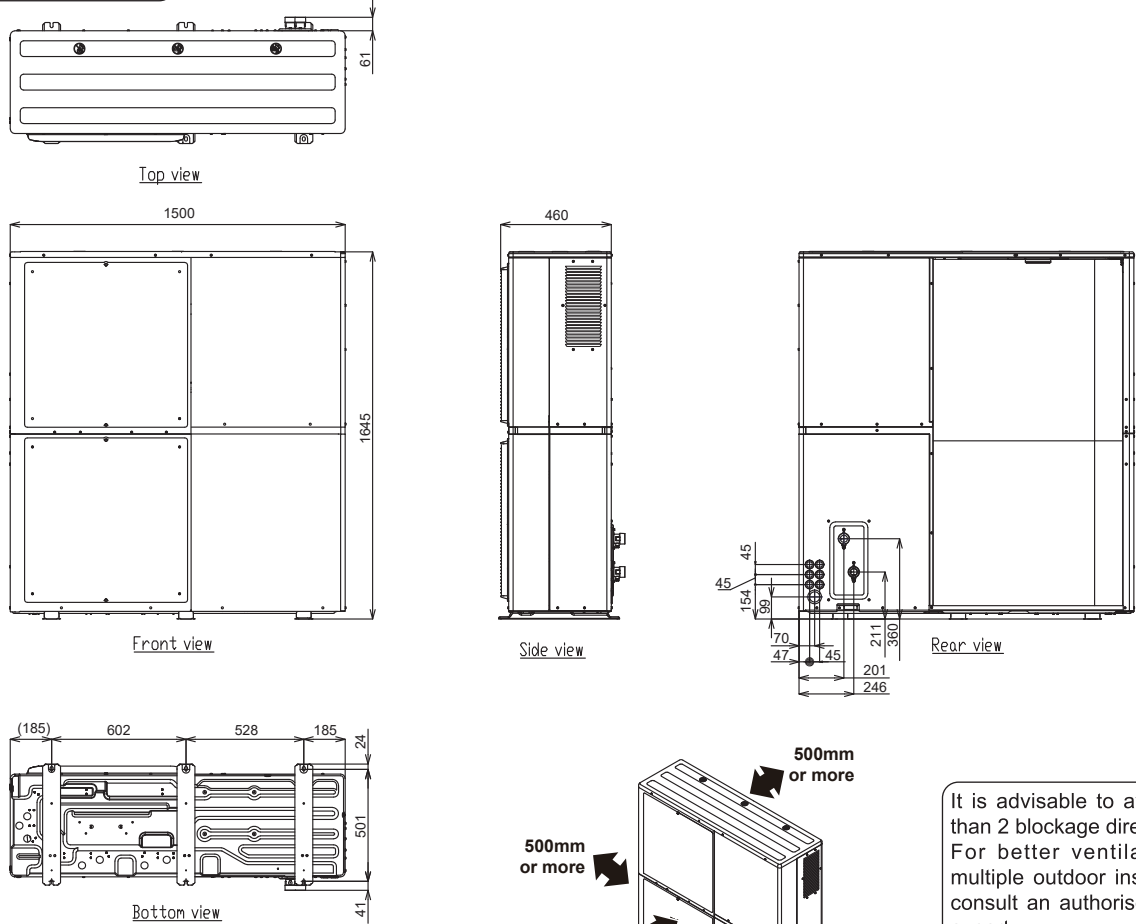
A 2400 mm
B 3600 mm
C 500 mm
D 600 mm
E 1500 mm
F 500 mm
G 2000 mm

4) Minimum distance when units are connected in close proximity



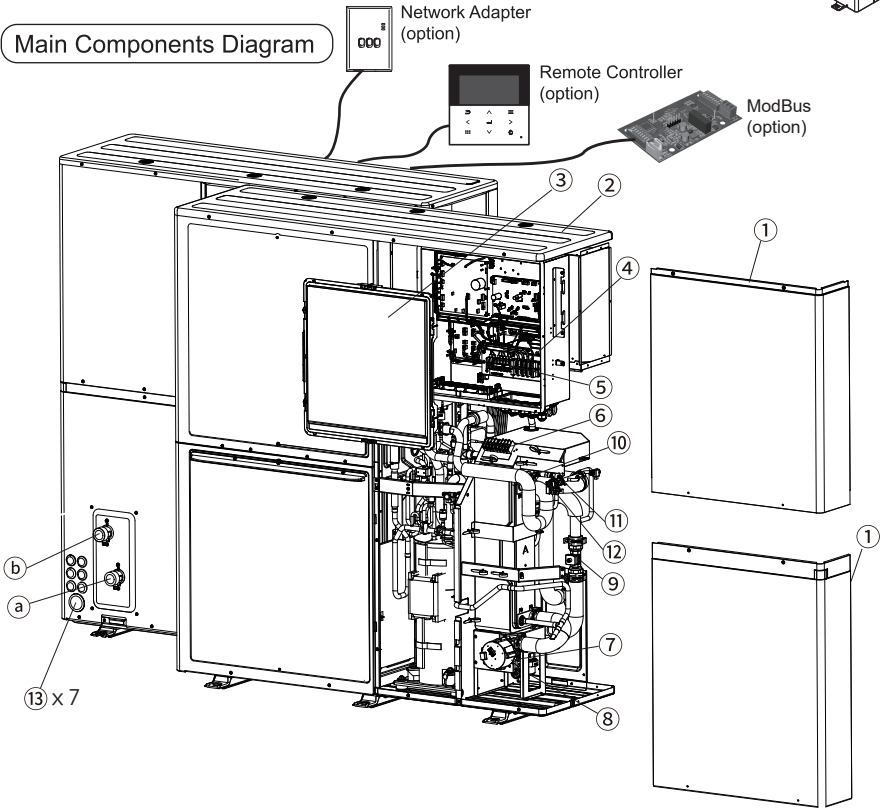
11.4.3 Install Outdoor Unit

Dimension Diagram



It is advisable to avoid more than 2 blockage directions. For better ventilation and multiple outdoor installations, consult an authorised dealer/ expert.

Main Components Diagram

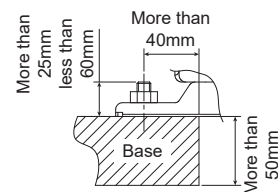


- ① Front plate
- ② Top plate
- ③ Terminal board cover
- ④ Terminal board
- ⑤ Optional terminal board
- ⑥ Indoor/outdoor connecting terminal
- ⑦ Water pump
- ⑧ Magnetic water filter
- ⑨ Flow sensor
- ⑩ Gas-liquid separator
- ⑪ Water pressure sensor (back side board)
- ⑫ Pressure relief valve
- ⑬ Connecting Cable Hole

Tube Connector	Function
	Connector size
a	Zone 1 Water Inlet (From Space Heating/Cooling)
	R 1½"
b	Zone 1 Water Outlet (To Space Heating/Cooling)
	R 1½"

INSTALL THE OUTDOOR UNIT

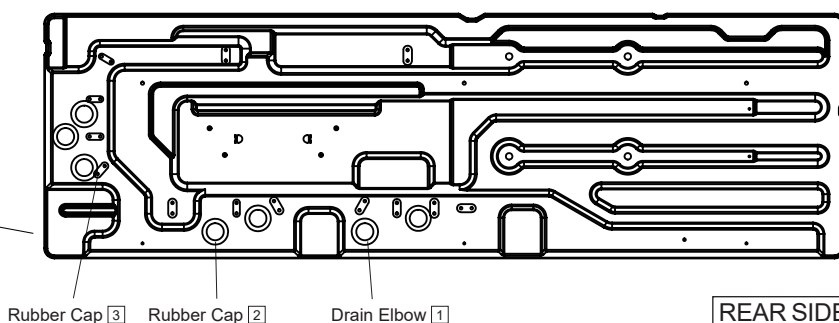
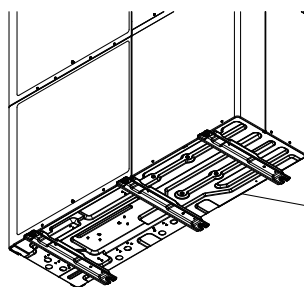
- After selecting the best location, start installation according to the Installation Diagram.
- When installing at roof, please consider strong wind and earthquake. Please fasten the installation stand firmly with bolt or nails.
- For mounting on concrete or solid surfaces, fix the unit using M10 or W 3/8 bolts and nuts. Make sure that the unit is installed vertically against the horizontal plane. (Install the unit using anchor bolt as shown right.)
- Install the outdoor unit outdoors
- Install the outdoor unit so that it is tilted horizontally.



DISPOSAL OF OUTDOOR UNIT DRAIN WATER

- When the Drain elbow [1] is used, please ensure to:
 - The unit must be mounted on a stand at least 50 mm high.
 - Seal the $\varnothing 32$ mm holes with Rubber caps [3]. (Refer to the diagram below and install from the outside)
 - If drain water leaks, attach rubber caps [4] when necessary. (Refer to the diagram below and install from the outside)
 - When disposing drain water from the outdoor unit, use a tray (field supply) if necessary.
- If the unit is used in an area where temperature falls below 0°C for 2 or 3 consecutive days, it is recommended not to use the Drain elbow [1] Rubber caps [3] and Rubber caps [4] since drain water will freeze up and obstruct fan rotation.

FRONT SIDE



REAR SIDE

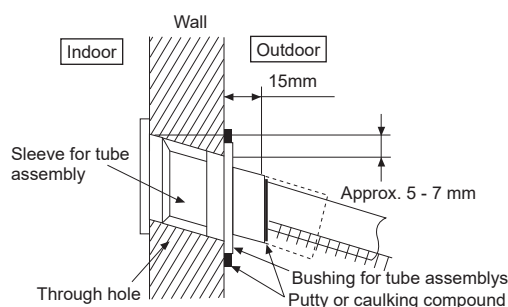
11.4.4 Install a Sleeve of Piping (Drill A HOLE IN THE WALL)

- Make a through hole. (Check pipe diameter and insulation thickness)
- Insert the piping sleeve into the hole.
- Fix the bushing to the sleeve.
- Cut the sleeve until it extrudes about 15 mm from the wall.

CAUTION

- When the wall is hollow, please be sure to use the sleeve for tube assembly to prevent dangers caused by mice biting the connection cable.

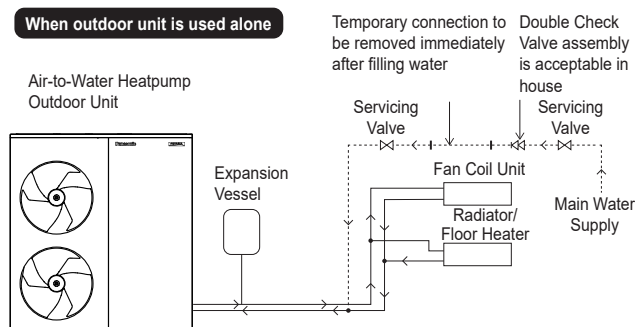
- Finish by sealing the sleeve with putty or caulking compound at the final stage.



11.4.5 Piping Installation

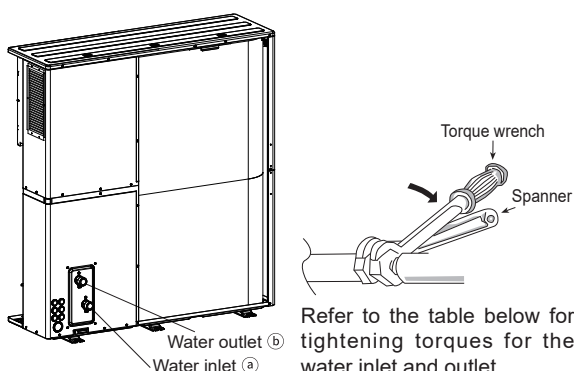
Typical Piping Installation

When outdoor unit is used alone



Water Piping Installation

- Please engage a licensed water circuit installer to install this water circuit.
- This water circuit must comply with relevant European and national regulations (including EN61770), and local building regulation codes.
- Ensure the components installed in the water circuit could withstand water pressure during operation.
- Do not use worn out tube or detachable hose set.
- Do not apply excessive force to the pipe. There is a risk of damage.
- Choose proper sealer which can withstand the pressures and temperatures of the system.
- Make sure to use two spanners to tighten the connection. Further tighten the nuts with torque wrench to the specified torque as stated in the table.
- Cover the pipe end to prevent dirt and dust when inserting it through a wall.
- If non-brass metallic piping is used for installation, make sure to insulate the pipes to prevent galvanic corrosion.
- Do not connect galvanised pipes. This may cause galvanic corrosion.
- Use correct nut for all Outdoor Unit tube connections and clean all tubes with tap water before installation.



	Size	Torque
Water Inlet Port (a)	R 1-1/2"	150 N•m
Water Outlet Port (b)		



CAUTION

Do not overtighten, overtightening may cause water leakage.

- Make sure to insulate the water circuit pipes to prevent reduction of heating capacity.
- After installation, check the water leakage condition in connection area during test run.
- Failure to connect the tube appropriately might cause the Outdoor Unit malfunction.
- Protection from frost:
When water is left inside the system, freezing up is very likely to happen, which could damage the system.
Make sure the power supply is turned off before draining.

When outdoor unit is used alone

Install an expansion tank (set pressure: 1 bar) to the circulation circuit. For capacity, refer to 11.4.11 Reconfirmation.

Space Cooling/Heating Pipework

- Failure to connect the tube appropriately might cause the Outdoor Unit malfunction.
- Refer to the table below for the rated flow rate of each particular Outdoor Unit.

Model	Rated flow rate (L/min)		
	Cooling(Efficiency)	Cooling(Comfort)	Heating
WH-WXG20ME8	43.0	57.3	57.3
WH-WXG25ME8	43.0	71.6	71.6
WH-WXG30ME8	43.0	74.5	86.0

When outdoor unit is used alone

- Connect Outdoor unit Zone 1 Water inlet (a) to outlet connector of Zone 1 Panel/Floor heater.
- Connect Outdoor unit Zone 1 Water outlet (b) to inlet connector of Zone 1 Panel/Floor heater.

When connected to indoor unit

Refer to the Indoor Unit Installation Manual.

* In the case of Control Module model, it is the same as outdoor unit alone case.

Pipe diameter and length

Refer to [Special Installation Patterns](#) in next page.

Model	Water piping (When outdoor unit is used alone)		
	Inner diameter	Insulation thickness	Maximum elevation between outdoor unit and Panel/Floor heater
WH-WXG20ME8	ø 32 mm	30 mm or more	10m
WH-WXG25ME8	ø 40mm		
WH-WXG30ME8			

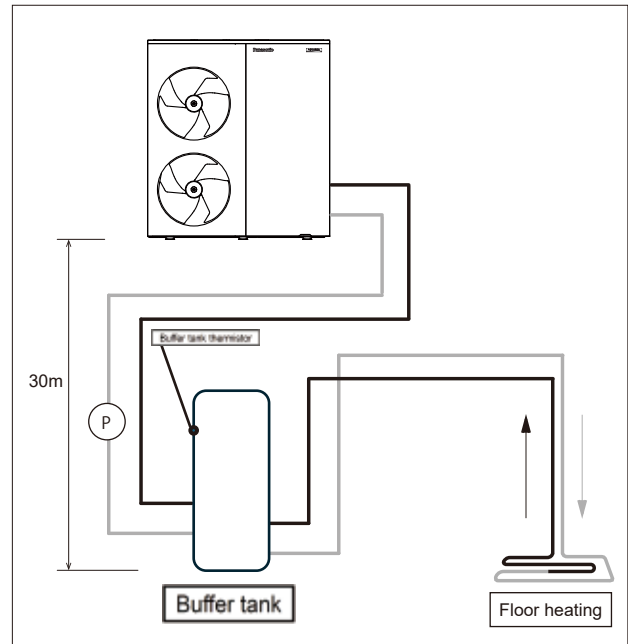
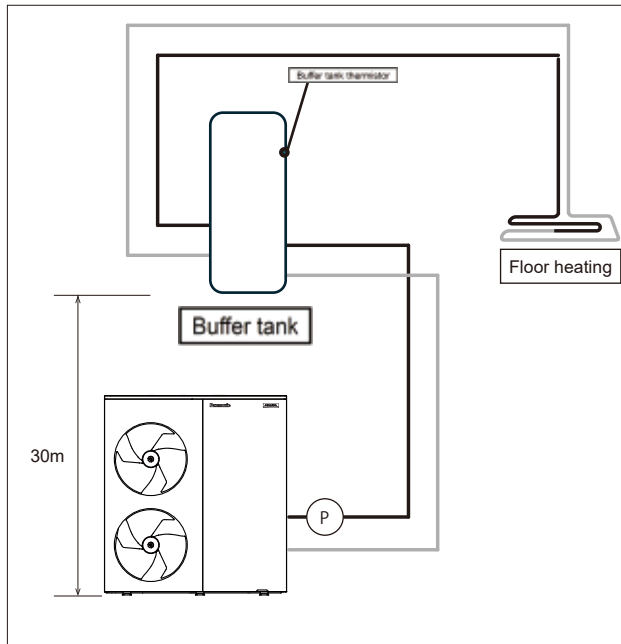
* WH-WXG30ME8 may require installation of an extra pump depending on piping length.

Special Installation Patterns

Special construction patterns mentioned here refer to the case where there is a substantial difference in elevation (e.g. more than 10 m) between the outdoor unit installation and the Panel/Floor heater (or indoor unit).

In this case, attention must be paid since incorrect water filling during installation may prevent the system from operating correctly and may cause water leak.

- ① When outdoor unit is located below and Panel/Floor heater is 30 m above it
- ② When outdoor unit is located above and Panel/Floor heater is 30 m below it



- Pressure checked by remote controller: 3.5 ~ 4 bar. (at an elevation difference of 30 m)
- When installing an extra pump, connect it to the water outlet of the outdoor unit. (If installed to the water inlet, the safety valve is activated and the water is drained) Indoor unit is required to install an extra pump.
- Pressure checked by remote controller: 0.5 ~ 1 bar. (at an elevation difference of 30 m)
- When installing an extra pump, connect it to the water outlet of the indoor unit.
- Indoor unit is required to install an extra pump.

Elevation difference between outdoor unit and tank unit	Water pressure in outdoor unit	
Outdoor unit above the tank unit	Up to 30m	0.5~1.0bar
	Up to 20m	1.0~2.0bar
	Up to 10m	1.0~3.0bar
Outdoor unit below the tank unit	Up to 10m	1.5~4.0bar
	Up to 20m	2.5~4.0bar
	Up to 30m	3.5~4.0bar

11.4.6 Connect to the cable to the outdoor unit

⚠ WARNING

This section is intended for licensed electricians.
Work inside terminal board covers ③ fixed with work screws must be carried out by an installer or service personnel under the supervision of qualified personnel.

Fixing of Power Supply Cable and Connecting Cable

1. An isolating device must be connected to the power supply cable.
 - Isolating device (disconnecting means) should have minimum 3.0 mm contact gap.
 - Use approved polychloroprene sheathed flexible cable of type designation 60245 IEC 57, H07RN-F or heavier. Connect the other end of the cable to isolating device (Disconnecting means). See table below for cable size requirements.

Power Supply Cable

Model	WH-WXG20ME8 WH-WXG25ME8 WH-WXG30ME8
Cable specification	5X10mm ² ~5X16mm ²
Cable Diameter	ø 5~8.8mm
Cable gland to be used (see diagram in 2 below)	A
Isolating Devices	50A
Recommended RCD	30mA, 4P, typeA

- Earth wire shall be longer than the other wires as shown in the figure 3 for the electrical safety in case of the slipping out of the cord from the Holder (Clamper).
This equipment complies with IEC 61000-3-12 provided that the short-circuit power S_{sc} is greater than or equal to 5300kVA (30kW model)/4500kVA(25kWmodel)/3600kVAw(20kW model) at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with a short -circuit power S_{sc} greater than or equal to 5300kVA(30kW model)/4500kVA (25kWmodel)/3600kVAw(20kW model) at the interface .

2. Connecting cable must be an approved polychloroprene sheathed flexible cable (see table below), type designation 60245 IEC 57, H07RN-F or heavier. The sheath diameter of some connecting cables must be within specification compatible with the cable gland.

	Tank temperature sensor	Remote controller
Cable Specifications	2 × min 0.75 mm ²	2×min 0.5mm ² or more, double insulation sheathed (PVC or rubber) and shielded cable

	3-Way Valve	Boiler	EXTRA PUMP
Cable Specifications	3 × min 1.0 mm ²	2 × min 1.5 mm ²	
Cable Diameter	ø 6.5~10.0mm		
Cable gland to be used (see diagram in 2 below)	B		

3. Route the cables as follows.

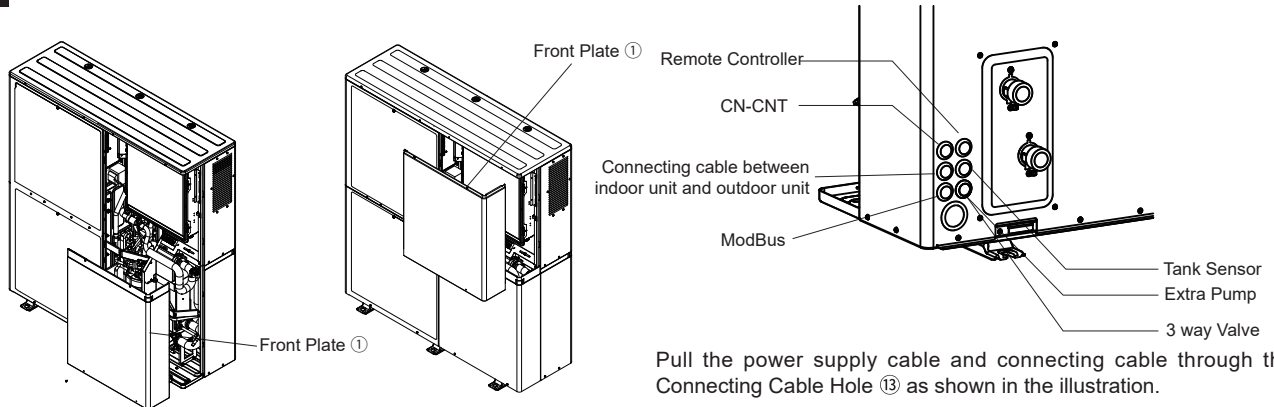
- Do not damage the cables by sharp edges.

- 1 Remove the front plate ① and pull the power cable (cable *1) and connection cable through into the rear bushing. Be sure to use the bushing and do not lose it.
- 2 Remove the terminal board cover ③ and cable gland cap and insert the cables into the cable gland on the bottom of the electrical control unit box.
- 3 Connect to Terminal board ④ and optional terminal board ⑤.
- 4 Fix the cable gland by referring to [Figure 2]*2
- 5 Set the terminal board cover ③ by referring to [Figure 2] *2

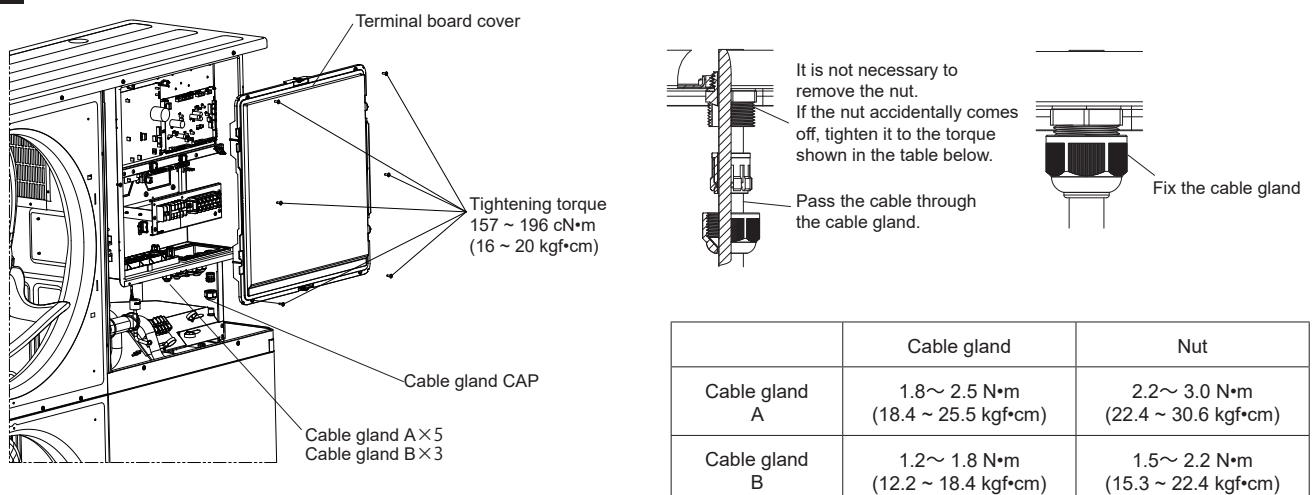
*1 Locally procure the specified cable.

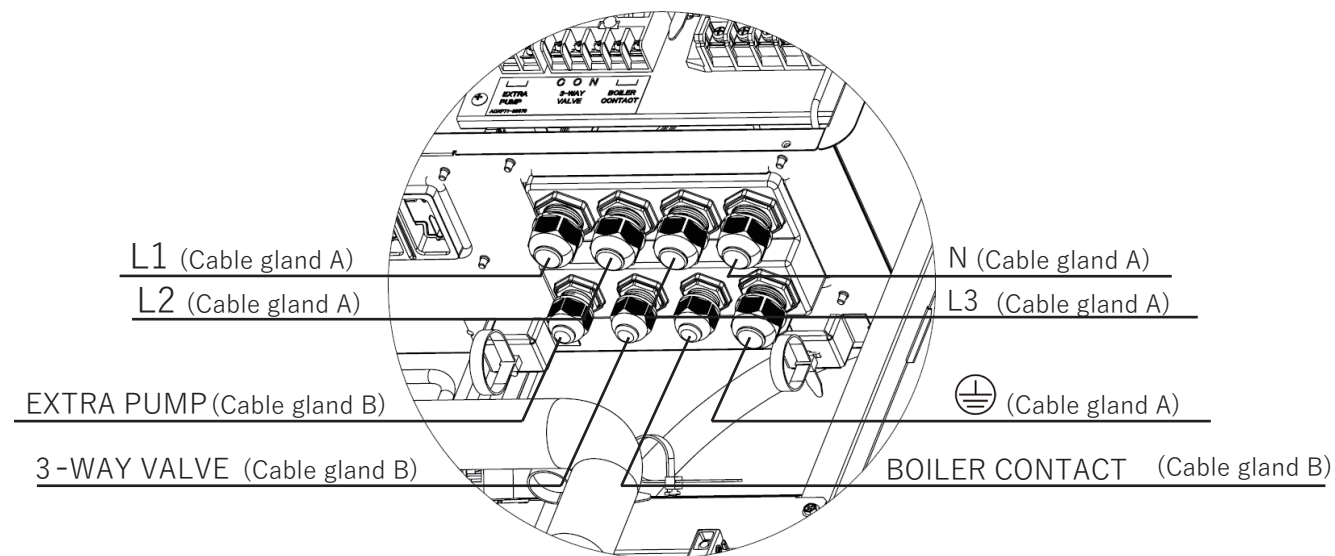
*2 Screws of cable gland and terminal board cover ③ must be tightened to the specified tightening torque to prevent ingress of gas.

1



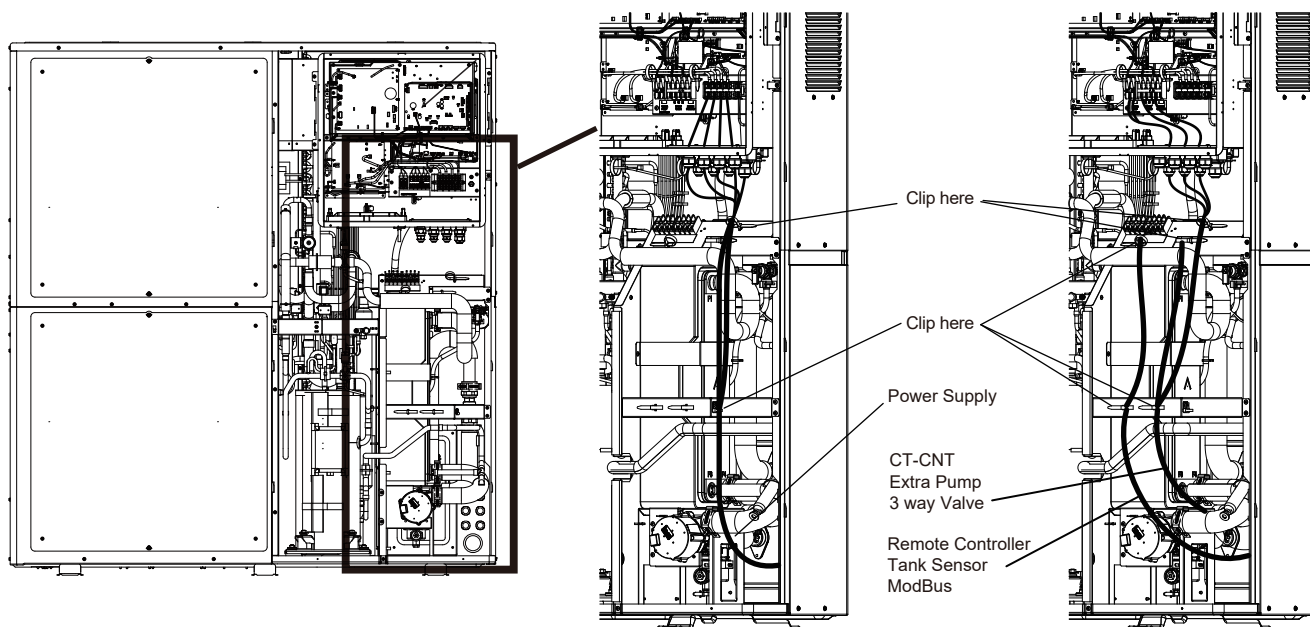
2





Overall view

2 3



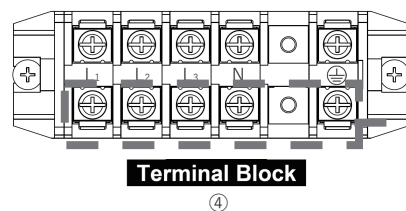
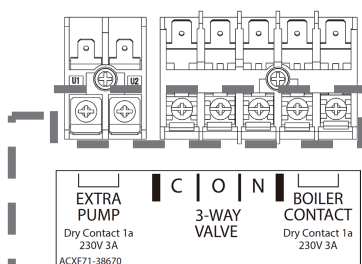
3

△ WARNING

⏏ This equipment must be properly earthed.

• OUTPUT

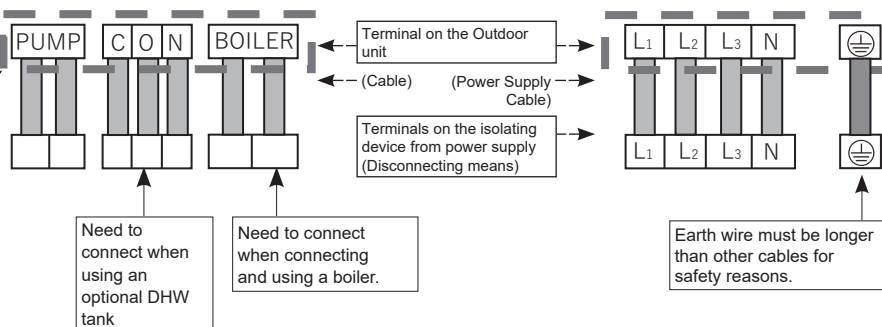
3-way valve	AC230V C : Close O : Open N : Neutral
Boiler contact	Dry contact 1a AC230V 3 A (System setup necessary)
EXTRA PUMP	Dry contact 1a AC230V 3 A



Please use only as auxiliary purpose for the outdoor built-in pump
*The extra pump connected to the outdoor unit can't be controlled by the remote controller.
*It operates in conjunction with the built-in pump.

refer to below

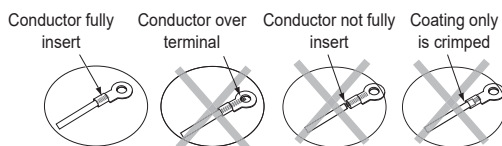
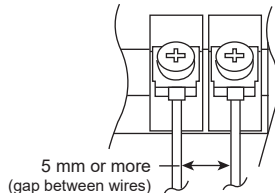
WIRE STRIPPING AND CONNECTING REQUIREMENT



WIRE STRIPPING AND CONNECTING REQUIREMENT

M4: I.D. Ø 4.2 or more O.D. Ø 10.0 or less
M5: I.D.: Ø 5.2 or more O.D.: Ø 12.5 or less

Wire stripping and Crimping a ring terminal onto wire



ACCEPTED PROHIBITED PROHIBITED PROHIBITED

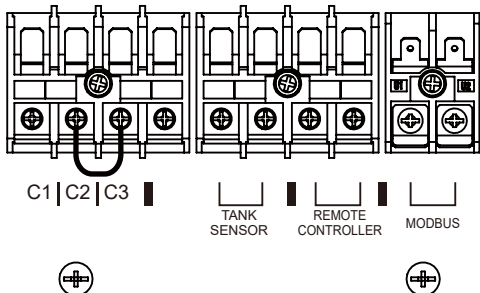
Terminal screw	Tightening torque cN·m {kgf·cm}
M4	157 ~ 196 {16 ~ 20}
M5	196 ~ 245 {20 ~ 25}

(Refer to the overall diagram on previous page)

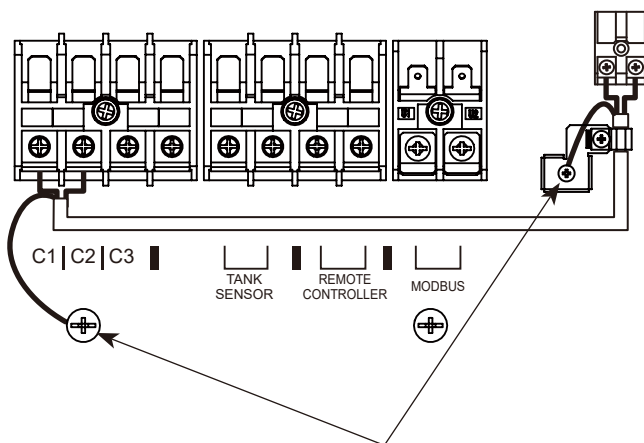
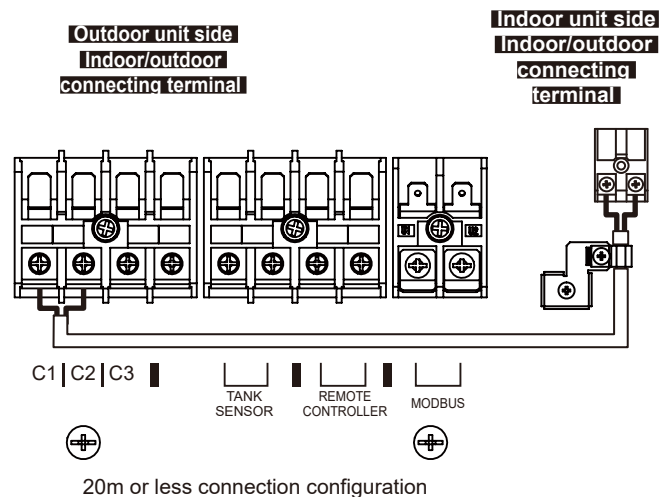


Connection between Indoor unit and Outdoor unit

When outdoor unit is used alone, leave the short-circuit wires "C2" and "C3" attached as shown in the diagram below.



When connecting to an indoor unit, remove the short-circuit wires "C2" and "C3" and connect as shown in the diagram below depending on whether the communication line length is 20m or less or 20m to 30m.



Use this screw when connecting the shield for the Inter-unit control wiring to ground (function earthing)

20m-30m connection configuration(use shielded wire)

CONNECTION REQUIREMENT

For model WH-WXG20ME8,WH-WXG25ME8,WH-WXG30ME8

- The equipment's Power Supply complies with IEC/EN 61000-3-12 provided that the short-circuit power S_{sc} is greater than or equal to 5300kVA(30kW model)/4500kVA(25kW model)/3600kVA(20kW model) at the interface point between the user's supply and the public system.
- The equipment's Power Supply complies with IEC/EN 61000-3-3 and can be connected to current supply network.

11.4.7 Install remote controller

Remote controller is an optional item.

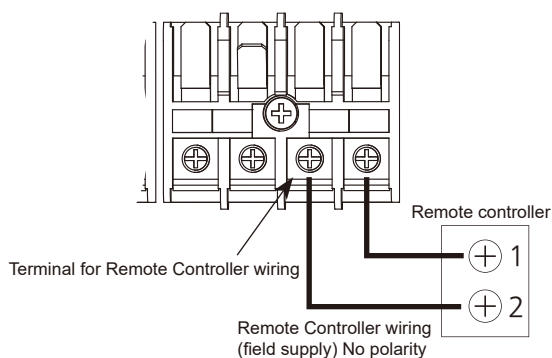
Be sure to purchase it if the outdoor unit is used alone. If you have purchased an indoor unit, it is included.

When relocating the remote controller, install in accordance with its Installation Manual.

INSTALLATION LOCATION

- When using as Room Thermostat, install at the height of 1 to 1.5 m from the floor (Location where average room temperature can be detected).
- Install vertically against the wall.
- Avoid the following locations for installation.
 - By the window, etc. where is exposed to direct sunlight or direct air
 - In the shadow or backside of objects deviated from the room airflow
 - Location where condensation occurs (Remote Controller is not moisture proof or drip proof)
 - Location near heat source
 - Uneven surface
 - Outdoors
- Keep distance of 1 m or more from the TV, radio and PC. (Cause of fuzzy image or noise)

REMOTE CONTROLLER WIRING (if the outdoor unit is used alone)

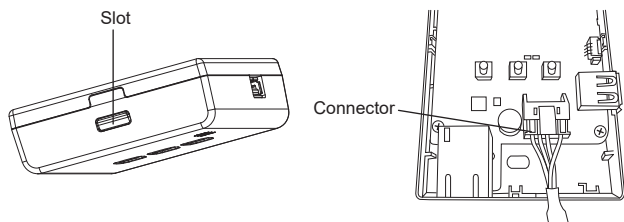


- Remote Controller cable shall be $2 \times \min 0.5\text{mm}^2$ or more, double insulation sheathed(PVC or rubber) and shielded cable. Total cable length shall be 50 m or less. (UV protection should be provided for the portion exposed to the outdoors) Shield/foil must be floated from chassis. (Not to connect shield/foil any where.)
- Be careful not to connect cables to other terminals of Outdoor Unit (e.g. power source wiring terminal). Malfunction may occur.
- Do not bundle together with the power source wiring or store in the same metal tube. Operation error may occur.
- When using the 2nd Remote Controller (optional), connect it to the terminal by tightening it together.

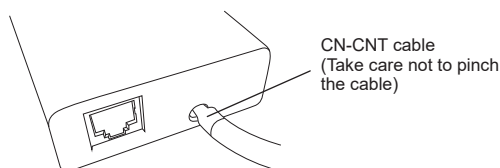
11.4.8 Network Adaptor Installation

11.4.8.1 NETWORK ADAPTOR(Optional)

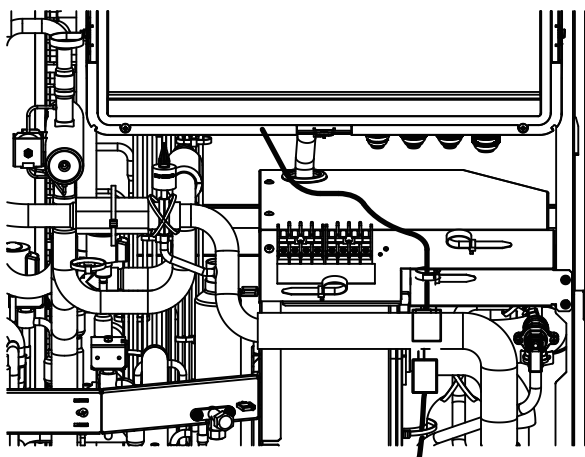
1. Insert a flat head screwdriver into the slot on the top of the adaptor and remove the cover. Connect the CN-CNT cable to the connector inside the adaptor.



2. Pull the CN-CNT cable through the hole at the bottom of the adaptor and reattach the cover.



3. Connect the CN-CNT cable to the CN-CNT connector on the outdoor unit.



For details, refer to the instructions supplied with the network adapter. For installation location, refer to "Installation location" in 11.4.7 Install remote controller.

11.4.8.2 MoBus(Optional)

Wiring is for ModBus. Use of RS-485 bus cable.

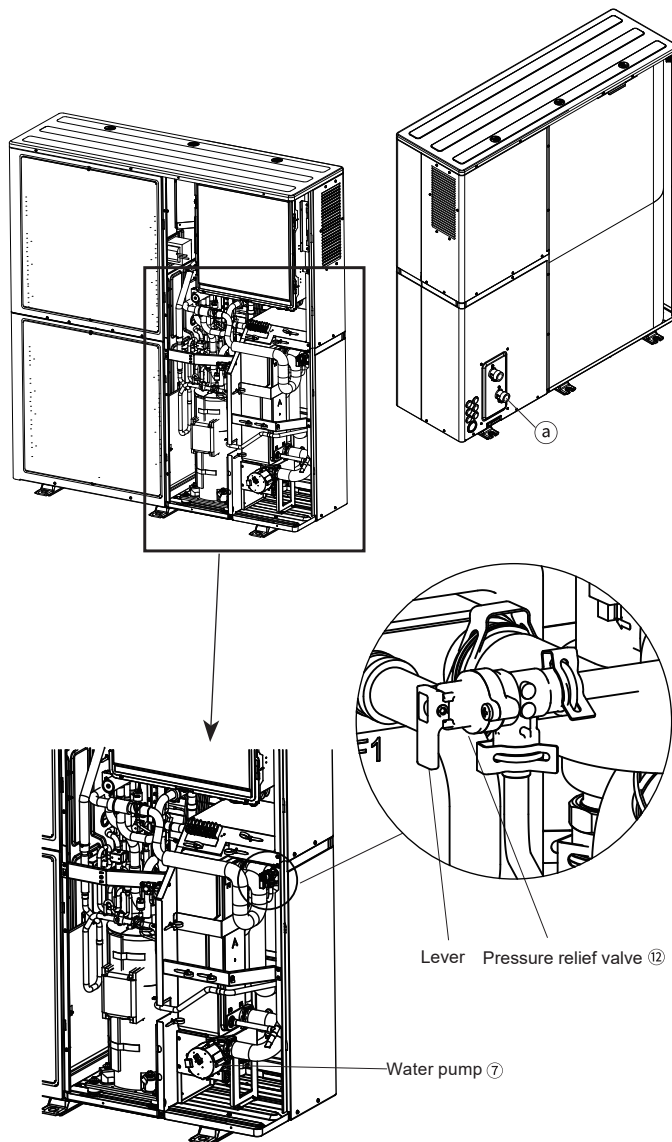
11.4.9 Piping Insulation

- Carry out insulation of pipe connections according to "Space Cooling/Heating Pipework" in 11.4.5 Piping Installation. Wrap the pipes end-to-end with insulation to prevent condensation.

11.4.10 Charging the Water

- Make sure all the piping installations are properly done before carrying out the steps below.

1. Start filling water to the Space Heating /Cooling circuit via Zone 1 Water inlet ③ (with pressure more than 1 bar (0.1MPa))
2. Stop filling water if the free water flow through Drain pipe of Pressure Relief Valve ⑫. (Check the Outdoor Unit)
3. Turn ON the Outdoor Unit.
4. Remote control menu → Installer setup → Service setup → Pump maximum speed → Turn on the pump.
5. Make sure Water Pump ⑦ is running.
6. Check and make sure no water leaking at the tube connecting points.

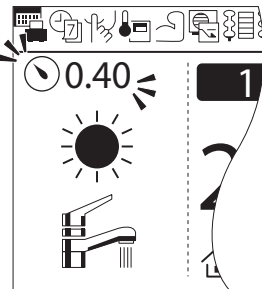


11.4.11 Reconfirmation

CHECK WATER PRESSURE * (0.50 bar = 0.05 MPa)

Water pressure should not be lower than 0.5 bar. (Check the water pressure by the remote controller) If necessary, add water into Space Heating /Cooling pipes (through the Zone 1 water inlet ①).

Icon flashes if dropped below "0.50 bar"



CHECK PRESSURE RELIEF VALVE

1. Pull the lever in the horizontal direction and confirm that the pressure relief valve works properly.
2. Release the lever when water comes out of the drain pipe of the pressure relief valve. (While the air continues to come out of the drain pipe, keep raising the lever to completely discharge the air)
3. Confirm that the water from the drain pipe stops.
4. If water is leaking, pull the lever several times and return it to make sure the water stops.
5. If water keeps coming out of the drain, drain water. Turn off the system and contact your local authorized dealer.

CHECK AIR ACCUMULATION

- Open the air vent plugs on the heating panel, fan convector, etc., and remove the air accumulated in the equipment and piping.
- If the outdoor unit and the indoor unit are installed on different floors, open the air vent plug on the water plug of the outdoor unit and the air vent plug on the heater bottle inside the indoor unit to remove the air. (Be careful, water will come out)

EXPANSION VESSEL VOLUME AND SET PRESSURE

- This outdoor unit does not have a built-in expansion tank.
- Capacity of expansion vessel should be calculated using the formula below:
- Install an expansion vessel (set pressure: 1 bar) to the circulation circuit.

See formula below for capacity:

$$V = \frac{\epsilon \times V_o}{1 - \frac{98 + P_1}{98 + P_2}}$$

V : Required gas amount <expansion vessel volume: L>

V_o : System total water volume <L>

ε : Water expansion rate 5 x 80°C = 0.0219

P₁ : Expansion tank charging pressure P₁ = 100 kPa

P₂ : Maximum system pressure P₂ = 400 kPa

- It is recommended to calculate the required volume of vessel with a margin of approximately 10%.

Water expansion rate table

Water temperature (°C)	Water expansion rate ε
10	0.0003
20	0.0019
30	0.0044
40	0.0078
50	0.0121
60	0.0171
70	0.0228
80	0.0291
90	0.0360

When an indoor unit is introduced and it is installed more than 7m lower than the outdoor unit

Increase the initial pressure in the expansion tank as per the calculations below.

$$P_g = (H \times 10 + 30) \text{ kPa}$$

P_g : Initial pressure of expansion tank (kPa)

H : Difference in elevation (m)

11.4.12 Test run

1. Before test run, make sure below items have been checked: -
 - a) Pipework are properly done.
 - b) Electric cable connecting work are properly done.
 - c) The Space Heating/Cooling circuit is filled up with water and trapped air is released.
 - d) Ensure that the water circulates through the water circuit as designed. Do not short circuit. Check that valves in the circuit are open and do not block the water flow.
2. For normal operation, the water pressure reading should be in between 0.5 bar and 4 bar (0.05 MPa and 0.4 MPa). If necessary, adjust the speed of the water pump ⑦ accordingly to obtain normal water pressure operating range. If adjusting the speed of the water pump ⑦ does not solve the problem, contact a local authorized dealer.
3. After test run, please clean the magnetic water filter ⑧. Reinstall it after the cleaning is finished. (Refer to 11.4.13 Maintenance)

CHECK WATER FLOW OF WATER CIRCUIT

Select Installer setup → Service setup → Pump maximum speed → Air purge.

Confirm the rated flow rate has been reached. If don't reach, change max duty or install the extra pump.

*Water flow can be check in Service setup (Pump maximum speed)

[Heating operation at low water temperature with lower water flow may trigger "H75" during defrost process.]

*If there is no flow or H62 is displayed, stop operating the pump and release the air. (See "CHECK AIR ACCUMULATION" in 11.4.11 Reconfirmation)

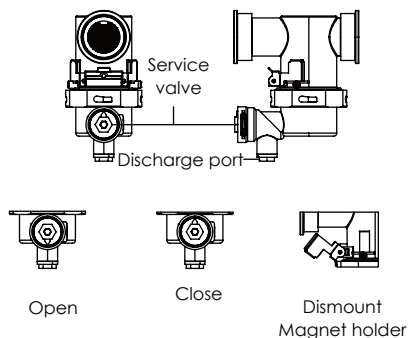
11.4.13 Maintenance

11.4.13.1 Maintenance for Magnetic Water Filter ⑧

- In order to ensure safety and optimal performance of the Outdoor Unit, seasonal inspections, functional check of RCCB/ELCB, field wiring and piping have to be carried out at regular intervals. This maintenance and scheduled inspection should be carried out by authorized dealer.

Maintenance for Magnetic Water Filter ⑧.

1. Turn OFF the power supply.
2. Place a container or hose below Magnetic Water Filter ⑧
3. Dismount magnet holder at side of Magnetic Water Filter ⑧
4. Remove the Cap of Discharge Port with Allen key (6mm).
5. Open the Service Valve with Allen key (6mm) to release the dirty water from the Discharge Port into a container.
6. Close the service valve when the container is full to avoid spillage in the outdoor unit.
7. Dispose the dirty water.
8. Reinstall the Cap of Discharge Port and Magnet holder.
9. Re-charge the water to Space Heating / Cooling circuit if necessary. (For details, refer to 11.4.10 Charging The Water)
10. Turn ON the power supply.



⚠ CAUTION

Do not clean the outdoor unit with hydrocarbon solvents when Outdoor Unit needs to be cleaned during installation or servicing.

CHECK ITEMS

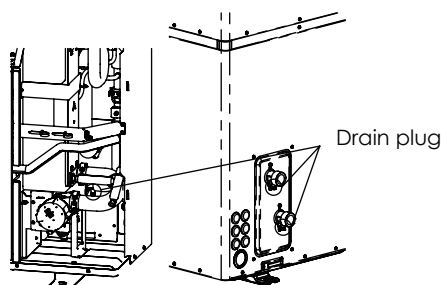
- ☐ Is there any water leakage at water piping connections?
- ☐ Has the heat insulation been carried out at water piping connection?
- ☐ Is the Pressure Relief Valve operation normal?
- ☐ Is water pressure higher than 0.5 bar?
- ☐ Is the water drainage work properly done?
- ☐ Is the power supply voltage within the rated voltage range?
- ☐ Is the cables being fixed to terminal board firmly?
- ☐ Is the cables being clamped firmly by holder (clammer)?
- ☐ Is the earth wire connection properly done?
- ☐ Is the Remote Controller LCD operation normal?
- ☐ Is there any abnormal sound?
- ☐ Is the heating operation normal?
- ☐ Is the Tank unit free from water leak during test run? (if tank unit connected)
- ☐ Check for incorrect wiring at the connection points

11.4.13.2 Water circuit freezing protection

- Be sure to have Anti-Freeze protection when outdoor temperature drops below the freezing point (0 °C) as the water in the system may freeze.
Recommended; Propylene glycol 40% (for -20°C)
- In order to prevent damage to the equipment due to freezing, be sure to drain water from the equipment when storing it with the power off, such as after construction or immediately after the completion of the test run. Drain when the outside temperature is above the freezing point (0 °C) to prevent freezing during drainage.

Water circuit freezing protection

1. Turn OFF the power supply.
2. Loose the drain plug(3 places) and drain the inside water.
Do not remove the drain plug.
3. Make sure that all drain ports have finished water drain.
4. Tighten the drain plug (3 places)



11.5 Appendix

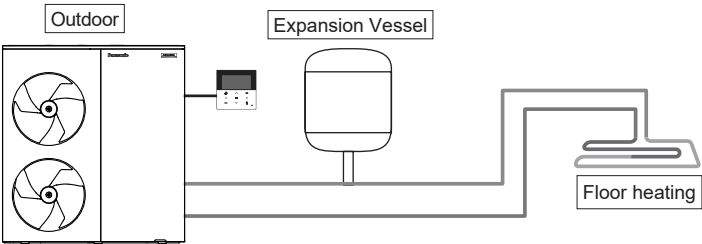
11.5.1 Variation of System

This section introduces variation of various systems using Air-To-Water Heatpump and actual setting method.
(NOTE) : This model does not have a built-in expansion vessel to prevent the pressure in the water circuit from rising in the event of temperature rise.
Be sure to purchase in the market and install it.

11.5.1.1 Introduce applications related to temperature setting

Temperature setting variation for heating

1. Remote controller



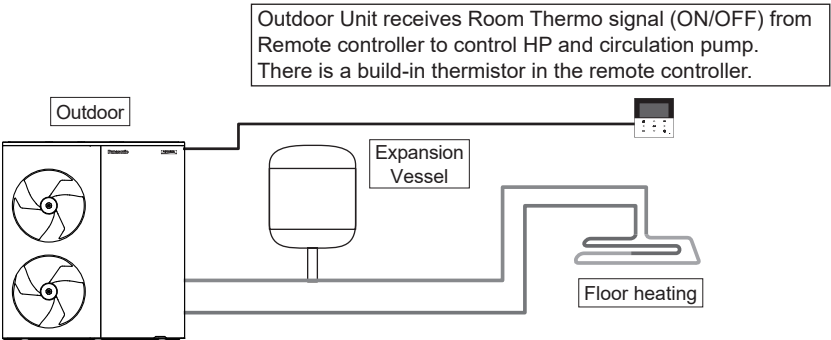
Connect floor heating or radiator directly to the Outdoor Unit.
Install remote controller on the wall of the room.
This is the basic form of the simplest system.

Setting of remote controller

Installer setup
System setup

Zone & Sensor:
Water temperature

2. Room Thermostat



Outdoor Unit receives Room Thermo signal (ON/OFF) from Remote controller to control HP and circulation pump. There is a build-in thermistor in the remote controller.

Connect floor heating or radiator directly to the Outdoor Unit.
Install the remote controller in the room where floor heating is installed.
This is an application that uses remote controller as Room Thermostat.

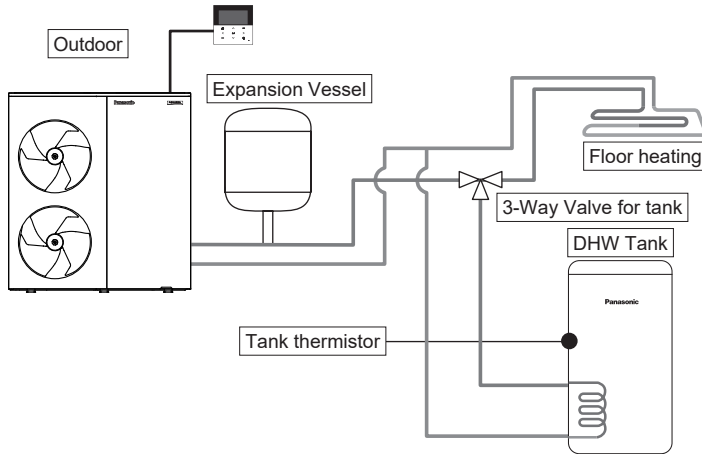
Setting of remote controller

Installer setup
System setup

Zone & Sensor:
Room Thermostat
Internal

Examples of installations

1. DHW (Domestic Hot Water) Tank connection

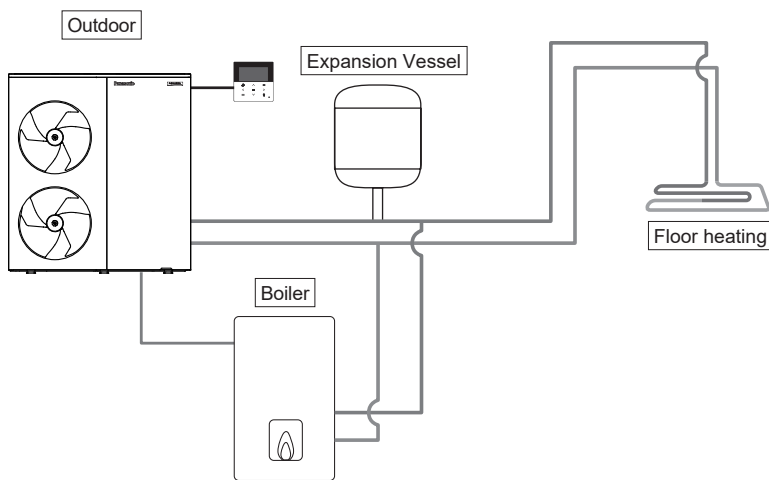


Setting of remote controller

Installer setup
System setup

Tank connection:
Yes

2. Boiler connection



Setting of remote controller

Installer setup
System setup

Bivalent - Yes
Turn ON: outdoor temp
Control pattern

This is an application that connects the boiler to the Outdoor Unit, to compensate for insufficient capacity by operate boiler when outdoor temperature drops & heat pump capacity is insufficient.

Boiler is connected parallel with heat pump and used as heating circuit.

Besides that, an application that connects to the DHW tank's circuit to heat up tank 's hot water is also possible.

Boiler output can be control by either SG ready input from Control Module unit or Auto control by 3 modes selection pattern.

(Operation setting of boiler shall be responsible by installer.)

Depending on the settings of the boiler, it is recommended to install buffer tank as temperature of circulating water may get higher. (It must connect to buffer tank especially when select Advanced Parallel setting) However, buffer tank connection requires Control Module unit.

Note: Buffer tank thermistor must be connected to Control Module unit PCB.

⚠ WARNING

Panasonic is NOT responsible for incorrect or unsafe situation of the boiler system.

⚠ CAUTION

Make sure the boiler and its integration in the system complies with applicable legislation.

Make sure the return water temperature from the heating circuit to the Outdoor Unit does NOT exceed 70°C.

Boiler is turned off by safety control when the water temperature of the heating circuit exceed 85°C.

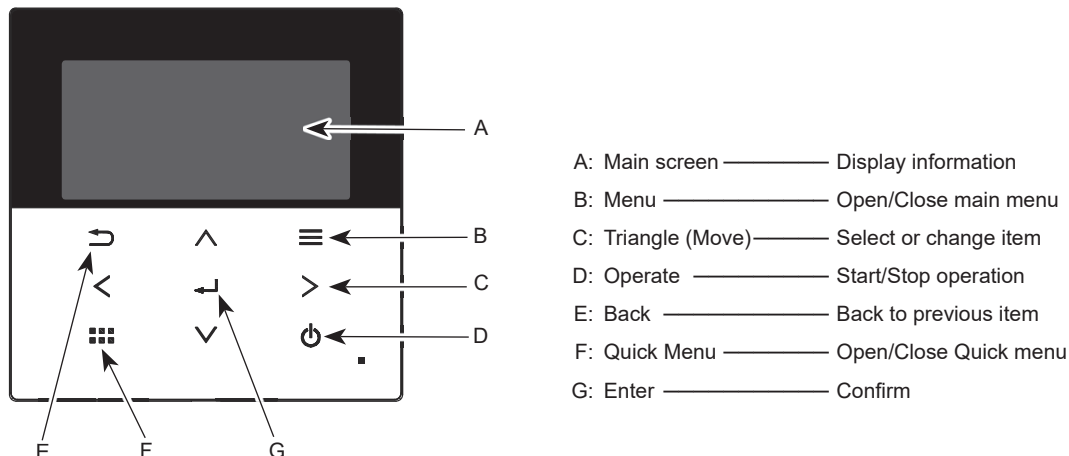
If you wish to use optional features other than connecting DHW tank or boiler, purchase an optional indoor unit or Control Module unit. Functions that become available by purchasing an indoor unit, etc. include:

- Buffer tank connection
 - 2-zone control
 - Solar connection
 - SG Ready
 - Demand control
 - and others
- } Optional PCB is required

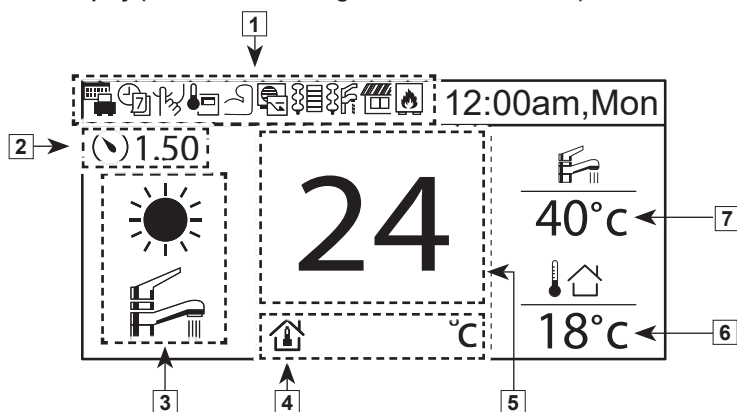
11.5.2 System Installation

11.5.2.1 Remote Controller Outline

The LCD display as shown in this manual are for instructional purpose only, and may differ from the actual unit.



LCD Display (Actual - Dark background with white icons)



1 Function icon ———— Displays the set functions/status.

- | | |
|-----------------------------------|----------------|
| Holiday mode | Demand control |
| Weekly timer | Room heater |
| Quiet mode | Tank heater |
| Remote controller room thermostat | Solar |
| Powerful mode | Boiler |

2 Water pressure (circulation circuit) ———— [bar]

3 Mode ———— Display set mode / current status of mode.

- | | | | |
|---------------------|------------------|--------------|--------------|
| Heating | Cooling | | |
| Auto | Hot water supply | Auto heating | Auto cooling |
| Heat pump operating | | | |

4 Temp setting ———— Set room temp Compensation curve Set direct water temp Set pool temp

5 Display Heat temp ———— Displays current heating temperature (it is set temperature when enclosed by line)

6 Outdoor temp ———— Displays outdoor temperature

7 Display tank temp ———— Displays current tank temperature (it is set temperature when enclosed by line)

11.5.2.2 First time of power ON (Start of installation)

Initialization	12:00 pm, Mon
Initializing	

When the power is ON, firstly the initialization screen appears (10 sec)



	12:00 pm, Mon
[Power] Start	

When the initialization screen ends, it turns to normal screen.



Language	12:00 pm, Mon
ENGLISH	
FRANÇAIS	
DEUTSCH	
ITALIANO	
▼ Select	[Left/Right] Confirm

When any button is pressed, language setting screen appears.
(NOTE) If initial setting is not performed, it does not go into menu.
When there are two remote controllers installed from the beginning, the first remote controller which set language will be recognised as the main remote controller.



Set language & confirm

Clock format	12:00 pm, Mon
24h	
▼	
am/pm	
▼ Select	[Left/Right] Confirm

When language is set, setting screen of time display appears (24h/am/pm)



Set time display & confirm

Date & time	12:00 pm, Mon
Year/Month/Day	Hour : Min
▲ 2024 / 01 / 01 ▼	12 : 00 pm
◆▶ Select	[Left/Right] Confirm

YY/MM/DD/Time setup screen appears



Set YY/MM/DD/Time & confirm

Front grille	12:00 pm, Mon
Is O/D front grille fixed?	
No	
Yes	
▼ Select	[Left/Right] Confirm

If set to No & confirm, a caution message will be displayed to ensure outdoor front grille is installed before proceeding to operate the unit.



Caution
To prevent injury, fix front grille before ope.
[Left] Close



Set Yes & confirm if outdoor front grille has been installed

	12:00 pm, Mon
[Power] Start	

Back to initial screen



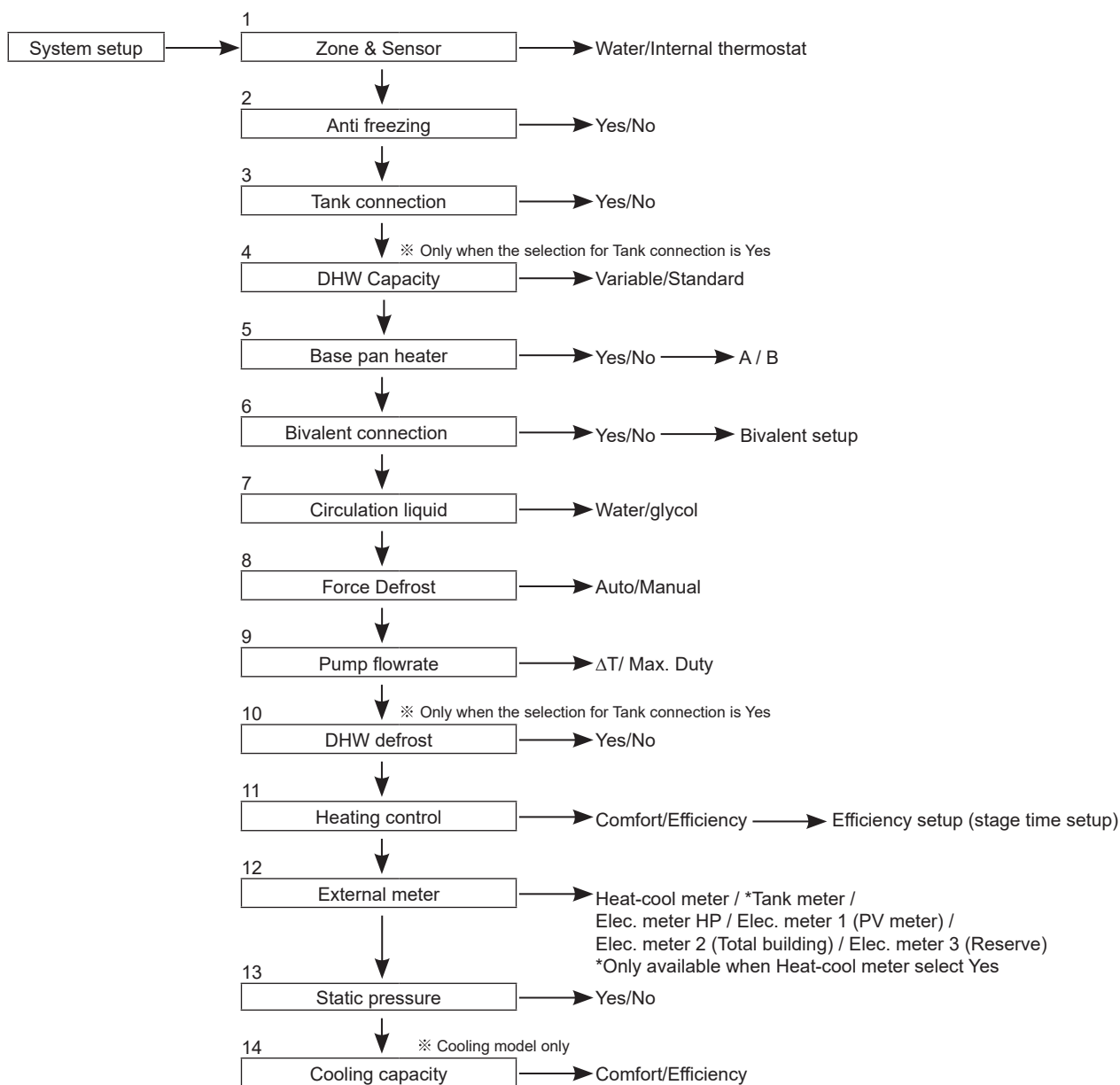
Press Menu and select Installer setup

Main Menu	12:00 pm, Mon
System check	
Personal setup	
Service contact	
Installer setup	
▲ Select	[↵] Confirm

↓ Confirm to go into Installer setup

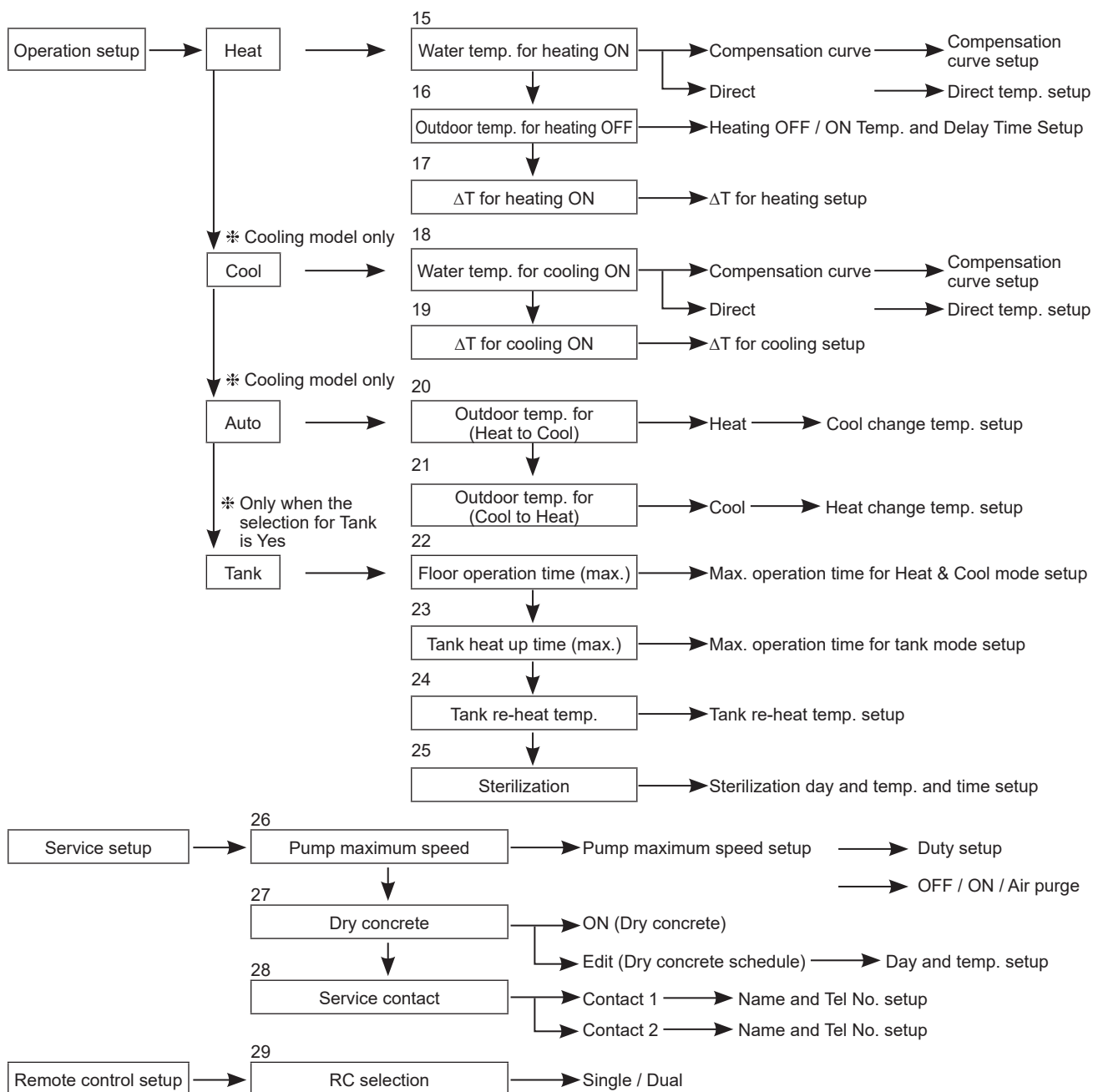
11.5.3 Setup

11.5.3.1 Installer Setup



※ The above description is for outdoor unit alone case.

For indoor units, please refer to the installation manual supplied with the indoor unit.



※ The above description is for outdoor unit alone case.

For indoor units, please refer to the installation manual supplied with the indoor unit.

11.5.3.2 System Setup

1. Zone & Sensor Initial setting: Water temp.	System setup 12:00am, Mon Zone & Sensor Anti freezing Tank connection DHW capacity ▼ Select [↩] Confirm
---	--

Select sensor of room temperature control from the following 2 items:

- 1 Water temperature (circulation water temperature)
- 2 Room thermostat (Internal)

2. Anti freezing Initial setting: Yes	System setup 12:00am, Mon Zone & Sensor Anti freezing Tank connection DHW capacity ⬆ Select [↩] Confirm
---	--

Operate anti-freezing of water circulation circuit.
If select "Yes", when the water temperature is reaching its freezing temperature, the circulation pump will start up. If the water temperature does not reach the pump stop temperature, heat pump will be activated.

(NOTE) If set to "No", when the water temperature is reaching its freezing temperature or below 0°C, the water circulation circuit may freeze and cause malfunction.

3. Tank connection Initial setting: No	System setup 12:00am, Mon Zone & Sensor Anti freezing Tank connection DHW capacity ⬆ Select [↩] Confirm
--	--

Select whether a hot water storage tank is connected or not.
If set to "Yes", the water heating function is set to be used.
The tank water temperature can be set from the main screen.

4. DHW capacity Initial setting: Variable	System setup 12:00am, Mon Zone & Sensor Anti freezing Tank connection DHW capacity ⬆ Select [↩] Confirm
---	--

Variable DHW capacity setting normally runs with efficient boiling which is energy saving heating. But while hot water usage is high and tank water temperature is low, variable DHW mode will run with fast heat up which heat up the tank with high heating capacity.
If standard DHW capacity setting is selected, heat pump runs with heating rated capacity at tank heat up operation.

※ Only when "Yes" is selected for tank connection

5. Base pan heater Initial setting: No	System setup 12:00am, Mon Anti freezing Tank connection DHW capacity Base pan heater ⬆ Select [↩] Confirm
--	--

Select whether Base pan heater is installed or not.
If set to "Yes", select to use either heater A or B.

A: Turn on Heater when heating with defrost operation only
B: Turn on Heater during heating operation when outside temperature is below 5 °C .

※ The above description is for outdoor unit alone case.
For indoor units, please refer to the installation manual supplied with the indoor unit.

6. Bivalent connection

Initial setting: No

Set if heat pump is linked with boiler operation.
Connect the start signal of the boiler to the boiler contact terminal (main PCB).
Set Bivalent connection to "Yes".
Then, begin setting according to remote controller instruction.
Boiler icon will be displayed on remote controller top screen.

System setup	12:00am, Mon
Tank connection	
DHW capacity	
Base pan heater	
Bivalent connection	
⬆ Select	[←] Confirm

• Auto

There are 3 different modes in the boiler auto pattern operation. Movement of each mode is as shown below:

① Alternative (switch to boiler operation when drops below setting temperature)

② Parallel (allow boiler operation when drops below setting temperature)

③ Advanced Parallel (able to slightly delay boiler operation time of parallel operation)

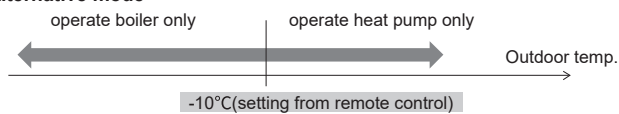
When the boiler operation is "ON", "boiler contact" is "ON", " _ " (underscore) will be displayed below the boiler icon.

Please set target temperature of boiler to be the same as heat pump temperature.

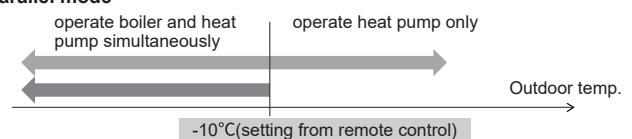
When boiler temperature is higher than heat pump temperature, zone temperature cannot be achieved if mixing valve is not installed.

This product only allows one signal to control the boiler operation. Operation setting of boiler shall be responsible by installer.

Alternative mode

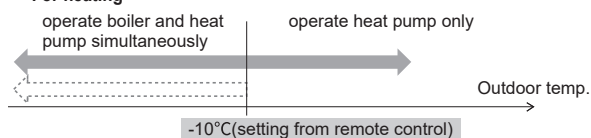


Parallel mode

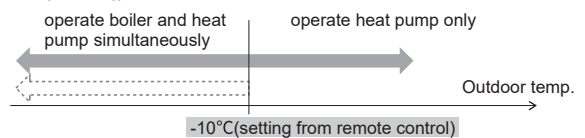


Advanced Parallel mode

For heating

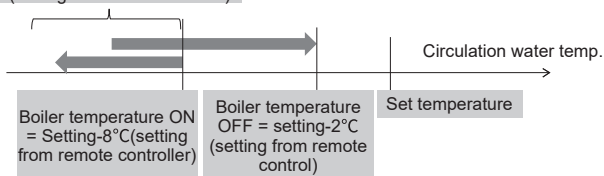


For DHW tank

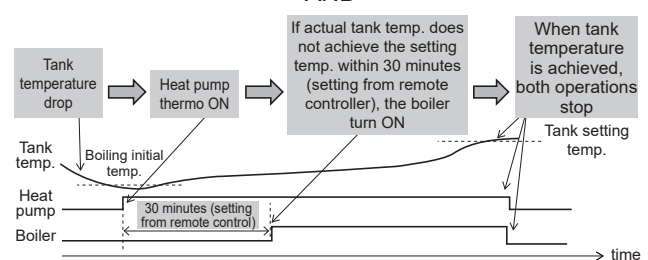


Heat pump operates but water temperature does not reach this temperature for more than 30 minutes (setting from remote control)

AND



AND



In Advanced Parallel mode, setting for both Heat and Tank can be made simultaneously. During operation of "Heat/Tank" mode, when each time the mode is switched, the boiler output will be reset to OFF. Please have good understanding on the boiler control characteristic in order to select the optimal setting for the system.

• Smart

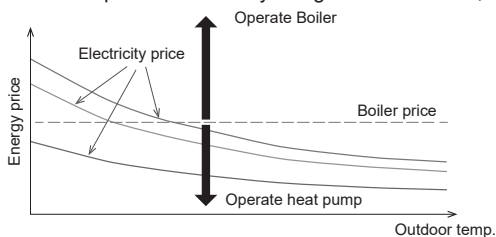
There are Energy price (both electricity and boiler) and Schedule to be set on remote controller.

Operation setting of Energy price and Schedule shall be responsible by installer.

Based on these settings, system will calculate the final price for both electricity and boiler.

When final price of Electricity is lower than Boiler's, heat pump will operate.

When final price of Electricity is higher than Boiler's, boiler will operate.



※ The above description is for outdoor unit alone case.

For indoor units, please refer to the installation manual supplied with the indoor unit.

7. Circulation Liquid Initial setting: Water	System setup 12:00am, Mon DHW capacity Base pan heater Bivalent connection Circulation Liquid ⬆ Select [↩] Confirm
--	--

Set circulation of heating water.

There are 2 types of settings: water and glycol.

(NOTE) Please set glycol when using anti-freeze liquid.
It may cause error if setting is wrong.

8. Force Defrost Initial setting: Manual	System setup 12:00am, Mon Base pan heater Bivalent connection Circulation Liquid Force Defrost ⬆ Select [↩] Confirm
--	---

Under manual mode, user can turn on force defrost through quick menu.

If 'Auto' is selected, the outdoor unit will run defrost operation once if heat pump have long hour of heating without any defrost operation at low ambient condition. (Even when Auto is selected, user still can turn on force defrost through quick menu)

9. Pump flowrate Initial setting: ΔT	System setup 12:00am, Mon Bivalent connection Circulation Liquid Force Defrost Pump flowrate ⬆ Select [↩] Confirm
--	---

If pump flowrate setting is *ΔT, the unit adjusts pump duty to use different water inlet and outlet based on the setting of *ΔT for heating ON and *ΔT for cooling ON in operation setup menu during indoor operation.

If pump flowrate setting is set to Max. duty, the unit will set the pump duty at *Pump maximum speed in the service setup menu during room side operation.

*1

10. DHW Defrost Initial setting: Yes	System setup 12:00am, Mon Circulation Liquid Force Defrost Pump flowrate DHW Defrost ⬆ Select [↩] Confirm
--	---

When DHW defrost set to "YES", hot water of domestic hot water tank will be used during defrost cycle.

When DHW defrost set to "NO", hot water of floor heating circuit will be used during defrost cycle.

11. Heating control Initial setting: Comfort	System setup 12:00am, Mon Force Defrost Pump flowrate DHW Defrost Heating control ⬆ Select [↩] Confirm
--	--

There are two modes to select for compressor frequency control: "Comfort" or "Efficiency".

When set to Comfort mode, the compressor will run at the zone limit maximum frequency to reach the set temperature faster.

When set to Efficiency mode, the compressor will run at part load frequency at initial stage for energy saving.

When "Efficiency" is selected, the time setting will transition to 1st, 2nd, and 3rd stage. Increasing the time will slowly increase the capacity.

*1 Only when the selection for Tank connection is Yes

※ The above description is for outdoor unit alone case.

For indoor units, please refer to the installation manual supplied with the indoor unit.

12. External meter

Initial setting: [Heat-cool meter : No]
 [Tank meter : No] *only available
 when Heat-cool meter select Yes
 [Elec. meter HP : No]
 [Elec. meter 1 (PV meter) : No]
 [Elec. meter 2 (Total building) : No]
 [Elec. meter 3 (Reserve) : No]

System setup	12:00am, Mon
Pump flowrate	
DHW Defrost	
Heating control	
External meter	
⬆ Select [←] Confirm	

There are two systems for generation meter connection: single generation meter system (Heat-cool meter) or two generation meter system (Heat-cool meter and Tank meter)

Both systems can provide all generation data of heating, cooling and DHW directly from external meter.

If Heat-cool meter is set to "Yes", it will read from external meter for heat pump's energy generation data during heating, cooling and DHW operation^{*1}.
 If Heat-cool meter is set to "No", it will base on unit's calculation for heat pump's energy generation data during heating, cooling and DHW operation.
 If Heat-cool meter is set to "Yes", it will read from external meter for heat pump's energy generation data during heating, cooling and DHW operation^{*1}.
 If Elec. meter HP is set to "Yes", it will read from external meter for heat pump's energy consumption data.
 If Elec. meter HP is set to "No", it will base on unit's calculation for heat pump's energy consumption data.
 If Elec. meter 1 (PV meter) is set to "Yes", it will read from external meter for energy generation data of solar system and display it on Cloud system.
 If Elec. meter 2 (Building) is set to "Yes", it will read from external meter for energy consumption data of the building and display it on Cloud system.
 If Elec. meter 3 (Reserve) is set to "Yes", it will read from external meter for energy consumption data obtained from reserved electricity meter and display it on Cloud system.

^{*1} Set Heat-cool meter to Yes and set Tank meter to No when the 1 generation meter system is installed.
 Set Heat-cool meter to Yes and set Tank meter to Yes when the 2 generation meter system is installed.

Remarks: Elec. meter HP refers to the electricity meter that measures Heat Pump unit's consumption.
 Elec. meter 1 / 2 / 3 refers to the Electricity meter No. 1 / No. 2 / No. 3.

13. Static pressure

Initial setting: No

System setup	12:00am, Mon
DHW Defrost	
Heating control	
External meter	
Static pressure	
⬆ Select [←] Confirm	

If set to "No", the outdoor fan motor operates at a normal speed.
 If set to "YES", the outdoor fan motor operates at a higher speed in response to high static pressure.

14. Cooling Capacity

Initial setting: Efficiency

System setup	12:00am, Mon
Heating control	
External meter	
Static pressure	
Cooling capacity	
⬆ Select [←] Confirm	

Select the cooling capacity.
 If set to "Efficiency", the unit performs cooling operation efficiently at rated capacity.
 If set to "Comfort", the cooling operation is performed at maximum capacity.

※ The above description is for outdoor unit alone case.
 For indoor units, please refer to the installation manual supplied with the indoor unit.

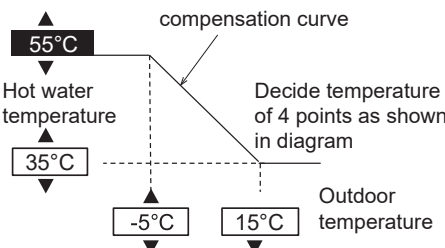
11.5.3.3 Operation Setup

Heat

15. Water temp. for heating ON

Initial setting: compensation curve

Set the target water temperature to perform heating operation.
Compensation curve: Target water temperature change in conjunction with outdoor temperature change.
Direct: Set the circulation water temperature directly.



16. Outdoor temp. for heating OFF

If the operation of the outdoor unit is frequently switched on and off depending on the outdoor air temperature, the following settings can be used to reduce the frequency.

a. Outdoor temp. for heating OFF

Initial setting: 24°C

Set outdoor temp. to stop heating
Setting range is 6°C~35°C

b. Outdoor temp. for heating ON

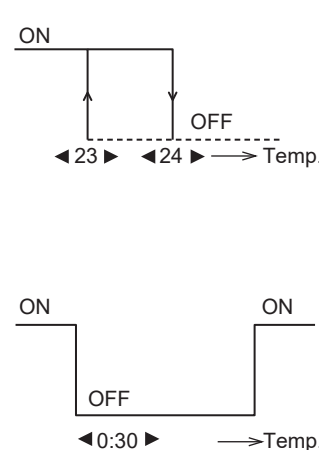
Initial setting: 23°C

Set outdoor temp. to start heating.
Setting range is 5°C~X°C (X is heating OFF temp. -1)

c. Heating ON delay time

Initial setting: 0:30min

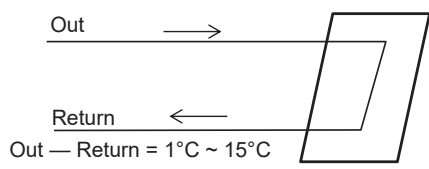
Set delay time from heating OFF to heating ON.



17. ΔT for heating ON

Initial setting: 5°C

Set temp difference between out temperature and return temperature of circulating water during Heating operation.
When the temperature gap is enlarged, it is energy saving but less comfort. When the gap gets smaller, energy saving effect gets worse but it is more comfortable.
Setting range is 1°C ~ 15°C

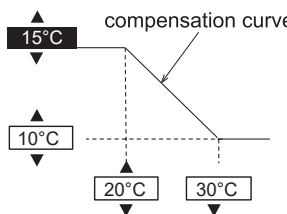


Cool ※ Cooling model only

18. Water temp. for cooling ON

Initial setting: compensation curve

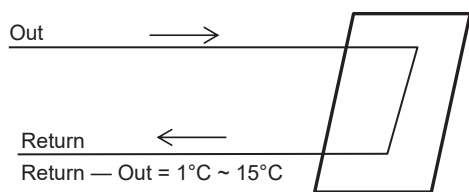
Set target water temperature to perform cooling operation.
Compensation curve: Target water temperature change in conjunction with outdoor ambient temperature change.
Direct: Set the circulation water temperature directly.



19. ΔT for cooling ON

Initial setting: 5°C

Set temp difference between out temperature and return temperature of circulating water during Cooling operation.
When the temperature gap is enlarged, it is energy saving but less comfort. When the gap gets smaller, energy saving effect gets worse but it is more comfortable.
Setting range is 1°C ~ 15°C



※ The above description is for outdoor unit alone case.
For indoor units, please refer to the installation manual supplied with the indoor unit.

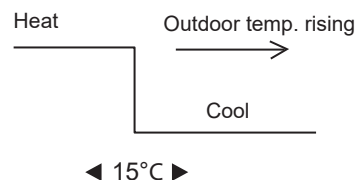
Auto ※ Cooling model only

20. Outdoor temp. for (Heat to Cool)

Initial setting: 15°C

Set outdoor temp that switches from Heating to Cooling by Auto setting.
Setting range is 11°C ~ 25°C

Timing of judgement is every 1 hour

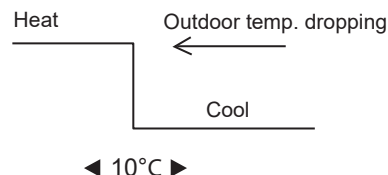


21. Outdoor temp. for (Cool to Heat)

Initial setting: 10°C

Set outdoor temp that switches from Cooling to Heating by Auto setting.
Setting range is 5°C ~ 14°C

Timing of judgement is every 1 hour



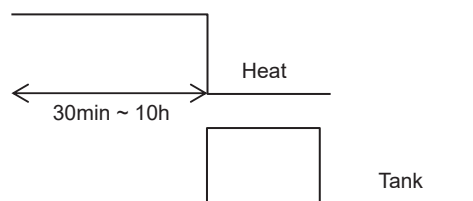
Tank ※ Only when the selection for Tank connection is Yes

22. Floor operation time (max.)

Initial setting: 8h

Set the max. operating hours of heating.
When max. operation time is shortened, it can boil the tank more frequently.

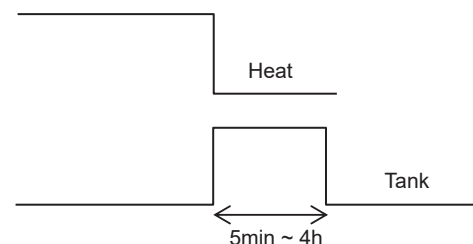
It is a function for Heating + Tank operation.



23. Tank heat up time (max.)

Initial setting: 1h

Set the max. boiling hours of tank.
When the max. boiling hours are shortened, it immediately returns to Heating operation, but it may not fully boil the tank.

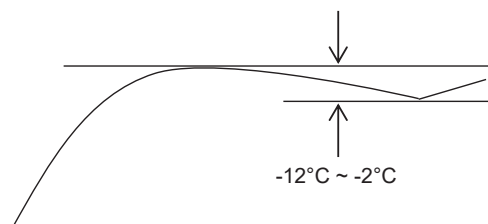


24. Tank re-heat temp.

Initial setting: -8°C

Set the temperature to re-boil the tank water.

Setting range is -12°C ~ -2°C



25. Sterilization

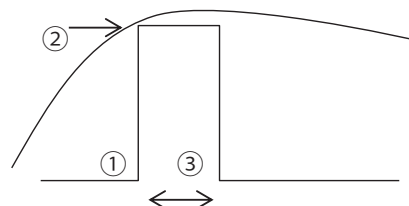
Initial setting: 65°C 10min.

Set timer to perform sterilization.

- 1 Set operating day & time. (Weekly timer format)
- 2 Sterilization temperature (* 55~65°C)
- 3 Operation time (Time to run sterilization when it reached setting temperature. (5 ~ 60 minutes))

* When the outdoor air temperature is below -15°C
The Tank temperature may only rise to about 55°C.
(Turn on the external heater to perform sterilization. Need Indoor unit).
Sterilization temperature varies depending on the model.

The use/non-use of the sterilization mode must be set.



※ The above description is for outdoor unit alone case.

For indoor units, please refer to the installation manual supplied with the indoor unit.

11.5.3.4 Service Setup

26. Pump maximum speed

Initial setting: Depend on model

Normally setting is not necessary.
Please adjust when needed to reduce the pump sound, etc.
Besides that, the unit has Air Purge function.

When the Pump flow setting is Max. Duty, this duty setting is the duty of fixed pump that runs during room-side operation.

Service setup		12:00am, Mon
Flow rate	Max. Duty	Operation
34.4 L/min	0xCE	▲ Air Purge
◀ Select		

27. Dry concrete

Operate concrete curing operation.
Select Edit and set the temperature for every stage (1~99
1 is for 1 day).
Setting range is 25~55°C
When it is turned ON, dry concrete starts.

Stage	Temperature
①	30°C
②	35°C
③	40°C
④	45°C
⑤	40°C
⑥	35°C

28. Service contact

Able to set the name & tel. no.
of contact person when there is
breakdown etc. or client has trouble.
(2 items)

Service setup		12:00am, Mon
Service contact:		
Contact 1		
Contact 2		
▲ Select		[↵] Confirm

Contact-1: Bryan Adams	
ABC/ abc	0-9/ Other
A B C D E F G H I J K L M N O P Q R	
S T U V W X Y Z a b c d e f g h i	
j k l m n o p q r s t u v w x y z	
▼ Select	[↵] Enter

11.5.3.5 Remote Control Setup

29. RC selection

Initial setting : Single

Set to "Single" when only one remote controller is installed.
Set to "Dual" when two remote controllers are installed.

RC selection		12:00am, Mon
Single ▼ Dual		
▼ Select		[↵] Confirm

11.6 Service and Maintenance

If forget Password and cannot operate remote controller

↶ + ↵ + >

Press for 5 seconds.

Password unlock screen appears, press Confirm and it shall reset.

Password will become 0000. Please reset it again.

(NOTE) This is displayed only when the remote controller is password-locked.

11.6.1 Maintenance Menu

Setting method of Maintenance menu

Maintenance menu12:00am,Mon

Actuator check

Test mode

Sensor setup

Reset password

▼ Select [↵] Confirm

↶ + ↵ + >

Press for 5 seconds.

Items that can be set

① Actuator check (Manual ON/OFF all functional parts)

(NOTE) As there is no protection action, please be careful not to cause any error when operating each part (do not turn on pump when there is no water etc.)

② Test mode (Test run)

Normally it is not used.

③ Sensor setup (offset gap of detected temp of each sensor can be set within -3~3°C range)

(NOTE) Please use only when sensor is deviated.

It affects temperature control.

④ Reset password (password reset)

11.6.2 Custom Menu

Setting method of Custom menu

Custom menu12:00am,Mon

Cool mode

Reset energy monitor

Reset operation history

Anti-stick mode

▼ Select [↵] Confirm

≡ + ∨ + <

Press for 5 seconds.

Items that can be set

1 Cool mode (Set With/Without Cooling function) Default is without

(NOTE) As with/without Cool mode may affect electricity application, please be careful and do not simply change it.

In Cool mode, please be careful if piping is not insulated properly, dew may form on pipe and water may drip on the floor and damage the floor.

2 Reset energy monitor (delete memory of Energy monitor)

Please use this when moving house and handover the unit.

3 Reset operation history (delete memory of operation history)

Please use this when moving house and handover the unit.

4 Anti-stick mode (select Anti-stick mode Enable/Disable)

Default is Anti-stick mode /Enable Every Monday at 3:00 AM

the actuator is activated periodically to prevent sticking of the operating parts.

Select Disable if you wish to stop the part being activated periodically.

Parts and other components that may not operate if Disable is selected may stick if not operated for a long period of time.

※ The above description is for outdoor unit alone case.
For indoor units, please refer to the installation manual supplied with the indoor unit.

12. Installation and Servicing Air-to-Water using R290



WARNING

This symbol shows that this equipment uses a flammable refrigerant with safety A3 group per ISO 817. If the refrigerant is leaked, together with an external ignition source, there is a possibility of fire / explosion.

12.1 About R290 Refrigerant

Hydrocarbon is a class of organic chemical made up only with the element Carbon (C) and Hydrogen (H). R290 is the type of Hydrocarbon refrigerant which is environmentally good-natured and odorless refrigerant. Under Kigali Amendment to the Montreal Protocol, 80% reduction of greenhouse gas emission by next 30 years is required, and due to this requirement, further reduction in the emission of high greenhouse effect gas is required. Therefore, the conversion of air-conditioning refrigerant into one which has no greenhouse effect, even if it is dissipated into the atmosphere became our responsibility.

Nevertheless, in case of air-conditioning refrigerant, it would be the best if there is a refrigerant which has no impact on global warming but ensures good energy efficiency and performance, and is safe; however, there is no such refrigerant which satisfies all these conditions. As a result, we have been considering the practical usage, within the safety frame-work, of R290 refrigerant which has no effect of global warming but highly flammable.

12.2 Characteristics of R290 Refrigerant

1. Chemical Characteristics

R290 (Propane) is refrigerant grade propane, which is natural, non toxic, and chemically stable compound formed by hydrogen.

R290 is one of natural refrigerant, therefore it has almost zero greenhouse gas effect. R-290 is a single-component hydrocarbon substance and the most hydrocarbon properties as it is highly flammable.

Chemical Characteristic Table of R290 and R32

	R290	R32
Chemical Formula	C ₃ H ₈	CH ₂ F ₂
Composition	Single Composition	Single Composition
Boiling point (°C)	-42.1	-51.7
50°C vapor pressure (MPa)	1.71	3.14
Ozone Depletion Potential	0	0
Global Warming Potential (GWP)	3	675
Inflammability	Highly Inflammable (A3)	Slightly Inflammable (A2L)
Toxicity	None	None

2. Characteristic of Pressure

As shown in Table 2, R290 has half the vapor pressure of R32 at the same refrigerant temperature.

As such, it can be installed and maintained with the same high-pressure tools and components as the R32.

Table 2. Saturated vapor pressure comparison table

(Unit: MPaG)

Temperature (°C)	Refrigerant	
	R290	R32
-20	0.14	0.30
0	0.37	0.71
20	0.74	1.37
40	1.27	2.38
60	2.03	3.84
65	2.23	4.29

Reference : Thermal properties table of Japan Society of Refrigerating and Air Conditioning Engineers (60, 65°C)
NIST REFPROP V8.0 (-20 ~ 40°C)

3. Flammable characteristic

As shown in below table, R290 is highly flammable and explosive when heated. The installation must be equipped with ATEX (Atmospheres Explosible) certified equipment and must always turn on the combustible gas detector during servicing and when entering the service area. Service must also be performed in a well-ventilated area, especially if the refrigerant system is being accessed.

3.1 Safety class

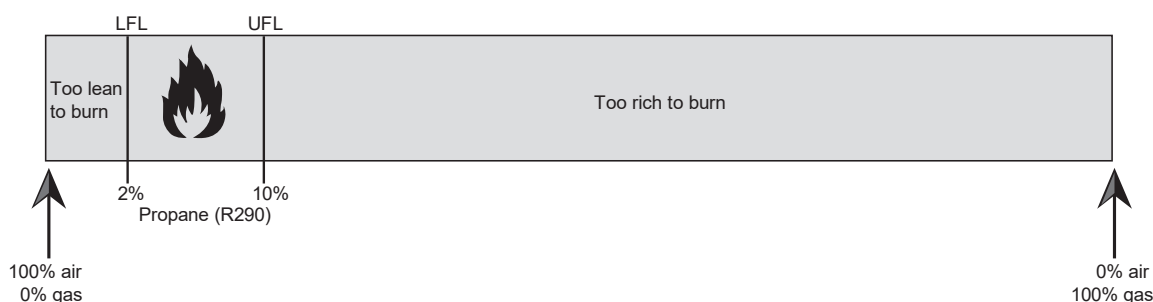
SAFETY GROUP		
Increasing Flammability ↑	Higher Flammability	A3 B3
	Lower Flammability	A2 B2
		A2L B2L
	No Flame Propagation	A1 B1
		Lower Toxicity Higher Toxicity
		Increasing Toxicity →
	Refrigerant	Burning Speed cm/s
	R32	6.7
	R290	38.7

3.2 Concentration control for R290

Because R290 is highly flammable, it can burn or explode if there is enough product concentrated in one space and the refrigerant comes in contact with an ignition source.

Control measurement;

Descriptions	Specifications
Lower flammability limit (LFL) [kg/m ³]	0.038
Lower flammability limit (LFL) [%]	2.1
Practical limit (PL) [kg/m ³]	0.008
Density of vapour [kg/m ³]	1.83



The concentration of R290 between the lower flammable limit (2%) and upper flammable limits (10%) is enough to ignite fire.

Note:

LFL – Lower flammable limit whereby the concentration of flammable gas, vapour or mist in the air below which an explosive gas atmosphere will not be formed.

UFL – Upper flammable limit whereby the concentration of flammable gas, vapour or mist in the air below which an explosive gas atmosphere will not be formed.

PL – Defined as concentration used for simplified calculation to determine the maximum acceptable amount of refrigerant in an occupied space (20% of LFL)

3.3 Material classification and Hazard statement

H280	Contain gas under pressure; may explode if heated
CGA-HG01	May cause frostbite

12.3 Refrigerant piping installation • Tools used in services

12.3.1 Required Tools

R290 refrigerant air conditioners must use ATEX (Atmosphere Explosible) certified equipment. The common parts as R32 air conditioners for two-way valves and three-way valves (diameters of service ports); thus, they maintain commonality in the maintenance of the compressive strength, the size of pipe flaring, and the size of flare nuts as R32. However refrigerant pipe installation and services must use tools certified for highly flammable gas.

However, mixing of refrigerants is not allowed, so that you have to separate the cylinders for the recovery of refrigerants.

Tools used for installation • relocation • replacement of air conditioning units

Works	R290	R32
Connecting of refrigerant pipes	Not applicable for Monobloc	
	Not applicable for Monobloc	
Manifold gauge charging hose	HC Manifold gauge to avoid refrigerant contamination	R32 & R410A Common
Air purging	Vacuum pump complied with ATEX (Atmosphere Explosible)	Vacuum pump + Reducer / expander
Gas leakage test	Combustible gas detector	Detection liquid or soup water, HFC detector

For other installation, you can use general tools such as screw drivers (+, -), metal saws, long-nose pliers, hole core drills, linen tape, levels, temperature gauges, clamp meters, electric knives, nippers, pipe cutters, reamers or scrapers, spring benders, monkey wrenches, fixing wrenches, feeler gauges, hexagon wrenches (4 mm), testers, megohm testers, etc.

Tools used for services.

Works	R290	R32
Insertion of refrigerant	Digital scale for refrigerant charging, refrigerant cylinders, cylinder adopters and packing *a	
Recovery of refrigerant	Refrigerant recovery devices, refrigerant cylinders, manifold gauges, charging hoses *b	

*a. Use cylinder for each refrigerant, cylinder adopter and packing.

*b. Use refrigerant recovery cylinder separately for each refrigerant **(no mixture of refrigerant allowed)**.

12.3.2 Tools for R290

1. Manifold gauges

R32 gauge can be used for R290 pressure.

Each port of manifold has different shapes in order to prevent inserting wrong refrigerant.

*However, the port shape for R290 and R32 is the same; therefore, attention need to be paid not to insert wrong refrigerant.

Differences in high/low pressure gauges

	R290 (common R32)
High pressure gauges (red)	-0.1 ~ 5.3 MPa -76 cmHg ~ 53 kgf / cm ²
Low pressure gauges (blue)	-0.1 ~ 3.8 MPa -76 cmHg ~ 38 kgf / cm ²

Difference in manifold port sizes

	R290 (common R32)
Port sizes	1/2 UNF20

2. Charging hoses

The material is changed to HC resistant, and the size of each manifold adopter is common, as the R32 port size of manifold gauge.

Further, some hoses are with anti-gas pressure backflow valves placed near the adopters. (hoses with the valves recommended)

Manifold gauges / Charging hoses



Differences in charging hoses

		R290 (common R32)
Pressure Resistance	Normal operation pressure	5.1 MPa (52 kgf / cm ²)
	Burst pressure	27.4 MPa (280 kgf / cm ²)
Material		HNBR rubber Internal nylon coating

3. Vacuum pump and isolator.

When using a vacuum pump, it is compulsory to use an ATEX certified vacuum pump.

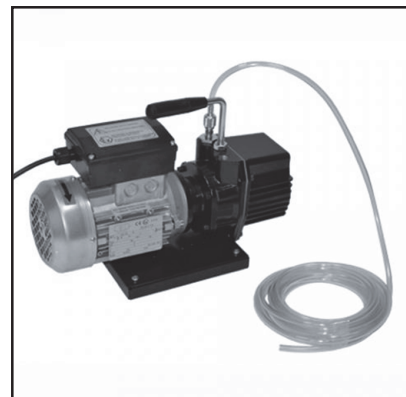
When connecting service equipment (such as vacuum pumps) to a power source, the connection should be made in outside the Temporary Danger Zone.

It is recommended to use an ATEX Isolator switch to facilitate a safe shutdown in the danger zone.

It is necessary to set a solenoid valve in order to prevent backflow of vacuum pump oil into the charge hoses and use a vacuum pump with oil backflow prevention function.

If vacuum pump oil (mineral oil-based) mixes with R290, it may cause damage to the machine.

Vacuum pump



Isolator



4. Leak Detector

HC refrigerant Electric gas leakage tester is used for R290. The usage of existing HFC detectors cannot be used as they can produce spark. We recommend to use detectors specifically designed for combustible gas.

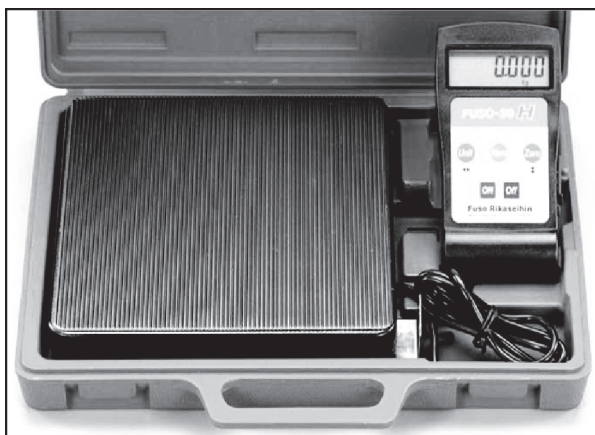
Combustible gas leak detector



5. Digital scale for refrigerant charging

R290 has lower pressure level and the evaporates speed is slow. Thus, the digital scale for refrigerant charging can be used in common with R32. The charging port for R32 is (1/2 UNF20), common with R290

Digital scale for refrigerant charging



6. Refrigerant cylinders

Refrigerant cylinders for R290 are painted in other colors that might subject to change according to the international standards. R290 is a single refrigerant, so that both liquid and gas insertion are possible. Additional charging is also possible.

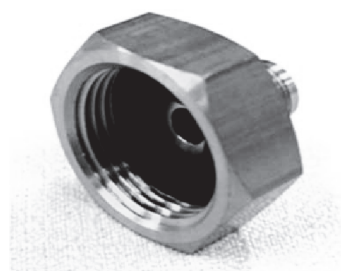
Refrigerant cylinders



7. Connection ports of refrigerant cylinders and packing

Charging ports which fit to the charging hose connection port size (1/2 UNF20) is needed. At the same time, the packing has to be of HC resistant materials.

Connection ports and packing



8. Tools used for refrigerant piping installations and services

	Common tools	R290	R32
1.	Pipe cutters, reamers or scrapers	Not applicable for Monobloc	Not applicable for Monobloc
2.	Flare tools (clutch type)	Not applicable for Monobloc	Not applicable for Monobloc
3.	Torque wrench (1/4, 3/8)	Not applicable for Monobloc	Not applicable for Monobloc
4.	Torque wrench (1/2, 5/8)	Not applicable for Monobloc	Not applicable for Monobloc
5.	Manifold gauges, charging hose	○	○
6.	Vacuum pump, vacuum pump isolator *2	Connection 5/16 [ATEX certified] *1	
7.	Electric gas leakage detectors	Combustible gas detector	HFC detector
8.	Digital scale for refrigerant charging	○	○
9.	Recovery devices (connection port 5/16) *2	ATEX certified	HFC recovery devices
10.	Refrigerant cylinder color	Other (colors that might subject to change according to the international standards)	Other (colors that might subject to change according to the international standards)
11.	Refrigerant cylinder connection port and packing	x	○
12.	Allen wrench (4mm) Electric knives	x	○
*1	Those testers only for HC only cannot be for common use with HFC		
*2	Recovery devices which are certified by Atmosphere Explosible (ATEX)		
[Knowledge for the common usage of tools for R290 & R32] R290 and R32 machines use different compressor oils. • If unregulated compressor oil gets mixed into, it may cause damage to the machine function.			
[Inserting wrong refrigerant] • It may cause "not cooling" and "not heating" customer claims because each component (expansion valve, compressor, PCB) of the refrigerant cycle is specially adjusted for R290. • At the same time, it is not subject to product warranty, if wrong refrigerant was inserted into system.			

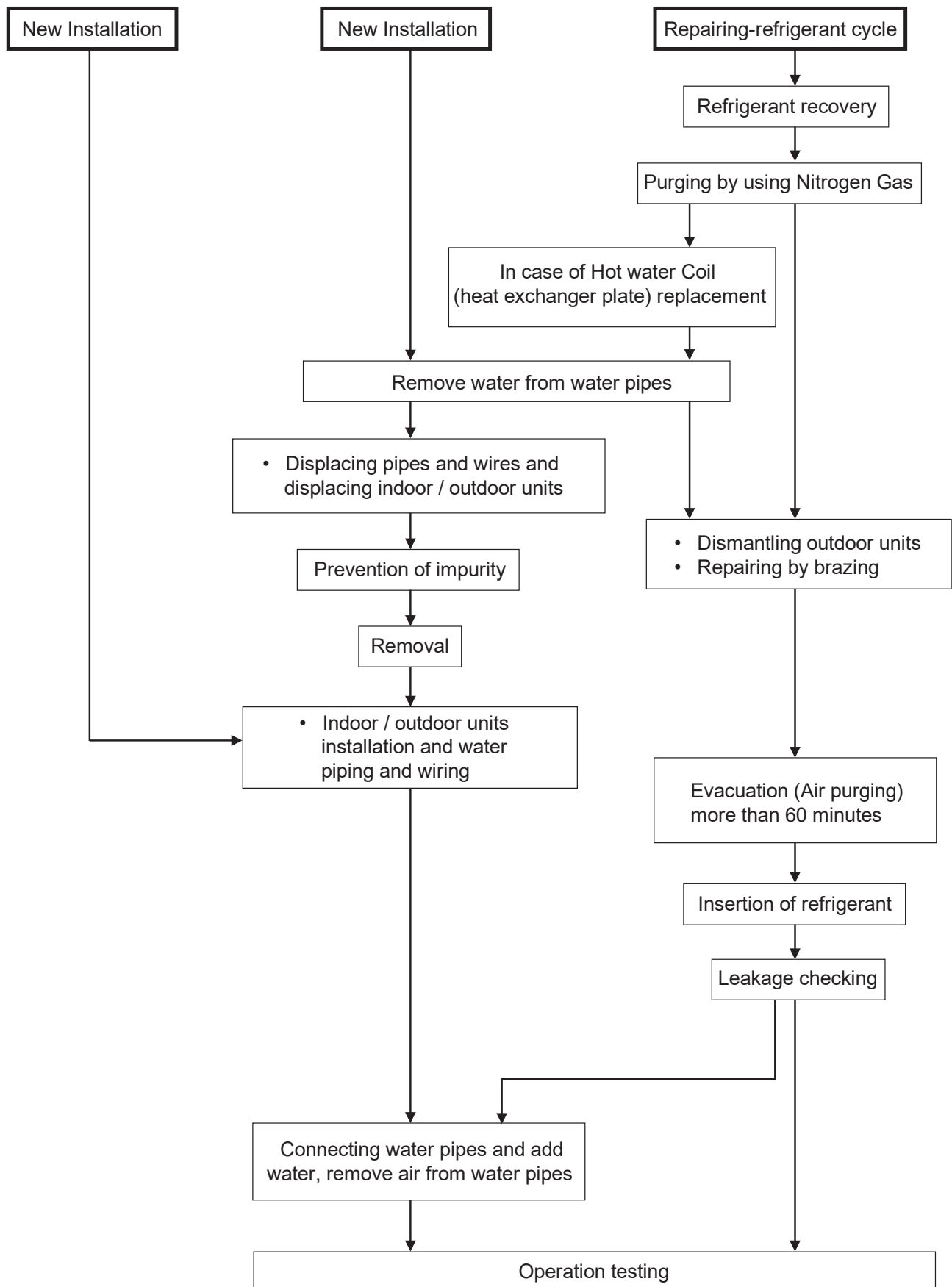
Reference:-

- ASHRAE Standard 34-2019
- ISO Standard ISO 5149
- ISO 817:2014

12.4 New installation, and Repairing of Refrigerant Cycle System Procedures

Personnels working on A3 systems may be subject to applicable occupational hazard or regulations required by local or national law.

For safe servicing and disposal, technicians must have detailed knowledge and skills in handling of flammable refrigerants, prevention of refrigerant leaks, leak detection, personal protective equipment, cylinder handling and loading. A dry powder or CO₂ fire extinguisher must be available at the place of service.

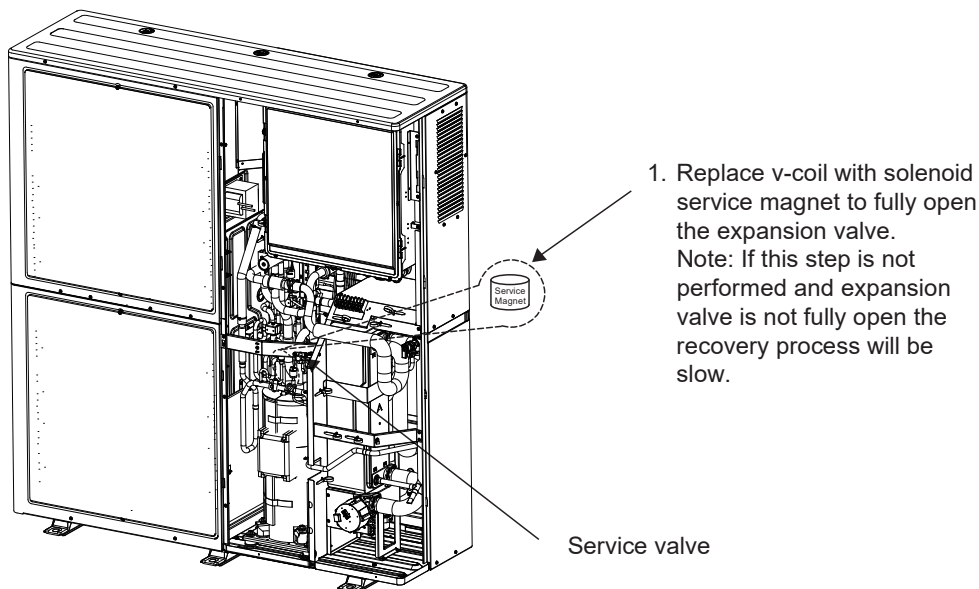


12.5 Servicing

12.5.1 Recover R290 refrigerant with refrigerant recovery machine

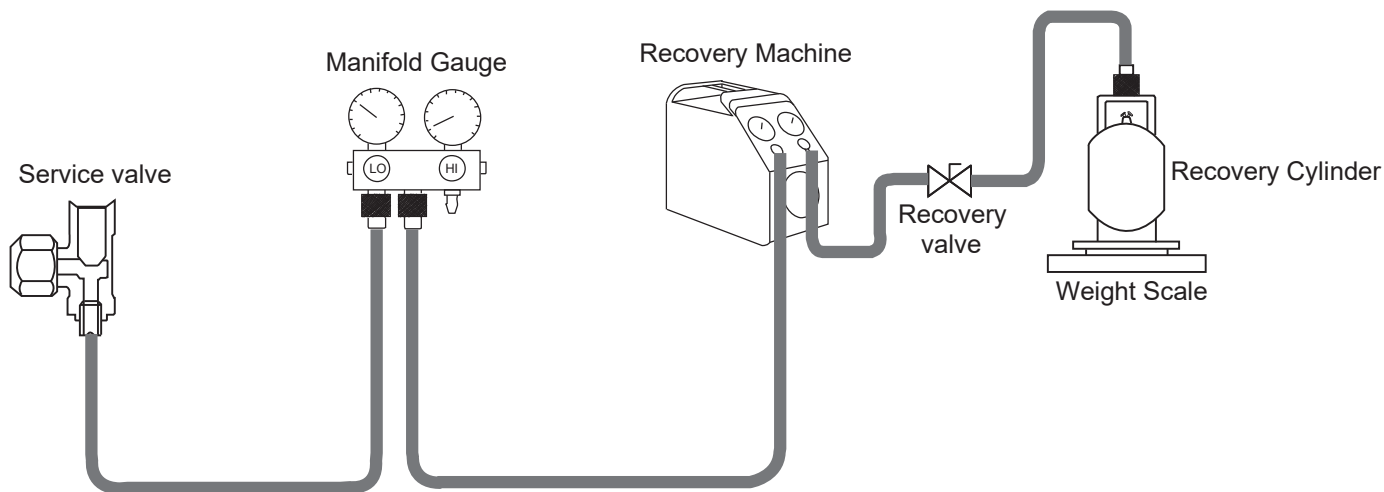
CAUTION!

- Always turn ON the combustible leak detector.
- Keep all ignition sources, hot surface, and open flames 3 meter away from the product.
- Ensure the servicing area is well ventilated.
- Ensure the product is service by certified serviceman.
- Ensure to always have the approved fire extinguisher.



CAUTION!

All equipment and material must be ATEX certified to be allowed to operate within Atmosphere Explosible zone.



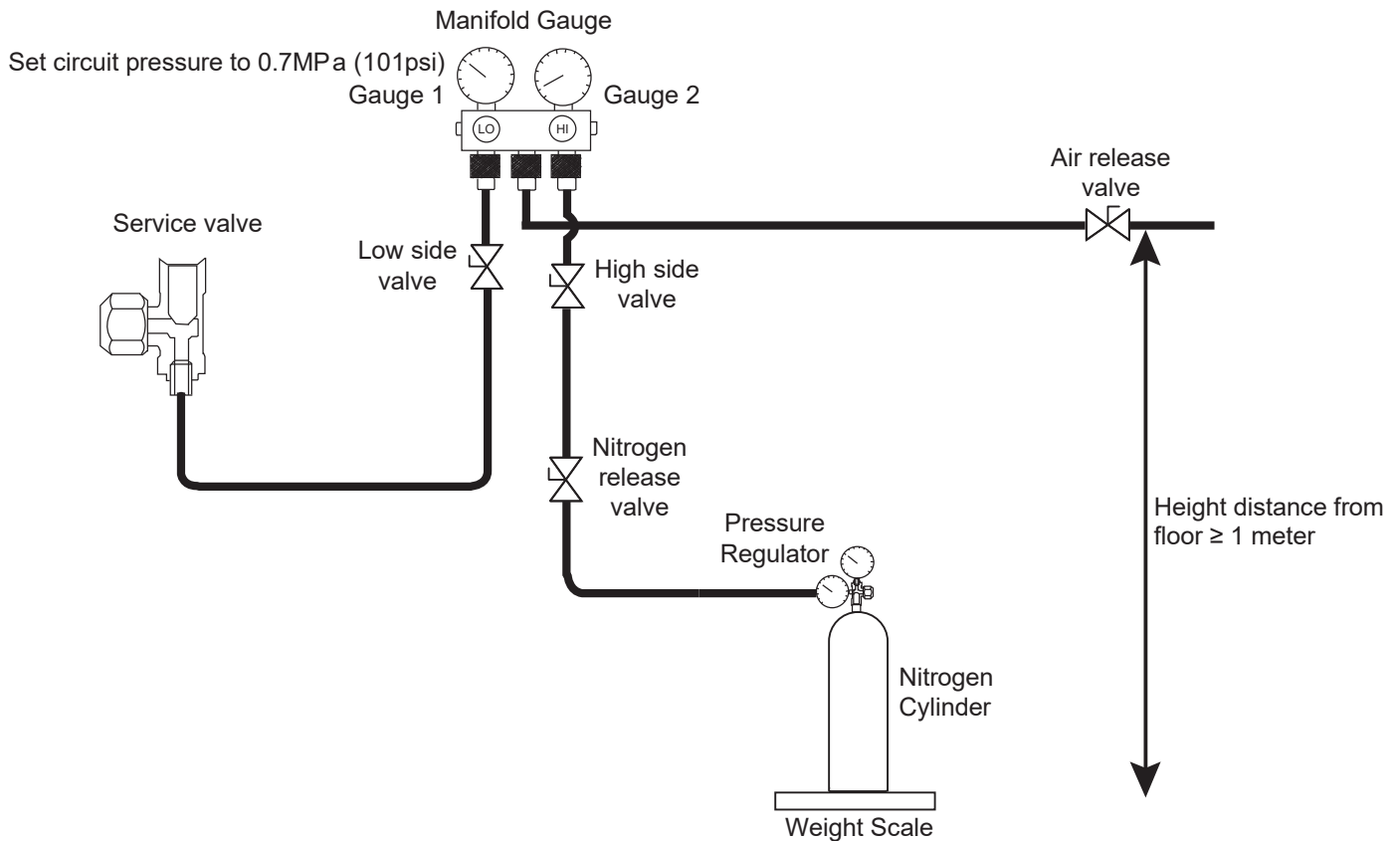
CAUTION!

Do not refill R290 refrigerant more than 50% of recovery cylinder capacity to avoid overpressure. (Safety risk)

Refrigerant Type	Recovery Cylinder Capacity
R32	80% of the weight
R290	50% of the weight

2. Connect the Low side charging hose of the manifold gauge to the service valve (2-way valve) in the outdoor unit.
3. Connect the center hose of the manifold gauge to the recovery machine.
4. Attached the manifold gauge correctly and tightly. Ensure both valve (Low side and High side) is in close position.
5. Connect the hose from recovery machine to the recovery cylinder.
6. Turn ON the recovery machine, turn the low side valve, service valve and recovery valve to open position.

12.5.2 Purging by using Nitrogen Gas Before Servicing and Disposal



1. Connect nitrogen cylinder to the high side at the manifold gauge. Ensure nitrogen cylinder is connected to pressure regulator.
2. Close air release valve and open service valve.
3. Open High side valve and nitrogen release valve. (Set the pressure regulator to 200psi).
4. Charge nitrogen gas up to 0.7MPa (101psi) or charge 400 grams of nitrogen into the unit.
5. Close high side valve and open air release valve (half open) to release remaining propane to the atmosphere. Air release valve must be directed 1 meter from the floor to enable the propane gas to spread properly in the atmosphere. [Beware not to fully open the air release valve to avoid high pressure and compressor oil discharge].
6. When gauge 1 pressure reach near atmospheric (15psi) point the combustible leak detector to air release valve to detect the presence of propane. If presence of propane can still be detected, repeat procedure 2 to 5 until presence of propane cannot be detected.
[Then refrigerant circuit repairment or unit decommissioning should be done].
7. Before charging new refrigerant, vacuum the system until it reaches to 500micron (67Pa) to remove foreign gas in the system and hold for 15 minutes.

13. Operation and Control

13.1 Basic Function

Inverter control, which equipped with a microcomputer in determining the most suitable operating mode as time passes, automatically adjusts output power for maximum comfort always. In order to achieve the suitable operating mode, the microcomputer maintains the set temperature by measuring the temperature of the environment and performing temperature shifting. The compressor at outdoor unit is operating following the frequency instructed by the microcomputer at indoor unit that judging the condition according to internal water setting temperature and water outlet temperature.

13.1.1 Internal Water Setting Temperature

Once the operation starts, control panel setting temperature will be taken as base value for temperature shifting processes. These shifting processes are depending on the Air-to-Water Heat pump settings and the operation environment. The final shifted value will be used as internal water setting temperature and it is updated continuously whenever the electrical power is supplied to the unit.

13.1.2 Heating Operation

13.1.2.1 Thermostat Control

- Compressor is OFF when Water Outlet Temperature – Internal Water Setting Temperature $> 3^{\circ}\text{C}$ for continuously 3 minutes.
- Compressor is ON after waiting for 3 minutes, if the Water Outlet Temperature – Water Inlet Temperature (temperature at thermostat OFF is triggered) $< -3^{\circ}\text{C}$.

13.1.2.2 Thermostat Control (Outdoor Ambient Temperature)

Stops provide heating to room side during high outdoor ambient condition.

Control content:

- Heating operation and water pump will turn OFF when outdoor ambient temperature $>$ outdoor thermo off temperature $+ 3^{\circ}\text{C}$.
(Outdoor thermo off set temperature is set by control panel. Thermo off set temperature is between $5^{\circ}\text{C} \sim 35^{\circ}\text{C}$)
- Heating operation will resume when Outdoor ambient temperature $<$ Outdoor thermo OFF set temperature $+ 1^{\circ}\text{C}$.

13.1.2.3 Heat Mode Operation

Operation of heat pump provide heating capacity to room side by hot water through heating panel, floor heating or fan coil unit.

- 1 3 ways valve control:
 - 3 ways valve switch and fix to heating side.
- 2 Heat pump operates follow normal heating operation.
- 3 Back up heater operate follow normal operation.
- 4 2 ways valve control:
 - 2 ways valve opens.

13.1.3 Cooling Operation

13.1.3.1 Thermostat Control

- Compressor is OFF when Water Outlet Temperature – Internal Water Setting Temperature $< -1.5^{\circ}\text{C}$ for continuously 3 minutes.
- Compressor is ON after waiting for 3 minutes, if the Water Outlet Temperature – Water Inlet Temperature (temperature at thermostat OFF is triggered) $> 3^{\circ}\text{C}$

13.1.3.2 Cool Mode Operation

- 1 3 ways valve control:
 - 3 ways valve switch and fix to cooling side.
- 2 Heat pump operates follow normal cooling operation.
- 3 Room heater DOES NOT operate during cool mode.
- 4 2 ways valve control:
 - 2 ways valve is closed.

13.1.3.3 Cooling Capacity Control

The cooling capacity can be set to either Efficiency or Comfort priority.

Remocon setting : Cooling capacity = Efficiency (default)

Prioritize efficiency and operate the cooling with reduced capacity

Remocon setting : Cooling capacity = Comfort

Prioritize comfort and operate the cooling at maximum capacity.

13.1.4 Target Water Temperature Setting

13.1.4.1 Target Water Temperature Control of Standard System (Optional PCB not Connected)

There are 2 types of temperature control selection which are Compensation and Direct.

- Temperature control type selection by installer:
 - 1 Compensation : WLo, WHi, ODL0, ODH1 can be set at installer menu.
 - 2 Direct : Direct Water Temperature Set
- Remote control setting by user:
 - 1 Compensation : Shift value $\pm 5^{\circ}\text{C}$ from the compensation curve
 - 2 Direct : Direct water temperature set change

*This setting only able to set when room sensor select as Water Temperature.

*Instead of water temperature, user will set target room temperature when room sensor select as Room Thermistor OR Internal Room Thermostat.

- Target water temperature is calculated as below condition.
 - Target water temperature = A (Base temperature) + B (shift temperature)

A (Base Temperature)	Compensation	Direct
	Value from the curve + User shift value set	Direct value from user setting

- B (shift temperature) value is depend on the room sensor selection at remote controller as below table:

B (Shift Temp.)	B shift value depend on the room sensor selection at remocon as table below
Sensor selection	
Water temperature	B = 0
External Room thermostat	B = 0
Internal Room thermostat & Room Thermistor	Cool Mode: B = 0 ; when Zone OFF or Zone Room Thermo OFF B = B = 1* (room set temp (R/C) – actual room temp) Max/Min Regulation of B: (Max = 5 ; Min = -5)
	Heat Mode: B = 0 ; when Zone OFF or Zone Room Thermo OFF B = follow Heating Room Temperature PI control logic

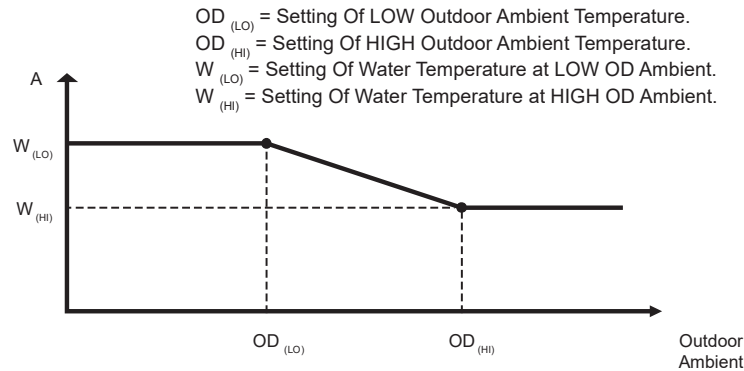
- Maximum/minimum regulation of Target Water Temperature

	Heating	Cooling
MAX	55°C (Below Ambient -20°C) * 65°C (Above Ambient -15°C) * 70°C (Above Ambient -7°C) 75°C (Above Ambient 15°C)	20°C
MIN	25°C	5°C

* Between outdoor ambient -15°C and -20°C, max target decreases gradually from 65°C to 55°C.

Compensation Type: (Operation under Heat Mode and Cool Mode)

- The set temperature defines the parameters for the ambient (Outdoor temperature) dependent operation of the unit. The water temperature is determined automatically depending on the outdoor temperature. Default setting is the colder outdoor temperature will result in warmer water and vice versa. The user has the possibility to shift up and shift down the target water by remote control setting.

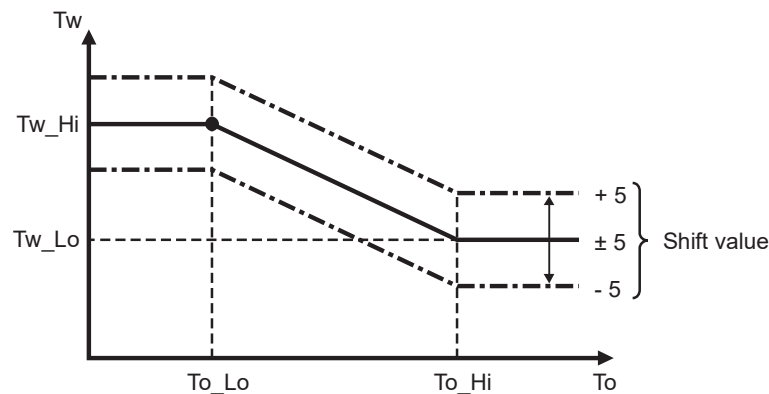


- Outdoor ambient is updated every 30 minutes when operation ON.
- Setting water outlet temperature always follow $W_{(LO)}$ or $W_{(HI)}$ whenever is higher if outdoor ambient sensor or indoor communication error happen.

However, when powerful mode is requested by remote control during heating mode, the higher value of HLo or Whi will be used for A calculation.

- There are 2 compensation curves (for heating and cooling). During heating mode, the heating curve is used and during cooling mode, the cooling curve is use.

- Compensation curve set shift value:



13.1.5 Target Water Temperature at Extension System (Optional PCB is Connected)

Target water temperature is calculated as below.

- Heat Mode:
 - When buffer tank selection is "YES:"
Target water temperature = Target buffer tank temperature + [2°C]
 - When buffer tank selection is "NO"
 - If both zone 1 and zone 2 is active
Target Water Temperature = Higher zone target water temperature of Zone 1 and Zone 2.
 - If only one zone is active
Target Water Temperature = Zone target water temperature of active zone.

- Cool mode:
- When buffer tank selection is “YES”
 - If both zone 1 and zone 2 active
Target Water Temperature = Lower Zone Target Water Temperature of Zone 1 and Zone 2
 - If only one zone is active
Target Water Temperature = Zone Target Water Temperature of active zone
- When buffer tank selection is “NO”
 - If both zone 1 and zone 2 active
Target Water Temperature = Lower Zone Target Water Temperature of Zone 1 and Zone 2
 - If only one zone is active
Target Water Temperature = Zone Target Water Temperature of active zone

*Cool Mode does not have SG ready control

13.1.6 Target Zone Water Temperature Control

Purpose:- To control zone mixing and zone pump according to the zone sensor temperature

13.1.6.1 Target Zone 1 Water Temperature Setting Control

- Start condition
 - Heating zone 1 is ON by remote control or Timer or Auto Mode **OR**
 - Cooling zone 1 is ON by remote control or Timer or Auto Mode.
- Cancel condition
 - Heating zone 1 is OFF by remote control or Timer or Auto mode **AND**
 - Cooling zone 1 is OFF by remote control or Timer or Auto mode.
- Target Zone 1 water temperature is calculated as below condition.
 - Target Zone 1 water temperature = A (Base temperature) + B (shift temperature)

A (Base Temperature)	Compensation	Direct
	Value from the curve + User shift value set	Direct value from user setting

- * During heat mode and compensation select, if powerful mode is activated, higher value of WLo or WHi will be use as curve value.

- B (shift temperature) value is depend on the room sensor selection at remote controller as below table:

B (Shift Temp.)	B shift value depend on the room sensor selection at remocon as table below
Sensor selection	
Water temperature	B = 0
External Room thermostat	B = 0
Internal Room thermostat & Room Thermistor	Cool Mode: B = 0 ; when Zone OFF or Zone Room Thermo OFF B = B = 1* (room set temp (R/C) – actual room temp) Max/Min Regulation of B: (Max = 5 ; Min = -5)
	Heat Mode: B = 0 ; when Zone OFF or Zone Room Thermo OFF B = follow Heating Room Temperature PI control logic
Pool Function Selected	B = Delta value setting from remocon

- * B = 0 regardless of which sensor selection, if SHP control bit is enable except Pool function select (maintain Pool “B” value)

** Pool function also can be select at Zone 1 when optional PCB is connected and Zone 1 system is select.

- Maximum/minimum regulation of Target Water Temperature.

	Heating	Cooling
MAX	55°C (Below Ambient -20°C) * 65°C (Above Ambient -15°C) * 70°C (Above Ambient -7°C) 75°C (Above Ambient 15°C)	20°C
MIN	25°C	5°C

* Between outdoor ambient -15°C and -20°C, max target decreases gradually from 65°C to 55°C.

- Target Zone 1 Water Temperature (Heat mode only) during SG ready control
 - If buffer tank selection is "NO" then following shift is carried out.
 - While digital input is "10" or "11" then,
Final Target Zone 1 water temperature
= Target Zone 1 water temperature* (SG ready % setting (remote control menu))%
 - If buffer tank selection is "YES"
 - No shift of Target Zone 1 Water Temperature. Target Buffer Tank Temperature will change accordingly.
* Refer to "SG Ready Control"

13.1.6.2 Target Zone 2 Water Temperature Setting Control

- Start condition
 - Heating zone 2 is ON by remote control or Timer or Auto Mode **OR**
 - Cooling zone 2 is ON by remote control or Timer or Auto Mode.
- Cancel condition
 - Heating zone 2 is OFF by remote control or Timer or Auto mode **AND**
 - Cooling zone 2 is OFF by remote control or Timer or Auto mode.
- Target Zone 2 water temperature is calculated as below condition.
 - Target Zone 2 water temperature = A (Base temperature) + B (shift temperature)

A (Base Temperature)	Compensation	Direct
	Value from the curve + User shift value set	Direct value from user setting

* During heat mode and compensation select, if powerful mode is activated, higher value of WLo or WHi will be use as curve value.

- B (shift temperature) value is depend on the room sensor selection at remote controller as below table:

B (Shift Temp.)	B shift value depend on the room sensor selection at remocon as table below
Sensor selection	
Water temperature	B = 0
External Room thermostat	B = 0
Internal Room thermostat & Room Thermistor	Cool Mode: B = 0 ; when Zone OFF or Zone Room Thermo OFF B = B = 1* (room set temp (R/C) – actual room temp) Max/Min Regulation of B: (Max = 5 ; Min = -5)
	Heat Mode: B = 0 ; when Zone OFF or Zone Room Thermo OFF B = follow Heating Room Temperature PI control logic
Pool Function Selected	B = Delta value setting from remocon

* B = 0 regardless of which sensor selection, if SHP control bit is enable except Pool function select (maintain Pool "B" value)

** Pool function also can be select at Zone 2 when optional PCB is connected and Zone 2 system is select.

- Maximum/minimum regulation of Target Water Temperature.

	Heating	Cooling
MAX	55°C (Below Ambient -20°C) * 65°C (Above Ambient -15°C) * 70°C (Above Ambient -7°C) 75°C (Above Ambient 15°C)	20°C
MIN	25°C	5°C

* Between outdoor ambient -15°C and -20°C, max target decreases gradually from 65°C to 55°C.

- Target Zone 2 Water Temperature (Heat mode only) during SG ready control
 - If buffer tank selection is "NO" then following shift is carried out.
 - While digital input is "10" or "11" then,
Final Target Zone 2 water temperature
= Target Zone 1 water temperature* (SG ready % setting (remote control menu))%
 - If buffer tank selection is "YES"
 - No shift of Target Zone 2 Water Temperature. Target Buffer Tank Temperature will change accordingly.
* Refer to "SG Ready Control"

13.1.6.3 Zone Temperature Control Contents

- During Standard System (Optional PCB not connected)
 - Only 1 zone temperature control is available
 - This zone room temperature is control by either one of the 4 room sensor (Room Th, Int/Ext Room Thermostat, Water temperature)
 - Target Zone Water Temperature is calculated based on selected temperature control type (Compensation or Direct) and selected room sensor. Target Water Temperature will set same as Target Zone Water Temperature
 - Target Water Temperature is the temperature for heat pump to operate refer to indoor water outlet sensor.
 - Heat pump and water pump OFF when ROOM Thermo OFF (Zone thermo OFF by Room Th or Room Thermostat).

* There will be no zone sensor connected to zone 1 (No zone sensor error), mixing valve and zone pump will not operate.

- During Extension System (Optional PCB connected)

* There will be no zone sensor connected to zone 1 (No zone sensor error), mixing valve and zone pump will not operate.

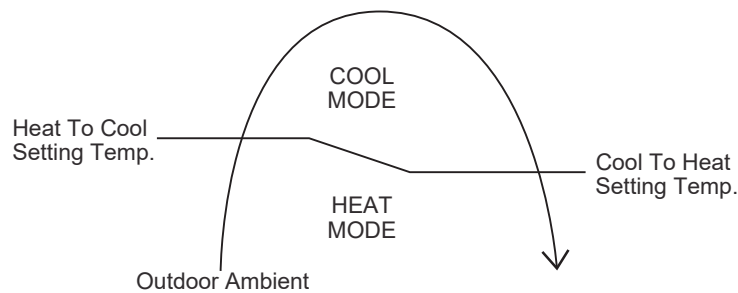
- During Extension System (Optional PCB connected)
 - Buffer Tank connection select "NO" &
 - One zone system is select
 - This zone room temperature control by either one of the 4 room sensor (Room Th, Int/Ext Room Thermostat, Water temp.)
 - Target Zone Water Temperature calculate base on selected temperature control type (Compensation or Direct) and selected room sensor.
 - Target Water Temperature will set same as Target Zone Water Temperature
 - Target Water Temperature is a temperature for heat pump to operate refer to indoor water outlet sensor.
 - Heat pump and water pump OFF when ROOM Thermo OFF (Zone thermo OFF by Room Th or Room Thermostat).

* There will be no zone sensor connected to zone 1 (No zone sensor error), mixing valve and zone pump will not operate.

- 2 zone system select
 - Each zone room temperature is control by each sensor which select from either one of the 4 room sensor
 - Target Zone 1 & 2 Water Temperature is calculated based on selected temperature control type (Compensation or Direct) and selected room sensor.
* Zone Mixing Valve & Zone pump will operate to achieve Target Zone Water Temperature which refer to zone sensor.
* Zone Sensor will detect if zone sensor is open or short.
 - Target Water Temperature will set same as the active & higher zone water temperature setting. (When cooling mode, lower zone water temp setting)

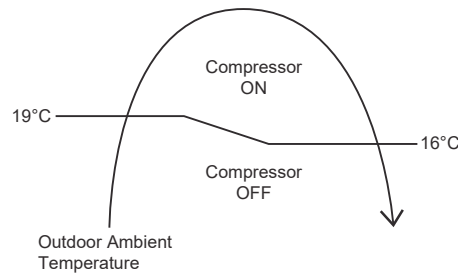
- Target Water Temperature is the temperature for heat pump to operate refer to indoor water outlet sensor.
- Heat pump and water pump OFF when ROOM Thermo OFF (Both Zone thermo OFF by Room Th or Room Thermostat).
- Buffer Tank Connection select "YES" &
 - 1 zone system or 2 zone system select
 - Each zone control by each sensor which select from either one of the 4 room sensor
 - Target Zone 1 & 2 Water Temperature calculate base on selected temperature control type (Compensation or Direct) and selected room sensor. Each zone have their own Target Zone Water Temperature.
 - * Zone Mixing Valve & Zone pump will operate to achieve each Target Zone Water Temperature which refer to zone sensor
 - * Zone Sensor will detect if zone sensor is open or short.
 - Target Buffer Tank Temperature will be set as active & higher zone water temperature setting + Buffer Delta T. (Heating) Target Buffer Tank Temperature will be set as active & lower zone water temperature setting (Cooling).
 - Target Water Temperature will set as Target Buffer Tank Temperature + [2°C] (Heating) Target Water Temperature will set as Lower or Active Target Zone Water Temp. + [-3°C] (Cooling)
 - Target Water Temperature is a temperature for heat pump to operate refer to indoor water outlet sensor.
 - Heat pump and water pump OFF when ROOM thermo OFF
 - Heat mode: ROOM thermo OFF (Buffer Tank Temperature > Target Buffer Tank + [0°C])
 - Cool mode: ROOM Thermo OFF (Both Zone thermo OFF by Room Th or Room Thermostat)

13.1.7 Auto Mode Operation



- Control details:
 - To enable the unit to operate either heat or cool mode automatically, heat to cool set temperature and cool to heat set temperature can be set by control panel.
 - Automatic operation is judged based on control panel setting temperature and outdoor ambient temperature.
 - * Minimum setting of heat to cool set temperature is 1°C higher than cool to heat set temperature.
- Judgement control:
 - If outdoor ambient temperature < Heat to Cool Set Temperature, unit will operate in Heat Mode or else the unit will operate in Cool Mode.
 - If current operation is Cool mode, outdoor ambient temperature > Cool to Heat Temperature, unit will maintain Cool mode operation or else the unit will operate Heat mode.
 - If current operation is Heat mode, outdoor ambient temperature > Heat to Cool Temperature, unit will maintain Heat mode operation or else the unit will operate Cool mode.
 - Every 60 minutes the outdoor ambient temperature is judged.
 - When Auto + Tank mode is selected, operation mode switching is judged by both outdoor ambient temperature and indoor air temperature.

13.1.8 Auto Cooling Mode Operation Limit



- Auto Mode Cooling Only operation will start once the outdoor ambient temperature reaches 19°C and compressor will continue to run until the outdoor ambient temperature drops to 16°C.
- Due to this limitation, If Heat to Cool temperature is set lower than 19°C, the compressor will not operate until the outdoor ambient temperature reaches 19°C or higher.

13.1.9 Tank Mode Operation

- 3 ways valve direction
 - 3 ways valve switch to tank side during Tank Thermo ON condition. Switch 3 ways valve to room side when tank achieve Tank Thermo OFF temperature.

- Tank Thermo ON/OFF Characteristic
 - Tank Thermo OFF

Case 1: Internal Tank Heater is select and Tank Heater ON

- Tank temperature > Tank Set Temperature continuously for 15 seconds.
- Water outlet > 75°C

- Case 2: Tank Heater OFF OR External Heater is select
 - When heat pump OFF due to water thermos & Tank temperature > Tank water set temperature for continuously 20 seconds. **OR**
 - Tank temperature > Tank set temperature + 1°C for continuously 20 seconds.
 - Tank Thermo ON

Case 1: Tank Heater ON (Internal Tank Heater)

- Tank temperature < Tank set temperature + R/C (Tank re-heat temperature)

Case 2: Tank Heater OFF (Internal Tank Heater)

- Tank temperature < Tank water set temperature + R/C (Tank re-heat temperature)

* When tank thermo ON, water pump will ON for 3 minutes then only heat pump turn ON.

* Tank water set temperature = tank set temperature or 65°C whichever lower.

- 2 ways valve close
- Heat pump Thermostat Characteristic
 - Heat pump Water Outlet set temperature is set to below table:

Outdoor ambient temperature	Heat pump water outlet temperature
< -20°C	55°C
> -20°C	65°C
> -10°C	75°C

Characteristic of heat pump thermos ON/OFF under tank mode condition:

Water Outlet Thermo Condition

- Heat pump thermos OFF temperature:
 - 1 Heat pump thermo OFF temperature = Target Water outlet temperature + (2°C)
 - 2 Water outlet temperature > heat pump thermo OFF temperature for continuously 3 minutes, heat pump OFF but water pump continue ON.

- Heat pump thermo ON temperature
 - Heat pump thermo ON temperature = water inlet during thermo OFF time + [-3°C]
 - When water outlet temperature < heat pump thermo ON temperature, heat pump ON.

Water inlet thermo protection condition

- Heat pump thermo OFF temperature:
 - Water inlet temperature > [75°C/65°C/55°C] for continuously 30 seconds, heat pump OFF, water pump continue ON.
- Heat pump thermo ON temperature:
 - Heat pump thermos ON temp = water inlet temperature < [75°C/65°C/55°C].

Outdoor ambient temperature	Water inlet temperature
OD temp < -20°C	55°C
-20°C ≤ OD temp < -15°C	65°C
-15°C ≤ OD temp	75°C

Thermo ON/OFF for Heat Pump in Tank Operation:

When tank temperature achieve heat pump OFF condition, refer below condition:

Conditon 1 : Tank Heater ON (Internal Tank Heater)

- Heat pump will turn OFF, water pump continue ON and room heater will continue ON if tank temperature below tank heater thermo ON condition. 3 ways valve will only switch to room side after tank temperature reach tank heater thermo OFF condition.

Conditon 2 : Tank Heater OFF (Internal Tank Heater)

- If tank temperature achieve tank thermo OFF, heat pump turn OFF, water pump turn OFF, room heater OFF and 3 ways valve switch to room side.

When tank temperature achieve heat pump ON condition, water pump ON, heat pump ON and room heater turn OFF.

Heat pump OFF condition at Tank Mode

- Tank temperature > tank water set temperature continuously for 20 seconds after heat pump thermos OFF due to water thermo. (Heat pump turn OFF but water pump continue ON and room heater turn ON to achieve tank set temperature) **OR**
- Tank temperature > tank set temperature + [1°C] for continuously 20 seconds. (Heat pump OFF, water pump OFF, room heater OFF and 3 ways valve switch to room side)

Heat pump ON condition at Tank Mode

- Tank temperature < tank water set temperature + R/C setting (Tank re-heat temp) (Water pump turn ON OR continue ON, heat pump ON and 3 ways valve switch to tank side or maintain at tank side)

Tank heater control

- Internal heater only operates to tank side if Tank heater ON and backup heater is enable.

Internal heater turn ON condition:

- Tank temperature < tank set temperature **AND**
- Heat pump thermos OFF **AND**
- 20 minutes from previous heater off **AND**
- Internal tank heater selects USE from control panel.

Internal heater turn OFF condition:

- Tank temperature > tank set temperature for continuously 15 seconds **OR**
- Heat pump thermo ON **OR**
- Mode change or operation is off by control panel.

13.1.10 Heat + Tank Mode Operation

- 1 3 ways valve control:
 - 3 ways valve switch to room side during room heat-up interval and switch to tank side during tank heat-up interval. Both modes will switch alternately. Tank mode is the initial running mode of Heat + Tank mode.
- 2 Heat pump operation control:
 - During room heat-up interval
 - Follow normal heating operation.
Switching to tank side depends to below cases:
Case 1:
[Previous switch from tank interval to room interval due to thermo OFF]
 - Switch to tank heat-up interval when Tank temp < Tank thermos ON temp (Room heat-up interval ends)
Case 2:
[If heating operation at room side is less than 30 minutes and switch to tank side 3 times consecutively]
 - Maintain at room heat-up interval regardless of the tank temperature. Switch to tank heat-up interval only when (Room Interval Timer is complete **OR** Room heat pump thermo OFF) **AND** Tank temperature < Tank thermo ON temperature.
Case 3:
[Previous switch from tank interval to room interval due to tank interval timer is complete]
 - Maintain at room heat-up interval regardless of the tank temperature. Switch to tank heat-up interval only when (Room Interval Timer is complete **OR** Room heat pump thermo OFF) **AND** tank temperature < Tank thermo ON temperature.
 - During Tank heat-up interval
 - Tank interval is the first mode running when heat + tank mode is select.
 - Switch to room interval only when tank achieve tank thermo OFF **OR** tank heat-up interval timer is complete.
 - Heat pump operates according to normal tank mode operation.
- 3 Room heater control:
 - During heating heat-up interval
 - Follow normal room heater control operation.
- 4 Tank heater control:
 - During heating heat-up interval
 - Internal tank heater will not function under heating heat-up interval.
 - During tank heat-up interval
 - Internal tank heater will turn ON after heat pump thermo off to boil tank temperature to tank set temperature.
 - 2 ways valve control is open
 - Indoor water pump control:
 - Indoor water pump always turn ON if room heat pump thermo ON **OR** Tank thermo ON.

13.1.11 Cool + Tank Mode Operation

- 1 3 ways valve control:
 - 3 ways valve switch to room side during room cooling interval and switch to tank side during tank heat-up interval. Both mode will switch alternately. Tank mode is the initial mode of cool + tank mode.
- 2 Heat pump operation control:
 - During room heat-up interval
 - Follow normal cooling operation.
Switching to tank side depends to below cases:
Case 1:
[Previous switch from tank interval to room interval due to thermo OFF]
 - Switch to tank heat-up interval when Tank temperature < Tank Thermo ON temperature (Room interval will ends)
Case 2:
[If cooling operation at room side is less than 30 minutes and switch to tank side for 3 times consecutively]

- Maintain at room cooling interval regardless of the tank temperature. Switch to tank heat-up interval only when (Room Interval Timer is complete **OR** Room heat pump thermo OFF) **AND** Tank temperature < Tank thermo ON temperature.

Case 3:

[Previous switch from tank interval to room interval is due to tank interval timer is complete]

- Maintain at room cooling interval regardless of the tank temperature. Switch to tank heat-up interval only when (Room Interval Timer is complete **OR** Room heat pump thermo OFF) **AND** tank temperature < Tank thermo ON temperature.

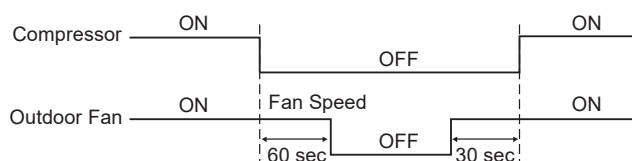
*Tank Thermo ON temperature:

Internal Tank Heater select USE	<Tank set temperature + R/C setting (Tank re-heat temperature)
Others	<Tank water set temperature + R/C setting (Tank re-heat temperature)

- During Tank heat-up interval
 - Tank interval is the first mode running when the cool + tank mode is select.
 - Switch to room interval only when tank achieve tank thermo OFF **OR** tank heat-up interval timer is complete.
 - Heat pump operates according to normal tank mode operation.
- 3 Room heater control:
 - During room cooling interval
 - Room heater is OFF and not operates.
- 4 Tank heater control:
 - During room cooling interval
 - Internal tank heater will not function under room cooling interval.
 - During tank heat-up interval
 - Internal tank heater will turn ON after heat pump thermos off to boil tank temperature to tank set temperature.
- 5 2 ways valve is close.
- 6 Indoor water pump control:
 - Indoor water pump always turn ON if room heat pump thermo ON **OR** Tank thermo ON.

13.1.12 Outdoor Fan Motor Operation

Outdoor fan motor is adjusted according to operation condition. It starts 30 seconds before compressor starts operation and it stops 60 seconds after compressor stops operation.



The reason the outdoor fan stops 60 seconds after the compressor stops is to exhaust heat.

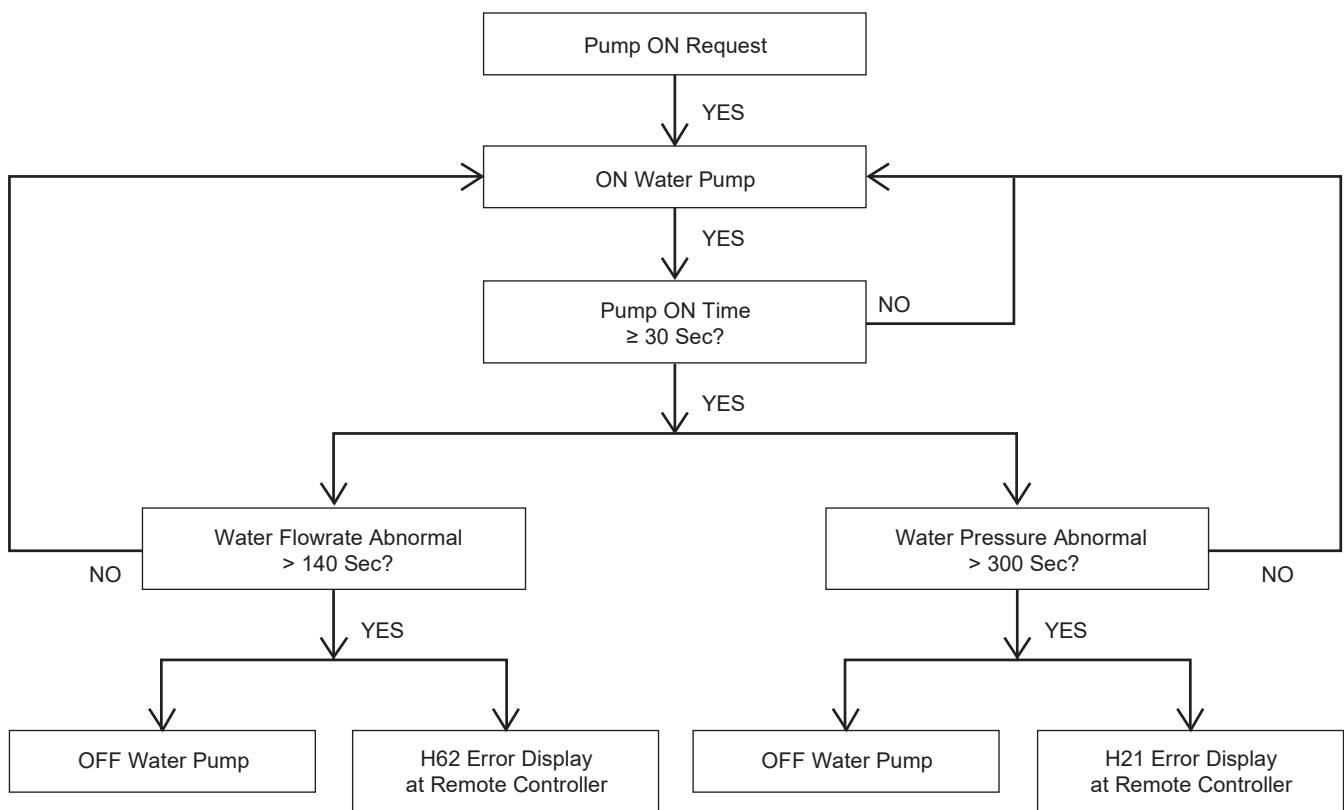
The reason why the compressor starts operating 30 seconds before it starts is to accurately detect the outside temperature.

13.2 Water Pump

The system will start checking on the water flow level after operation start for 70 seconds. If water pressure level is detected low or high continuously 300 seconds, the water pump and the compressor will be OFF permanently and OFF/ON control panel LED will blink (H21 error occurs).

13.2.1 Water Pump Control

- Once the indoor unit is ON, the water pump will be ON immediately and no error judgment for 70 seconds. However, during this 70 seconds operation, if there is any abnormality cause at outdoor or malfunction, the compressor should be OFF immediately and restart delay after 3 minutes.
- The system will start checking on the water flow level after operation start for 70 seconds. If water flow level is detected low continuously 60 seconds, the water pump and the compressor will be OFF permanently and OFF/ON control panel LED will blink (H62 error occurs).
- When error happens, the power has to be reset to clear the error.
- If there is no error indication, the water pump shall be continuously running.
- The water pump will remain ON when compressor OFF due to thermostat OFF setting is reached.
- Water pump will OFF when room thermo **OR** tank thermo **OR** buffer tank thermo OFF.
- Water pump will delay 15 seconds to turn OFF when request to OFF except during anti-freeze deice activate or air purge mode.



Maximum pump speed setting on remote control

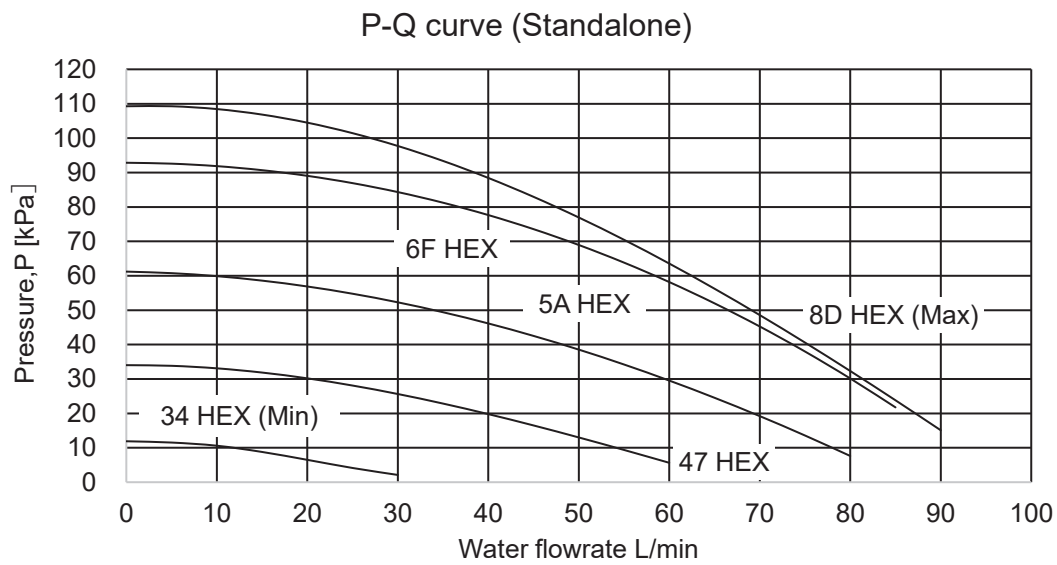
- Standard pump speed is automatically controlled to get the designed water temperature different between water inlet and outlet (ΔT). Instead of setting the standard pump speed, maximum pump speed is manually adjusted by the installer according to water circuit pressure drop.

However, the following sequences do not follow maximum pump duty setting by remote control.

- Pump down mode
- Air purge mode
- Normal deice

1) P-Q graph for different pump HEX duty

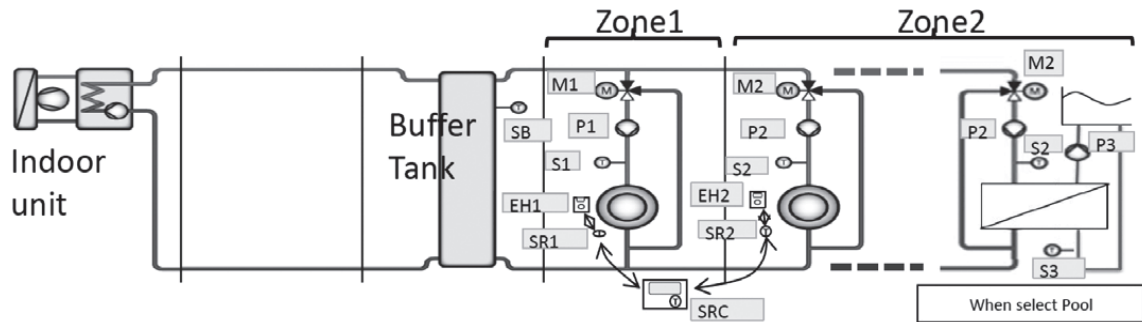
- Connection Control Module (WH-WXG20ME8, WH-WXG25ME8, WH-WXG30ME8)



13.2.2 Zone Water Pump Control

Purpose:

- Water pump install at each zone to circulate the water inside each zone during buffer tank connection selected "YES" or 2 zone systems.



Content:

- AC type water pump install for this zone water pump control. When optional PCB connected, 230V output will drive this zone pump.
- There are three pump can be connected through Optional PCB. (Zone 1 Pump, Zone 2 Pump, & Pool Pump)
 - * Zone 1 pump [P1] use to circulate zone 1 water circuit & Zone 1 mixing valve [M1] adjust to control the Zone 1 target water temperature.
 - * Zone 2 pump [P2] use to circulate zone 2 water circuit & Zone 2 mixing valve [M2] adjust to control the Zone 2 target water temperature.
 - * When Pool Function select as Zone 2 circuit, [P2] use to circulate water to heat exchanger which use to transfer heat to pool water.
 - * Pool pump [P3] circulates the pool water through the heat exchanger to get warm water.
- Zone 1 and Zone 2 water pump start condition:
 - Zone room request ON
(eg. Zone 1 thermo ON, only zone 1 pump will turn ON)
- Zone 1 and Zone 2 water pump stop condition:
 - Zone room request OFF
- Pool water pump start condition:
 - Pool Zone request ON **AND**
 - Pool function is selected
- Pool water pump stop condition
 - Pool zone: Zone room request OFF **OR**
 - Pool function is cancel
- * Zone 1 & Zone 2 water pump need to turn OFF when antifreeze deice pump stop control activate and turn ON back after the antifreeze deice pump stop control end under setting of "NO" buffer tank connection.

Zone Pump Prohibit ON control:

- Start condition:
 - Zone 1 water temperature $\geq 80^{\circ}\text{C}$ continuously for 5 minutes
 - *stop zone water pump operates if the zone water fulfilled.
- Cancel condition:
 - After 30 minutes from start condition fulfilled.
 - *zone water pump operates according to normal condition.

Zone Pump Control during Anti-Freeze

Zone pump control during Zone Anti-Freeze Control:

- When Zone Anti-Freeze Flag=1, Zone Pump Turn ON.
- When Zone Anti-Freeze Flag=0, Zone Pump Turn OFF.

Zone pump control during Indoor Anti-Freeze Control:

- Zone pump only ON/OFF if the Extension PCB connected and Buffer Tank select "NO" condition

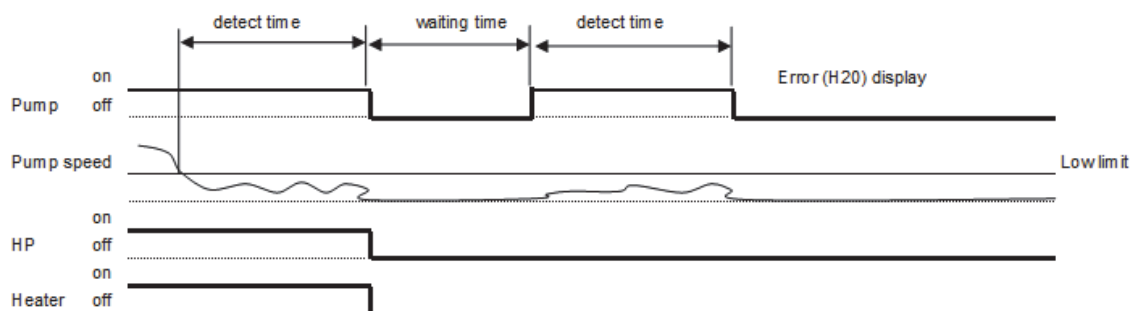
When Indoor Anti-Freeze flag=1, Zone Pump Turn ON

When Indoor Anti-Freeze flag=0, Zone Pump Turn OFF

* Pool Water Pump will not affected by both Indoor anti-freeze control or zone anti-freeze control.

13.2.3 Water Pump Speed Feedback Error

- Basically pump speed feedback is control by micon.
- When pump speed is below low limit or over high limit for a few seconds, micon detect pump error and system is stopped.
- Error detection conditions:
 - Detect abnormal water pump speed for continuous 10 secs.
 - Current pump speed < 300 rpm or
 - Current pump speed > 6000 rpm for 10 seconds.
- Control contents:
 - When error occurs, water pump, heating and heater is stopped for 30 seconds then restart again (Retry control).
 - When micon detect error again, system is stopped and error code [H20] is displayed at control panel.



13.3 Extra Pump Function (Optional)

There are three different controls for the external pump, Heat (default), DHW or NO.

*This is for the extra pump connected to the indoor unit, and is not related to the extra pump connected to the outdoor unit.

Remocon setting : Extra pump = Heat (default)

This is the conventional setting for adding an external water pump when the flow rate is insufficient due to water pressure loss, etc.

Start conditions:

- 1) Outdoor Water Pump Turn ON
 - 2) 3 ways valve switch at room side
 - 3) External Pump control for Bivalent ON. (Alternative or SG ready mode or Smart mode)
 - 4) Heat Pump OFF AND Boiler turn ON under Bivalent control
 - 5) When Optional PCB Connectivity select No AND Buffer Tank Connection select Yes
 - 6) Not Tank only mode AND Zone room thermo ON
- When [(1) AND (2)] OR [(3) AND (4)] OR [(5) AND (6)] fulfill, turn ON extra pump.

*Output 230V to the external pump when fulfil start condition.

Cancel conditions:

- 1) Outdoor water pump turn OFF
 - 2) 3 ways valve switch to tank side
 - 3) Heat pump OFF and Boiler OFF under Bivalent Control
 - 4) When Optional PCB Connectivity select No AND Buffer Tank Connection select Yes
 - 5) Tank Only mode
 - 6) Zone room thermo OFF
- When [(1) OR (2)] AND (3) } OR { (4) AND [(5) AND (6)] } fulfill, turn OFF extra pump.

*Stop output 230V to external pump when either one stop condition fulfil.

Remocon setting : Extra pump = DHW

This is the setting when using DHW circulation operation.

DHW circulation start conditions

All of the following holds

- 1) Extra pump = "DHW"
- 2) DHW circulation is effective time.
- 3) Tank mode is "ON"

DHW circulation start conditions

Which of the following holds

- 1) Extra pump = "No" or "Heat"
- 2) DHW circulation isn't effective time.
- 3) Tank mode is "OFF"

DHW circulation operation

Operation is 2 type, Comfort or Efficiency

DHW circulation operation (Comfort)

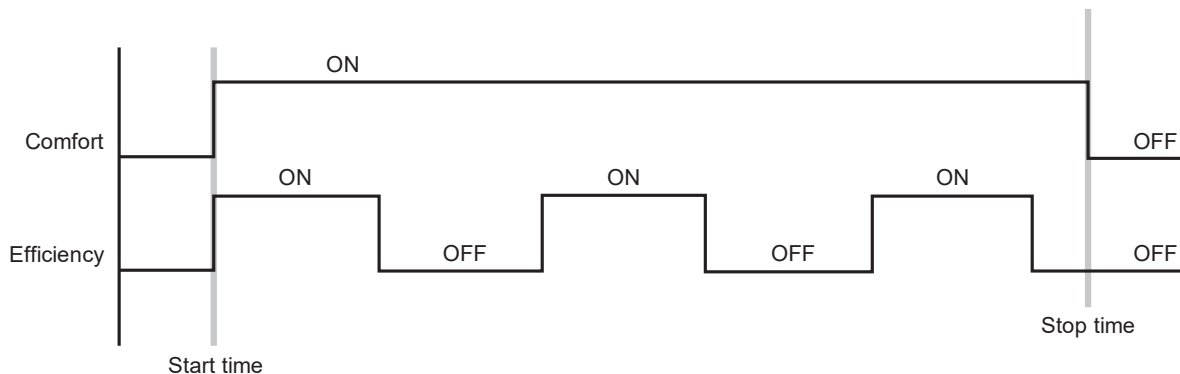
Prioritize comfort over power consumption

- 1) When DHW circulation request is received, pump port is supply 230V
- 2) During this operation, 230V is always supply
- 3) When operation is "OFF", 230V is stopped

DHW circulation operation (Efficiency)

Pump operate intermittent (ON/OFF)

- 1) When DHW circulation request is received, pump port is supply 230V.
- 2) Pump operate intermittent (ON/OFF)
ON time and OFF time is decided by Remocon.
- 3) When operation is "OFF", 230V is stopped

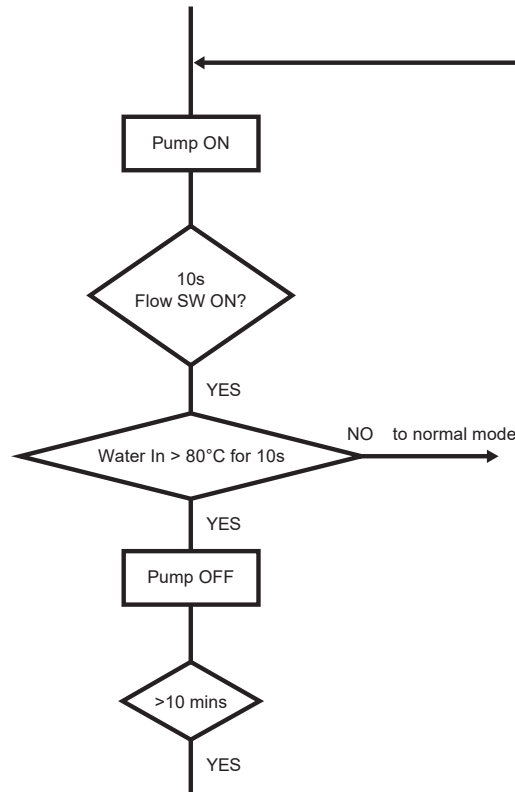
**Remocon setting : Extra pump = No**

The extra pump does not work.

13.4 Indoor Unit Safety

13.4.1 Indoor Unit Safety Control

- 1 When water pump is ON, the system will start checking flow switch status (ON/OFF).
- 2 If the flow switch ON for 10 seconds, the system will check on the water inlet temperature for 10 seconds.
If the water inlet temperature not exceeds 80°C, the water pump shall be continuously running with normal mode.
If the water inlet temperature exceeds 80°C for continuously 10 seconds, the water pump will be OFF immediately.
- 3 After water pump OFF for more than 10 minutes, it will be ON back and the indoor unit safety control checking is restarted.



13.5 Auto Restart Control

- 1 When the power supply is cut off during the operation of Air-to-Water Heatpump, the compressor will reoperate after power supply resumes.

13.6 Indication Panel

LED	Operation
Color	Green
Light ON	Operation ON
Light OFF	Operation OFF

Note:

- If Operation LED is blinking, there is an abnormality operation occurs.

13.7 External Heater Control (Optional)

Control for attaching an external heater

When the external heater is In-line heater.

- Select “in-line” in the “External Heater” menu on the remote control.
- The heaters enabled by the above selection will operate in the same way as “Back-Up Heater” during Heating operation.

*However, a heater that has external heater control enabled cannot be used for protection control.

When the external heater is Buffer tank heater.

- Select “Buffer tank” in the “External Heater” menu on the remote control.

13.8 Indoor Back-Up Heater Control

13.8.1 Indoor Electric Heater Control

- 1 Normal Heating Mode
 - Heater On condition:
 - a. Heater switch is ON
 - b. After Heatpump thermo ON for **[30]** mins
 - c. After water pump operate **[9]** mins
 - d. Outdoor air temperature < Outdoor set temperature for heater
 - e. When water outlet temperature < Water set temperature + **[-4°C]**
 - f. **[20]** minutes since previous Backup heater Off
 - * When heatpump cannot operate due to error happens during normal operation, heater will go into force mode automatic
 - * Heater need to operate during deice operation
 - Heater Stop Condition:
 - a. When outdoor set temperature > outdoor set temperature + **[+2°C]** for continuous 15 secs OR
 - b. When water out temp> water set temperature + **[-2°C]** for continuous 15 secs OR
 - c. Heater switch is Off OR
 - d. Heatpump thermo-off or OFF condition
- 2 Force Heater Mode
 - Heater On condition:
 - a. After water pump operate **[9]** mins
 - b. When water outlet temperature < water set temperature + **[-4°C]**
 - c. **[20]** minutes since previous Backup heater Off
 - Heater Stop condition
 - a. Force mode off **OR**
 - b. When water outlet temperature > water set temperature + **[-2°C]** for continuous 15 secs

* Do not operate heater at the following situation

- 1 Water outlet temperature sensor, and water inlet sensor abnormal
- 2 Flow switch abnormal
- 3 Circulation pump stop condition

13.9 Base Pan Heater Control (Optional)

- To enable the base pan heater function, control panel initial setting has to be manually adjusted by activating Base Pan Heater menu.
- There are 2 optional start condition can be selected, Type A or Type B.
- Control details:
 - Type A: (Default Auto Mode)

Start conditions:

 - When outdoor air temperature $\leq 3^{\circ}\text{C}$ during heating and deice operation is ON.

Control contents:

 - Base pan heater is ON during deice operation and continues ON for 10 minutes after deice operation ends.

Cancel condition:

 - When outdoor temperature $> 6^{\circ}\text{C}$ after deice end or
 - When operation is not at heating mode or
 - Base pan heater ON timer count is completed.
 - Type B: (ON Mode)

Start conditions:

 - When outdoor air temperature is $\leq 5^{\circ}\text{C}$ and operates in heating mode, base pan heater is ON.

Cancel conditions:

 - When outdoor air temperature is $> 7^{\circ}\text{C}$ or
 - When operation is not at heating mode.

13.10 Force Heater Mode

Purpose of Force Heater Mode:

- As a backup heat source when heat pump error. Force heater Mode only control backup heater to heat up the room circuit, and turn ON back up heater or booster heater to boil up tank water base on the tank heater selection.

Force Heater Control start condition:

- Force heater request ON by user during error OR auto turn ON by remote controller during error **AND** (Force Heater mode can be operate regardless of mode selection, remocon will send the latest mode selection force bit by bit to indoor. Indoor will judge to turn ON heater to room side if it is heat mode selected, and turn ON heater to heat tank water base on tank heater selection)
- During Error Happen (exclude the error list below)

Error List which not allow Force Heater operation

H12	Capacity Mismatch	H90	Abnormal ID/OD communication
H20	Abnormal Water Pump	H95	Abnormal Voltage Connection
H21	Abnormal Water Pressure	F30	Abnormal water outlet 2 sensor
H62	Abnormal Water Flow	F37	Abnormal Water Inlet sensor
H70	Abnormal Back-up Heater OLP	F45	Abnormal Water Outlet sensor
H74	PCB Communication Error	F50	Abnormal Water Inlet 2 sensor
H76	Indoor-Remote Controller Communication Error		
[When tank mode operate with external heater selected & tank heater select ON]			
H22	Abnormal tank 2 sensor	H91	Abnormal tank heater OLP
H72	Abnormal tank 1 sensor		

Force Heater Control Stop Condition:

- Force Heater request OFF **OR**
- Operation OFF request **OR**
- Power reset **OR**
- Error of above list happens during force heater operation.

Control contents:

- After fulfill start condition, indoor will operate the force heater operation according to below mode condition
Heat mode Only: Turn ON backup heater to achieve room heat pump target water temperature.
Heat + Tank mode: Turn ON backup heater to heat up room **OR** Turn ON Heater to Boil up tank water.
Cool mode Only: Water pump and backup heater will OFF in force heater mode.
Cool + Tank mode: Operate pump and internal Heater OR External heater to Boil up tank water.
Tank mode Only: Operate pump and internal Heater OR External heater to Boil up tank water.
* For heat mode condition, backup heater will only turn ON if the backup heater is enable regardless of Room Heater Selection.
* For tank mode condition, If internal heater selected backup heater will turn ON to boil up tank water.
If external heater selected, booster heater will turn ON to boil up tank water regardless of tank heater selection.

Room Side: (Heat Mode):

- When force heater mode start condition fulfilled, turn ON water pump and turn ON backup heater follow below control.
- Operate the 3 ways valve at room side only and turn ON 2 ways valve as heat mode operation.
- Turn ON the zone pump and mixing valve if system select 2 zone system or Buffer tank connect YES, control according to normal zone pump and mixing valve control.
- When Force heater mode stop condition fulfilled, turn OFF heater as below condition and turn OFF water pump after pump delay time.

Backup Heater On Condition:

- When Force Heater Control start condition fulfill **AND**
- After water pump operate 2 minutes **AND**
- When water outlet temperature < water set temperature + [-4°C] **AND**
- 20 minutes since previous Backup heater Off **AND**
- Backup Heater Enable

Backup Heater Stop condition:

- Force mode off **OR**
- Operation off **OR**
- When water outlet temperature > water set temperature + [-2°C] for continuous 15 secs **OR**
* ON/OFF follow normal heater sequence.

Tank side (Tank mode):

- When tank mode select and force heater bit received, turn ON backup heater (INTERNAL) or Booster Heater (External) depend on the tank heater selection.
- If tank heater selection is INTERNAL, follow normal thermo judgement to switch 3 ways valve to tank side and room side.
- If tank heater selection is EXTERNAL, only turn ON booster heater according to tank thermo.

Tank Heater selection is EXTERNAL:

Booster Heater ON condition:

- Force Heater mode ON **AND**
- Tank temperature < tank set temperature + [Remocon Set Tank Re-heat Temp] - 1°C, **AND**
- 20 minutes since previous heater off.

Booster Heater OFF condition:

- Tank temperature > tank set temperature for continuous 15 secs.
- Force mode OFF
- Tank Mode Operation OFF
(During tank interval or tank mode condition, water pump and 3 ways valve will OFF)

13.11 Powerful Operation

Powerful mode is use to increase the capacity of heat pump to achieve higher target temperature. Powerful mode is applicable when heat mode is operating.

Remote control setting:

On quick menu of remote control, there is 4 options of powerful mode can be select.

- OFF : Cancel powerful mode
- 30 minutes : Set powerful for 30 minutes
- 60 minutes : Set powerful for 60 minutes
- 90 minutes : Set powerful for 90 minutes

Control contents:

During the time set by remote control, powerful will activate according to 2 shift up controls. However, this function is applicable only for heating. Remote control will transmit the signal to indoor unit once this function is select then transmit OFF signal to indoor when the timer is complete. Indoor will transmit signal to outdoor for frequency control.

Indoor setting temperature shift

- If system is standard system (Optional PCB is not connected)
 - Target water temperature will shift up to Wlo or Whi whichever higher.
- If system is extension system (Optional PCB is connected)
 - Target water Zone 1 and Zone 2 temperature will shift up to Wlo or Whi whichever higher.

* If "Direct Type" temperature control is select, this powerful shift up setting is not effective.

- **Start condition**
 - Powerful function is select by remote control.
- **End Condition**
 - OFF/ON button is pressed.
 - Powerful function is OFF by remote control.

13.12 Quiet Operation

Quiet mode is use to reduce the noise of outdoor unit by reducing the frequency or fan speed.

Quiet level

There are 3 level (Level 1, Level 2, Level 3) to set by quick menu function on remote control.

Control content

Once the quiet function is select, the remote control will transmit the signal to indoor and outdoor unit.

Quiet priority

Set whether to prioritize "Sound" or "Capacity"

In case of "Sound" is set for "Quiet priority" in the function setup of the remote control

Start condition

- Quiet mode is set on remote control.
- Quiet mode is request ON by weekly timer.

Stop condition

- OFF/ON button is pressed.
- Quiet mode is OFF by remote control.
- Quiet mode is request OFF by weekly timer.

In case of "Capacity" is set for "Quiet priority" in the function setup of the remote control

Start condition

- 1) Quiet mode is set on remote control.
- 2) Quiet mode is request ON by weekly timer.
- 3) During heating : Water outlet temperature > Target Water Temperature - 3°C
- 4) During Cooling : Water outlet temperature < Target Water Temperature + 3°C
- 5) During operation mode when 3 way valve is at tank direction : Tank temperature > Tank set Temperature - 3°C

When condition {{(1) or (2)}} and {{(3) or (4) or (5)}} is fulfilled, after the quiet mode start by user or timer.

Stop condition

- 1) Quiet mode is OFF by remote control.
- 2) OFF/ON button is pressed.
- 3) Quiet mode is request OFF by weekly timer.
- 4) During heating : Water outlet temperature $\leq$ Target Water Temperature - 5°C for continues 30 minutes
- 5) During Cooling : Water outlet temperature $\geq$ Target Water Temperature + 5°C for continues 30 minutes
- 6) During operation mode when 3 way valve is at tank direction : Tank temperature $\leq$ Tank set temperature - 5°C for continues 30 minutes

When any of above mentioned condition is achieved, this control is cancelled.

13.13 Sterilization Mode

- Purpose:
 - To sterilize water tank by setting the required boiling temperature.
- Remote control setting
 - Days for sterilization function to start can be select.
 - Time of selected day to start sterilization function.
 - Boiling temperature (Internal heater is 55°C ~ 65°C)
 - Maximum operation time is 5 minutes to 1 hour.
- Start condition
 - Tank connection set to "YES" by remote control
 - Sterilization function selects "YES".
 - Sterilization signal received from remote controller by timer.
 - Tank mode request ON.
- Stop condition
 - When boiling timer is completed. Boiling timer (Remote control set maximum operation time) start counting once tank achieve boiling set temperature **OR**
 - After 8 hours of operation since sterilization start.
 - Tank mode request OFF.
- Control content:
 - During sterilization function activation time, target tank set temperature will internally change to boiling set temperature.
 - During sterilization activates, heat pump and heater (external or internal) will operate as normal tank mode to achieve the boiling set temperature.
 - Sterilization operation will end when stop condition is fulfill.
 - After sterilization is complete, tank set temperature will resume to normal operation.

* Tank temperature may not achieve boiling set temperature if tank heater is select OFF **OR** external compressor switch.

13.14 DHW Circulation Pipe Sterilization Operation

Purpose:

This control is designed to prevent legionella for DHW circulation pipe.

DHW circulation pipe sterilization mode start conditions

All of the following holds

- 1) Remocon setting : Extra pump = DHW
- 2) Tank sterilization operation is finished.
- 3) Tank sterilization is completed within 490 minutes since sterilization function start

DHW circulation pipe sterilization mode stop conditions

Which of the following holds

- 1) After 490 minutes of operation since DHW circulation pipe sterilization start
- 2) Circulation pump operated 30 minutes
- 3) Tank mode Request OFF
- 4) Remocon setting : Extra pump = Heat or NO

DHW circulation pipe sterilization mode control contents

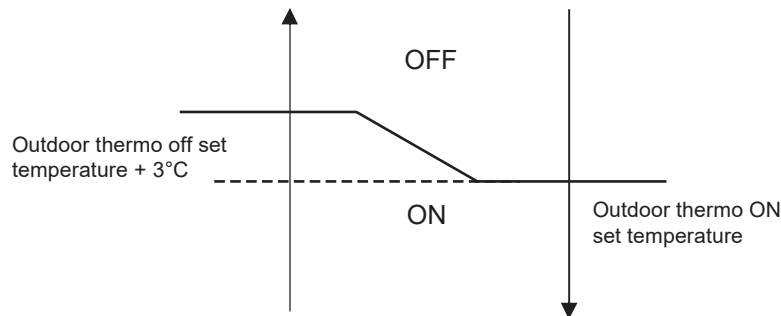
It works in the following order.

- 1) Tank sterilization mode is ON
- 2) Tank boiling start Target temp. is RC setting
- 3) Tank sterilization mode finish or stop.
- 4) DHW circulation pump operate during 30 minutes
- 5) Back to normal operation

13.15 Outdoor Ambient Thermo OFF Control

Purpose:

Stop provides heating to room side during high outdoor ambient condition.



Control content:

- Heating outdoor ambient thermo OFF control only applicable when heat pump operate in heat mode. (This control will not activate when running in tank side)
- Heat pump and water pump will turn OFF when outdoor ambient is higher than outdoor thermo OFF set temperature.
- Heat pump will thermo ON back when outdoor ambient < Outdoor thermo ON set temperature and RC delay time has passed after Heating thermo-ON temperature is reached.

13.16 Alternative Outdoor Ambient Sensor Control

Purpose of the Alternative Outdoor Ambient Sensor:

- It is some possibility that the air to water heat pump unit will install at a location where the original ambient sensor is expose to direct sunlight. Therefore, another optional ambient sensor can be connect to indoor PCB and locate at new and better reading location to improve the heat pump performance.

Control Detail:

- Remocon can select either the extra outdoor ambient sensor is connected or not. (YES/NO)
- The alternative outdoor ambient sensor will connect to indoor unit main PCB terminal.
 - when alternative sensor select NO
 - Original Outdoor temperature sensor will use for Indoor & Outdoor heat pump operation reference sensor.
 - Data communication direction : OUTDOOR send outdoor temperature reading to INDOOR.
 - Error judge : OUTDOOR will judge the original outdoor sensor error (F36 display if error detect). No judge error on alternative outdoor sensor
 - when alternative sensor select YES
 - Alternative Outdoor temperature sensor will use for Indoor & Outdoor heat pump operation reference sensor.
 - Data communication direction : INDOOR send outdoor temperature reading to OUTDOOR.
 - Error judge : INDOOR will judge the Extra outdoor sensor error only after operation ON request received from remocon. (F36 display if error detect). No judge error on original outdoor sensor.

13.17 Force DHW Mode

Purpose:

When user want to use hot water now, user can press this force DWH mode under the quick menu to operate tank only mode to boil up the tank temperature.

Remocon setting:

Force DHW function can be activate under quick menu.

Control Content:

- when press the Force DHW function during operation OFF condition:
 - When receive this Force DHW bit from remocon, indoor will run tank only mode regardless of the mode selection.
 - After tank temperature achieve tank thermo off temperature, turn OFF force DHW bit and return to operation OFF with previous mode selection.
- When press the Force DHW function during operation ON condition:
 - When receive this Force DHW bit from remocon, indoor will memories the running mode and run tank only mode regardless of the mode selection.
 - After tank temperature achieve tank thermo off temperature, turn OFF force DHW bit and return to previous memories running mode.

* When operation OFF or mode change request from remocon during force DHW mode operation, End force DHW mode and follow the new request operation.

* Once receive force DHW mode from remocon, indoor direct start tank mode and consider tank thermo ON. Thermo OFF only when achieve tank thermo OFF depend on the Tank System Setting.

13.18 SMART DHW Mode

Panasonic All In One model provide the option to choose STANDARD DHW Mode or SMART DHW Mode for Tank Heat Up according to requirement. SMART DHW mode comparatively consume lower tank heat up power but longer re-heat time than STANDARD DHW Mode.

SMART DHW control

- During SMART DHW start time 20:00 (Default Setting) to SMART DHW stop time 05:00 (Default setting)
Heat pump re-heat the tank water only when tank temperature drop below 20°C (Default setting)
- Time between 05:00 to 20:00
Heat pump reheat the tank water when tank temperature as below condition

Condition 1: Tank Heater ON

Reheat when tank temperature below tank set temperature + R/C (Tank re-heat Temperature) - 3°C

Condition 2: Tank Heater OFF

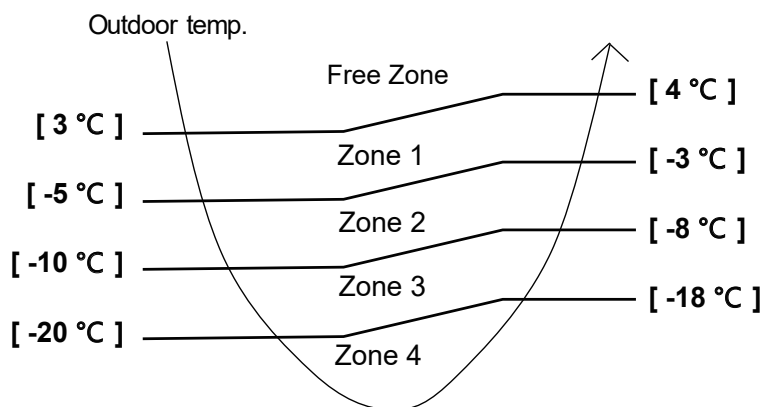
Reheat when tank temperature below Tank set temperature or 52°C (Whichever lower) + R/C (Tank re-heat Temperature) -3°C

* SMART DHW start time, stop time and SMART ON Temperature can change in CUSTOM menu.

13.19 Anti Freeze Control

- Anti freeze protection control menu can be set YES or NO by control panel.
- heatpump system there are 2 types of anti freeze control:
 1. Models with Back up heater (Excluding in Standalone and connection control module):

Outdoor air temp zone is defined as below :



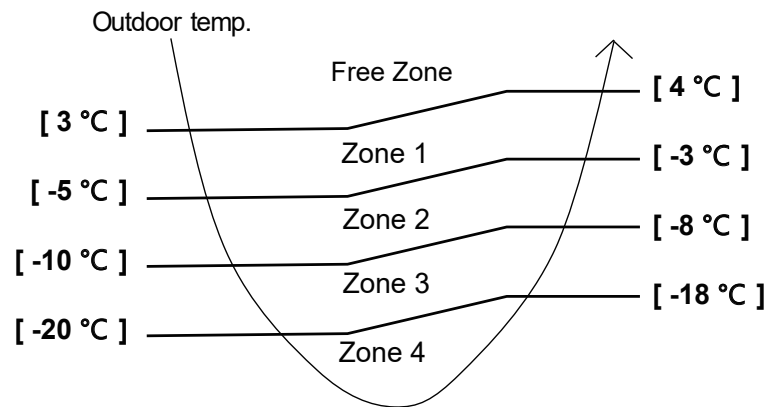
- Water pump circulation anti freeze control
 - Water pump turns ON when ALL below conditions are fulfilled:
 - Heat pump OFF (Stand by) OR error occurs.
 - Water flowing flag is ON.
 - Water flow sensor is not abnormal.
 - Outdoor air temp zone is any of Zones 1 to 4 OR outdoor ambient temp. sensor is abnormal.
 - Water inlet/outlet temp. < [A °C]
 - After 5 minutes from previous water pump OFF.
 - Water pump turns OFF when ANY below conditions is fulfilled:
 - Outdoor air temp zone is Free Zone
 - Outdoor air temp zone is any of Zones 1 to 4.
 - After water pump ON for 4 minutes, and water inlet temp. ≥ [B °C]
 - Else, shift to back up heater anti freeze control.
 - However, if flow sensor is abnormal (H62), then water pump circulation anti freeze control will not activate.
- Back up heater anti freeze control
 - Back up heater turns ON when ALL below conditions are fulfilled:
 - Water inlet/outlet temp. < [B °C]
 - Water pump circulation anti freeze control activated and water pump ON for 4 minutes.
 - Back up heater turns OFF when ANY below conditions is fulfilled:
 - Outdoor air temp zone is Free Zone
 - Outdoor air temp zone is any of Zones 1 to 4.
 - water inlet/outlet temp. ≥ [C °C]
 - However, if back up heater is abnormal (H70), then back up heater anti freeze control will not activate.

	A °C	B °C	C °C
Zone 1	6°C	8°C	13°C
Zone 2	10°C	15°C	20°C
Zone 3	16°C	21°C	28°C
Zone 4	25°C	33°C	33°C

Table : Threshold condition for Water temp when Models with Back up heater

2. Models without Back up heater (Standalone and connection control module):

Outdoor air temp zone is defined as below :



- Water pump circulation anti freeze control
 - Water pump turns ON when ALL below conditions are fulfilled:
 - Heat pump OFF (Stand by) OR error occurs.
 - Water flowing flag is ON.
 - Water flow sensor is not abnormal.
 - Outdoor air temp zone is any of Zones 1 to 4 OR outdoor ambient temp. sensor is abnormal.
 - Water inlet 2 /outlet 2 temp. < [A°C]
 - After 5 minutes from previous water pump OFF.
 - Water pump turns OFF when ANY below conditions is fulfilled:
 - Outdoor air temp zone is Free Zone
 - Outdoor air temp zone is any of Zones 1 to 4.
 - After water pump ON for 4 minutes, and water inlet temp. ≥ [B°C]
 - Else, shift to Heat pump unit operation anti freeze control.
 - However, if flow sensor is abnormal (H62), then water pump circulation anti freeze control will not activate.
- Heat pump unit operation anti freeze control
 - Heat pump unit operation turns ON when ALL below conditions are fulfilled:
 - Water pump circulation anti freeze control activated and water pump ON for 4 minutes.
 - Heat pump unit operation turns OFF when ANY below conditions is fulfilled:
 - Water inlet / Water inlet 2 temp. > [C°C] for 3 minutes.

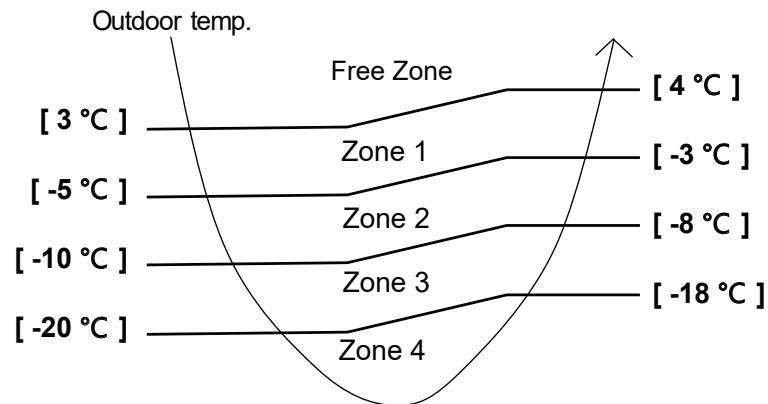
	A °C	B °C	C °C
Zone 1	20°C	19°C	24°C
Zone 2	20°C	19°C	24°C
Zone 3	20°C	23°C	28°C
Zone 4	20°C	27°C	33°C

Table : Threshold condition for Water temp when Models without Back up heater

13.19.1 Zone Anti-Freeze Control

- If buffer tank selection is "NO" and Anti- Freeze function select "NO" from remote control, this control cannot activate.

Outdoor air temp zone is defined as below :



Start condition:

- After [5] min from previous Zone pump off. AND
- Outdoor air temp zone is any of Zones 1 to 4 OR outdoor ambient temp. sensor is abnormal. AND
- Zone water temperature < [A°C] OR Zone Sensor Short or Open

Cancel condition:

- After water Zone pump ON [4] min AND
- Outdoor air temp zone is Free Zone OR
- Outdoor air temp zone is any of Zones 1 to 4.
Zone water temperature sensor $\geq$ [B°C]

*However, Zone water temperature sensor is Open or Short, cancel zone water temperature condition is ignored.

	A °C	B °C
Zone 1	6°C	8°C
Zone 2	10°C	15°C
Zone 3	16°C	21°C
Zone 4	25°C	33°C

Table : Threshold condition for Water temp when Models with Back up heater

	A °C	B °C
Zone 1	20°C	19°C
Zone 2	20°C	19°C
Zone 3	20°C	23°C
Zone 4	20°C	27°C

Table : Threshold condition for Water temp when Models without Back up heater

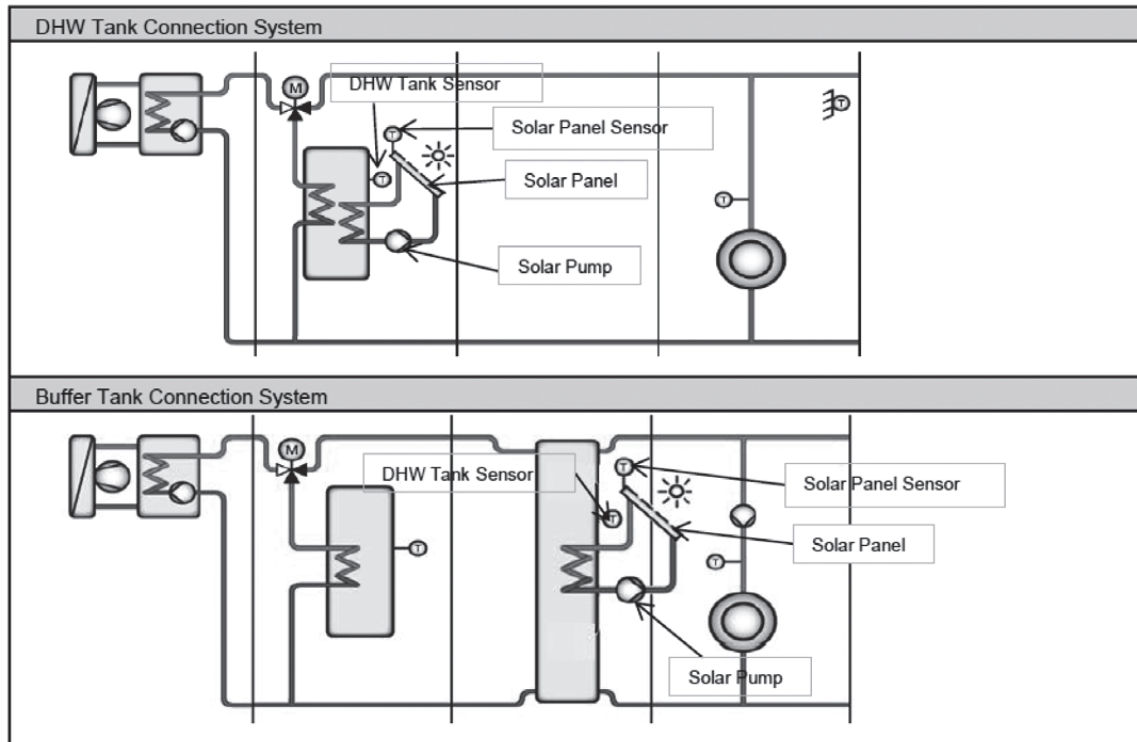
13.20 Solar Operation (Optional)

13.20.1 Solar Operation:

Solar function:

- This function allow user to control the solar pump to operate depend on the solar sensor reading compare to the tank installed. Solar pump will circulate the hot water energy store at solar panel to heat up the DHW Tank or Buffer Tank.

Solar Connection Diagram:



- Solar function can only enable when the Optional PCB is connected.
- Few part as below need to install to control the solar operation:
 - Solar Panel
 - Solar Pump
 - Solar Panel Sensor
 - Tank Sensor (Buffer tank sensor OR DHW Tank sensor depend on the connection direction)
- * During Solar Connection to the system, installer need to alert on the high water temperature may flow to the zone circuit or DHW piping circuit. Therefore pipe which withstand higher water temperature need to be installed.
- Solar remote control setting
 - Solar Setting can only be set when the optional PCB connection is select "YES"
 - By remote controller, Setting as below list can be set for solar function operation (Installer Menu)
 - Solar Function ("YES" or "NO")
 - Tank Connection Direction ("DHW TANK" or "BUFFER TANK")
 - Delta T turns ON: Difference temperature setting between solar panel sensor and Tank to turn on solar pump. (Range :5 ~ 15°C)
 - Delta T turns OFF: Difference temperature setting between solar panel thermistor and Tank to turn off solar pump. (Range :2 ~ 10°C)
 - Outdoor temp for Anti-Freeze : Outdoor temp to start Anti-Freeze control for solar circuit. (Range : -20 ~ 10°C)
 - Tank Temperature HI Limit Set (Range : 70 ~ 90°C)

13.20.2 Solar Operation Control

- Solar function can only be activate if the solar function selection “YES” from remote control. To achieve hot water from solar panel, indoor need to control the solar pump and circulate hot water from solar panel.

Under normal case:

- Solar pump start condition:
 - Solar panel temperature > Delta T turn on setting temp (R/C) + Tank temperature (depend on selection, DHW or Buffer) **AND**
 - Tank temperature (DHW or Buffer) < Solar HI Limit Temp (R/C) **AND**
 - Operation ON with heat mode (apply to solar connect to “Buffer Tank” case)
- * Condition c) ignore if the solar system is connect to DHW tank (control active under operation OFF time for Tank connection case)
- Solar pump stop condition:
 - Solar panel temperature < Delta T turn OFF setting temp (R/C) + Tank temperature (depend on selection, DHW or Buffer) **OR**
 - Tank hot water temp $\geq$ Solar HI Limit Temp (R/C) + [2]°C

Under solar Anti-freeze protection control:

- Solar pump start condition:
 - Outdoor temp < Outdoor temp setting for Anti-Freeze (R/C)
- Solar pump stop condition:
 - Outdoor temp > Outdoor temp setting for Anti-Freeze + [2]°C

**However, During Cool mode this function cannot activate if Tank selection is “Buffer Tank”.

**Solar pump can operate even if Heat pump is under error stop.

- Solar operation during error:
 - During Tank sensor (DHW or Buffer depend on selection) abnormal, Solar operation will not able to function.
 - During Solar Panel sensor detect OPEN (not include SHORT), Solar operation will not able to function too.

13.21 Boiler Bivalent Control

- Boiler is an additional or alternative heat source to heat up the room when necessary.
- Purpose of this control is to turn ON and turn OFF the Boiler output signal when boiler heating capacity needed in the system.
- Boiler is possible to connect to DHW Tank and Buffer Tank depends on the installer.
- Boiler operation parameter need to be set on Boiler itself, indoor do not control the boiler operation direction and operation.
- There are Alternative mode, Parallel mode, & Advance Parallel mode available to select by installer to fit to the total system.

Bivalent control selection by remote controller

■ Auto

Remote control setting value:

1 Outdoor Ambient Set = (Range: -15°C ~ 35°C)

• Alternative Mode

- Only one heat source operates at one time, either heat pump or boiler depends on condition.

Control detail:

During Operation ON at Heat mode or Tank mode or Heat + Tank Mode

- Boiler signal turn ON and heat pump and water pump turn OFF when:
 - Outdoor ambient < Outdoor Ambient Set **AND**
 - Boiler prohibit flag = 0

** However indoor water pump can operate when Anti-freeze control condition fulfilled.

- **Parallel Mode**

- Parallel mode allows heat pump and boiler ON at the same time. Boiler operates as an additional heating capacity when low heat pump capacity at low ambient condition.

Control detail:

During operation ON at Heat mode or Tank mode or Heat + Tank mode

- Boiler signal turns ON when:
 - Outdoor ambient < Outdoor Ambient Set **AND**
 - Boiler prohibit flag = 0
- Boiler signal turns OFF when:
 - Outdoor ambient > Outdoor Ambient Set + [2°C] **OR**
 - Boiler prohibit flag = 1

- **Advance Parallel Mode**

- Advance parallel mode allow heat pump to operate and turn ON boiler only when ambient and temperature condition is fulfilled.

Remote control setting value:

- 1 Outdoor Ambient Set = (Range : -15°C ~ 15°C)
- 2 Selection of boiler connection direction. (Heat only, DHW only, Heat & DHW)
- 3 Setting data under Heat Direction
 - Start Temperature | START_TEMP |
 - Start Delay Timer | START_TIMER |
 - Stop Temperature | STOP_TEMP |
 - Stop Delay Timer | STOP_TIMER |
- 4 Setting data under DHW Direction
 - Delay Timer | DELAY_TIMER |

Control detail:

During operation ON at Heat Mode

- Boiler signal turns ON when
 - Outdoor ambient < Outdoor Ambient Set **AND**
 - Buffer tank temperature < Target Buffer Tank Temperature + [START_TEMP] for [START_TIMER] **AND**
 - Heat pump operate at room side **AND**
 - Connection of Boiler to Heating Select "YES" From installer menu **AND**
 - Buffer Tank connection select "YES" **AND**
 - Boiler prohibit flag = 0
- Boiler signal turns OFF when
 - Outdoor ambient > Outdoor Ambient Set + [-2°C] **OR**
 - Buffer Tank temperature > Target Buffer Tank temperature + [STOP_TEMP] for [STOP_TIMER] **OR**
 - Heat pump not at room side. **OR**
 - Boiler prohibit flag = 1

During operation ON at Tank Mode

- Boiler signal turns ON when
 - Outdoor ambient < Outdoor Ambient Set **AND**
 - Heat pump operate at tank side for continuous | DELAY_TIMER | **AND**
 - Connection of Boiler to DWH Tank select "YES" from installer menu. **AND**
 - Boiler prohibit flag = 0
- Boiler signal turns OFF when
 - Outdoor ambient > Outdoor Ambient Set + [2°C] **OR**
 - Heat pump not operates at tank side. **OR**
 - Boiler prohibit flag = 1

■ SG ready

SG ready (Only available to set when optional PCB set to YES)

- SG Ready input from optional PCB terminal control ON/OFF of boiler and heat pump as below condition

SG signal		Operation pattern
Vcc-bit1	Vcc-bit2	
Open	Open	Heat pump OFF, Boiler OFF
Short	Open	Heat pump ON, Boiler OFF
Open	Short	Heat pump OFF, Boiler ON
Short	Short	Heat pump ON, Boiler ON

* This bivalent SG ready input is sharing same terminal as [16. SG ready] connection. Only one of these two setting can be set at the same time.

When one is set, another setting will reset to not set.

■ Smart

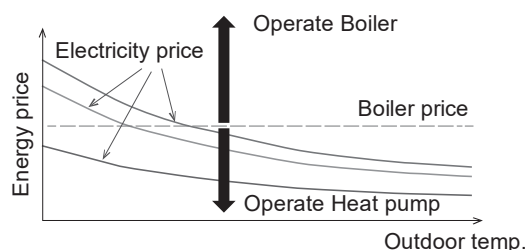
There are Energy price (both electricity and boiler) and Schedule to be set on remote controller.

Operation setting of Energy price and Schedule shall be responsible by installer.

Based on these settings, system will calculate the final price for both electricity and boiler.

When final price of Electricity is lower than Boiler's, heat pump will operate.

When final price of Electricity is higher than Boiler's, boiler will operate.



Boiler prohibit flag control

Purpose:

- For product safety. Boiler signal is OFF when water temperature is too high.

Start condition:

- Water outlet $\geq 85^{\circ}\text{C}$ continues for 5 minutes.
- Water inlet $\geq 85^{\circ}\text{C}$ continues for 5 minutes.
- Zone1 water temp $\geq 75^{\circ}\text{C}$ continues for 5 minutes.
- Zone2 water temp $\geq 75^{\circ}\text{C}$ continues for 5 minutes.

Contents:

- After start condition fulfilled, set boiler prohibit flag = 1

Cancel condition:

- After 30 minutes from start condition fulfilled.

Contents:

- Set boiler prohibit flag = 0

13.22 External Room Thermostat Control (Optional)

Purpose:

- 1 Better room temperature control to fulfill different temperature request by external room thermostat.

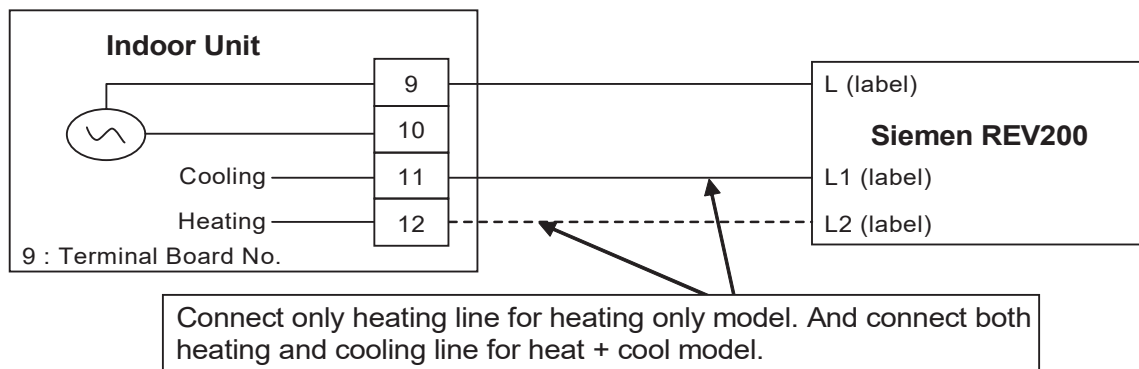
Recommended external room thermostat:

Maker	Characteristic
Siemen (REV200)	Touch panel
Siemen (RAA20)	Analog

Connection of external room thermostat:

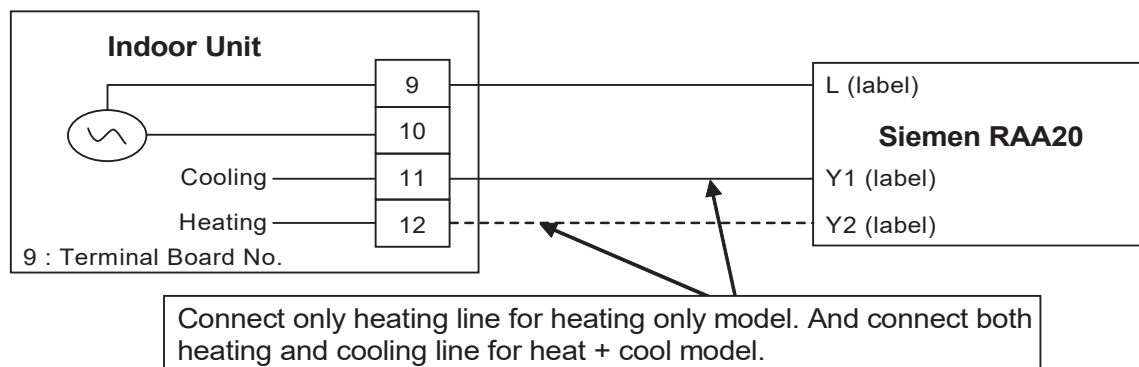
Wire Connection and thermo characteristic of Siemen REV200:

Setting	L/L1 (H)	Heat Thermo	L/L2 (C)	Cool Thermo
Set Temp < Actual Temp	Open Circuit	OFF	Short Circuit	ON
Set Temp > Actual Temp	Short Circuit	ON	Open Circuit	OFF



Wire Connection and thermo characteristic of Siemen RAA20:

Setting	L/Y1 (H)	Heat Thermo	L/Y2 (C)	Cool Thermo
Set Temp < Actual Temp	Open Circuit	OFF	Short Circuit	ON
Set Temp > Actual Temp	Short Circuit	ON	Open Circuit	OFF



Control Content:

- External room thermostat control activate only when remote thermostat connection select YES by Indoor control panel.
- When indoor running heat mode, refer thermo On/Off from heating line feedback. And when indoor running cool mode, refer thermo On/Off from cooling line feedback.
Heat pump Off immediately when receive thermo off feedback.

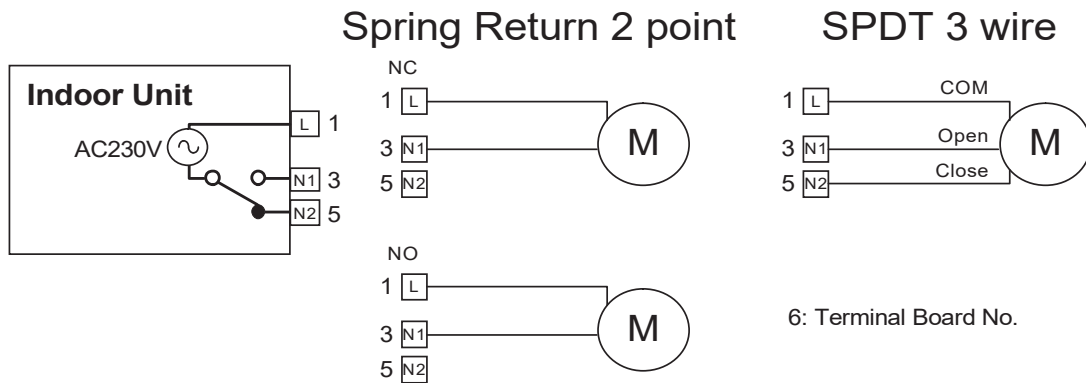
13.23 Three Ways Valve Control

Purpose:

- 3 ways valve is used to change flow direction of hot water from heat pump between heating side and tank side.

Control contents:

- 1 3 ways valve switch Off:
 - During 3 ways valve switch Off time, the hot water will provide heat capacity to heating side.
- 2 3 ways valve switch On:
 - During 3 ways valve switch On time, the hot water will provide heat capacity to tank side.
- 3 Stop condition:
 - During stop mode, 3 ways valve will be in switch off position.



* During pump down and force mode, fix 3 ways valve in close condition.

* Recommended Parts : SFA 21/18 (Siemens)

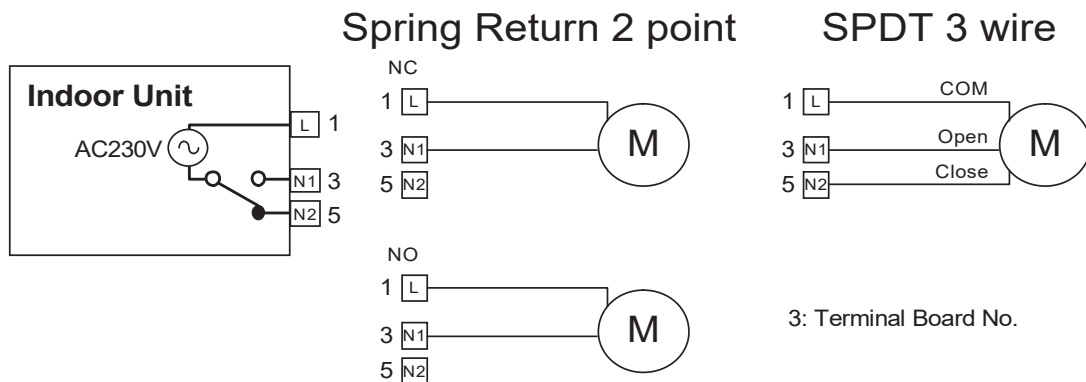
13.24 Two Ways Valve Control

Functionality of 2 ways valve:

- Use to allow hot water to floor heating panel or block cold water to floor heating panel.

Control contents:

- 1 When indoor running in heat mode, OPEN the 2 ways valve.
- 2 When indoor running in cool mode, CLOSE the 2 ways valve.
- 3 Stop condition:
 - a. During stop mode, fix 2 ways valve in close condition.



* During pump down mode, fix 2 ways valve in close condition.

* During force mode, open 2 ways valve.

* Recommended Parts : SFA 21/18 (Siemens)

13.25 Anti-Stick Mode Operation

This mode is a control to prevent the water circuit actuator from locking up if not used for an extended period of time.

Start conditions

- 1) A.M 3:00 o'clock every Monday.
- 2) Anti-stick mode = Enable. (Anti-stick mode is selected in custom menu)

Control Contents:

It works in the following order.

- 1) If any mode operated, all operation is stopped.
- 2) Anti-stick mode operates
- 3) If Anti-stick mode finished, back to the last operation.

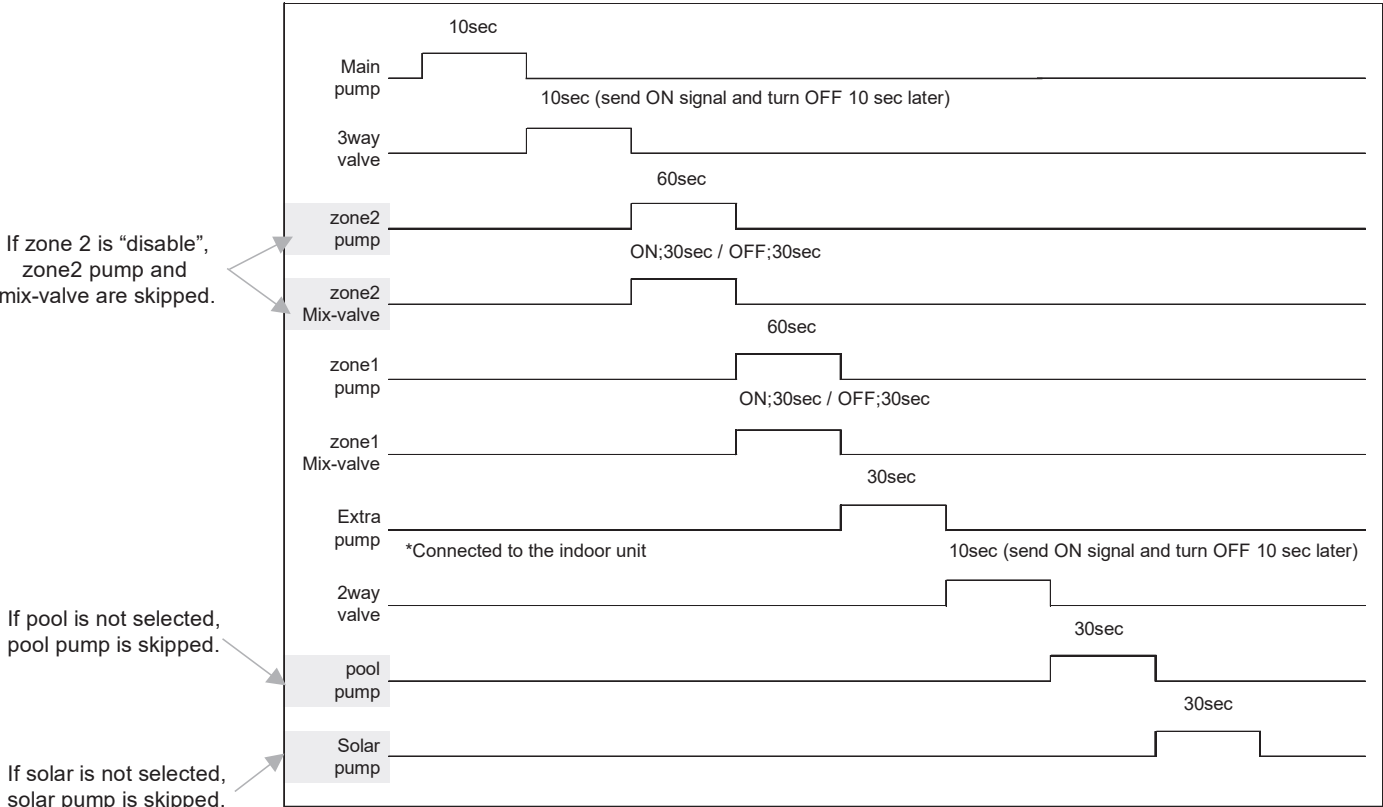
Cancel conditions:

Which of the following holds

- 1) Anti-stick mode is finished.
- 2) When the customer manually starts any mode operation. (include weekly timer, sterilization mode)

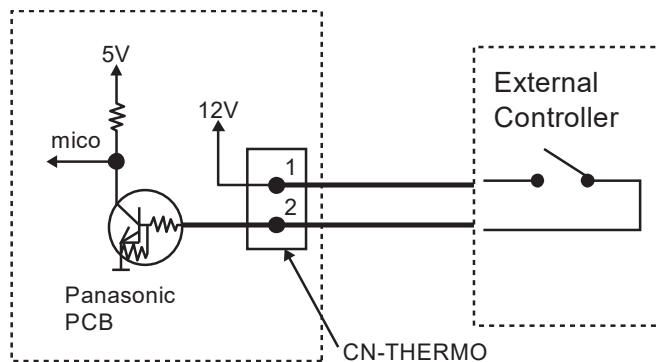
Anti-stick mode

If zone 2 or pool or solar are not connected, they are skipped



13.26 External OFF/ON Control

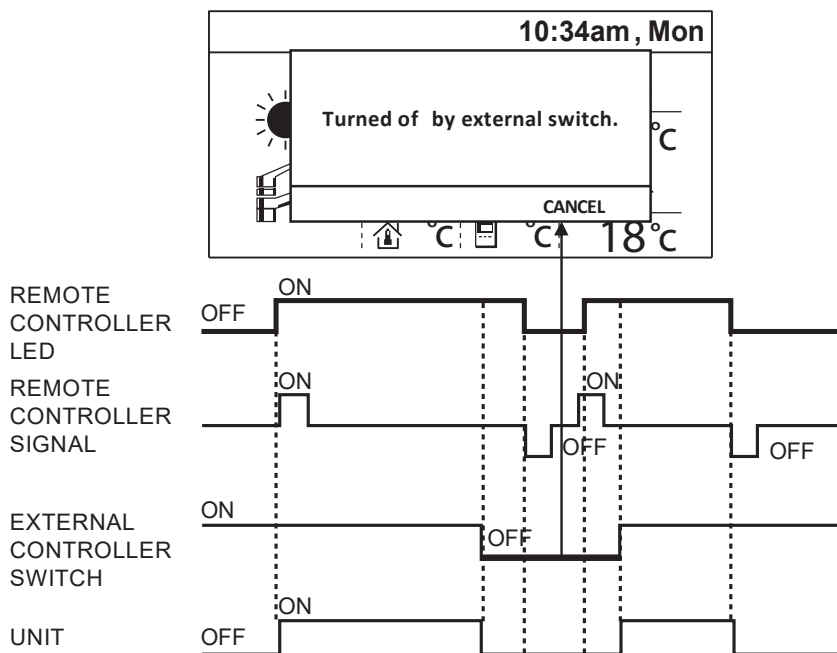
- Communication circuit between indoor unit and external controller is as per below.



- Maximum length of communication cable is 50 meter.
- Control content:

External Control Switch	Control Panel OFF/ON	Control Panel Power LED	System Status
ON	ON	ON	ON
ON	OFF	OFF	OFF
OFF	ON	ON	OFF
OFF	OFF	OFF	OFF

Remocon Screen Display and Control Detail:



When External SW connection select "YES" from remocon installer menu:

- Heating or Cooling system will operate normally if the External Switch signal is ON.
- Once the External Switch turn OFF, System Turn OFF (Heat pump, water pump, heater etc...)
- Remocon LED remain ON or OFF according to the current operation request.
- Pop up menu at remocon main screen as above screen to inform customer system stop by External Switch.
- It is possible to press cancel and return to main screen to do change of operation setting while waiting the External Switch turn ON back.
- Remocon LED will always follow the latest changes from remocon.
- If no action on remocon for continuous 5 minutes, the pop up screen will show again on the screen.
- But once the External Switch Turn ON back, pop up screen will disappear and system can operate normally according to the latest operation setting and request.

13.27 External Compressor Switch (Optional PCB)

External compressor switch port can have two purpose of control as below:

- Heat source ON/OFF function (Dip switch Pin 3 on PCB "OFF")
- Heater ON/OFF function (Dip switch Pin 3 on PCB "ON")
- Heat source ON/OFF function

Purpose:

- Heat pump ON/OFF function is use to turn OFF the high power consumption device (Heat pump, & Heater) when there is energy or electric current limitation. Other optional function still can be operate under heat pump and heater OFF condition.

Control Detail:

- This External Compressor Switch is possible to connect to Optional PCB only.
- Once the remocon select External Compressor Switch connection "YES", & Dip Switch on PCB "OFF" This heat pump ON/OFF function will activate
- The ON/OFF signal of this External Compressor Switch is same as External Switch.
- When the External Compressor Switch is ON:
 - Heat pump system operate normally
- When the External Compressor Switch is OFF:
 - Heat pump, Indoor water pump & Heater (Booster heater & Backup Heater) need to turn OFF
 - Solar, Boiler and zone control can be operate follow normal control condition.
 - * pump delay OFF also included in this control

(There is NO pop up screen like External Switch when this External Compressor Switch is OFF.)

- Heater ON/OFF function

Purpose:

- Heater ON/OFF function is use to turn OFF the heater (backup heater & booster heater) when there is energy or electric current limitation. Heat pump and other optional function still can operate.

Control detail:

- This External Compressor Switch is possible to connect to Optional PCB only.
- Once the remocon select External Compressor Switch connection "YES", & Dip Switch on PCB "ON" This heater ON/OFF function will activate
- When the External Compressor Switch is ON:
 - Heat pump and heater operate normally
- When the External Compressor Switch is OFF:
 - Backup heater and booster heater cannot operate even heater request is ON.
 - Heat pump and option function (Solar, Boiler and zone control) can be operate follow normal control condition.

(There is NO pop up screen like External Switch when this External Compressor Switch is OFF.)

13.28 Heat/Cool Switch (Optional PCB)

Purpose:

- User can switch the running mode from heat to cool or cool to heat through external installed Heat/Cool switch. This kind of heat / cool switch may built in inside the field supply room remocon as well.

Control contents:

- Heat/Cool Switch can only be set when Cool Function is "enable" at custom menu setting, & Extension PCB select "YES" & Zone 1 not set "Pool" condition.
- This heat/cool switch control will be activate only when installer set the Heat/Cool Switch "USE" through remocon.
- Once the Heat/Cool Switch Set "USE", remocon will check indoor send Signal to judge the option of mode select.
 - When Heat/Cool Switch Contact Open : Remocon only can select Heat Mode, or Heat + Tank Mode, or Tank Mode
 - When Heat/Cool Switch Contact Close : Remocon only can select Cool Mode, or Cool + Tank Mode, or Tank Mode

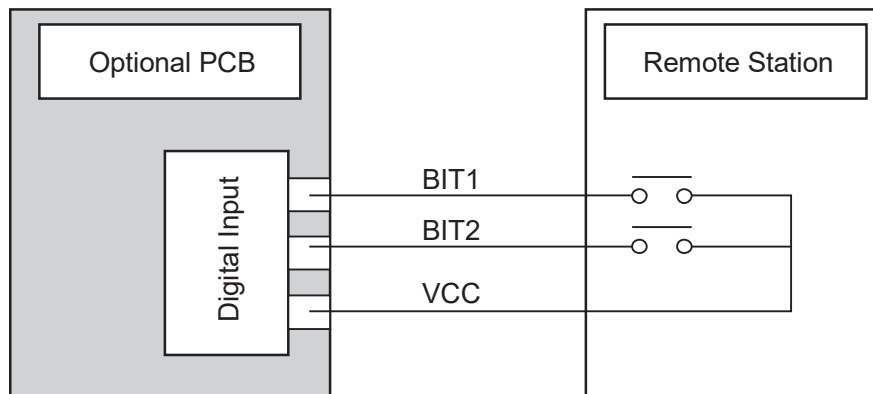
- Operation ON/OFF will depend on remocon request.
- When Heat Mode is running with Contact Open, user change this setting to contact close, indoor will this signal to remocon judge and change mode to cool and send back to indoor. And it is same as from cool mode change to heat mode.
- * This switch have higher priority, remocon follow indoor send signal when control activated.
- * There is no effect to the operation when the mode running is only Tank Mode.

(Weekly Timer are ignored and cannot be set during Heat / Cool Switch is “Enable” Condition.)

13.29 SG Ready Control (Optional PCB)

Purpose:

- To set ON/OFF of heat pump and target temperature by digital input of third party device if necessary in field.



Remote control setting

For this function, following items need to be set on R/C (installer menu) –

- SG control = YES or NO
- Capacity up setting 1
 - Heating capacity [50 ~ 150 %]
 - DHW capacity [50 ~ 150 %]
 - Cooling capacity [-15 ~ 0 °C]
- Capacity up setting 2
 - Heating capacity [50 ~ 150 %]
 - DHW capacity [50 ~ 150 %]
 - Cooling capacity [-15 ~ 0 °C]
- HPU stop consumption [0.5 ~ 10.0 kW]
- Power consumption setting 1
 - Heating Power consumption [0.5 ~ 10.0 kW]
 - DHW Power consumption [0.5 ~ 10.0 kW]
 - Cooling Power consumption [0.5 ~ 10.0 kW]
- Power consumption setting 2
 - Heating Power consumption [0.5 ~ 10.0 kW]
 - DHW Power consumption [0.5 ~ 10.0 kW]
 - Cooling Power consumption [0.5 ~ 10.0 kW]

Control contents:

If SG control on remote control = “Yes”, then following control only activate by digital input.

- **While Digital input is “ 00 ” (Normal operation)**
 - Normal operation. Once detect ‘00’ system will operate back to normal condition.
(All the target set temperature for heating side and DHW side will return back to previous set temperature when digital signal change from “10” or “11” back to “00”.)
- **While digital input is detected “ 01 ” (HP stop)**
 - Heat pump & room heater & tank heater cannot operate.
(Solar control and Boiler back up and 2 Zone control can activate.)

- **While digital input is detected “ 10 ” (Capacity 1)**
 - Target temperature for heating and DHW Tank is changed according to the percentage set by Remote control setting. However, which setting temperature is change depend on system setting.
 - Target temperature of cooling is change according to the adjustment value set by remocon setting.
- **While digital input is detected “ 11 ” (Capacity 2)**
 - Target temperature for heating and DHW Tank is changed according to the percentage set by Remote control setting. However, which setting temperature is change depend on system setting.
 - Target temperature of cooling is change according to the adjustment value set by remocon setting.
- **While digital input is detected “ 10 ” (Capacity 1)**
 - Setting temperature for heating and Tank is changed.
However, which setting temperature is change depend on system setting.

If Buffer selection is “YES”

Room side

New Target Buffer tank temperature = Current Target Buffer Tank Temperature * Remote Control setting (“ capacity 1) %

* Max Min regulation is follow Target Buffer tank temperature control specification

** No change of Target zone water temperature, only set higher buffer tank temperature.

DHW Tank side

New Tank Set Temperature = Tank Set Temperature * Remote Control setting for DHW (“Capacity 1) % *
(Max regulation depend on the tank max setting limit)

If Buffer selection is “NO”

Room side

New Target Zone Water Temperature = Current Target Zone Water Temperature * Remote Control Setting (*Capacity 1) %

(Zone 1 and Zone 2 will change according to its own target zone water temperature.)

(Max regulation depend on the temperature control type select)

DHW Tank side

New Tank Set Temperature = Tank Set Temperature * Remote Control setting for DHW (“Capacity 1) %

* (Max regulation depends on the tank max setting limit)

Setting temperature for cooling is changed

New Target water temperature = target water temperature + R/C setting for cool (*Capacity 1)

* (Min/max regulation of cooling water set apply)

- **While digital input is detected “ 11 ” (Capacity 2)**
 - Setting temperature for heating and Tank is changed.
However, which setting temperature is change depend on system setting.

If Buffer selection is “YES”

Room side

New Target Buffer tank temperature = Current Target Buffer Tank Temperature * Remote Control setting (“ capacity 2) %

* Max Min regulation is follow Target Buffer tank temperature control specification

** No change of Target zone water temperature, only set higher buffer tank temperature.

DHW Tank side

New Tank Set Temperature = Tank Set Temperature * Remote Control setting for DHW (“Capacity 2) %

* (Max regulation depends on the tank max setting limit)

If Buffer selection is “NO”

Room side

New Target Zone Water Temperature = Current Target Zone Water Temperature * Remote Control Setting (*Capacity 2) %

(Zone 1 and Zone 2 will change according to it's own target zone water temperature.)

(Max regulation depend on the temperature control type select)

DHW Tank side

New Tank Set Temperature = Tank Set Temperature * Remote Control setting for DHW (“Capacity 2) %

* (Max regulation depends on the tank max setting limit)

** This function is not applicable for Cooling mode.

Setting temperature for cooling is changed

New Target water temperature = target water temperature + R/C setting for cool (*Capacity 2)

* (Min/max regulation of cooling water set apply)

HPU stop consumption

Operation will stop when the power consumption of the entire system exceeds (HPU stop consumption kW).

- **While digital input is detected “ 10 ” (Power consumption 1)**

Room side

Operate with the target of reducing power consumption to (Heating Power consumption 1) or less.

DHW Tank side

Operate with the target of reducing power consumption to (DHW Power consumption 1) or less.

Cool mode

Operate with the target of reducing power consumption to (Cooling Power consumption 1) or less.

- **While digital input is detected “ 11 ” (Power consumption 2)**

Room side

Operate with the target of reducing power consumption to (Heating Power consumption 2) or less.

DHW Tank side

Operate with the target of reducing power consumption to (DHW Power consumption 2) or less.

Cool mode

Operate with the target of reducing power consumption to (Cooling Power consumption 2) or less.

13.30 Demand Control (Optional PCB)

Remote control setting:

- When Optional PCB connection select “YES”, Demand Control function can select “YES” or “NO”.

Purpose:

- After the demand control select YES, below control will activated.
 - 0-10V Demand control

0-10V Demand control

- Demand control is use to reduce the current usage of heat pump unit by third party device.

Control start condition:

- Select “YES” at Demand control at installer menu.
- 0-10V input for this electrical current control is detected.

Control content:

- If start condition is fulfilled, indoor will receive the voltage signal from optional PCB. Indoor will send the rate value to outdoor unit.
- Outdoor will change the current limit according to the percentage receive from indoor unit.

13.31 Holiday Mode

- Purpose:
Promotes energy saving by allowing the user to stop the system during holiday and enables the system to resume at the preset temperature after holiday.
- Control details:
 - Indoor operate the unit according running mode request. Target temperature will follow holiday setting temperature.
 - If heat mode request is receive, Target Water Out Temperature will change according to holiday shift temperature set.
[If heat is set OFF at holiday, unit, water pump and zone control will OFF]
 - If tank mode request is receive, Target Tank Set Temperature will change according to the holiday tank shift temperature set.
[If tank is set OFF at holiday, heat pump and tank heater will OFF]
 - After days of holiday have been set, heat pump will stop and only resume operation at the end of holiday countdown.
- Start condition:
 - Holiday timer set and the holiday timer start
* The day holiday mode was set is counted as day 1.
- Stop condition:
 - OFF/ON button is pressed.
 - Holiday timer is reached.

13.32 Dry Concrete

- Purpose
Provide heat to floor heating panel and dry the wet concrete during installation.
- Setting condition:
 - Dry concrete parameter can be set through remote control under system setup.
 - Parameters are possible to set up to 99 days with different target set temperature
- Control details:
 - Dry concrete mode will be activates when select ON from service setup.
 - Once start dry concrete function, remote control will send step 1 setting temperature to indoor unit.
* This temperature is set at zone temperature. If system is 2 zones, both zone target temperature is set as same temperature.
 - Heat pump will start heat mode operation to room side with received target water outlet temperature.
* Heat pump will operate according to Heat pump Target Water Temperature.
 - After complete day 1 setup operation, day 2 data will be send to indoor at 12.00am on the second day.
 - Each preset data will be send every day until dry concrete mode is complete, unit will turns OFF and exit dry concrete function.
 - 3 ways valve and booster heater will turn OFF and 2 ways valve will turns ON.
- Cancel condition:
 - Dry concrete mode is complete and OFF signal is received.
 - OFF signal is received by pressing OFF/ON button.

13.33 Flow Sensor

- The water flow sensor serves as an overload protector that shuts down the unit when the water level is detected to be low.
- Abnormal flow detection:

Sequence	Abnormal flow	Normal flow
Normal case	Flow rate < 14.4 L/min or ≥ 150 L/min	≥ 14.4 L/min
During status 2~6 on Anti-freeze deice	≥ 14.4 L/min	< 14.4L/min

14. Protection Control

14.1 Protection Control for All Operations

14.1.1 Time Delay Safety Control

- 1 The compressor will not start for three minutes after stop of operation.

14.1.2 Total Running Current Control

- 1 When the outdoor running current exceeds X value, the compressor frequency will decrease.
- 2 If the outdoor running current does not exceed X value, the compressor frequency will return to normal operating frequency.
- 3 If the outdoor running current continues to increase till exceed 38A, the compressor will stop, and if this occurs 2 times, the system will stop operation (F16 error occurs, refer to 17.5.31).

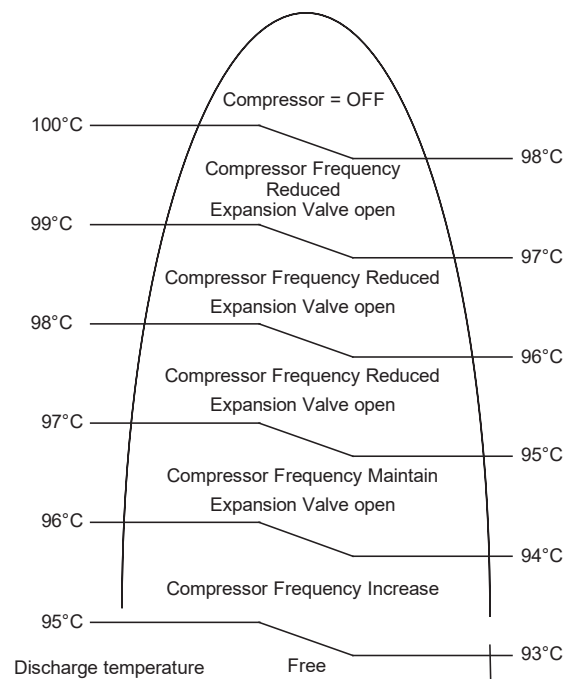
Operation Mode	WH-WXG20ME8	WH-WXG25ME8	WH-WXG30ME8
Heating	X = 27.0	X = 30.0	X = 33.0
Cooling	X = 19.4	X = 21.4	X = 23.4

A. DC Peak Current Control

- 1 If the current of the PIM exceeds the set value of 82 A or the temperature exceeds 100°C, the compressor will stop. The compressor will restart after 3 minutes.
- 2 If this condition occurs continuously 10 times after the compressor restarts, the system will stop operation (F23 error occurs).
- 3 If the compressor runs continuously for 30 minutes after restarting, the error count will be stopped.

14.1.3 Compressor Overheating Prevention Control

- The compressor operating frequency is regulated in accordance to discharge temperature as shown in below figures. When the discharge temperature exceeds 107°C, compressor will stop, and if this occurs 4 times within 30 minutes, system will stop operation and OFF/ON control panel LED will blink (F20 error occurs).

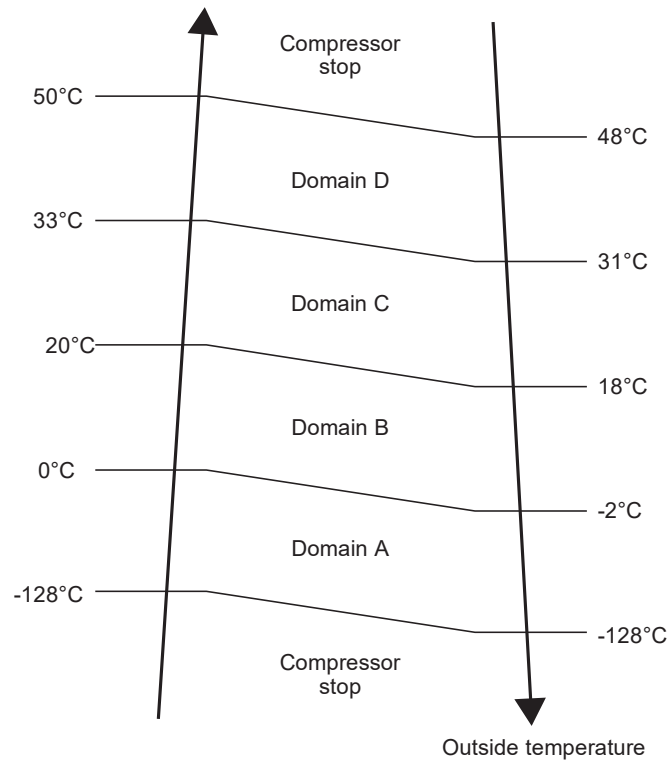


14.1.4 High Pressure Sensor Control

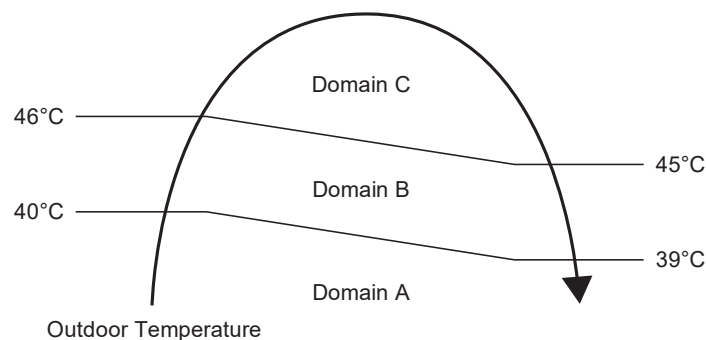
- Purpose:
 - To protect the system operation.
- Detection period:
 - After compressor on for 1 minute.
- Detection conditions:
 - When abnormal high voltage detection, 5 V or when open circuit detection 0V for 5 seconds continuously.
- After detection:
 - When abnormality is detected 4 times within 120 minutes, unit stop operation.
 - OFF/ON control panel LED will blink (H64 error occurs).

14.1.5 Outside Temperature Current Control

Heating



Cooling



14.1.6 Pre-Heat Control

- Purpose:
 - For compressor protection during low outdoor ambient operation (during heating low temperature operation).
- Control content:
 - a. Trigger Pre-Heat Control condition
 - When the outdoor air temperature is below than -10°C, and discharge temperature is -10°C or below.
 - b. Resetting Pre-Heat Control condition
 1. When the outdoor air temperature exceeds entry condition (-7°C)
 2. When the discharge temperature exceeds entry condition (-7°C)

14.2 Protection Control for Heating Operation

14.2.1 Outdoor Air Temperature Control

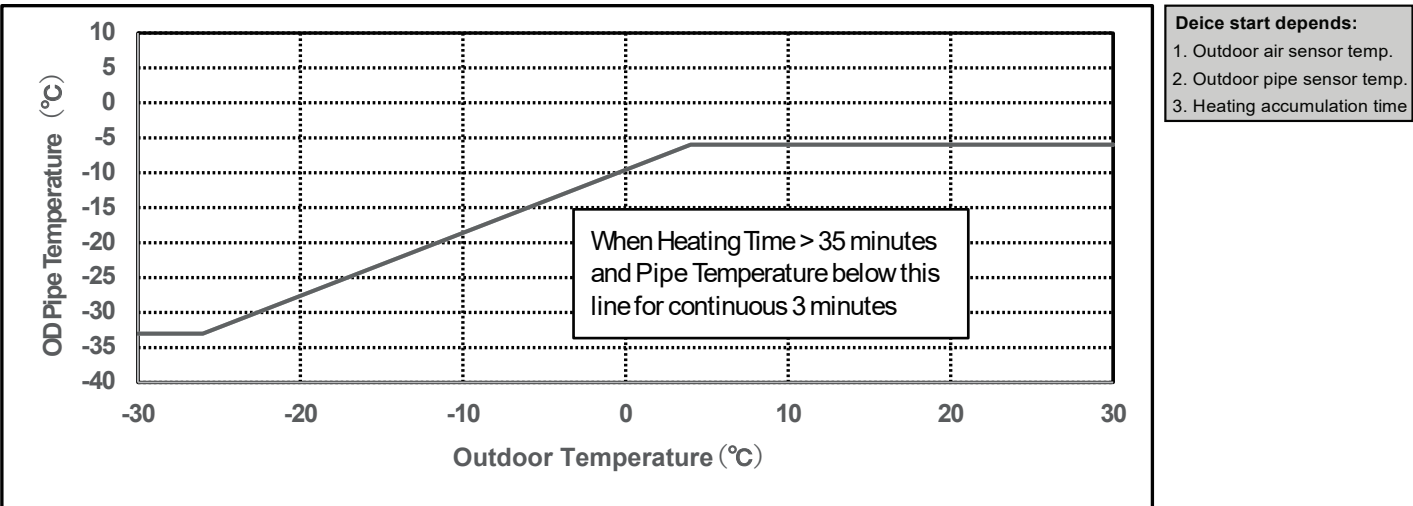
The maximum current value is regulated when the outdoor air temperature rises above 14°C in order to avoid compressor overloading.

14.2.2 Deice Operation

When outdoor pipe temperature and outdoor air temperature is low, deice operation start where outdoor fan motor stop.

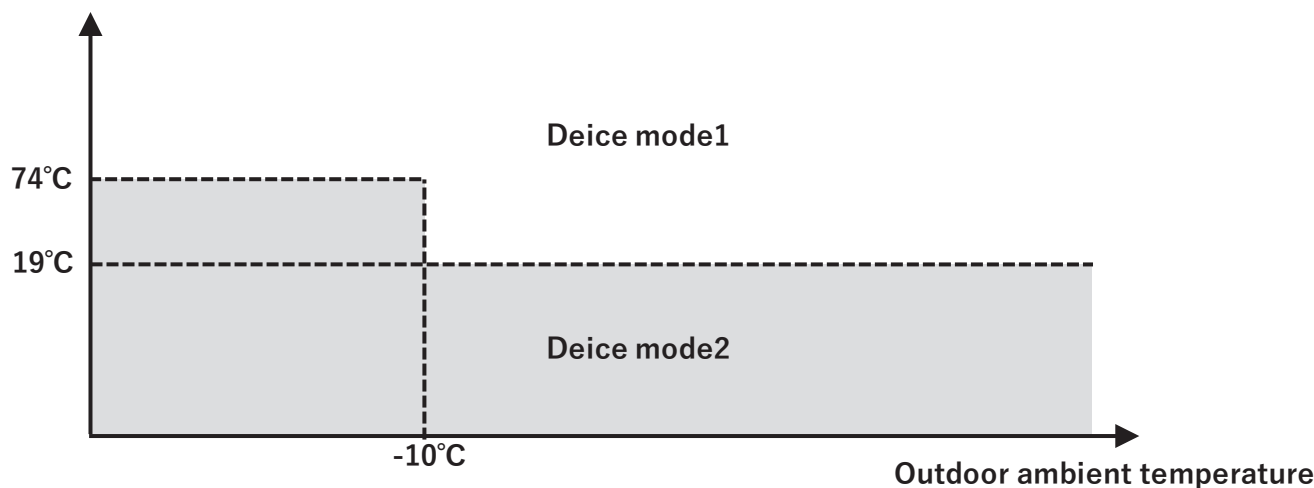
- Deice judging condition

Outdoor Unit Deice Control



- Deice mode selection condition
There are 2 deice modes, according to water inlet temperature and outdoor ambient temperature the deice mode is decided.

Water inlet temperature

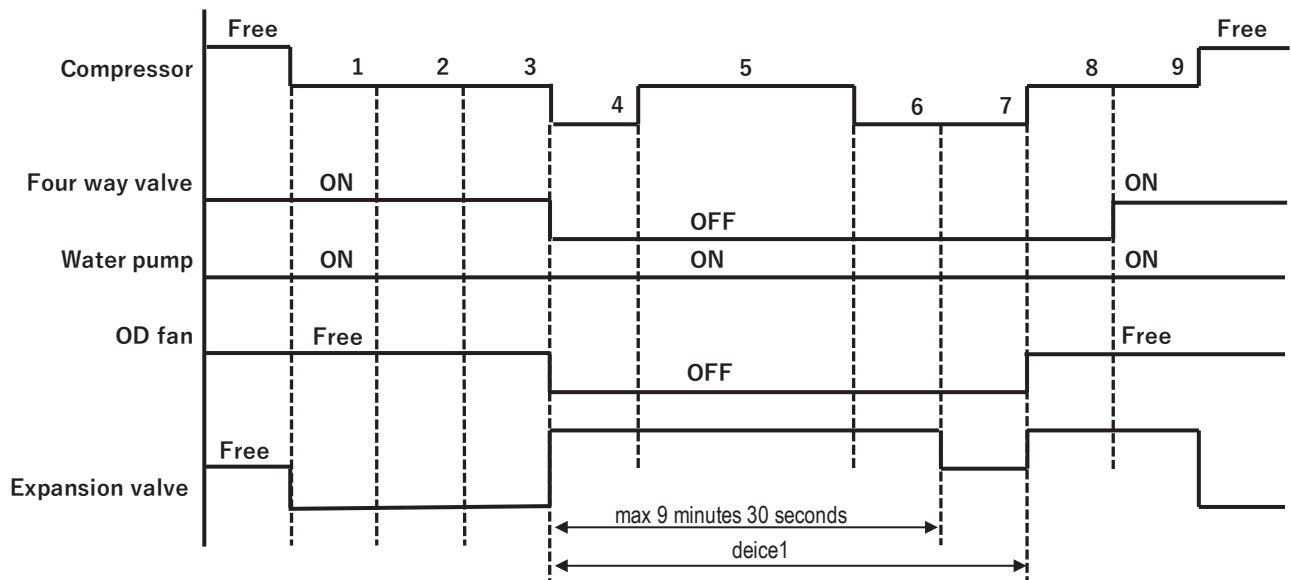


Judgement details:

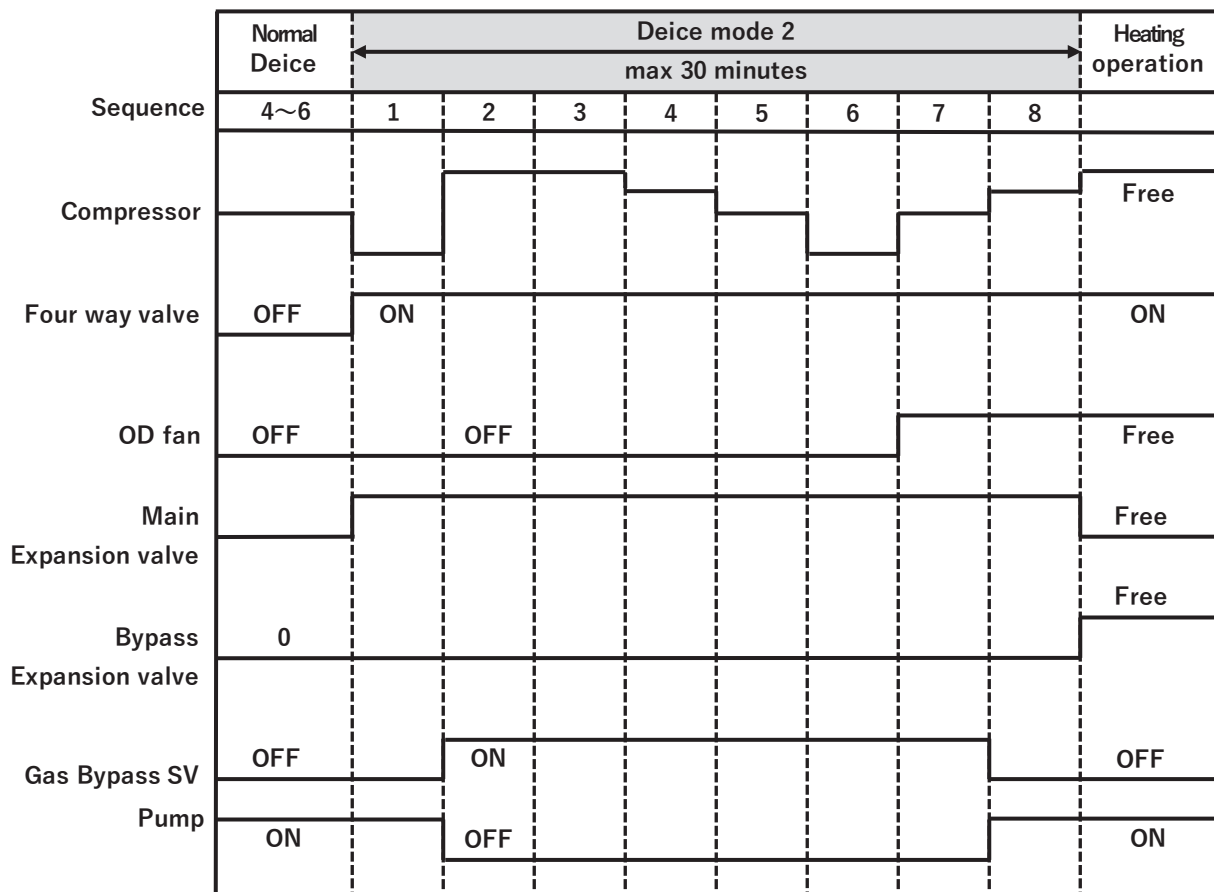
- 1 When water inlet temperature is more than 74°C, unit will operate deice mode 1.
- 2 When water inlet temperature is less than 19°C, unit will operate deice mode 2.
- 3 When water inlet temperature is less than 74°C and outdoor ambient temperature is less than -10°C, unit will operate deice mode 2.
- 4 When water outlet temperature sensor 2 detect temperature is less than 14°C, unit will operate deice mode 2.

• Deice operation time diagram

a. Deice mode 1 control:



b. Deice mode 2 control:



14.2.2.1 Ice choke detection control

This control is only available on models equipped with 「Deice mode 2」 .

Purpose

Ice choke detection and forced defrosting to melt the ice are performed to prevent abnormal rises in discharge port temperature.

Control Content

1. During heating operation (excluding deice control)

Start Conditions

1. During heating operation (excluding deice mode 2 control)
2. Outdoor temperature < 10°C
3. Compressor is ON
4. After Compressor starting control ends
5. High-pressure saturation temperature - Indoor piping temperature $\geq 40^{\circ}\text{C}$
6. EVA outlet temperature - Outdoor piping temperature $\geq 35^{\circ}\text{C}$
7. Outdoor piping temperature < -35°C
8. Outdoor temperature - EVA outlet temperature < -4°C

If all the above start conditions 1 to 7 are met continuously for 30 seconds,
or if all the above start conditions 1 to 5 and 8 are met continuously for 30 seconds,
deice mode 2 control will be executed.

※If the conditions are no longer met during the timer 30 seconds, the timer of 30 seconds count will be reset.

2. During normal deice (excluding antifreezing deice control)

Start Conditions

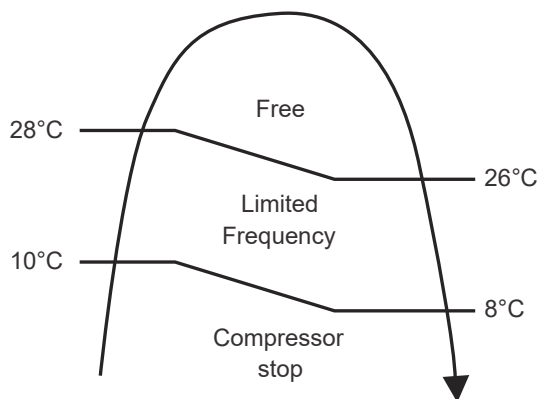
1. During normal deice (including 0Hz instruction sequence)
2. Outdoor temperature < 10°C
3. High-pressure saturation temperature - Indoor piping temperature $\geq 20^{\circ}\text{C}$
4. Indoor piping temperature < -25°C

If all the above start conditions 1 to 4 are met continuously for 30 seconds, forced antifreezing deice control will be executed.

14.3 Protection Control for Cooling Operation

14.3.1 Outdoor Air Temperature Control

- The Compressor operating frequency is regulated in accordance to the outdoor air temperature as shown in the diagram below.
- This control will begin 1 minute after the compressor starts.
- Compressor frequency will adjust base on outdoor air temperature.



14.3.2 Freeze Prevention Control 1

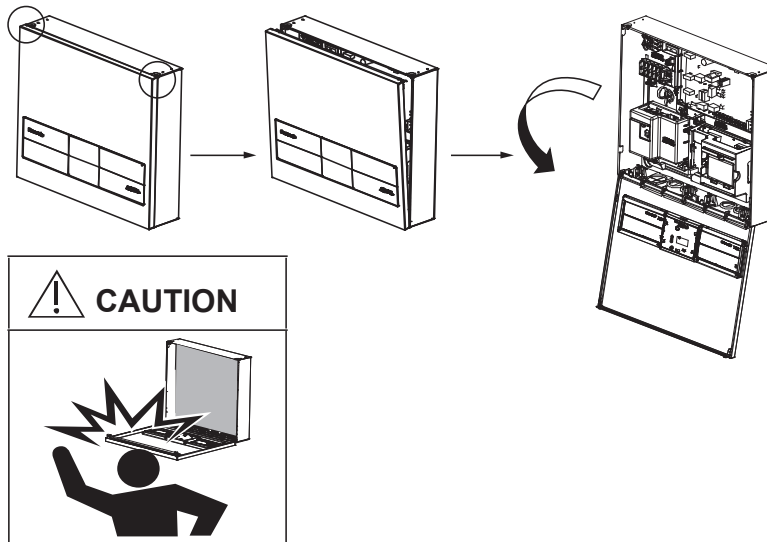
- 1 When refrigerant temperature is lower than 0°C continuously for 10 seconds, compressor will stop operating.
- 2 Compressor will resume its operation three minutes after the refrigerant heat exchanger is higher than 2°C.
- 3 Heat exchanger freeze prevention (H99) will memory in error history.

15. Servicing Mode

15.1 Open the Front Cover

Before opening the front cover ① of the Indoor Unit, always switch off all power supplies (e.g. the Indoor Unit power supply, the outdoor unit power supply, and the heater power supply).

1. Remove the 2 mounting screws located at the top of the enclosure ②.
2. Gently pull the upper section of the front cover ① towards you.
(The front cover will stop once it has opened about 2 degrees.)
3. Gently rotate the front cover ① to open 180 degrees.



15.2 Test Run

1. Check the items below before the test run.
 - a) Pipework are properly done.
 - b) Electric cable connecting work are properly done.
 - c) Water circuit unit is filled up with water and trapped air is released.
 - d) Turn ON the power supply after filling the indoor until full.
2. Turn ON the power supply for the Indoor, and RCCB/ELCB in the Indoor Unit. Then, refer to the Operation Instruction for operation of remote controller ③.

Note:

During winter, turn ON the power supply and standby the unit for at least 15 minutes before test run. To allow sufficient time to warm up refrigerant and prevent wrong error code judgement.

3. For normal operation, the water pressure reading should be in between 0.50 bar and 4.00 bar (0.05 MPa and 0.4 MPa). If not, adjust the speed of the water pump to bring it into the aforementioned pressure operating range. If this procedure does not solve the problem, contact a local authorized dealer.
4. After test run, clean the magnetic water filter set with reference to "Maintenance for magnetic water filter" in the Installation Manual of the AIR-TO-WATER HEAT PUMP OUTDOOR UNIT and reinstall it. After the cleaning is finished.

15.2.1 Check Water Flow of the Water Circuit

Select Installer setup → Service setup → Pump maximum speed → Air purge.

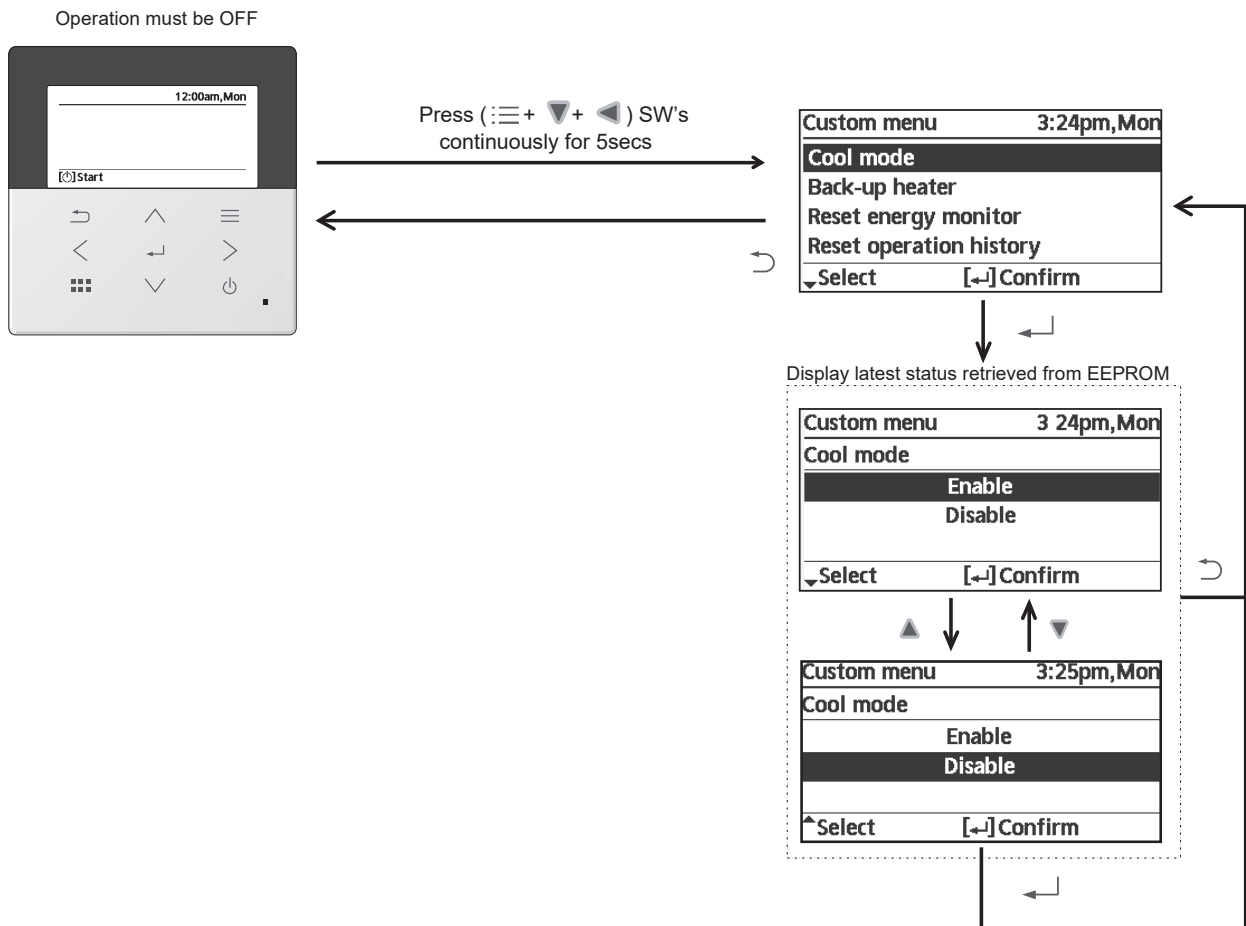
Confirm that the maximum water flow rate is not less than 25 l/min when the main pump is in operation.

- * Water flow can be checked in Service setup (Pump maximum speed)
[Heating operation at low water temperature with lower flow rate may cause "H75" during defrost process.]
- * If there is no water flow or H62 is displayed, stop pump operation and release the air (See "Check Air Accumulation").

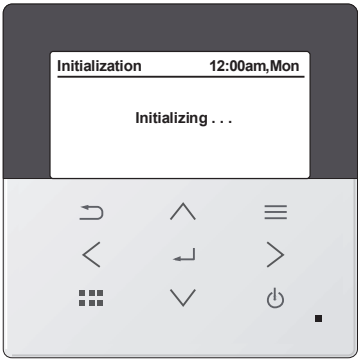
15.3 Expansion Vessel Pre Pressure Checking

- The system where the Indoor Unit is installed is equipped with an expansion vessel with the capacity of 10 L and the initial pressure of 1 bar.
 - The total volume of water in the system should not exceed 200 L.
 - If the total water volume exceeds 200 L, add an expansion vessel. (Supplied on site)
 - The installed height difference of the water circuit of the system should not exceed 30 m. (Extra pump may be required).
- * In case of 30 m, set the pressure in the circulation circuit to 0.5~1.0 bar.
Higher than 1.0 bar may cause water leakage due to component breakage.

15.4 How to Unlock Cool Mode

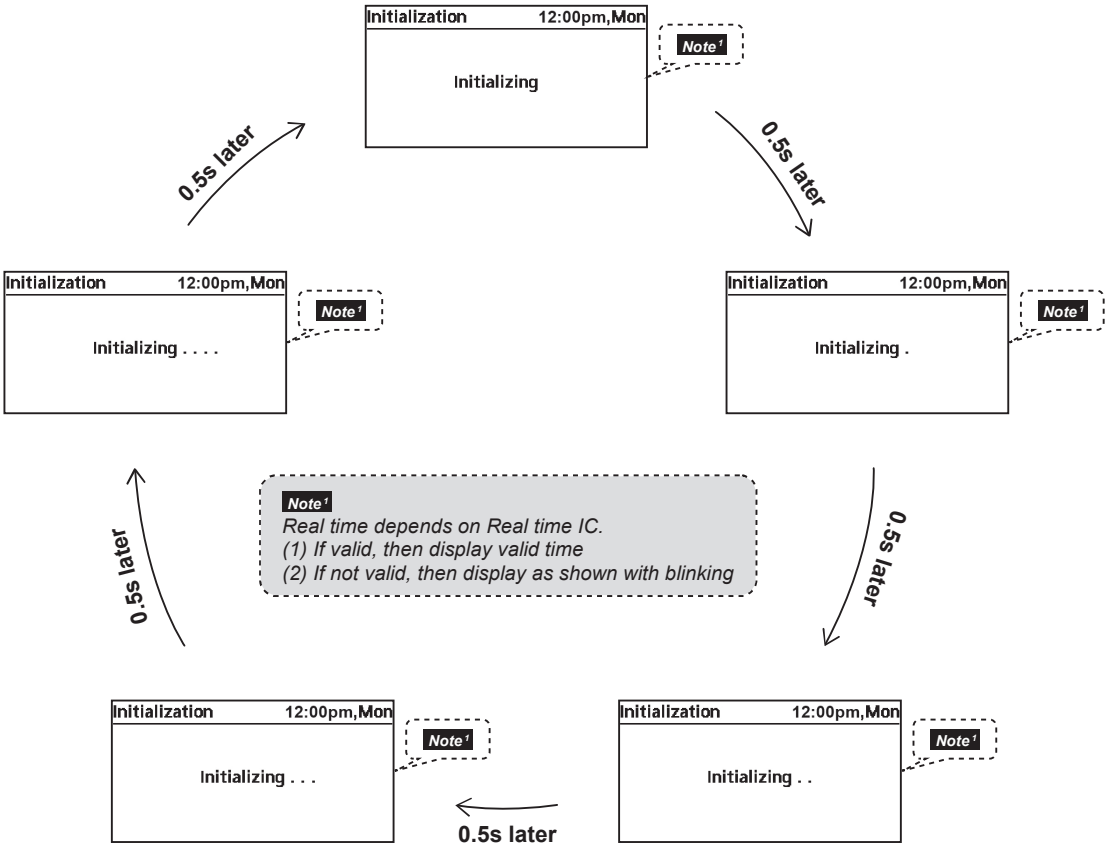


15.5 EEPROM Factory Default Data Setup Procedure

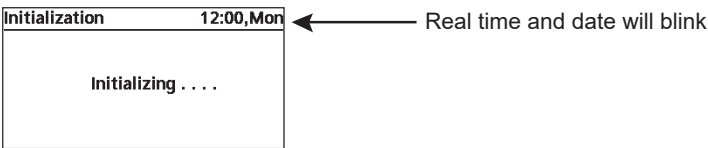


- EEPROM default data setup is only possible during initialization process.
- Press (, , ,) simultaneously for 5secs continuously, initialization process will stop & EEPROM default data setup process will start.

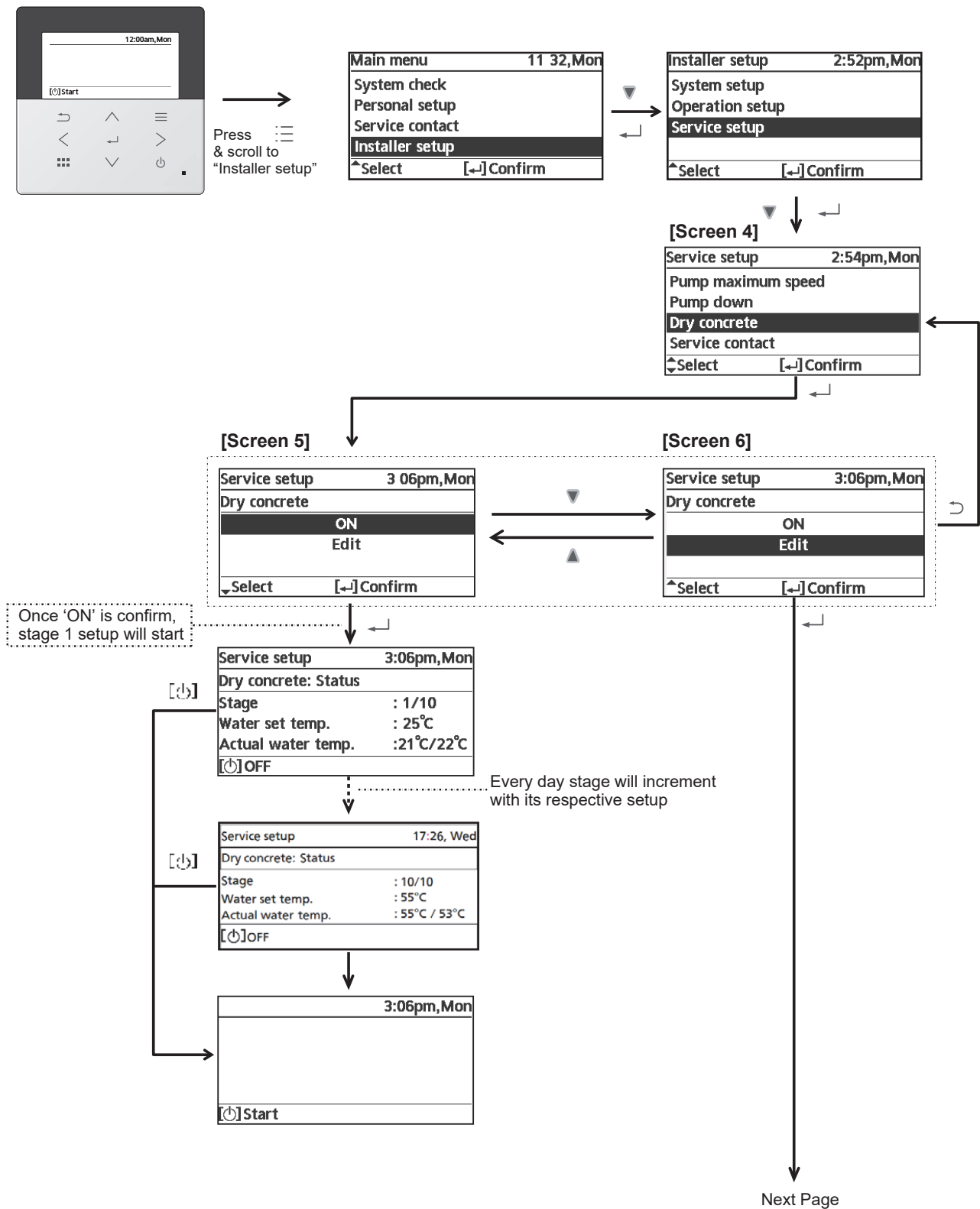
During EEPROM default data setup process, display should be as shown below.



- Once EEPROM default data setup process is complete, initialization process will re-start from beginning.



15.6 Dry Concrete Setup

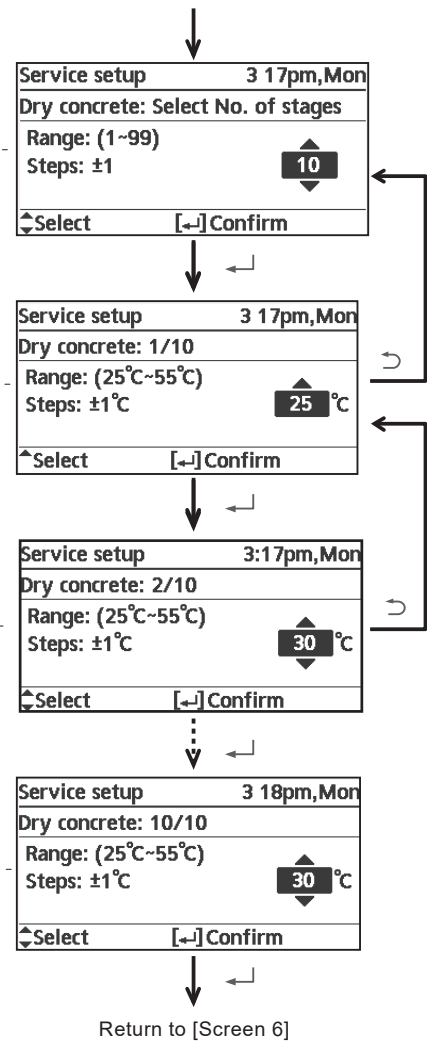


- Press ▲ or ▼ button to select no. of stages.
 - Press ↵ button to store latest status.
 - Press ↶ button, display will return to [Screen 6].

- If suppose to select 10 stages, then setup will start from stage 1/10.
 - Press ▲ or ▼ button to select set temperature.
 - Press ↵ button to store latest status.

- Move to next stage 2/10
 - Repeat the same procedure

- Move to next stage 10/10
 - Repeat the same procedure.
 - Press ↵ to store latest status the display will return to [Screen 4]
 - Press ↶ button to return to stage 9/10.



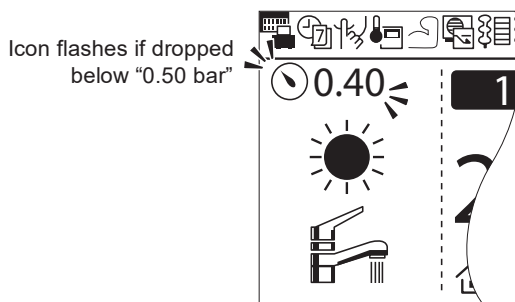
16. Maintenance Guide

To ensure the safety and optimum performance of the indoor unit, seasonal inspections of the indoor unit and functional checks of RCCB/ELCB, field wiring and pipe should be carried out on a regular basis. This maintenance and scheduled inspection should be carried out by authorized dealer.

Regular maintenance of the expansion vessel (at least once a year) is recommended and should be performed by authorized dealer. First, make sure that the expansion or pressure tank is completely drained of water, that the system is switched off, and that there are no live electrical components. If you need to reset the preload pressure, set 1bar.

1. Check Water Pressure * (0.50 bar = 0.05 MPa)

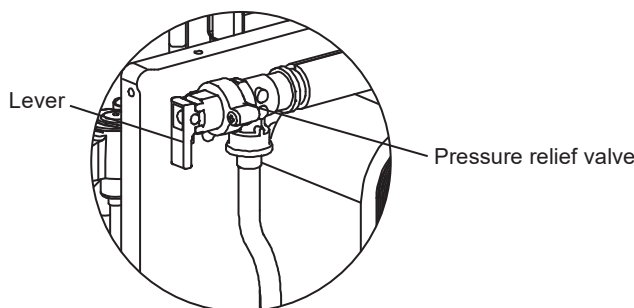
Water pressure must not be lower than 0.50 bar. (Check the water pressure by the remote controller.) If it is lower, fill Space Heating/Cooling pipes with water through the tube connector on the outdoor unit.



2. Check Pressure Relief Valve

* Pressure relief valve is located on outdoor unit.

- Pull the lever in the horizontal direction and confirm that the pressure relief valve works properly.
- Release the lever when water comes out of the drain pipe of the pressure relief valve. While the air continues to come out of the drain pipe, keep raising the lever to completely discharge the air.
- Confirm that the water from the drain pipe stops.
- If water is leaking, pull the lever several times and return it to make sure the water stops.
- If water keeps coming out of the drain, turn OFF the system and contact your local authorized dealer.



3. Check Air Accumulation

- Open the air vent plugs on the heating panel, fan convector, etc., and remove the air accumulated in the equipment and piping.

4. Check RCCB/ELCB

- Ensure the RCCB/ELCB set to "ON" condition before check RCCB/ELCB.
- Turn ON the power supply to the Indoor Unit.

This check can only be done when power is supplied to the Indoor Unit.

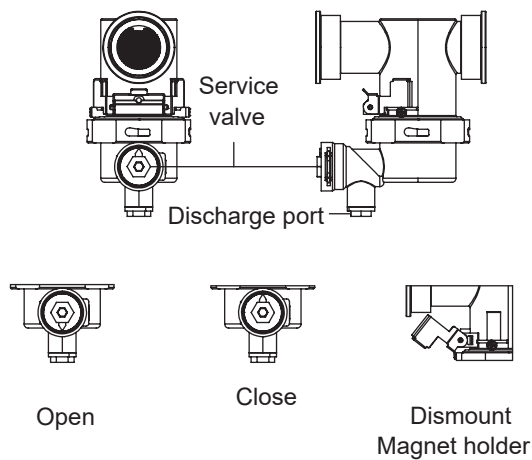
WARNING

Be careful not to touch parts other than RCCB/ELCB test button when the power is supplied to Indoor Unit. Otherwise, electrical shock may be caused. Before obtaining access to terminals, all supply circuits must be disconnected.

- Push the "TEST" button on the RCCB/ELCB. The lever would turn down, if it works properly.
- Contact authorized dealer if the RCCB/ELCB malfunction.
- Turn OFF the power supply to the Indoor Unit.
- If RCCB/ELCB functions normal, set the lever to "ON" again.

5. Maintenance for Magnetic Water Filter Set OR [Check Magnetic Water Filter Set]

1. Turn OFF the power supply.
2. Place a container or hose below Magnetic Water Filter
3. Dismount magnet holder at side of Magnetic Water Filter
4. Remove the Cap of Discharge Port with Allen key (6mm).
5. Open the Service Valve with Allen key (6mm) to release the dirty water from the Discharge Port into a container.
6. Close the service valve when the container is full to avoid spillage in the outdoor unit.
7. Dispose the dirty water.
8. Reinstall the Cap of Discharge Port and Magnet holder.
9. Re-charge the water to Space Heating / Cooling circuit if necessary.
(For details, refer to 11.4.10 CHARGING THE WATER)
10. Turn ON the power supply.



16.1 Service and Maintenance

16.1.2 Custom Menu

If forget Password and cannot operate remote controller

↶ + ↵ + ➤

Press for 5 seconds.
Password unlock screen appears, press Confirm and it shall reset.
Password will become 0000. Please reset it again.
Note: This is displayed only when the remote controller is password-locked.

16.1.1 Maintenance Menu

How to set up the Maintenance menu

Maintenance menu12:00 pm, Mon

Actuator check

Test mode

Sensor setup

Reset password

▼ Select [↵] Confirm

↶ + ↵ + ➤

Press for 5 seconds.

Items that can be set

①

Actuator check (Manual ON/OFF all functional parts)
Note: As there is no protection action, be careful not to cause any error when operating each part (do not turn ON pump when there is no water etc.)

②

Test mode (Test run)
Normally it is not used.

③

Sensor setup (offset gap of detected temp of each sensor can be set within -3~3°C range)
Note: Use only when sensor is deviated. It affects temperature control.

④

Reset password (password reset)

How to set up a Custom menu

Custom menu12:00 pm, Mon

Cool mode

Back-up heater

Reset energy monitor

Reset operation history

▼ Select [↵] Confirm

Custom menu12:00 pm, Mon

Back-up heater

Reset energy monitor

Reset operation history

Anti-stick mode

▲ Select [↵] Confirm

≡ + ▼ + <

Press for 5 seconds.

Items that can be set

①

Cool mode (Select Cooling function: Enable/Disable) Default is Disable.
Note: As Enable/Disable Cool mode may affect electricity application, be careful and do not simply change it. In Cool mode, be careful if piping is not insulated properly, dew may form on pipe and water may drip on the floor and damage the floor.

②

Back-up heater (Select Back-up heater: Enable/Disable)
Note: This back-up heater refers to the Extra heater. Differs from the use/non-use of back-up heater that is set by the customer. (This setting should only be used if requested by the utility company.) Installation must be carried out under the responsibility of the person in charge of installation.

③

Reset energy monitor (delete memory of Energy monitor).
Use this when moving house and handover the unit.

④

Reset operation history (delete memory of operation history)
Use this when moving house and handover the unit.

⑤

Anti-stick mode (select Anti-stick mode: Enable/Disable) Default is Anti-stick mode Enable.
The actuator is regularly activated every Monday at 3:00 am to prevent the actuating parts from sticking together. Select Disable if wish to stop the mode being activated periodically.
Parts and other components that may not operate if Disable is selected may stick if not operated for a long period of time.

16.2 Specifications

16.2.1 Specifications of Fresh Water was Heat Transfer Medium in Brazed Heat Exchanger

Parameter	Quality Limits for Tap Water on the Secondary Side
Temperature	Below 75°C
pH	7 to 9
Alkalinity	60mg/l HCO_3^- < 300mg/l
Conductivity	< 750 or 1250
Hardness	$[\text{Ca}^{2+}, \text{Mg}^{2+}] / [\text{HCO}_3^-] > 0.5$
Chloride	< 200mg/l at 60°C
Sulphate	$[\text{SO}_4^{2-}] < 100\text{mg/l}$ and $[\text{HCO}_3^-] / [\text{SO}_4^{2-}] > 1$
Nitrate	$\text{NO}_3^- < 100\text{mg/l}$
Chlorine	< 0.5mg/l

16.2.2 External Filter

Solids in the water must be filtered.

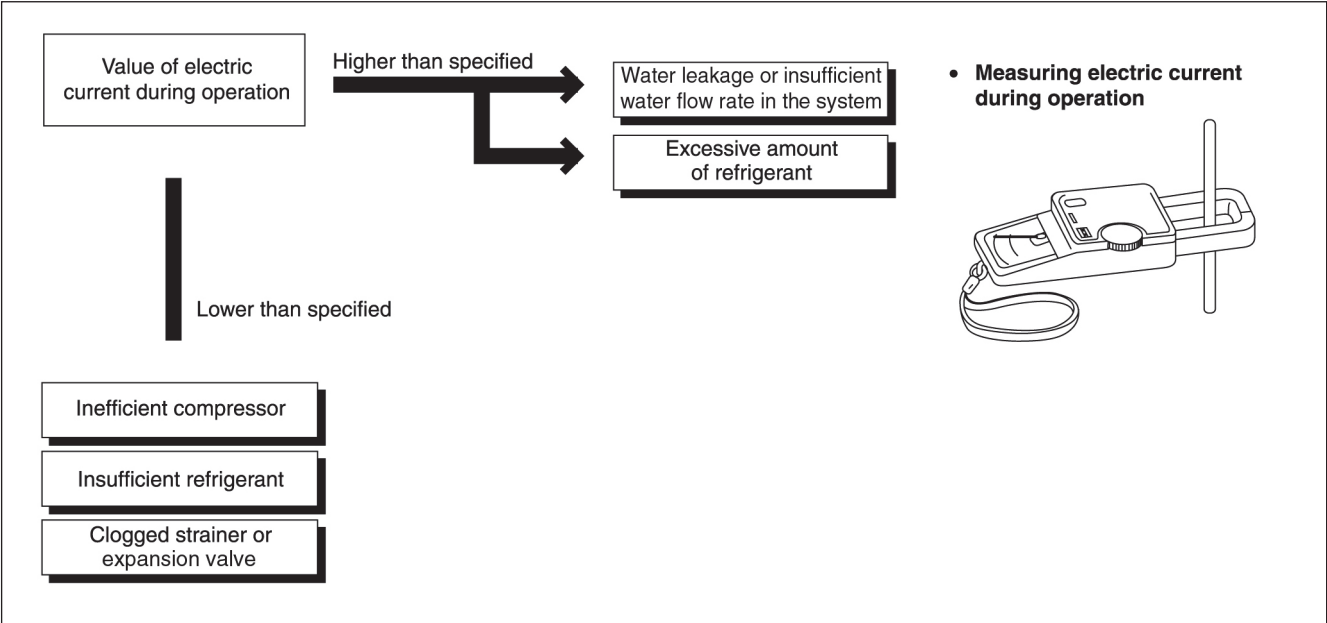
Minimum filter mesh size required for the field supply external filter in the water inlet is 20 mesh.

17. Troubleshooting Guide

17.1 Refrigeration Cycle System

In order to diagnose malfunctions, make sure that there are no electrical problems before inspecting the refrigeration cycle.

Such problems include insufficient insulation, problem with the power source, malfunction of a compressor and a fan.



17.2 Relationship between the Condition of the Air-to-Water Heatpump Indoor and Outdoor Units and Electric Current

Condition of the Air-to-Water Heatpump indoor and outdoor units	Heating Mode	Cooling Mode
	Electric current during operation	Electric current during operation
Water leakage or insufficient water flow rate in the system		
Excessive amount of refrigerant		
Inefficient compression		
Insufficient refrigerant (gas leakage)		
Outdoor heat exchange deficiency		
Clogged expansion valve or Strainer		

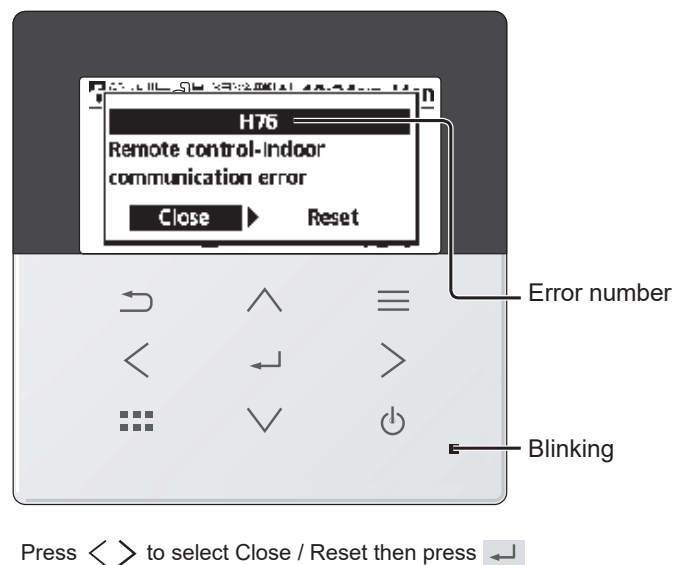
- Carry out the measurements of pressure, electric current, and temperature fifteen minutes after an operation is started.

17.3 Breakdown Self Diagnosis Function

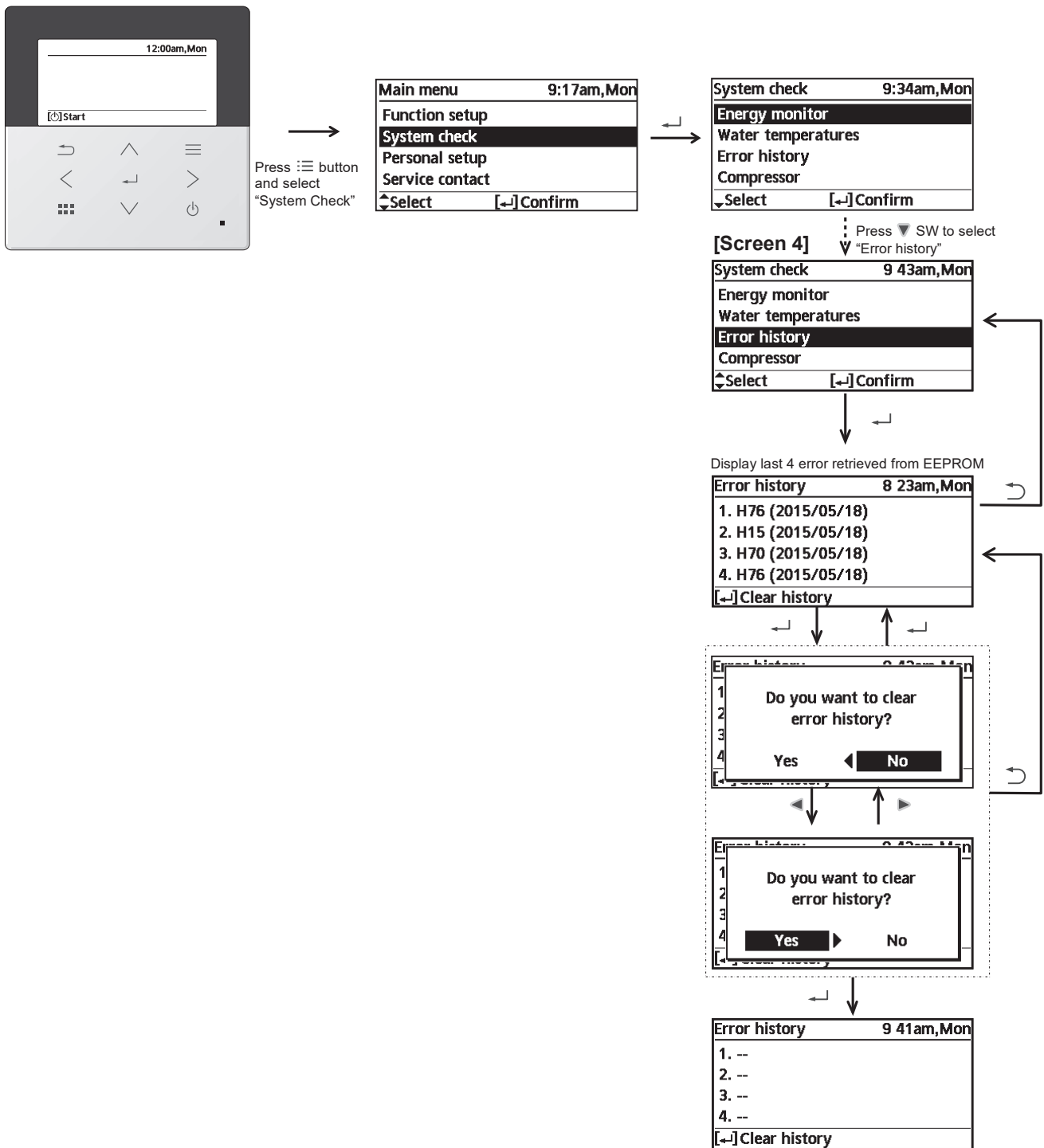
17.3.1 Self Diagnosis Function (Three Digits Alphanumeric Code)

- When abnormality occur during operation, the system will stop operation, and OFF/ON control panel LED will blink and error code will display on the control panel.
- Even error code is reset by turning OFF power supply or by selecting ERROR RESET, if the system abnormality is still unrepaired, system will again stop operation, and OFF/ON control panel LED will again blinks and error code will be display.
- The error code will store in IC memory.
- **To check the error code**
 - 1 When an abnormality occurs, system will stop operation and OFF/ON control panel LED will blink.
 - 2 Error code of the abnormality will be display on the control panel.
 - 3 To determine the abnormality description, the error code table needs to be referred.

eg:



- **To display past/last error code**
 - 1 Turn ON power supply.
 - 2 Refer below procedure to retrieve the error code history.
- **To permanently delete error code from IC memory**
 - 1 Turn ON power supply.
 - 2 Refer below procedure to clear error history.



17.4 Error Codes Table

Diagnosis display	Abnormality/Protection control	Abnormality judgement	Primary location to verify
H00	No abnormality detected	—	—
H12	Indoor/Outdoor capacity unmatched	10s after power supply	- Indoor/outdoor connection wire - Indoor/outdoor PCB - Specification and combination table in catalogue
*H15	Outdoor compressor temperature sensor abnormality	Continue for 5 sec.	Compressor temperature sensor (defective or disconnected)
*H17	Zone 2 water pump abnormality	Continue for 10 sec.	- Indoor PCB (main) - Water pump (malfunction)
H20	Water pump abnormality	Continue for 10 sec.	- Outdoor PCB (main), Outdoor PCB (sub) - Water pump (malfunction)
H21	Abnormal water pressure	Continue for 300 sec.	Water pressure sensor
*H22	Abnormal tank 2 sensor	Continue for 5 sec.	Tank 2 sensor
H23	Refrigerant liquid temperature sensor abnormality	Continue for 5 sec.	Refrigerant liquid temperature sensor (defective or disconnected)
*H27	Service valve error	Continue for 5 minutes	High pressure sensor (defective or disconnected)
H28	Abnormal solar sensor	Continue for 5 sec.	Solar temperature sensor (defective or disconnected)
H31	Abnormal swimming pool sensor	Continue for 5 sec.	Pool temperature sensor (defective or disconnected)
H36	Abnormal buffer tank sensor	Continue for 5 sec.	Buffer tank sensor (defective or disconnected)
H38	Brand code not match	When indoor and outdoor brand code not same	—
H42	Compressor low pressure abnormality	—	- Outdoor pipe temperature sensor - Clogged expansion valve or strainer - Insufficient refrigerant - Outdoor PCB - Compressor
H43	Abnormal Zone 1 sensor	Continue for 5 sec.	Water temperature Zone 1 sensor
H44	Abnormal Zone 2 sensor	Continue for 5 sec.	Water temperature Zone 2 sensor
H62	Water flow switch abnormality	Continue for 140 sec.	Water flow switch
H63	Abnormal low pressure sensor	4 times in 20 minutes	Low pressure sensor (defective or disconnect)
H64	Refrigerant high pressure abnormality	4 times in 120 minutes	Outdoor high pressure sensor (defective or disconnected)
H65	Abnormal deice water circulation	Water flow > 14.4 L/min continuously for 10 seconds during anti freeze deice	Water pump
H67	Abnormal External Thermistor 1	Continue for 5 sec.	Room temperature Zone 1 sensor
H68	Abnormal External Thermistor 2	Continue for 5 sec.	Room temperature Zone 2 sensor
H70	External heater OLP abnormality	Continue for 60 sec.	External heater OLP (Disconnection or activated)
H72	Abnormal tank 1 sensor	Continue for 5 sec.	Tank 1 sensor
H74	PCB communication error	Communication or transfer error	Indoor main PCB and Sub PCB
H75	Low water temperature control	Room heater disable and deice request to operate under low water temperature	Heater operation must enable to increase water temperature
H76	Communication error (RC-1 & Indoor or RC-1 & RC-2)	—	- Indoor - control panel (defective or disconnected) - control panel 1 - control panel 2 (defective or disconnected)
H90	Indoor/outdoor abnormal communication	> 15 sec after starting operation	- Internal/external cable connections - Indoor/Outdoor PCB

Diagnosis display	Abnormality/Protection control	Abnormality judgement	Primary location to verify
H91	Tank heater OLP abnormality	Continue for 60 sec.	• Tank heater OLP (Disconnection or activated)
H95	Voltage connection error	a single detection	• HIC PCB • Filter PCB • Wiring • power equipment
H98 / F95	Outdoor high pressure overload protection Cooling high pressure overload protection	—	• Outdoor high pressure sensor • Water pump or water leakage • Clogged expansion valve or strainer • Excess refrigerant • Outdoor PCB
H99	Indoor heat exchanger freeze prevention	—	• Indoor heat exchanger • Refrigerant shortage
F12	Pressure switch activate	4 times occurrence within 30 minutes	• Pressure switch
F14	Poor compressor rotation	10 times occurrences continuously, however the counter value can be cleared by compressor drive for 3 minutes.	• HIC PCB • Compressor • Construction
F15	Fan motor lock error	10 times occurrences continuously, however the counter value can be cleared by fan motor drive for 6 minutes.	• HIC PCB • FAN PCB • Wiring • Fan motor 1
F16	Current protection	2 times occurrence	• HIC PCB • Filter PCB • Construction • Power equipment • Wiring
F20	Outdoor compressor overheating protection	4 times occurrence within 30 minutes	• Compressor tank temperature sensor • Clogged expansion valve or strainer • Insufficient refrigerant • Outdoor PCB • Compressor
F22	IPM (power transistor) overheating protection	3 times occurrence within 30 minutes	• Improper heat exchange • IPM (Power transistor)
F23	DC peak	10 times occurrences continuously, however the counter value can be cleared by compressor drive for 30 minutes.	• HIC PCB • Compressor
F24	Refrigeration cycle abnormality	2 times occurrence within 30 minutes	• Insufficient refrigerant • Outdoor PCB • Compressor low compression
F25	Cooling/Heating cycle changeover abnormality	4 times occurrence within 30 minutes	• 4-way valve • V-coil
F27	Pressure switch abnormality	Continue for 1 min.	• Pressure switch
F30	Water outlet sensor 2 abnormality	Continue for 5 sec.	• Water outlet sensor 2 (defective or disconnected)
F32	Internal thermostat error (RC-1 or RC-2)	Continue for 5 sec.	• Control panel PCB thermostat
F35 (No Self-diagnosis Method)	External meter communication error	Continue for 180 sec.	• External meter
F36	Outdoor air temperature sensor abnormality	Continue for 5 sec.	• Outdoor air temperature sensor (defective or disconnected)
*F37	Indoor water inlet temperature sensor abnormality	Continue for 5 sec.	• Water inlet temperature sensor (defective or disconnected)
F40	Outdoor discharge pipe temperature sensor abnormality	Continue for 5 sec.	• Outdoor discharge pipe temperature sensor (defective or disconnected)
F41	PFC control	4 times occurrence within 10 minutes	• Voltage at PFC
F42	Outdoor heat exchanger temperature sensor abnormality	Continue for 5 sec.	• Outdoor heat exchanger temperature sensor (defective or disconnected)
*F43	Outdoor defrost sensor abnormality	Continue for 5 sec.	• Outdoor defrost sensor (defective or disconnected)

Diagnosis display	Abnormality/Protection control	Abnormality judgement	Primary location to verify
F45	Indoor water outlet temperature sensor abnormality	Continue for 5 sec.	• Water outlet temperature sensor (defective or disconnected)
*F46	CT disconnection	2 times occurrences continuously, however the counter value can be cleared by ac current (all phase) exceeding 2.4A.	• HIC PCB • Filter PCB • Power equipment • Wiring
F48	Outdoor EVA outlet temperature sensor abnormality	Continue for 5 sec.	• Outdoor EVA outlet temperature sensor (defective or disconnected)
F49	Outdoor bypass outlet temperature sensor abnormality	Continue for 5 sec.	• Outdoor bypass outlet temperature sensor (defective or disconnected)
F50	Water inlet 2 sensor error	Continue for 5 sec.	• Water inlet 2 sensor
F51	Economizer outlet sensor abnormality	Continue for 5 sec.	• Economizer outlet sensor (defective or disconnected)
F52	Bypass inlet sensor abnormality	Continue for 5 sec.	• Bypass inlet sensor (defective or disconnected)
F53	Main expansion valve overcurrent protection	4 times occurrence within 40 minutes	• Main expansion valve
F54	Bypass expansion valve overcurrent protection	4 times occurrence within 40 minutes	• Bypass expansion valve
F55	Electrical anode error	Continue for 60 sec.	• Electric anode • Electric anode PCB
F56	Outdoor heat exchanger middle sensor	Continue for 5 sec.	• Outdoor heat exchanger middle sensor (defective or disconnected)
F64	Fan motor 2 lock error	10 times occurrences continuously, however the counter value can be cleared by fan motor 2 drive for 6 minutes.	• HIC PCB • FAN PCB • Wiring • Fan motor 2
F71	Compressor open phase	2 times occurrences continuously, however the counter value can be cleared by compressor drive for 6 minutes.	• HIC PCB • Wiring
F72	Compressor overcurrent	10 times occurrences continuously, however the counter value can be cleared by compressor drive for 6 minutes.	• HIC PCB • Compressor • Construction
F73	DCCT error	10 times occurrences continuously, however the counter value can be cleared by compressor drive for 6 minutes.	• HIC PCB
F74	DC voltage error	2 times occurrences continuously, however the counter value can be cleared by compressor drive for 6 minutes..	• HIC PCB • FAN PCB • Filter PCB • Wiring • Reactor • power equipment
F75	Communication error in outdoor unit	When communication from INV micon is interrupted for 30 seconds or more or an undefined code is received three times in a row.	• Outdoor CR PCB • HIC PCB • Wiring

Note: * This error code is not applicable for this system.

17.5 Self-Diagnosis Method

17.5.1 Connection Capability Rank Abnormality (H12)

Malfunction Decision Conditions:

During startup operation of cooling and heating, the capability rank of indoor checked by the outdoor is used to determine connection capability rank abnormality.

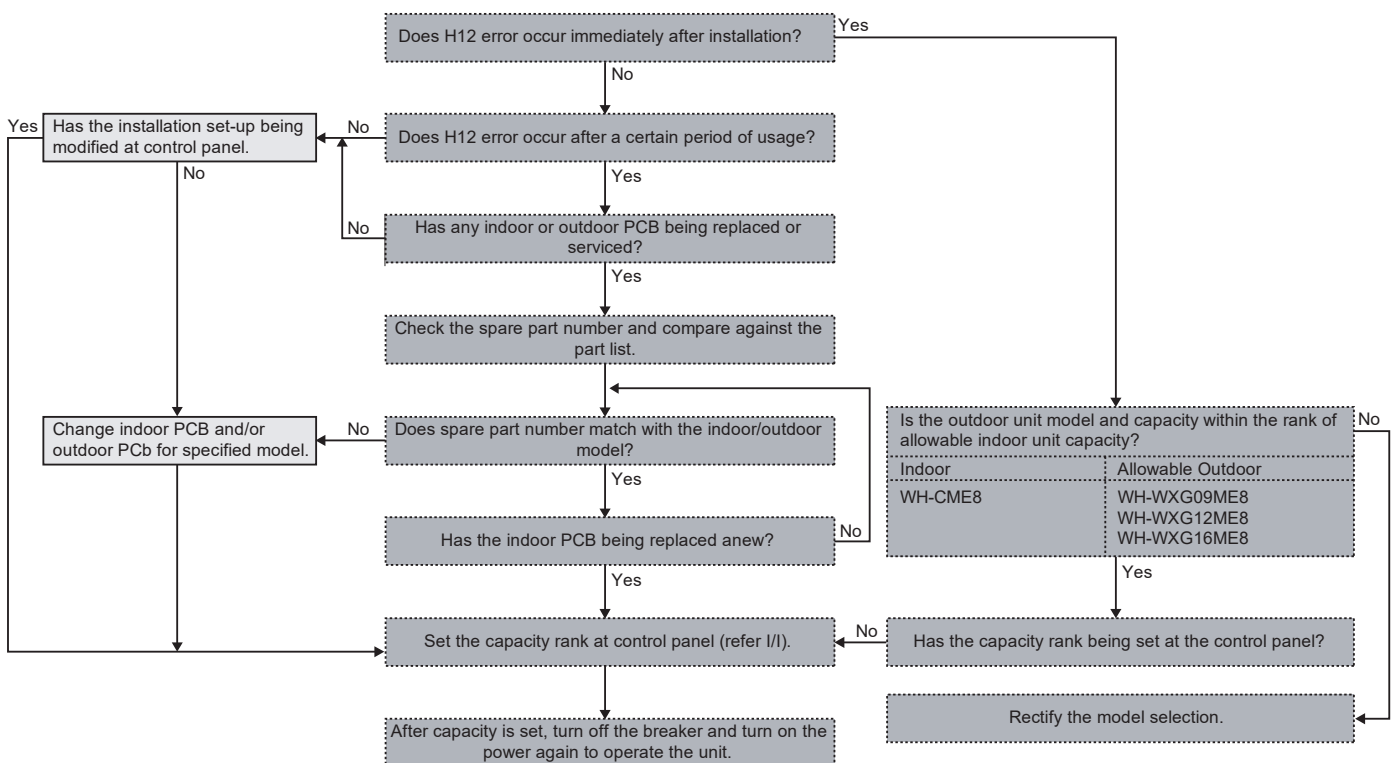
Malfunction Caused:

- 1 Wrong model interconnected.
- 2 Wrong indoor unit or outdoor unit PCB (main) used.
- 3 Faulty indoor unit or outdoor unit PCB (main).

Abnormality Judgment:

Continue for 10 seconds.

Troubleshooting:



17.5.2 Compressor Tank Temperature Sensor Abnormality (H15)

Malfunction Decision Conditions:

During startup and operation of cooling and heating, the temperatures detected by the compressor tank temperature sensor are used to determine sensor error.

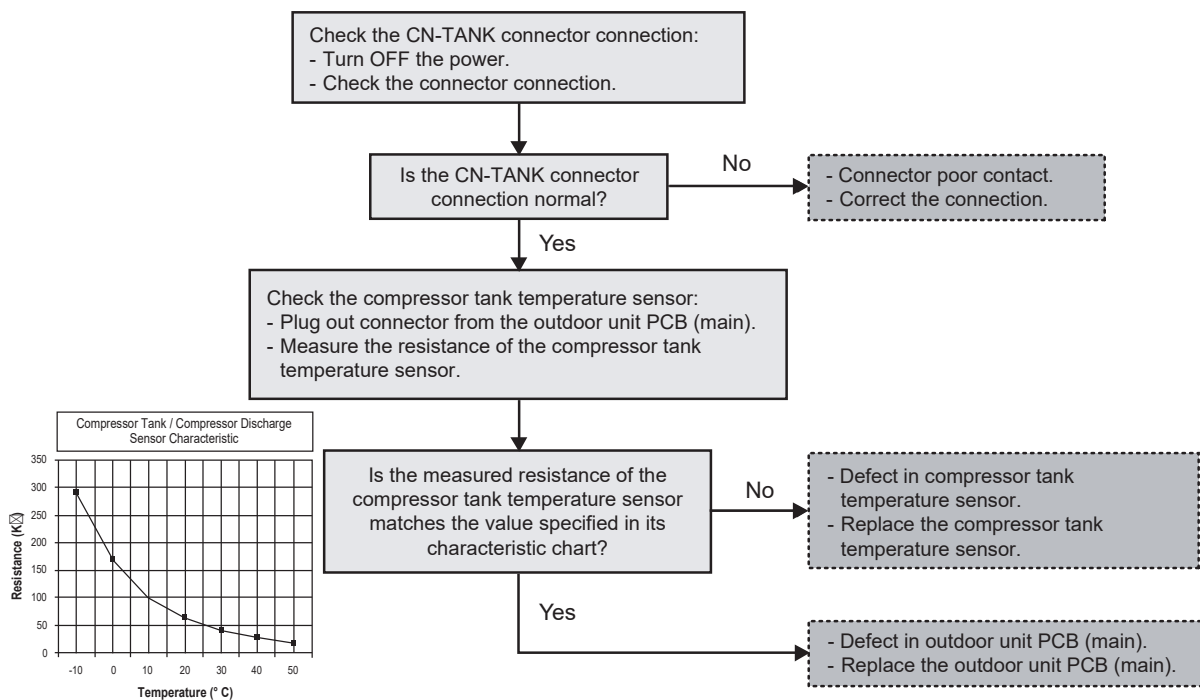
Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty sensor.
- 3 Faulty outdoor unit PCB (main).

Abnormality Judgment:

Continue for 5 seconds.

Troubleshooting:



17.5.3 Zone 2 Water Pump Abnormality (H17)

Malfunction Decision Conditions:

During startup and operation of cooling and heating, the rotation speed detected by the IPM of water pump motor during water pump operation is used to determine abnormal water pump (feedback of rotation > 6,000rpm or < 300rpm).

Malfunction Caused:

- 1 Operation stop due to short circuit inside the water pump motor winding.
- 2 Operation stop due to breaking of wire inside the water pump motor.
- 3 Operation stop due to breaking of water pump lead wires.
- 4 Operation stop due to water pump motor IPM malfunction.
- 5 Operation error due to faulty indoor unit PCB (main).

Abnormality Judgment:

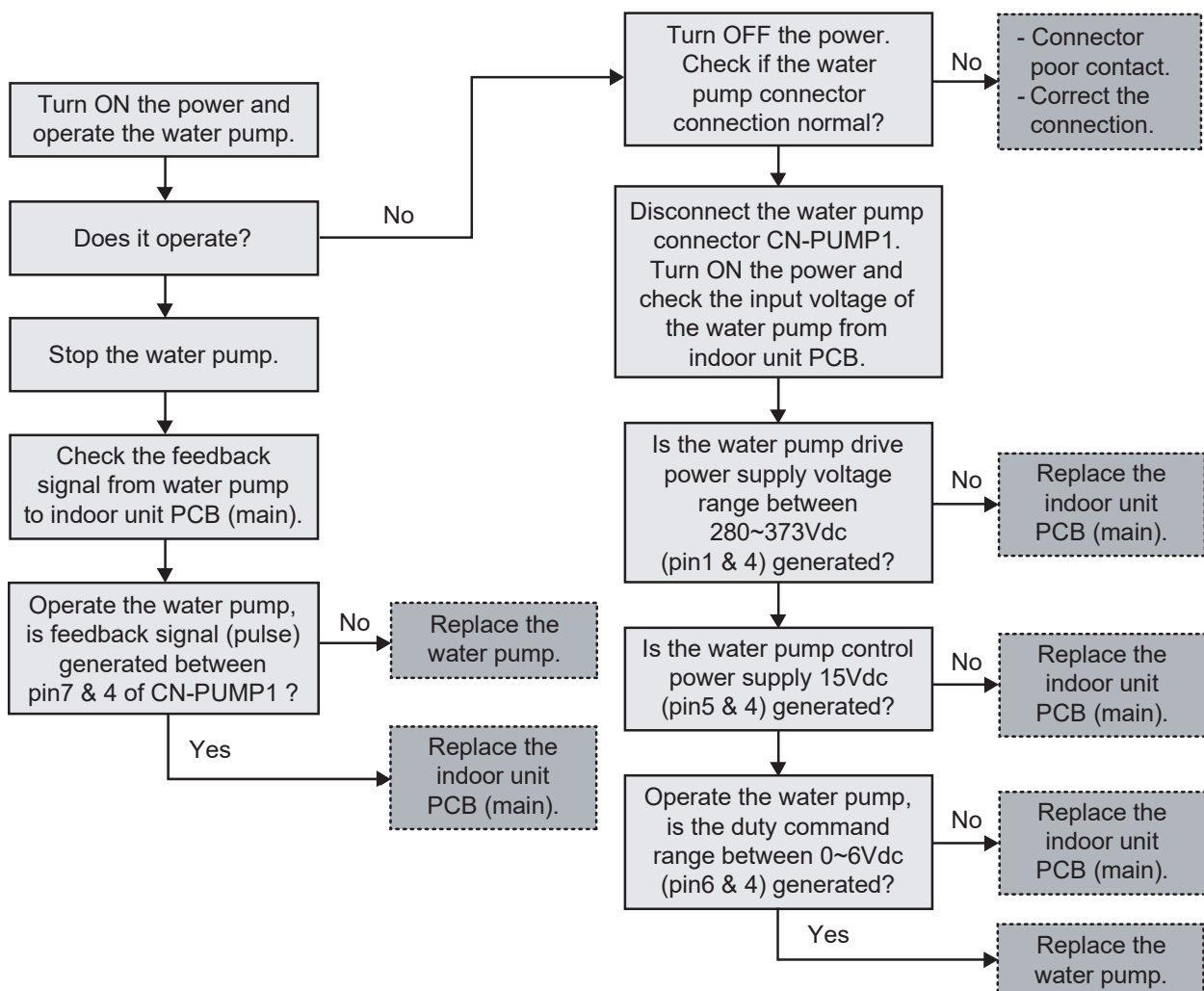
Continue for 10 seconds.

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.4 Water Pump Abnormality (H20)

Malfunction Decision Conditions:

During startup and operation of cooling and heating, the rotation speed detected by the IPM of water pump motor during water pump operation is used to determine abnormal water pump (feedback of rotation > 6,000rpm or < 300rpm).

Malfunction Caused:

- 1 Operation stop due to short circuit inside the water pump motor winding.
- 2 Operation stop due to breaking of wire inside the water pump motor.
- 3 Operation stop due to breaking of water pump lead wires.
- 4 Operation stop due to water pump motor IPM malfunction.
- 5 Operation error due to faulty outdoor unit PCB (main).
- 6 Operation error due to faulty outdoor unit PCB (sub).

Abnormality Judgment:

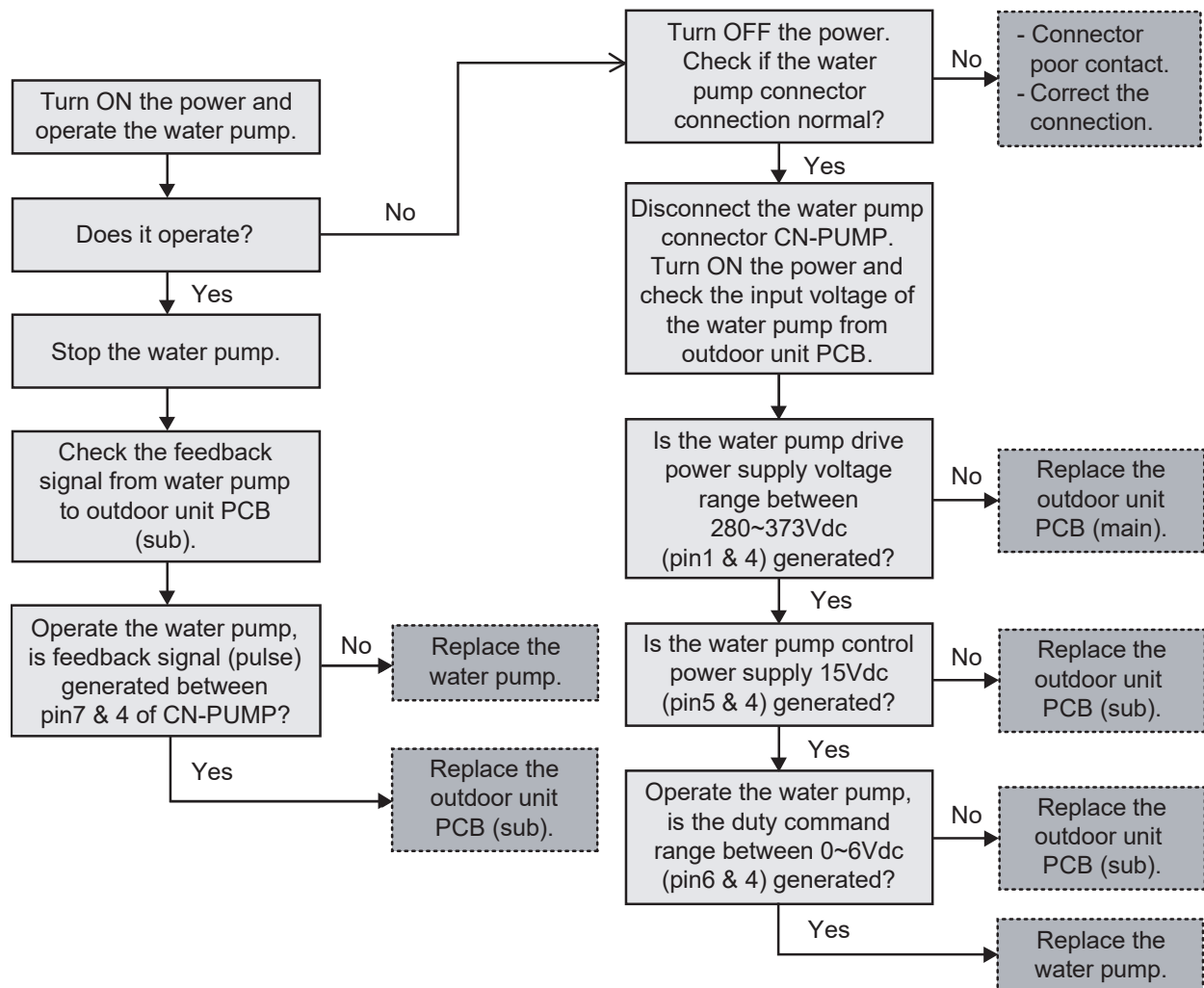
Continue for 10 seconds.

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.5 Refrigerant Liquid Temperature Sensor Abnormality (H23)

Malfunction Decision Conditions:

During startup and operation of cooling and heating, the temperatures detected by the refrigerant liquid temperature sensor are used to determine sensor error.

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty sensor.
- 3 Faulty outdoor unit PCB (main).

Abnormality Judgment:

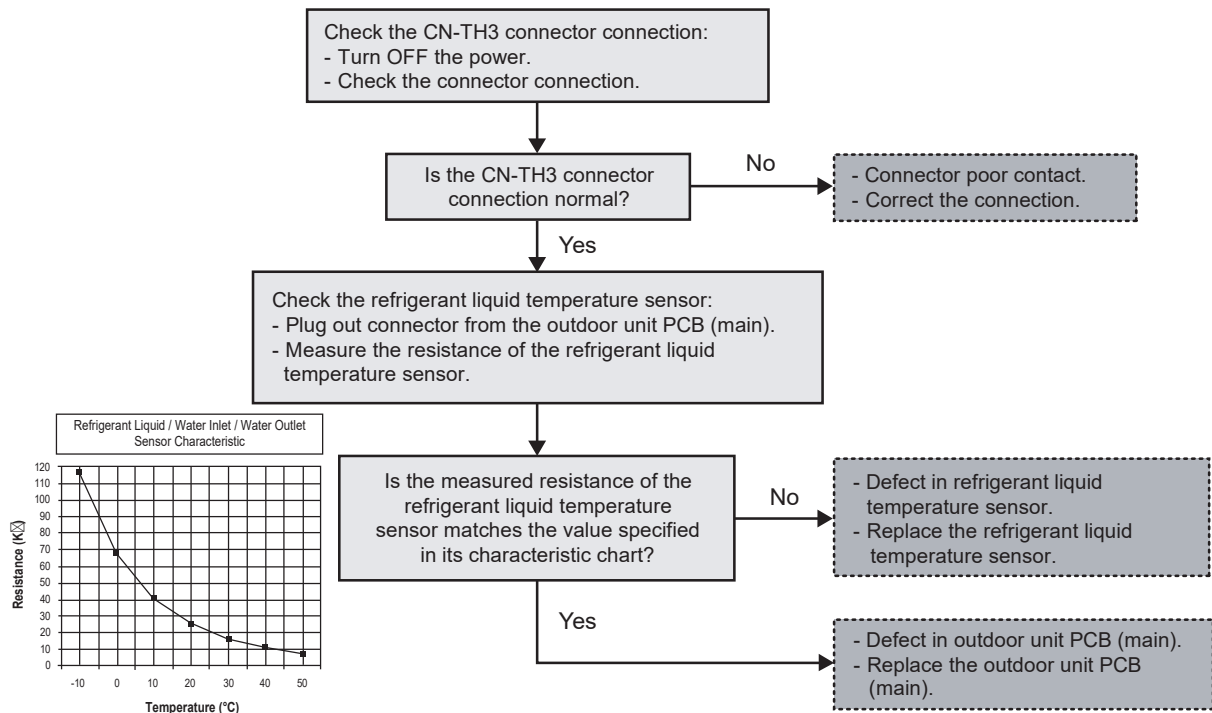
Continue for 5 seconds.

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.6 Service Valve Error (H27)

Malfunction Decision Conditions:

During cooling operation, when:-

[a] Indoor refrigerant pipe temperature at compressor startup - present indoor refrigerant pipe temperature < 2°C

[b] Present high pressure - high pressure at compressor startup < 5kg/cm²

**Judgment only for first time cooling operation and not during pump down operation.

Malfunction Caused:

- 1 3 way valves closed.
- 2 Faulty high pressure sensor.
- 3 Faulty indoor refrigerant pipe temperature sensor
- 4 Faulty outdoor unit PCB (main).

Abnormality Judgment:

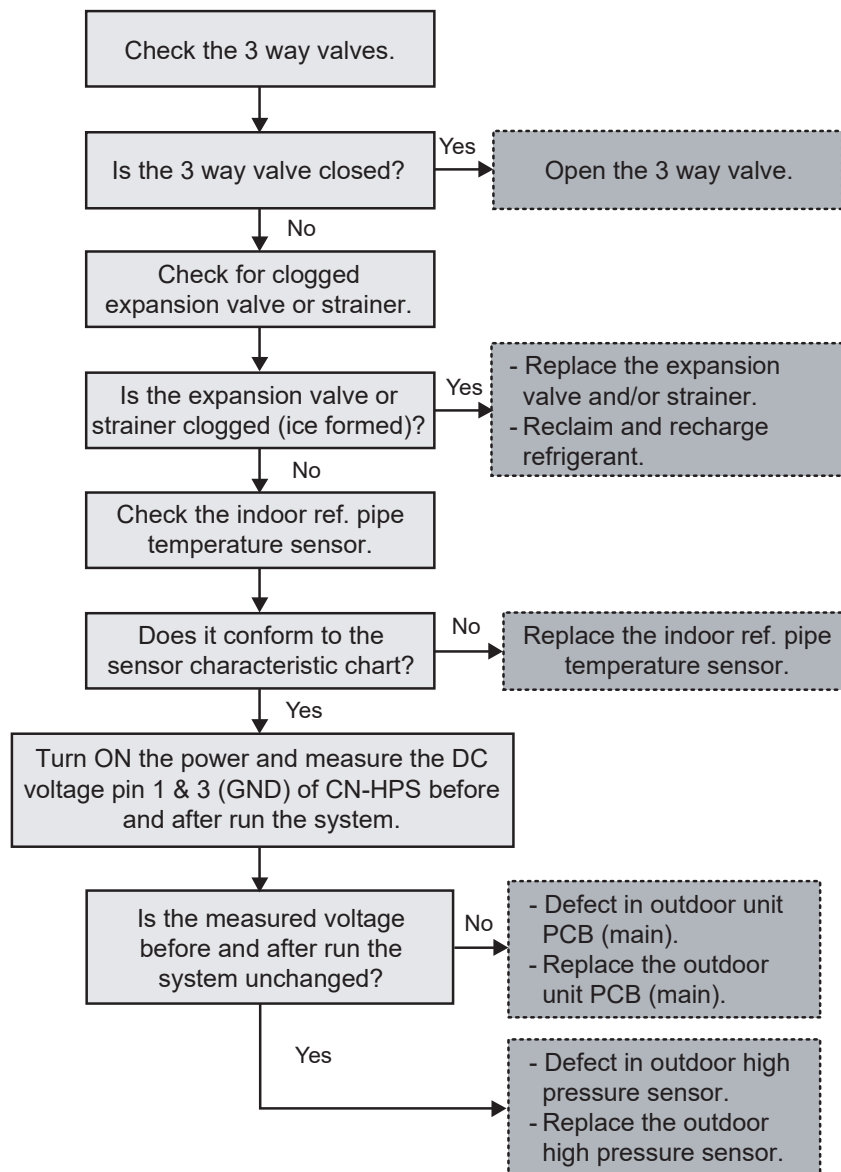
Continue for 5 minutes.

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



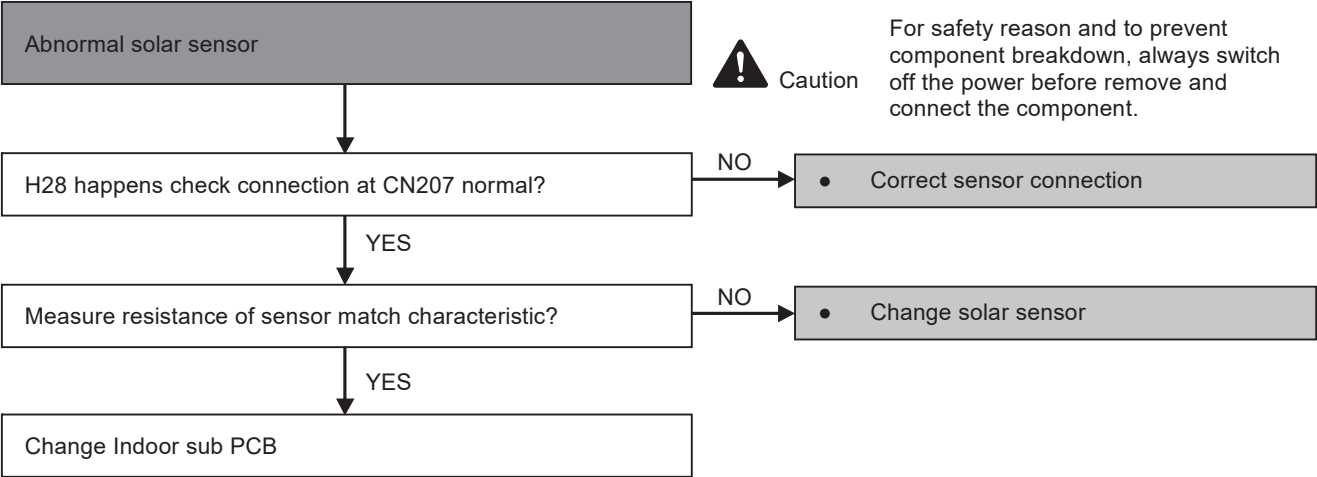
17.5.7 Abnormal Solar Sensor (H28)

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty solar sensor.
- 3 Faulty indoor sub PCB.

Abnormality Judgment:

Continue for 5 seconds.



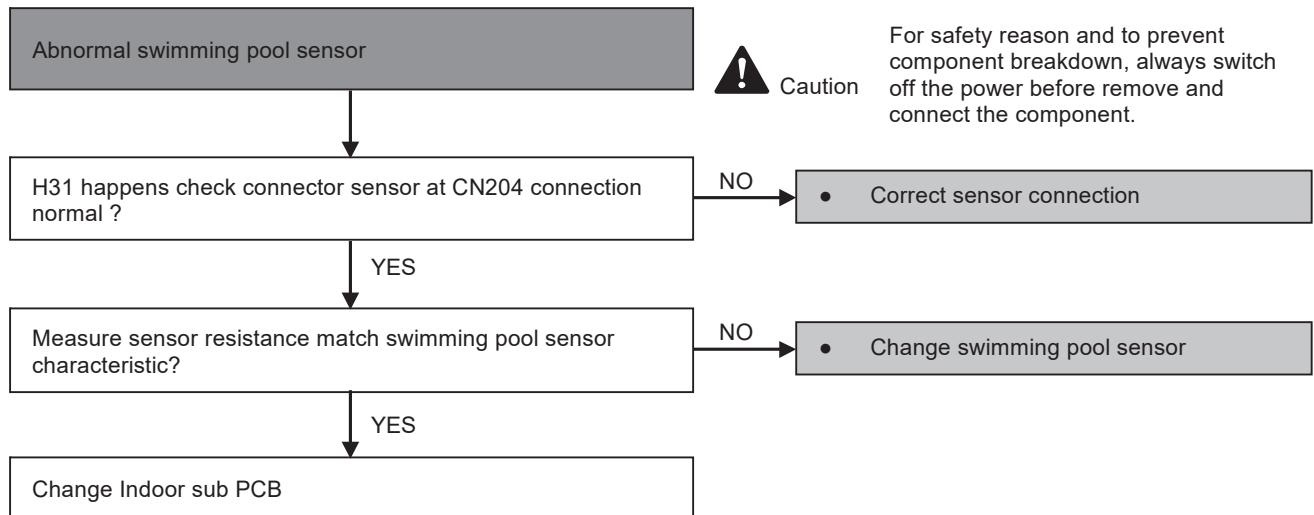
17.5.8 Abnormal Swimming Pool Sensor (H31)

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty swimming pool sensor.
- 3 Faulty indoor sub PCB.

Abnormality Judgment:

Continue for 5 seconds.



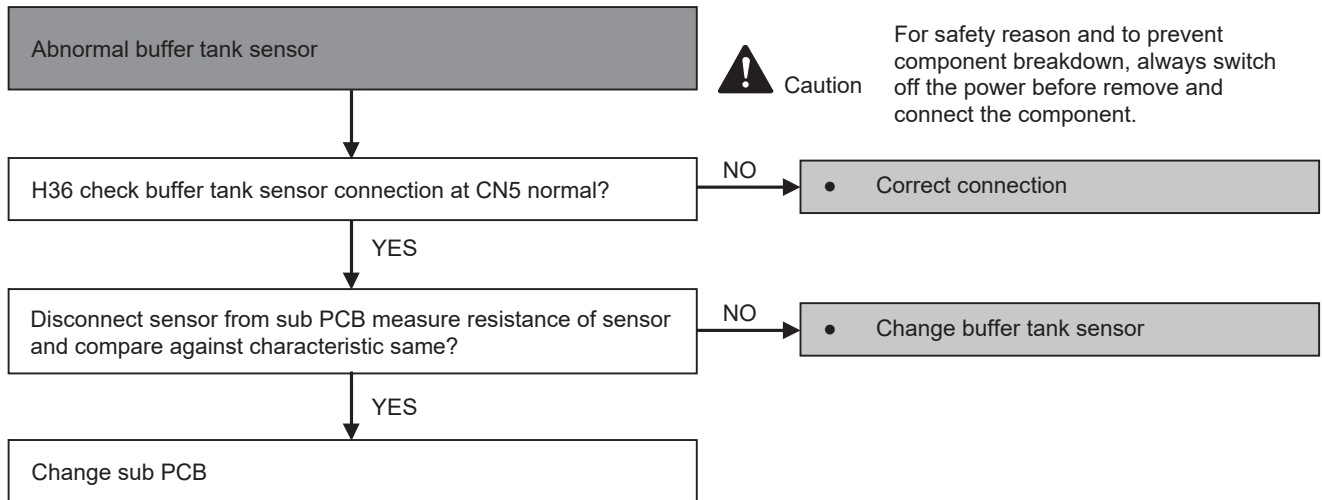
17.5.9 Abnormal Buffer Tank Sensor (H36)

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty buffer tank sensor.
- 3 Faulty indoor sub PCB.

Abnormality Judgment:

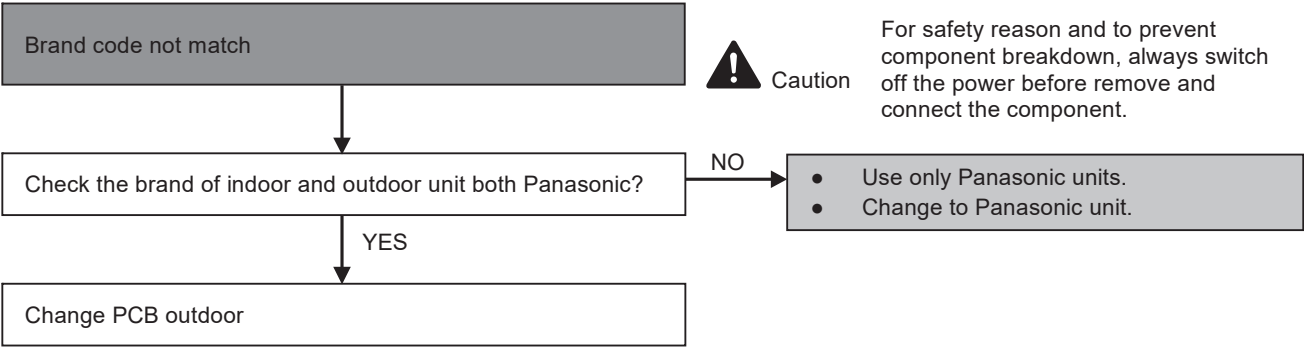
Continue for 5 seconds.



17.5.10 Brand Code Not Matching (H38)

Malfunction Caused:

- 1 Indoor and outdoor brand code not match.



17.5.11 Compressor Low Pressure Protection (H42)

Malfunction Decision Conditions:

During operation of heating and after 5 minutes compressor ON, when outdoor pipe temperature below -40°C or above 37°C is detected by the outdoor pipe temperature sensor.

Malfunction Caused:

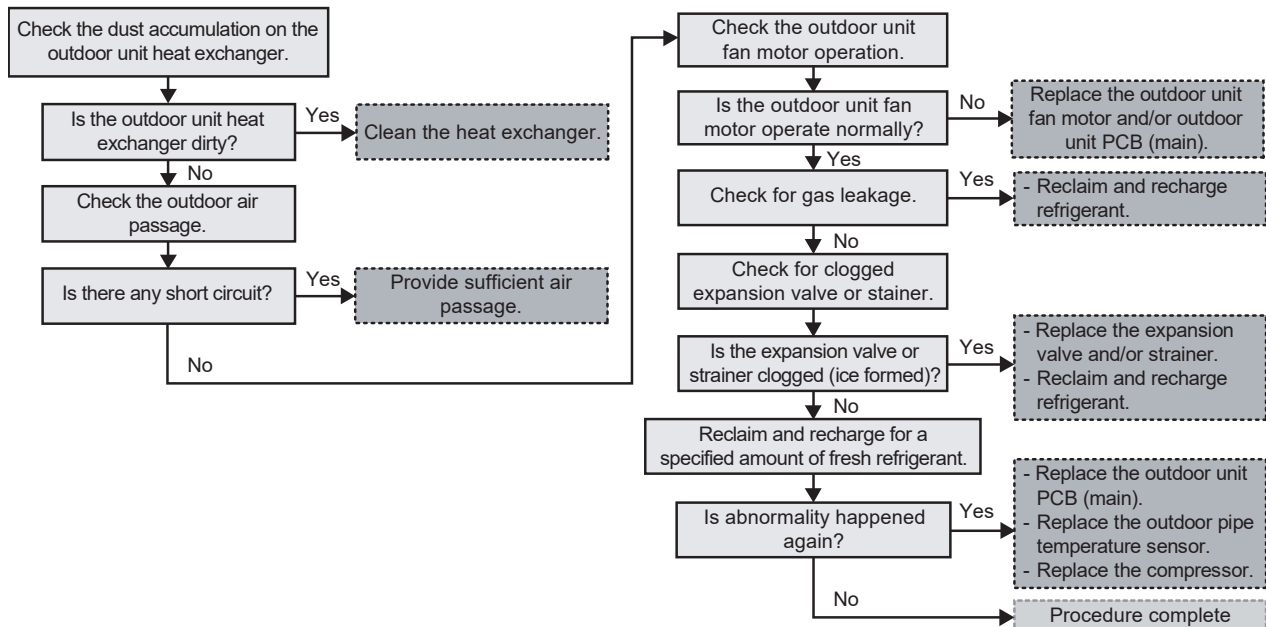
- 1 Dust accumulation on the outdoor unit heat exchanger.
- 2 Air short circuit at outdoor unit.
- 3 Faulty outdoor unit fan motor.
- 4 Refrigerant shortage (refrigerant leakage).
- 5 Clogged expansion valve or strainer.
- 6 Faulty outdoor pipe temperature sensor.
- 7 Faulty outdoor unit main PCB (main).

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



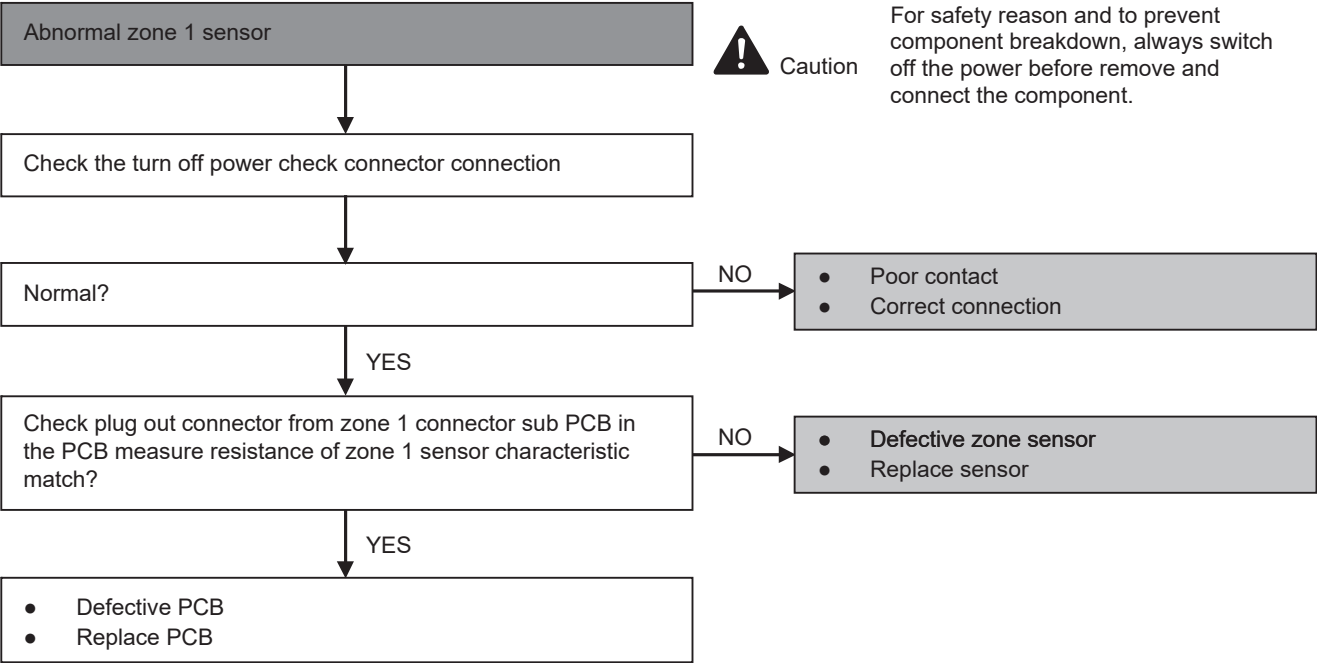
17.5.12 Abnormal Zone 1 Sensor (H43)

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty buffer tank sensor.
- 3 Faulty indoor sub PCB.

Abnormality Judgment:

Continue for 5 seconds.



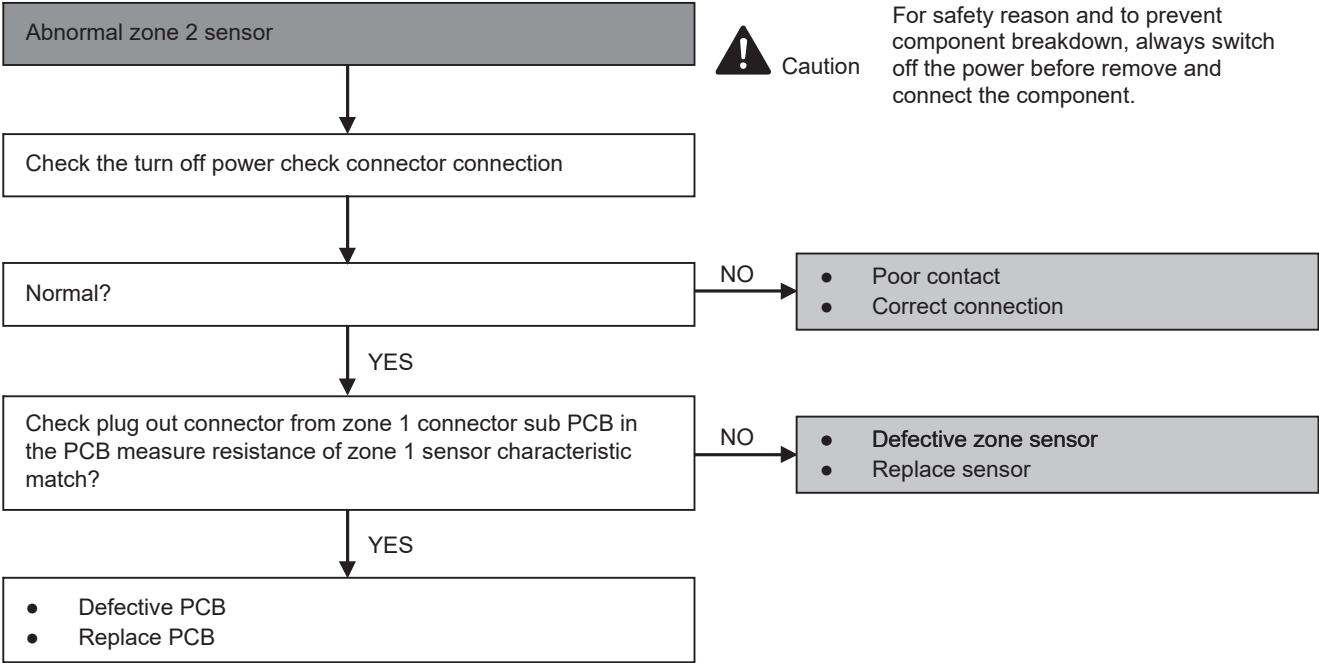
17.5.13 Abnormal Zone 2 Sensor (H44)

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty buffer tank sensor.
- 3 Faulty indoor sub PCB.

Abnormality Judgment:

Continue for 5 seconds.



17.5.14 Water Flow Switch Abnormality (H62)

Malfunction Decision Conditions:

During operation of cooling and heating, the water flow detected by the outdoor water flow switch is used to determine water flow error.

Malfunction Caused:

- 1 Faulty water pump.
- 2 Water leak in system.
- 3 Faulty connector connection.
- 4 Faulty water flow switch.
- 5 Faulty outdoor unit PCB (sub).

Abnormality Judgment:

Continue for 140 seconds (but no judgment for 30 seconds after water pump startup/restart).

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.

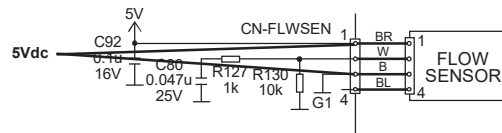
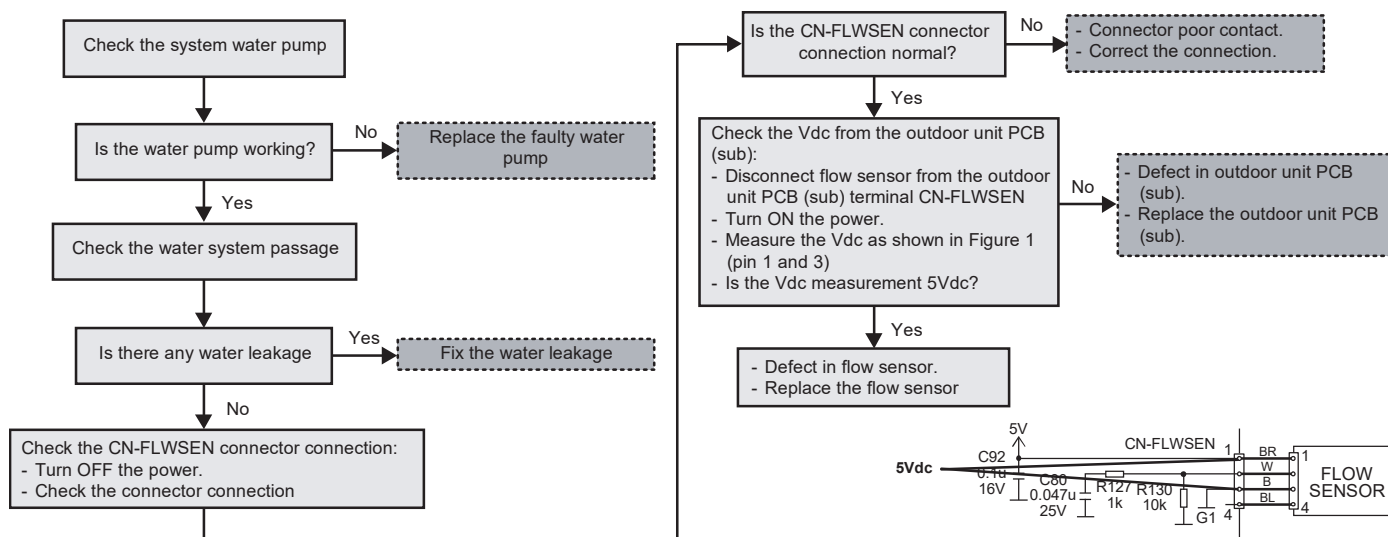


Figure 1

17.5.15 Outdoor High Pressure Abnormality (H64)

Malfunction Decision Conditions:

During operation of cooling and heating, when the outdoor high pressure sensor output signal is 0 Vdc or 5 Vdc.

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty sensor.
- 3 Faulty outdoor unit PCB (main).

Abnormality Judgment:

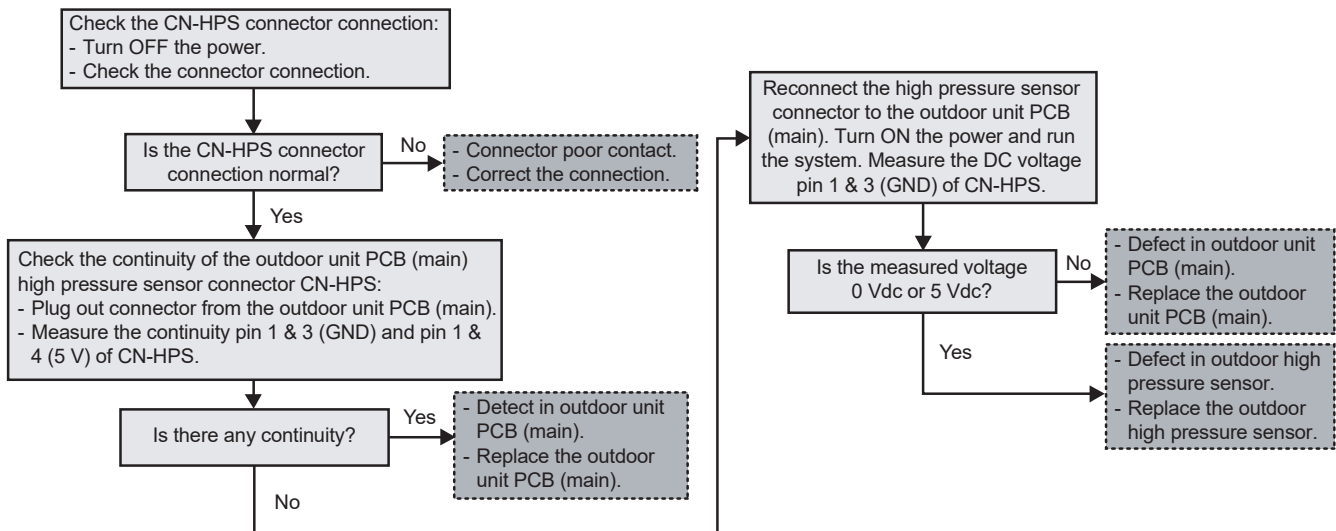
Continue 4 times in 120 minutes.

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.16 Deice Circulation Error (H65)

Malfunction Decision Conditions:

During startup and operation of deice (mode 2), the water flow (> 8 l/min) detected by the water flow switch is used to determine deice circulation error.

Malfunction Caused:

- 1 Water flow in air-to-water heatpump unit circuitry.
- 2 Faulty outdoor unit water flow switch.
- 3 Faulty outdoor unit water pump.
- 4 Faulty outdoor unit PCB (sub).
- 5 Faulty outdoor unit PCB (main).

Abnormality Judgment:

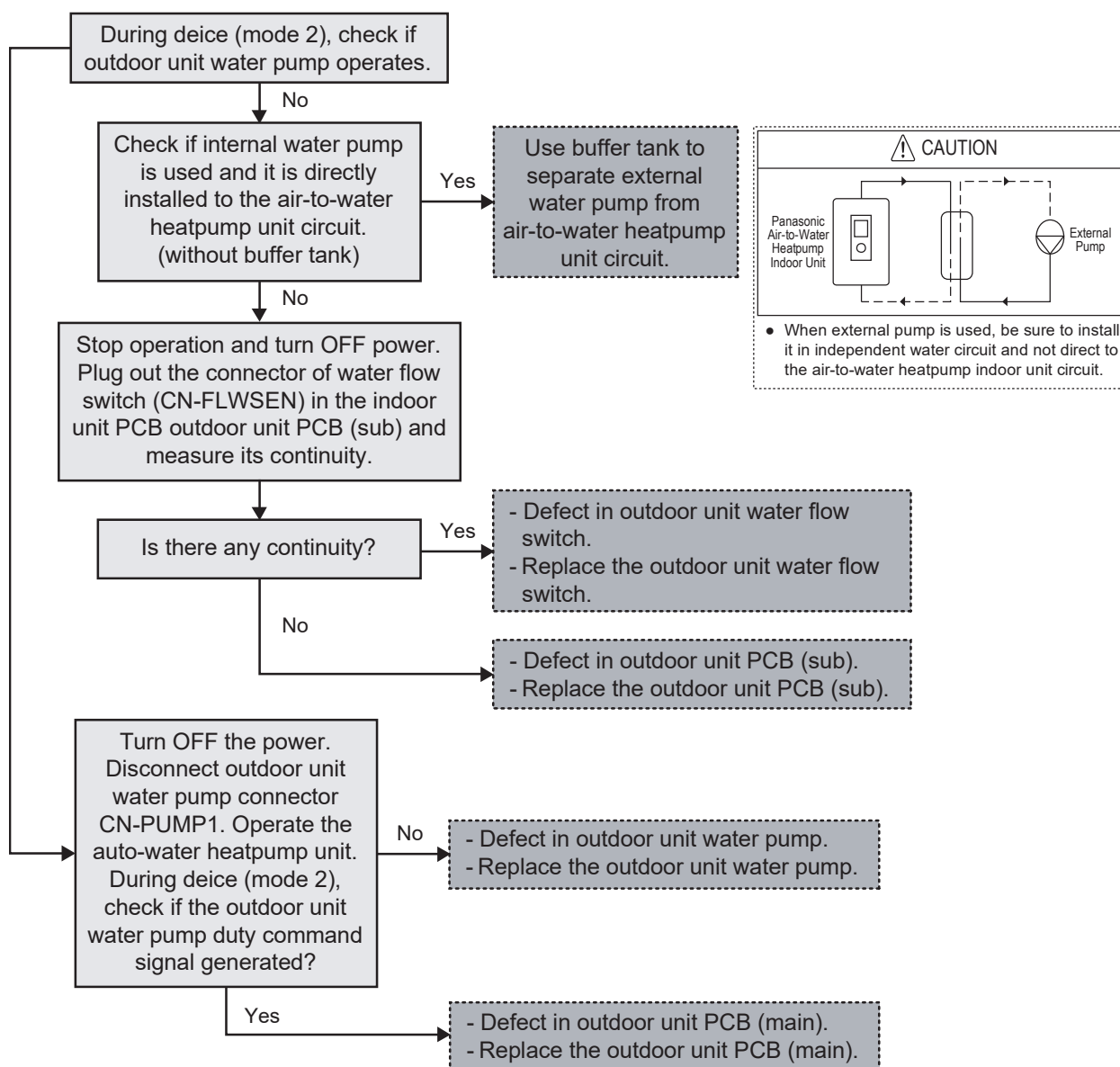
Continue for 10 seconds.

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



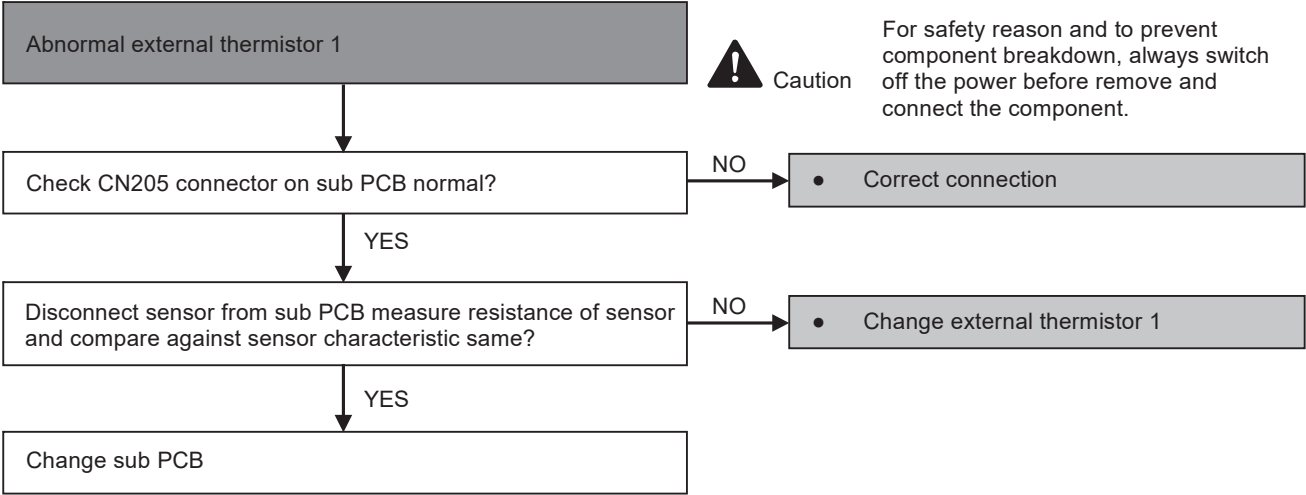
17.5.17 Abnormal External Thermistor 1 (H67)

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty room temperature zone 1 sensor.
- 3 Faulty indoor sub PCB.

Abnormality Judgment:

Continue for 5 seconds.



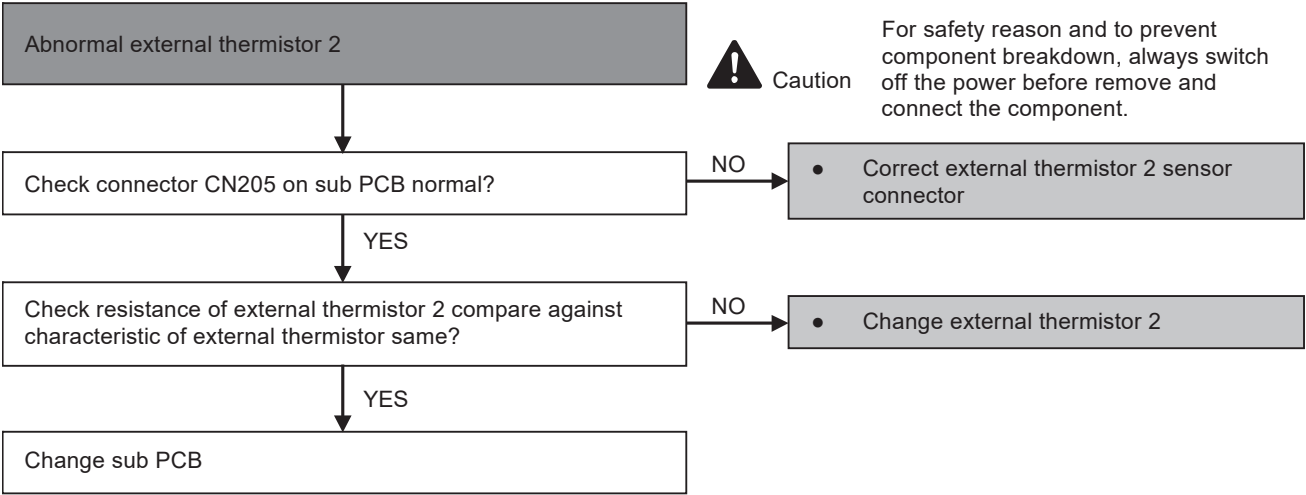
17.5.18 Abnormal External Thermistor 2 (H68)

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty room temperature zone 2 sensor.
- 3 Faulty indoor sub PCB.

Abnormality Judgment:

Continue for 5 seconds.



17.5.19 External Heater OLP Abnormality (H70)

Malfunction Decision Conditions:

During operation of external heater, when no power supplies to external heater or OLP open circuit.

Malfunction Caused:

- 1 Faulty power supply connector connection.
- 2 Faulty connector connection.
- 3 Faulty external heater overload protector (OLP).
- 4 Faulty indoor unit PCB (main).

Abnormality Judgment:

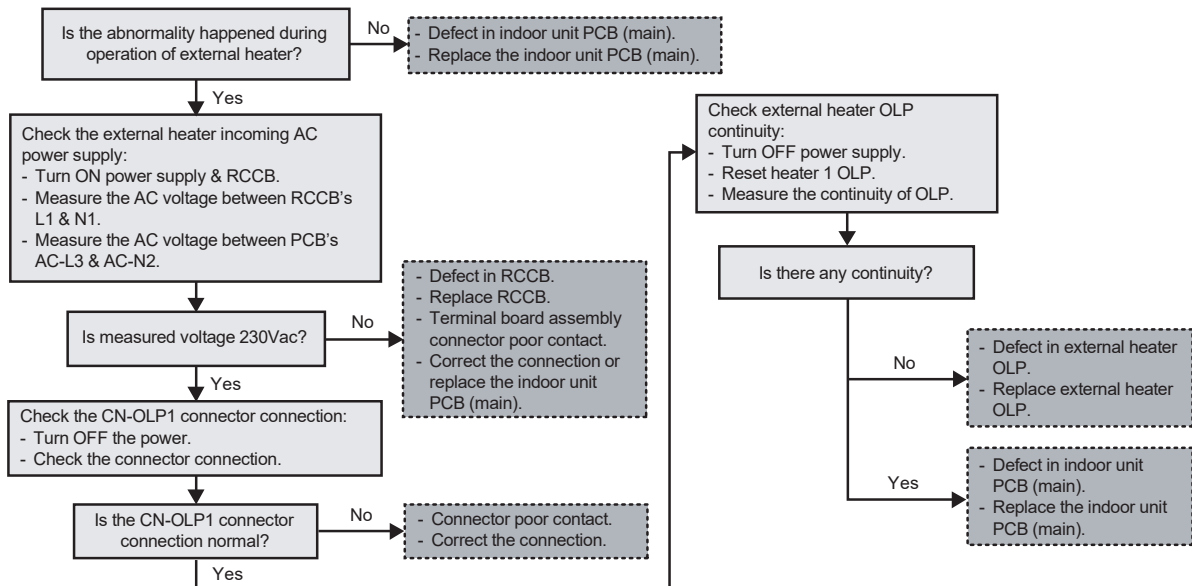
Continue for 60 seconds.

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.20 Tank Temperature Sensor Abnormality (H72)

Malfunction Decision Conditions:

When tank connection is set to ON, the temperatures detected by the tank temperature sensor are used to determine sensor error.

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty sensor.
- 3 Faulty indoor unit PCB (main).
- 4 Faulty outdoor unit PCB (sub).

Abnormality Judgment:

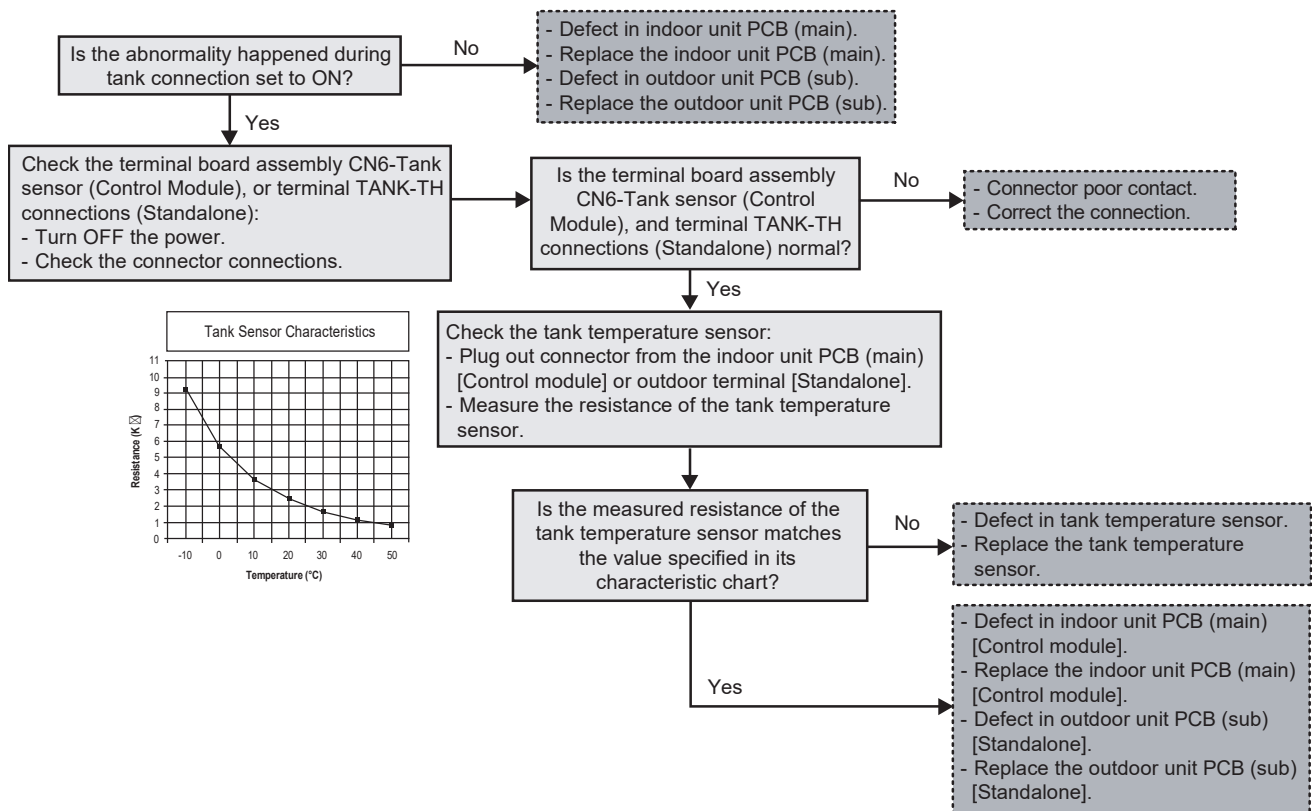
Continue for 5 seconds.

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.21 PCB Communication Error (H74)

Malfunction Decision Conditions:

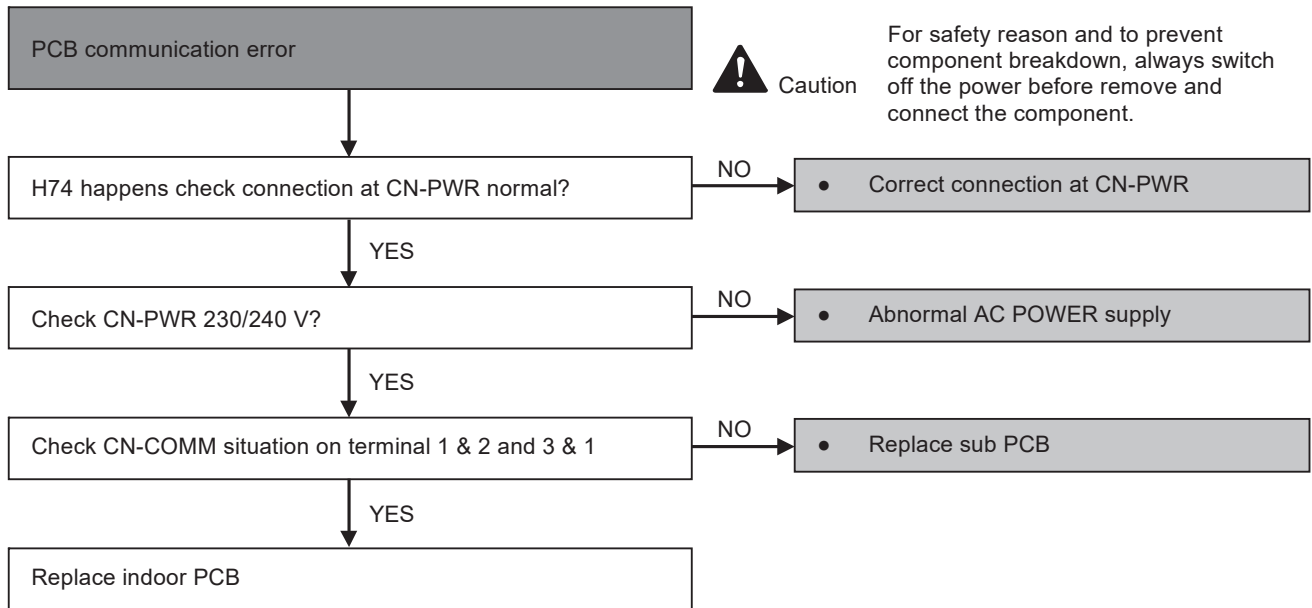
When External PCB connection is select "YES" and no communication with External PCB micon for 10 seconds and above.

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty indoor PCB.
- 3 Faulty indoor sub PCB.

Abnormality Judgment:

After 1 minute operation started.



17.5.22 Indoor-Control Panel Communication Abnormality (H76)

Malfunction Decision Conditions:

During standby and operation of cooling and heating, indoor-control panel error occur.

Malfunction Caused:

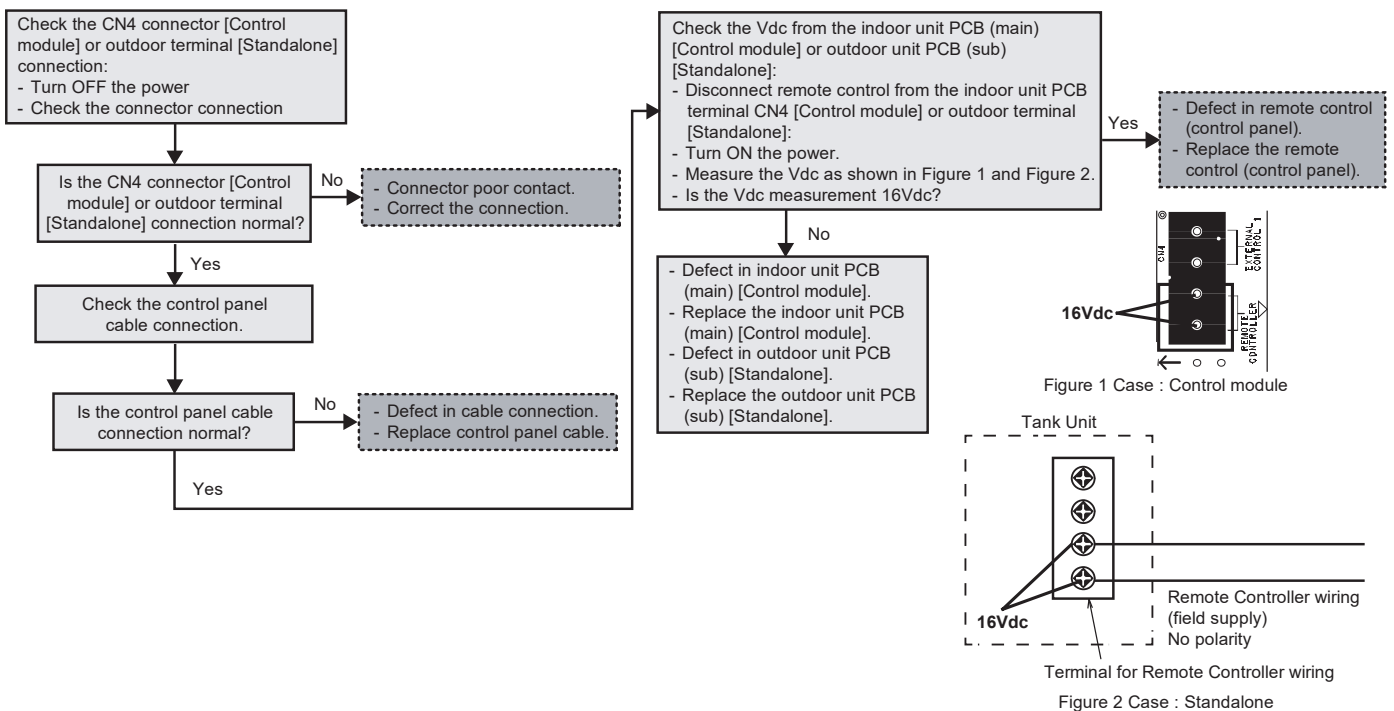
- 1 Faulty connector connection.
- 2 Faulty control panel.
- 3 Faulty indoor unit PCB (main).
- 4 Faulty outdoor unit PCB (sub).

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.23 Indoor/Outdoor Abnormal Communication (H90)

Malfunction Decision Conditions:

During operation of cooling and heating, the data received from outdoor unit in indoor unit signal transmission is checked whether it is normal.

Malfunction Caused:

- 1 Faulty outdoor unit PCB (main).
- 2 Faulty outdoor unit PCB (sub).
- 3 Faulty indoor unit PCB (main).
- 4 Indoor-outdoor signal transmission error due to wrong wiring.
- 5 Indoor-outdoor signal transmission error due to breaking of wire in the connection wires between the indoor and outdoor units.
- 6 Indoor-outdoor signal transmission error due to disturbed power supply waveform.

Abnormality Judgment:

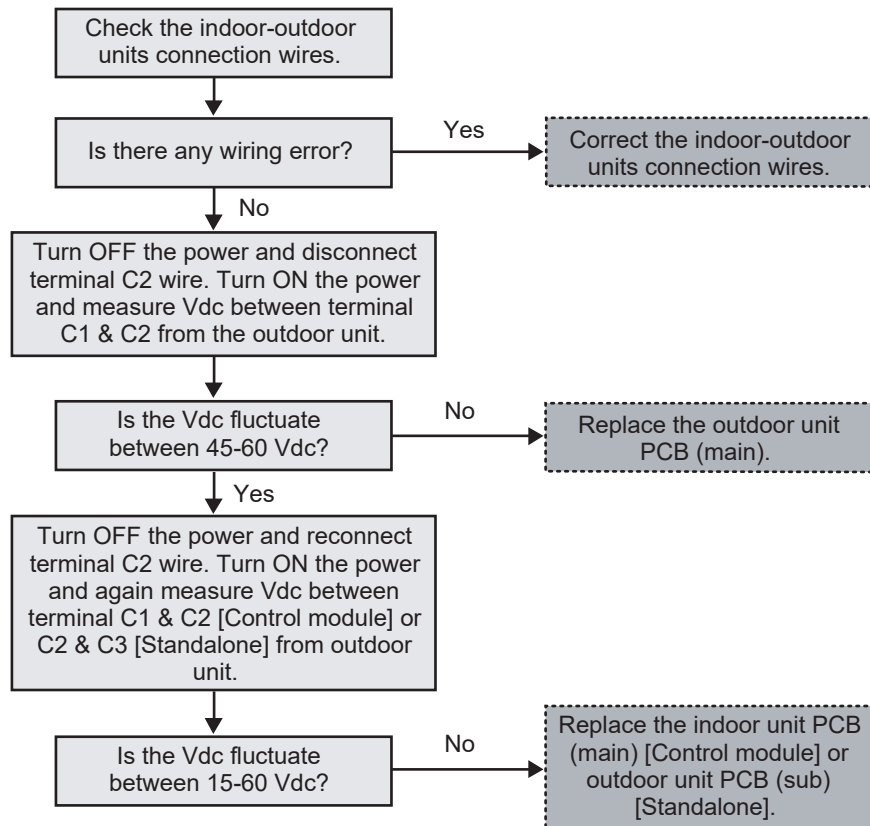
Continue for 15 seconds after operation.

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.24 Tank Booster Heater OLP Abnormality (H91)

Malfunction Decision Conditions:

During operation of tank booster heater, and tank booster heater OLP open circuit.

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty tank booster heater overload protector (OLP).
- 3 Faulty indoor unit PCB (main).

Abnormality Judgment:

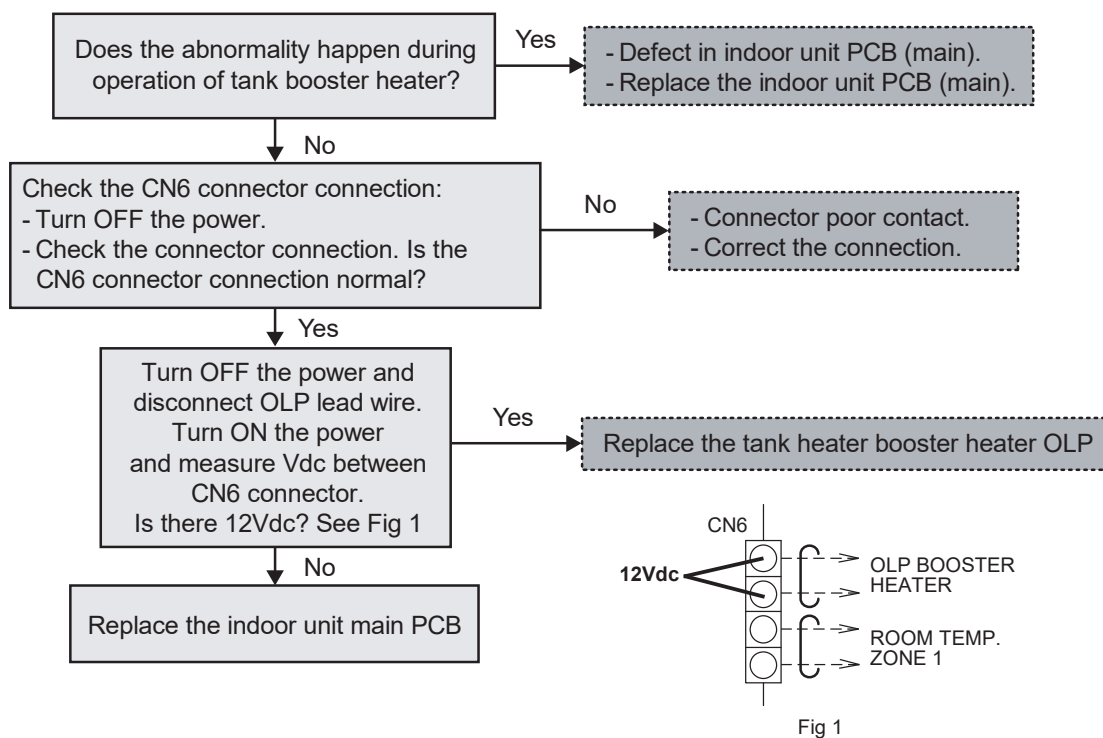
Continue for 60 seconds.

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.25 Voltage connection error (H95)

Alarm meaning	Open phase, reversed-phase of the compressor wiring
Alarm conditions	Open phase any of the L1-L2-L3-N, reversed-phase of the compressor wiring
Probable cause	(1) Open phase any of the L1-L2-L3-N (2) Reversed-phase of the compressor wiring (3) Wiring failure
Check	(1) Check the power supply and power wiring. (2) Check the compressor wiring. Check whether the wiring between the HIC PCB and compressor is reversed-phase (position of U, V, W is properly placed), missing, connection failure. (3) Check the wiring. Check whether each wiring is missing or connector is damaged.
Correction	(1) Correct the power supply and power wiring. (2) Correct the compressor wiring. (3) Correct the wiring failure.
Example	Miswiring occurred when replacing the compressor or HIC PCB.
Notes	—

17.5.26 Outdoor High Pressure Protection (H98 / F95)

Malfunction Decision Conditions:

During operation of cooling / heating, when pressure 3.2 MPa and above is detected by outdoor high pressure sensor.

Malfunction Caused:

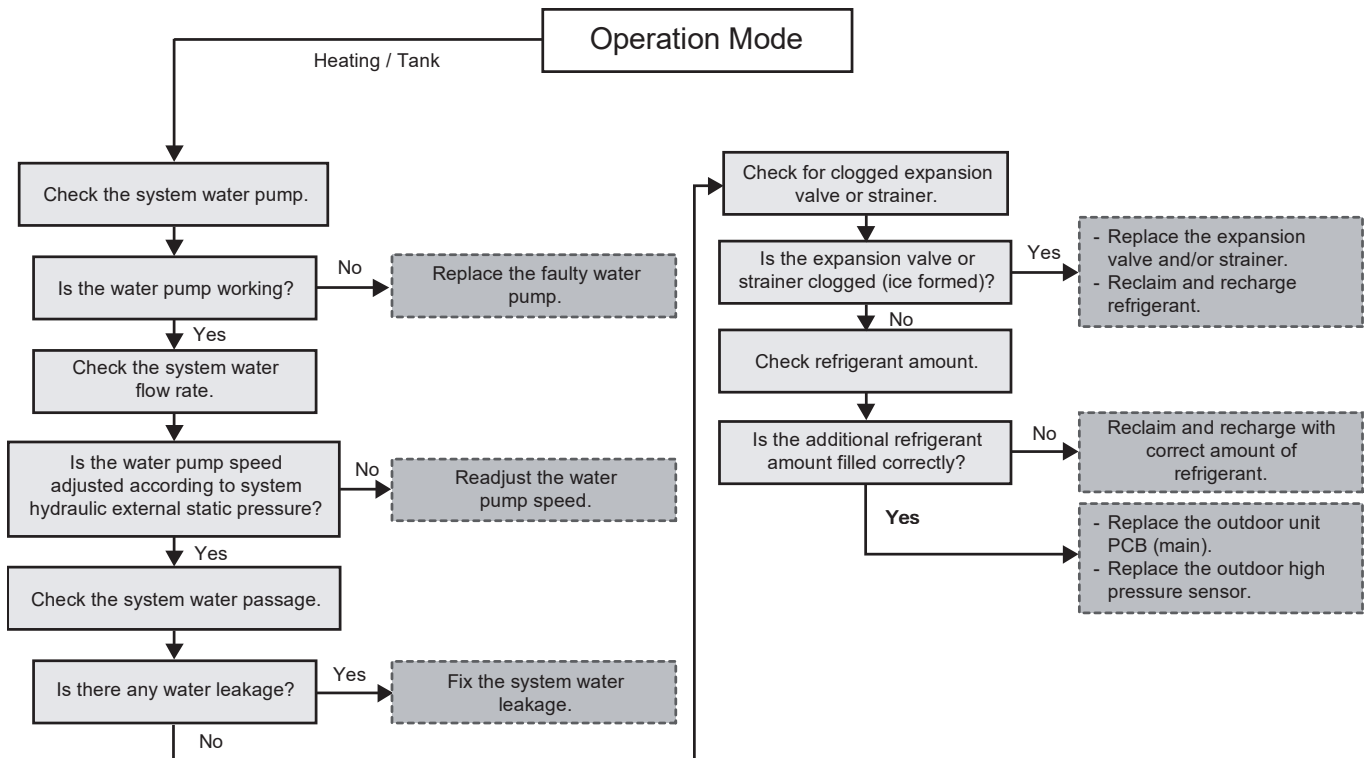
- 1 Faulty water pump.
- 2 Insufficient water flow rate in system.
- 3 Water leak in system.
- 4 Dust accumulation in the outdoor unit heat exchanger.
- 5 Air short circuit at outdoor.
- 6 Faulty outdoor unit fan motor.
- 7 2/3 way closed.
- 8 Clogged expansion valve or strainer.
- 9 Excessive refrigerant.
- 10 Faulty outdoor high pressure sensor.
- 11 Faulty outdoor unit PCB (main).

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.

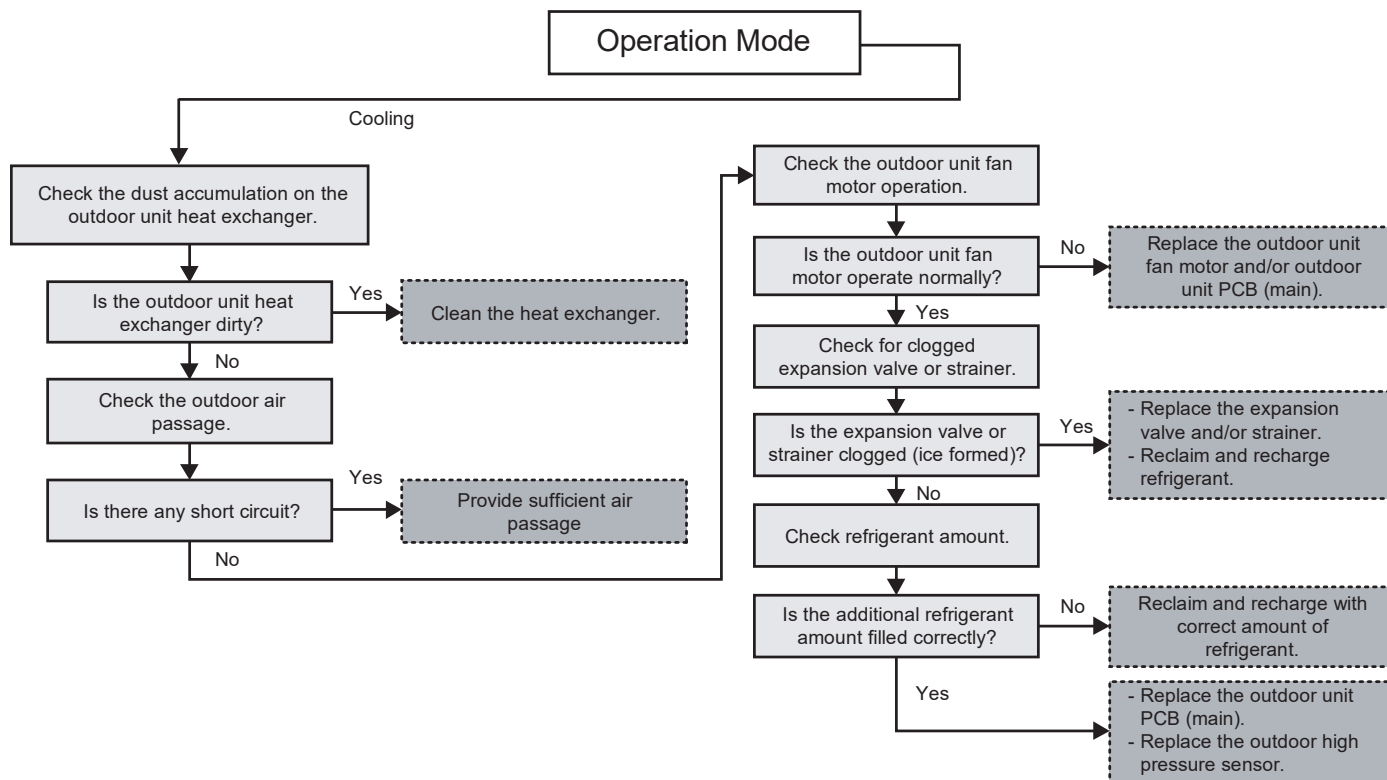


Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.27 Indoor Freeze-up Protection (H99)

Malfunction Decision Conditions:

During anti-freezing control in cooling operation, when the refrigerant liquid temperature $< 0^{\circ}\text{C}$.

Malfunction Caused:

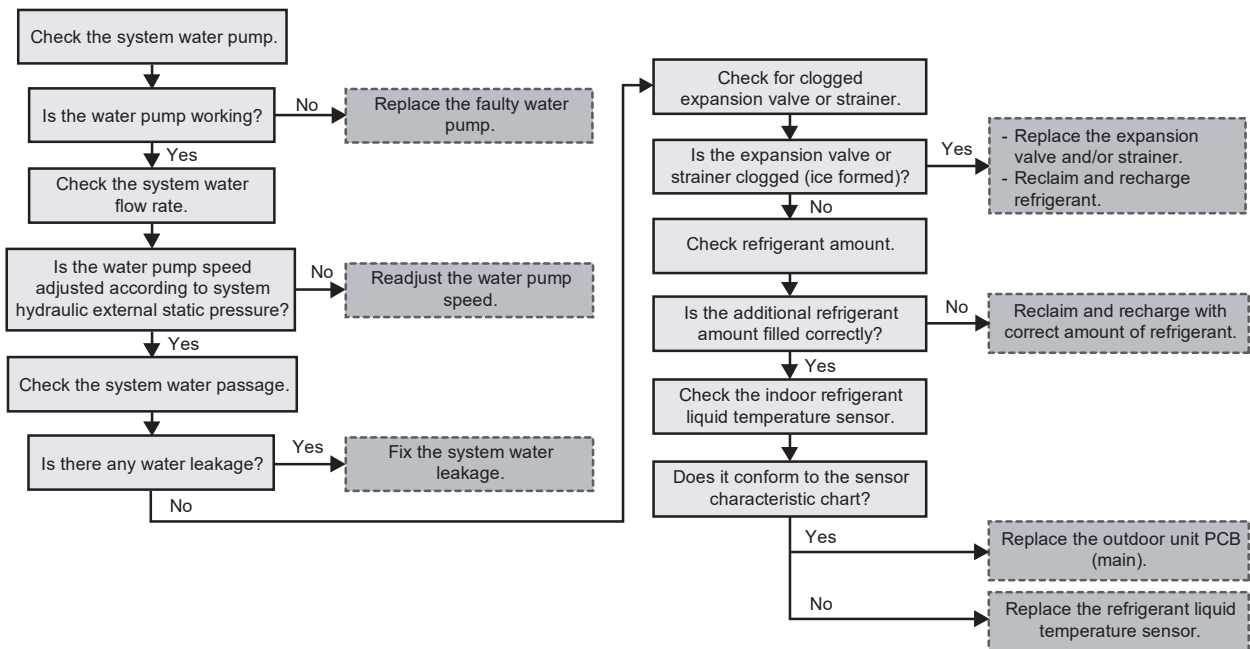
- 1 Faulty water pump.
- 2 Insufficient water flow rate in system.
- 3 Water leak in system.
- 4 Clogged expansion valve or strainer.
- 5 Refrigerant shortage (refrigerant leakage).
- 6 Faulty indoor refrigerant liquid temperature sensor.
- 7 Faulty outdoor unit PCB (main).

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.28 Outdoor High Pressure Switch Activate (F12)

Malfunction Decision Conditions:

During operation of cooling and heating, when pressure 3.9 MPa and above is detected by outdoor high pressure switch.

Malfunction Caused:

- 1 Dust accumulation on the outdoor unit heat exchanger.
- 2 Air short circuit at outdoor unit.
- 3 Faulty water pump.
- 4 Insufficient water flow rate in system.
- 5 Water leak in system.
- 6 Clogged expansion valve or strainer.
- 7 Excessive refrigerant.
- 8 Faulty outdoor high pressure sensor and switch.
- 9 Faulty outdoor unit PCB (main).

Abnormality Judgment:

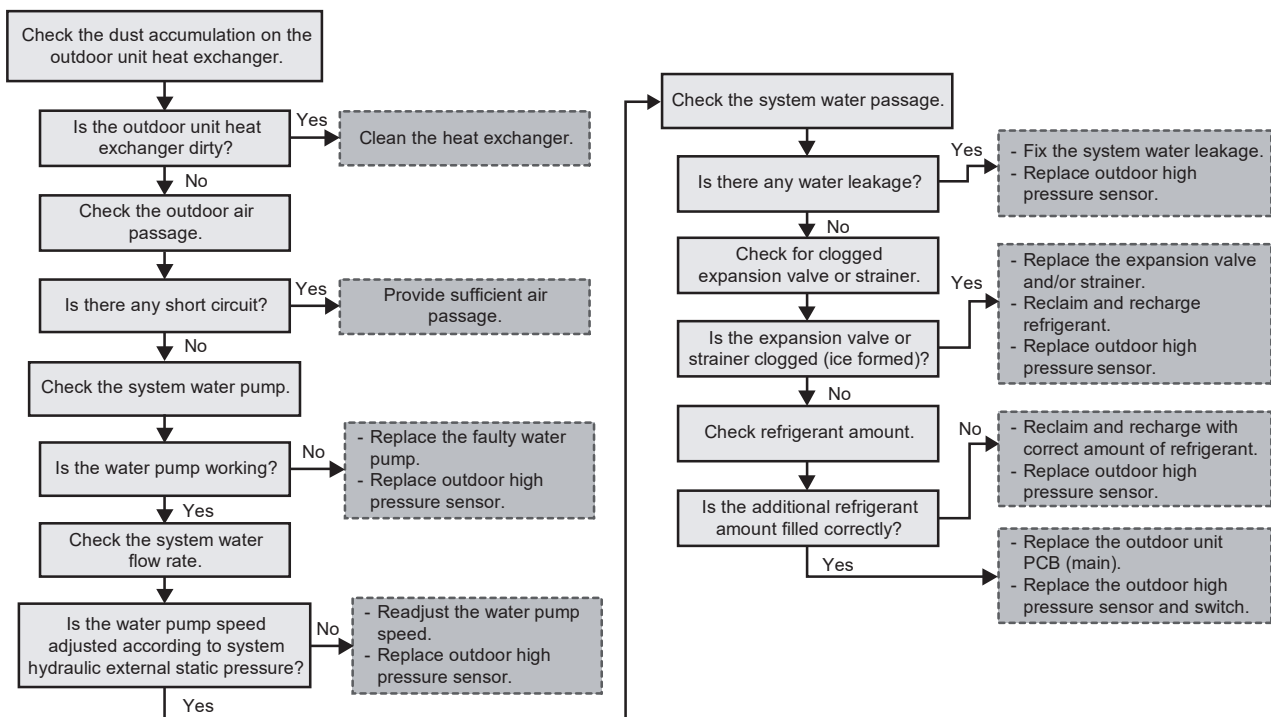
Continue 4 times in 30 minutes.

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.29 Poor compressor rotation (F14)

Alarm meaning	Compressor start failure (compressor lock)
Alarm conditions	This alarm may occur at start, and occurs when lock is detected.
Probable cause	(1) Power supply voltage malfunction (2) Wiring failure (missing, connection failure, miswiring) * Wiring between the HIC PCB and compressor
Check	(1) Check the power supply and voltage. Check whether the voltage between each of the phases is correct while the compressor is running. (It is necessary to check the compressor while running because the voltage may decrease when the compressor starts running.) (2) Check the wiring. Check whether the following wiring is missing, connection failure or miswiring (position of U, V, W is properly placed). • Wiring between the HIC PCB and compressor • HIC PCB side • Compressor side
Correction	(1) Correct the power supply voltage. (2) Correct the wiring. (3) Replace the HIC PCB. (4) Replace the compressor.
Example	—
Notes	—

17.5.30 Fan motor lock error (F15)

Alarm meaning	Fan motor 1 trouble
Alarm conditions	Fan motor start failure, fan motor Hall IC input failure
Probable cause	(1) Wiring failure (2) Fan PCB failure (3) Fan failure (4) Fan motor failure (5) HIC PCB failure
Check	(1) Check the wiring. Check whether the following items are missing or connection failure. (2) Check the fan rotation. Check if there is any obstacle affecting fan rotation. (3) Check the abnormal fan motor. Rotate the fan manually and check whether the fan rotates smoothly. If the fan cannot rotate smoothly and it is necessary to rotate forcibly, the fan motor is abnormal. (Compare with the normal unit.) Check the status without wires (x2) from the fan motor to the PCB.
Correction	(1) Correct the wiring. (2) Remove the obstacles attached to the fan. (3) Replace the fan motor. (4) Replace the fan PCB. (5) Replace the HIC PCB.
Example	—
Notes	—

17.5.31 Current protection (F16)

Alarm meaning	Primary current trouble
Alarm conditions	The primary current detected overcurrent higher than 38A (overcurrent).
Probable cause	(1) Wiring failure (2) Power supply voltage malfunction (sudden-voltage-drop)
Check	(1) Wiring failure Forgot to connect the wires L1, L2, L3. Check whether the terminals are connected correctly. (2) Check the power supply voltage.
Correction	(1) Wiring failure Correct the disconnection and wiring failure (2) Correct the power supply voltage.
Example	—
Notes	—

17.5.32 Compressor Overheating (F20)

Malfunction Decision Conditions:

During operation of cooling and heating, when temperature above 112°C is detected by the outdoor discharge pipe temperature sensor.

Malfunction Caused:

- 1 Faulty outdoor discharge pipe temperature sensor.
- 2 Refrigerant shortage (refrigerant leakage).
- 3 Clogged expansion valve or strainer.
- 4 Faulty outdoor unit PCB (main).
- 5 Faulty compressor.

Abnormality Judgment:

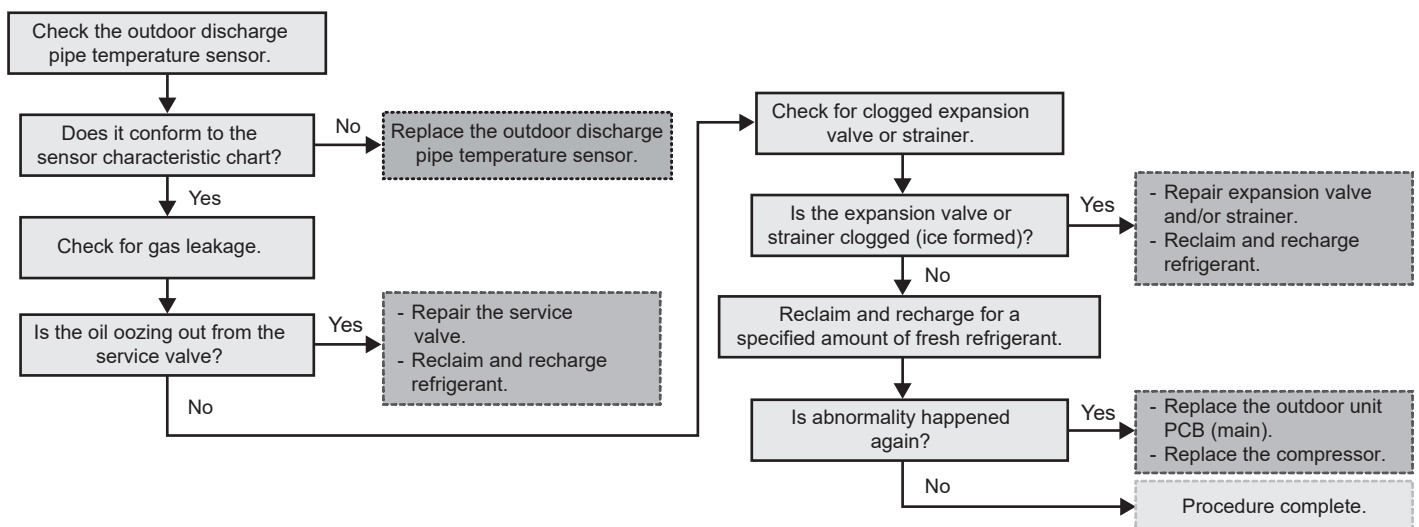
Continue 4 times in 30 minutes.

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.33 IPM Overheating (F22)

Malfunction Decision Conditions:

During operation of cooling and heating, when temperature 95°C is detected by the outdoor IPM temperature sensor.

Malfunction Caused:

- 1 Faulty outdoor unit fan motor.
- 2 Faulty outdoor unit PCB (main).

Abnormality Judgment:

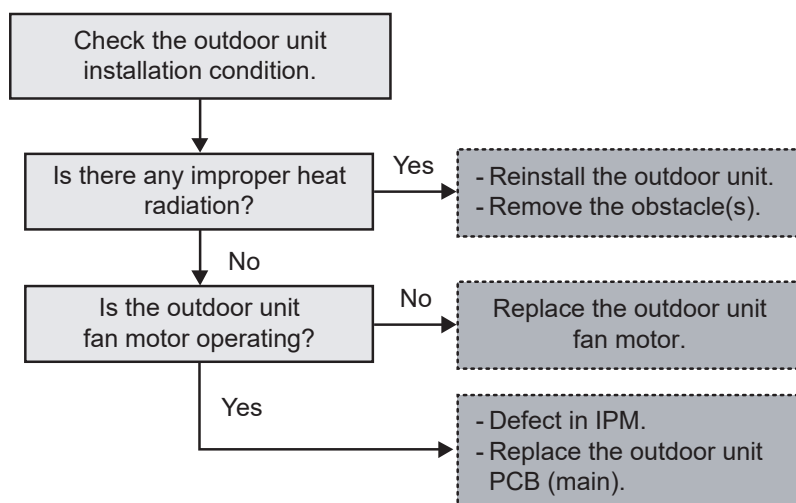
Continue 4 times in 30 minutes.

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.34 DC peak (F23)

Alarm meaning	HIC trouble alarm
Alarm conditions	This alarm occurs when the microcomputer identifies a trouble signal (indicating abnormal HIC temperature or other trouble) from the HIC. The HIC judges the current and temperature, and outputs the trouble signal. In general this indicates trouble with the HIC itself.
Probable cause	(1) Power supply voltage malfunction (2) Overcurrent HIC caused the HIC failure by abnormal temperature.
Check	(1) Check the power supply and voltage. Check whether the voltage between each of the phases is correct while the compressor is running. (It is necessary to check the compressor while running because the voltage may decrease when the compressor starts running.) (2) Radiation failure of HIC. Check the follows. • Confirm that radiation surface of the rear HIC PCB and the radiation plate of the electrical component box contact properly. Putty of thermal conductivity is properly adhered. • No screws loose. • Cooling air flows properly through the rear radiation plate of the electrical component box (fin part). (Clogged in the airflow, etc.)
Correction	(1) Correct the power supply voltage. (2) HIC failure and PCB replacement (3) Improve the HIC radiation failure.
Example	—
Notes	Disconnect the power supply.

17.5.35 Refrigeration Cycle Abnormality (F24)

Malfunction Decision Conditions:

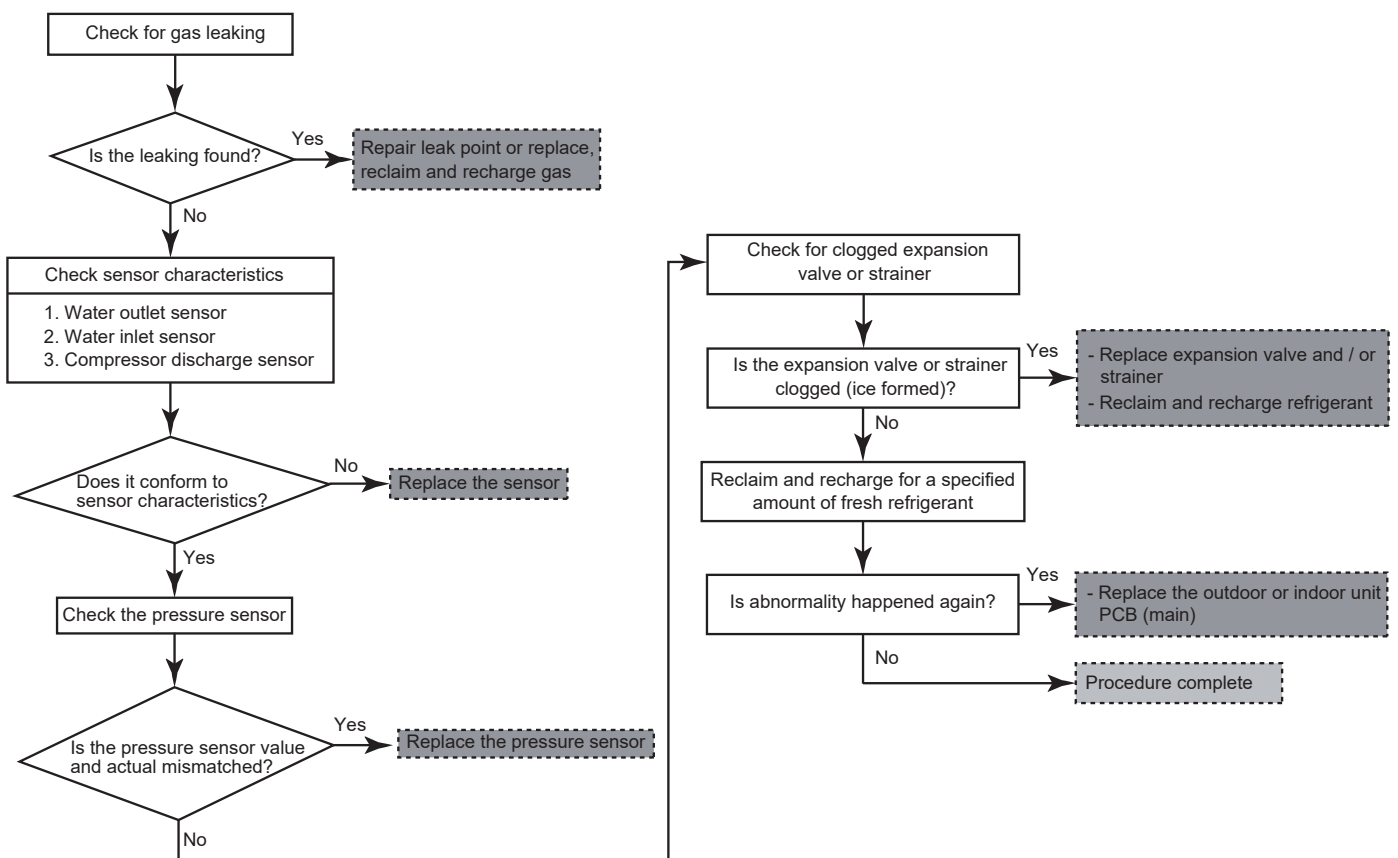
- 1 During compressor running (heating / cooling) for more than 10 minutes except deice and test mode.
- 2 During heating, water outlet and water inlet difference is less than 3°C.
- 3 During cooling, water outlet and water inlet difference is less than 2°C.
- 4 During heating, high pressure < 0.16 MPa (23 Psi) for more than 10 minutes or during cooling, high pressure < 0.04 MPa (6 Psi) for more than 10 minutes or high pressure < 0.01 MPa (1 Psi) for more than 5 minutes.
- 5 During heating, discharge temperature - saturation temperature of high pressure $\geq 65^{\circ}\text{C}$.
- 6 During cooling, discharge temperature - saturation temperature of high pressure $\geq 70^{\circ}\text{C}$.

Malfunction Caused:

- 1 Refrigerant shortage (refrigerant leakage).
- 2 Faulty indoor water inlet, indoor water outlet, compressor discharge temp sensor or high pressure sensor.
- 3 Clogged expansion valve or strainer.
- 4 Faulty indoor or outdoor PCB (main).

Abnormality Judgment:

Continue 2 times in 30 minutes.



17.5.36 Four Way Valve Abnormality (F25)

Malfunction Decision Conditions:

- 1 During heating operation, when the refrigerant liquid temperature of thermostat ON indoor unit $< 0^{\circ}\text{C}$.
- 2 During cooling operation, when the refrigerant liquid temperature of thermostat ON indoor unit $> 45^{\circ}\text{C}$.

Malfunction Caused:

- 1 Faulty sensor.
- 2 Faulty connector connection.
- 3 Faulty outdoor unit PCB (noise filter/main).
- 4 Faulty four way valve.

Abnormality Judgment:

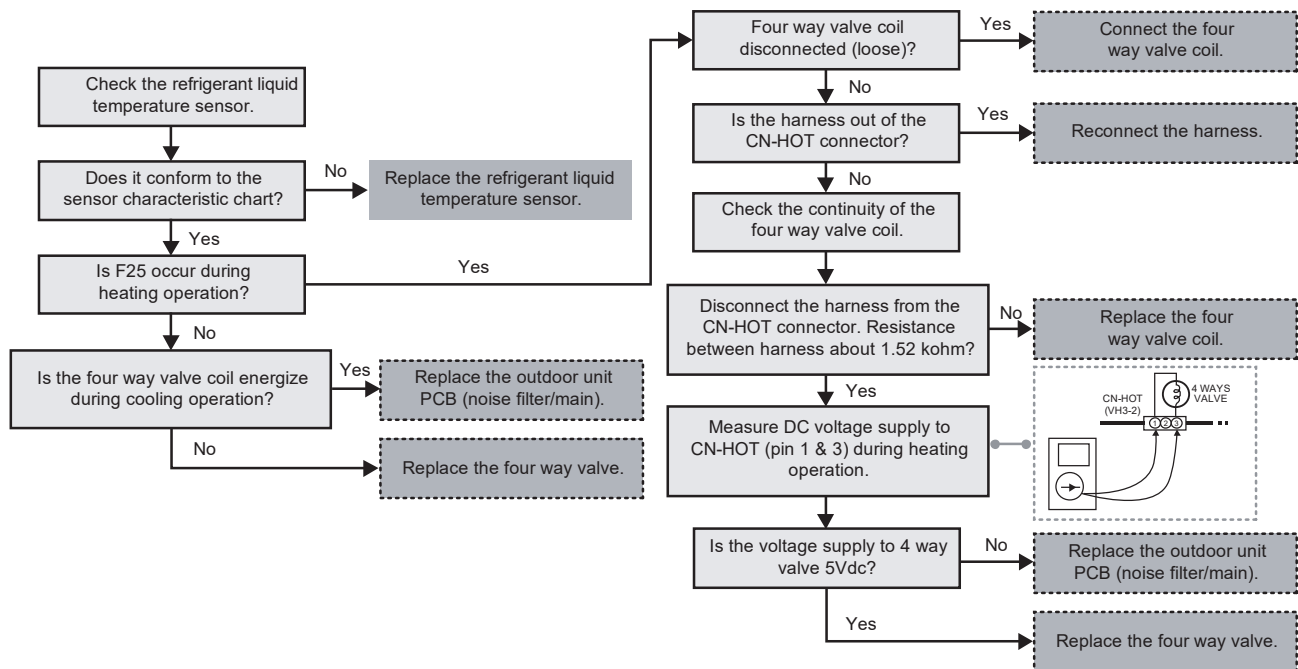
Continue 3 times in 40 minutes.

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.37 Outdoor High Pressure Switch Abnormal (F27)

Malfunction Decision Conditions:

During compressor stop, and outdoor high pressure switch is remain opened.

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty switch.
- 3 Faulty outdoor unit PCB (main).

Abnormality Judgment:

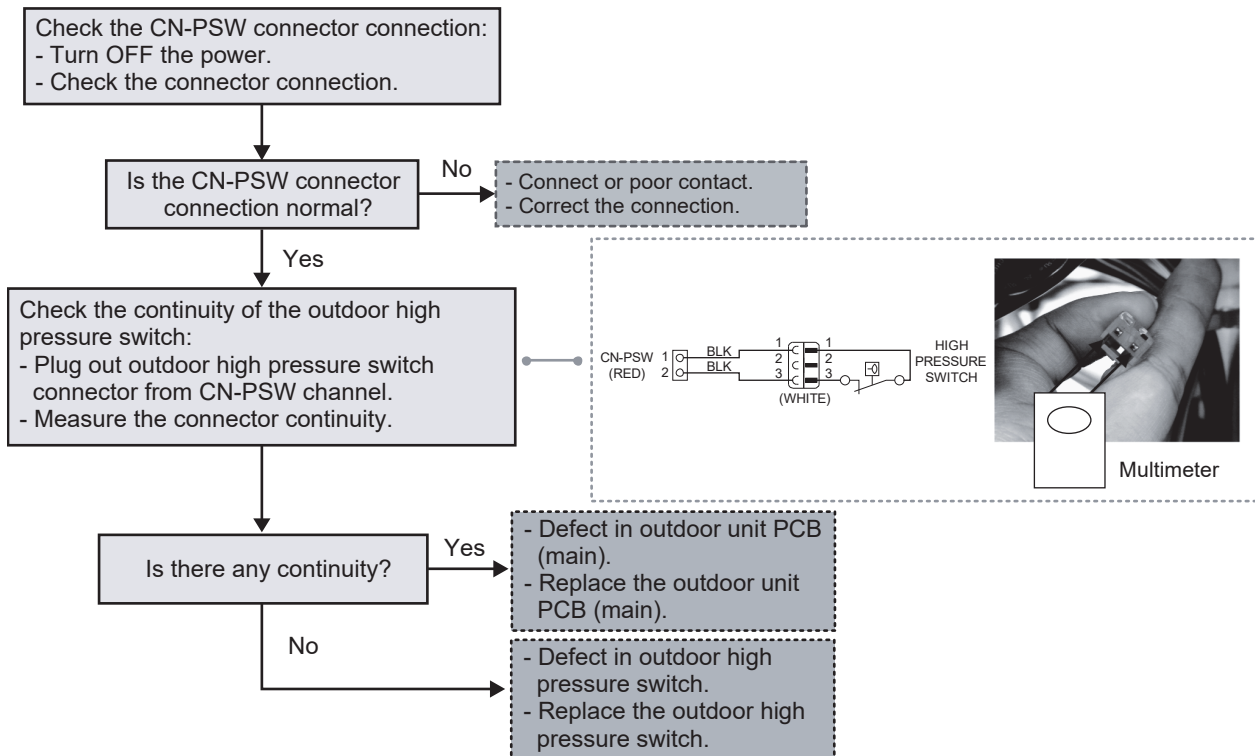
Continue for 1 minute.

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.38 Outdoor Water Outlet Temperature Sensor 2 Abnormality (F30)

Malfunction Decision Conditions:

During startup and operation of cooling and heating, the temperatures detected by the water outlet temperature sensor 2 are used to determine sensor error.

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty sensor.
- 3 Faulty outdoor unit PCB (main).

Abnormality Judgment:

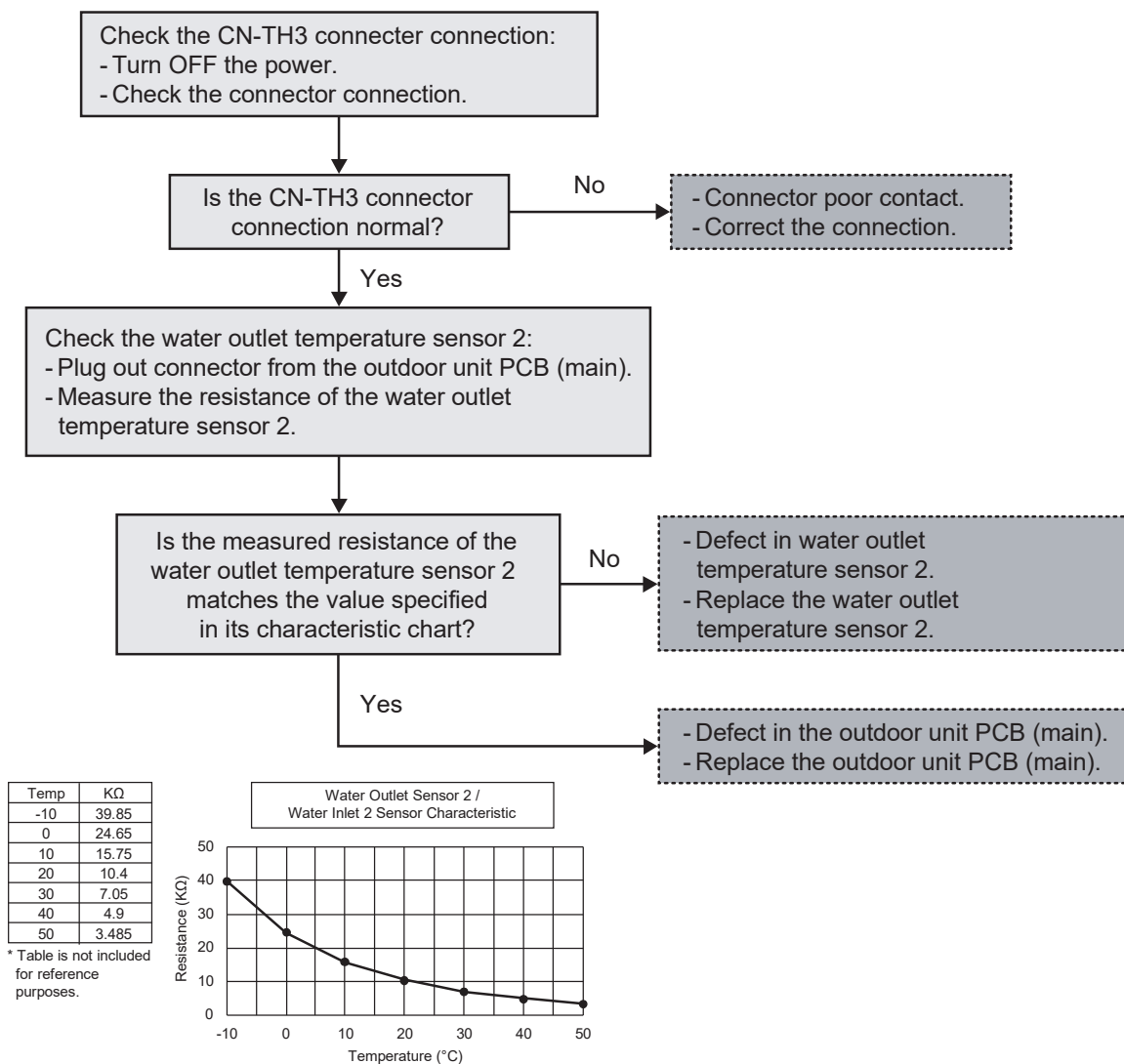
Continue for 5 seconds.

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.39 Outdoor Air Temperature Sensor Abnormality (F36)

Malfunction Decision Conditions:

During startup and operation of cooling and heating, the temperatures detected by the outdoor air temperature sensor are used to determine sensor error.

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty sensor.
- 3 Faulty outdoor unit PCB (main).

Abnormality Judgment:

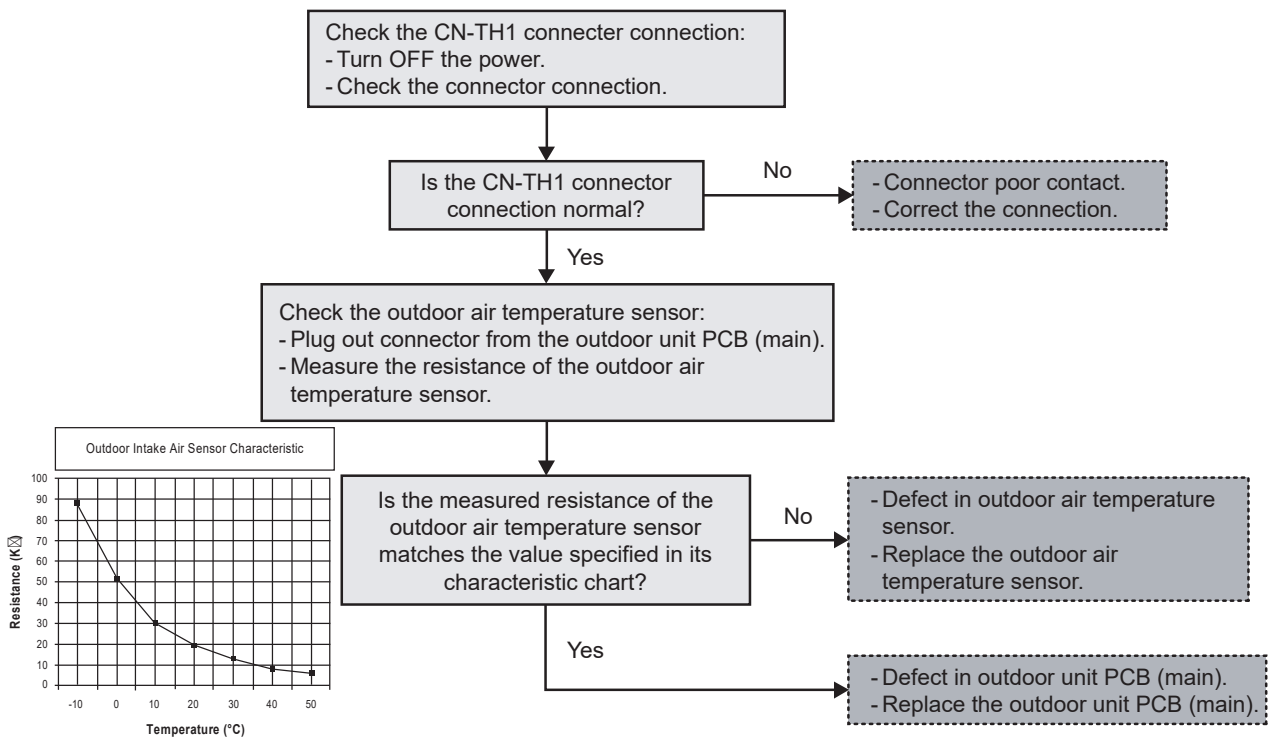
Continue for 5 seconds.

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.40 Indoor Water Inlet Temperature Sensor Abnormality (F37)

Malfunction Decision Conditions:

During startup and operation of cooling and heating, the temperatures detected by the indoor water inlet temperature sensor are used to determine sensor error.

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty sensor.
- 3 Faulty indoor unit PCB (main).

Abnormality Judgment:

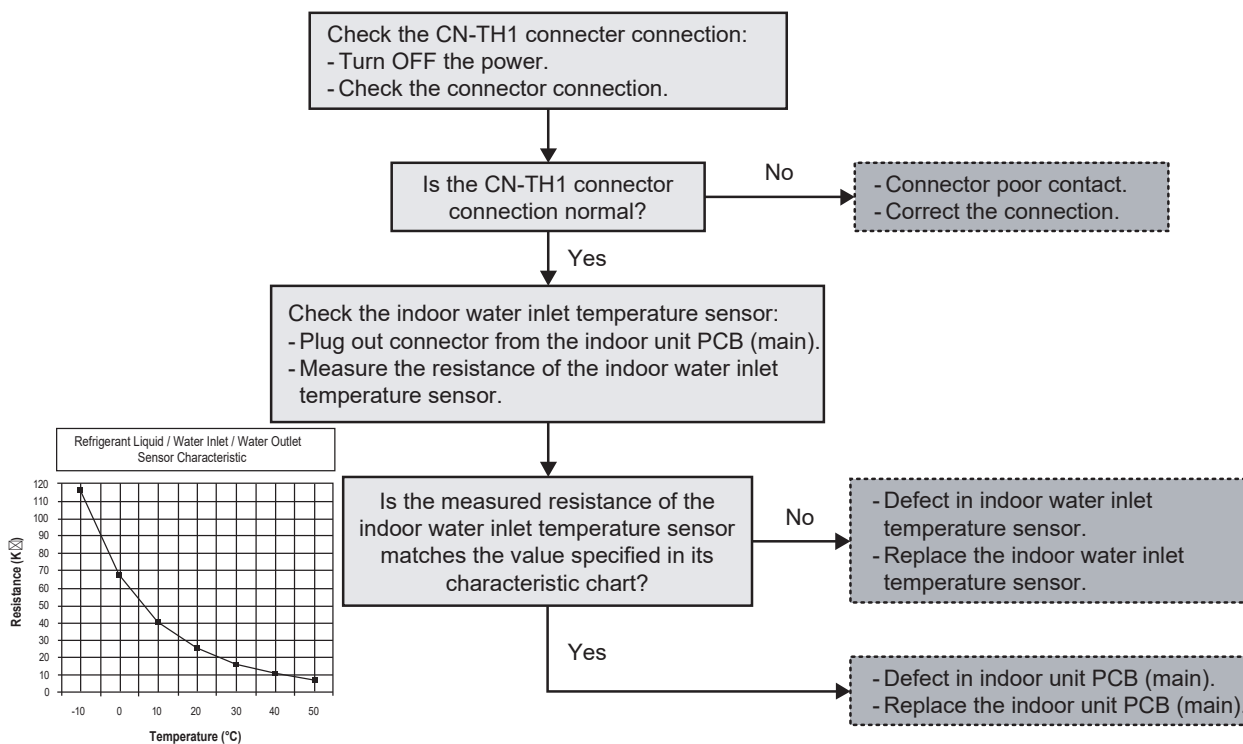
Continue for 5 seconds.

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.41 Outdoor Discharge Pipe Temperature Sensor Abnormality (F40)

Malfunction Decision Conditions:

During startup and operation of cooling and heating, the temperatures detected by the outdoor discharge pipe temperature sensor are used to determine sensor error.

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty sensor.
- 3 Faulty outdoor unit PCB (main).

Abnormality Judgment:

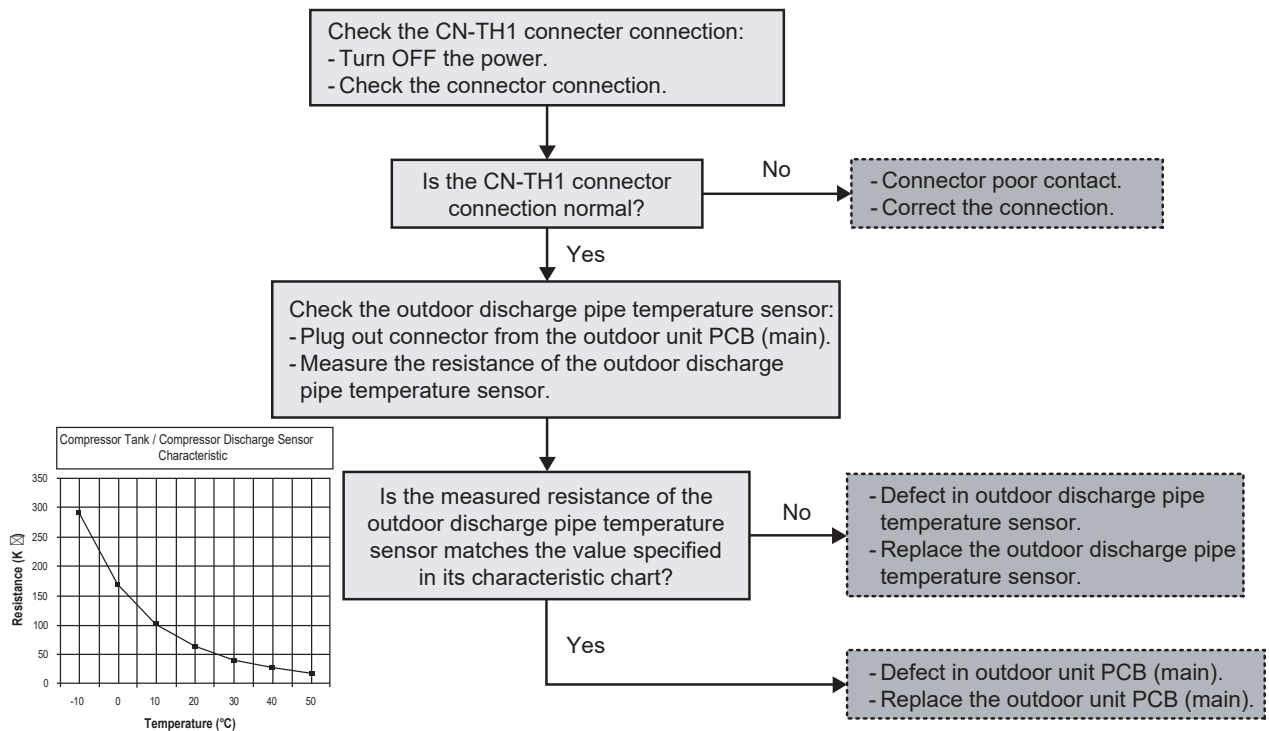
Continue for 5 seconds.

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.42 Power Factor Correction (PFC) Abnormality (F41)

Malfunction Decision Conditions:

During operation of cooling and heating, when the PFC protection circuitry in the outdoor unit PCB (main) senses abnormal high DC voltage level.

Malfunction Caused:

- 1 Power supply surge.
- 2 Compressor windings not uniform.
- 3 Faulty outdoor unit PCB (main).

Abnormality Judgment:

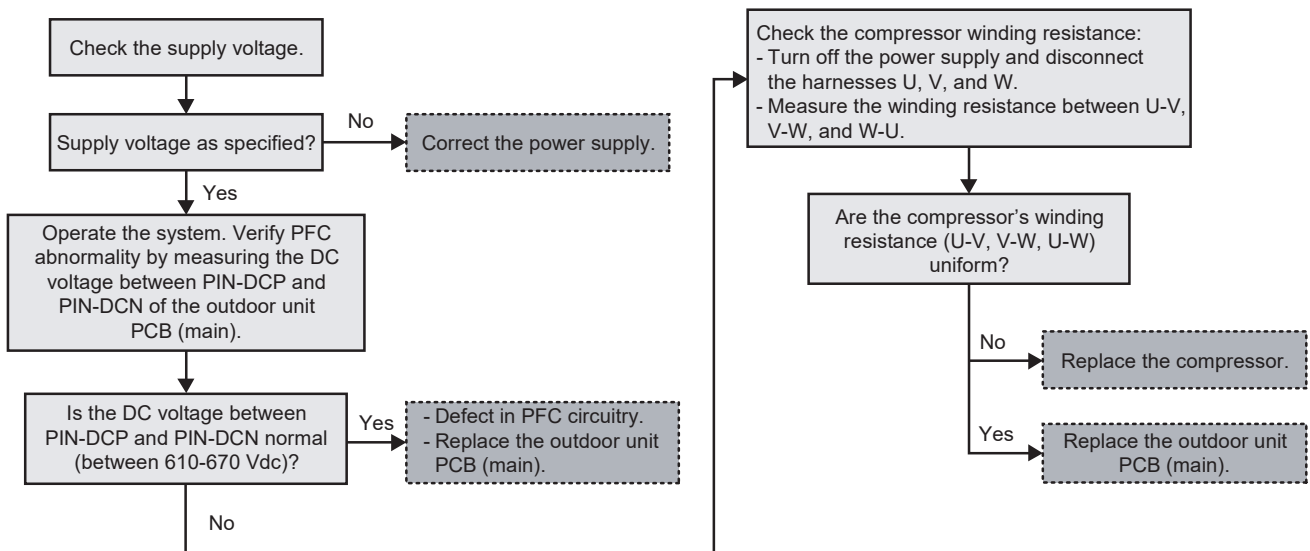
Continue 4 times in 20 minutes.

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.43 Outdoor Pipe Temperature Sensor Abnormality (F42)

Malfunction Decision Conditions:

During startup and operation of cooling and heating, the temperatures detected by the outdoor pipe temperature sensor are used to determine sensor error.

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty sensor.
- 3 Faulty outdoor unit PCB (main).

Abnormality Judgment:

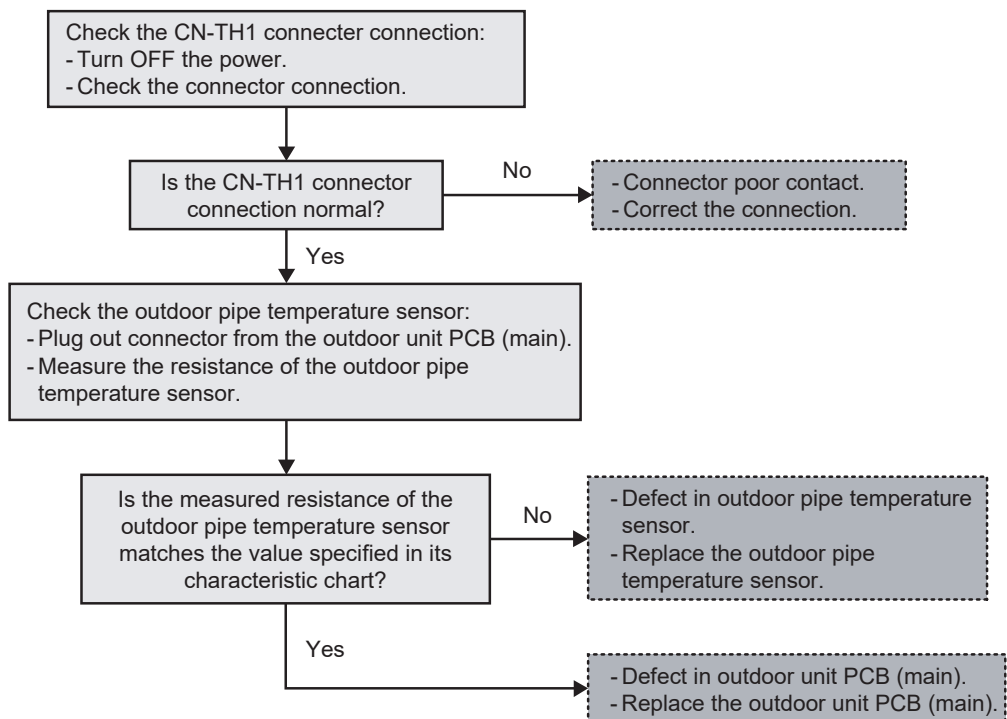
Continue for 5 seconds.

Troubleshooting:



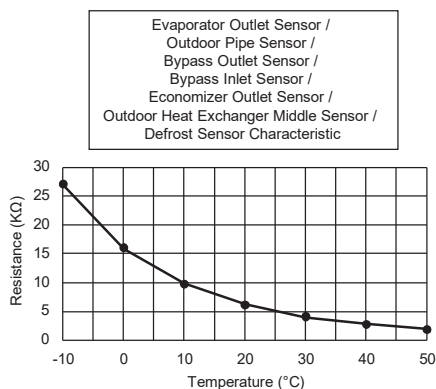
Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



Temp	KΩ
-10	27.05
0	15.95
10	9.75
20	6.17
30	4.02
40	2.7
50	1.85

* Table is not included for reference purposes.



17.5.44 Outdoor Defrost Temperature Sensor Abnormality (F43)

Malfunction Decision Conditions:

During startup and operation of cooling and heating, the temperatures detected by the outdoor defrost temperature sensor are used to determine sensor error.

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty sensor.
- 3 Faulty outdoor unit PCB (main).

Abnormality Judgment:

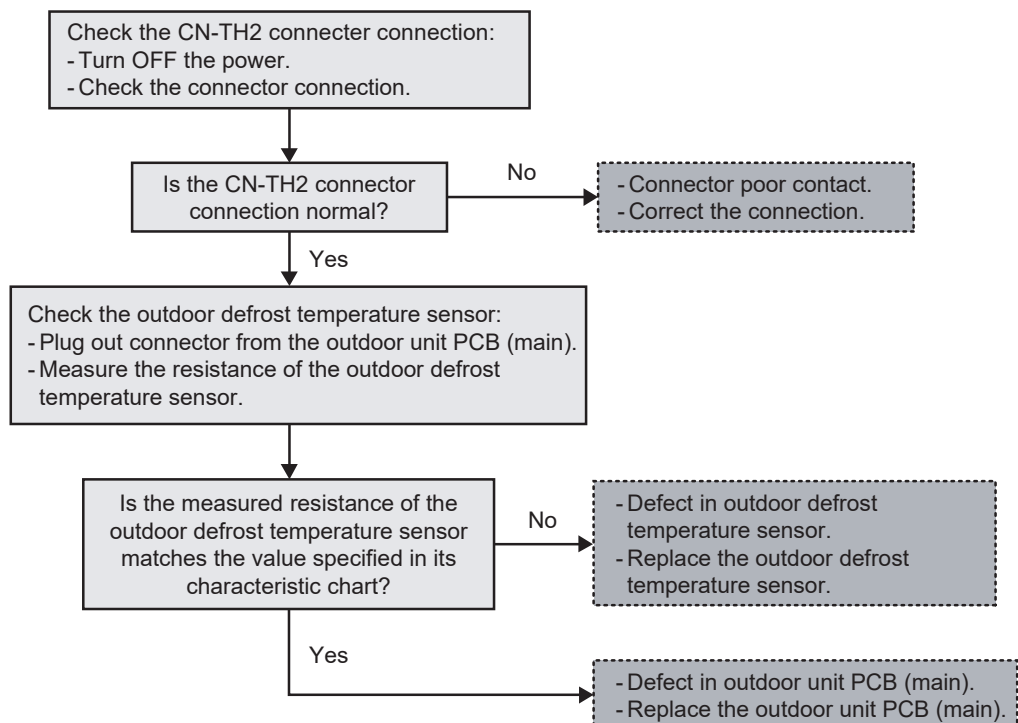
Continue for 5 seconds.

Troubleshooting:



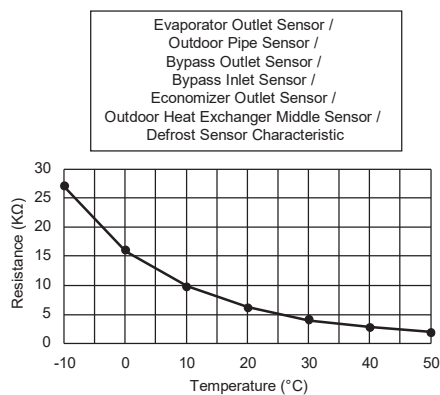
Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



Temp	KΩ
-10	27.05
0	15.95
10	9.75
20	6.17
30	4.02
40	2.7
50	1.85

* Table is not included for reference purposes.



17.5.45 Indoor Water Outlet Temperature Sensor Abnormality (F45)

Malfunction Decision Conditions:

During startup and operation of cooling and heating, the temperatures detected by the indoor water outlet temperature sensor are used to determine sensor errors.

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty sensor.
- 3 Faulty indoor unit PCB (main).

Abnormality Judgment:

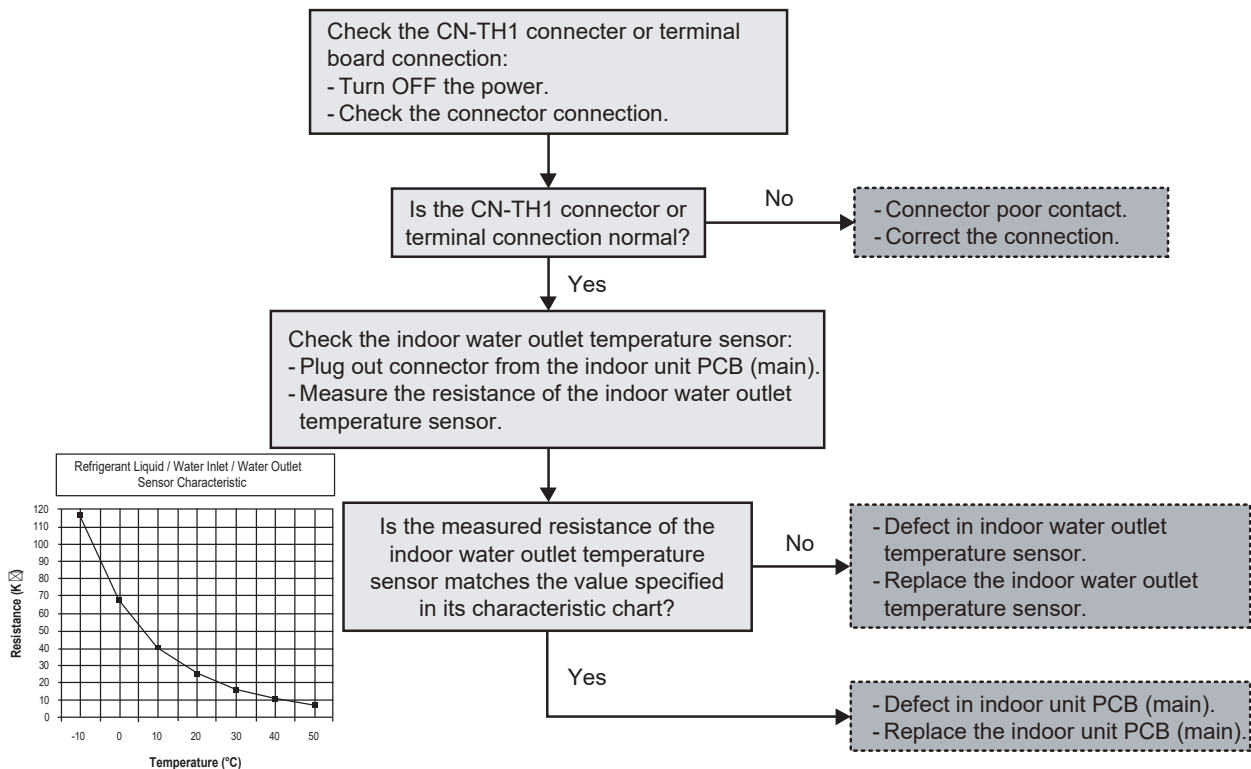
Continue for 5 seconds.

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.46 CT disconnection (F46)

Alarm meaning	Compressor CT sensor disconnected or short-circuit
Alarm conditions	When the frequency of compressor (INV) is over 50Hz and the secondary current is over 8.2A, the primary current detected lower than 2.0A. * No current is detected even though the compressors are operating.
Probable cause	(1) CT failure (2) HIC PCB failure (3) Power supply and voltage malfunction
Check	Check the power supply and voltage. Check whether the voltage between each of the phases is correct while the compressor is running. (It is necessary to check the compressor while running because the voltage may decrease if the compressor starts running.)
Correction	(1) Correct the power supply voltage. (2) Replace HIC PCB.
Example	—
Notes	—

17.5.47 Outdoor Evaporator Outlet Temperature Sensor Abnormality (F48)

Malfunction Decision Conditions:

During start up and operation of cooling and heating, the temperature detected by outdoor evaporator outlet sensor is used to determine sensor error.

Malfunction Caused:

- 1 Faulty connector connection
- 2 Faulty sensor
- 3 Faulty outdoor unit PCB (main)

Abnormality Judgment:

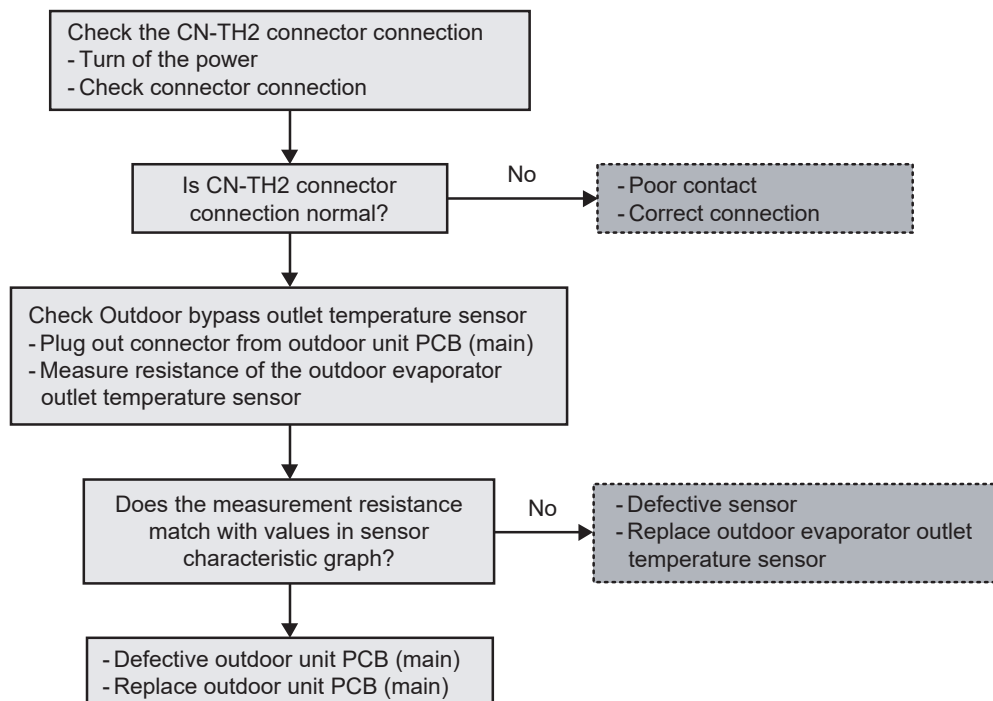
Continuous for 5 seconds

Troubleshooting:



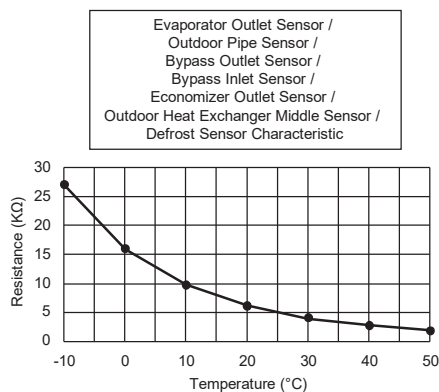
Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



Temp	KΩ
-10	27.05
0	15.95
10	9.75
20	6.17
30	4.02
40	2.7
50	1.85

* Table is not included for reference purposes.



17.5.48 Outdoor Bypass Outlet Temperature Sensor Abnormality (F49)

Malfunction Decision Conditions:

During start up and operation of cooling and heating, the temperature detected by outdoor bypass outlet sensor is used to determine sensor error.

Malfunction Caused:

- 1 Faulty connector connection
- 2 Faulty sensor
- 3 Faulty outdoor unit PCB (main)

Abnormality Judgment:

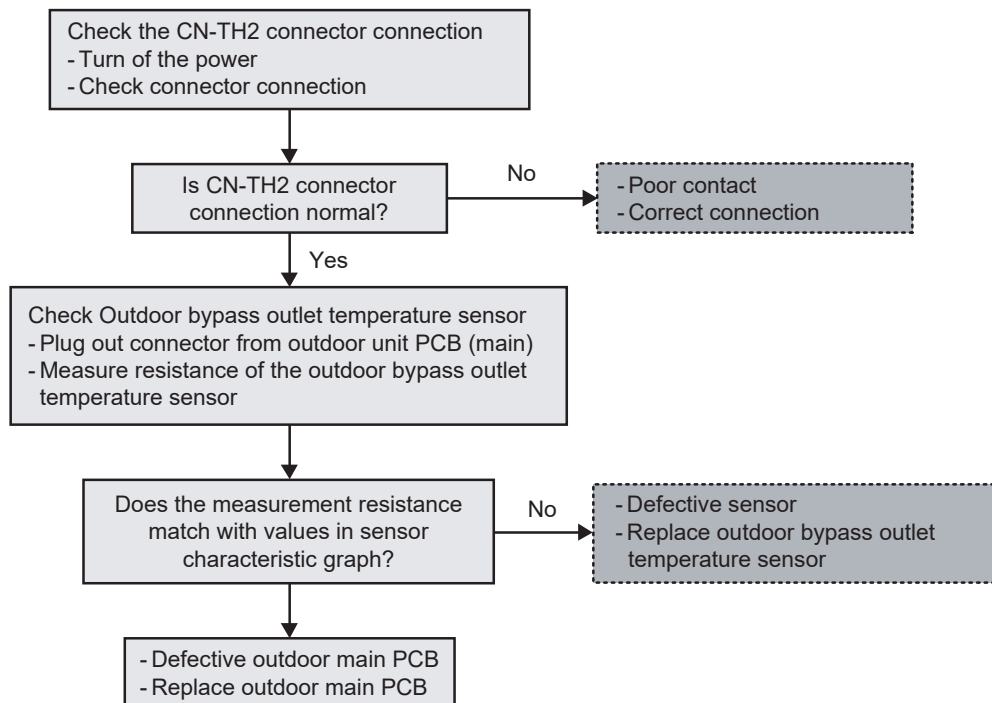
Continuous for 5 seconds

Troubleshooting:



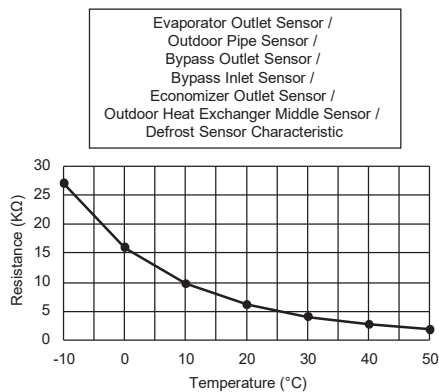
Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



Temp	KΩ
-10	27.05
0	15.95
10	9.75
20	6.17
30	4.02
40	2.7
50	1.85

* Table is not included for reference purposes.



17.5.49 Outdoor Water Inlet 2 Temperature Sensor Abnormality (F50)

Malfunction Decision Conditions:

During startup and operation of cooling and heating, the temperatures detected by the indoor water inlet 2 temperature sensor are used to determine sensor error.

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty sensor.
- 3 Faulty outdoor unit PCB (main).

Abnormality Judgment:

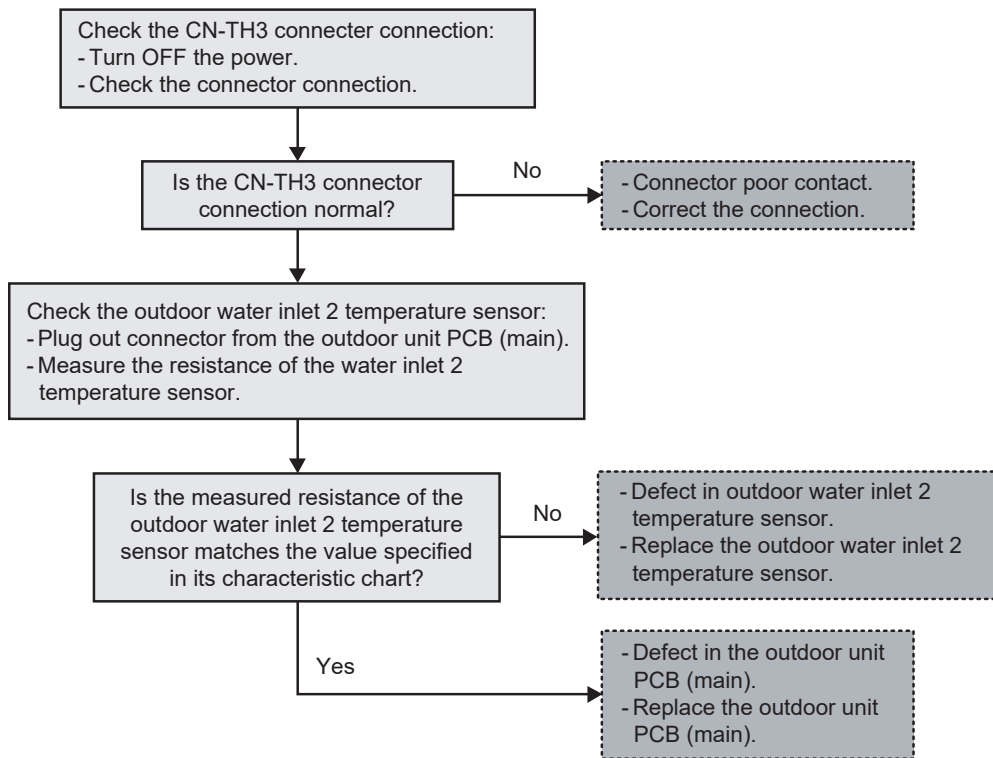
Continue for 10 seconds.

Troubleshooting:



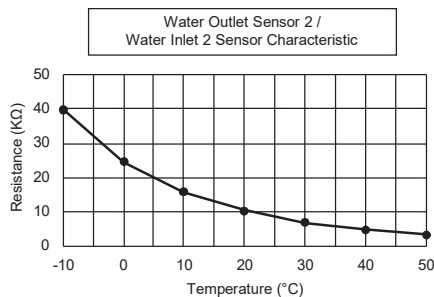
Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



Temp	KΩ
-10	39.85
0	24.65
10	15.75
20	10.4
30	7.05
40	4.9
50	3.485

* Table is not included for reference purposes.



17.5.50 Outdoor Economizer Outlet Temperature Sensor Abnormality (F51)

Malfunction Decision Conditions:

During start up and operation of cooling and heating, the temperature detected by outdoor economizer outlet sensor is used to determine sensor error.

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty sensor.
- 3 Faulty outdoor unit PCB (main).

Abnormality Judgment:

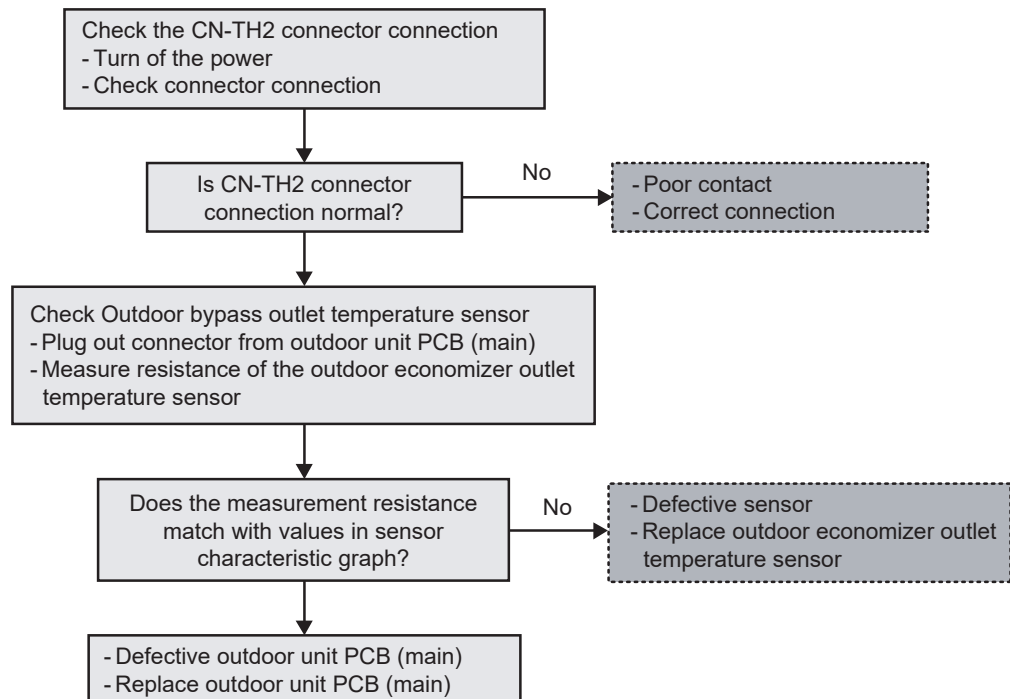
Continuous for 5 seconds.

Troubleshooting:



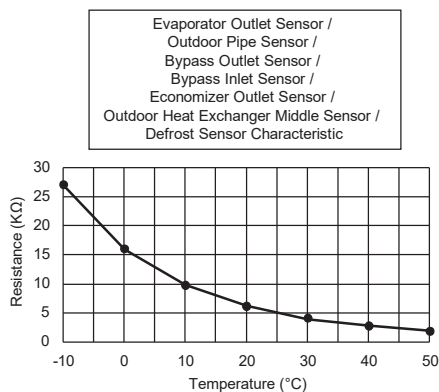
Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



Temp	KΩ
-10	27.05
0	15.95
10	9.75
20	6.17
30	4.02
40	2.7
50	1.85

* Table is not included for reference purposes.



17.5.51 Outdoor Bypass Inlet Temperature Sensor Abnormality (F52)

Malfunction Decision Conditions:

During start up and operation of cooling and heating, the temperature detected by outdoor bypass inlet sensor is used to determine sensor error.

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty sensor.
- 3 Faulty outdoor unit PCB (main).

Abnormality Judgment:

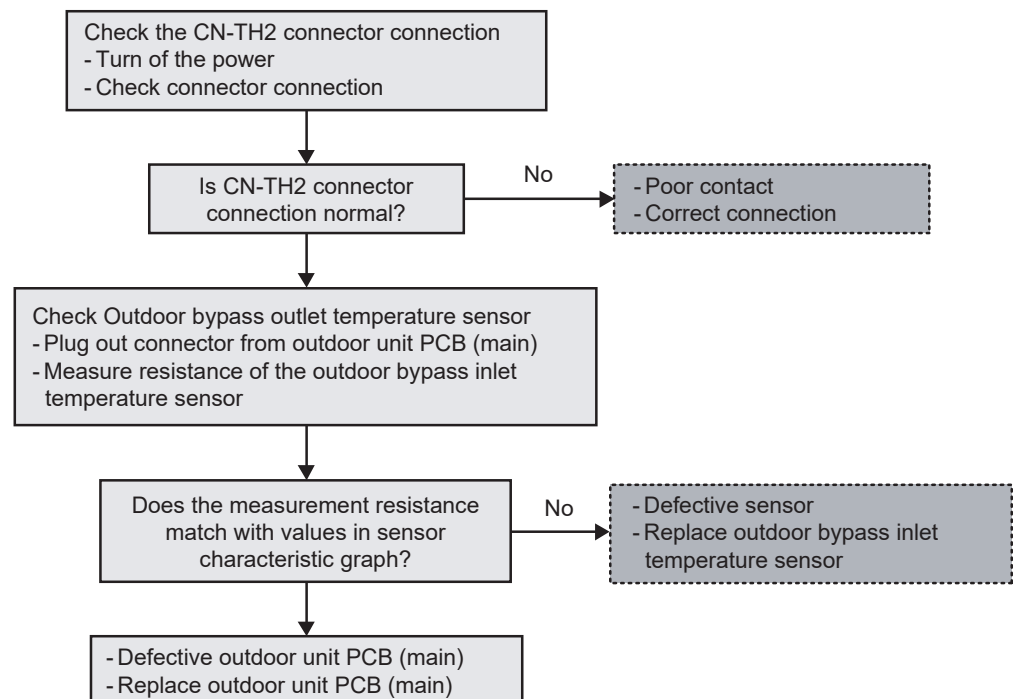
Continuous for 5 seconds.

Troubleshooting:



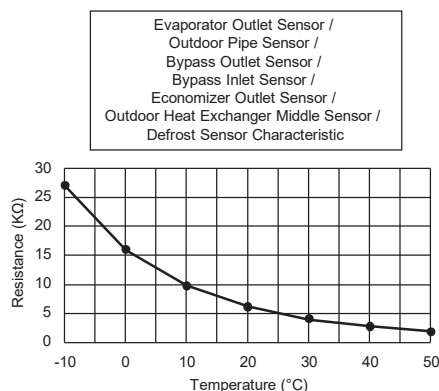
Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



Temp	KΩ
-10	27.05
0	15.95
10	9.75
20	6.17
30	4.02
40	2.7
50	1.85

* Table is not included for reference purposes.



17.5.52 Main Expansion Valve Overcurrent Protection (F53)

Malfunction Decision Conditions:

During start up and operation of cooling and heating, the determination is made based on whether or not an overcurrent flows through the main expansion valve coil.

Malfunction Caused:

- 1 Faulty connector connection
- 2 Faulty main expansion valve coil
- 3 Faulty outdoor unit PCB (main)

Abnormality Judgment:

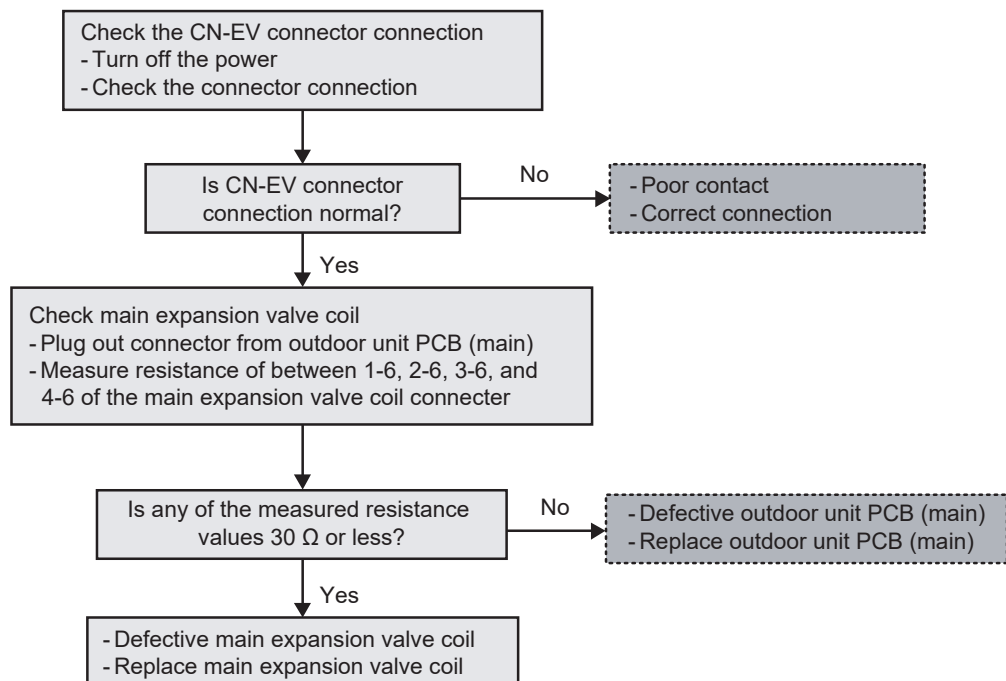
4 times occurrence in 40 minutes

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.53 Bypass Expansion Valve Overcurrent Protection (F54)

Malfunction Decision Conditions:

During start up and operation of cooling and heating, the determination is made based on whether or not an overcurrent flows through the bypass expansion valve coil.

Malfunction Caused:

- 1 Faulty connector connection
- 2 Faulty bypass expansion valve coil
- 3 Faulty outdoor unit PCB (main)

Abnormality Judgment:

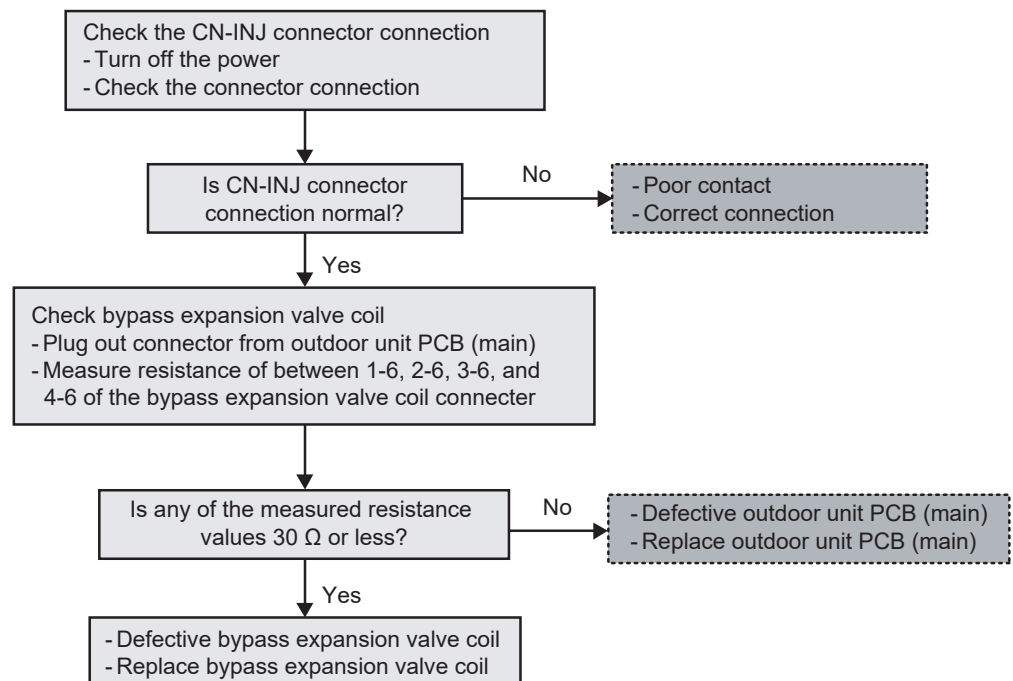
4 times occurrence in 40 minutes

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



17.5.54 Electrical Anode Error (F55)

Malfunction Decision Conditions:

If the indoor unit type is Control module, an error will occur due to a mismatch in settings.

Malfunction Caused:

- 1 The settings are incorrect.

Abnormality Judgment:

Continuous for 60 seconds

Troubleshooting:



Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.

Check the [Electrical anode] menu.

- Turn on the power
- Check [Installer setup - System setup - Electrical anode] menu.
- Change setting to [No] from [Yes]

17.5.55 Outdoor Heat Exchanger Middle Temperature Sensor Abnormality (F56)

Malfunction Decision Conditions:

During start up and operation of cooling and heating, the temperature detected by outdoor heat exchanger middle sensor is used to determine sensor error.

Malfunction Caused:

- 1 Faulty connector connection.
- 2 Faulty sensor.
- 3 Faulty outdoor unit PCB (main).

Abnormality Judgment:

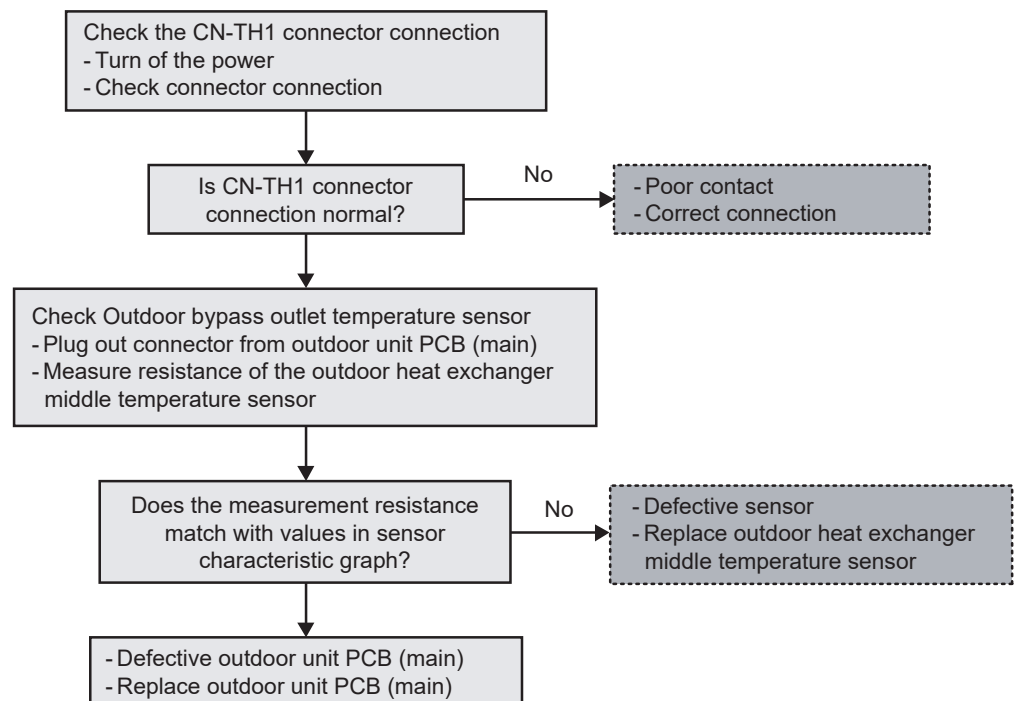
Continuous for 5 seconds.

Troubleshooting:



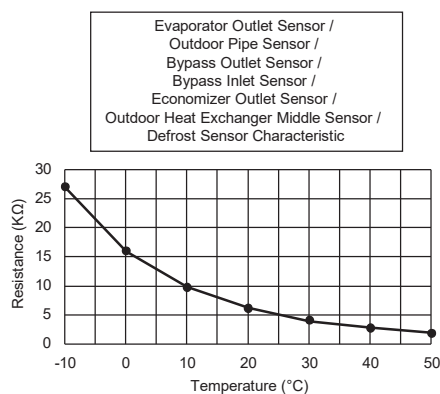
Caution

For safety reason and to prevent component breakdown, always switch off the power before remove and connect the component.



Temp	KΩ
-10	27.05
0	15.95
10	9.75
20	6.17
30	4.02
40	2.7
50	1.85

* Table is not included for reference purposes.



17.5.56 Fan motor 2 lock error (F64)

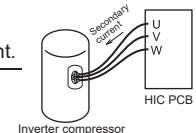
Alarm meaning	Fan motor 2 trouble
Alarm conditions	Fan motor start failure, fan motor Hall IC input failure
Probable cause	(1) Wiring failure (2) Fan PCB failure (3) Fan failure (4) Fan motor failure (5) HIC PCB failure
Check	(1) Check the wiring. Check whether the following items are missing or connection failure. (2) Check the fan rotation. Check if there is any obstacle affecting fan rotation. (3) Check the abnormal fan motor. Rotate the fan manually and check whether the fan rotates smoothly. If the fan cannot rotate smoothly and it is necessary to rotate forcibly, the fan motor is abnormal. (Compare with the normal unit.) Check the status without wires (x2) from the fan motor to the PCB.
Correction	(1) Correct the wiring. (2) Remove the obstacles attached to the fan. (3) Replace the fan motor. (4) Replace the fan PCB. (5) Replace the HIC PCB.
Example	—
Notes	—

17.5.57 Compressor open phase (F71)

Alarm meaning	Compressor start failure (compressor wiring open phase)
Alarm conditions	This alarm may occur at start, and occurs when open phase.
Probable cause	Wiring failure (missing, connection failure, miswiring) * Wiring between the HIC PCB and compressor
Check	Check the wiring. Check whether the following wiring is missing, connection failure or miswiring (position of U, V, W is properly placed). • Wiring between the HIC PCB and compressor • HIC PCB side • Compressor side
Correction	(1) Correct the power supply voltage. (2) Correct the wiring. (3) Replace the HIC PCB. (4) Replace the compressor.
Example	—
Notes	—

17.5.58 Compressor overcurrent (F72)

Alarm meaning	Compressor overcurrent alarm
Alarm conditions	This alarm occurs when current trouble or current detection trouble occur (when trouble judgement current is detected in the second ary current). * Changed to output error by current regardless of the inverter frequency. When more than the current values shown in the table are instantly detected in the secondary current.
Probable cause	(1) Power supply voltage malfunction (2) Wiring failure (connection failure, miswiring) * Wiring between HIC PCB and compressor
Check	(1) Check the power supply voltage. Check whether the voltage between each of the phases is correct while the compressor is running. (It is necessary to check the compressor while running because the voltage may decrease when the compressor starts running.) (2) Check the wiring. Check whether the following wiring is missing, connection failure or miswiring (position of U, V, W is properly placed). • Wiring between HIC PCB and compressor • HIC PCB side • Compressor side
Correction	(1) Correct the power supply voltage. (2) Correct the wiring. (3) Replace the HIC PCB.
Example	—
Notes	—



17.5.59 DCCT error (F73)

Alarm meaning	Compressor start failure (DCCT failure)
Alarm conditions	This alarm may occur at start, and occurs when a DCCT failure occurs.
Probable cause	HIC PCB failure
Check	Check the HIC PCB Is there any visible damage? After checking the location of the damage, replace the HIC PCB and try operating it again.
Correction	(1) Replace the HIC PCB. (2) Replace the compressor.
Example	—
Notes	—

17.5.60 DC voltage error (F74)

Alarm meaning	HIC trouble alarm
Alarm conditions	In general this indicates trouble with the HIC itself.
Probable cause	Power supply voltage malfunction
Check	(1) Check the power supply and voltage. Check whether the voltage between each of the phases is correct while the compressor is running. (It is necessary to check the compressor while running because the voltage may decrease when the compressor starts running.) (2) Check the wiring.
Correction	(1) Correct the power supply voltage. (2) HIC PCB replacement.
Example	—
Notes	—

17.5.61 Communication error in outdoor unit (F75)

Alarm meaning	Communication error between two microcomputers on the Control PCB.
Alarm conditions	—
Probable cause	(1) When failed in rewriting microcomputer. (2) Wiring failure
Check	(1) Rewrite microcomputer again. (2) Switch on the unit power again. (2) Correct the wiring.
Correction	Replace Outdoor Unit Control PCB.
Example	—
Notes	—

18. Disassembly and Assembly Instructions

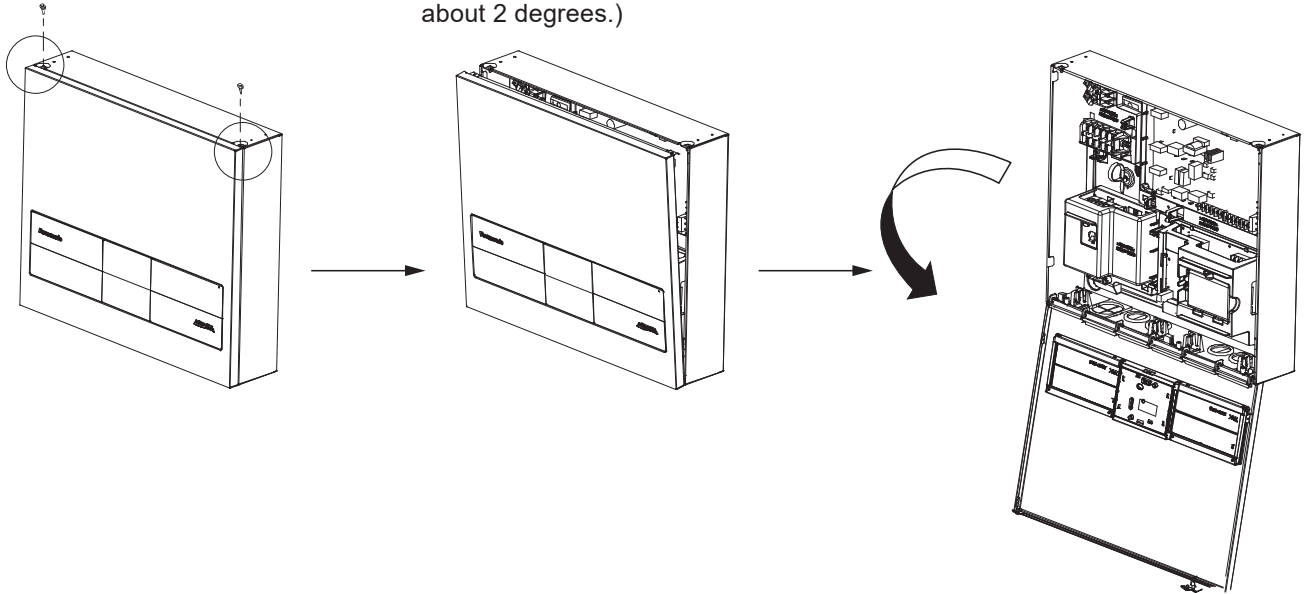
WARNING

High Voltage are generated in the electrical parts area by the capacitor. Ensure that the capacitor has discharged sufficiently before proceeding with repair work. Failure to heed this caution may result in electric shocks.

18.1 Indoor Unit

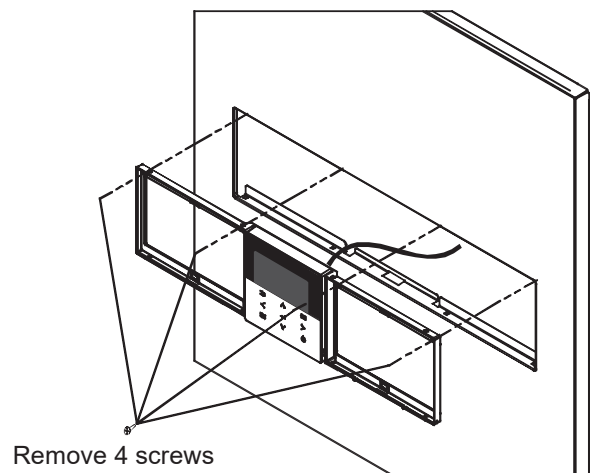
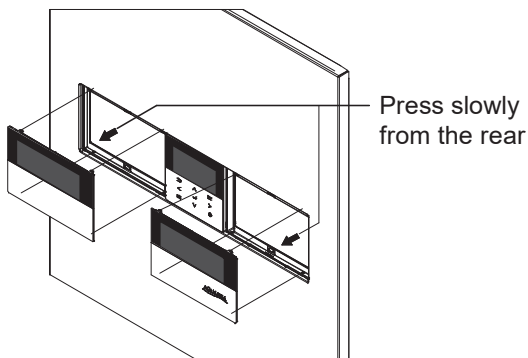
18.1.1 To Remove Front Cover

1. Remove 2 mounting screws located at the top of the enclosure
2. Gently pull the upper section of the front cover towards you.
(The front cover will stop once it has opened about 2 degrees.)
3. Gently open the front cover.

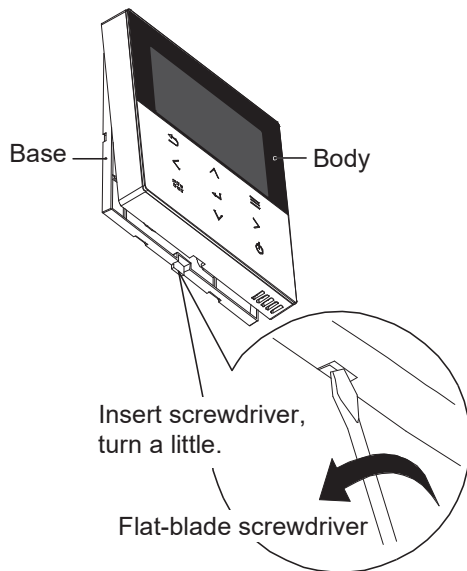


18.1.2 To Remove Remote Controller

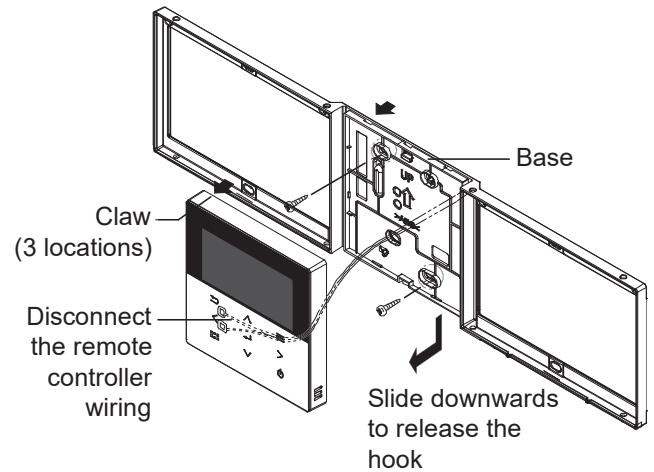
1. Remove both left and right decoration panel from the front cover while gently pushing them from the behind.
2. Remove the 4 screws and take out the holder with remote controller.



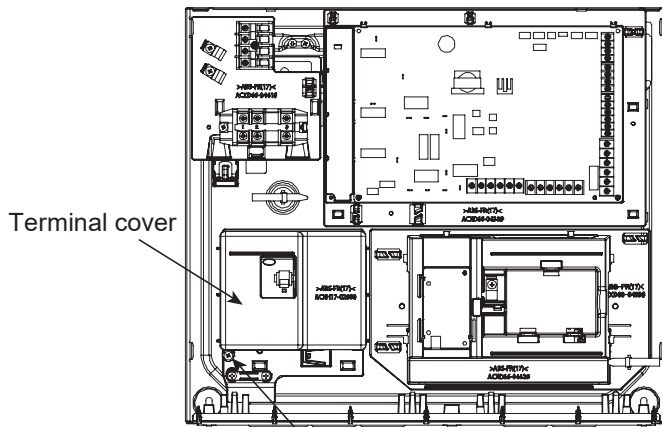
3. Remove the body from the base.



4. Remove the cable between remote controller and Indoor Unit terminal.

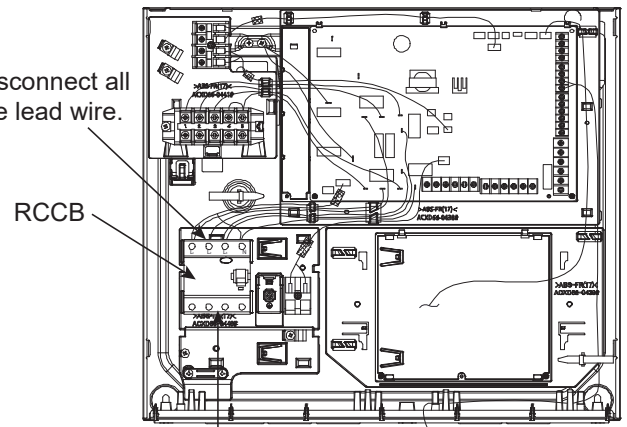


18.1.3 To Remove RCCB



1. Remove the terminal cover screw. Then remove the terminal cover.

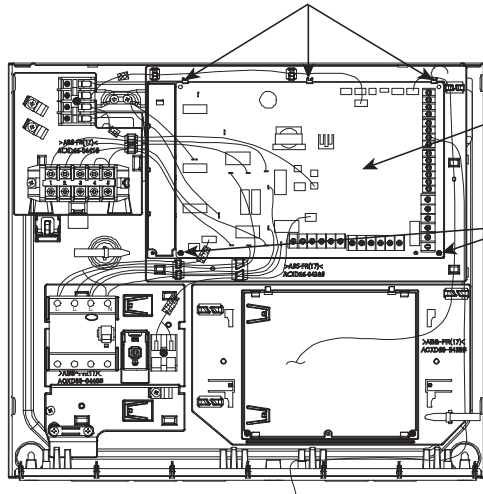
2. Disconnect all the lead wire.



3. Remove the RCCB screw. Then remove the RCCB.

18.1.4 To Remove Electronic Controller Board

3. Release the hooks and remove the electronic controller board.



1. Disconnect all connectors and lead wires from the electronic controller board. (Refer indoor unit wiring diagram).

2. Remove 2 screws from electronic control board.

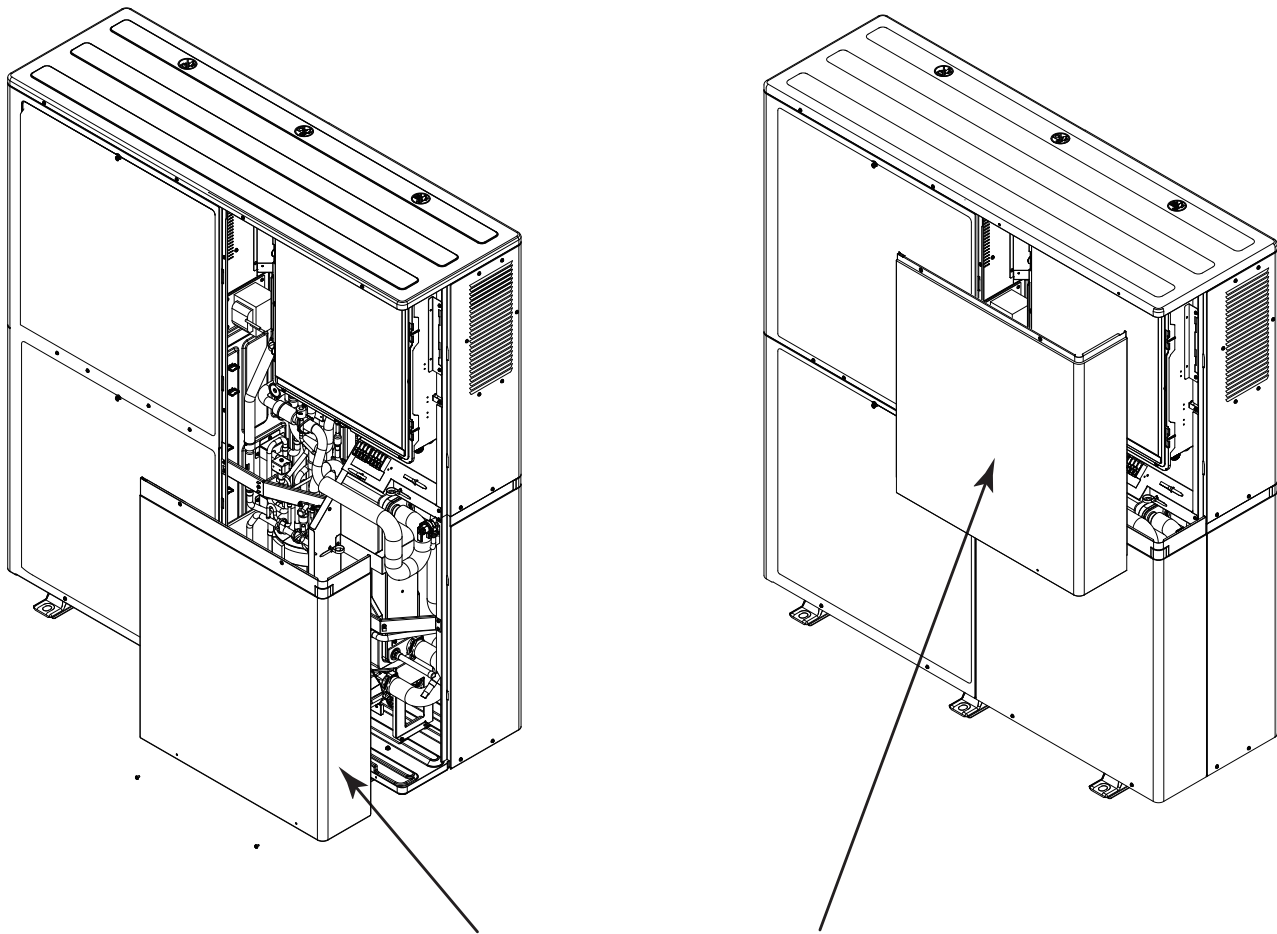
**WARNING**

This symbol shows that this equipment uses a flammable refrigerant with safety A3 group per ISO 817. If the refrigerant is leaked, together with an external ignition source, there is a possibility of fire / explosion.

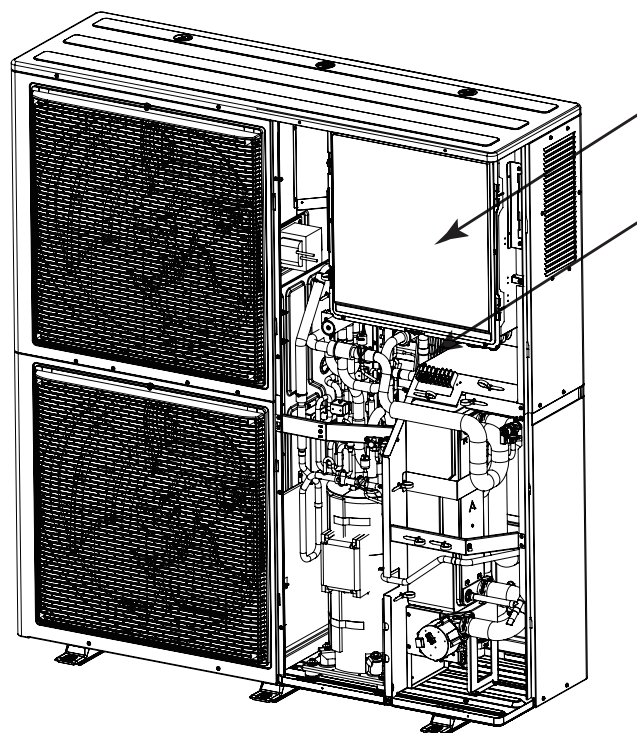
- If you are working on the R290 product, before starting work and when entering the service area, always turn ON the combustible gas leak detector to ensure there is no leakage.
- Keep all ignition sources away from the product. In particular, open flames, hot surfaces, electrical devices that are not free from electrical sources, static discharges.
- Ensure the servicing area is well ventilated.
- Ensure all the serving tools and equipment complied with ATEX (Atmosphere Explosible) standard.
- Ensure the product is service by certified and authorized serviceman.
- Ensure to always have the approved fire extinguisher during servicing.
- Use a warning placard to ensure that unauthorized personnel cannot enter the protective zone.

18.2 Outdoor Unit

18.2.1 Electronic Controller Removal Procedures



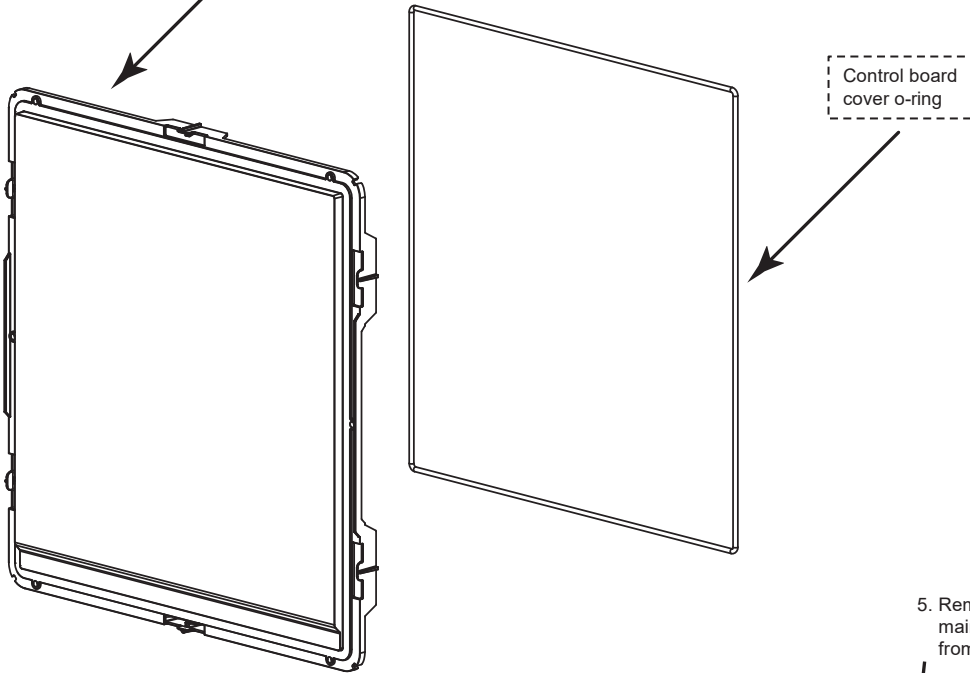
1. Unscrew the control board cover screws and remove the control board cover.



2. Unscrew and remove the control board complete.

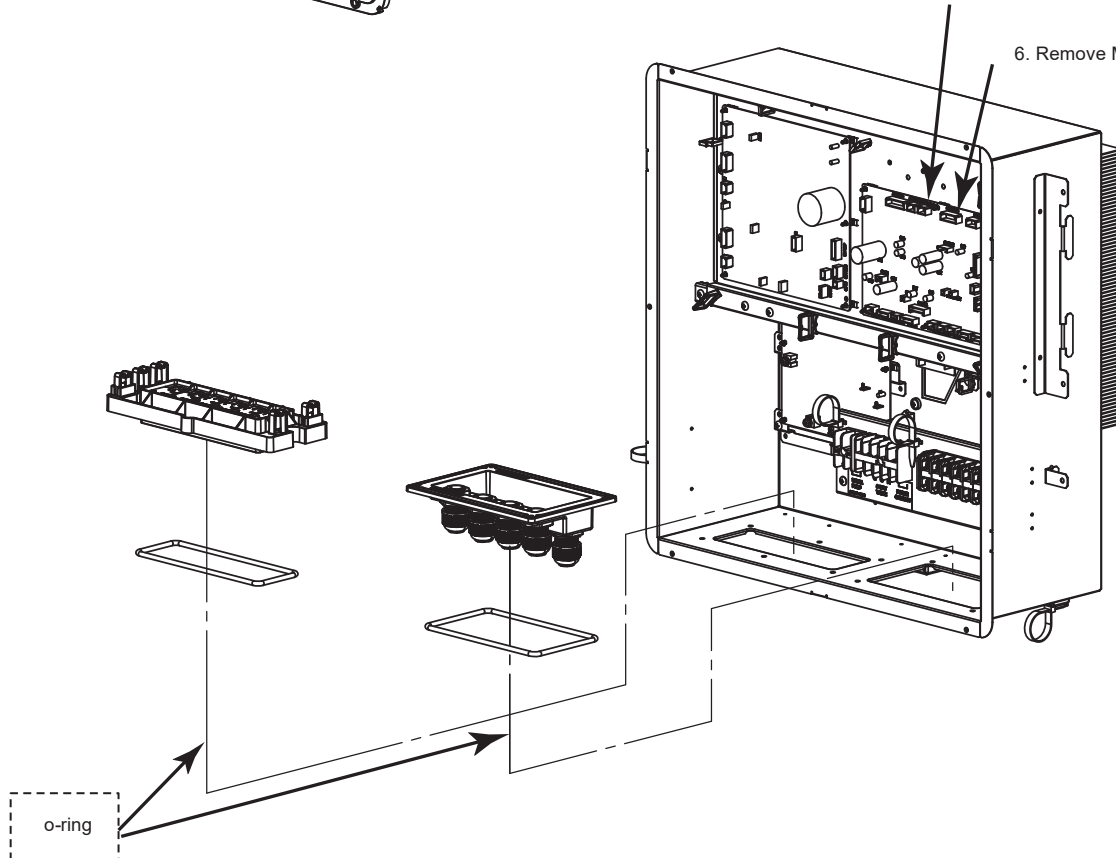
3. Remove all connectors.

4. Unscrew the control board cover screws and remove the control board cover.



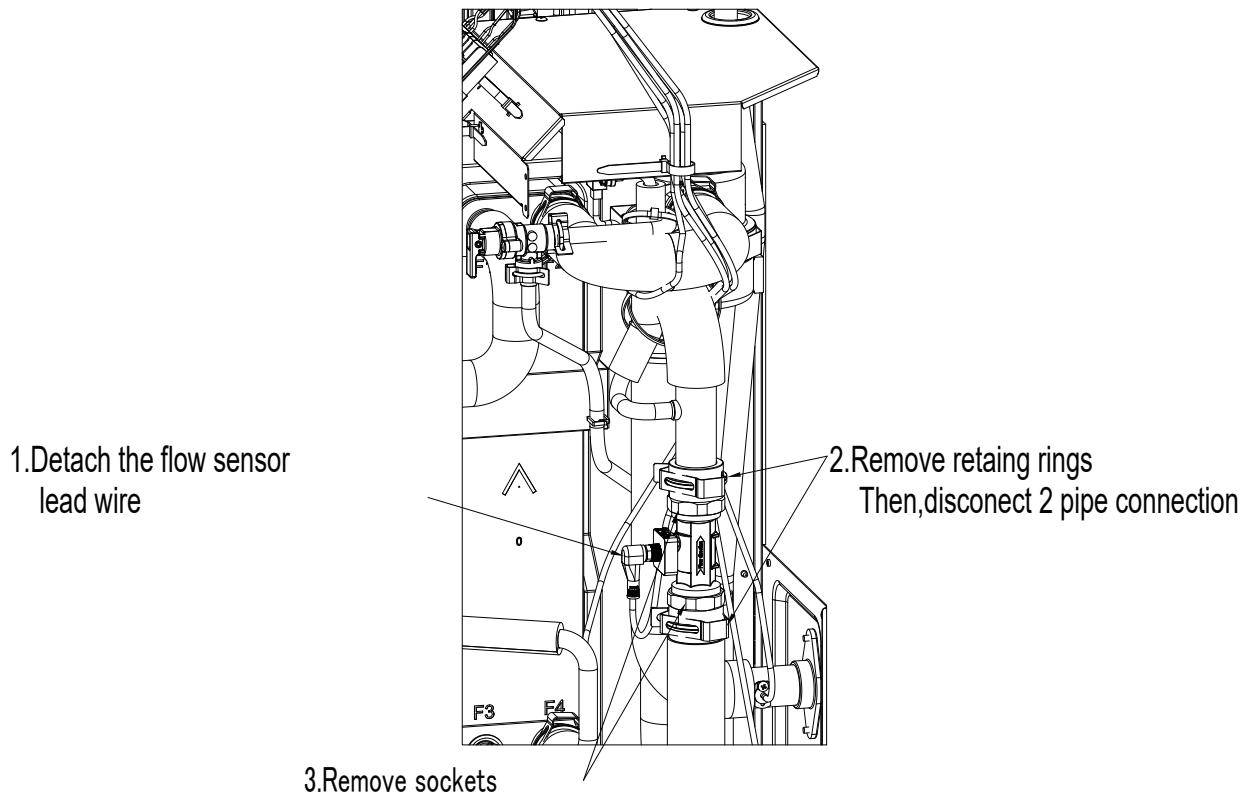
5. Remove all connectors from main PCB and remove lead wires from terminal board

6. Remove Main PCB.



Note: During re-assemble the Main PCB, ensure to attach the O-ring properly to avoid gas leakage into the control board complete.

18.2.2 To Remove Flow Sensor



- When reinstall Flow sensor, ensure the arrow on the flow sensor is upward and is facing in the direction of flow.
- The tightening torque of the lead wire connection plug should not exceed 1 Nm.

19. Technical Data

19.1 Operation Characteristics

19.1.1 WH-WXG20ME8

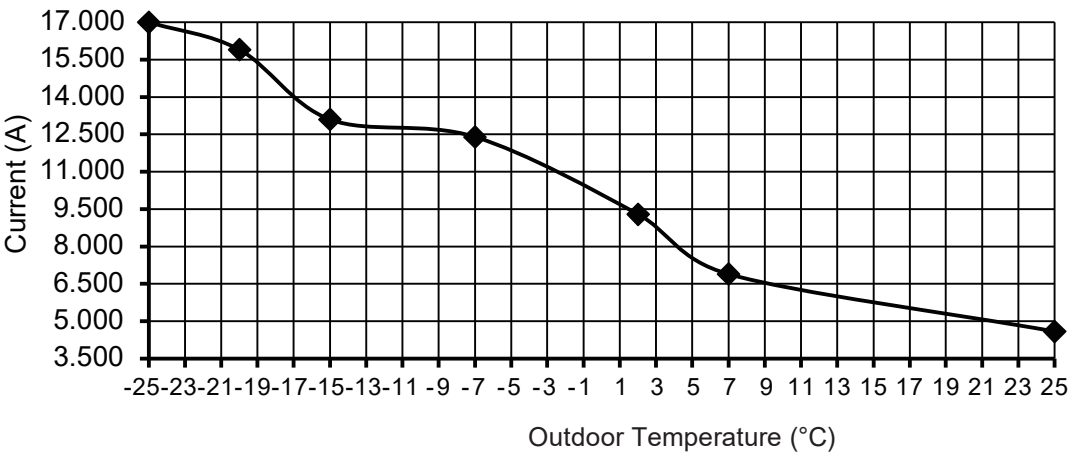
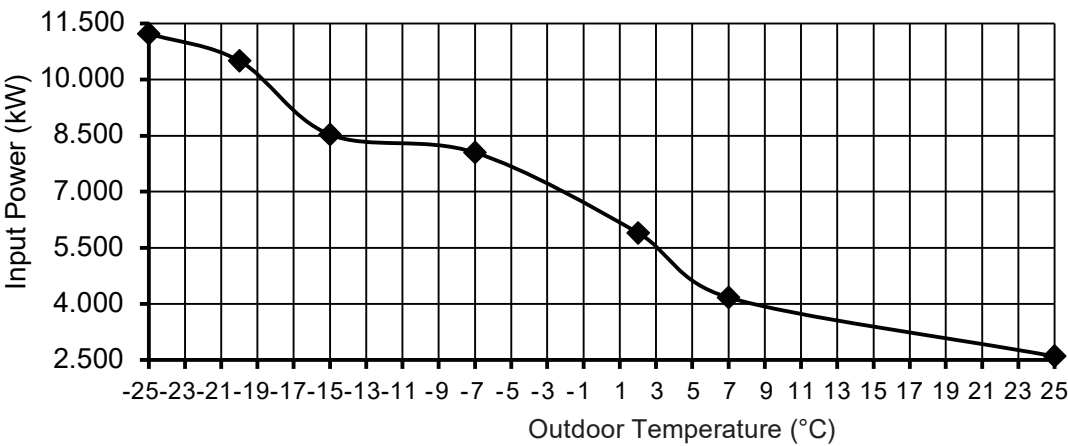
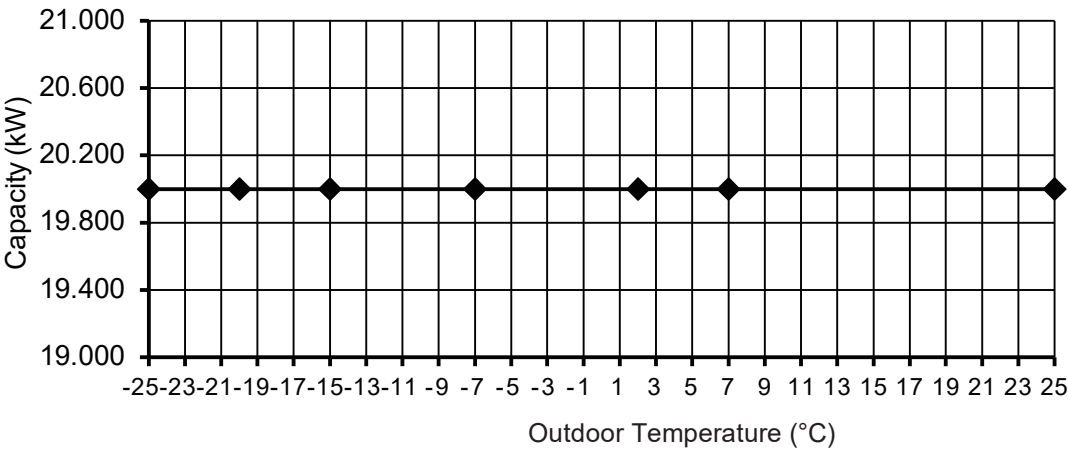
Heating Characteristics at Different Outdoor Air Temperature

Condition

Outdoor air temperature : 7°C (DBT), 6°C (WBT)

Indoor water inlet temperature : 30°C

Indoor water outlet temperature : 35°C



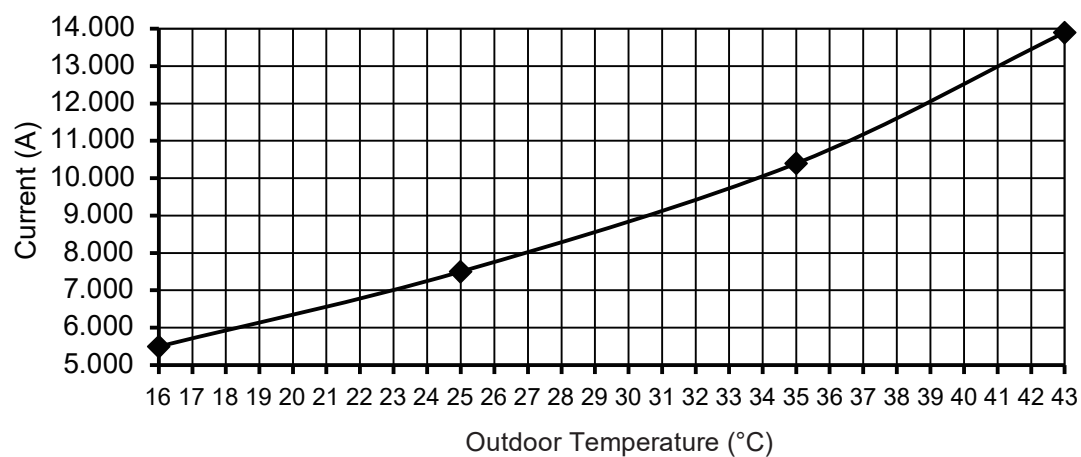
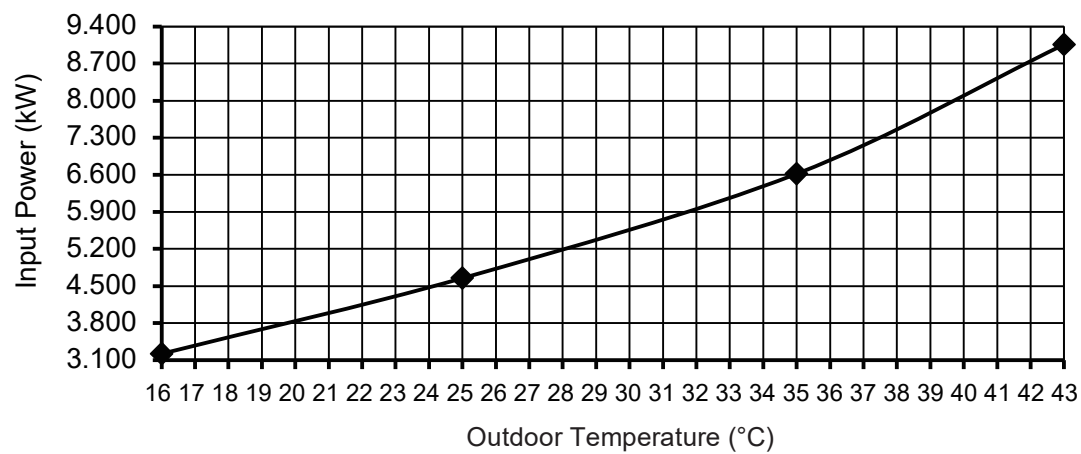
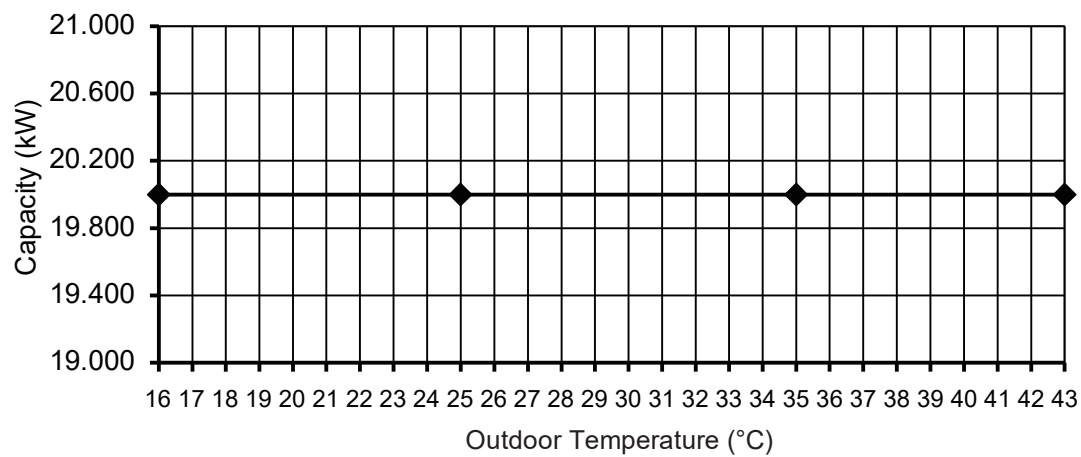
Cooling Characteristics at Different Outdoor Air Temperature

Condition

Outdoor air temperature : 35°C (DBT), -°C (WBT)

Indoor water inlet temperature : 12°C

Indoor water outlet temperature : 7°C



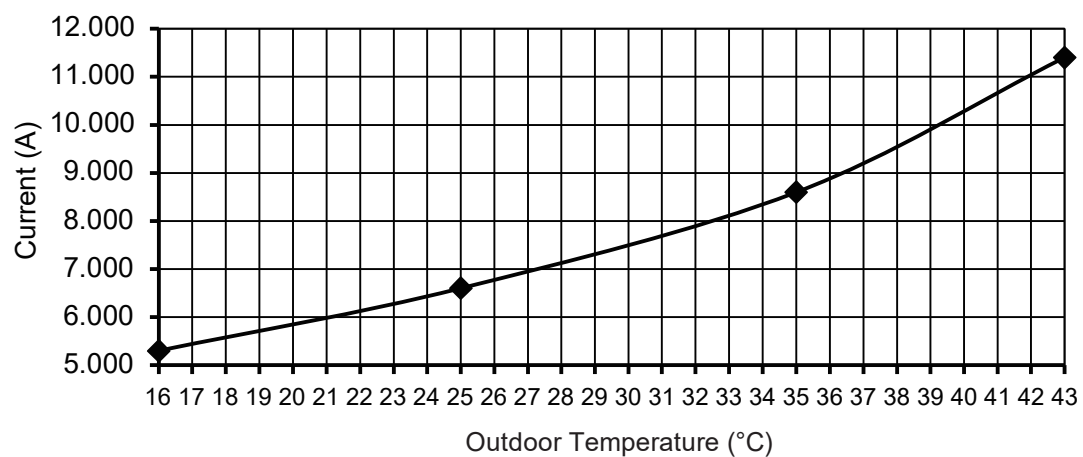
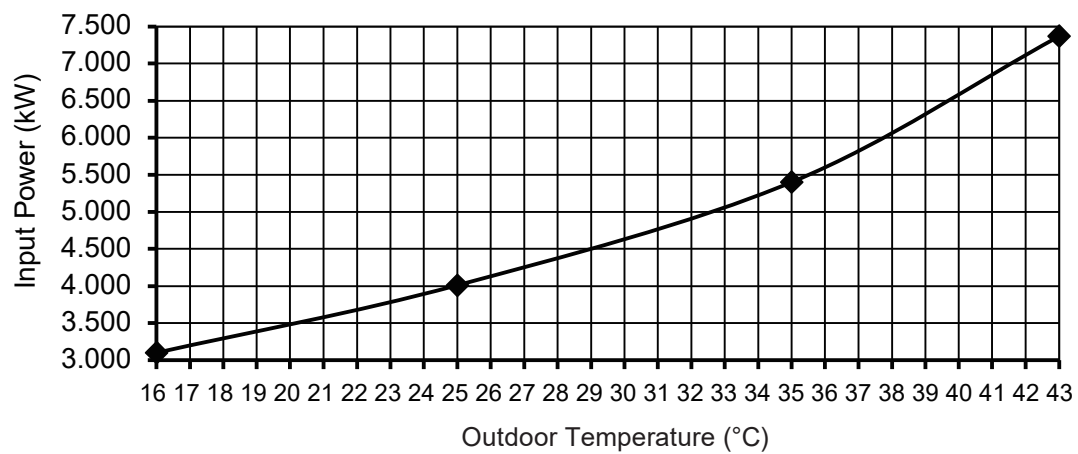
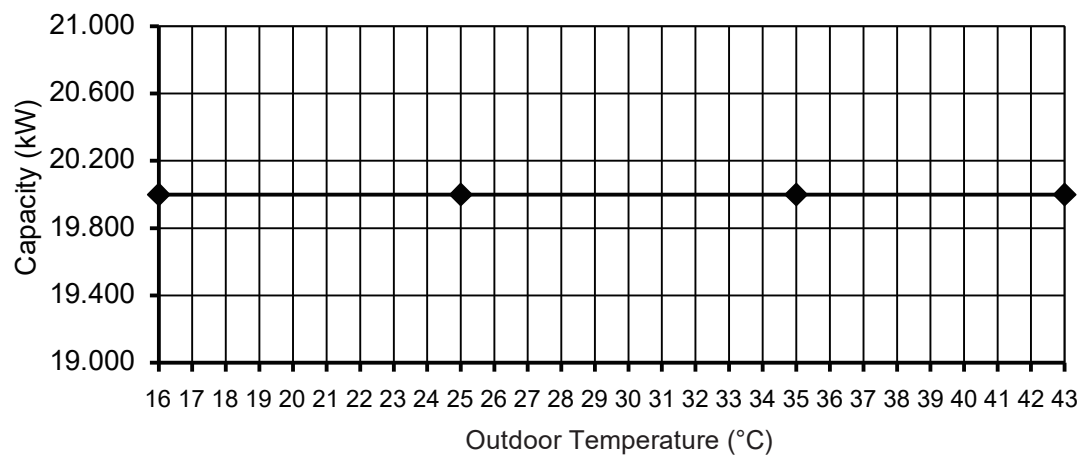
Cooling Characteristics at Different Outdoor Air Temperature

Condition

Outdoor air temperature : 35°C (DBT), -°C (WBT)

Indoor water inlet temperature : 19°C

Indoor water outlet temperature : 14°C



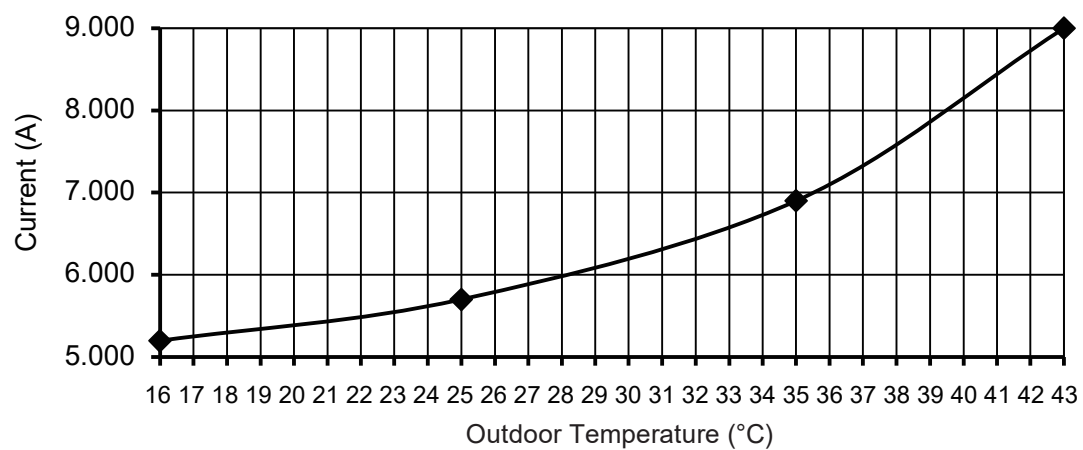
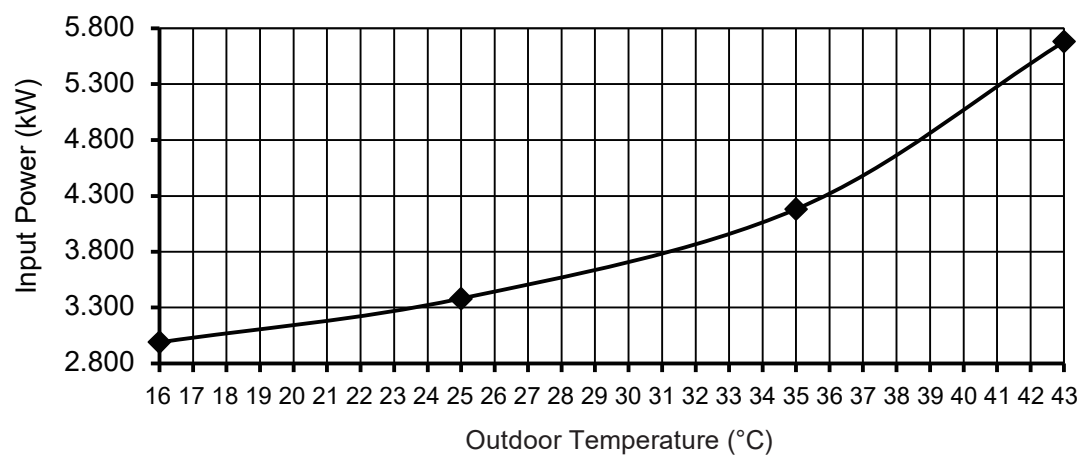
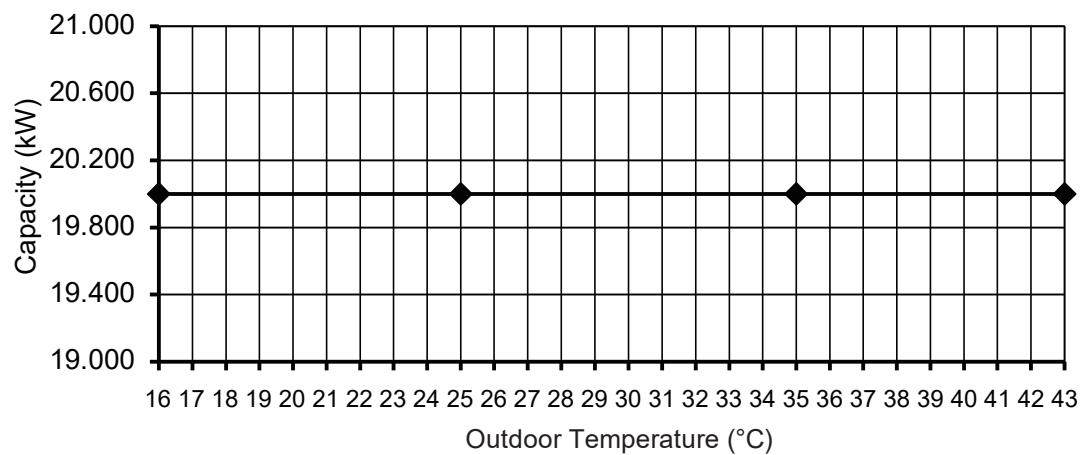
Cooling Characteristics at Different Outdoor Air Temperature

Condition

Outdoor air temperature : 35°C (DBT), -°C (WBT)

Indoor water inlet temperature : 23°C

Indoor water outlet temperature : 18°C



19.1.2 WH-WXG25ME8

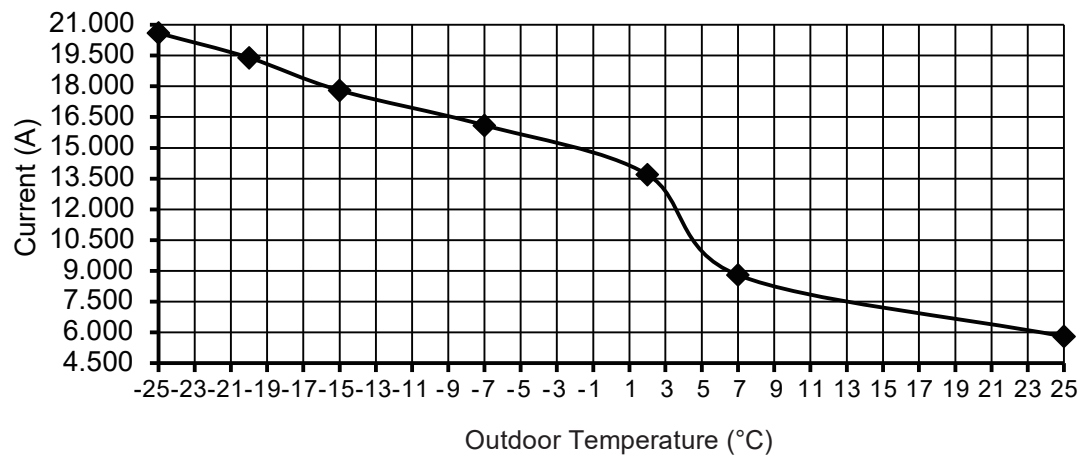
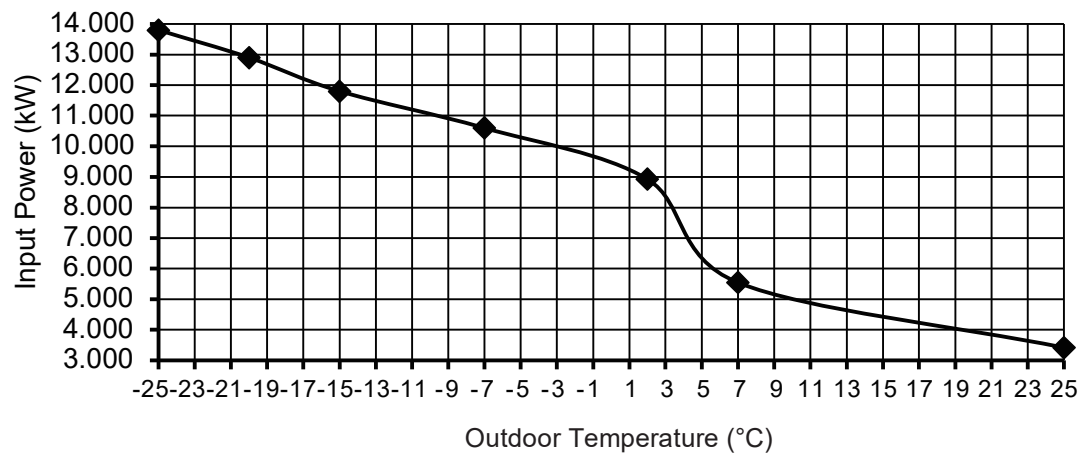
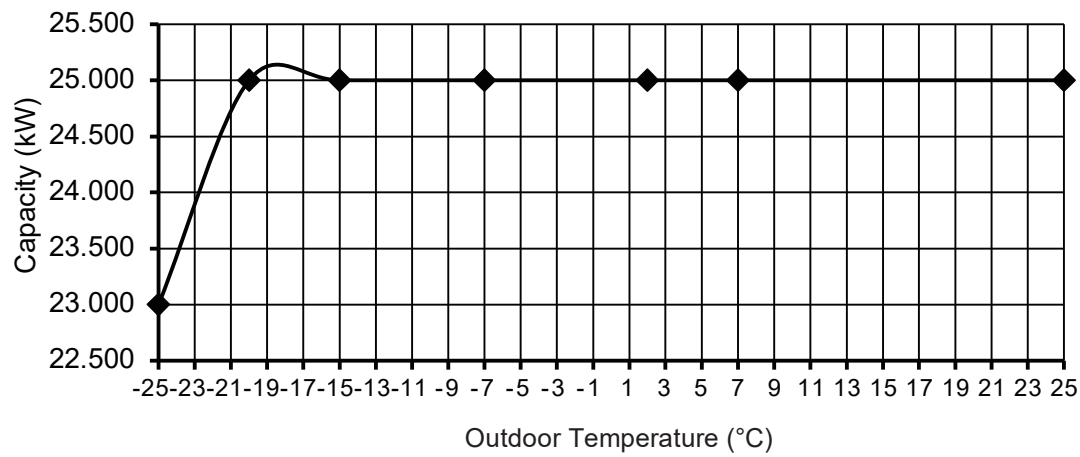
Heating Characteristics at Different Outdoor Air Temperature

Condition

Outdoor air temperature : 7°C (DBT), 6°C (WBT)

Indoor water inlet temperature : 30°C

Indoor water outlet temperature : 35°C



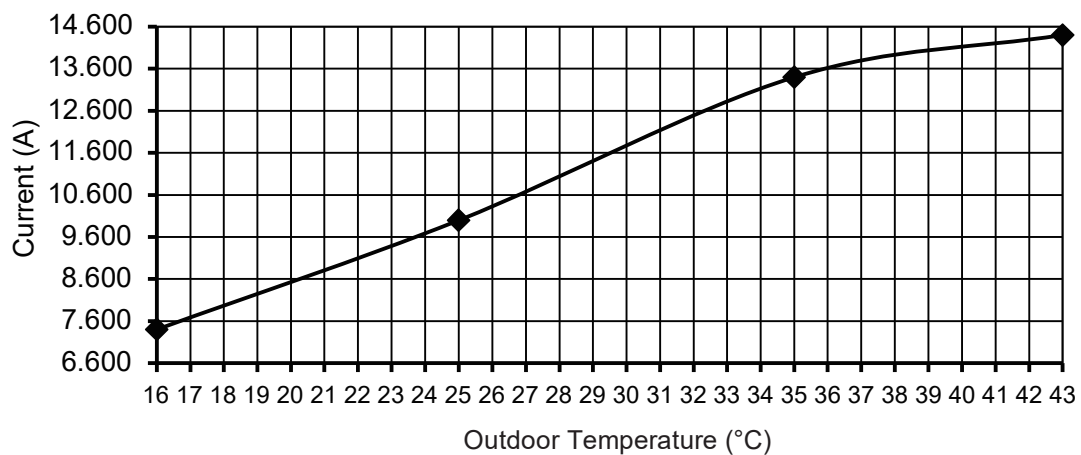
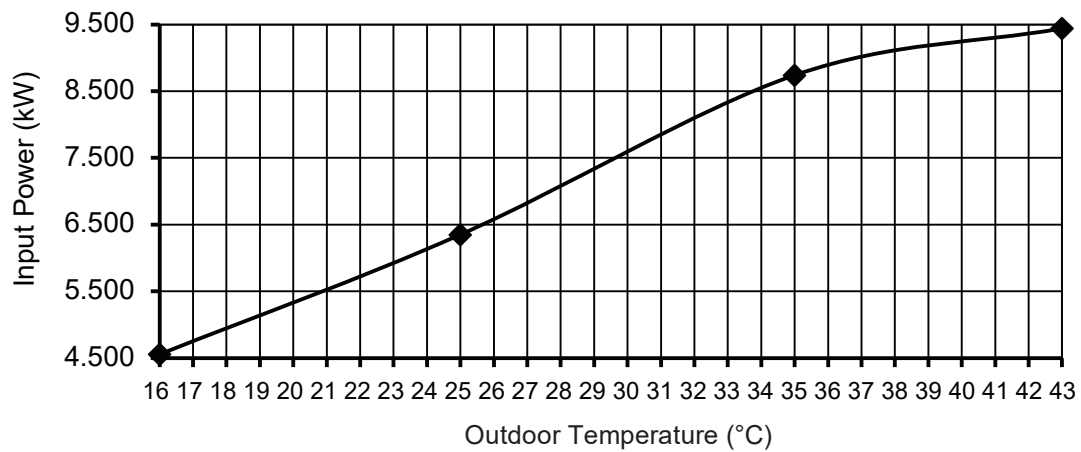
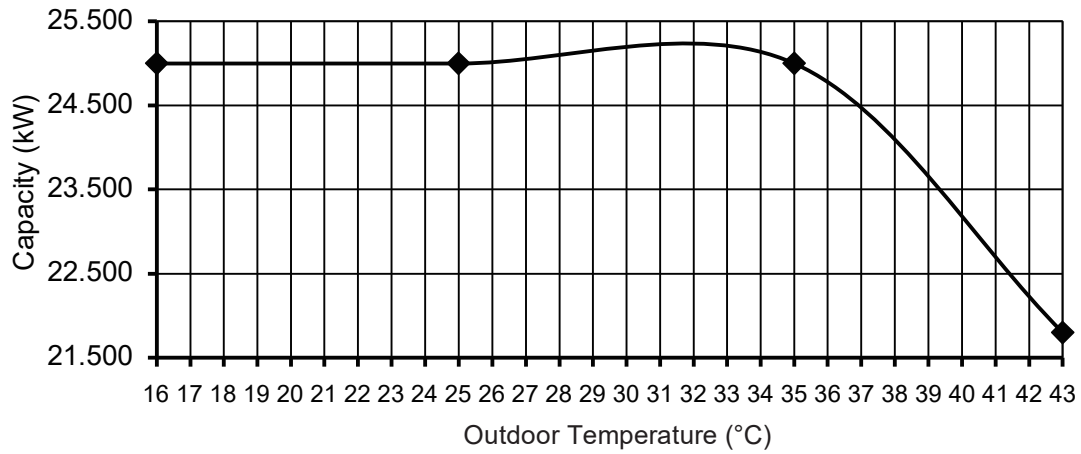
Cooling Characteristics at Different Outdoor Air Temperature

Condition

Outdoor air temperature : 35°C (DBT), -°C (WBT)

Indoor water inlet temperature : 12°C

Indoor water outlet temperature : 7°C



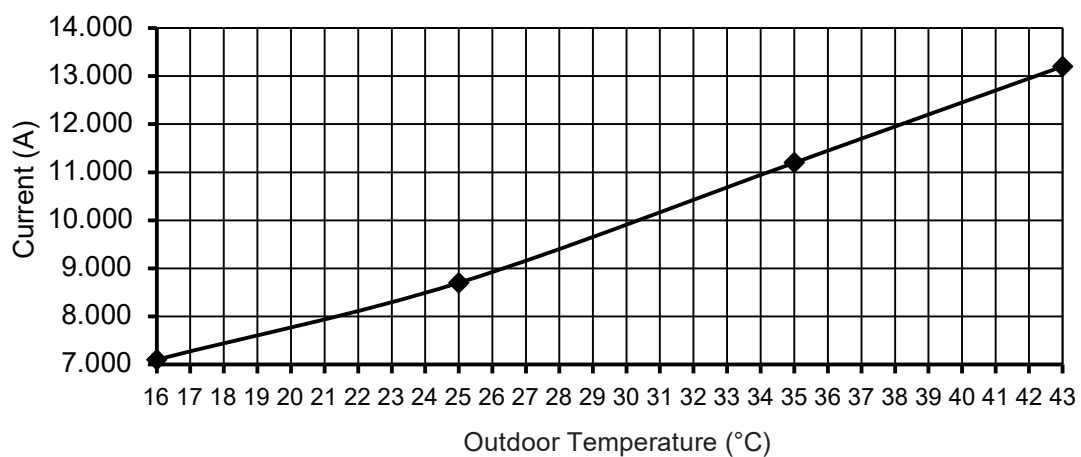
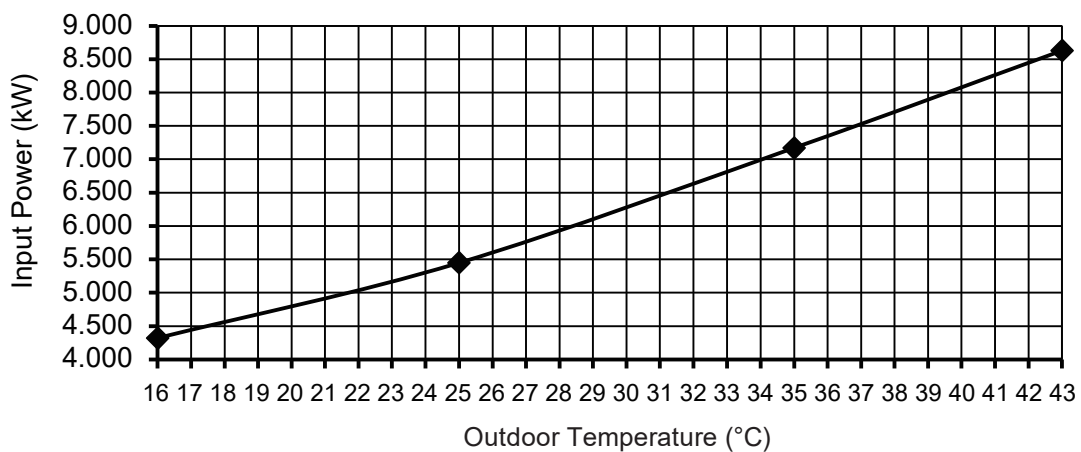
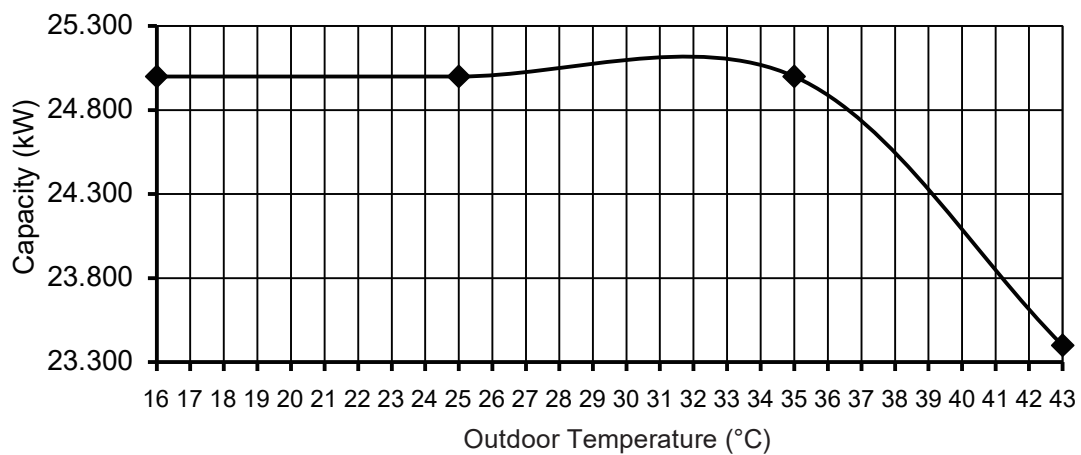
Cooling Characteristics at Different Outdoor Air Temperature

Condition

Outdoor air temperature : 35°C (DBT), -°C (WBT)

Indoor water inlet temperature : 19°C

Indoor water outlet temperature : 14°C



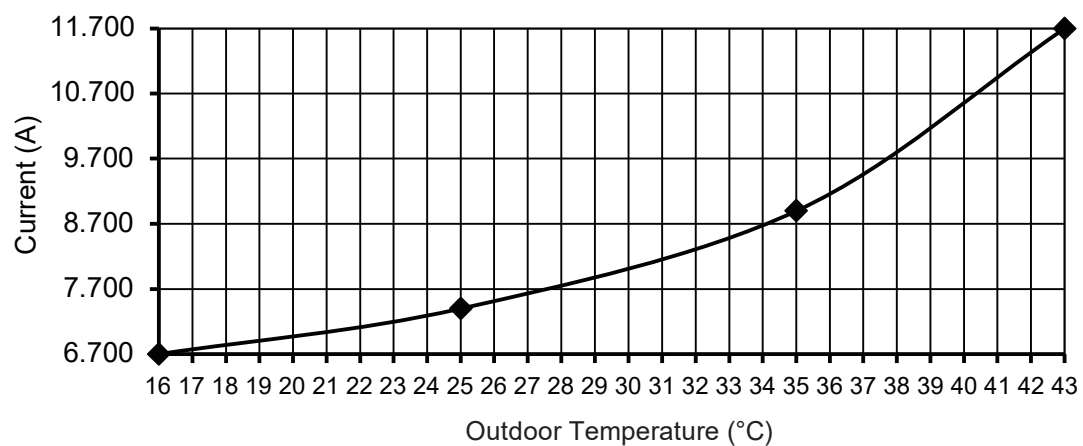
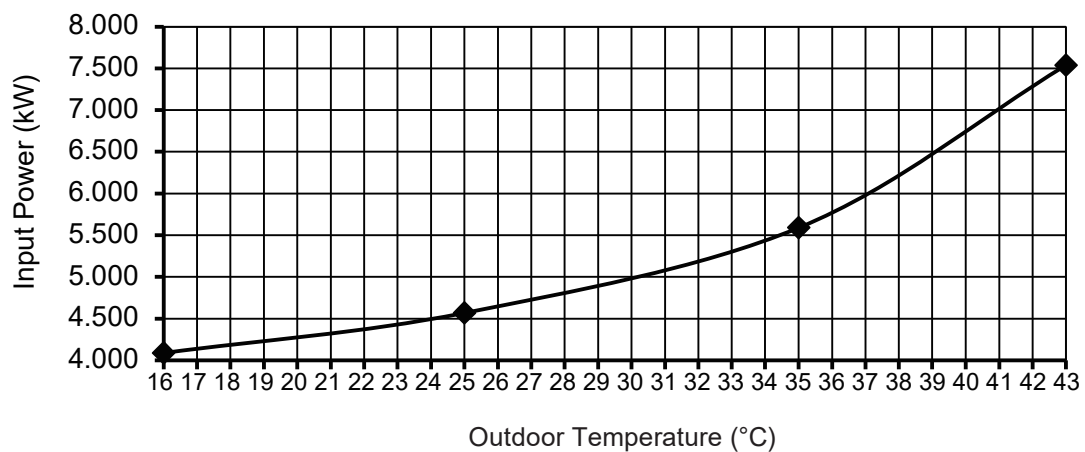
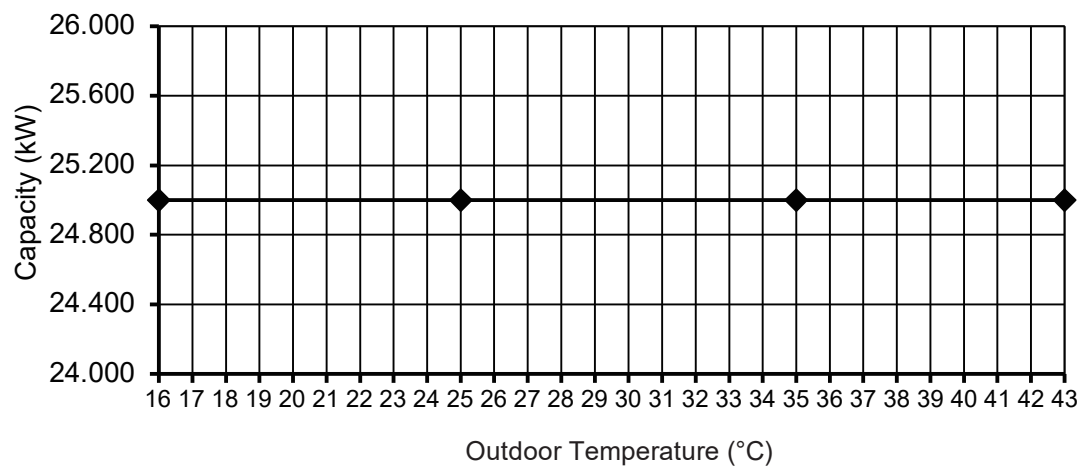
Cooling Characteristics at Different Outdoor Air Temperature

Condition

Outdoor air temperature : 35°C (DBT), -°C (WBT)

Indoor water inlet temperature : 23°C

Indoor water outlet temperature : 18°C



19.1.3 WH-WXG30ME8

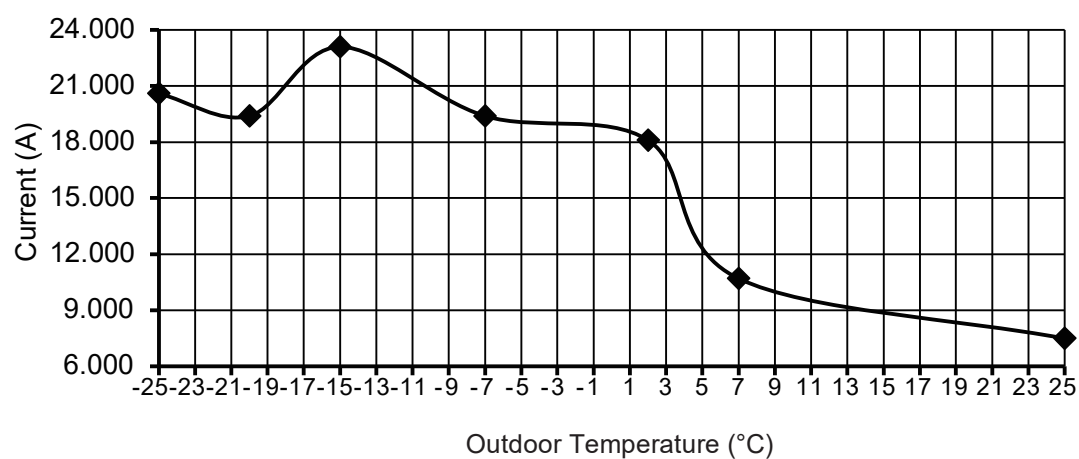
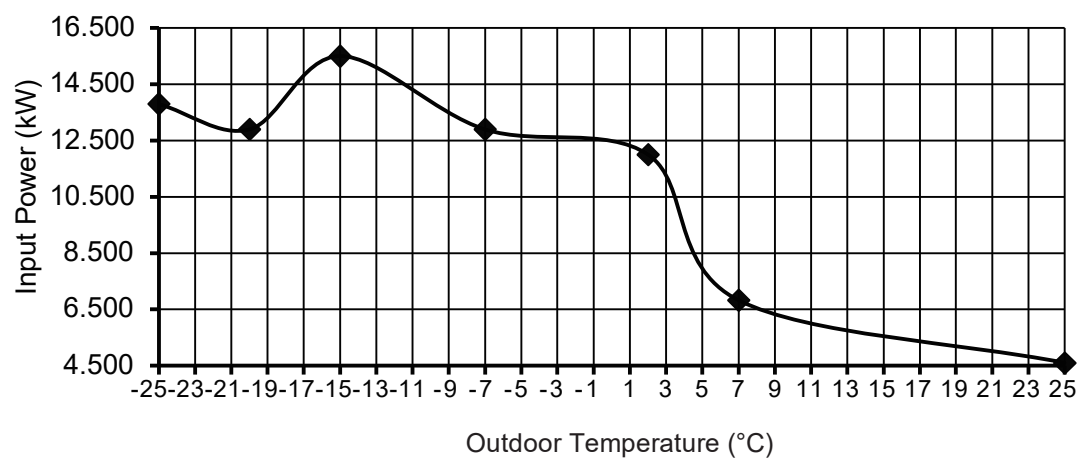
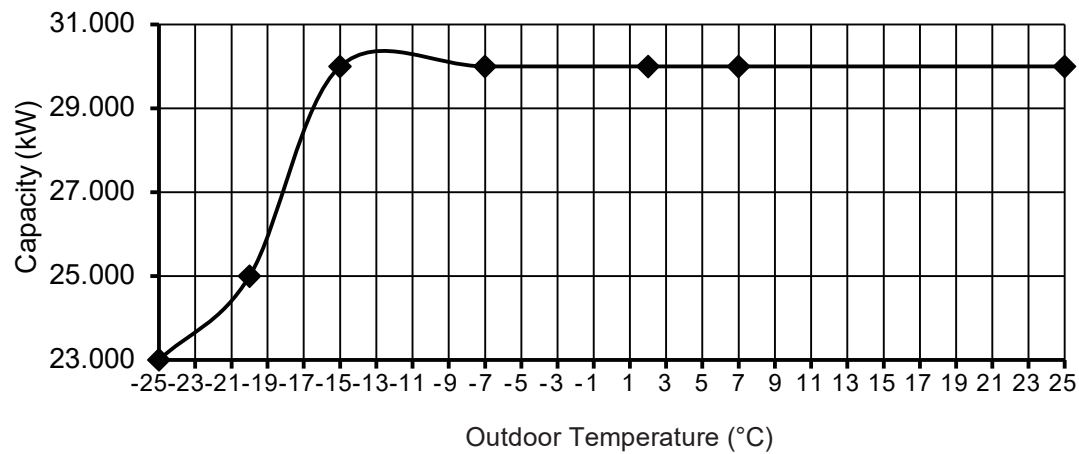
Heating Characteristics at Different Outdoor Air Temperature

Condition

Outdoor air temperature : 7°C (DBT), 6°C (WBT)

Indoor water inlet temperature : 30°C

Indoor water outlet temperature : 35°C



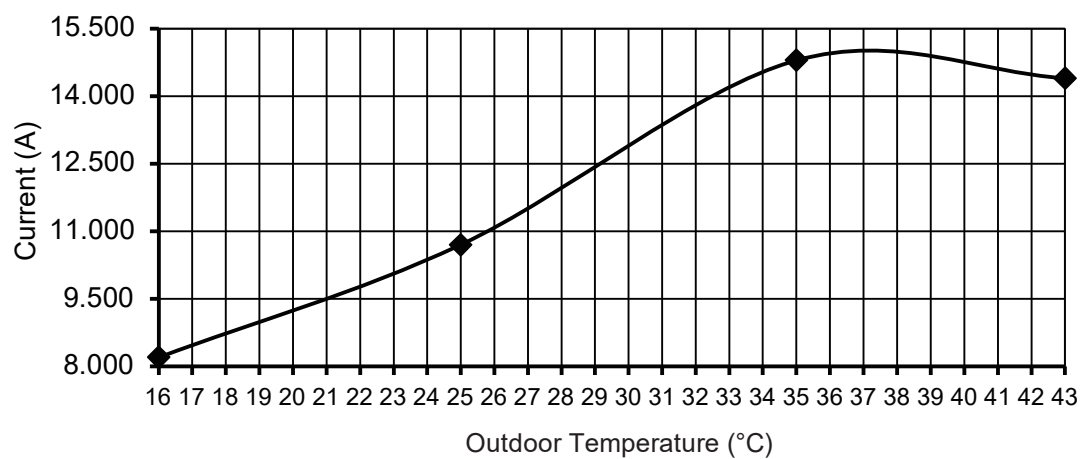
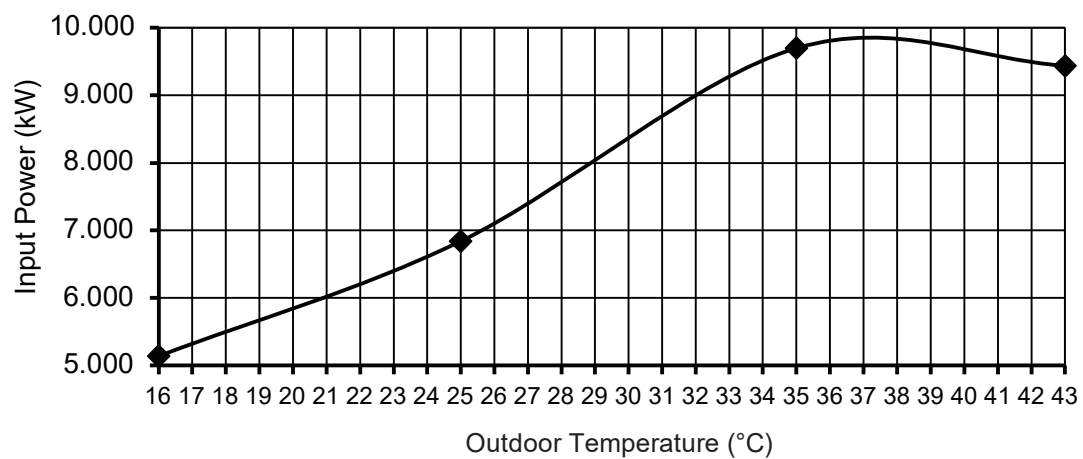
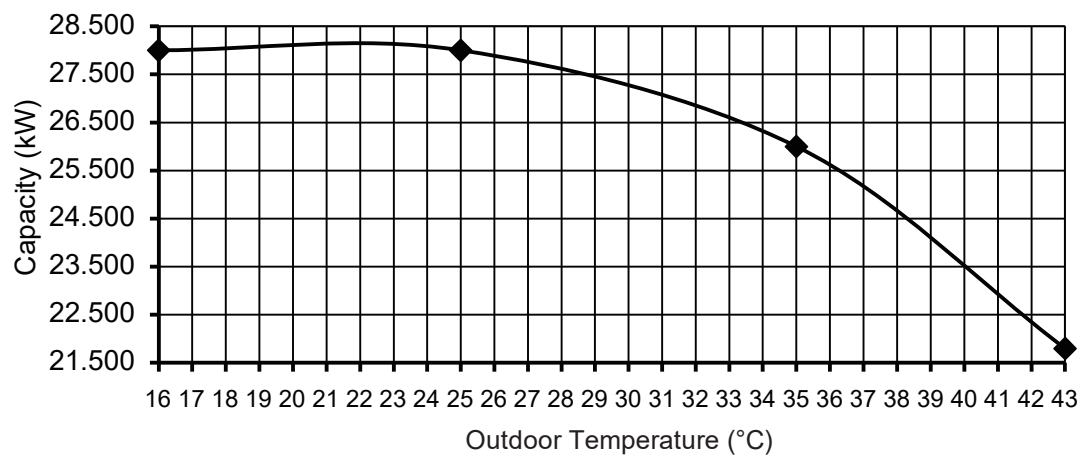
Cooling Characteristics at Different Outdoor Air Temperature

Condition

Outdoor air temperature : 35°C (DBT), -°C (WBT)

Indoor water inlet temperature : 12°C

Indoor water outlet temperature : 7°C



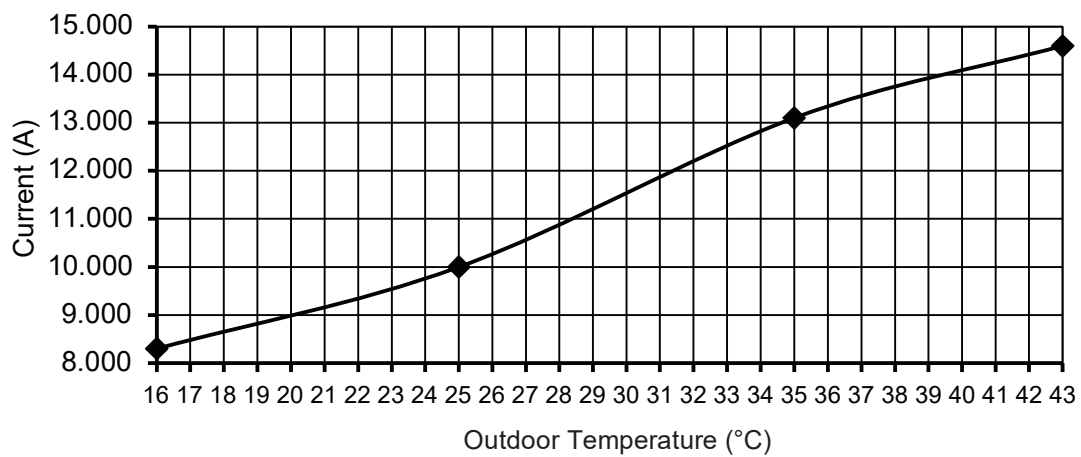
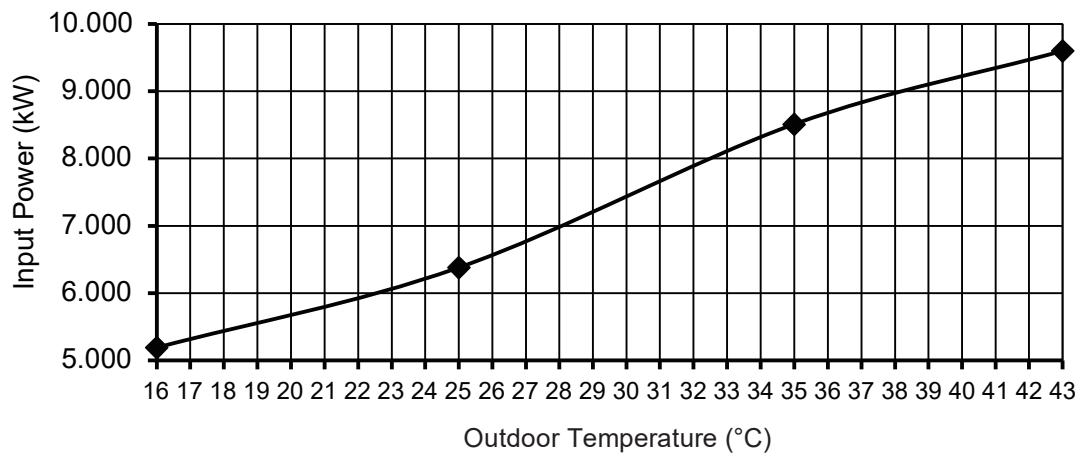
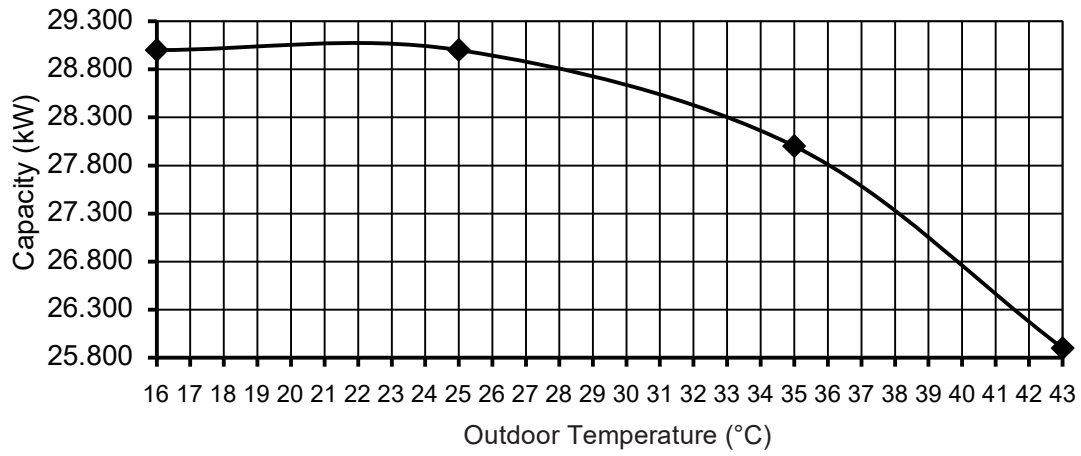
Cooling Characteristics at Different Outdoor Air Temperature

Condition

Outdoor air temperature : 35°C (DBT), -°C (WBT)

Indoor water inlet temperature : 19°C

Indoor water outlet temperature : 14°C



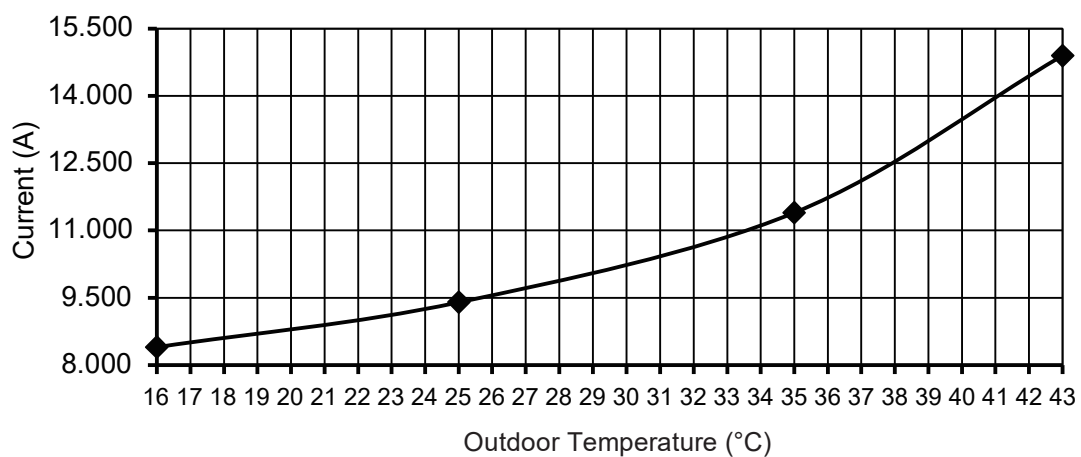
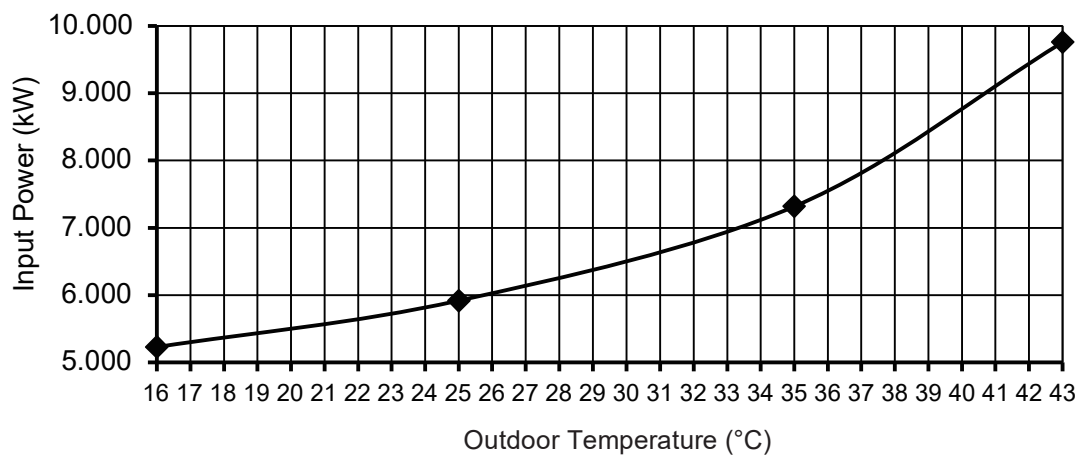
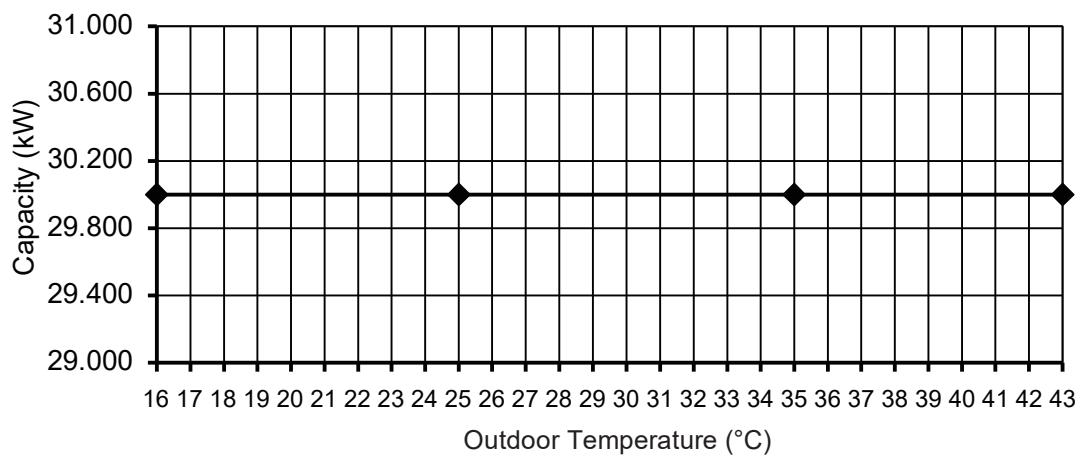
Cooling Characteristics at Different Outdoor Air Temperature

Condition

Outdoor air temperature : 35°C (DBT), -°C (WBT)

Indoor water inlet temperature : 23°C

Indoor water outlet temperature : 18°C



19.2 Heating Capacity Table

19.2.1 WH-WXG20ME8

Water Out(°C)	25			35			45		
Outdoor Air(°C)	Capacity (kW)	Input Power (kW)	Current (A)	Capacity (kW)	Input Power (kW)	Current (A)	Capacity (kW)	Input Power (kW)	Current (A)
-25	20.0	9.15	14.0	20.0	11.23	17.0	20.0	13.32	20.0
-20	20.0	8.55	13.1	20.0	10.50	15.9	20.0	12.45	18.7
-15	20.0	7.40	11.5	20.0	8.53	13.1	20.0	10.27	15.6
-7	20.0	6.83	10.7	20.0	8.05	12.4	20.0	9.28	14.2
2	20.0	3.99	6.6	20.0	5.90	9.3	20.0	7.81	12.1
7	20.0	2.50	4.5	20.0	4.17	6.9	20.0	5.84	9.3
25	20.0	2.33	4.2	20.0	2.60	4.6	20.0	2.87	5.0

Water Out(°C)	55			65			75		
Outdoor Air(°C)	Capacity (kW)	Input Power (kW)	Current (A)	Capacity (kW)	Input Power (kW)	Current (A)	Capacity (kW)	Input Power (kW)	Current (A)
-25	—	—	—	—	—	—	—	—	—
-20	20.0	14.40	21.5	On request			—	—	—
-15	20.0	10.80	16.3	20.0	11.00	16.6	—	—	—
-7	20.0	10.50	15.9	20.0	10.60	16.1	—	—	—
2	20.0	9.61	14.6	20.0	10.45	15.8	—	—	—
7	20.0	6.28	9.9	20.0	9.16	14.0	—	—	—
25	20.0	3.14	5.4	20.0	4.03	6.7	20.0	7.67	11.9

19.2.2 WH-WXG25ME8

Water Out(°C)	25			35			45		
Outdoor Air(°C)	Capacity (kW)	Input Power (kW)	Current (A)	Capacity (kW)	Input Power (kW)	Current (A)	Capacity (kW)	Input Power (kW)	Current (A)
-25	22.0	11.34	17.1	23.0	13.80	20.6	24.0	16.26	24.2
-20	23.0	10.60	16.1	25.0	12.90	19.4	25.0	15.20	22.6
-15	25.0	9.80	14.9	25.0	11.80	17.8	25.0	13.80	20.6
-7	25.0	7.60	11.8	25.0	10.60	16.1	25.0	13.60	20.4
2	25.0	6.85	10.7	25.0	8.93	13.7	25.0	11.01	16.6
7	25.0	3.89	6.5	25.0	5.55	8.8	25.0	7.21	11.2
25	25.0	3.09	5.3	25.0	3.42	5.8	25.0	3.75	6.3

Water Out(°C)	55			65			75		
Outdoor Air(°C)	Capacity (kW)	Input Power (kW)	Current (A)	Capacity (kW)	Input Power (kW)	Current (A)	Capacity (kW)	Input Power (kW)	Current (A)
-25	—	—	—	—	—	—	—	—	—
-20	25.0	16.20	24.1	On request			—	—	—
-15	25.0	14.50	21.6	24.0	13.25	19.9	—	—	—
-7	25.0	13.90	20.8	25.0	14.10	21.1	—	—	—
2	25.0	12.70	19.1	25.0	13.70	20.5	—	—	—
7	25.0	8.33	12.8	25.0	11.60	17.5	—	—	—
25	25.0	4.08	6.7	25.0	5.18	8.3	25.0	9.60	14.6

19.2.3 WH-WXG30ME8

Water Out(°C)	25			35			45		
Outdoor Air(°C)	Capacity (kW)	Input Power (kW)	Current (A)	Capacity (kW)	Input Power (kW)	Current (A)	Capacity (kW)	Input Power (kW)	Current (A)
-25	22.0	11.34	17.1	23.0	13.80	20.6	24.0	16.26	24.2
-20	23.0	10.60	16.1	25.0	12.90	19.4	25.0	15.20	22.6
-15	27.0	13.43	20.1	30.0	15.50	23.1	30.0	17.57	26.0
-7	29.0	9.70	14.8	30.0	12.90	19.4	30.0	16.10	23.9
2	30.0	10.10	15.3	30.0	12.00	18.1	30.0	13.90	20.8
7	30.0	4.88	7.9	30.0	6.82	10.7	30.0	8.76	13.4
25	30.0	4.33	7.1	30.0	4.60	7.5	30.0	4.87	7.9

Water Out(°C)	55			65			75		
Outdoor Air(°C)	Capacity (kW)	Input Power (kW)	Current (A)	Capacity (kW)	Input Power (kW)	Current (A)	Capacity (kW)	Input Power (kW)	Current (A)
-25	—	—	—	—	—	—	—	—	—
-20	25.0	16.20	24.1	On request			—	—	—
-15	30.0	18.50	27.4	25.0	14.61	21.8	—	—	—
-7	30.0	16.76	24.9	30.0	17.10	25.4	—	—	—
2	30.0	15.40	22.9	30.0	16.70	24.8	—	—	—
7	30.0	10.00	15.2	30.0	14.00	20.9	—	—	—
25	30.0	5.14	8.2	30.0	6.49	10.2	25.0	9.60	14.6

19.3 Cooling Capacity Table

19.3.1 WH-WXG20ME8

Water Out(°C)	7			14			18		
Outdoor Air(°C)	Capacity (kW)	Input Power (kW)	Current (A)	Capacity (kW)	Input Power (kW)	Current (A)	Capacity (kW)	Input Power (kW)	Current (A)
16	20.0	3.22	5.5	20.0	3.10	5.3	20.0	2.99	5.2
25	20.0	4.65	7.5	20.0	4.01	6.6	20.0	3.38	5.7
35	20.0	6.62	10.4	20.0	5.40	8.6	20.0	4.18	6.9
43	20.0	9.06	13.9	20.0	7.37	11.4	20.0	5.68	9.0

19.3.2 WH-WXG25ME8

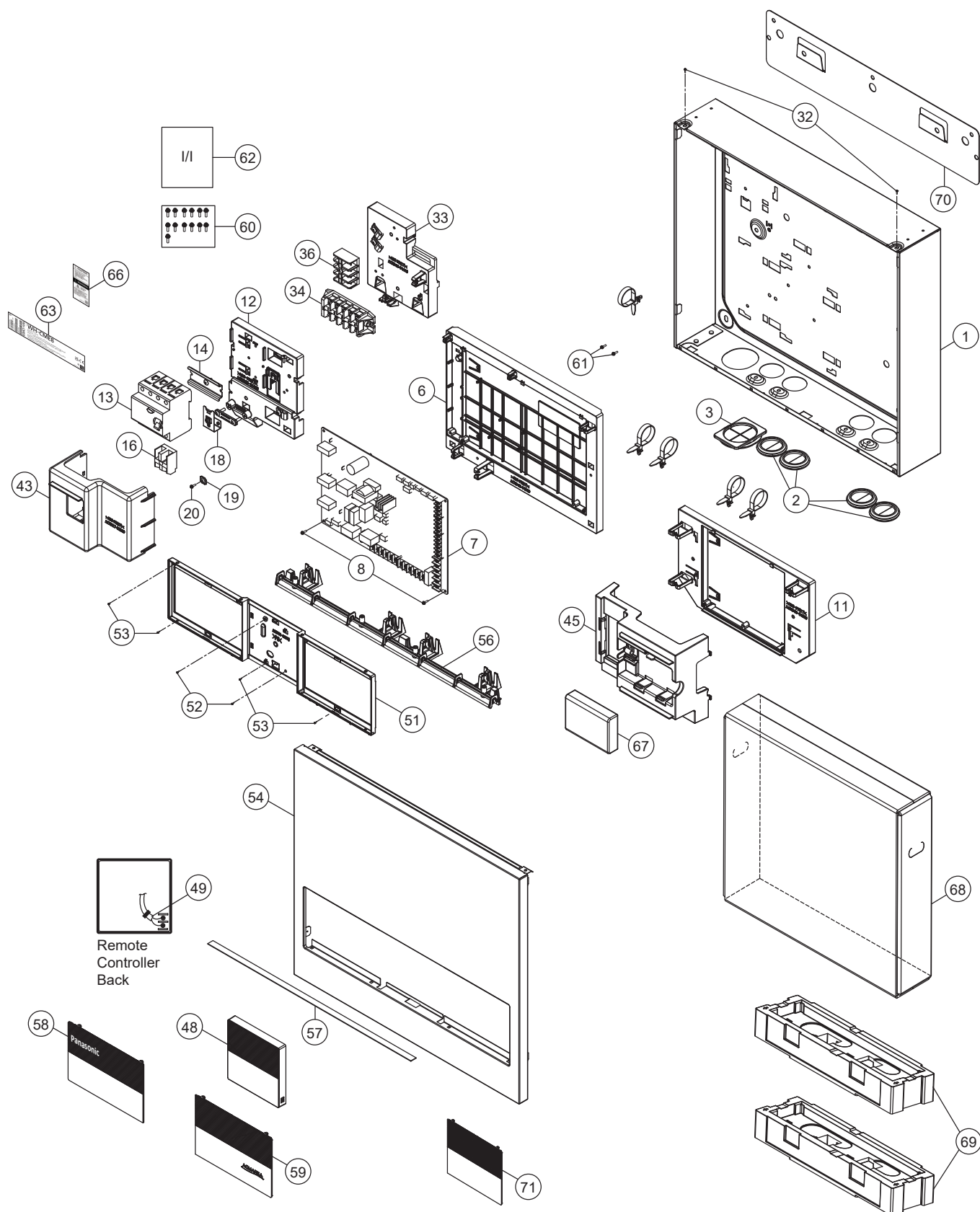
Water Out(°C)	7			14			18		
Outdoor Air(°C)	Capacity (kW)	Input Power (kW)	Current (A)	Capacity (kW)	Input Power (kW)	Current (A)	Capacity (kW)	Input Power (kW)	Current (A)
16	25.0	4.56	7.4	25.0	4.32	7.1	25.0	4.09	6.7
25	25.0	6.35	10.0	25.0	5.45	8.7	25.0	4.57	7.4
35	25.0	8.74	13.4	25.0	7.17	11.2	25.0	5.59	8.9
43	21.8	9.44	14.4	23.4	8.63	13.2	25.0	7.54	11.7

19.3.3 WH-WXG30ME8

Water Out(°C)	7			14			18		
Outdoor Air(°C)	Capacity (kW)	Input Power (kW)	Current (A)	Capacity (kW)	Input Power (kW)	Current (A)	Capacity (kW)	Input Power (kW)	Current (A)
16	28.0	5.14	8.2	29.0	5.19	8.3	30.0	5.23	8.4
25	28.0	6.84	10.7	29.0	6.38	10.0	30.0	5.92	9.4
35	26.0	9.70	14.8	28.0	8.51	13.1	30.0	7.32	11.4
43	21.8	9.44	14.4	25.9	9.60	14.6	30.0	9.76	14.9

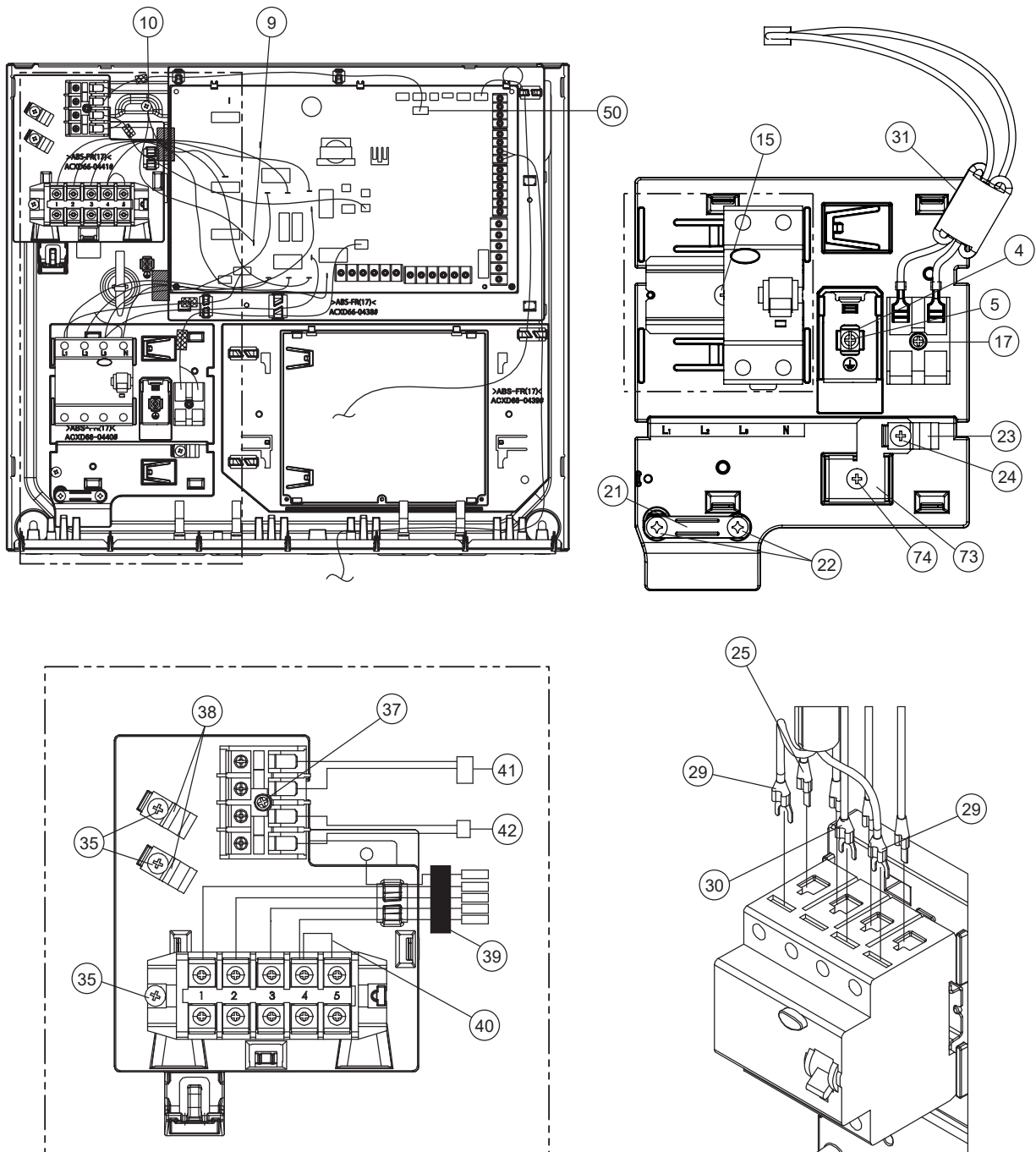
20. Exploded View and Replacement Parts List

20.1 Indoor Unit



Note:

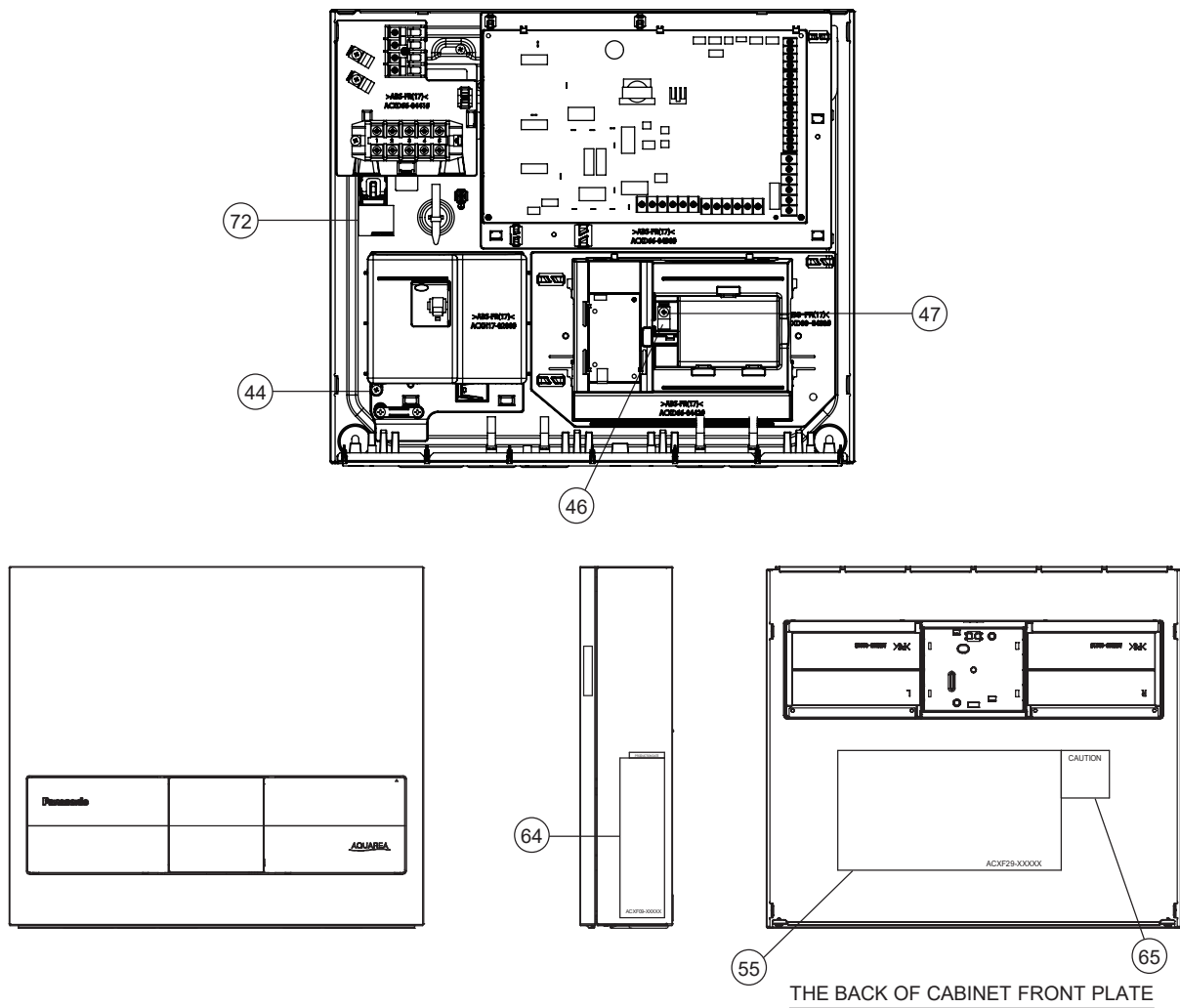
The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.



DTL A

Note:

The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.



DTL B

Note:

The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.

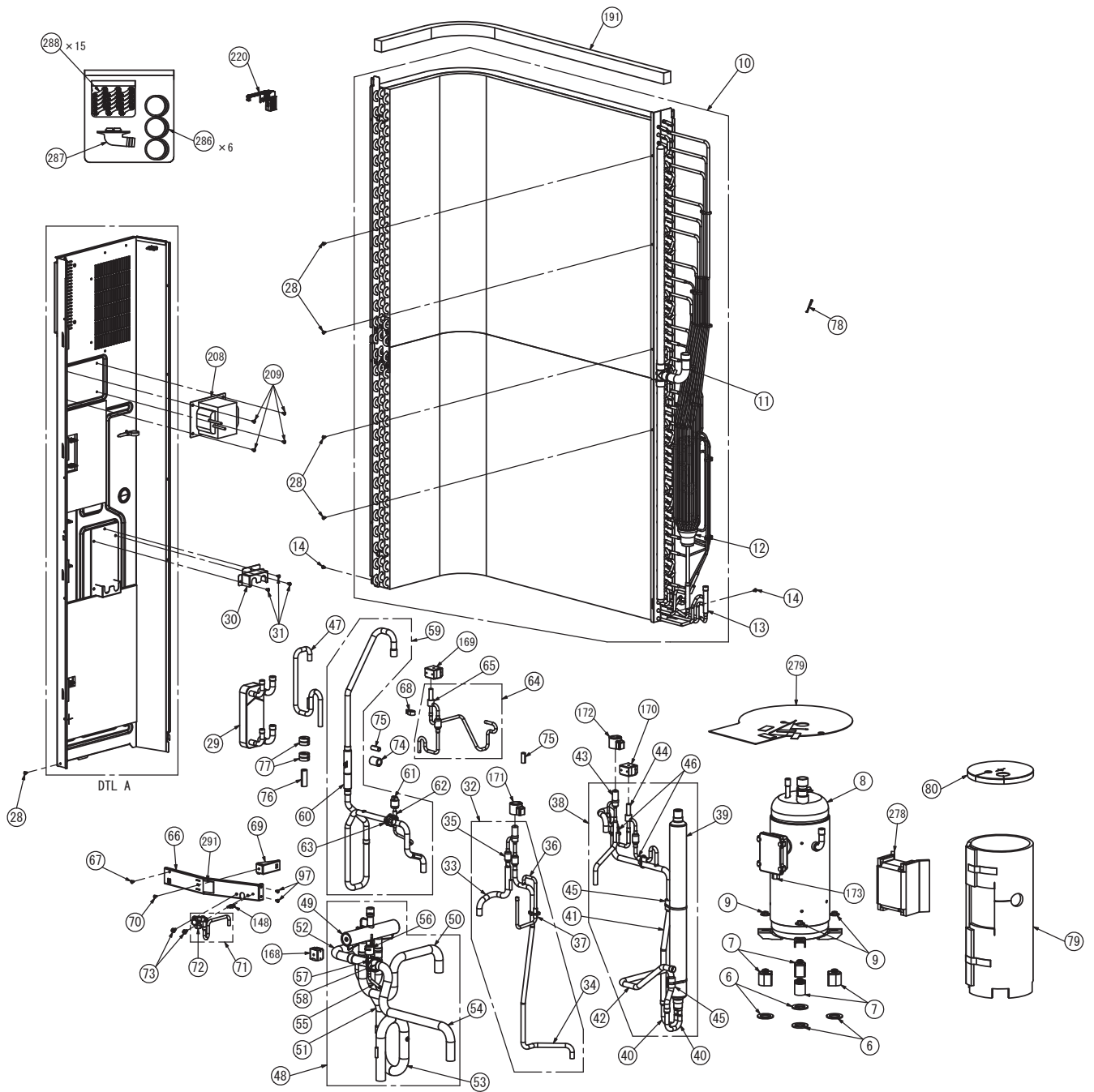
SAFETY	REF. NO.	DESCRIPTION & NAME	QTY.	WH-CME8L	REMARK
	1	CHASSIS	1	ACXD50-03100A	
	2	PACKING	4	ACXB81-00030	
	3	PACKING	1	ACXB81-00040	
	4	WASHER	1	H57094	
	5	MACHINE SCREW & WASHER ASSY	1	XYN4DC8FJ	
	6	BOX SHAPED PLATE	1	ACXD66-04380	
	7	ELECTRONIC CONTROLLER (MAIN)	1	ACXA74C16270	O
	8	MACHINE SCREW & WASHER ASSY	2	XTB3+8CFJ	
	9	LEAD WIRE - COMPLETE	1	ACXA61C03470	O
	10	SELF TAPPING SCREW	1	XTT4+8FFJ	
	11	BOX SHAPED PLATE	1	ACXD66-04390	
	12	BOX SHAPED PLATE	1	ACXD66-04400	
	13	CIRCUIT BREAKER	1	ACXA18-00021	O
	14	U-SHAPED PLATE	1	ACXD62-03010	
	15	SELF TAPPING SCREW	1	XTT4+12CFJ	
	16	TERMINAL BOARD ASSY	1	A28K1064J	O
	17	SELF TAPPING SCREW	1	XTN4+20CFJ	
	18	U-SHAPED PLATE	1	ACXD62-02970	
	19	WASHER	1	H57094	
	20	MACHINE SCREW & WASHER ASSY	1	XYN4DC8FJ	
	21	HOLDER - P.S. CORD	1	H31103	
	22	SELF TAPPING SCREW	2	XTT4+16GFJ	
	23	HOLDER - P.S. CORD	1	H31042	
	24	SELF TAPPING SCREW	1	XTT4+12CFJ	
	25	LEAD WIRE - COMPLETE	1	ACXA61C03350	O
	26	-	-	-	-
	27	-	-	-	-
	28	-	-	-	-
	29	LEAD WIRE - COMPLETE (CN-AC)	1	ACXA61C04470	O
	30	LEAD WIRE - COMPLETE (AC-L3_2)	1	ACXA61C03400	O
	31	LEAD WIRE - COMPLETE (CN-DATA)	1	ACXA61C03460	O
	32	SCREW	2	H551217	
	33	BOX SHAPED PLATE	1	ACXD66-04410	
	34	TERMINAL BOARD ASSY	1	A28K1240	O
	35	SELF TAPPING SCREW	3	XTT4+12CFJ	
	36	TERMINAL BOARD ASSY	1	ACXA28K02540	O
	37	SELF TAPPING SCREW	1	XTN4+20CFJ	
	38	HOLDER - P.S. CORD	2	H31042	
	39	LEAD WIRE - COMPLETE (WIRE1)	1	ACXA61C07410	O
	40	LEAD WIRE - COMPLETE (WIRE2)	1	ACXA61C03980	O

SAFETY	REF. NO.	DESCRIPTION & NAME	QTY.	WH-CME8L	REMARK
	41	LEAD WIRE - COMPLETE (CN-TH1)	1	ACXA61C03490	O
	42	LEAD WIRE - COMPLETE (CN-OLP1)	1	ACXA61C03500	O
	43	TERMINAL COVER	1	ACXH17-02080	
	44	SELF TAPPING SCREW	1	XTT4+12CFJ	
	45	BOX SHAPED PLATE	1	ACXD66-04420	
	46	A-PIECE	1	D77001	
	47	SELF TAPPING SCREW	1	XTT4+12CFJ	
	48	REMOTE CONTROL SWITCH - COMPLETE	1	ACXA75C26382	O
	49	LEAD WIRE - COMPLETE (RC)	1	ACXA61C03510	O
	50	LEAD WIRE - COMPLETE (CN-CNT2)	1	ACXA61C03520	O
	51	BOX SHAPED PLATE (DECO)	1	ACXD66-03970	
	52	SELF TAPPING SCREW	2	XTB4+8CFJ	
	53	SELF TAPPING SCREW	4	XTB4+8FFJ	
	54	CABINET FRONT PLATE	1	ACXE06-05530A	O
	55	WIRING DIAGRAM	1	ACXF29-01212	
	56	PARTICULAR PIECE	1	ACXD93-28250	O
	57	RUBBER (DECO)	1	ACXB81-07400	
	58	DECORATION BASE ASSY (L)	1	ACXE35K03630	
	59	DECORATION BASE ASSY (R)	1	ACXE35K03640	
	60	SELF TAPPING SCREW	13	XTT4+8CFJ	
	61	SCREW	2	ACXH55-00120	
	62	INSTALLATION INSTRUCTION COMPLETE	1	ACXF60C20303	
	63	MODEL LABEL	1	ACXF87-45131	
	64	NAME PLATE	1	ACXF09-10580	
	65	CAUTION LABEL	1	ACXF75-14410	
	66	WARNING LABEL	1	ACXF75-16770	
	67	NETWORK ADAPTOR	1	CZ-TAW*	
	68	CORRUGATED CARDBOARD	1	ACXG57-13730	
	69	SHOCK ABSORBER	2	ACXG70-16800	
	70	INSTALLING HOLDER	1	ACXH36-01290	
	71	DUMMY COVER FOR REMOTE C	1	ACXE15-01170	
	72	CAUTION LABEL	1	ACXF75-16960	
	73	U-SHAPED PLATE	1	ACXD62-03290	
	74	SELF TAPPING SCREW	1	XTT4+8FFJ	

Note:

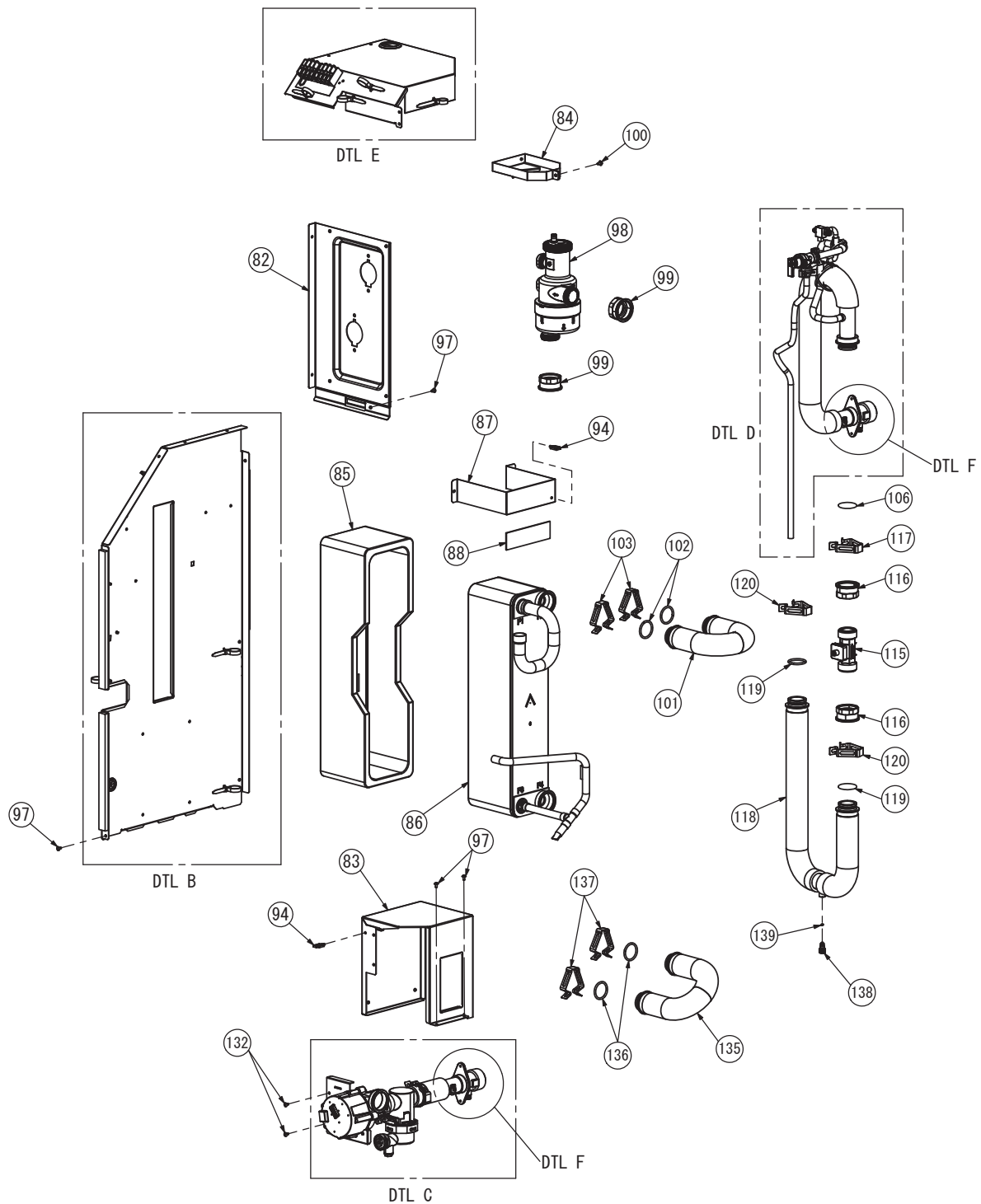
- All parts are supplied from PHVACCZ, Czech (Vendor Code: 00029407).
- “O” marked parts are recommended to be kept in stock.

20.2 Outdoor Unit



Note:

The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.



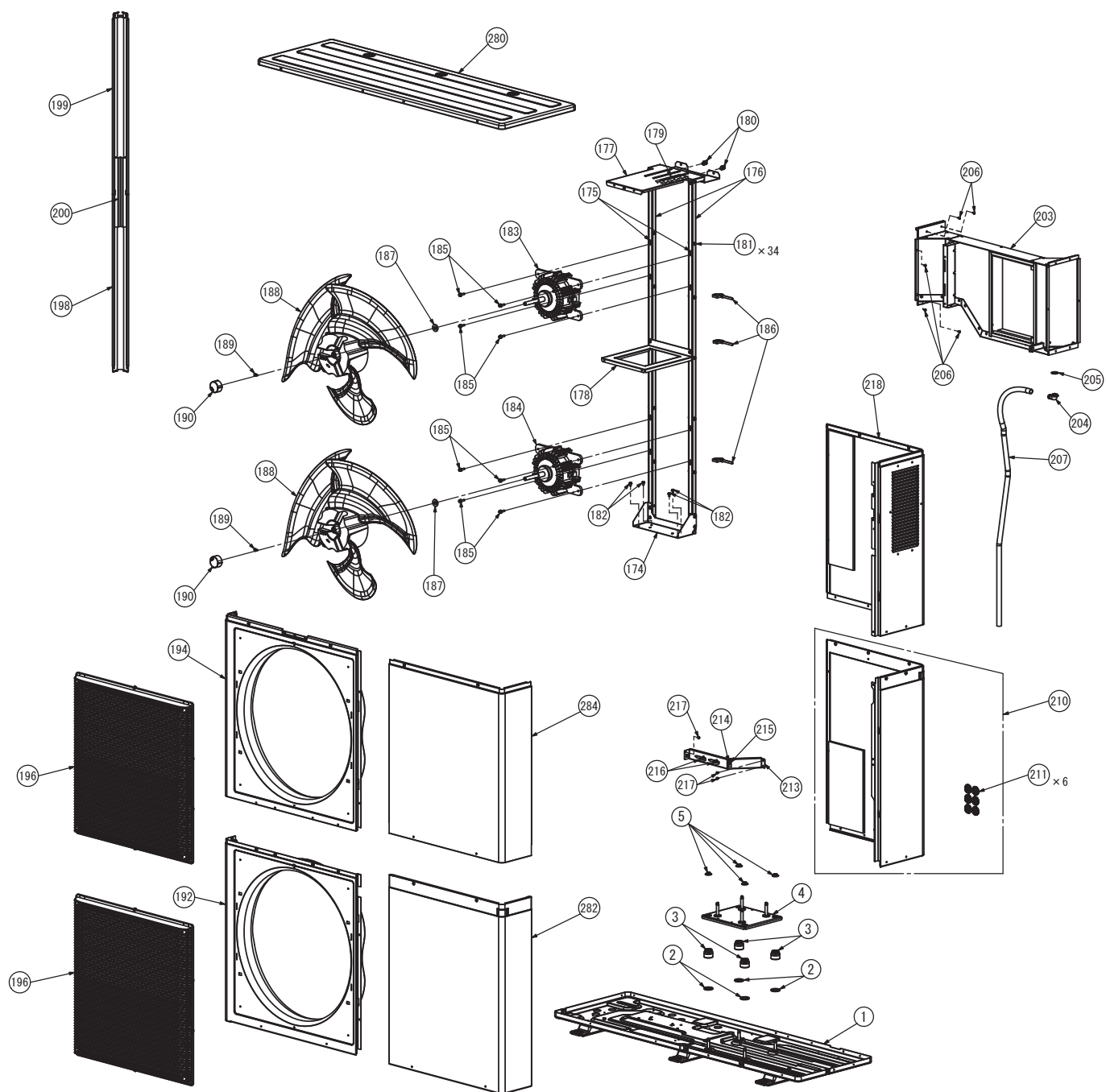
Note:

The above exploded view is for the purpose of parts disassembly and replacement.

The non-numbered parts are not kept as standard service parts.

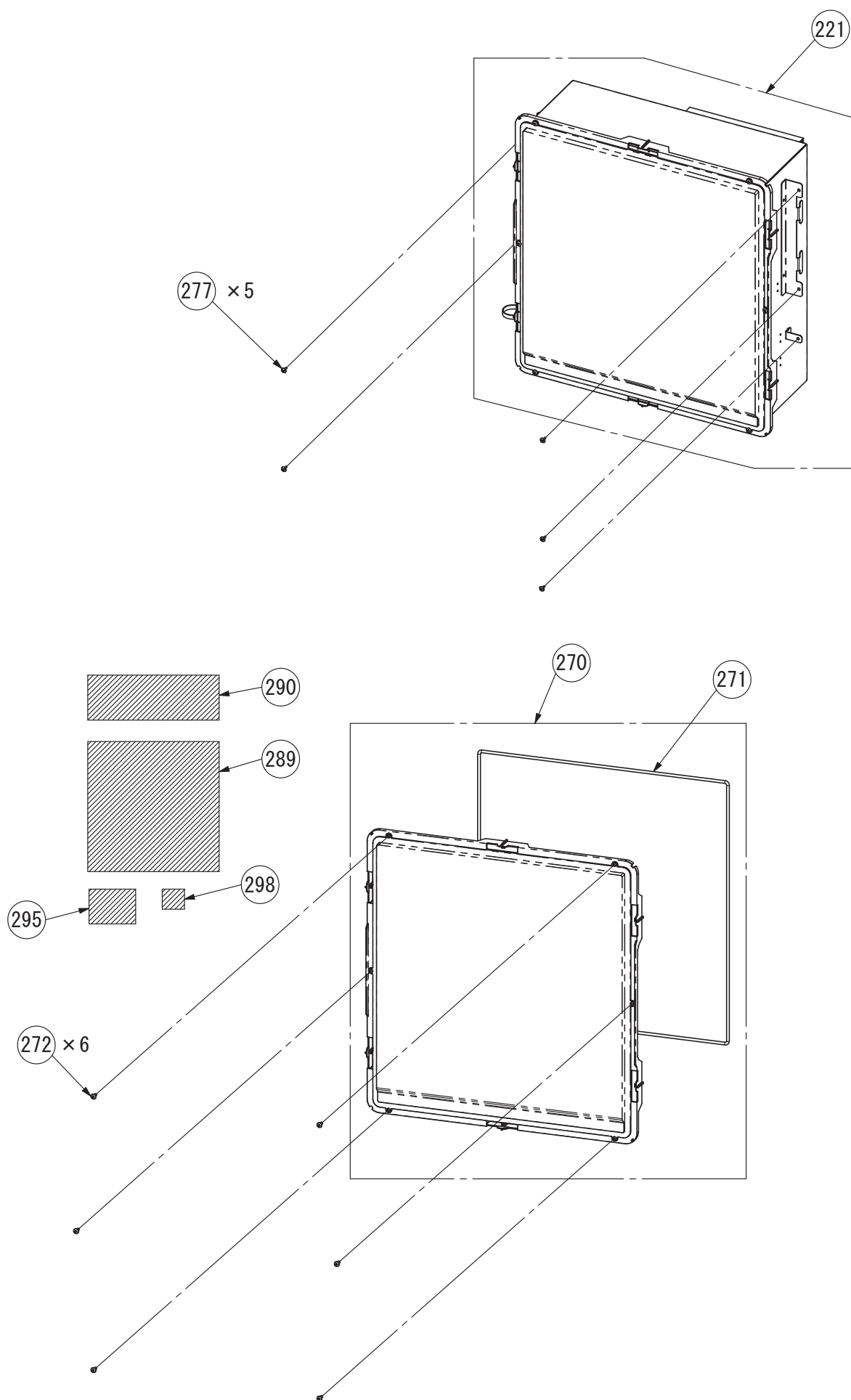
The tightening torque for (99) is 22 ± 1 Nm.

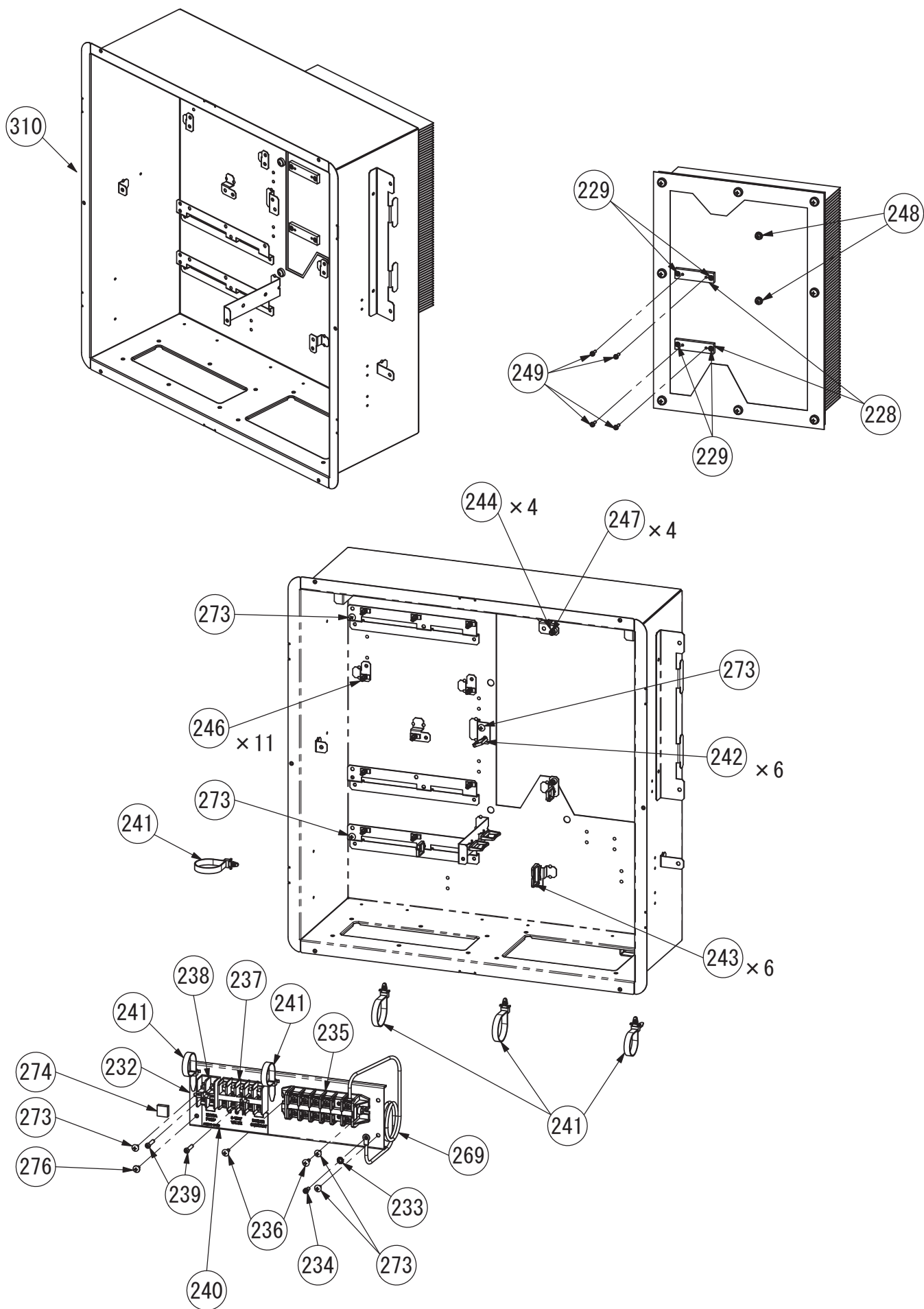
The tightening torque for (116) is 19 ± 1 Nm.

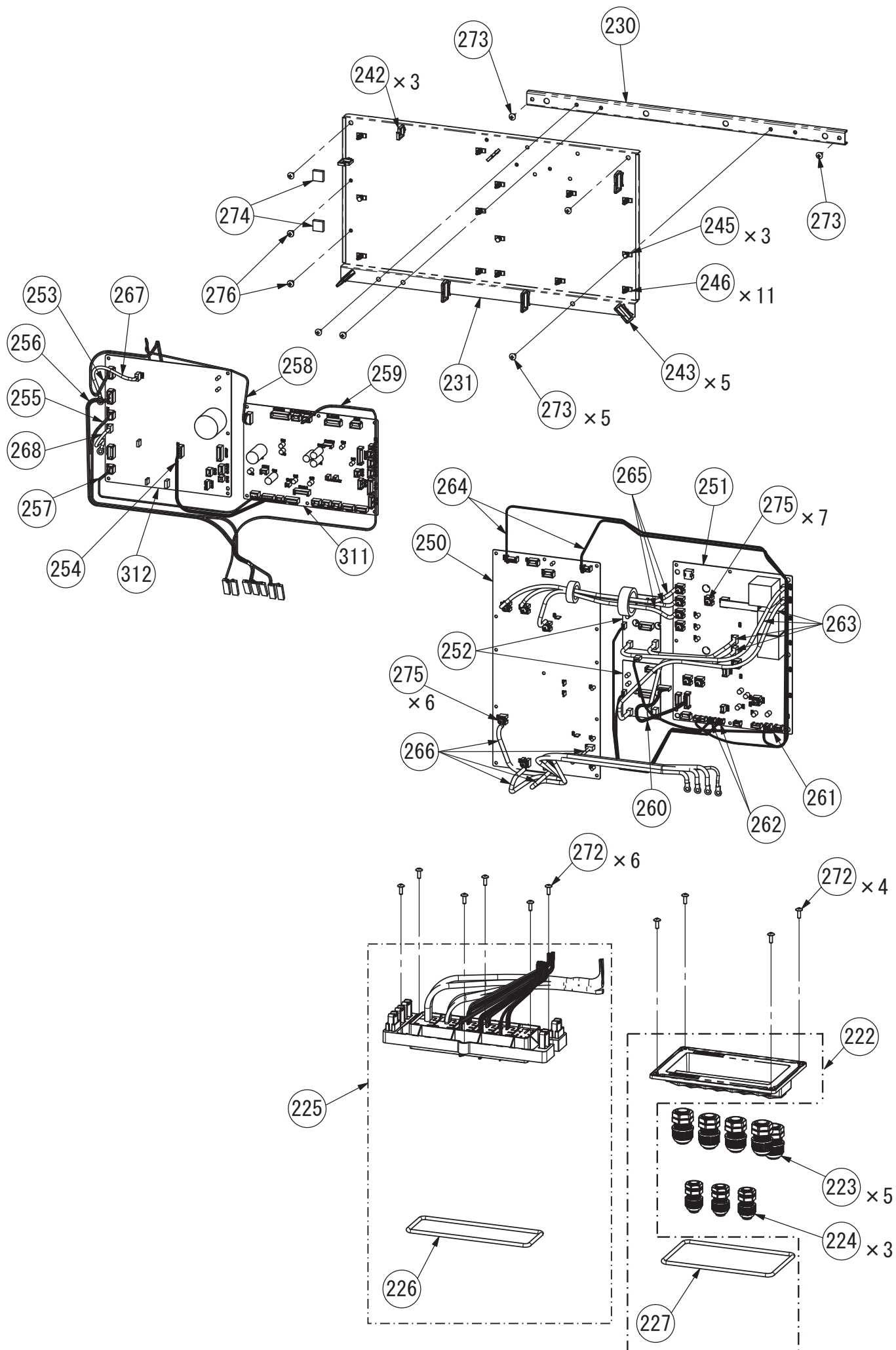


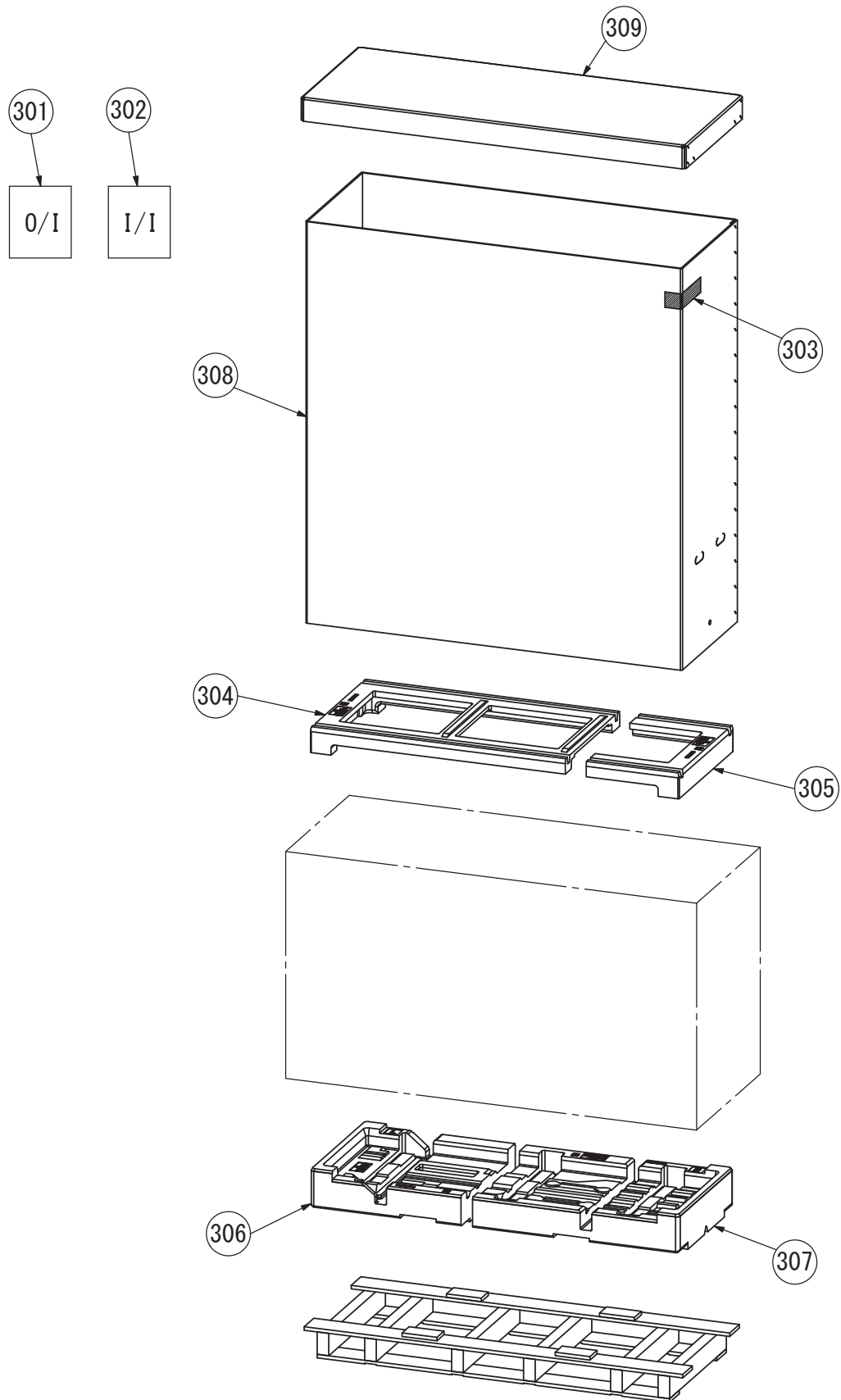
Note:

The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.



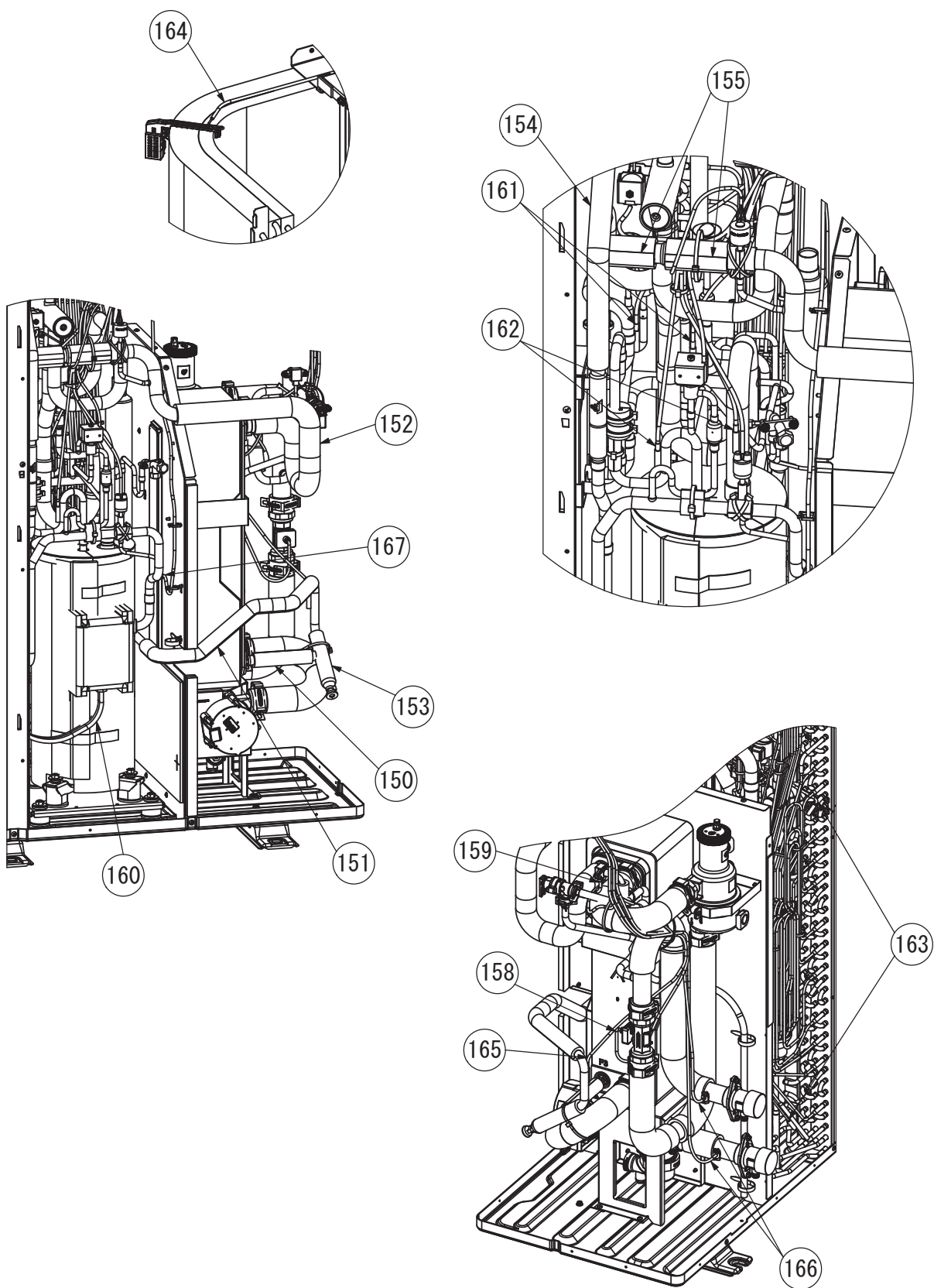






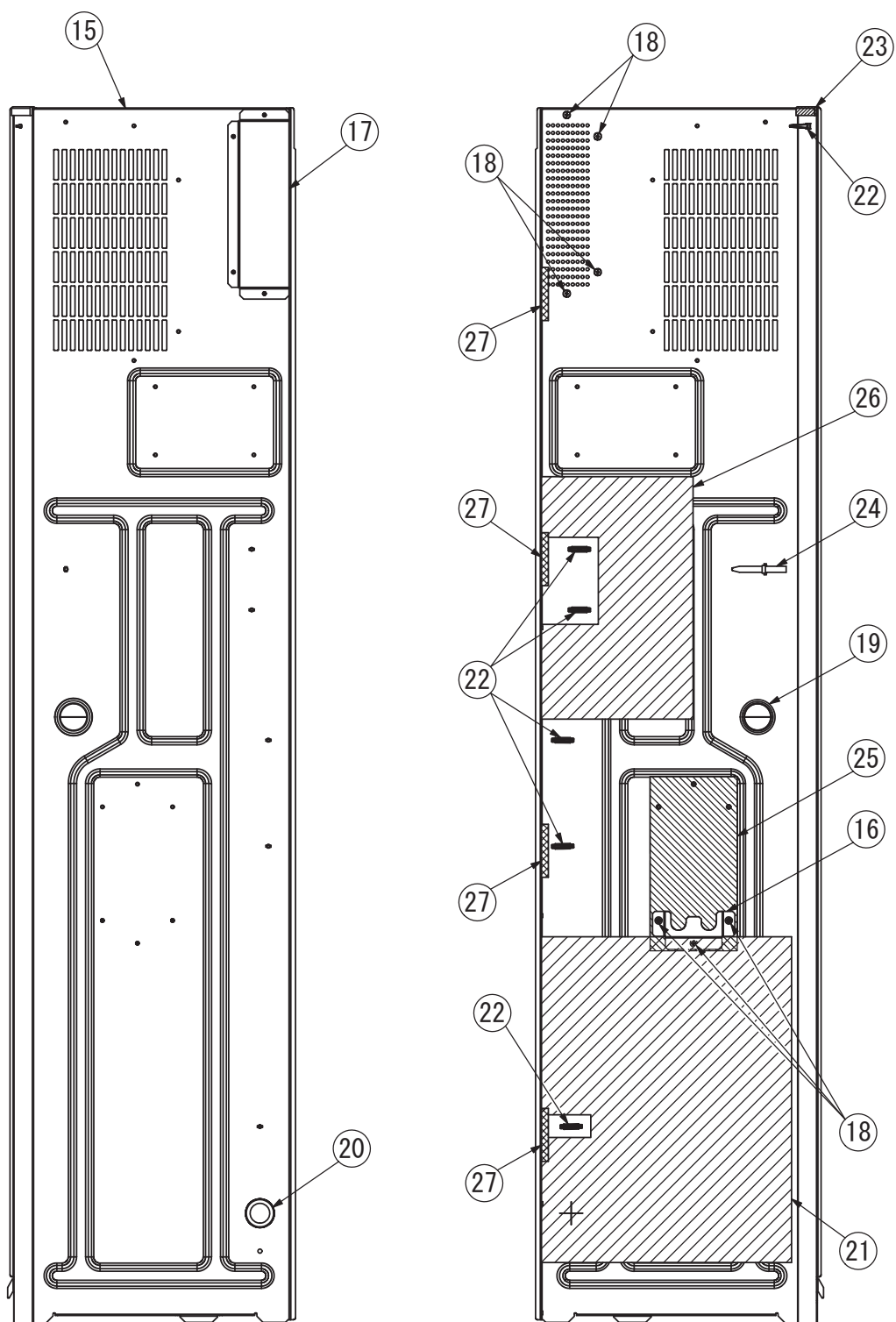
Note:

The above exploded view is for the purpose of parts disassembly and replacement. The non-numbered parts are not kept as standard service parts.



Note:

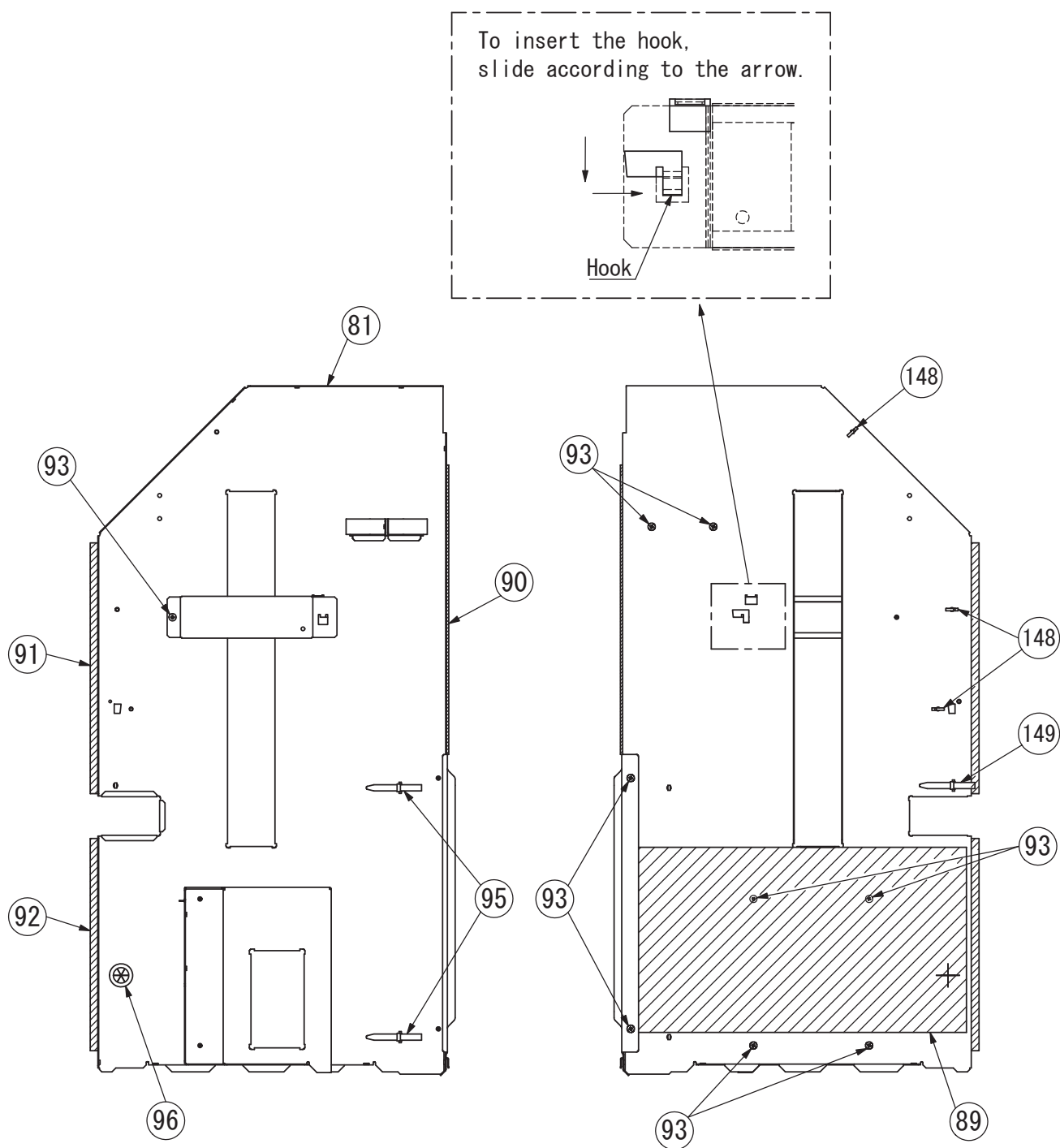
The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.



DTL A

Note:

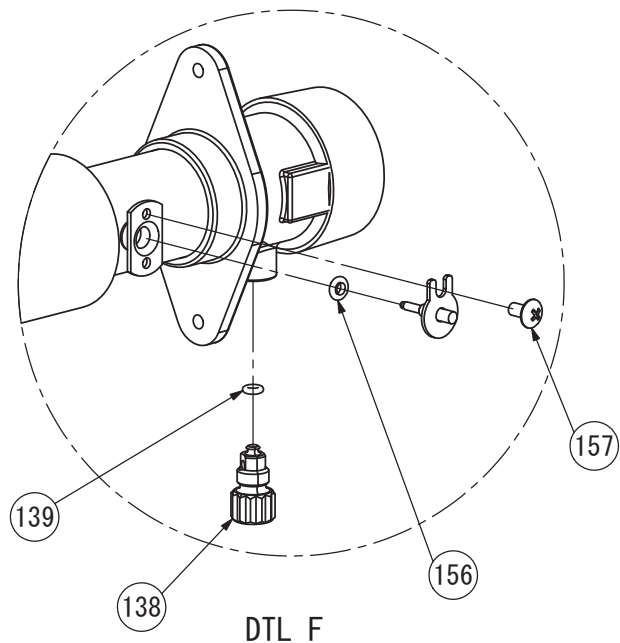
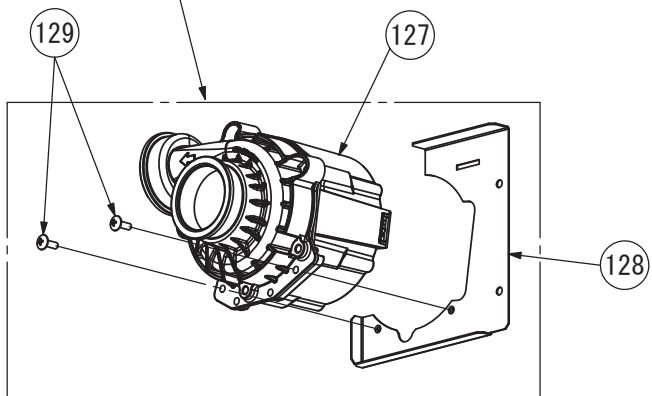
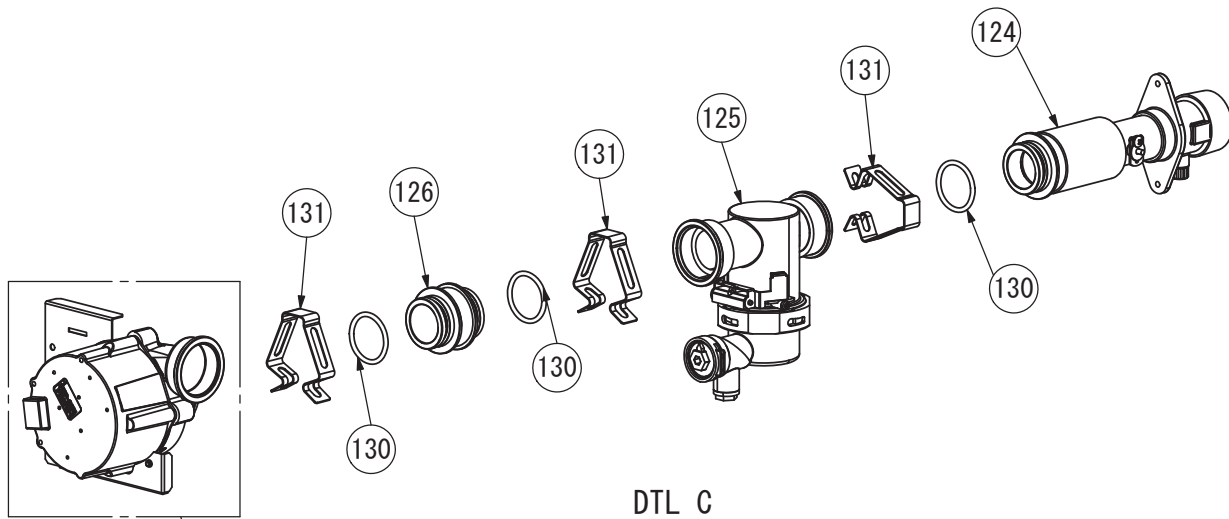
The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.



DTL B

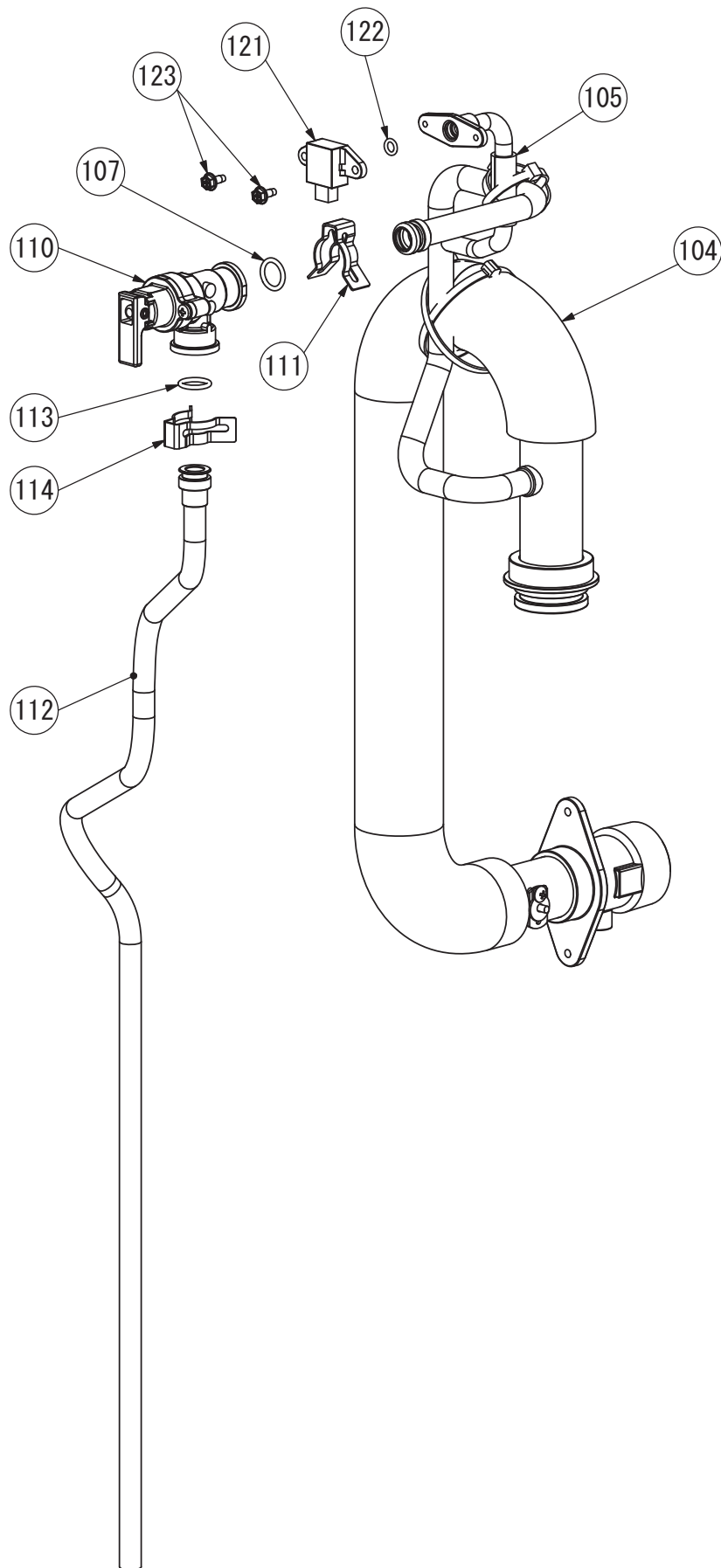
Note:

The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.



Note:

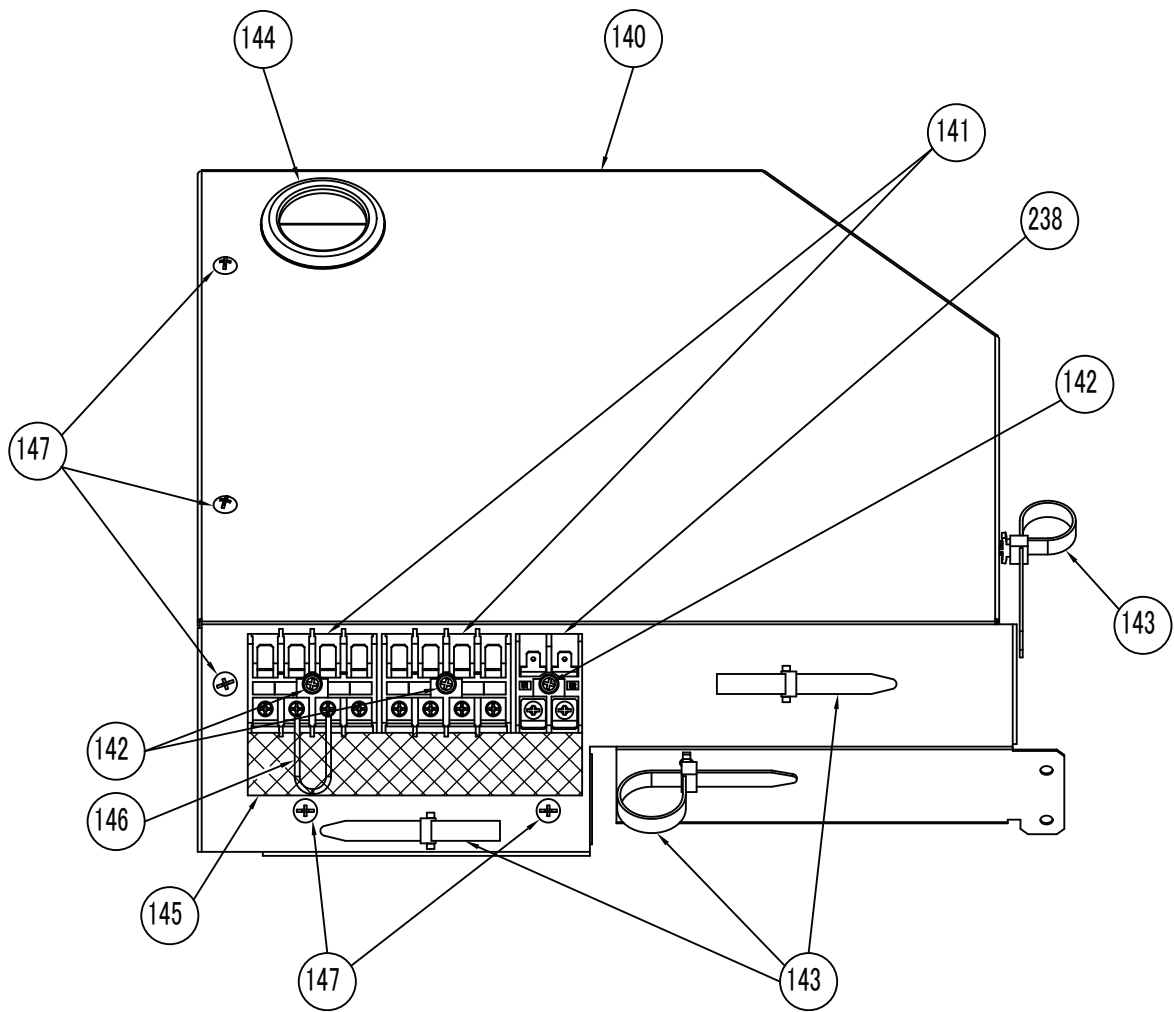
The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.



DTL D

Note:

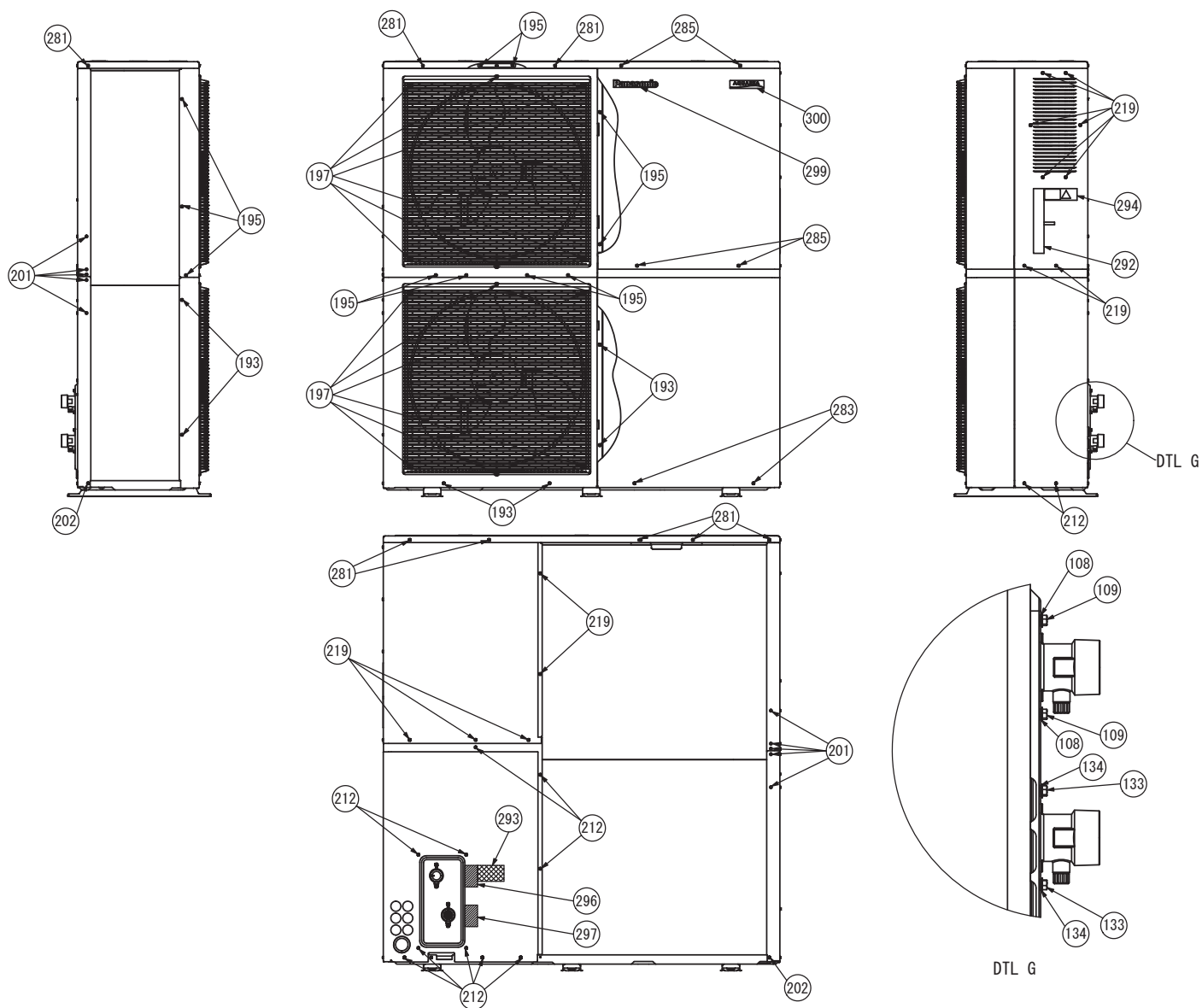
The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.



DTL E

Note:

The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.



Note:

The above exploded view is for the purpose of parts disassembly and replacement.
The non-numbered parts are not kept as standard service parts.

SAFETY	REF. NO.	DESCRIPTION & NAME	QTY.	WH-WXG20ME8	WH-WXG25ME8	WH-WXG30ME8	REMARK
	1	BASE PAN ASSY	1	ACXD52K05690	←	←	
	2	PACKING	4	B811017	←	←	
	3	ANTI-VIBRATION BUSHING	4	ACXH50-00480	←	←	
	4	FLAT PLATE ASSY	1	ACXD64K00080	←	←	
	5	NUT	4	H561049	←	←	
	6	PACKING	4	ACXB81-07660	←	←	
	7	ANTI-VIBRATION BUSHING	4	H501113	←	←	
	8	COMPRESSOR	1	ACXB09-10240	←	←	○
	9	NUT	4	H561049	←	←	
	10	FIN & TUBE CONDENSER COMPLETE	1	ACXB32C30040	←	←	○
	11	HEADER ASSY COMPLETE INHOUSE	1	ACXT52K029CZ	←	←	
	12	MANIFOLD TUBE ASSY	1	ACXT07K11600	←	←	
	13	TUBE ASSY	1	ACXT00-88630	←	←	
	14	SCREW	2	ACXH55-07140	←	←	
	15	SOUND-PROOF BOARD	1	ACXH15-04480	←	←	
	16	PARTICULAR PIECE	1	ACXD93-28400	←	←	
	17	PARTICULAR PLATE	1	ACXD90-32550	←	←	
	18	SCREW	7	ACXH55-07140	←	←	
	19	PACKING	1	ACXB81-00030	←	←	
	20	CAP	1	ACXH52-04230G	←	←	
	21	SOUND PROOF MATERIAL	1	ACXG30-16090	←	←	
	22	BAND	6	4605011	←	←	
	23	EPT SEAL	1	ACXD3A20-105	←	←	
	24	BAND	1	H88133	←	←	
	25	ADH. POLY-E. FOAM	1	ACXG12-43650	←	←	
	26	SOUND PROOF MATERIAL	1	ACXG30-16530	←	←	
	27	ADH. POLY-E. FOAM	4	G123150	←	←	
	28	SCREW	5	ACXH55-07140	←	←	
	29	PLATE HEAT EXCHANGER ASSY	1	ACXB39K00280	←	←	○
	30	PARTICULAR PIECE	1	ACXD93-28400	←	←	
	31	SCREW	3	ACXH55-07140	←	←	
	32	TUBE ASSY	1	ACXT00-88640	←	←	
	33	TUBE ASSY	1	ACXT00-91100	←	←	
	34	MULTIBENT TUBE	1	ACXT31-39280	←	←	
	35	TUBE ASSY	1	ACXT00-91090	←	←	
	36	MULTIBENT TUBE	1	ACXT31-40450	←	←	
	37	RUBBER	1	G251060	←	←	
	38	TUBE ASSY-COMPLETE	1	ACXT00C50070	←	←	
	39	RECEIVER	1	ACXB14-00890	←	←	
	40	MULTIBENT TUBE	2	ACXT31-39310	←	←	

SAFETY	REF. NO.	DESCRIPTION & NAME	QTY.	WH-WXG20ME8	WH-WXG25ME8	WH-WXG30ME8	REMARK
	41	MULTIBENT TUBE	1	ACXT31-39290	←	←	
	42	MULTIBENT TUBE	1	ACXT31-39300	←	←	
	43	TUBE ASSY	1	ACXT00-88650	←	←	
	44	2-WAYS VALVE	1	ACXB02-04110	←	←	○
	45	RUBBER	2	G251095	←	←	
	46	RUBBER	2	G251062	←	←	
	47	TUBE ASSY	1	ACXT00-88660	←	←	
	48	4-WAYS VALVE ASSY	1	ACXB00K01540CZ	←	←	○
	49	4-WAYS VALVE	1	ACXB00-01620	←	←	○
	50	MULTIBENT TUBE	1	ACXT31-39360	←	←	
	51	MULTIBENT TUBE	1	ACXT31-39370	←	←	
	52	MULTIBENT TUBE	1	ACXT31-39380	←	←	
	53	TUBE ASSY	1	ACXT00-91080	←	←	
	54	MULTIBENT TUBE	1	ACXT31-39400	←	←	
	55	MULTIBENT TUBE	1	ACXT31-40380	←	←	
⚠	56	SENSOR	1	ACXA50-07130	←	←	○
	57	RUBBER	1	G251059	←	←	
	58	RUBBER	1	ACXG25-02360	←	←	
	59	TUBE ASSY	1	ACXT00-88670	←	←	
	60	CHECK VALVE	1	ACXB03-00550	←	←	
⚠	61	PRESSURE SWITCH	1	ACXA10-00910	←	←	○
	62	RUBBER	1	G251059	←	←	
	63	RUBBER	1	G251095	←	←	
	64	TUBE ASSY	1	ACXT00-88680	←	←	
	65	2-WAYS VALVE	1	ACXB02-04110	←	←	○
	66	VALVE MOUNTING PLATE	1	ACXD59-00390	←	←	
	67	SCREW	1	ACXH55-07140	←	←	
	68	BUSHING	1	ACXH51-01440	←	←	
	69	PARTICULAR PLATE	1	ACXD90-32930	←	←	
	70	SCREW	1	ACXH55-07140	←	←	
	71	TUBE ASSY	1	ACXT00-88690	←	←	
	72	2-WAYS VALVE	1	ACXB02-03960	←	←	○
	73	SCREW	2	H55440J	←	←	
	74	RUBBER	1	G251095	←	←	
	75	RUBBER	2	G251060	←	←	
	76	RUBBER	1	G251064	←	←	
	77	ANTI-VIBRATION BUSHING	2	H50037J	←	←	
	78	PLATE SPRING	8	H711010	←	←	
	79	SOUND PROOF MATERIAL	1	ACXG30-16111	←	←	
	80	SOUND PROOF MATERIAL	1	ACXG30-16120	←	←	

SAFETY	REF. NO.	DESCRIPTION & NAME	QTY.	WH-WXG20ME8	WH-WXG25ME8	WH-WXG30ME8	REMARK
	81	SOUND-PROOF BOARD	1	ACXH15-04530	←	←	
	82	HOLDER-COUPLING	1	ACXH35-02400	←	←	
	83	PARTICULAR PLATE	1	ACXD90-32440	←	←	
	84	PARTICULAR PLATE	1	ACXD90-32450	←	←	
	85	FOAMED POLYSTYRENE	1	ACXG07-09170	←	←	
	86	HOT WATER COIL-COMplete	1	ACXB90C02150	←	←	○
	87	PARTICULAR PLATE	1	ACXD90-32460	←	←	
	88	POLY-E.FOAM	1	ACXE2A40-140	←	←	
	89	SOUND PROOF MATERIAL	1	ACXG30-16100	←	←	
	90	EPT SEAL	1	ACXD3A20-375	←	←	
	91	EPT SEAL	1	ACXD10A20-325	←	←	
	92	EPT SEAL	1	ACXD10A20-275	←	←	
	93	SCREW	9	ACXH55-07140	←	←	
	94	BAND	2	4605008	←	←	
	95	BAND	2	H88133	←	←	
	96	BUSHING	1	ACXH51-01760	←	←	
	97	SCREW	6	ACXH55-07140	←	←	
	98	FILTER COMPLETE	1	ACXB51C00190	←	←	
	99	SOCKET	2	ACXT27-01540	←	←	
	100	SCREW	1	ACXH55-07140	←	←	
	101	TUBE ASSY-COMplete	1	ACXT00C50030	←	←	
	102	PACKING	2	ACXB81-07900	←	←	
	103	RETAINING RING	2	ACXH58-00440	←	←	
	104	TUBE ASSY-COMplete	1	ACXT00C50040	←	←	
	105	RUBBER	1	G251062	←	←	
	106	PACKING	1	ACXB81-07900	←	←	
⚠	107	PACKING	1	ACXB81-06820	←	←	
	108	TOOTHED LOCK WASHER	2	XWC5BV	←	←	
	109	SCREW	2	H551049J	←	←	
⚠	110	VALVE BODY	1	ACXB62-01320	←	←	○
	111	RETAINING RING	1	H581038	←	←	
	112	TUBE ASSY	1	ACXT00-88910	←	←	
⚠	113	PACKING	1	ACXB81-06820	←	←	
	114	RETAINING RING	1	H581038	←	←	
⚠	115	FLOW SENSOR	1	ACXB62-01330	←	←	○
	116	SOCKET	2	ACXT27-01540	←	←	
	117	RETAINING RING	1	ACXH58-00440	←	←	
	118	TUBE ASSY-COMplete	1	ACXT00C50050	←	←	
	119	PACKING	2	ACXB81-07900	←	←	
	120	RETAINING RING	2	ACXH58-00440	←	←	

SAFETY	REF. NO.	DESCRIPTION & NAME	QTY.	WH-WXG20ME8	WH-WXG25ME8	WH-WXG30ME8	REMARK
	121	SENSOR-COMPLETE	1	ACXA50C20090	←	←	○
	122	PACKING	1	ACXB81-06790	←	←	
	123	SCREW	2	H55406J	←	←	
	124	TUBE ASSY-COMPLETE	1	ACXT00C50020	←	←	
	125	FILTER COMPLETE	1	ACXB51C00180	←	←	
	126	SOCKET	1	ACXT27-01520	←	←	
	127	PUMP	1	ACXB53-01060	←	←	○
	128	PARTICULAR PLATE	1	ACXD90-32470	←	←	
	129	SCREW	2	H551198	←	←	
	130	PACKING	3	ACXB81-07900	←	←	
	131	RETAINING RING	3	ACXH58-00440	←	←	
	132	SCREW	2	ACXH55-07140	←	←	
	133	SCREW	2	H551049J	←	←	
	134	TOOTHED LOCK WASHER	2	XWC5BV	←	←	
	135	TUBE ASSY-COMPLETE	1	ACXT00C50030	←	←	
	136	PACKING	2	ACXB81-07900	←	←	
	137	RETAINING RING	2	ACXH58-00440	←	←	
	138	PLUG	3	B821027	←	←	○
	139	PACKING	3	ACXB81-06770	←	←	
	140	PARTICULAR PLATE	1	ACXD90-32480	←	←	
	141	TERMINAL BOARD ASSY	2	ACXA28K02540	←	←	○
	142	SELF TAPPING SCREW	3	XTN4+16CFJ	←	←	
	143	BAND	4	H88133	←	←	
	144	PACKING	1	ACXB81-00030	←	←	
	145	INDICATION LABEL (TERMINAL)	1	ACXF71-46430	←	←	
	146	LEAD WIRE-COMPLETE	1	ACXA61C00650	←	←	
	147	SCREW	5	ACXH55-07140	←	←	
	148	BAND	4	4605008	←	←	
	149	BAND	1	H88133	←	←	
	150	ADH. POLY-E. FOAM	1	ACXG12-43870	←	←	
	151	ADH. POLY-E. FOAM	1	ACXG12-42860	←	←	
	152	ADH. POLY-E. FOAM	1	ACXG12-42870	←	←	
	153	ADH. POLY-E. FOAM	1	ACXG12-43490	←	←	
	154	ADH. POLY-E. FOAM	1	ACXG12-43500	←	←	
	155	ADH. POLY-E. FOAM	2	ACXG12-43510	←	←	
	156	PACKING	2	ACXB81-06780	←	←	
	157	SELF TAPPING SCREW	2	XTT4+8FFJ	←	←	
	158	LEAD WIRE-COMPLETE	1	ACXA61C04670	←	←	
	159	LEAD WIRE-COMPLETE	1	ACXA61C01510	←	←	
	160	LEAD WIRE-COMPLETE	1	ACXA61C01580	←	←	

SAFETY	REF. NO.	DESCRIPTION & NAME	QTY.	WH-WXG20ME8	WH-WXG25ME8	WH-WXG30ME8	REMARK
⚠	161	SENSOR-COMPLETE	1	ACXA50C20760	←	←	○
⚠	162	SENSOR-COMPLETE	1	ACXA50C20770	←	←	○
⚠	163	SENSOR-COMPLETE	1	ACXA50C20780	←	←	○
⚠	164	SENSOR-COMPLETE	1	ACXA50C20790	←	←	○
⚠	165	SENSOR-COMPLETE	1	ACXA50C20800	←	←	○
⚠	166	SENSOR-COMPLETE	1	ACXA50C20810	←	←	○
⚠	167	SENSOR-COMPLETE	1	ACXA50C20820	←	←	○
⚠	168	V-COIL COMPLETE	1	ACXA43C08380	←	←	○
⚠	169	V-COIL COMPLETE	1	ACXA43C08390	←	←	○
⚠	170	V-COIL COMPLETE	1	ACXA43C08400	←	←	○
⚠	171	V-COIL COMPLETE	1	ACXA43C08410	←	←	○
⚠	172	V-COIL COMPLETE	1	ACXA43C08420	←	←	○
	173	HOLDER-P.S. CORD	1	ACXH31-01730	←	←	
	174	PARTICULAR PLATE	1	ACXD90-32300	←	←	
	175	FAN MOTOR BRACKET (B)	2	ACXD54-05440	←	←	
	176	FAN MOTOR BRACKET (A)	2	ACXD54-05450	←	←	
	177	PARTICULAR PLATE	1	ACXD90-32290	←	←	
	178	PARTICULAR PLATE	1	ACXD90-32310	←	←	
	179	POLY-E.FOAM	1	ACXE8A50-150	←	←	
	180	BAND	2	4605008	←	←	
	181	SCREW	34	H551040J	←	←	
	182	SCREW	4	H551040J	←	←	
⚠	183	DC MOTORS (BRUSHLESS GENERAL USE)	1	L6CAYYYL0203	←	←	○
⚠	184	DC MOTORS (BRUSHLESS GENERAL USE)	1	L6CAYYYL0204	←	←	○
	185	SCREW	8	H551334	←	←	
	186	BAND	3	H881030	←	←	
	187	SPACER (FAN)	2	H541158	←	←	
	188	PROPELLER FAN ASSY	2	ACXH00K00120	←	←	
	189	BOLT	2	XVG6A10FJ4	←	←	
	190	CAP (FAN)	2	H521248	←	←	
	191	EPT SEAL	1	ACXD35A30-1200	←	←	
	192	CABINET FRONT PLATE LOWER_L	1	ACXE06-05750	←	←	○
	193	SCREW	6	ACXH55-07980	←	←	
	194	CABINET FRONT PLATE- COMPLETE UPPER_L	1	ACXE06C05520	←	←	○
	195	SCREW	11	ACXH55-07980	←	←	
	196	DISCHARGE GRILLE	2	ACXE20-03110GR	←	←	○
	197	SCREW	12	ACXH55-07980	←	←	
	198	CABINET SIDE PLATE LOWER	1	ACXE04-14400	←	←	○
	199	CABINET SIDE PLATE UPPER	1	ACXE04-14410	←	←	○
	200	PARTICULAR PLATE	1	ACXD90-32560	←	←	

SAFETY	REF. NO.	DESCRIPTION & NAME	QTY.	WH-WXG20ME8	WH-WXG25ME8	WH-WXG30ME8	REMARK
	201	SCREW	10	ACXH55-07980	←	←	
	202	SCREW	2	ACXH55-07980	←	←	
	203	PARTICULAR PLATE-COMplete	1	ACXD90C06040	←	←	
	204	L-TUBE	1	5850080	←	←	
	205	PACKING	1	B81012	←	←	
	206	SCREW	5	ACXH55-07140	←	←	
	207	STRAIGHT TUBE (AIR DUCT)	1	ACXT10-22500	←	←	
	208	FIXED INDUCTORS	1	G0C122J00011	←	←	
	209	SCREW	4	ACXH55-07140	←	←	
	210	CABINET REAR PLATE-COMplete	1	ACXE02C02130	←	←	○
	211	CAP	6	ACXH52-04230G	←	←	
	212	SCREW	12	ACXH55-07980	←	←	
	213	PARTICULAR PLATE	1	ACXD90-32800	←	←	
	214	A-PIECE	1	D77001	←	←	
	215	SCREW	1	ACXH55-07140	←	←	
	216	BAND	2	H88133	←	←	
	217	SCREW	3	ACXH55-07140	←	←	
	218	CABINET REAR PLATE-COMplete	1	ACXE02C02220	←	←	○
	219	SCREW	13	ACXH55-07980	←	←	
	220	HOLDER-SENSOR	1	ACXH32-01570	←	←	
	221	CONTROL BOARD-COMplete	1	ACXH11C27920	←	←	
	222	BOX SHAPED PLATE_B	1	ACXD66-04500	←	←	
	223	HOLDER-P.S. CORD	5	ACXH31-01480	←	←	
	224	HOLDER-P.S. CORD	3	ACXH31-01620	←	←	
	225	BOX SHAPED PLATE-COMplete_A	1	ACXD66C00790	←	←	
	226	PACKING	1	ACXB81-07670	←	←	
	227	PACKING	1	ACXB81-07920	←	←	
	228	FLAT PIECE	2	ACXD74-01420	←	←	
	229	MACHINE SCREW	4	XSS3+10FJ	←	←	
	230	U-SHAPED PLATE	1	ACXD62-03110	←	←	
	231	PARTICULAR PLATE	1	ACXD90-32540	←	←	
	232	U-SHAPED PLATE	1	ACXD62-03120	←	←	
	233	TOOTHED LOCK WASHER	1	XWC4BV	←	←	
	234	SELF TAPPING SCREW & WASHER ASSY	1	XYC4+CD10FJ	←	←	
⚠	235	TERMINAL BOARD ASSY_C	1	A28K1111	←	←	○
	236	SELF TAPPING SCREW	2	XTT4+12CFJ	←	←	
⚠	237	TERMINAL BOARD ASSY_A	1	A28K1294	←	←	○
⚠	238	TERMINAL BOARD ASSY_B	2	A28K1267	←	←	○
	239	SELF TAPPING SCREW	2	XTN4+20CFJ	←	←	
	240	INDICATION LABEL	1	ACXF71-38670	←	←	

SAFETY	REF. NO.	DESCRIPTION & NAME	QTY.	WH-WXG20ME8	WH-WXG25ME8	WH-WXG30ME8	REMARK
	241	BAND	6	H88133	←	←	
	242	BAND	9	4605008	←	←	
	243	BAND	11	4605011	←	←	
	244	SPACER_A	4	H541207	←	←	
	245	SPACER_B	3	H541204	←	←	
	246	SPACER_C	22	H541203	←	←	
	247	MACHINE SCREW	4	XSN3+12FJ	←	←	
	248	MACHINE SCREW & WASHER ASSY	2	XYN5+J12FJ	←	←	
	249	MACHINE SCREW & WASHER ASSY	4	XYN3+J12FJ	←	←	
⚠	250	ELECTRONIC CONTROLLER(FIL)	1	ACXA73-52190	←	←	○
⚠	251	ELECTRONIC CONTROLLER(HIC)	1	ACXA73-52170	←	←	○
⚠	252	ELECTRONIC CONTROLLER(FAN)	2	ACXA73-51870	←	←	○
⚠	253	LEAD WIRE-COMPLETE	1	ACXA61C01330	←	←	
⚠	254	LEAD WIRE-COMPLETE	1	ACXA61C01390	←	←	
⚠	255	LEAD WIRE-COMPLETE	1	ACXA61C01410	←	←	
⚠	256	LEAD WIRE-COMPLETE	1	ACXA61C01420	←	←	
⚠	257	LEAD WIRE-COMPLETE	1	ACXA61C01470	←	←	
⚠	258	LEAD WIRE-COMPLETE	1	ACXA61C01480	←	←	
⚠	259	LEAD WIRE-COMPLETE	1	ACXA61C01500	←	←	
	260	LEAD WIRE-COMPLETE	1	ACXA61C02030	←	←	
	261	LEAD WIRE-COMPLETE	1	ACXA61C02040	←	←	
	262	LEAD WIRE-COMPLETE	1	ACXA61C02050	←	←	
⚠	263	LEAD WIRE-COMPLETE	1	ACXA61C02070	←	←	
	264	LEAD WIRE-COMPLETE	1	ACXA61C02120	←	←	
⚠	265	LEAD WIRE-COMPLETE	1	ACXA61C02150	←	←	
⚠	266	LEAD WIRE-COMPLETE	1	ACXA61C02180	←	←	
⚠	267	LEAD WIRE-COMPLETE	1	ACXA61C01340	←	←	
⚠	268	LEAD WIRE-COMPLETE	1	ACXA61C01350	←	←	
	269	LEAD WIRE-COMPLETE	1	ACXA61C06760	←	←	
	270	CONTROL BOARD COVER-COMPLETE	1	ACXH13C07000	←	←	
	271	PACKING (C-BOX COVER)	1	ACXB81-07930	←	←	
	272	SCREW	16	H551198	←	←	
	273	MACHINE SCREW	13	XST4+8FJ	←	←	
	274	POLY-E.FOAM (FLAME PROOF)	3	ACXEN5A15-15	←	←	
	275	SCREW	14	ACXH55-02570	←	←	
	276	SELF TAPPING SCREW	3	XTT4+8CFJ	←	←	
	277	SCREW	5	ACXH55-00120	←	←	
	278	SOUND PROOF MATERIAL	1	ACXG30-14880	←	←	
	279	SHEET (COMPRESSOR)	1	ACXH86-07010	←	←	

SAFETY	REF. NO.	DESCRIPTION & NAME	QTY.	WH-WXG20ME8	WH-WXG25ME8	WH-WXG30ME8	REMARK
	280	CABINET TOP PLATE-COMplete	1	ACXE03C02700	←	←	○
	281	SCREW	8	ACXH55-07980	←	←	
	282	CABINET FRONT PLATE-COMplete LOWER_R	1	ACXE06C05390	←	←	○
	283	SCREW	2	ACXH55-07980	←	←	
	284	CABINET FRONT PLATE-COMplete UPPER_R	1	ACXE06C05510	←	←	○
	285	SCREW	4	ACXH55-07980	←	←	
	286	CAP	6	ACXH52-04310	←	←	
	287	DRAIN NOZZLE	1	ACXH41-00700	←	←	○
	288	CAP (ACCESSORY-COMplete CAP)	15	ACXH52-04470	←	←	
⚠	289	WIRING DIAGRAM (CU)	1	ACXF22-12090	←	←	
	290	CAUTION LABEL (DIAGNOSTIC DISPLAY)	1	ACXF75-16760	←	←	
⚠	291	INDICATION LABEL	1	F746943	←	←	
⚠	292	NAME PLATE (CU)	1	ACXF02-98830	ACXF02-98840	ACXF02-98850	
	293	CAUTION LABEL (CABINET)	1	ACXF75-15511	←	←	○
	294	INDICATION LABEL (R290)	1	ACXF71-40160	←	←	
	295	INDICATION LABEL (FM)	1	ACXF71-40220	←	←	
	296	INDICATION LABEL (OUT)	1	ACXF71-25700	←	←	
	297	INDICATION LABEL (IN)	1	ACXF71-25710	←	←	
⚠	298	CAUTION LABEL	1	F762691	←	←	
	299	BADGE	1	ACXE37-20190	←	←	
	300	BADGE	1	ACXE37-20200	←	←	
⚠	301	OPERATING INSTRUCTION-COMplete	1	ACXF55C31540	←	←	
⚠	302	INSTALLATION INSTRUCTION COMplete	1	ACXF60C21140	←	←	
	303	MODEL LABEL	2	ACXF87-43340	ACXF87-43350	ACXF87-43360	
	304	SHOCK ABSORBER	1	ACXG70-16920	←	←	
	305	SHOCK ABSORBER	1	ACXG70-16930	←	←	
	306	SHOCK ABSORBER	1	ACXG70-16940	←	←	
	307	SHOCK ABSORBER	1	ACXG70-16950	←	←	
	308	C.C.CASE	1	ACXG50-66830	←	←	
	309	C.C.CASE	1	ACXG50-66950	←	←	
	310	CONTROL BOARD-BOX	1	ACXH11C36410	←	←	○
	311	ELECTRONIC CONTROLLER (CR)	1	ACXA74C16200	ACXA74C16210	ACXA74C16220	○
	312	ELECTRONIC CONTROLLER (SUB)	1	ACXA74C16230	←	←	○