TOSHIBA

FILE No. AE0-2101W

AIR TO WATER HEAT PUMP

Service Manual

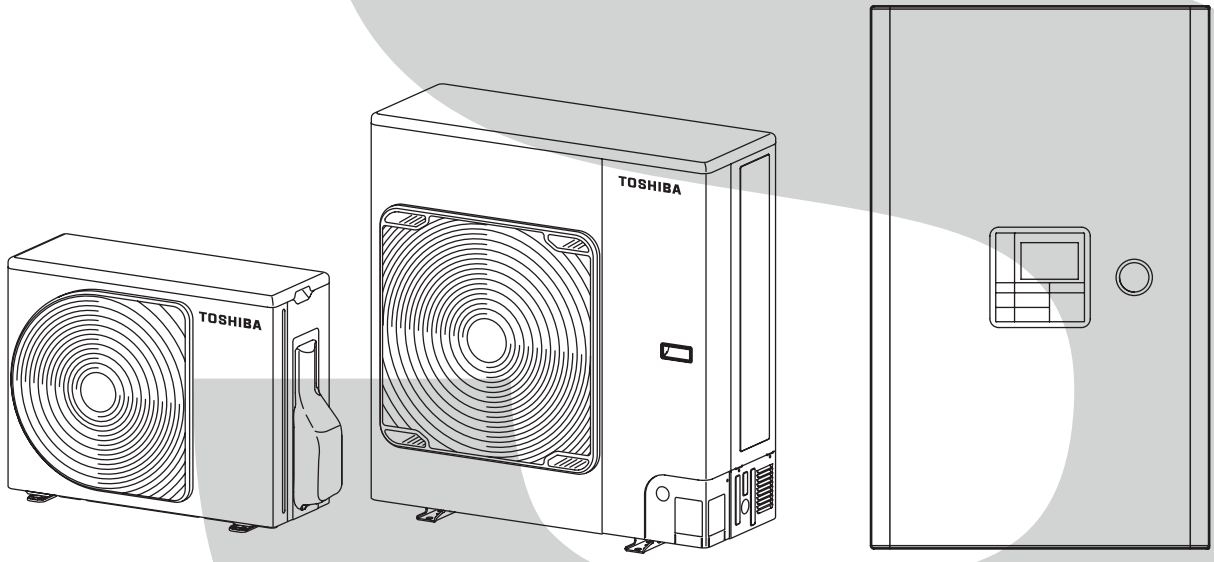
Model name:

Hydro unit -Wall Mounted Type-

HWT-601XWHM3W-E(TR)
HWT-601XWHM6W-E(TR)
HWT-601XWHT6W-E(TR)
HWT-1101XWHM3W-E(TR)
HWT-1101XWHM6W-E(TR)
HWT-1101XWHT6W-E(TR)
HWT-1101XWHT9W-E(TR)
HWT-1401XWHM3W-E(TR)
HWT-1401XWHM6W-E(TR)
HWT-1401XWHT6W-E(TR)
HWT-1401XWHT9W-E(TR)

Outdoor unit

HWT-401HW-E(TR)
HWT-601HW-E(TR)
HWT-801HW-E(TR)
HWT-1101HW-E(TR)
HWT-1401HW-E(TR)
HWT-801HRW-E
HWT-1101HRW-E
HWT-1401HRW-E
HWT-801H8W-E
HWT-1101H8W-E
HWT-1401H8W-E
HWT-801H8RW-E
HWT-1101H8RW-E
HWT-1401H8RW-E



Contents

Generic denomination: Air to Water Heat Pump

Definition of qualified installer or qualified service person

The Air to Water Heat Pump must be installed, maintained, repaired and removed by a qualified installer or qualified service person

When any of these jobs is to be done, ask a qualified installer or qualified service person to do them.

A qualified installer or qualified service person is an agent who has the qualifications and knowledge described in the table below.

Agent	Qualifications and knowledge which the agent must have
Qualified installer (*1)	• The qualified installer is a person who installs, maintains, relocates and removes the Air to Water Heat Pump made by Toshiba Carrier Air-conditioning Europe Sp. z o.o.. He or she has been trained to install, maintain, relocate and remove the Air to Water Heat Pump made by Toshiba Carrier Air-conditioning Europe Sp. z o.o. or, alternatively, he or she has been instructed in such operations by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to these operations. • The qualified installer who is allowed to do the electrical work involved in installation, relocation and removal has the qualifications pertaining to this electrical work as stipulated by the local laws and regulations, and he or she is a person who has been trained in matters relating to electrical work on the Air to Water Heat Pump made by Toshiba Carrier Air-conditioning Europe Sp. z o.o. or, alternatively, he or she has been instructedin such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work. • The qualified installer who is allowed to do the refrigerant handling and piping work involved in installation, relocation and removal has the qualifications pertaining to this refrigerant handling and piping work as stipulated by the local laws and regulations, and he or she is a person who has been trained in matters relating to refrigerant handling and piping work on the Air to Water Heat Pump made by Toshiba Carrier Air-conditioning Europe Sp. z o.o. or, alternatively, he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work. • The qualified installer who is allowed to work at heights has been trained in matters relating to working at heights with the Air to Water Heat Pump made by Toshiba Carrier Air-conditioning Europe Sp. z o.o. or, alternatively, he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work.
Qualified service person (*1)	• The qualified service person is a person who installs, repairs, maintains, relocates and removes the Air to Water Heat Pump made by Toshiba Carrier Air-conditioning Europe Sp. z o.o.. He or she has been trained to install, repair, maintain, relocate and remove the Air to Water Heat Pump made by Toshiba Carrier Air-conditioning Europe Sp. z o.o. or, alternatively, he or she has been instructed in such operations by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to these operations. • The qualified service person who is allowed to do the electrical work involved in installation, repair, relocation and removal has the qualifications pertaining to this electrical work as stipulated by the local laws and regulations, and he or she is a person who has been trained in matters relating to electrical work on the Airto Water Heat Pump made by Toshiba Carrier Air-conditioning Europe Sp. z o.o. or, alternatively, he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work. • The qualified service person who is allowed to do the refrigerant handling and piping work involved in installation, repair, relocation and removal has the qualifications pertaining to this refrigerant handling and piping work as stipulated by the local laws and regulations, and he or she is a person who has been trained in matters relating to refrigerant handling and piping work on the Air to Water Heat Pump made by Toshiba Carrier Air-conditioning Europe Sp. z o.o. or, alternatively, he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work. • The qualified service person who is allowed to work at heights has been trained in matters relating to working at heights with the Air to Water Heat Pump made by Toshiba Carrier Air-conditioning Europe Sp. z o.o. or, alternatively, he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work.

Definition of protective gear

When the Air to Water Heat Pump is to be transported, installed, maintained, repaired or removed, wear protective gloves and “safety” work clothing.

In addition to such normal protective gear, wear the protective gear described below when undertaking the special work detailed in the table below.

Failure to wear the proper protective gear is dangerous because you will be more susceptible to injury, burns, electric shocks and other injuries.

Work undertaken	Protective gear worn
All types of work	Protective gloves “Safety” working clothing
Electrical-related work	Gloves to provide protection for electricians and from heat Insulating shoes Clothing to provide protection from electric shock
Work done at heights (50 cm or more)	Helmets for use in industry
Transportation of heavy objects	Shoes with additional protective toe cap
Repair of Outdoor Unit	Gloves to provide protection for electricians and from heat

The unit and this service guide list very important safety precautions.
Understand the following details (indications and symbols) before reading the body text, and follow the instructions.

The important contents concerned to the safety are described on the product itself and on this Service Manual.
Please read this Service Manual after understanding the described items thoroughly in the following contents (Indications / Illustrated marks), and keep them.

[Explanation of indications]

Indication	Explanation
⚠ DANGER	Indicates contents assumed that an imminent danger causing a death or serious injury of the repair engineers and the third parties when an incorrect work has been executed.
⚠ WARNING	Indicates possibilities assumed that a danger causing a death or serious injury of the repair engineers, the third parties, and the users due to troubles of the product after work when an incorrect work has been executed.
⚠ CAUTION	Indicates contents assumed that an injury or property damage (*) may be caused on the repair engineers, the third parties, and the users due to troubles of the product after work when an incorrect work has been executed.

* Property damage: Enlarged damage concerned to property, furniture, and domestic animal/pet.

[Explanation of illustrated marks]

Mark	Explanation
	Indicates prohibited items (Forbidden items to do) The sentences near an illustrated mark describe the concrete prohibited contents.
	Indicates mandatory items (Compulsory items to do) The sentences near an illustrated mark describe the concrete mandatory contents.
	Indicates cautions (Including danger / warning) The sentences or illustration near or in an illustrated mark describe the concrete cautious contents.

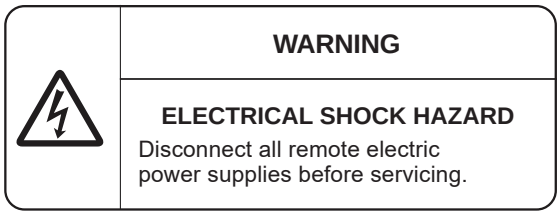
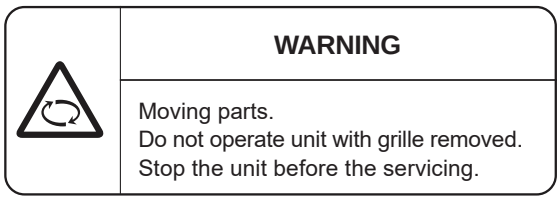
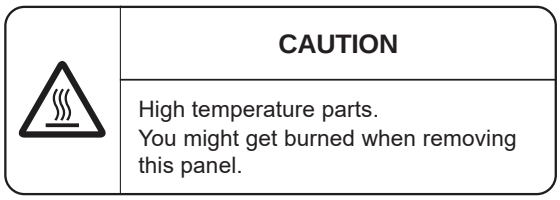
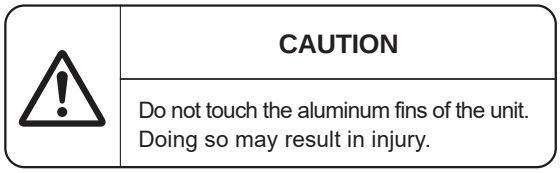
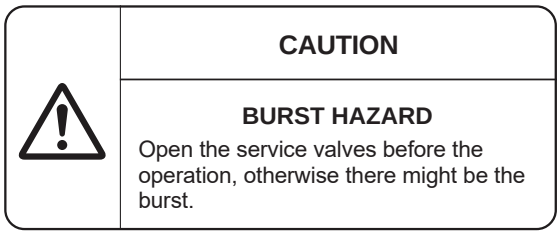
Warning indications on the Air to Water Heat Pump

[Confirmation of warning label on the main unit]

Confirm that labels are indicated on the specified positions

If removing the label during parts replace, stick it as the original.

	**WARNING** (Risk of fire)	This mark is for R32 refrigerant only. Refrigerant type is written on nameplate of Outdoor Unit. In case that refrigerant type is R32, this unit uses a flammable refrigerant. If refrigerant leaks and comes in contact with fire or heating part, it will create harmful gas and there is risk of fire.
	Read the OWNER'S MANUAL carefully before operation.	
	Service personnel are required to carefully read the OWNER'S MANUAL and INSTALLATION MANUAL before operation.	
	Further information is available in the OWNER'S MANUAL, INSTALLATION MANUAL, and the like.	

Warning indication	Description
	**WARNING** ELECTRICAL SHOCK HAZARD Disconnect all remote electric power supplies before servicing.
	**WARNING** Moving parts. Do not operate unit with grille removed. Stop the unit before the servicing.
	**CAUTION** High temperature parts. You might get burned when removing this panel.
	**CAUTION** Do not touch the aluminum fins of the unit. Doing so may result in injury.
	**CAUTION** BURST HAZARD Open the service valves before the operation, otherwise there might be the burst.

Precaution for safety

The appliance shall be installed in accordance with national wiring regulations. Capacity shortages of the power circuit or an incomplete installation may cause an electric shock or fire.

⚠ DANGER	
 Turn off breaker	Before carrying out the installation, maintenance, repair or removal work, be sure to set the circuit breaker to the OFF position. Otherwise, electric shocks may result.
	Before opening the intake grille of the indoor unit or service panel of the outdoor unit, set the circuit breaker to the OFF position. Failure to set the circuit breaker to the OFF position may result in electric shocks through contact with the interior parts. Only a qualified installer (*1) or qualified service person (*1) is allowed to remove the intake grille of the indoor unit or service panel of the outdoor unit and do the work required.
	Before starting to repair the outdoor unit fan or fan guard, be absolutely sure to set the circuit breaker to the OFF position, and place a “Work in progress” sign on the circuit breaker.
	When cleaning the filter or other parts of the indoor unit, set the circuit breaker to OFF without fail, and place a “Work in progress” sign near the circuit breaker before proceeding with the work.
 Prohibition	Do not turn ON the circuit breaker under the condition of removing a cabinet, a panel, etc. Otherwise, it leads to an electric shock with a high voltage, resulting in loss of life.

(*1) Refer to the “Definition of qualified installer or qualified service person”.

⚠ WARNING	
General	Before starting to repair the Air to Water Heat Pump, read carefully through the Service Manual, and repair the Air to Water Heat Pump by following its instructions.
	Only qualified service person (*1) is allowed to repair the Air to Water Heat Pump. Repair of the Air to Water Heat Pump by unqualified person may give rise to a fire, electric shocks, injury, water leaks and/or other problems.
	Only a qualified installer (*1) or qualified service person (*1) is allowed to carry out the electrical work of the Air to Water Heat Pump. Under no circumstances must this work be done by an unqualified individual since failure to carry out the work properly may result in electric shocks and/or electrical leaks.
	Wear protective gloves and safety work clothing during installation, servicing and removal.
	When connecting the electrical wires, repairing the electrical parts or undertaking other electrical jobs, wear gloves to provide protection for electricians, insulating shoes and clothing to provide protection from electric shocks. Failure to wear this protective gear may result in electric shocks.
	Use wiring that meets the specifications in the Installation Manual and the stipulations in the local regulations and laws. Use of wiring which does not meet the specifications may give rise to electric shocks, electrical leakage, smoking and/or a fire.
	Only a qualified installer (*1) or qualified service person (*1) is allowed to undertake work at heights using a stand of 50 cm or more.
	When working at heights, use a ladder which complies with the ISO 14122 standard, and follow the procedure in the ladder's instructions. Also wear a helmet for use in industry as protective gear to undertake the work.
	When working at heights, put a sign in place so that no-one will approach the work location, before proceeding with the work. Parts and other objects may fall from above, possibly injuring a person below.
	Do not touch the aluminum fin of the outdoor unit. You may injure yourself if you do so. If the fin must be touched for some reason, first put on protective gloves and safety work clothing, and then proceed.
	Do not climb onto or place objects on top of the outdoor unit. You may fall or the objects may fall of the outdoor unit and result in injury.
	When transporting the Air to Water Heat Pump, wear shoes with additional protective toecap.
	When transporting the Air to Water Heat Pump, do not hold the bands around the packing carton. You may injure yourself if the bands should break.
	This Air to Water Heat Pump has passed the pressure test as specified in IEC 60335-2-40 Annex EE.
Electric shock hazard	When you access inside of the electric cover to repair electric parts, wait for about five minutes after turning off the breaker. Do not start repairing immediately. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised. Initial safety checks shall include: - that capacitors are discharged; Touching the terminals of charged high-voltage capacitors may cause electric shock. Natural discharge of the capacitor takes about five minutes. - that no live electrical components and wiring are exposed while charging, recovering or purging the system; - that there is continuity of earth bonding;
Prohibition	Place a "Work in progress" sign near the circuit breaker while the installation, maintenance, repair or removal work is being carried out. There is a danger of electric shocks if the circuit breaker is set to ON by mistake.
	When checking the electric parts, removing the cover of the electric parts box of Indoor Unit and/or front panel of Outdoor Unit inevitably to determine the failure, put a sign "Do not enter" around the site before the work. Failure to do this may result in third person getting electric shock.
	Before operating the Air to Water Heat Pump after having completed the work, check that the electrical parts box cover of the indoor unit and service panel of the outdoor unit are closed, and set the circuit breaker to the ON position. You may receive an electric shock if the power is turned on without first conducting these checks.

(*1) Refer to the "Definition of qualified installer or qualified service person".

⚠ WARNING	
Stay on protection	If, in the course of carrying out repairs, it becomes absolutely necessary to check out the electrical parts with the electrical parts box cover of one or more of the indoor units and the service panel of the outdoor unit removed in order to find out exactly where the trouble lies, wear insulated heat-resistant gloves, insulated boots and insulated work overalls, and take care to avoid touching any live parts. You may receive an electric shock if you fail to heed this warning. Only qualified service person (*1) is allowed to do this kind of work.
Check earth wires	Before troubleshooting or repair work, check the earth wire is connected to the earth terminals of the main unit, otherwise an electric shock is caused when a leak occurs. If the earth wire is not correctly connected, contact an electric engineer for rework.
	After completing the repair or relocation work, check that the earth wires are connected properly.
	Be sure to connect earth wire. (Grounding work) Incomplete earthing causes an electric shock. Do not connect earth wires to gas pipes, water pipes, and lightning rods or earth wires for telephone wires.
Prohibition of modification	Do not modify the products. Do not also disassemble or modify the parts. It may cause a fire, electric shock or injury.
Use specified parts	When any of the electrical parts are to be replaced, ensure that the replacement parts satisfy the specifications given in the Service Manual (or use the parts contained on the parts list in the Service Manual). Use of any parts which do not satisfy the required specifications may give rise to electric shocks, smoking and/or a fire.
	Replace components only with parts specified by the manufacturer. Other parts may result in the ignition of refrigerant in the atmosphere due to the refrigerant leak.
Do not bring a child close to the equipment	If, in the course of carrying out repairs, it becomes absolutely necessary to check out the electrical parts with the electrical parts box cover of one or more of the indoor units and the service panel of the outdoor unit removed in order to find out exactly where the trouble lies, place “Keep out” signs around the work site before proceeding. Third-party individuals may enter the work site and receive electric shocks if this warning is not heeded.
Insulating measures	Connect the cut-off lead wires with crimp contact, etc, put the closed end side upward and then apply a water-cut method, otherwise a leak or production of fire is caused at the users’ side.
No fire	When performing repairs using a gas burner, replace the refrigerant with nitrogen gas because the oil that coats the pipes may otherwise burn. When repairing the refrigerating cycle, take the following measures. 1)Be attentive to fire around the cycle. When using a gas stove, etc, be sure to put out fire before work; otherwise the oil mixed with refrigerant gas may catch fire. 2)Do not use a brazing in the closed room. When using it without ventilation, carbon monoxide poisoning may be caused. 3)Do not bring inflammables close to the refrigerant cycle, otherwise fire of the brazing may catch the inflammables.

(*1) Refer to the “Definition of qualified installer or qualified service person”.

⚠ WARNING	
Refrigerant	The refrigerant used by this Air to Water Heat Pump is the R32.
	Check the used refrigerant name and use tools and materials of the parts which match with it. For the products which use R32 refrigerant, the refrigerant name is indicated at a position on the outdoor unit where is easy to see. To prevent miss charging, the route of the service port is changed from one of the former R22. Be careful for miss charging since a charging port of R32 is the same diameter as that of R410A.
	Do not use any refrigerant different from the one specified for complement or replacement. Otherwise, abnormally high pressure may be generated in the refrigeration cycle, which may result in a failure or explosion of the product or an injury to your body.
	For an Air to Water Heat Pump which uses R32, never use other refrigerant than R32. For an Air to Water Heat Pump which uses other refrigerant (R22, R410A etc.), never use R32. If different types of refrigerant are mixed, abnormal high pressure generates in the refrigerating cycle and an injury due to breakage may be caused. If the different type of refrigerants are mixed in, be sure to recharge the refrigerant.
	Do not charge refrigerant additionally. If charging refrigerant additionally when refrigerant gas leaks, the refrigerant composition in the refrigerating cycle changes resulted in change of Air to Water Heat Pump characteristics or refrigerant over the specified standard amount is charged and an abnormal high pressure is applied to the inside of the refrigerating cycle resulted in cause of breakage or injury. Therefore if the refrigerant gas leaks, recover the refrigerant in the Air to Water Heat Pump, execute vacuuming, and then newly recharge the specified amount of liquid refrigerant. In this time, never charge the refrigerant over the specified amount.
	When recharging the refrigerant in the refrigerating cycle, do not mix the refrigerant or air other than R32 into the specified refrigerant. If air or others is mixed with the refrigerant, abnormal high pressure generates in the refrigerating cycle resulted in cause of injury due to breakage.
	After the installation work, confirm that refrigerant gas does not leak. If refrigerant gas leaks into the room and flows near a fire source, such as a cooking range, it may generate noxious gases, causing a fire.
	Never recover the refrigerant into the outdoor unit. When the equipment is moved or repaired, be sure to recover the refrigerant with recovering device. The refrigerant cannot be recovered in the outdoor unit; otherwise a serious accident such as breakage or injury is caused.
Assembly / Cabling	After repair work, surely assemble the disassembled parts, and connect and lead the removed wires as before. Perform the work so that the cabinet or panel does not catch the inner wires. If incorrect assembly or incorrect wire connection was done, a disaster such as a leak or fire is caused at user's side.
Insulator check	After the work has finished, be sure to use an insulation tester set (500 VMΩ) to check the resistance is 1 MΩ or more between the charge section and the non-charge metal section (Earth position). If the resistance value is low, a disaster such as a leak or electric shock is caused at user's side.
Ventilation	When the refrigerant gas leaks during work, execute ventilation. If the refrigerant gas touches to a fire, it may generate noxious gases, causing a fire. A case of leakage of the refrigerant and the closed room full with gas is dangerous because a shortage of oxygen occurs. Be sure to execute ventilation.
	If refrigerant gas has leaked during the installation work, ventilate the room immediately. If the leaked refrigerant gas comes in contact with fire, it may generate noxious gases, causing a fire.

⚠ WARNING	
Compulsion	When the refrigerant gas leaks, find out the leaked position and repair it surely. If the leaked position cannot be found out and the repair work is interrupted, pump-down and tighten the service valve, otherwise the refrigerant gas may leak into the room. When gas touches to fire such as fan heater, stove or cocking stove, it may generate noxious gases, causing a fire though the refrigerant gas itself is innocuous. When installing equipment which includes a large amount of charged refrigerant in a sub-room, it is necessary that the concentration does not the limit even if the refrigerant leaks. If the refrigerant leaks and exceeds the limit concentration, an accident of shortage of oxygen is caused.
	Tighten the flare nut with a torque wrench in the specified manner. Excessive tighten of the flare nut may cause a crack in the flare nut after a long period, which may result in refrigerant leakage.
	Nitrogen gas must be used for the airtight test.
	The charge hose must be connected in such a way that it is not slack.
	For the installation/moving/reinstallation work, follow to the Installation Manual. If an incorrect installation is done, a trouble of the refrigerating cycle, water leak, electric shock or fire is caused.
	Install the outdoor unit properly in a location that is durable enough to support the weight of the outdoor unit. Insufficient durability may cause the outdoor unit to fall, which may result in injury.
Check after repair	Once the repair work has been completed, check for refrigerant leaks, and check the insulation resistance and water drainage. Then perform a trial run to check that the Air to Water Heat Pump is running properly.
	After repair work has finished, check there is no trouble. If check is not executed, a fire, electric shock or injury may be caused. For a check, turn off the power breaker.
	After repair work (installation of front panel and cabinet) has finished, execute a test run to check there is no generation of smoke or abnormal sound. If check is not executed, a fire or an electric shock is caused. Before test run, install the front panel and cabinet.
Do not operate the unit with the valve closed	Check the following matters before a test run after repairing piping. • Connect the pipes surely and there is no leak of refrigerant. • The valve is opened. Running the compressor under condition that the valve closes causes an abnormal high pressure resulted in damage of the parts of the compressor and etc. and moreover if there is leak of refrigerant at connecting section of pipes, the air is suctioned and causes further abnormal high pressure resulted in burst or injury.
Check after reinstallation	Only a qualified installer (*1) or qualified service person (*1) is allowed to relocate the Air to Water Heat Pump. It is dangerous for the Air to Water Heat Pump to be relocated by an unqualified individual since a fire, electric shocks, injury, water leakage, noise and/or vibration may result.
	Check the following items after reinstallation. 1) The earth wire is correctly connected. 2) The power cord is not caught in the product. 3) There is no inclination or unsteadiness and the installation is stable. If check is not executed, a fire, an electric shock or an injury is caused.
Cooling check	When the service panel of the outdoor unit is to be opened in order for the compressor or the area around this part to be repaired immediately after the Air to Water Heat Pump has been shut down, set the circuit breaker to the OFF position, and then wait at least 10 minutes before opening the service panel. If you fail to heed this warning, you will run the risk of burning yourself because the compressor pipes and other parts will be very hot to the touch. In addition, before proceeding with the repair work, wear the kind of insulated heat-resistant gloves designed to protect electricians.
	When the service panel of the outdoor unit is to be opened in order for the fan motor, reactor, inverter or the areas around these parts to be repaired immediately after the Air to Water Heat Pump has been shut down, set the circuit breaker to the OFF position, and then wait at least 10 minutes before opening the service panel. If you fail to heed this warning, you will run the risk of burning yourself because the fan motor, reactor, inverter heat sink and other parts will be very hot to the touch. In addition, before proceeding with the repair work, wear the kind of insulated heat-resistant gloves designed to protect electricians.

(*1) Refer to the “Definition of qualified installer or qualified service person”.

⚠ WARNING	
Installation	Only a qualified installer (*1) or qualified service person (*1) is allowed to install the Air to Water Heat Pump. If the Air to Water Heat Pump is installed by an unqualified individual, a fire, electric shocks, injury, water leakage, noise and/or vibration may result.
	Before starting to install the Air to Water Heat Pump, read carefully through the Installation Manual, and follow its instructions to install the Air to Water Heat Pump.
	Do not install the Air to Water Heat Pump in a location that may be subject to a risk of expire to a combustible gas. If a combustible gas leaks and becomes concentrated around the unit, a fire may occur.
	When transporting the Air to Water Heat Pump, use a forklift truck and when moving the Air to Water Heat Pump by hand, move the unit with 4 people.
	Install a circuit breaker that meets the specifications in the Installation Manual and the stipulations in the local regulations and laws.
	Install the circuit breaker where it can be easily accessed by the agent.
	Do not place any combustion appliance in a place where it is directly exposed to the wind of Air to Water Heat Pump, otherwise it may cause imperfect combustion.
Compulsion	When carrying out the pump-down work shut down the compressor before disconnecting the refrigerant pipe. Disconnecting the refrigerant pipe with the service valve left open and the compressor still operating will cause air, etc. to be sucked in, raising the pressure inside the refrigeration cycle to an abnormally high level, and possibly resulting in rupture, injury, etc.
	When removing the brazing parts of suction and discharge pipe for the compressor, remove them at the place ventilated well after recovering the refrigerant. Improper recovering may cause the spurt of the refrigerant and the refrigeration oil, causing an injury.
Prohibition	Do not vent gases to the atmosphere. Venting gases to the atmosphere is prohibited by the law.

(*1) Refer to the “Definition of qualified installer or qualified service person”.

⚠ CAUTION	
Wearing of gloves	Ensure wearing of gloves when performing any work in order to avoid injury from parts, etc. Failure to wear the proper protective gloves cause an injury due to the parts, etc.
Confirm	When performing the brazing work, check whether refrigerant leaks or remains. If the leakage refrigerant gas touches a fire source, it may generate noxious gases, causing a fire.

Explanations given to user

- If you have discovered that the fan grille is damaged, do not approach the outdoor unit but set the circuit breaker to the OFF position, and contact a qualified service person to have the repairs done.
  Do not set the circuit breaker to the ON position until the repairs are completed.

Relocation

- Only a qualified installer (*1) or qualified service person (*1) is allowed to relocate the Air to Water Heat Pump. It is dangerous for the Air to Water Heat Pump to be relocated by an unqualified individual since a fire, electric shocks, injury, water leakage, noise and/or vibration may result.
- When carrying out the pump-down work shut down the compressor before disconnecting the refrigerant pipe. Disconnecting the refrigerant pipe with the service valve left open and the compressor still operating will cause air, etc. to be sucked in, raising the pressure inside the refrigeration cycle to an abnormally high level, and possibly resulting in rupture, injury, etc.

(*1) Refer to the “Definition of qualified installer or qualified service person”.

Note: This Air to Water Heat Pump is for residential use.

Refrigerant R32

This Air to Water Heat Pump adopts a new HFC type refrigerant (R32) which does not deplete the ozone layer.

(1) Safety caution concerned to refrigerant R32

Be sure that water, dust, the former refrigerant or the former refrigerating oil is not mixed into the refrigerating cycle of the Air to Water Heat Pump with refrigerant R32 during installation work or service work.
If an incorrect work or incorrect service is performed, there is a possibility to cause a serious accident.
Use the tools and materials exclusive to R32 to purpose a safe work.

(2) Safety and cautions on installation / service

<Safety items>

When gas concentration and ignition energy are happened at the same time, R32 has a slight possibility of burning. Although it will not ignite under normal work environment conditions, be aware that the flame spreads if ignition should occur.
It is necessary to carry out installation/servicing safely while taking the following precautions into consideration.

(1) Never use refrigerant other than specified refrigerant (R32) in an Air to Water Heat Pump which is designed to operate with the specified refrigerant (R32).
If other refrigerant than R32 is used, it may cause personal injury, etc. by a malfunction, a fire, a rupture.

(2) Since R32 is heavier than air, it tends to accumulate at the bottom (near the floor).
Ventilate properly for the working environment to prevent its combustion.
Especially in a basement or a closed room where is the high risk of the accumulation, ventilate the room with a local exhaust ventilation.
If refrigerant leakage is confirmed in the room or the place where the ventilation is insufficient, do not work until the proper ventilation is performed and the work environment is improved.

(3) When performing brazing work, be sure to check for leakage refrigerant or residual refrigerant.
If the leakage refrigerant comes into contact with fire, a poisonous gas may occur or it may cause a fire.
Keep adequate ventilation during the work.

(4) When refrigerant gas leaks during work, execute ventilation. If the leakage refrigerant comes into contact with a fire, a poisonous gas may occur or it may cause a fire.

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

(6) When installing or removing an Air to Water Heat Pump, do not mix air in the refrigerant cycle.
If air or others is mixed with the refrigerant, abnormal high pressure generates in the refrigerating cycle, causing injury due to the breakage.

(7) After installation work complete, confirm that refrigerant gas is not leaking on the flare connection part or others. If leaked refrigerant comes to contact with a fire, toxic gas may occur, causing a fire.

(8) Perform the installation work and re-installation according to the installation manual.
Pay attention especially to the area of application. Improper installation may cause refrigeration trouble, water leakage, electric shock, or fire etc.

(9) Unauthorized modifications to the Air to Water Heat Pump may be dangerous. If a breakdown occurs please call a qualified Air to Water Heat Pump technician or electrician.
Improper repair may result in water leakage, electric shock and fire, etc.

(10) Carry out the airtight test with nitrogen at a specified pressure. Do not use oxygen or acetylene gas absolutely as it may cause an explosion.

(11) Always carry a refrigerant leakage detection sensor during the work and work while checking that no refrigerant leaks around working environment.

(12) If the leakage refrigerant comes into contact with fire, it may cause a fire.
Have a dry powder or CO_2 fire extinguisher adjacent to the charging area.

(13) During repairs to sealed components, all electrical supplies shall be disconnected from the equipment being

worked upon prior to any removal of sealed covers, etc. If it is absolutely necessary to have an electrical supply to equipment during servicing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.
Particular attention shall be paid to the following to ensure that by working on electrical components, the casing is not altered in such a way that the level of protection is affected. This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc.
Ensure that seals or sealing materials have not degraded to the point that they no longer serve the purpose of preventing the ingress of flammable atmospheres. Replacement parts shall be in accordance with the manufacturer's specifications.

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

<Caution items>

(1) The opposite side dimension of the Air to Water Heat Pump's flared nut using R32 and the shape of the charge port are the same as those of R410A.
(2) Be careful not to charge refrigerant by mistake. Should the different type of refrigerant mix in, be sure to recharge the refrigerant.
(3) Do not mix the other refrigerant or refrigerating oil with the refrigerant.
(4) Since the pressure of R32 is 1.6 times higher than that of the former refrigerant (R22), use tools and parts with high pressure resistance specification similar to R410A.
(5) In the installation time, use clean pipe materials and work with great attention so that water and others do not mix in because pipes are affected by impurities such as water, oxide film, oil, etc. Use the clean pipes. Be sure to braze while flowing nitrogen gas in the pipe. (Never use gas other than nitrogen gas.)
(6) For the earth protection, use a vacuum pump for air purge.
(7) R32 refrigerant is Single-component refrigerant that does not change its composition.
Although it is possible to charge the refrigerant with either liquid or gas, charge it with liquid.

(3) Pipe materials

For the refrigerant pipes, copper pipe and joints are mainly used.
It is necessary to select the most appropriate pipes to conform to the standard.
Use clean pipes or joints to which little impurities adhere.

(1) Copper pipe

<Piping>
The pipe thickness, flare-finishing size, flare nut and others differ according to a refrigerant type.
When using a long copper pipe for R32, it is recommended to select “Copper or copper-base pipe without seam” and one with bonded oil amount 40 mg / 10 m or less.
Also do not use crushed, deformed, discolored (especially inside) pipes.
(Impurities cause clogging of expansion valves and capillary tubes.)
<Flare nut>
Use the flare nuts which are attached to the Air to Water Heat Pump unit.

Be sure to select the pipes with copper thickness in the table below since the pressure of an Air to Water Heat Pump using R32 is higher than that of R22.

Nominal diameter	Outer diameter (mm)	Thickness (mm) R410A or R32
1/4	6.4	0.80
1/2	12.7	0.80
5/8	15.9	1.00

Make sure not to use a thin copper pipe such as 0.7 mm copper thickness in the market.

(2) Joint

The flare joint and socket joint are used for joints of the copper pipe.
The joints are rarely used for installation of the Air to Water Heat Pump.
However clear impurities when using them.

(4) Tools

○: R410A tools available, △: Partly unavailable, ✕: R410A tools unavailable

No.	Installation / service tools		Use	Applicability to R32 Air to Water Heat Pump or not	Applicability to R22 Air to Water Heat Pump or not
	Tools / Equipment	specification			
1	Flare tool	Clutch type	Pipe flaring	○	○
2	Copper pipe gauge for adjusting projection margin	—	Flaring by conventional flare tool	○	—
3	Torque wrench	—	Tightening of flare nut	○	✕
4	Gauge manifold	Port size 1/2”-20UNF (5/16” Flare)	Evacuating, refrigerant charge, run check, etc.	○ Note 2	✕
5	Charge hose	High-voltage		○	✕
6	Vacuum pump	—	Vacuum drying	○ Note 3 1/2”-20UNF (5/16” Flare)	△ Connection diameter 1/4”
7	Vacuum pump adapter	—	Vacuum drying	○ Note 4 1/2”-20UNF (5/16” Flare)	△ Connection diameter 1/4”
8	Electronic balance for refrigerant charging	For 10 kg or 20 kg cylinder	Refrigerant charge	○	○
9	Leakage detector	—	Gas leakage check	○ Note 5	○ Note 5
10	Refrigerant cylinder	—	Refrigerant charge	✕ Note 6	✕
11	Refrigerant recovery cylinder	Exclusive for R32	Refrigerant recovery container	✕ Note 7	✕
12	Refrigerant recovery device	—	Refrigerant recovery device	○ Note 8	△ Connection diameter 1/4”

Note 1 When flaring is carried out for R410A or R32 using the conventional flare tools, adjustment of projection margin is necessary. For this adjustment, a copper pipe gauge, etc. are necessary.

Note 2 When saturation temperature is described, the gauge manifold differs for R410A and R32. If saturation temperature reading is required, special tools exclusive for R32 are required.

Note 3 Since R32 has a slight possibility of burning, be sure to use the tools corresponding to R32.

Note 4 Like R410, a Vacuum pump adapter needs installing to prevent a Vacuum pump oil (mineral oil) from flowing backward into the Charge hose. Mixing of the Vacuum pump oil into R32 refrigerant may cause a trouble such as generation of sludge, clogging of capillary, etc.

Note 5 Be sure to use those tools after confirming they correspond to each refrigerant.

Note 6 For a refrigerant cylinder exclusive for R32, the paint color (or label color) of the cylinder is set to the specified color (light blue) together with the indication of the refrigerant name.

Note 7 Although the container specification is the same as R410A, use a recovering container exclusive for R32 to avoid mixing with other refrigerants.

Note 8 Be careful for miss charging of the refrigerant during work. Miss-charging of the refrigerant type may cause not only damage of the equipment but also a fire etc.

▼General tools

In addition to the above exclusive tools, the following equipments is necessary as the general tools.

1) Pipe cutter
2) Reamer
3) Pipe bender
4) Level vial
5) Screwdriver (+, –)
6) Spanner or Adjustable wrench
7) Hole core drill
8) Tape measure
9) Metal saw

Also prepare the following equipment for other installation method and run check.

1) Clamp meter
2) Thermometer
3) Insulation resistance tester (Megger)
4) Electroscope

1 Specifications

Unit name	Hydro unit		HWT-601XWHM3W-E, HWT-601XWHM6W-E, HWT-601XWHT6W-E			
	Outdoor unit		HWT-401HW-E		HWT-601HW-E	
Heating capacity *1 (kW)			4.0		6.0	
Cooling capacity *2 (kW)			4.0		5.0	
Variable range of compressor frequency			10 - 80 Hz		10 - 100 Hz	
Power source			1 phase 50 Hz 220-240 V			
Operation mode			Heating	Cooling	Heating	Cooling
Electric characteristic *1 *2	Total	Current (A)	4.08	5.38	5.78	7.11
		Power (kW)	0.77	1.15	1.25	1.52
		Power factor (%)	82	93	94	93
Operating noise sound power level ①	Hydro unit (dB (A))		40	40	40	40
	Outdoor unit (dB (A))		65	62	65	62
Coefficient of performance *1 *2			5.20	3.45	4.80	3.30
Hydro unit	Outer dimension	Height (mm)	720			
		Width (mm)	450			
		Depth (mm)	235			
	Net weight (kg)		27			
	Color		White			
	Remote controller Outer dimension *3	Height (mm)	120			
		Width (mm)	120			
		Depth (mm)	16			
	Circulation pump	Motor output (W)	60 (MAX)			
		Flow rate (L/min)	11.6	11.5	17.3	14.3
		Type	Non-self-suction centrifugal pump			
	Heat exchanger		Plate-type heat exchange			
Outdoor unit	Outer dimension	Height (mm)	630			
		Width (mm)	800			
		Depth (mm)	300			
	Net weight (kg)		42			
	Color		Silky shade			
	Compressor	Motor output (W)	1100			
		Type	Twin rotary type with DC-inverter variable speed control			
		Model	DX150A1T-21F			
	Fan motor	Standard air capacity (m^3/min)	33.6	36.4	33.6	36.4
		Motor output (W)	43			
Refrigerant piping	Connection method		Flare connection (Conformity with ISO 14903 in Hydro side)			
	Hydro unit	Liquid	Ø6.4			
		Gas	Ø12.7			
	Outdoor unit	Liquid	Ø6.4			
		Gas	Ø12.7			
	Maximum length (m)		30			
	Maximum chargeless length (m)		20			
	Maximum height difference (m)		±30			
	Minimum length (m)		5			
Refrigerant	Refrigerant name		R32			
	Charge amount (kg)		0.9			
Water piping	Pipe diameter		R1			
	Maximum length (m)		None (Need the flow rate 14ℓ/min or more)			
	Maximum height difference (m)		±7			
	Maximum working water pressure (kPa) *4		430			
Operating temperature range	Hydro unit (°C) *5 (Cooling / Heating / Hot water)		5-32 / 5-32 / 5-32			
	Outdoor unit (°C) (Cooling / Heating / Hot water)		10-43 / -20-25 / -20-43			
Operating humidity range	Hydro unit (%)		15-85			
	Outdoor unit (%)		15-100			
Wiring connection	Power wiring		3 wires: including earth wire (Outdoor unit)			
	Connecting line		4 wires: including earth wire			

*1 Heating performance measurement conditions: outside air temperature 7°C, water supply temperature 30°C, outlet water temperature 35°C, refrigerant piping length 7.5 m (no height difference).
*2 Cooling performance measurement conditions: outside air temperature 35°C, water supply temperature 12°C, outlet water temperature 7°C, refrigerant piping length 7.5 m (no height difference).
*3 • The remote controller should be shipped with the hydro unit.
• Use two 1.5-meter wires to connect the hydro unit with the remote controller.
*4 Check the water piping for leakage under the maximum operating pressure.
*5 Do not leave the hydro unit at 5°C or below.
① Max operation
Heating: outside air temperature 7°C, water supply temperature 47°C, outlet water temperature 55°C.
Cooling: outside air temperature 35°C, water supply temperature 12°C, outlet water temperature 7°C.

Unit name	Hydro unit		HWT-1101XWHM3W-E, HWT-1101XWHM6W-E, HWT-1101XWHT6W-E, HWT-1101XWHT9W-E			
	Outdoor unit		HWT-801H(R)W-E		HWT-1101H(R)W-E	
Heating capacity *1 (kW)			8.0		11.0	
Cooling capacity *2 (kW)			6.0		8.0	
Variable range of compressor frequency			10 - 90 Hz		10 - 100 Hz	
Power source			1 phase 50 Hz 220-240 V			
Operation mode			Heating	Cooling	Heating	Cooling
Electric characteristic *1 *2	Total	Current (A)	7.05	8.51	10.60	12.82
		Power (kW)	1.54	1.88	2.39	2.86
		Power factor (%)	95	96	98	97
Operating noise sound power level ①	Hydro unit (dB (A))		40	40	40	40
	Outdoor unit (dB (A))		65	63	65	64
Coefficient of performance *1 *2			5.19	3.20	4.60	2.80
Hydro unit	Outer dimension	Height (mm)	720			
		Width (mm)	450			
		Depth (mm)	235			
	Net weight (kg)		27			
	Color		White			
	Remote controller Outer dimension *3	Height (mm)	120			
		Width (mm)	120			
		Depth (mm)	16			
	Circulation pump	Motor output (W)	60 (MAX)			
		Flow rate (L/min)	23.0	16.7	32.1	22.7
		Type	Non-self-suction centrifugal pump			
	Heat exchanger		Plate-type heat exchange			
Outdoor unit	Outer dimension	Height (mm)	1050			
		Width (mm)	1010			
		Depth (mm)	370			
	Net weight (kg)		75			
	Color		Silky shade			
	Compressor	Motor output (W)	2000			
		Type	Twin rotary type with DC-inverter variable speed control			
		Model	NX220A1FJ-20N			
	Fan motor	Standard air capacity (m^3/min)	52.4	52.4	58.4	52.4
		Motor output (W)	60			
Refrigerant piping	Connection method		Flare connection (Conformity with ISO 14903 in Hydro side)			
	Hydro unit	Liquid	Ø6.4			
		Gas	Ø15.9			
	Outdoor unit	Liquid	Ø6.4			
		Gas	Ø15.9			
	Maximum length (m)		30			
	Maximum chargeless length (m)		8			
	Maximum height difference (m)		±30			
	Minimum length (m)		5			
Refrigerant	Refrigerant name		R32			
	Charge amount (kg)		1.25			
Water piping	Pipe diameter		R1			
	Maximum length (m)		None (Need the flow rate 14ℓ/min or more)			
	Maximum height difference (m)		±7			
	Maximum working water pressure (kPa) *4		430			
Operating temperature range	Hydro unit (°C) *5 (Cooling / Heating / Hot water)		5-32 / 5-32 / 5-32			
	Outdoor unit (°C) (Cooling / Heating / Hot water)		10-43 / -25-25 / -25-43			
Operating humidity range	Hydro unit (%)		15-85			
	Outdoor unit (%)		15-100			
Wiring connection	Power wiring		3 wires: including earth wire (Outdoor unit)			
	Connecting line		4 wires: including earth wire			

*1 Heating performance measurement conditions: outside air temperature 7°C, water supply temperature 30°C, outlet water temperature 35°C, refrigerant piping length 7.5 m (no height difference).
*2 Cooling performance measurement conditions: outside air temperature 35°C, water supply temperature 12°C, outlet water temperature 7°C, refrigerant piping length 7.5 m (no height difference).
*3 • The remote controller should be shipped with the hydro unit.
• Use two 1.5-meter wires to connect the hydro unit with the remote controller.
*4 Check the water piping for leakage under the maximum operating pressure.
*5 Do not leave the hydro unit at 5°C or below.
① Max operation
Heating: outside air temperature 7°C, water supply temperature 47°C, outlet water temperature 55°C.
Cooling: outside air temperature 35°C, water supply temperature 12°C, outlet water temperature 7°C.

Unit name	Hydro unit		HWT-1401XWHM3W-E. HWT-1401XWHM6W-E. HWT-1401XWHT6W-E. HWT-1401XWHT9W-E	
	Outdoor unit		HWT-1401H(R)W-E	
Heating capacity *1 (kW)			14.0	
Cooling capacity *2 (kW)			10.0	
Variable range of compressor frequency			10 - 82 Hz	
Power source			1 phase 50 Hz 220-240 V	
Operation mode			Heating	Cooling
Electric characteristic *1 *2	Total	Current (A)	14.2	18.7
		Power (kW)	3.04	4.08
		Power factor (%)	93.0	95.0
Operating noise sound power level ①	Hydro unit (dB (A))		45	45
	Outdoor unit (dB (A))		72	70
Coefficient of performance *1 *2			4.60	2.45
Hydro unit	Outer dimension	Height (mm)	720	
		Width (mm)	450	
		Depth (mm)	235	
	Net weight (kg)		28	
	Color		White	
	Remote controller Outer dimension *3	Height (mm)	120	
		Width (mm)	120	
		Depth (mm)	16	
	Circulation pump	Motor output (W)	75 (MAX)	
		Flow rate (L/min)	40.5	28.6
		Type	Non-self-suction centrifugal pump	
	Heat exchanger		Plate-type heat exchange	
Outdoor unit	Outer dimension	Height (mm)	1050	
		Width (mm)	1010	
		Depth (mm)	370	
	Net weight (kg)		88	
	Color		Silky shade	
	Compressor	Motor output (W)	3750	
		Type	Twin rotary type with DC-inverter variable speed control	
		Model	DX380A2TJ-20M	
	Fan motor	Standard air capacity (m3/min)	78.7	
		Motor output (W)	100W	
Refrigerant piping	Connection method		Flare connection (Conformity with ISO 14903 in Hydro side)	
	Hydro unit	Liquid	Ø6.4	
		Gas	Ø15.9	
	Outdoor unit	Liquid	Ø6.4	
		Gas	Ø15.9	
	Maximum length (m)		25	
	Maximum chargeless length (m)		8	
	Maximum height difference (m)		±25	
	Minimum length (m)		5	
Refrigerant	Refrigerant name		R32	
	Charge amount (kg)		1.40	
Water piping	Pipe diameter		R1	
	Maximum length (m)		None (Need the flow rate 18 ℓ/min or more)	
	Maximum height difference (m)		±7	
	Maximum working water pressure (kPa) *4		430	
Operating temperature range	Hydro unit (°C) *5 (Cooling / Heating / Hot water)		5-32 / 5-32 / 5-32	
	Outdoor unit (°C) (Cooling / Heating / Hot water)		10-43 / -25-25 / -25-43	
Operating humidity range	Hydro unit (%)		15-85	
	Outdoor unit (%)		15-100	
Wiring connection	Power wiring		3 wires: including earth wire (Outdoor unit)	
	Connecting line		4 wires: including earth wire	

*1 Heating performance measurement conditions: outside air temperature 7°C. water supply temperature 30°C. outlet water temperature 35°C. refrigerant piping length 7.5 m (no height difference).
*2 Cooling performance measurement conditions: outside air temperature 35°C. water supply temperature 12°C. outlet water temperature 7°C. refrigerant piping length 7.5 m (no height difference).
*3 • The remote controller should be shipped with the hydro unit.
• Use two 1.5-meter wires to connect the hydro unit with the remote controller.
*4 Check the water piping for leakage under the maximum operating pressure.
*5 Do not leave the hydro unit at 5°C or below.
① Max operation
Heating: outside air temperature 7°C. water supply temperature 47°C. outlet water temperature 55°C.
Cooling: outside air temperature 35°C. water supply temperature 12°C. outlet water temperature 7°C.

Unit name	Hydro unit		HWT-1101XWHM3W-E, HWT-1101XWHM6W-E, HWT-1101XWHT6W-E, HWT-1101XWHT9W-E			
	Outdoor unit		HWT-801H8(R)W-E		HWT-1101H8(R)W-E	
Heating capacity *1 (kW)			8.0		11.0	
Cooling capacity *2 (kW)			6.0		8.0	
Variable range of compressor frequency			10 - 53 Hz		10 - 64 Hz	
Power source			3 phase 50 Hz 380-415V			
Operation mode			Heating	Cooling	Heating	Cooling
Electric characteristic *1 *2	Total	Current (A)	2.50	3.10	3.63	4.37
		Power (kW)	1.55	1.94	2.30	2.88
		Power factor (%)	93	93	94	98
Operating noise sound power level ①	Hydro unit (dB (A))		40	44	40	44
	Outdoor unit (dB (A))		71	66	70	67
Coefficient of performance *1 *2			5.15	3.04	4.78	2.77
Hydro unit	Outer dimension	Height (mm)	720			
		Width (mm)	450			
		Depth (mm)	235			
	Net weight (kg)		27			
	Color		White			
	Remote controller Outer dimension *3	Height (mm)	120			
		Width (mm)	120			
		Depth (mm)	16			
	Circulation pump	Motor output (W)	60 (MAX)			
		Flow rate (L/min)	23.0	16.7	32.1	22.7
		Type	Non-self-suction centrifugal pump			
	Heat exchanger		Plate-type heat exchange			
Outdoor unit	Outer dimension	Height (mm)	1050			
		Width (mm)	1010			
		Depth (mm)	370			
	Net weight (kg)		92			
	Color		Silky shade			
	Compressor	Motor output (W)	3750			
		Type	Twin rotary type with DC-inverter variable speed control			
		Model	RX380A2TJ-20M			
	Fan motor	Standard air capacity (m^3/min)	58.4	58.4	78.7	78.7
		Motor output (W)	100W			
Refrigerant piping	Connection method		Flare connection (Conformity with ISO 14903 in Hydro side)			
	Hydro unit	Liquid	Ø6.4			
		Gas	Ø15.9			
	Outdoor unit	Liquid	Ø6.4			
		Gas	Ø15.9			
	Maximum length (m)		30			
	Maximum chargeless length (m)		8			
	Maximum height difference (m)		±30			
	Minimum length (m)		5			
Refrigerant	Refrigerant name		R32			
	Charge amount (kg)		1.30			
Water piping	Pipe diameter		R1			
	Maximum length (m)		None (Need the flow rate 14ℓ/min or more)			
	Maximum height difference (m)		±7			
	Maximum working water pressure (kPa) *4		430			
Operating temperature range	Hydro unit (°C) *5 (Cooling / Heating / Hot water)		5-32 / 5-32 / 5-32			
	Outdoor unit (°C) (Cooling / Heating / Hot water)		10-43 / -25-25 / -25-43			
Operating humidity range	Hydro unit (%)		15-85			
	Outdoor unit (%)		15-100			
Wiring connection	Power wiring		3 wires: including earth wire (Outdoor unit)			
	Connecting line		4 wires: including earth wire			

*1 Heating performance measurement conditions: outside air temperature 7°C, water supply temperature 30°C, outlet water temperature 35°C, refrigerant piping length 7.5 m (no height difference).
*2 Cooling performance measurement conditions: outside air temperature 35°C, water supply temperature 12°C, outlet water temperature 7°C, refrigerant piping length 7.5 m (no height difference).
*3 • The remote controller should be shipped with the hydro unit.
• Use two 1.5-meter wires to connect the hydro unit with the remote controller.
*4 Check the water piping for leakage under the maximum operating pressure.
*5 Do not leave the hydro unit at 5°C or below.
① Max operation
Heating: outside air temperature 7°C, water supply temperature 47°C, outlet water temperature 55°C.
Cooling: outside air temperature 35°C, water supply temperature 12°C, outlet water temperature 7°C.

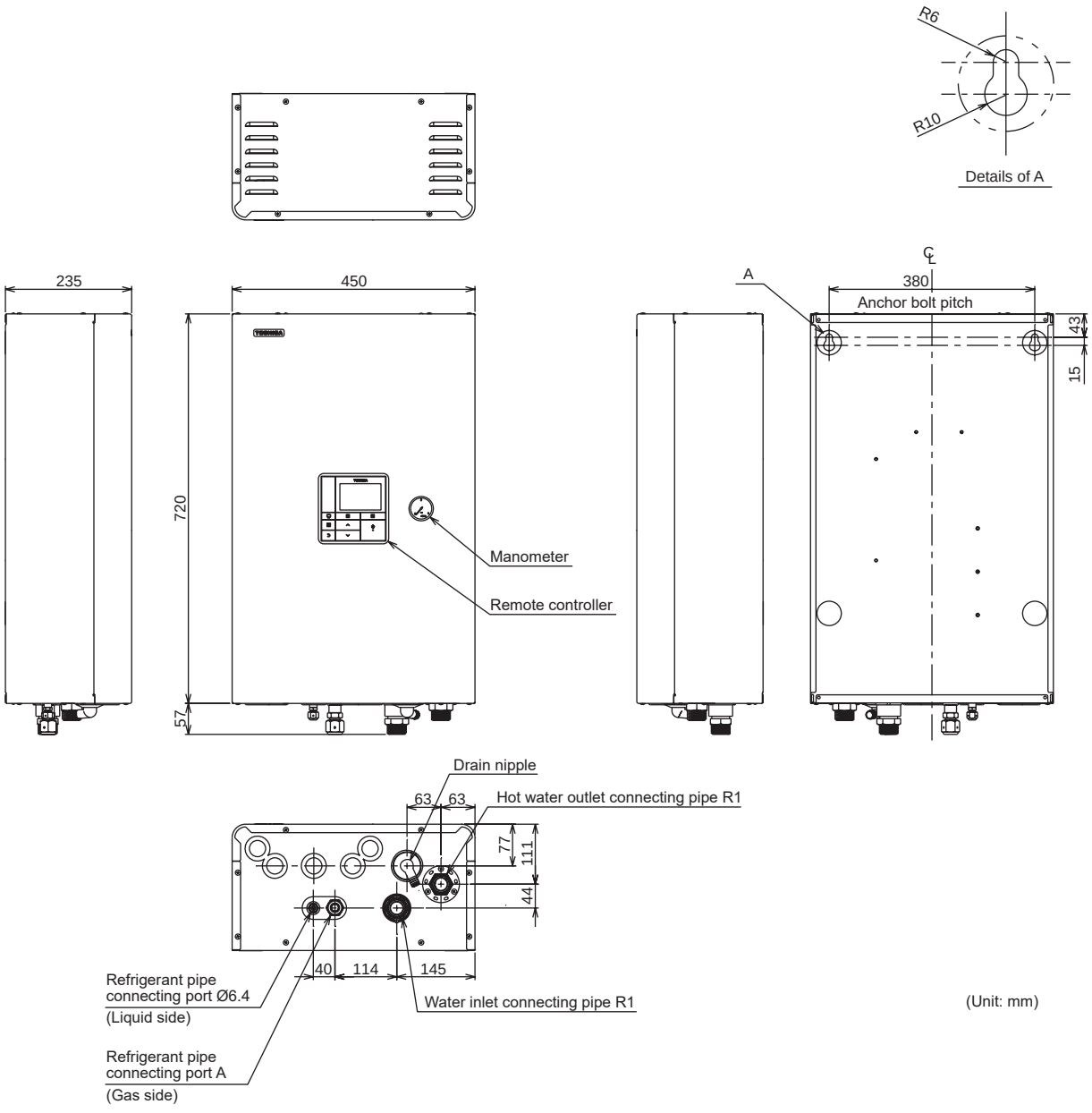
Unit name	Hydro unit		HWT-1401XWHM3W-E. HWT-1401XWHM6W-E. HWT-1401XWHT6W-E. HWT-1401XWHT9W-E	
	Outdoor unit		HWT-1401H8(R)W-E	
Heating capacity *1 (kW)			14.0	
Cooling capacity *2 (kW)			10.0	
Variable range of compressor frequency			10 - 82 Hz	
Power source			3 phase 50 Hz 380-415V	
Operation mode			Heating	Cooling
Electric characteristic *1 *2	Total	Current (A)	4.6	5.6
		Power (kW)	3.04	4.08
		Power factor (%)	93.0	95.0
Operating noise sound power level ①	Hydro unit (dB (A))		45	45
	Outdoor unit (dB (A))		72	70
Coefficient of performance *1 *2			4.60	2.45
Hydro unit	Outer dimension	Height (mm)	720	
		Width (mm)	450	
		Depth (mm)	235	
	Net weight (kg)		28	
	Color		White	
	Remote controller Outer dimension *3	Height (mm)	120	
		Width (mm)	120	
		Depth (mm)	16	
	Circulation pump	Motor output (W)	75 (MAX)	
		Flow rate (L/min)	40.5	28.6
		Type	Non-self-suction centrifugal pump	
	Heat exchanger		Plate-type heat exchange	
Outdoor unit	Outer dimension	Height (mm)	1050	
		Width (mm)	1010	
		Depth (mm)	370	
	Net weight (kg)		92	
	Color		Silky shade	
	Compressor	Motor output (W)	3750	
		Type	Twin rotary type with DC-inverter variable speed control	
		Model	RX380A2TJ-20M	
	Fan motor	Standard air capacity (m3/min)	78.7	
		Motor output (W)	100W	
Refrigerant piping	Connection method		Flare connection (Conformity with ISO 14903 in Hydro side)	
	Hydro unit	Liquid	Ø6.4	
		Gas	Ø15.9	
	Outdoor unit	Liquid	Ø6.4	
		Gas	Ø15.9	
	Maximum length (m)		25	
	Maximum chargeless length (m)		8	
	Maximum height difference (m)		±25	
	Minimum length (m)		5	
Refrigerant	Refrigerant name		R32	
	Charge amount (kg)		1.40	
Water piping	Pipe diameter		R1	
	Maximum length (m)		None (Need the flow rate 18 ℓ/min or more)	
	Maximum height difference (m)		±7	
	Maximum working water pressure (kPa) *4		430	
Operating temperature range	Hydro unit (°C) *5 (Cooling / Heating / Hot water)		5-32 / 5-32 / 5-32	
	Outdoor unit (°C) (Cooling / Heating / Hot water)		10-43 / -25-25 / -25-43	
Operating humidity range	Hydro unit (%)		15-85	
	Outdoor unit (%)		15-100	
Wiring connection	Power wiring		3 wires: including earth wire (Outdoor unit)	
	Connecting line		4 wires: including earth wire	

*1 Heating performance measurement conditions: outside air temperature 7°C. water supply temperature 30°C. outlet water temperature 35°C. refrigerant piping length 7.5 m (no height difference).
*2 Cooling performance measurement conditions: outside air temperature 35°C. water supply temperature 12°C. outlet water temperature 7°C. refrigerant piping length 7.5 m (no height difference).
*3 • The remote controller should be shipped with the hydro unit.
• Use two 1.5-meter wires to connect the hydro unit with the remote controller.
*4 Check the water piping for leakage under the maximum operating pressure.
*5 Do not leave the hydro unit at 5°C or below.
① Max operation
Heating: outside air temperature 7°C. water supply temperature 47°C. outlet water temperature 55°C.
Cooling: outside air temperature 35°C. water supply temperature 12°C. outlet water temperature 7°C.

2 Construction views (External views)

2-1. Hydro unit

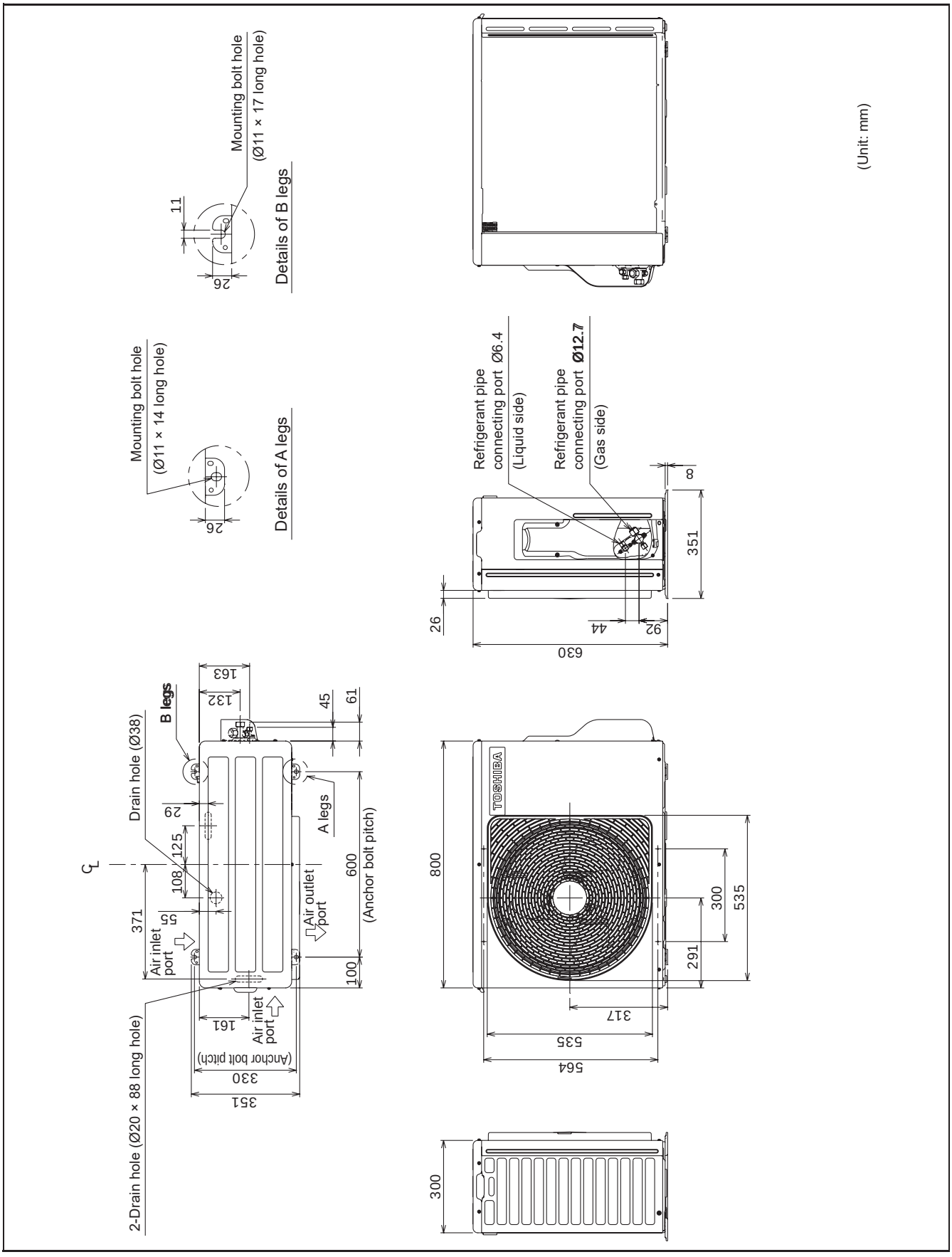
HWT-601XWHM3W-E, HWT-601XWHM6W-E, HWT-601XWHT6W-E
HWT-1101XWHM3W-E, HWT-1101XWHTM6W-E, HWT-1101XWHT6W-E, HWT-1101XWHT9W-E
HWT-1401XWHM3W-E, HWT-1401XWHTM6W-E, HWT-1401XWHT6W-E, HWT-1401XWHT9W-E



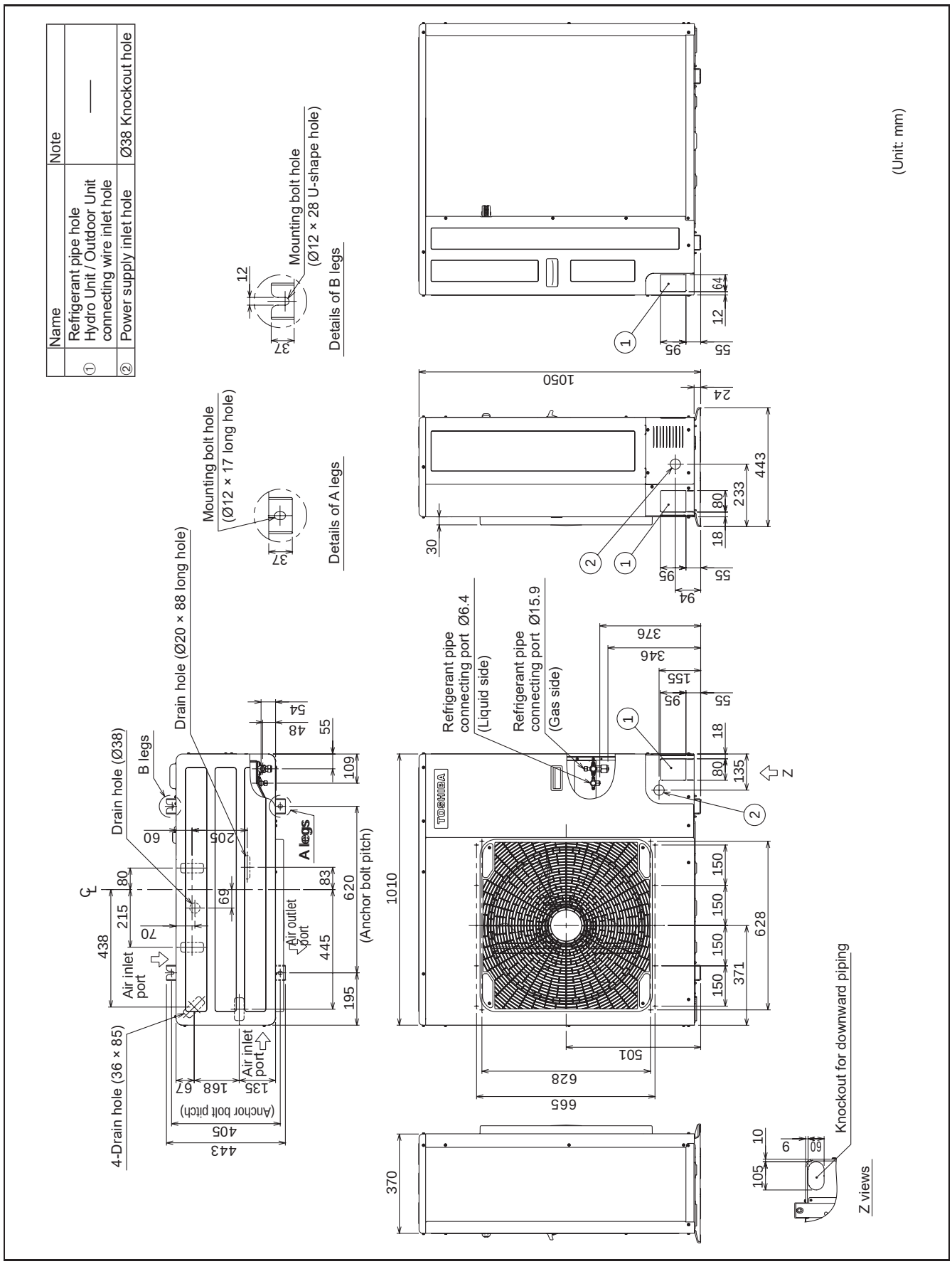
Model name	A
HWT-601	Ø12.7
HWT-1101,1401	Ø15.9

2-2. Outdoor unit

HWT-401HW-E, HWT-601HW-E

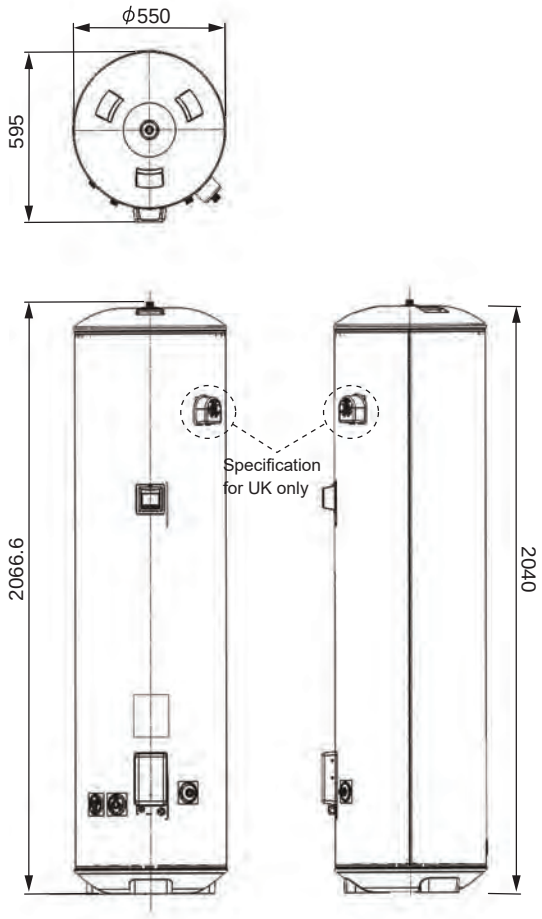


HWT-801HW-E, HWT-1101HW-E, HWT-1401HW-E, HWT-801HRW-E, HWT-1101HRW-E
HWT-1401HRW-E, HWT-801H8W-E, HWT-1101H8W-E, HWT-1401H8W-E
HWT-801H8RW-E, HWT-1101H8RW-E, HWT-1401H8RW-E

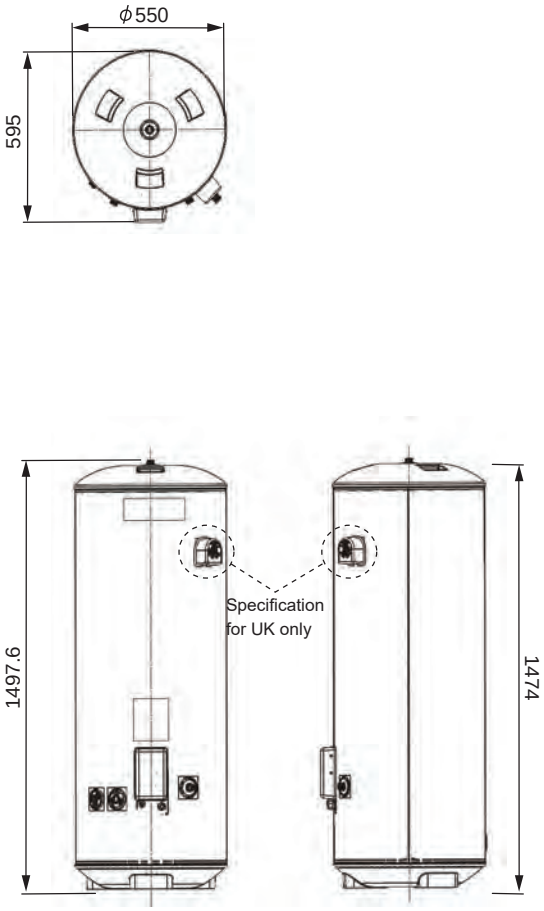


2-3. Hot water cylinder

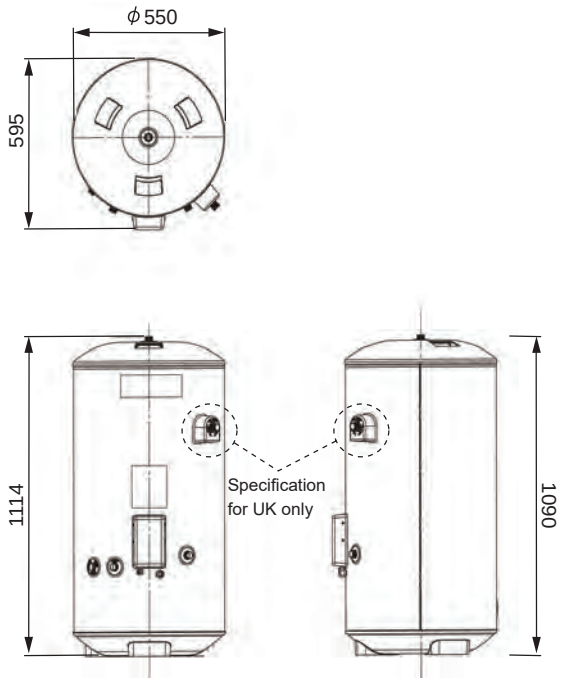
HWS-3001CSHM3-E(-UK)



HWS-2101CSHM3-E(-UK)

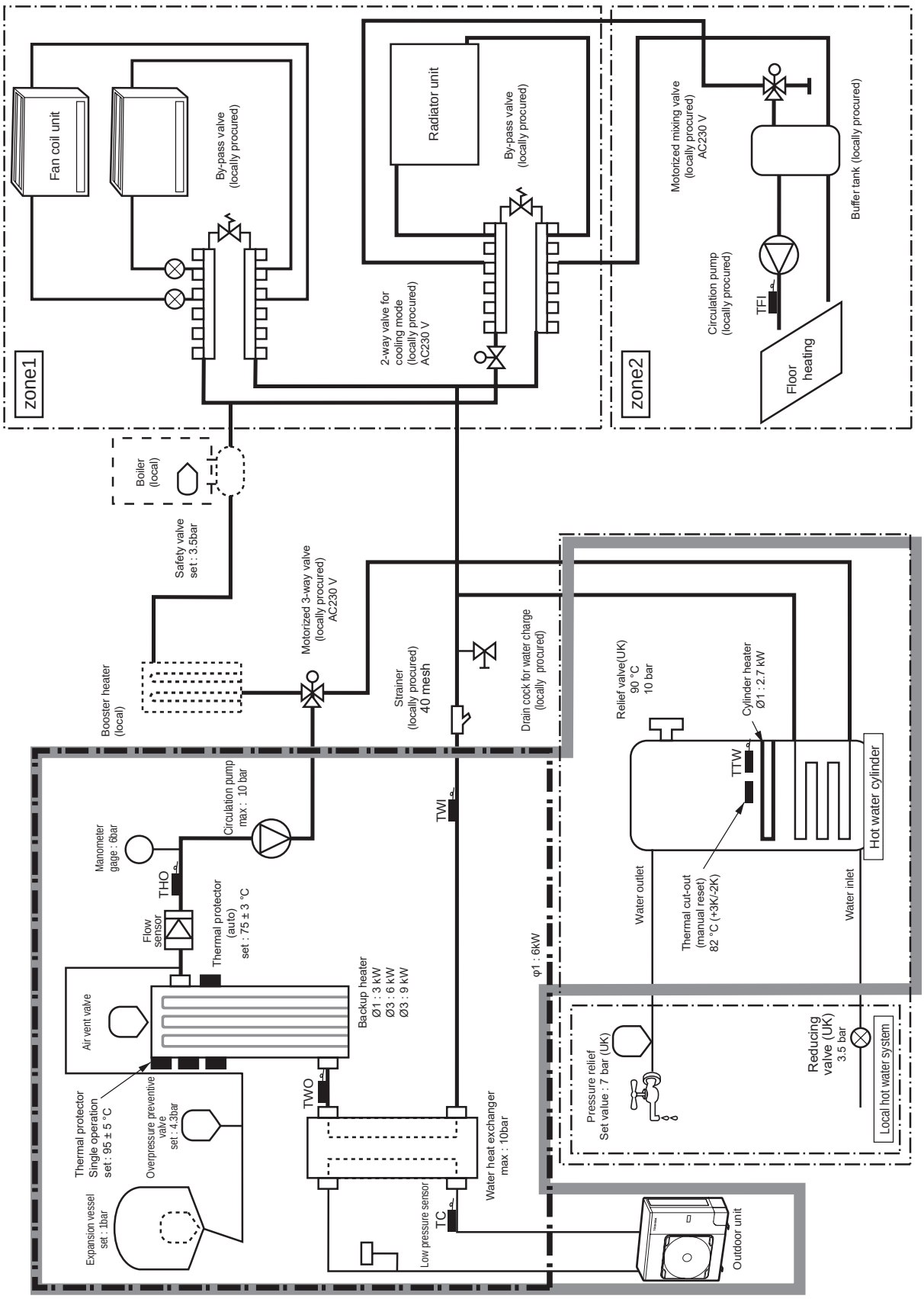


HWS-1501CSHM3-E(-UK)

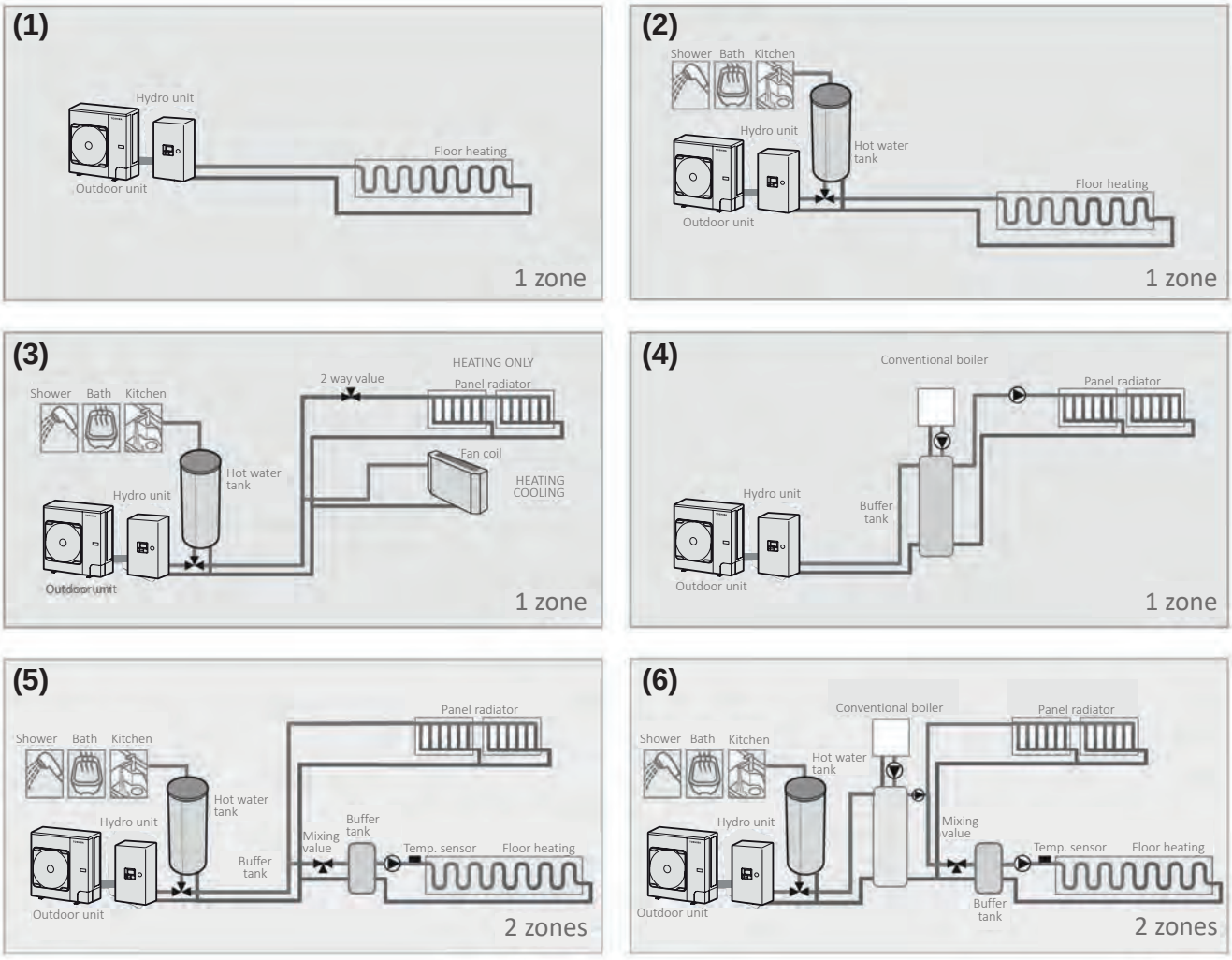


3 Refrigeration cycle / Water system diagram

3-1. Water system diagram



Installation example of water circuit

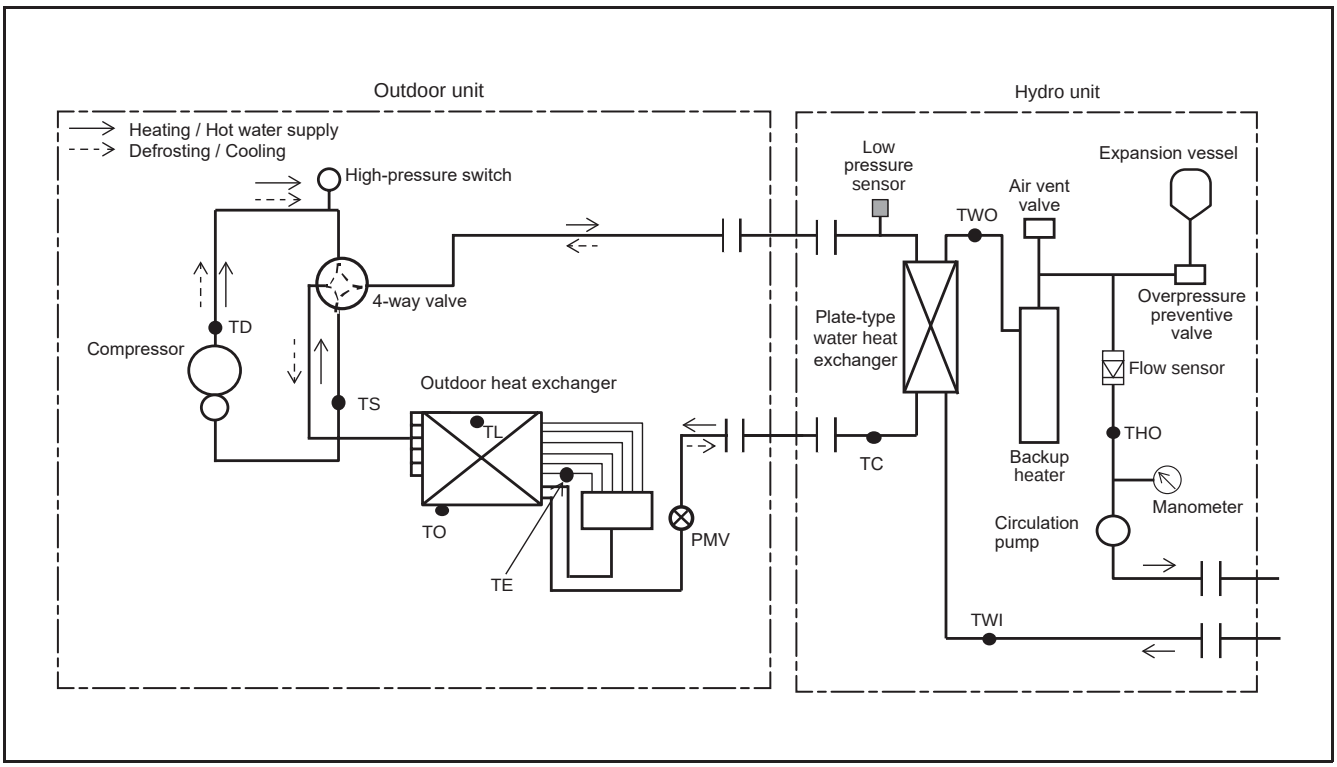


The water flowing for a system without buffer tank ((1), (2), (3), (5)) requires 18L/min(1401XWH), 14L/min (1101XWH), 11 L/min(601XWH) or more. This water flowing requires 5 or more branches of Floor heating or Radiator etc. Less than 5 branches may cause a flow deficiency. In this case, please provide a buffer tank and secondary pumps as shown in (4).

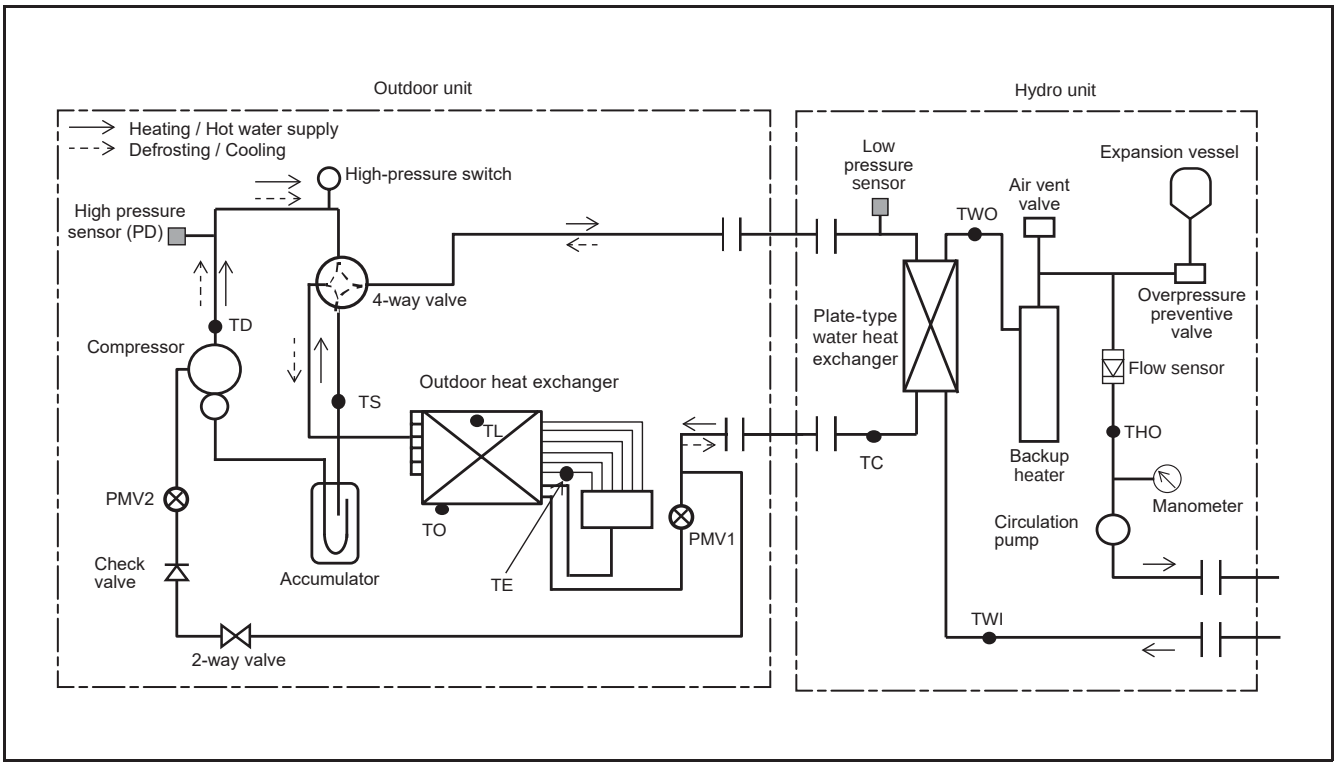
Please check how to install the boiler (See page 61)

3-2. Refrigeration cycle system diagram

HWT-601XWHW-E**
HWT-401HW-E, HWT-601HW-E



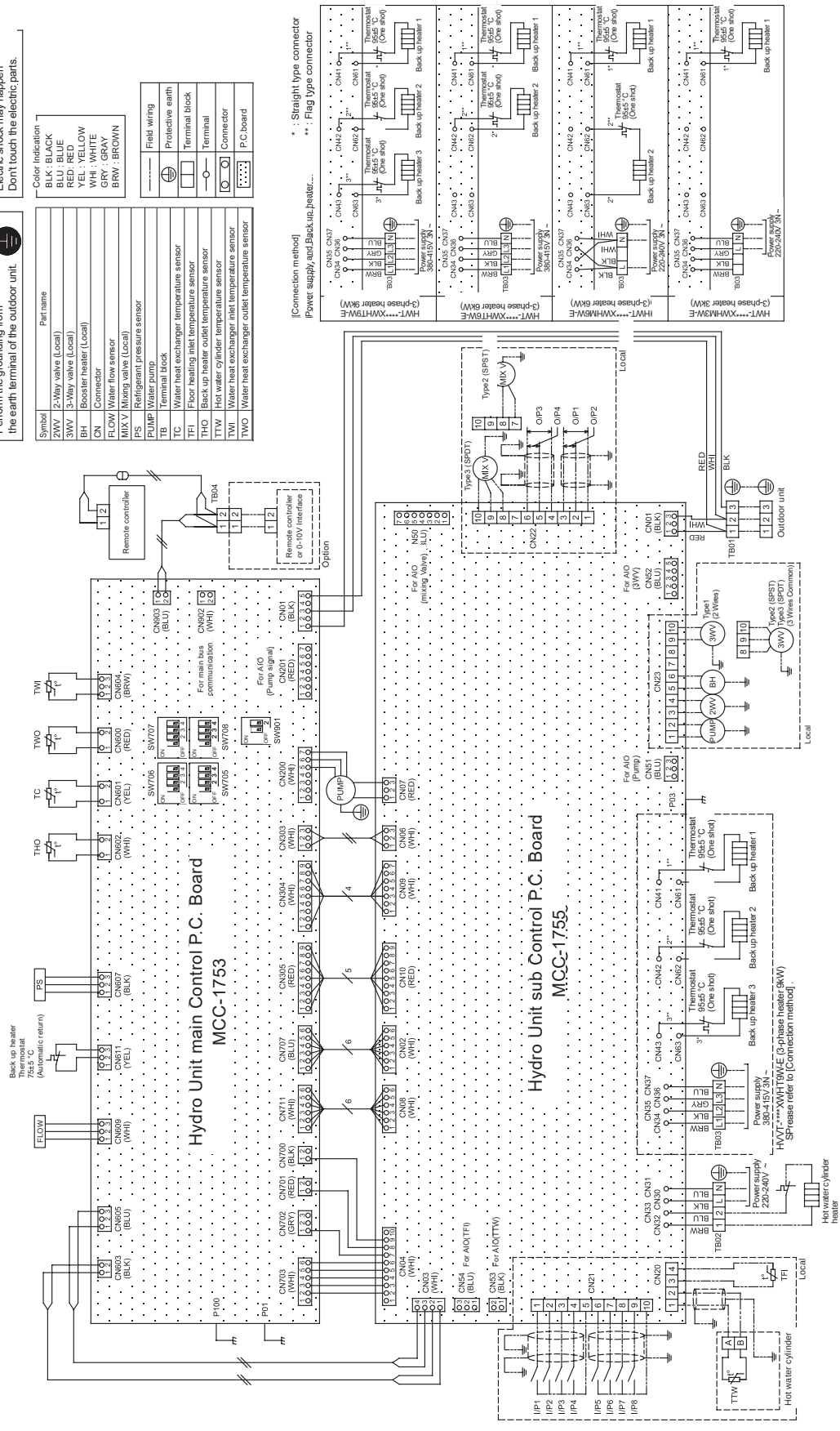
HWT-1101XWHW-E, HWT-1401XWH**W-E**
HWT-801H(8)(R)W-E, HWT-1101(8)(R)W-E, HWT-1401(8)(R)W-E



* Refrigeration cycle temperature and pressure data are described in item 15 Appendix.

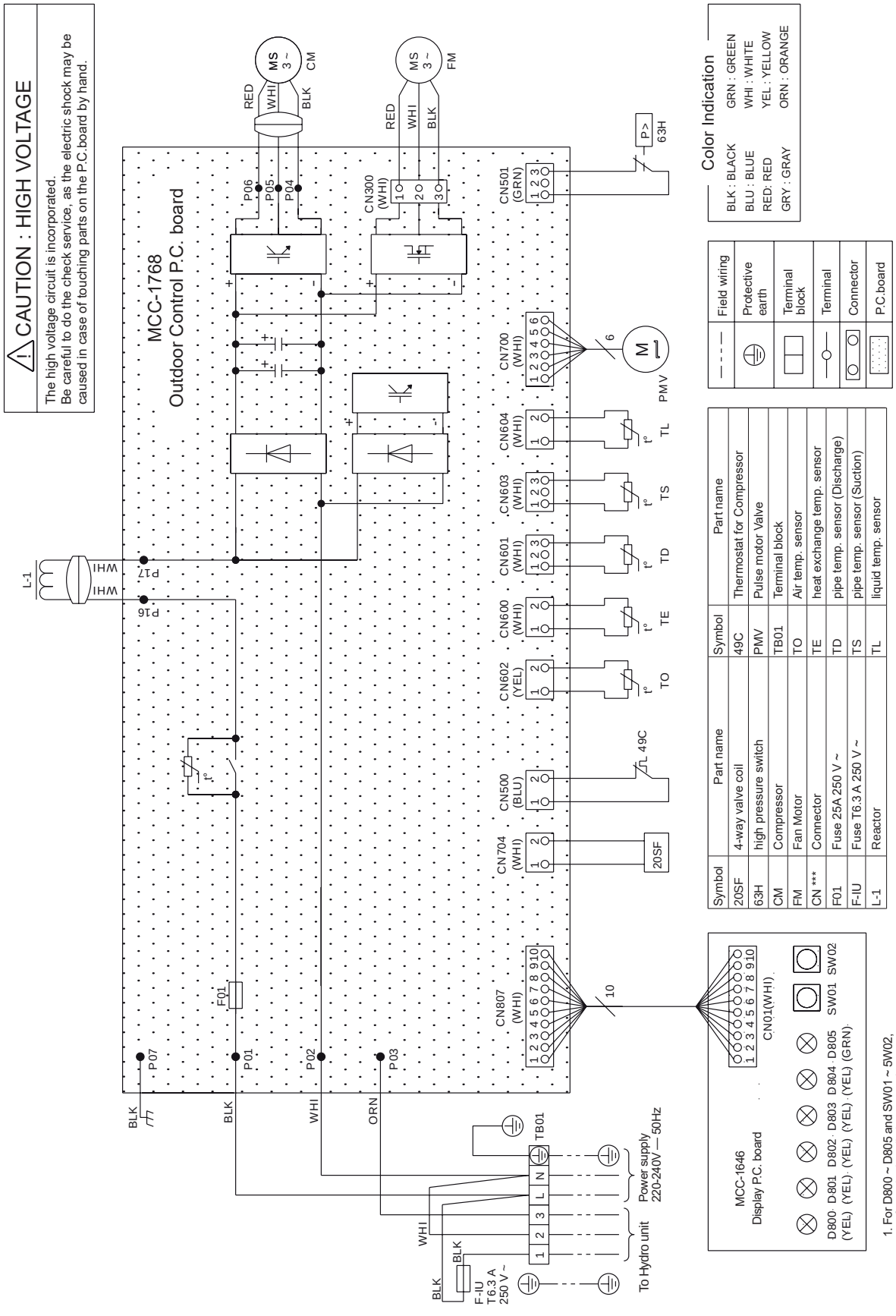
4 Wiring diagram

4-1. Hydro unit



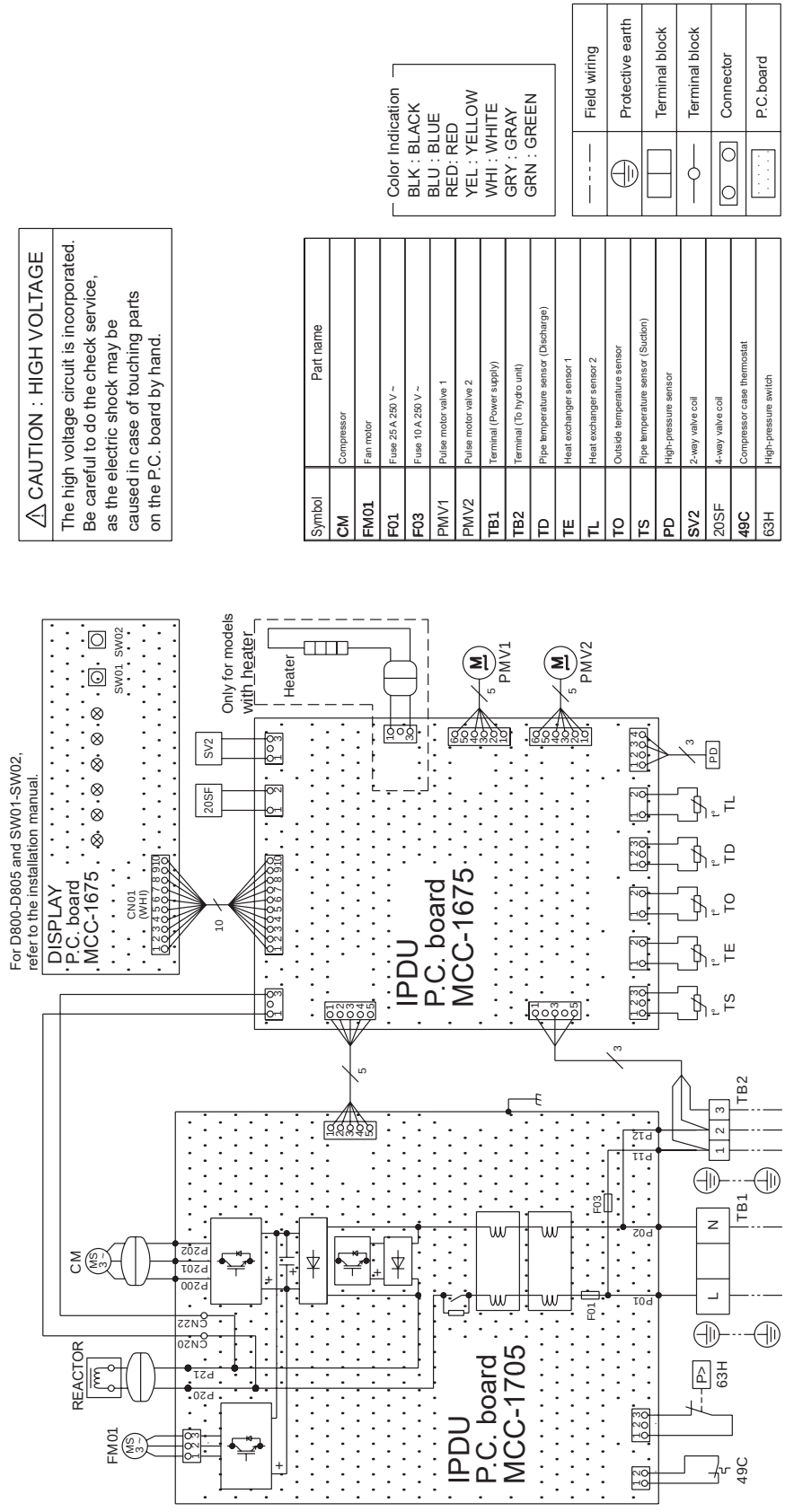
4-2. Outdoor unit

HWT-401HW-E, HWT-601HW-E

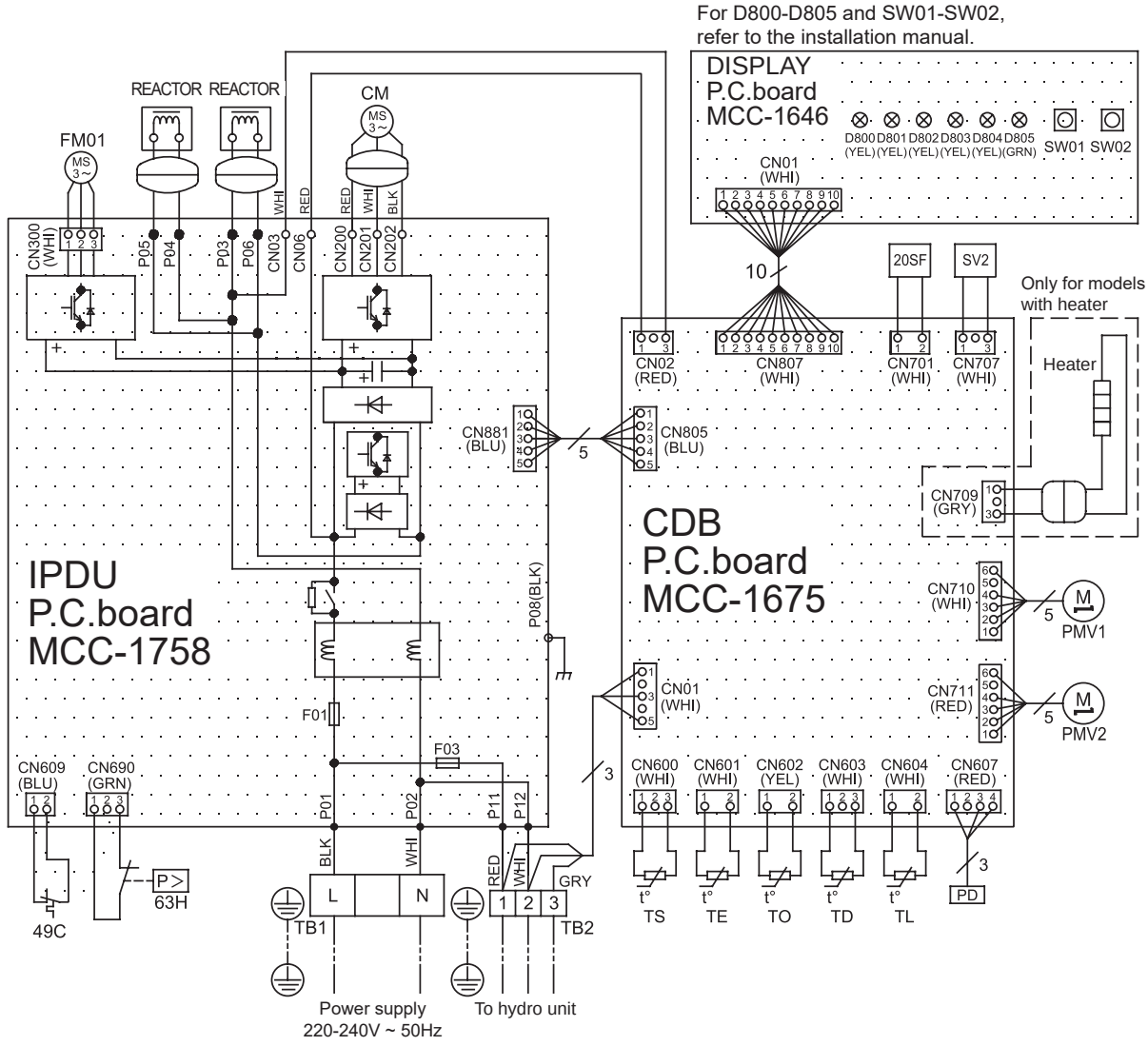


HWT-801HW-E, HWT-801HRW-E

HWT-1101HW-E, HWT-1101HRW-E



HWT-1401HW-E, HWT-1401HRW-E



Symbol	Part name
CM	Compressor
FM01	Fan motor
F01	Fuse 25A 250V ~
F03	Fuse 10A 250V~
PMV1	Pulse motor valve 1
PMV2	Pulse motor valve 2
TB1	Terminal (Power supply)
TB2	Terminal (To hydro unit)
TD	Pipe temperature sensor(Discharge)
TE	Heat exchanger sensor 1
TL	Heat exchanger sensor 2
TO	Outside temperature sensor
TS	Pipe temperature sensor(Suction)
PD	High-pressure sensor
SV2	2-way valve coil
20SF	4-way valve coil
49C	Compressor case thermostat
63H	High-pressure switch

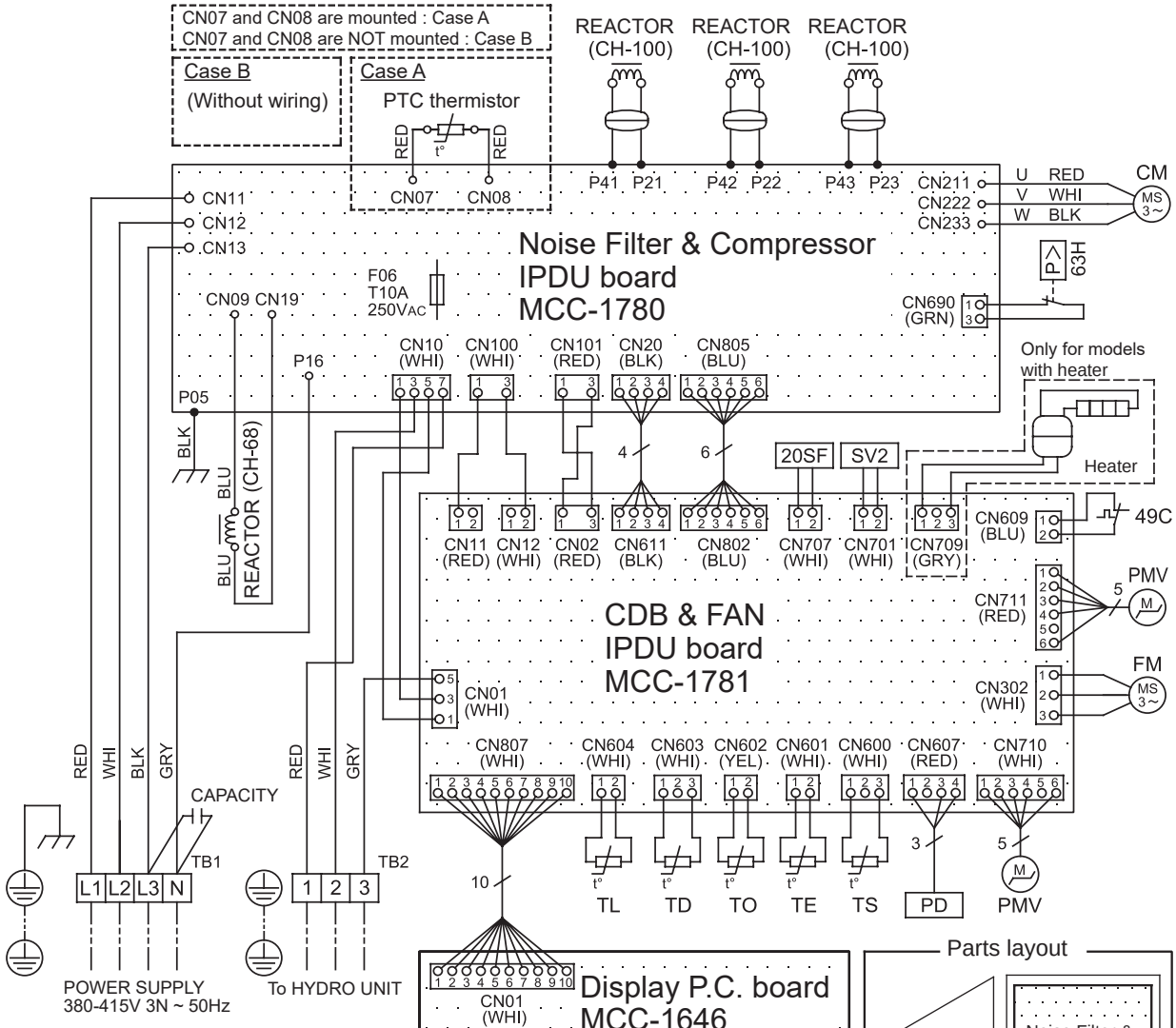
Color Indication
BLK : BLACK
BLU : BLUE
RED: RED
YEL : YELLOW
WHI : WHITE
GRY : GRAY
BRW : BROWN

——---——	Field wiring
⏚	Protective earth
▭	Terminal block
—○—	Terminal
○ ○	Connector
⋰⋱	P.C.board

⚠ CAUTION : HIGH VOLTAGE

The high voltage circuit is incorporated. Be careful to do the check service, as the electric shock may be caused in case of touching parts on the P.C.board by hand.

HWT-801H8W-E, HWT-1101H8W-E, HWT-1401H8W-E
HWT-801H8RW-E, HWT-1101H8RW-E, HWT-1401H8RW-E



For D800 ~ D805 and SW01 ~ SW02, refer to the installation manual.

Symbol	Part name
CM	Compressor
FM	Fan motor
F06	Fuse 10A 250V AC
PD	High-pressure sensor
PMV	Pulse motor valve
SV2	2-way valve coil
TB1	Terminal (Power supply)
TB2	Terminal (To hydro unit)
TD	Pipe temperature sensor(Discharge)
TE	Heat exchanger sensor 1
TL	Heat exchanger sensor 2
TO	Outside temperature sensor
TS	Pipe temperature sensor(Suction)
20SF	4-way valve coil
49C	Compressor case thermostat
63H	High-pressure switch

Color Indication

BLK : BLACK
BLU : BLUE
RED: RED
YEL : YELLOW
WHI : WHITE
GRY : GRAY
BRW : BROWN

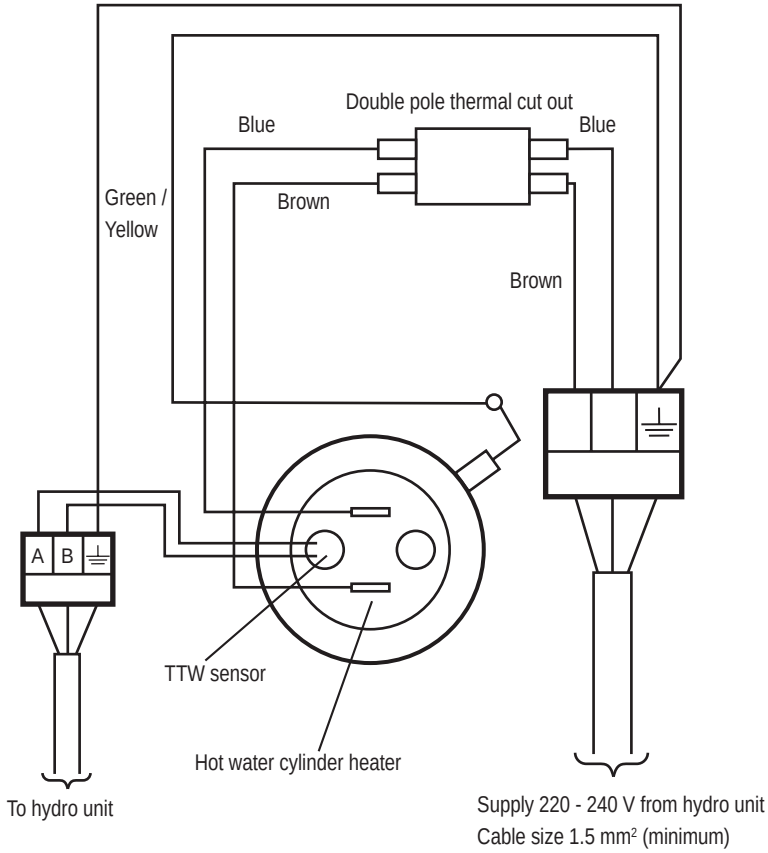
----	Field wiring
	Protective earth
	Terminal block
	Terminal
	Connector
	P.C.board

The 4-way valve coil will be energized only during the switching process.

⚠ CAUTION : HIGH VOLTAGE

The high voltage circuit is incorporated.
Be careful to do the check service, as the electric shock may be caused in case of touching parts on the P.C.board by hand.

4-3. Hot water cylinder unit



5 Key electric component rating

5-1. Hydro unit

HWT-601XWHM3W-E, HWT-601XWHM6W-E, HWT-601XWHT6W-E

No.	Component name	Model name			Type name	Rating
		M3W-E	M6W-E	T6W-E		
1	Circulation pump	O	O	O	UPM 3K 15-75 130 UPM 4K 15-75 130	AC230 V 0.58 A (MAX)
2	Backup heater 3 kW	O			80176-1	AC230 V 3 kW
3	Backup heater 6 kW		O		SMP10E8304 6KW	AC230 V 6 kW
4	Backup heater 6 kW			O	80177-1	AC400 V (3N) 6 kW
5	Backup heater 9 kW				80178-1	AC400 V (3N) 9 kW
6	Water heat exchange temperature sensor (TC sensor)	O	O	O	–	10 kΩ (25°C)
7	Water inlet temperature sensor (TWI sensor)	O	O	O	–	10 kΩ (25°C)
8	Water outlet temperature sensor (TWO sensor)	O	O	O	–	10 kΩ (25°C)
9	Heater outlet water temperature sensor (THO sensor)	O	O	O	–	10 kΩ (25°C)
10	Floor inlet temperature sensor (TFI sensor)	O	O	O	–	10 kΩ (25°C)
11	Low pressure sensor	O	O	O	–	Operating pressure 0.20 MPa
12	Thermal protector (auto)	O	O	O	–	Operating temperature 75±3°C DC42 V 0.2 A
13	Thermal protector (single operation)	O	O	O	–	Operating temperature 95±5°C AC250 V 16 A
14	Flow sensor	O	O	O	VVX20	DC12 V 15 mA
15	Remote controller (Main)	O	O	O	HWS-AMSU51-E	
16	Remote controller (Sub)	OP	OP	OP	HWS-AMSU51-E	
17	0 - 10 V Interface	OP	OP	OP	HWS-IFAIP01U-E	
18	Water 3-way valve terminal	O	O	O	–	AC230 V 0.1 A 2Wire, 3Wire SPST, SPDT type mountable
19	Water 2-way valve terminal	O	O	O	–	AC230 V 0.1 A 2Wire type mountable
20	Mixing valve terminal	O	O	O	–	AC230 V 0.1 A 3Wire SPST, SPDT type mountable
21	Circulation pump terminal	O	O	O	–	AC230 V 1.0 A
22	Booster heater terminal	O	O	O	–	AC230 V 1.0 A
23	Fuse (Backup heater)	O	O	O	–	AC250 V 25 A
24	PC board (Main)	O	O	O	MCC-1753	
25	PC board (Sub)	O	O	O	MCC-1755	

O····· Applied
OP ····· Optional accessory

HWT-1101XWHM3W-E, HWT-1101XWHM6W-E, HWT-1101XWHT6W-E, HWT-1101XWHT9W-E

No.	Component name	Model name				Type name	Rating
		M3W-E	M6W-E	T6W-E	T9W-E		
1	Circulation pump	O	O	O	O	UPM 3K 15-75 130 UPM 4K 15-75 130	AC230 V 0.58 A (MAX)
2	Backup heater 3 kW	O				80176-1	AC230 V 3 kW
3	Backup heater 6 kW		O			SMP10E8304 6KW	AC230 V 6 kW
4	Backup heater 6 kW			O		80177-1	AC400 V (3N) 6 kW
5	Backup heater 9 kW				O	80178-1	AC400 V (3N) 9 kW
6	Water heat exchange temperature sensor (TC sensor)	O	O	O	O	–	10 kΩ (25°C)
7	Water inlet temperature sensor (TWI sensor)	O	O	O	O	–	10 kΩ (25°C)
8	Water outlet temperature sensor (TWO sensor)	O	O	O	O	–	10 kΩ (25°C)
9	Heater outlet water temperature sensor (THO sensor)	O	O	O	O	–	10 kΩ (25°C)
10	Floor inlet temperature sensor (TFI sensor)	O	O	O	O	–	10 kΩ (25°C)
11	Low pressure sensor	O	O	O	O	–	Operating pressure 0.20 MPa
12	Thermal protector (auto)	O	O	O	O	–	Operating temperature 75±3°C DC42 V 0.2 A
13	Thermal protector (single operation)	O	O	O	O	–	Operating temperature 95±5°C AC250 V 16 A
14	Flow sensor	O	O	O	O	VVX20	DC12 V 15 mA
15	Remote controller (Main)	O	O	O	O	HWS-AMSU51-E	
16	Remote controller (Sub)	OP	OP	OP	OP	HWS-AMSU51-E	
17	0 - 10 V Interface	OP	OP	OP	OP	HWS-IFAIP01U-E	
18	Water 3-way valve terminal	O	O	O	O	–	AC230 V 0.1 A 2Wire, 3Wire SPST, SPDT type mountable
19	Water 2-way valve terminal	O	O	O	O	–	AC230 V 0.1 A 2Wire type mountable
20	Mixing valve terminal	O	O	O	O	–	AC230 V 0.1 A 3Wire SPST, SPDT type mountable
21	Circulation pump terminal	O	O	O	O	–	AC230 V 1.0 A
22	Booster heater terminal	O	O	O	O	–	AC230 V 1.0 A
23	Fuse (Backup heater)	O	O	O	O	–	AC250 V 25 A
24	PC board (Main)	O	O	O	O	MCC-1753	
25	PC board (Sub)	O	O	O	O	MCC-1755	

O····· Applied
OP ····· Optional accessory

HWT-1401XWHM3W-E, HWT-1401XWHM6W-E, HWT-1401XWHT6W-E, HWT-1401XWHT9W-E

No.	Component name	Model name				Type name	Rating
		M3W-E	M6W-E	T6W-E	T9W-E		
1	Circulation pump	O	O	O	O	UPM 4LK 15-75 130	AC230 V 0.66 A (MAX)
2	Backup heater 3 kW	O				SMP10E8304 3KW	AC230 V 3 kW
3	Backup heater 6 kW		O			SMP10E8304 6KW	AC230 V 6 kW
4	Backup heater 6 kW			O		SMP10E8304 6KW	AC400 V (3N) 6 kW
5	Backup heater 9 kW				O	SMP10E8304 9KW	AC400 V (3N) 9 kW
6	Water heat exchange temperature sensor (TC sensor)	O	O	O	O	–	10 kΩ (25°C)
7	Water inlet temperature sensor (TWI sensor)	O	O	O	O	–	10 kΩ (25°C)
8	Water outlet temperature sensor (TWO sensor)	O	O	O	O	–	10 kΩ (25°C)
9	Heater outlet water temperature sensor (THO sensor)	O	O	O	O	–	10 kΩ (25°C)
10	Floor inlet temperature sensor (TFI sensor)	O	O	O	O	–	10 kΩ (25°C)
11	Low pressure sensor	O	O	O	O	–	Operating pressure 0.20 MPa
12	Thermal protector (auto)	O	O	O	O	–	Operating temperature 75±3°C DC42 V 0.2 A
13	Thermal protector (single operation)	O	O	O	O	–	Operating temperature 95±5°C AC250 V 16 A
14	Flow sensor	O	O	O	O	VVX20	DC12 V 15 mA
15	Remote controller (Main)	O	O	O	O	HWS-AMSU51-E	
16	Remote controller (Sub)	OP	OP	OP	OP	HWS-AMSU51-E	
17	0 - 10 V Interface	OP	OP	OP	OP	HWS-IFAIP01U-E	
18	Water 3-way valve terminal	O	O	O	O	–	AC230 V 0.1 A 2Wire, 3Wire SPST, SPDT type mountable
19	Water 2-way valve terminal	O	O	O	O	–	AC230 V 0.1 A 2Wire type mountable
20	Mixing valve terminal	O	O	O	O	–	AC230 V 0.1 A 3Wire SPST, SPDT type mountable
21	Circulation pump terminal	O	O	O	O	–	AC230 V 1.0 A
22	Booster heater terminal	O	O	O	O	–	AC230 V 1.0 A
23	Fuse (Backup heater)	O	O	O	O	–	AC250 V 25 A
24	PC board (Main)	O	O	O	O	MCC-1753	
25	PC board (Sub)	O	O	O	O	MCC-1755	

O····· Applied
OP ····· Optional accessory

5-2. Outdoor unit

HWT-401HW-E, HWT-601HW-E

No.	Component name	Type name	Rating
1	Compressor	DX150A1T-21F	
2	Outdoor fan motor	ICF-140-A43-1	Output 43 W
3	Reactor	CH-102	18 mH, 16 A
4	4-way valve coil	DXQ-1233	DC12 V
5	Pulse motor valve (PMV) coil	PQ-M10012-000313	DC12 V
6	Compressor case thermostat	US-622KXTMQO-SS	OFF = 125 ± 4°C, ON = 90 ± 5°C
7	PC board	MCC-1768	
8	High pressure switch	ACB-4UB154W	OFF = 4.15 + 0, -0.15 MPa

HWT-801H(R)W-E, HWT-1101H(R)W-E

No.	Component name	Type name	Rating
1	Compressor	NX220A1FJ-20N	
2	Outdoor fan motor	ICF-280-A60-1	Output 60 W
3	Reactor	CH-101	10 mH, 20 A
4	4-way valve coil	DXQ-1233	DC12 V
5	Pulse motor valve (PMV) coil	UKV-A040	DC12 V
6	PC board (Compressor)	MCC-1705	
7	PC board (Control)	MCC-1675	
8	High pressure sensor	NSK-BH042J-873	0 - 4.15 MPa
9	High pressure switch	ACB-4UB231W	OFF = 4.60 +0, - 0.3 MPa
10	Compressor case thermostat	US-622	OFF = 125 ± 4°C, ON = 90 ± 5°C
11	2-way valve coil INJ	TEV-SMOAG2260A1	AC220 - 240 V
12	Check valve INJ	BCV-302DY	
13	Pulse motor valve (PMV) coil INJ	FAM-MD12TF-1	
14	Cord heater	Flexelec	150W

HWT-1401H(R)W-E

No.	Component name	Type name	Rating
1	Compressor	DX380A2TJ-20M	
2	Outdoor fan motor	ICF-280-A100-1	Output 100 W
3	Reactor	CH-100-FC□	10 mH, 16 A
4	4-way valve coil	DXQ-1233	DC12 V
5	Pulse motor valve (PMV) coil	UKV-A040	DC12 V
6	PC board (Compressor)	MCC-1758	
7	PC board (Control)	MCC-1675	
8	High pressure sensor	NSK-BH042J-873	0 - 4.15 MPa
9	High pressure switch	ACB-4UB231W	OFF = 4.60 +0, - 0.3 MPa
10	Compressor case thermostat	US-622	OFF = 125 ± 4°C, ON = 90 ± 5°C
11	2-way valve coil INJ	TEV-SMOAG2260A1	AC220 - 240 V
12	Check valve INJ	BCV-302DY	
13	Pulse motor valve (PMV) coil INJ	FAM-MD12TF-1	
14	Cord heater	Flexelec	150W

HWT-801H8(R)W-E, HWT-1101H8(R)W-E, HWT-1401H8(R)W-E

No.	Component name	Type name	Rating
1	Compressor	RX380A2TJ-20M	
2	Outdoor fan motor	ICF-280-A100-1	Output 100 W
3	Reactor(CH-100)	CH-100-2Z	10 mH, 16 A
4	4-way valve coil	DXQ-1233	DC12 V
5	Pulse motor valve (PMV) coil	UKV-A040	DC12 V
6	PC board (Compressor)	MCC-1780	
7	PC board (Control)	MCC-1781	
8	High pressure sensor	NSK-BH042J-873	0 - 4.15 MPa
9	High pressure switch	ACB-4UB231W	OFF = 4.60 +0, - 0.3 MPa
10	Compressor case thermostat	US-622	OFF = 125 ± 4°C, ON = 90 ± 5°C
11	2-way valve coil INJ	TEV-SMOAG2260A1	AC220 - 240 V
12	Check valve INJ	BCV-302DY	
13	Pulse motor valve (PMV) coil INJ	FAM-MD12TF-1	
14	Cord heater	Flexelec	150W
15	Reactor(CH-68)	CH-68-3FC	18 mH, 5A

5-3. Hot water cylinder unit

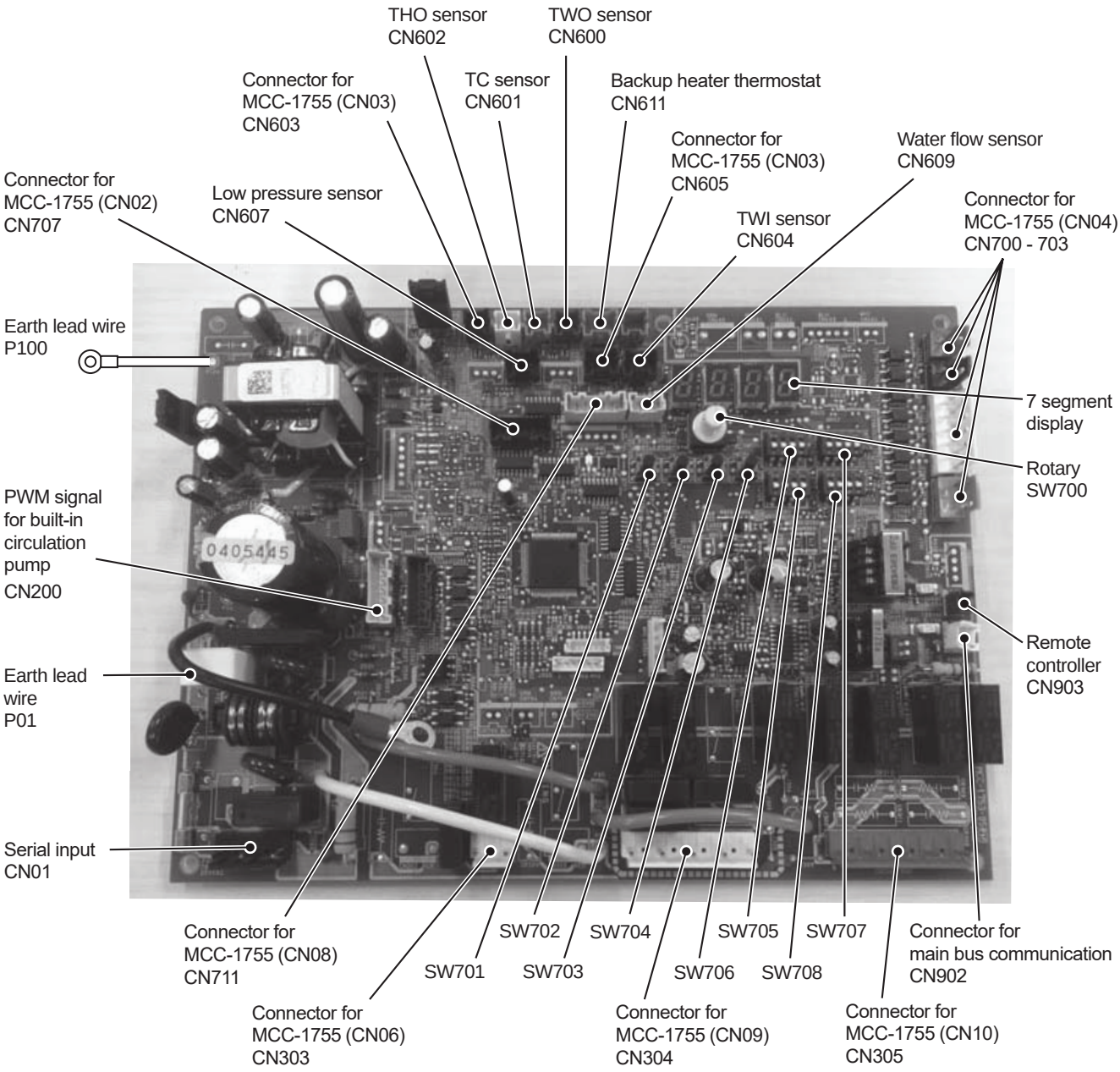
No.	Component name	Model name			Type name	Rating
		1501 CSH M3-E (-UK)	2101 CSH M3-E (-UK)	3001 CSH M3-E (-UK)		
1	Hot water cylinder heater	O	O	O	–	AC230 V 2.7 kW
2	Hot water cylinder temperature sensor (TTW sensor)	O	O	O	–	10 kΩ (25°C)
3	Thermal cut-out	O	O	O	–	Operating temperature Manual reset 82°C (+3K/-2K)

O····· Applied

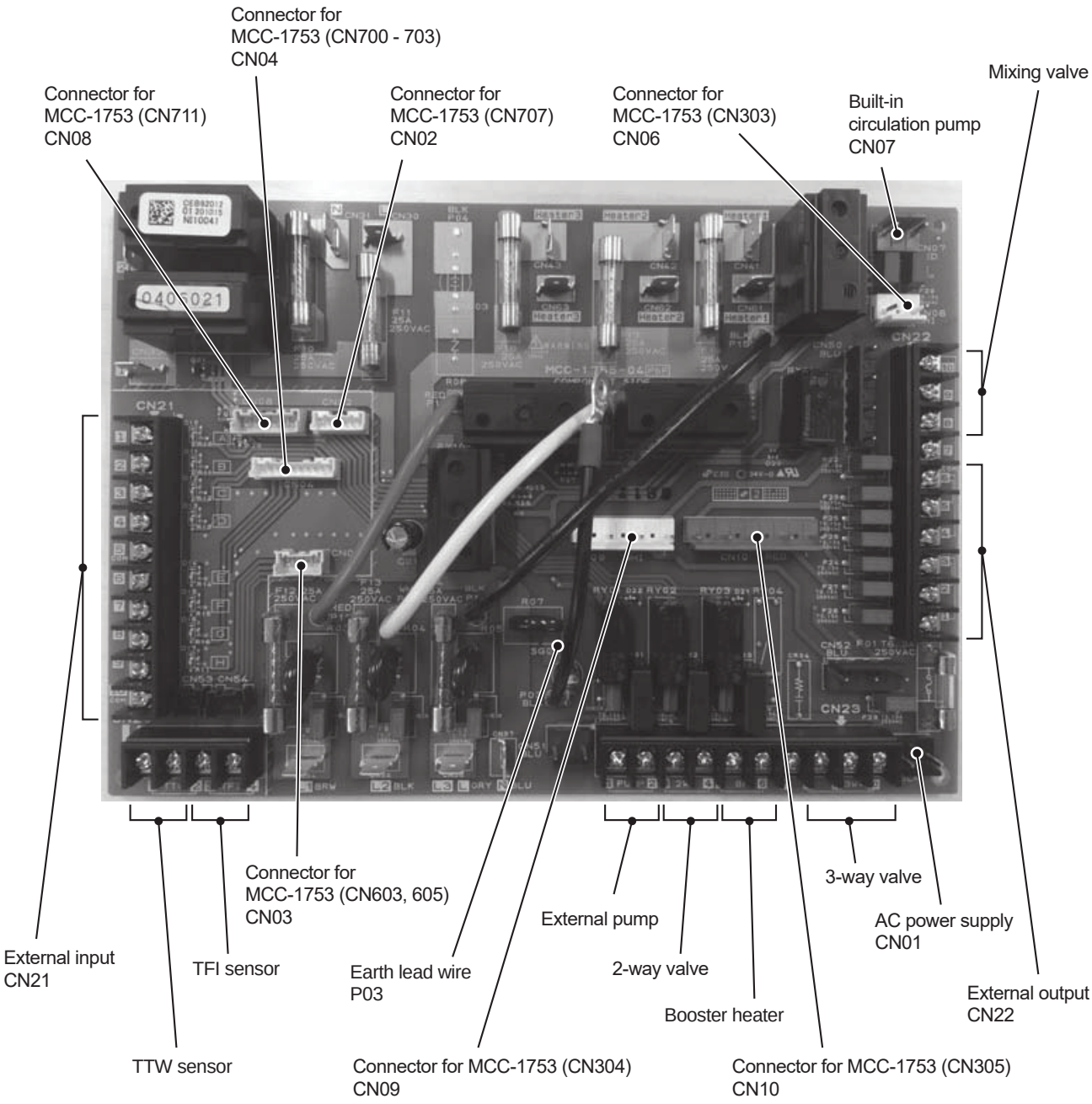
5-4. Water heat exchange control board

HWT-601XWHM3W-E, HWT-601XWHM6W-E, HWT-601XWHT6W-E
HWT-1101XWHM3W-E, HWT-1101XWHM6W-E, HWT-1101XWHT6W-E, HWT-1101XWHT9W-E
HWT-1401XWHM3W-E, HWT-1401XWHM6W-E, HWT-1401XWHT6W-E, HWT-1401XWHT9W-E

MCC-1753 (main)



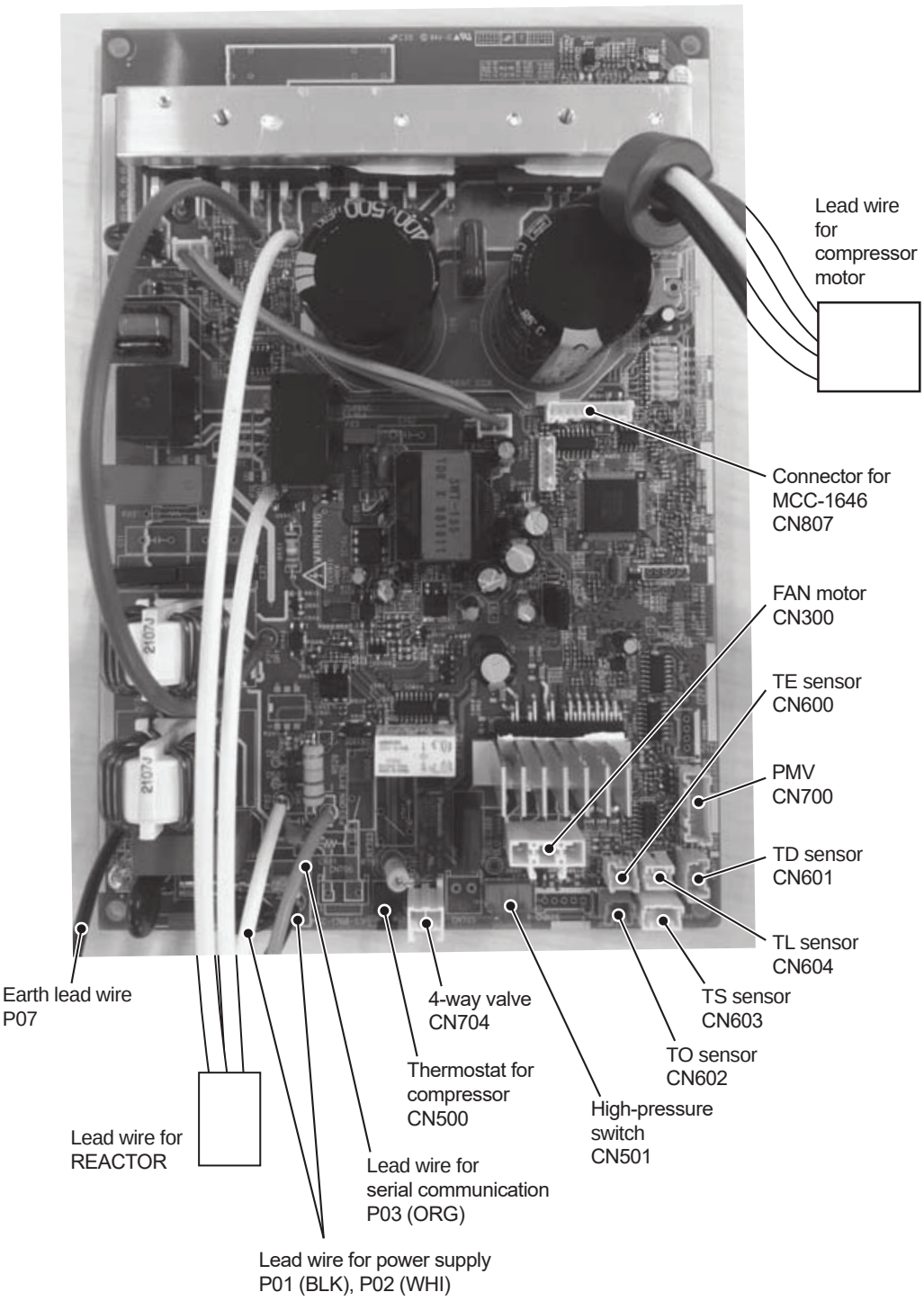
MCC-1755 (sub)


Connector for
MCC-1753 (CN700 - 703)
CN04
Connector for
MCC-1753 (CN711)
CN08
Connector for
MCC-1753 (CN707)
CN02
Connector for
MCC-1753 (CN303)
CN06
Built-in
circulation pump
CN07
Mixing valve
CN21
CN22
CN23
Connector for
MCC-1753 (CN603, 605)
CN03
External input
CN21
TFI sensor
TTW sensor
Earth lead wire
P03
External pump
2-way valve
Booster heater
3-way valve
AC power supply
CN01
External output
CN22
Connector for MCC-1753 (CN304)
CN09
Connector for MCC-1753 (CN305)
CN10

5-5. Outdoor control board

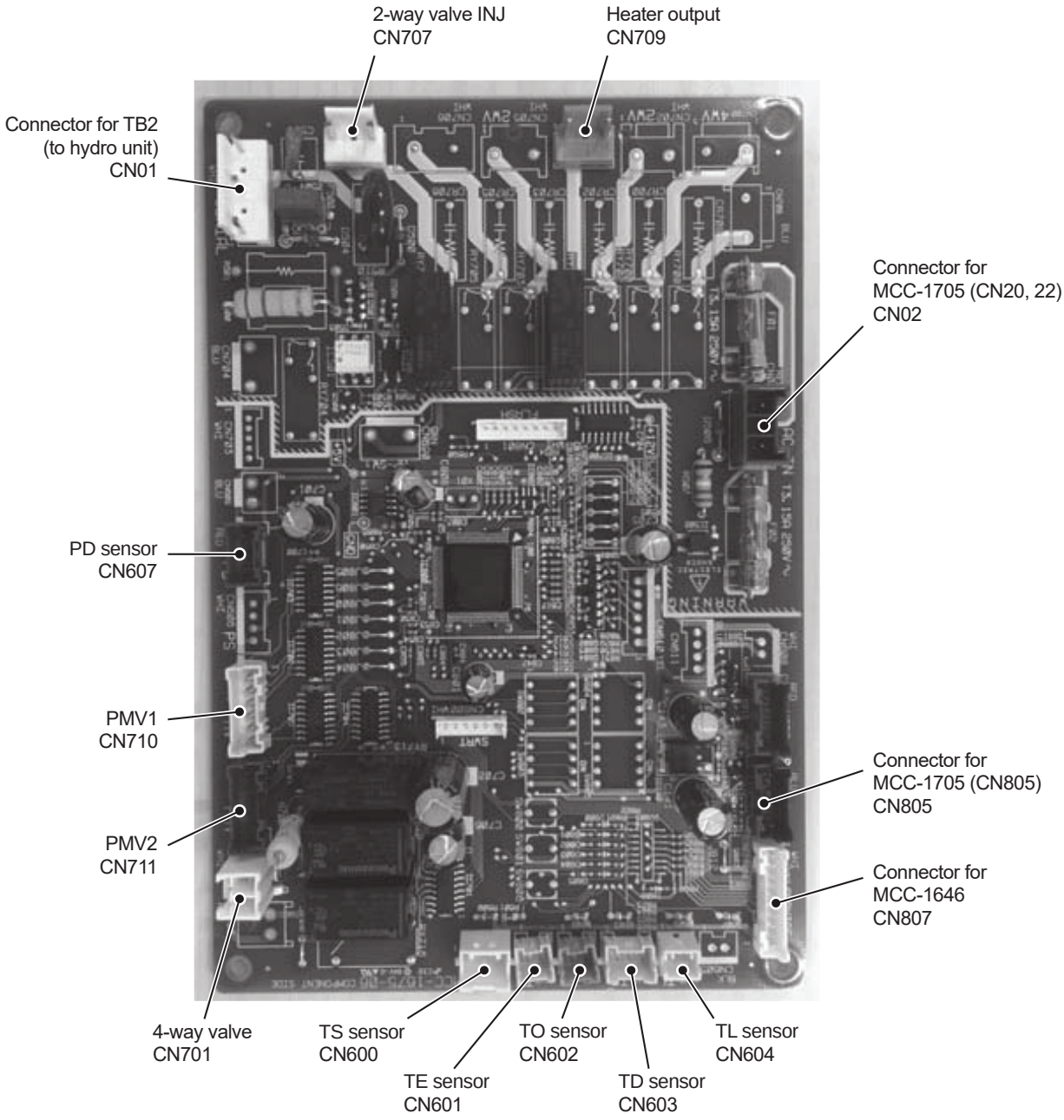
HWT-401HW-E, HWT-601HW-E

MCC-1768



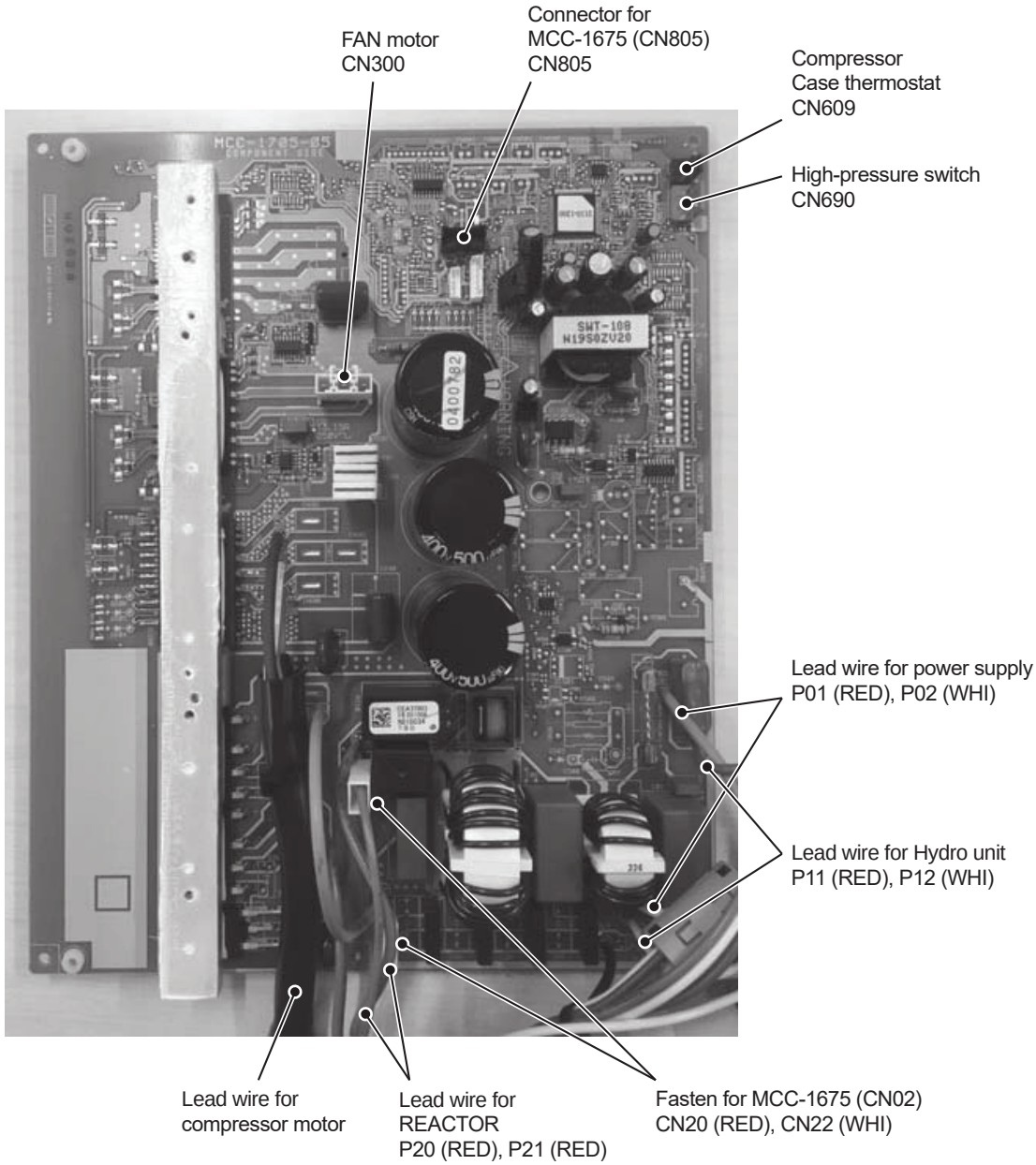
HWT-801H(R)W-E, HWT-1101H(R)W-E, HWT-1401H(R)W-E

MCC-1675 (Interface CDB)



HWT-801H(R)W-E, HWT-1101H(R)W-E

MCC-1705 (Compressor, Fan IPDU)

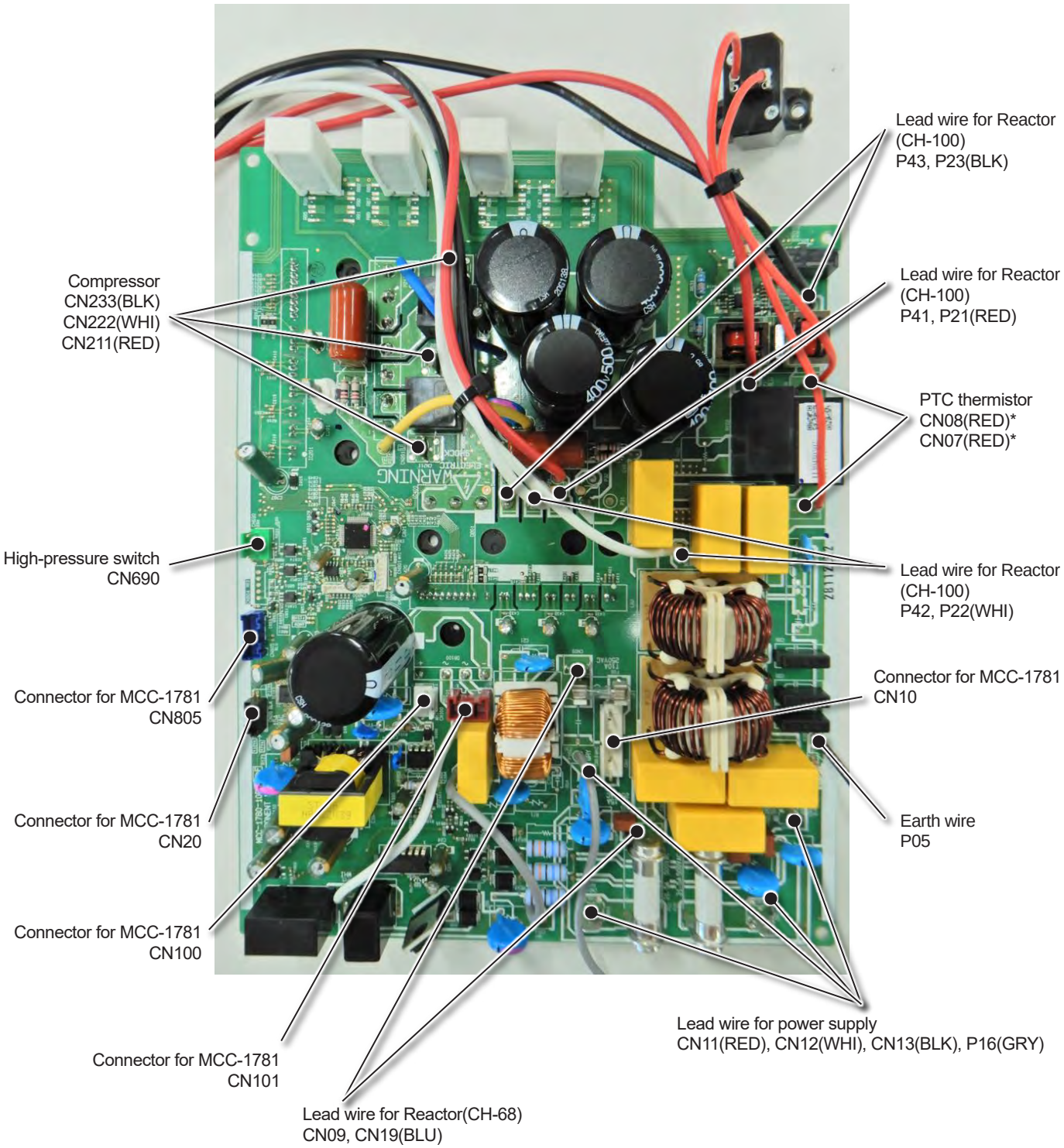


HWT-1401HW-E, HWT-1401HRW-E

MCC-1758 (Compressor, Fan IPDU)

HWT-801H8(R)W-E, HWT-1101H8(R)W-E, HWT-1401H8(R)W-E

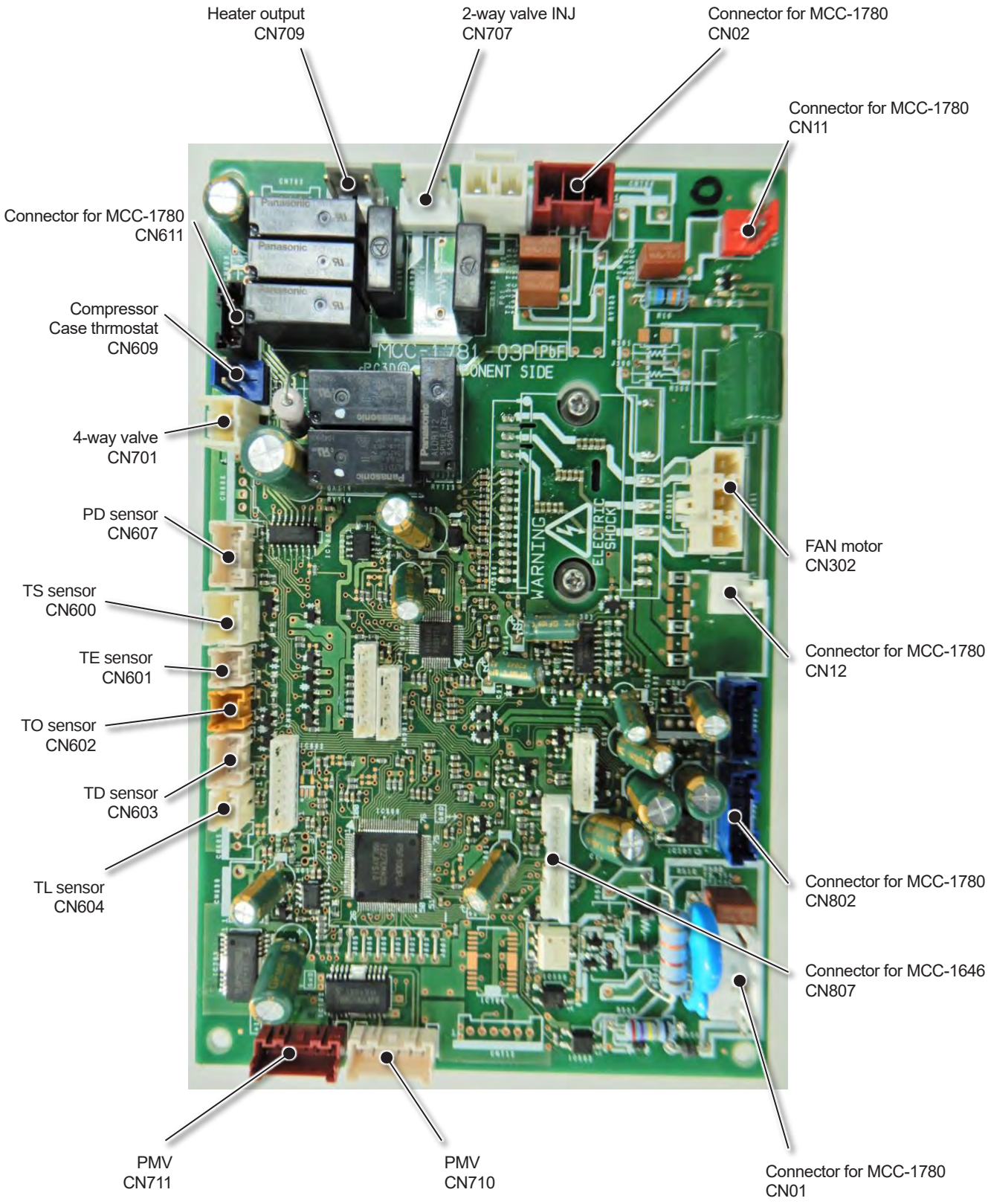
MCC-1780(Compressor IPDU)



*This figure of the board shows the type with the PTC thermistor doesn't mounted on the board.
The board with the PTC thermistor doen't have lead wires for CN07 and CN08.

HWT-801H8(R)W-E, HWT-1101H8(R)W-E, HWT-1401H8(R)W-E

MCC-1781(CDB & FAN IPDU)



6 Refrigerant (R32)

This Air to Water Heat Pump adopts the R32 refrigerant which does not damage the ozone layer.
The working pressure of the new refrigerant R32 is 1.6 times higher than conventional refrigerant (R22).
The refrigerating oil is also changed in accordance with change of refrigerant, so be careful that water, dust, and existing refrigerant or refrigerating oil are not entered in the refrigerant cycle of the Air to Water Heat Pump using the new refrigerant during installation work or servicing time.
The next section describes the precautions for Air to Water Heat Pump using the new refrigerant.
Conforming to contents of the next section together with the general cautions included in this manual, perform the correct and safe work.

6-1. Safety during installation / servicing

As R32's pressure is about 1.6 times higher than that of R22, improper installation / servicing may cause a serious trouble. By using tools and materials exclusive for R32, it is necessary to carry out installation/ servicing safely while taking the following precautions into consideration.

(1) Never use refrigerant other than R32 in an Air to Water Heat Pump which is designed to operate with R32.
If other refrigerant than R32 is mixed, pressure in the refrigeration cycle becomes abnormally high, and it may cause personal injury, etc. by a rupture.

(2) Confirm the used refrigerant name, and use tools and materials exclusive for the refrigerant R32.
The refrigerant name R32 is indicated on the visible place of the outdoor unit of the Air to Water Heat Pump using R32 as refrigerant.
A diameter of the charge port for R32 is the same as that for the R410A's. Be careful not to charge the refrigerant by mistake.

(3) If a refrigeration gas leakage occurs during installation/servicing, be sure to ventilate fully.
If the refrigerant gas comes into contact with fire, a poisonous gas may occur.

(4) When installing or removing an Air to Water Heat Pump, do not allow air or moisture to remain in the refrigeration cycle.
Otherwise, pressure in the refrigeration cycle may become abnormally high so that a rupture or personal injury may be caused.

(5) After completion of installation work, check to make sure that there is no refrigeration gas leakage.
If the refrigerant gas leaks into the room, coming into contact with fire in the fan-driven heater, space heater, etc., a poisonous gas may occur.

(6) When an Air to Water Heat Pump system charged with a large volume of refrigerant is installed in a small room, it is necessary to exercise care so that, even when refrigerant leaks, its concentration does not exceed the marginal level.
If the refrigerant gas leakage occurs and its concentration exceeds the marginal level, an oxygen starvation accident may result.

(7) Be sure to carry out installation or removal according to the installation manual.
Improper installation may cause refrigeration trouble, water leakage, electric shock, fire, etc.

(8) Unauthorized modifications to the Air to Water Heat Pump may be dangerous. If a breakdown occurs please call a qualified Air to Water Heat Pump technician or electrician.
Improper repair may result in water leakage, electric shock and fire, etc.

(9) When breaking into the refrigerant circuit to make repairs or for any other purpose conventional procedures shall be used.
However, for flammable refrigerants it is important that best practice is followed since flammability is a consideration.
The following procedure shall be adhered to:

- remove refrigerant;
- purge the circuit with inert gas
- evacuate
- purge with inert gas
- open the circuit by cutting or brazing

6-2. Refrigerant piping installation

6-2-1. Piping materials and joints used

For the refrigerant piping installation, copper pipes and joints are mainly used.
Copper pipes and joints suitable for the refrigerant must be chosen and installed.
Furthermore, it is necessary to use clean copper pipes and joints whose interior surfaces are less affected by contaminants.

(1) Copper pipes

It is necessary to use seamless copper pipes which are made of either copper or copper alloy and it is desirable that the amount of residual oil is less than 40 mg / 10 m.
Do not use copper pipes having a collapsed, deformed or discolored portion (especially on the interior surface). Otherwise, the expansion valve or capillary tube may become blocked with contaminants.
As an Air to Water Heat Pump using R32 incurs pressure higher than when using R22, it is necessary to choose adequate materials.
Thicknesses of copper pipes used with R32 are as shown in Table 6-2-1. Never use copper pipes thinner than 0.8 mm even when it is available on the market.

NOTE

Refer to the "**6-6. Instructions for re-use piping of R22 or R407C**".

Table 6-2-1 Thicknesses of annealed copper pipes

		Wall thickness (mm)	
Nominal diameter	**Outer diameter (mm)**	**R410A or R32**	**R22**
1/4	6.4	0.80	0.80
1/2	12.7	0.80	0.80
5/8	15.9	1.00	1.00

(2) Joints

For copper pipes, flare joints or socket joints are used. Prior to use, be sure to remove all contaminants.

a) Flare joints
Flare joints used to connect the copper pipes cannot be used for piping whose outer diameter exceeds 20 mm. In such a case, socket joints can be used.
Sizes of flare pipe ends, flare joint ends and flare nuts are as shown in Tables 6-2-3 to 6-2-5 below.

b) Socket joints
Socket joints are such that they are brazed for connections, and used mainly for thick piping whose diameter is larger than 20 mm.
Thicknesses of socket joints are as shown in Table 6-2-2.

Table 6-2-2 Minimum thicknesses of socket joints

Nominal diameter	Reference outer diameter of copper pipe jointed (mm)	Minimum joint thickness (mm)
1/4	6.4	0.50
1/2	12.7	0.70
5/8	15.9	0.80

6-2-2. Processing of piping materials

When performing the refrigerant piping installation, care should be taken to ensure that water or dust does not enter the pipe interior, that no other oil other than lubricating oils used in the installed Air to Water Heat Pump is used, and that refrigerant does not leak.
When using lubricating oils in the piping processing, use such lubricating oils whose water content has been removed. When stored, be sure to seal the container with an airtight cap or any other cover.

(1) Flare processing procedures and precautions

a) Cutting the pipe
By means of a pipe cutter, slowly cut the pipe so that it is not deformed.
b) Removing burrs and chips
If the flared section has chips or burrs, refrigerant leakage may occur.
Carefully remove all burrs and clean the cut surface before installation.
c) Insertion of flare nut
d) Flare processing
Make certain that a clamp bar and copper pipe have been cleaned.
By means of the clamp bar, perform the flare processing correctly.
Use either a flare tool for R410A / R32 or conventional flare tool.
Flare processing dimensions differ according to the type of flare tool.
When using a conventional flare tool, be sure to secure “dimension A” by using a gauge for size adjustment.

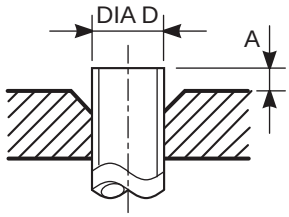


Fig. 6-2-1 Flare processing dimensions

Table 6-2-3 Dimensions related to flare processing for R410A or R32 / R22

Nominal diameter	Outer diameter (mm)	Thickness (mm)	A (mm)				
			Flare tool for R410A, R22 clutch type	Conventional flare tool (R410A or R32)		Conventional flare tool (R22)	
				Clutch type	Wing nut type	Clutch type	Wing nut type
1/4	6.4	0.8	0 to 0.5	1.0 to 1.5	1.5 to 2.0	0.5 to 1.0	1.0 to 1.5
1/2	12.7	0.8	0 to 0.5	1.0 to 1.5	2.0 to 2.5	0.5 to 1.0	1.5 to 2.0
5/8	15.9	1.0	0 to 0.5	1.0 to 1.5	2.0 to 2.5	0.5 to 1.0	1.5 to 2.0

Table 6-2-4 Flare and flare nut dimensions for R410A or R32

Nominal diameter	Outer diameter (mm)	Thickness (mm)	Dimension (mm)				Flare nut width (mm)
			A	B	C	D	
1/4	6.4	0.8	9.1	9.2	6.5	13	17
1/2	12.7	0.8	16.6	16.0	12.9	23	26
5/8	15.9	1.0	19.7	19.0	16.0	25	29

Table 6-2-5 Flare and flare nut dimensions for R22

Nominal diameter	Outer diameter (mm)	Thickness (mm)	Dimension (mm)				Flare nut width (mm)
			A	B	C	D	
1/4	6.4	0.8	9.1	9.2	6.5	13	17
1/2	12.7	0.8	16.2	16.0	12.9	20	24
5/8	15.9	1.0	19.4	19.0	16.0	23	27

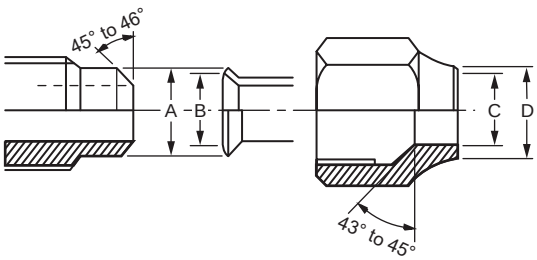


Fig. 6-2-2 Relations between flare nut and flare seal surface

(2) Flare connecting procedures and precautions

a) Make sure that the flare and union portions do not have any scar or dust, etc.
b) Correctly align the processed flare surface with the union axis.
c) Tighten the flare with designated torque by means of a torque wrench.
The tightening torque for R410A or R32 is the same as that for conventional R22.
Incidentally, when the torque is weak, the gas leakage may occur.
When it is strong, the flare nut may crack and may be made non-removable.
When choosing the tightening torque, comply with values designated by manufacturers.
Table 6-2-6 shows reference values.

NOTE

When applying oil to the flare surface, be sure to use oil designated by the manufacturer.
If any other oil is used, the lubricating oils may deteriorate and cause the compressor to burn out.

Table 6-2-6 Tightening torque of flare for R410A or R32 [Reference values]

Nominal diameter	Outer diameter (mm)	Tightening torque N•m (kgf•m)	Tightening torque of torque wrenches available on the market N•m (kgf•m)
1/4	6.4	14 to 18 (1.4 to 1.8)	16 (1.6), 18 (1.8)
1/2	12.7	50 to 62 (5.0 to 6.2)	55 (5.5)
5/8	15.9	68 to 82 (6.8 to 8.2)	65 (6.5)

6-3. Tools

6-3-1. Required tools

Refer to the “**(4) Tools**” (page 17)

6-4. Recharging of refrigerant

When it is necessary to recharge refrigerant, charge the specified amount of new refrigerant according to the following steps.

Recover the refrigerant, and check no refrigerant remains in the equipment.

↓

Connect the charge hose to packed valve service port at the outdoor unit's gas side.

↓

Connect the charge hose of the vacuum pump adapter.

↓

Open fully both packed valves at liquid and gas sides.

↓

Place the handle of the gauge manifold Low in the fully opened position, and turn on the vacuum pump's power switch. Then, evacuating the refrigerant in the cycle.

↓

When the compound gauge's pointer has indicated –0.1 MPa (–76 cmHg), place the handle Low in the fully closed position, and turn off the vacuum pump's power switch.

↓

Keep the status as it is for 1 to 2 minutes, and ensure that the compound gauge's pointer does not return.

↓

Set the refrigerant cylinder to the electronic balance, connect the connecting hose to the cylinder and the connecting port of the electronic balance, and charge **liquid refrigerant.**

(For refrigerant charging, see the figure below.)

NOTE

(1) Never charge refrigerant exceeding the specified amount.

(2) If the specified amount of refrigerant cannot be charged, charge refrigerant bit by bit in COOL mode.

(3) Do not carry out additional charging.
When additional charging is carried out if refrigerant leaks, the refrigerant composition changes in the refrigeration cycle, which changes characteristics of the Air to Water Heat Pump, refrigerant exceeding the specified amount is charged, and working pressure in the refrigeration cycle becomes abnormally high pressure, and may cause a rupture or personal injury.

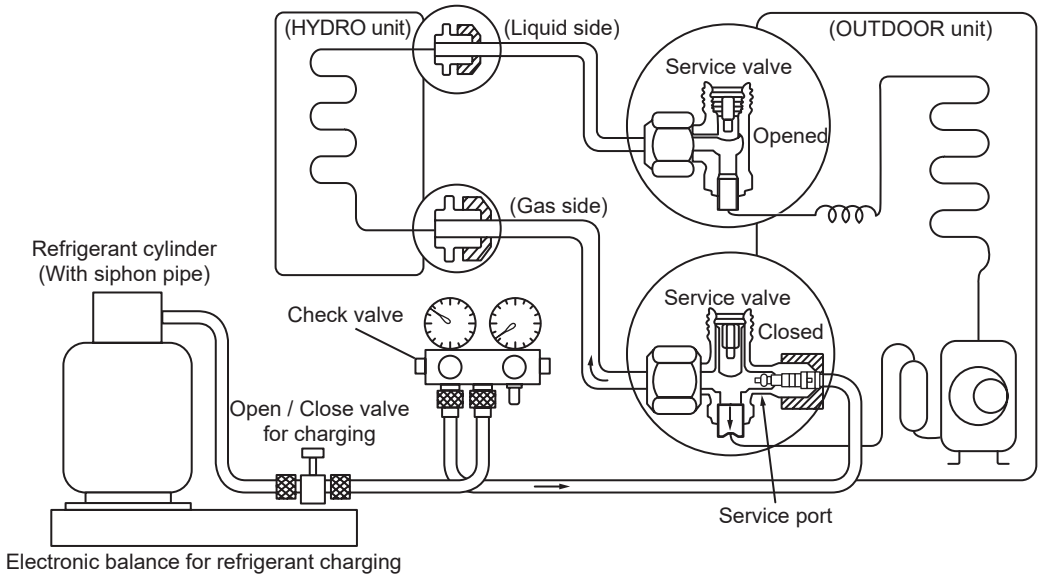


Fig. 6-4-1 Configuration of refrigerant charging

NOTE

(1) Be sure to make setting so that **liquid** can be charged.

(2) When using a cylinder equipped with a siphon, liquid can be charged without turning it upside down.

R32 refrigerant is a Single-component refrigerant that does not change its composition.

Although it is possible to charge the refrigerant with either liquid or gas, charge it with liquid.

(If using gas for charging, composition of the refrigerant changes and then characteristics of the Air to Water Heat Pump change.)

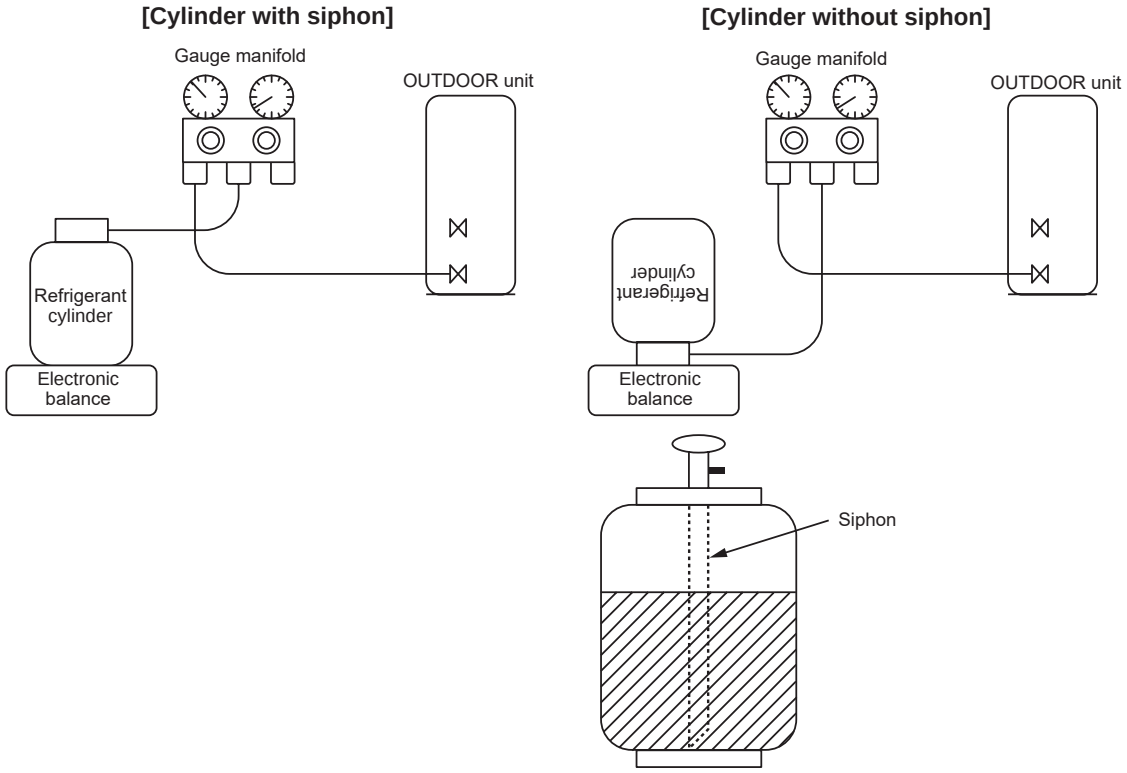


Fig. 6-4-2

6-5. Brazing of pipes

6-5-1. Materials for brazing

(1) Silver brazing filler

Silver brazing filler is an alloy mainly composed of silver and copper.

It is used to join iron, copper or copper alloy, and is relatively expensive though it excels in solderability.

(2) Phosphor bronze brazing filler

Phosphor bronze brazing filler is generally used to join copper or copper alloy.

(3) Low temperature brazing filler

Low temperature brazing filler is generally called solder, and is an alloy of tin and lead.

Since it is weak in adhesive strength, do not use it for refrigerant pipes.

NOTE

(1) Phosphor bronze brazing filler tends to react with sulfur and produce a fragile compound water solution, which may cause a gas leakage. Therefore, use any other type of brazing filler at a hot spring resort, etc., and coat the surface with a paint.

(2) When performing brazing again at time of servicing, use the same type of brazing filler.

6-5-2. Flux

(1) Reason why flux is necessary

- By removing the oxide film and any foreign matter on the metal surface, it assists the flow of brazing filler.
- In the brazing process, it prevents the metal surface from being oxidized.
- By reducing the brazing filler's surface tension, the brazing filler adheres better to the treated metal.

(2) Characteristics required for flux

- Activated temperature of flux coincides with the brazing temperature.
- Due to a wide effective temperature range, flux is hard to carbonize.
- It is easy to remove slag after brazing.
- The corrosive action to the treated metal and brazing filler is minimum.
- It excels in coating performance and is harmless to the human body.

As the flux works in a complicated manner as described above, it is necessary to select an adequate type of flux according to the type and shape of treated metal, type of brazing filler and brazing method, etc.

(3) Types of flux

- **Noncorrosive flux**
  Generally, it is a compound of borax and boric acid. It is effective in case where the brazing temperature is higher than 800°C.
- **Activated flux**
  Most of fluxes generally used for silver brazing are this type.
  It features an increased oxide film removing capability due to the addition of compounds such as potassium fluoride, potassium chloride and sodium fluoride to the borax-boric acid compound.

(4) Piping materials for brazing and used brazing filler / flux

Piping material	Used brazing filler	Used flux
Copper - Copper	Phosphor copper	Do not use
Copper - Iron	Silver	Paste flux
Iron - Iron	Silver	Vapour flux

NOTE

(1) Do not enter flux into the refrigeration cycle.
(2) When chlorine contained in the flux remains within the pipe, the lubricating oil deteriorates. Therefore, use a flux which does not contain chlorine.
(3) When adding water to the flux, use water which does not contain chlorine (e.g. distilled water or ion-exchange water).
(4) Remove the flux after brazing.

6-5-3. Brazing

As brazing work requires sophisticated techniques, experiences based upon a theoretical knowledge, it must be performed by a person qualified.
In order to prevent the oxide film from occurring in the pipe interior during brazing, it is effective to proceed with brazing while letting dry Nitrogen gas flow.

Never use gas other than Nitrogen gas.

(1) Brazing method to prevent oxidation

1) Attach a reducing valve and a flow-meter to the Nitrogen gas cylinder.
2) Use a copper pipe to direct the piping material, and attach a flow-meter to the cylinder.
3) Apply a seal onto the clearance between the piping material and inserted copper pipe for Nitrogen in order to prevent backflow of the Nitrogen gas.
4) When the Nitrogen gas is flowing, be sure to keep the piping end open.
5) Adjust the flow rate of Nitrogen gas so that it is lower than 0.05 m³/Hr or 0.02 MPa (0.2 kgf/cm²) by means of the reducing valve.
6) After performing the steps above, keep the Nitrogen gas flowing until the pipe cools down to a certain extent (temperature at which pipes are touchable with hands).
7) Remove the flux completely after brazing.

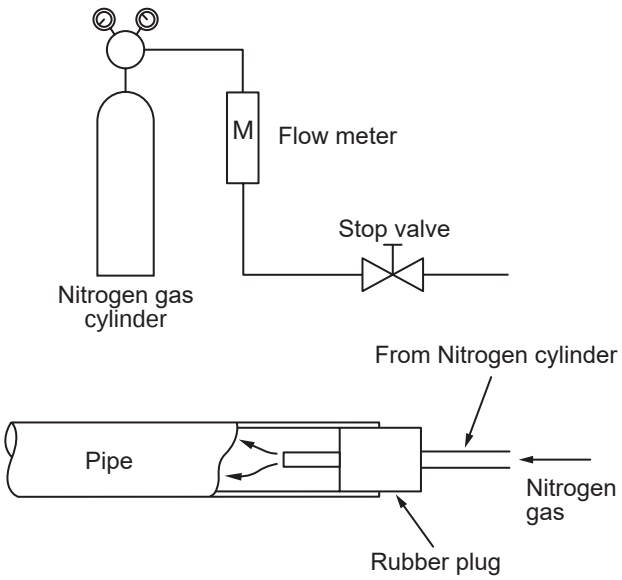


Fig. 6-5-1 Prevention of oxidation during brazing

6-6. Instructions for re-use piping of R22 or R407C

Instruction of works:
The existing R22 and R407C piping can be reused for our Air to Water Heat Pump R32 products installations.

⚠ WARNING

Confirming the existence of scratches or dents on the existing pipes and confirming the reliability of the pipe strength are conventionally referred to the local site. If the specified conditions can be cleared, it is possible to update existing R22 and R407C pipes to those for R32 models.

6-6-1. Basic conditions needed to reuse the existing pipe

Check and observe three conditions of the refrigerant piping works.

(1) Dry (There is no moisture inside of the pipes.)

(2) Clean (There is no dust inside of the pipes.)

(3) Tight (There is no refrigerant leak.)

6-6-2. Restricted items to use the existing pipes

In the following cases, the existing pipes cannot be reused as they are. Clean the existing pipes or exchange them with new pipes.

(1) When a scratch or dent is heavy, be sure to use the new pipes for the works.

(2) When the thickness of the existing pipe is thinner than the specified “Pipe diameter and thickness” be sure to use the new pipes for the works.

- The operating pressure of R32 is high. If there is a scratch or dent on the pipe or a thinner pipe is used, the pressure strength may be inadequate, which may cause the pipe to break in the worst case.

*** Pipe diameter and thickness (mm)**

Reference outside diameter (mm)	Wall thickness (mm)	Material
6.4	0.8	—
12.7	0.8	—
15.9	1.0	—

- In case that the pipe diameter is DIA 12.7 mm or less and the thickness is less than 0.7 mm, be sure to use the new pipes for works.

(3) The pipes are left as coming out or gas leaks. (Poor refrigerant)

- There is possibility that rain water or air including moisture enters in the pipe.

(4) Refrigerant recovery is impossible. (Refrigerant recovery by the pump-down operation on the existing Air to Water Heat Pump)

- There is possibility that a large quantity of poor oil or moisture remains inside of the pipe.

(5) A dryer on the market is attached to the existing pipes.

- There is possibility that copper green rust generated.

(6) Check the oil when the existing Air to Water Heat Pump was removed after refrigerant had been recovered.
In this case, if the oil is judged as clearly different compared with normal oil.

- The refrigerator oil is copper rust green: There is possibility that moisture is mixed with the oil and rust generates inside of the pipe.
- There is discolored oil, a large quantity of the remains, or bad smell.
- A large quantity of sparkle remained wear-out powder is observed in the refrigerator oil.

(7) The Air to Water Heat Pump which compressor was exchanged due to a trouble compressor.
When the discolored oil, a large quantity of the remains, mixture of foreign matter, or a large quantity of sparkle remained wear-out powder is observed, the cause of trouble will occur.

(8) Installation and removal of the Air to Water Heat Pump are repeated with temporary installation by lease and etc.

(9) In case that type of the refrigerator oil of the existing Air to Water Heat Pump is other than the following oil (Mineral oil), Suniso, Freol-S, MS (Synthetic oil), alkyl benzene (HAB, Barrel-freeze), ester series, PVE only of ether series.

- Winding-insulation of the compressor may become inferior.

NOTE

The above descriptions are results of confirmation by our company and they are views on our Air to Water Heat Pump, but they do not guarantee the use of the existing pipes of the Air to Water Heat Pump that adopted R410A in other companies.

6-6-3. Branching pipe for simultaneous operation system

In the concurrent twin system, when TOSHIBA-specified branching pipe is used, it can be reused.

Branching pipe model name:

RBC-TWP30E, RBC-TWP50E

On the existing Air to Water Heat Pump for simultaneous operation system (twin system), there is a case of using branch pipe that has insufficient compressive strength. In this case please change it to the branch pipe for R32 or R410A.

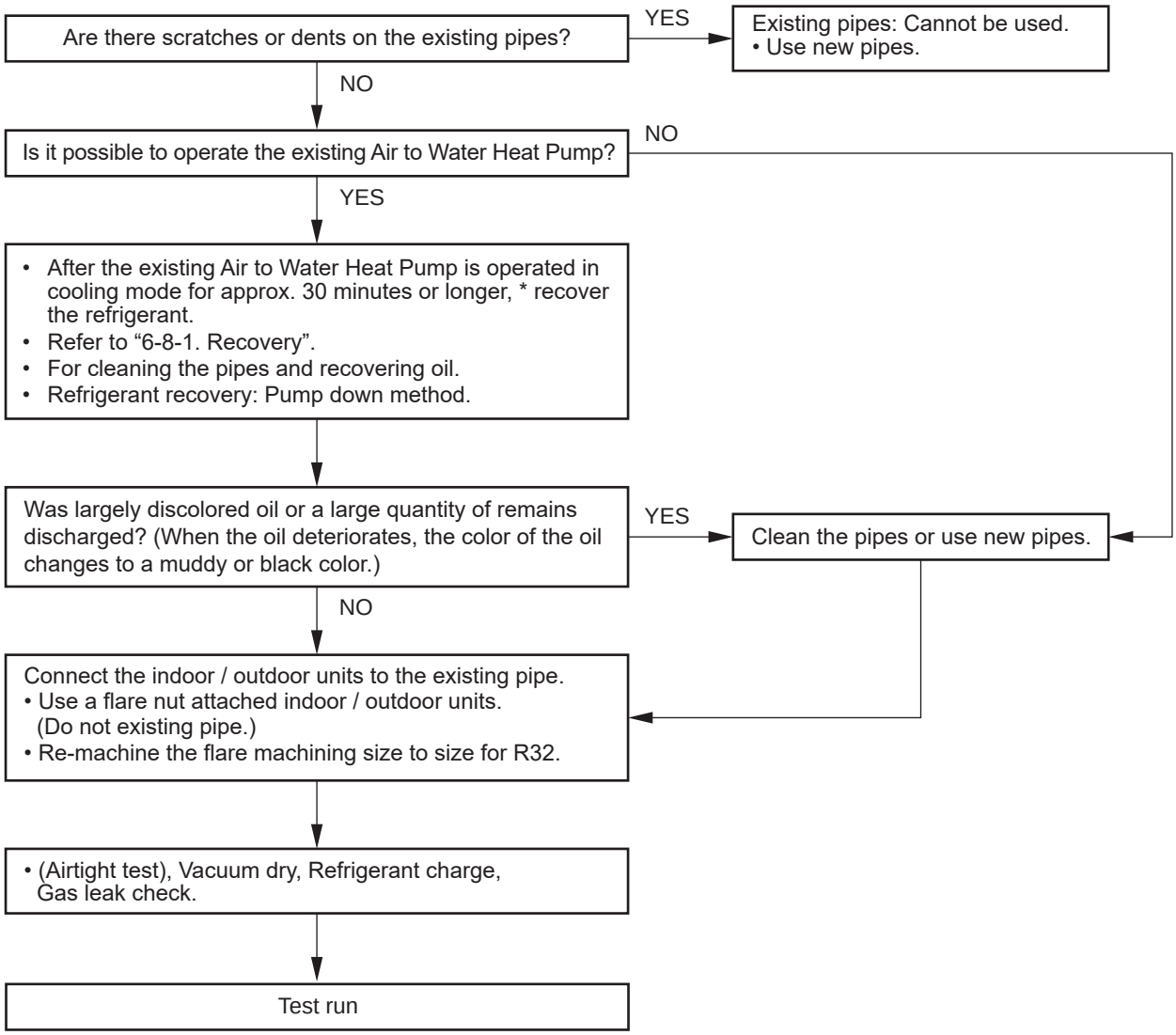
6-6-4. Curing of pipes

When removing and opening the indoor unit or outdoor unit for a long time, cure the pipes as follows:

- Otherwise rust may generate when moisture or foreign matter due to dewing enters in the pipes.
- The rust cannot be removed by cleaning, and a new piping work is necessary.

Place position	Term	Curing manner
Outdoors	1 month or more	Pinching
	Less than 1 month	Pinching or taping
Indoors	Every time	

6-6-5. Final installation checks



6-6-6. Handling of existing pipe

When using the existing pipe, carefully check it for the following:

- Wall thickness (within the specified range)
- Scratches and dents
- Water, oil, dirt, or dust in the pipe
- Flare looseness and leakage from welds
- Deterioration of copper pipe and heat insulator
- Before recovering the refrigerant in the existing system, perform a cooling operation for at least 30 minutes.

Cautions for using existing pipe

- Do not reuse a flare nut to prevent gas leaks. Replace it with the supplied flare nut and then process it to a flare.
- Blow nitrogen gas or use an appropriate means to keep the inside of the pipe clean.
  If discolored oil or much residue is discharged, wash the pipe.
- Check welds, if any, on the pipe for gas leaks.
- There may be a problem with the pressure resistance of the branching pipes of the existing piping.
  Replace them with branch pipes (sold separately).

When the pipe corresponds to any of the following, do not use it. Install a new pipe instead.

- The pipe has been opened (disconnected from indoor unit or outdoor unit) for a long period.
- The pipe has been connected to an outdoor unit that does not use refrigerant R22, R410A, R32 R407C.
- The existing pipe must have a wall thickness equal to or larger than the following thicknesses.

Reference outside diameter (mm)	Wall thickness (mm)	Material
6.4	0.8	—
12.7	0.8	—
15.9	1.0	—

- Do not use any pipe with a wall thickness less than these thicknesses due to insufficient pressure capacity

6-6-7. Recovering refrigerant

Use the refrigerant recovery equipment to recover the refrigerant.

6-7. Charging additional refrigerant

Amount of additional refrigerant shall be restricted by the following explanation to ensure the reliability. Miss-charging leads to the abnormal high pressure in the refrigerant cycle, causing a rupture, an injury and a compressor malfunction.

6-7-1. [Assumed gas leak]

The refrigerant can be charged only when the amount of a leak such as a slow-leak found at the installation work can be ensured that it is within the additional limits shown in the following.
Recharge the refrigerant if the amount of leakage is unknown when you feel “Cooling is not working well” or “Heating is not working well”.

6-7-2. [Limiting the additional charge]

- The maximum amount of additional refrigerant shall be up to 10% of the normal amount of the refrigerant. If no improvement in symptoms can be found at the above limitation, recover all gases and recharge the normal amount of refrigerant.
- If the slow leak is found at the installation work and the connection pipe length is 15 m or less, tighten the flare nut at the leak point and do not add the refrigerant.

6-7-3. [Cautions on charging additional refrigerant]

- When charging additional refrigerant, use a balance with an accuracy of more than 10 g scale.
  Do not use a health-meter etc.
- If the refrigerant gas leaks, find the leakage point and repair it securely. Though the refrigerant gas itself is innocuous, if it touch a fire source such as fan heater, stove or kitchen stove, noxious gas may occur.
- When charging the refrigerant, charge with liquid refrigerant.
  Work carefully and charge it little by little since it may be rapidly charged due to the liquid state.

6-8. General safety precautions for using R32 refrigerant

6-8-1. Recovery

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

6-8-2. Decommissioning

- Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its details. Only a qualified installer (*1) or qualified service person (*1) is allowed to do this work.
- It is recommended good practice that all refrigerants are recovered safely.
- Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of reclaimed refrigerant.
- It is essential that electrical power is available before the task is commenced.

NOTE

a) Become familiar with the equipment and its operation.

b) Isolate system electrically.

c) Before attempting the procedure ensure that:
   - Mechanical handling equipment is available, if required, for handling refrigerant cylinders;
   - All personal protective equipment is available and being used correctly;
   - The recovery process is supervised at all times by a competent person;
   - Recovery equipment and cylinders conform to the appropriate standards.

d) Pump down refrigerant system, if possible.

e) If a vacuum is not possible, make a manifold so that refrigerant can be removed from the various parts of the system.

f) Make sure that cylinder is situated on the scales before recovery takes place.

g) Start the recovery machine and operate in accordance with manufacturers instructions.

h) Do not overfill cylinders (No more than 80% volume liquid change).

i) Do not exceed the maximum working pressure of the cylinder, even temporarily.

j) When the cylinders have been filled correctly and the process complete, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on equipment are closed off.

k) Recovered refrigerant shall not be changed into another refrigerant system unless it has been cleaned and checked.

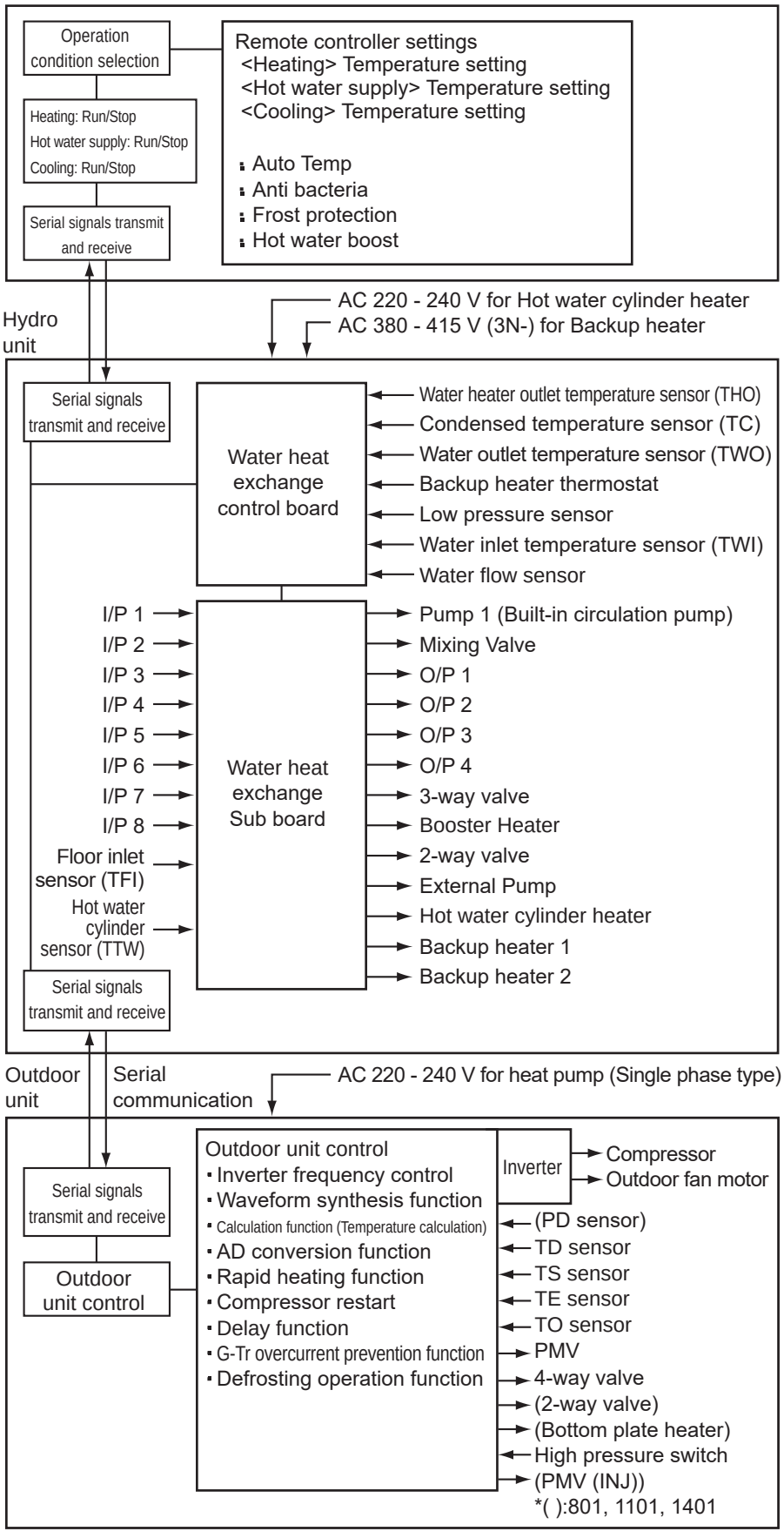
(*1) Refer to the “Definition of qualified installer or qualified service person”.

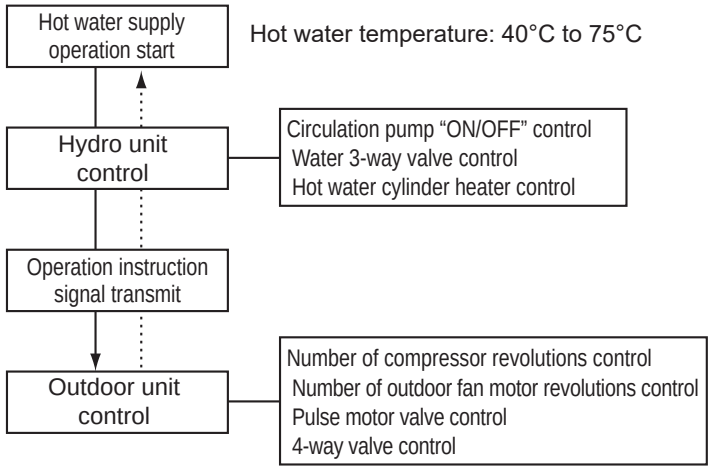
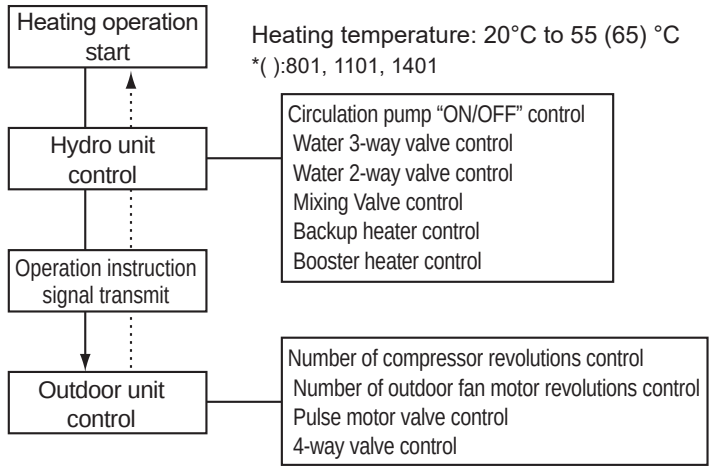
6-8-3. Labelling

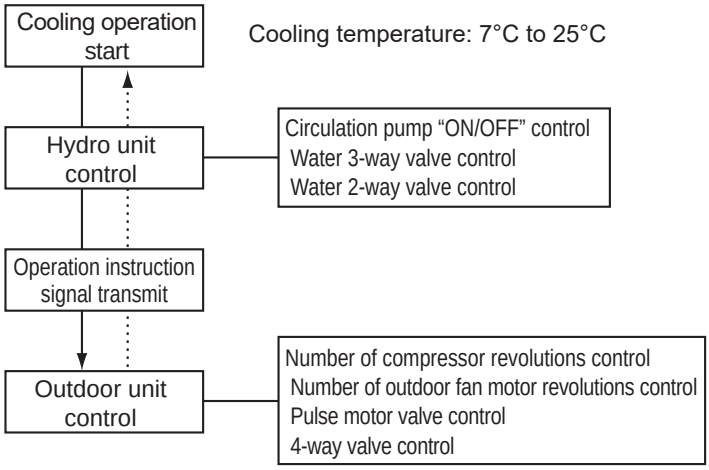
- Equipment shall be labelled stating that it has been de-commissioned and emptied of refrigerant.
- The label shall be dated and signed.
- Ensure that are labels on the equipment stating the equipment contains mildly flammable refrigerant.

7 Operational description

This chapter describes the working circuit and control of Air to Water Heat Pump about the following operations.

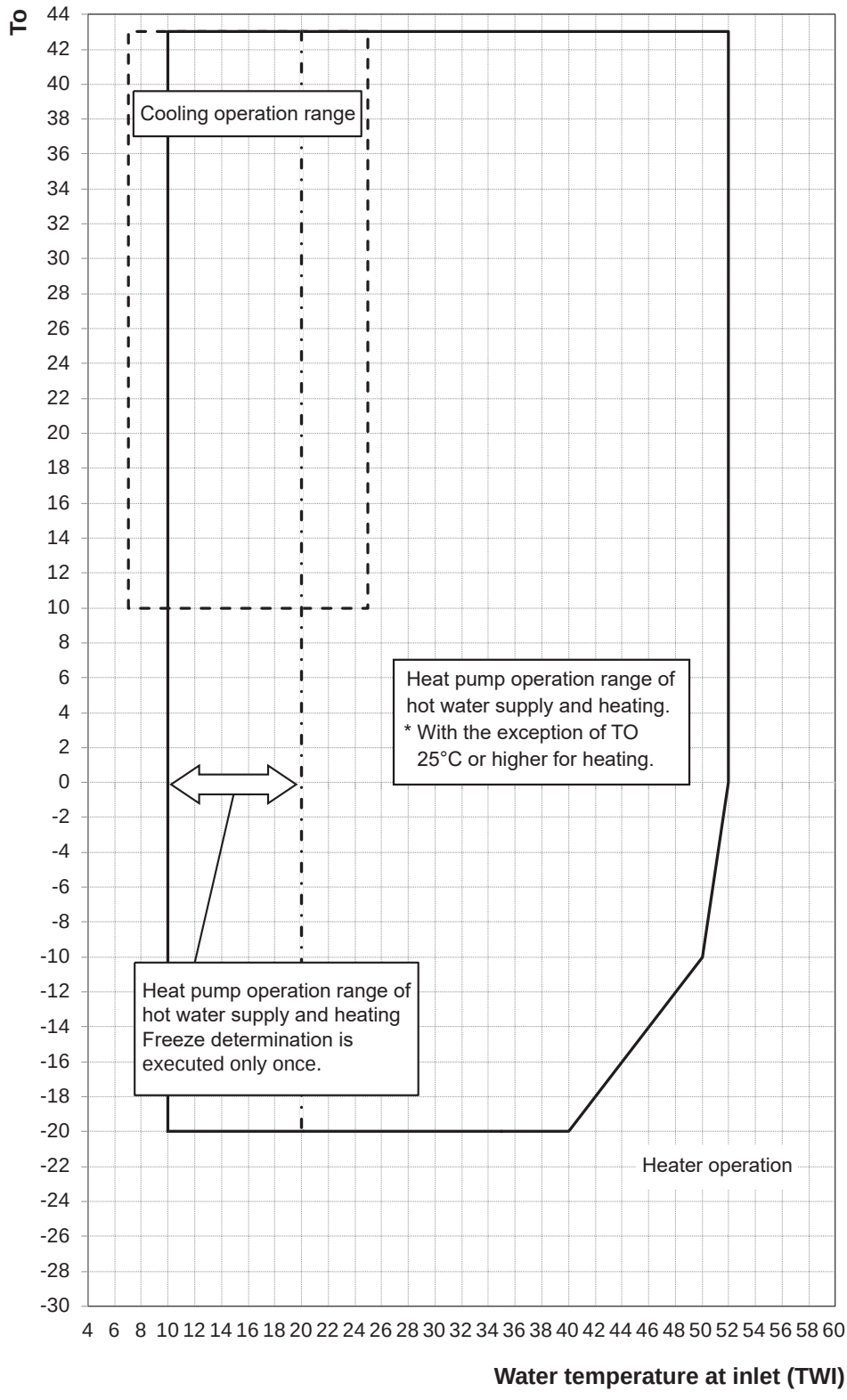
Item	Operation flow and applicable data, etc.	Operation description
7-1. Basic Operation	1) Operation control Remote controller 	1. Purpose The operations of the hydro unit and the outdoor unit are controlled according to user-defined operation condition settings. 2. Details The operation controls include those shown on the left. 3. Operations 1) An operation condition is selected with the remote controller. 2) Setting the remote controller button to "ON" transmits a signal to the hydro unit. 3) The hydro unit controller controls the operations shown on the left while also controlling the water 2-way valve, water 3-way valve, circulation pump, mixing valve, hot water cylinder heater, and backup heater. 4) The hydro unit controller transmits an operation instruction to the outdoor unit, and uses serial signals to transmit and receive control statuses. 5) The outdoor unit control unit performs the operation controls shown on the left while also controlling the compressor, outdoor fan motor, pulse motor valve, 4-way valve, 2-way valve, and bottom plate heater.

Item	Operation flow and applicable data, etc.	Operation description
7-1. Basic Operation	2) Hot water supply operation 	Hot water supply operation 1. Purpose Hot water supply 2. Details This section performs hot water supply operation according to heating conditions specified for the steps on the left. 3. Operations 1) By pressing the [F2] button on the remote controller, the hydro unit controller starts to transmit a hot water supply operation signal to the outdoor unit. 2) The hydro unit performs the operation controls shown on the left while also controlling the circulation pump, hot water cylinder heater "3WV". 3) The outdoor unit controls the compressor, outdoor fan motor, electric expansion valve, and 4-way valve based on the operation signals transmitted by the hydro unit.
	3) Heating operation 	Heating operation 1. Purpose Heating 2. Details This section performs heating operation according to heating conditions specified for the steps on the left. 3. Operations 1) By pressing the [F2] button on the remote controller, the hydro unit controller starts to transmit a heating operation signal to the outdoor unit. 2) The hydro unit performs the operation controls shown on the left while also controlling the circulation pump, backup booster heater "ON/OFF", water 2-way valve, and water 3-way valve. 3) The outdoor unit controls the compressor, outdoor fan motor, electric expansion valve, and 4-way valve based on the operation signals transmitted by the hydro unit.

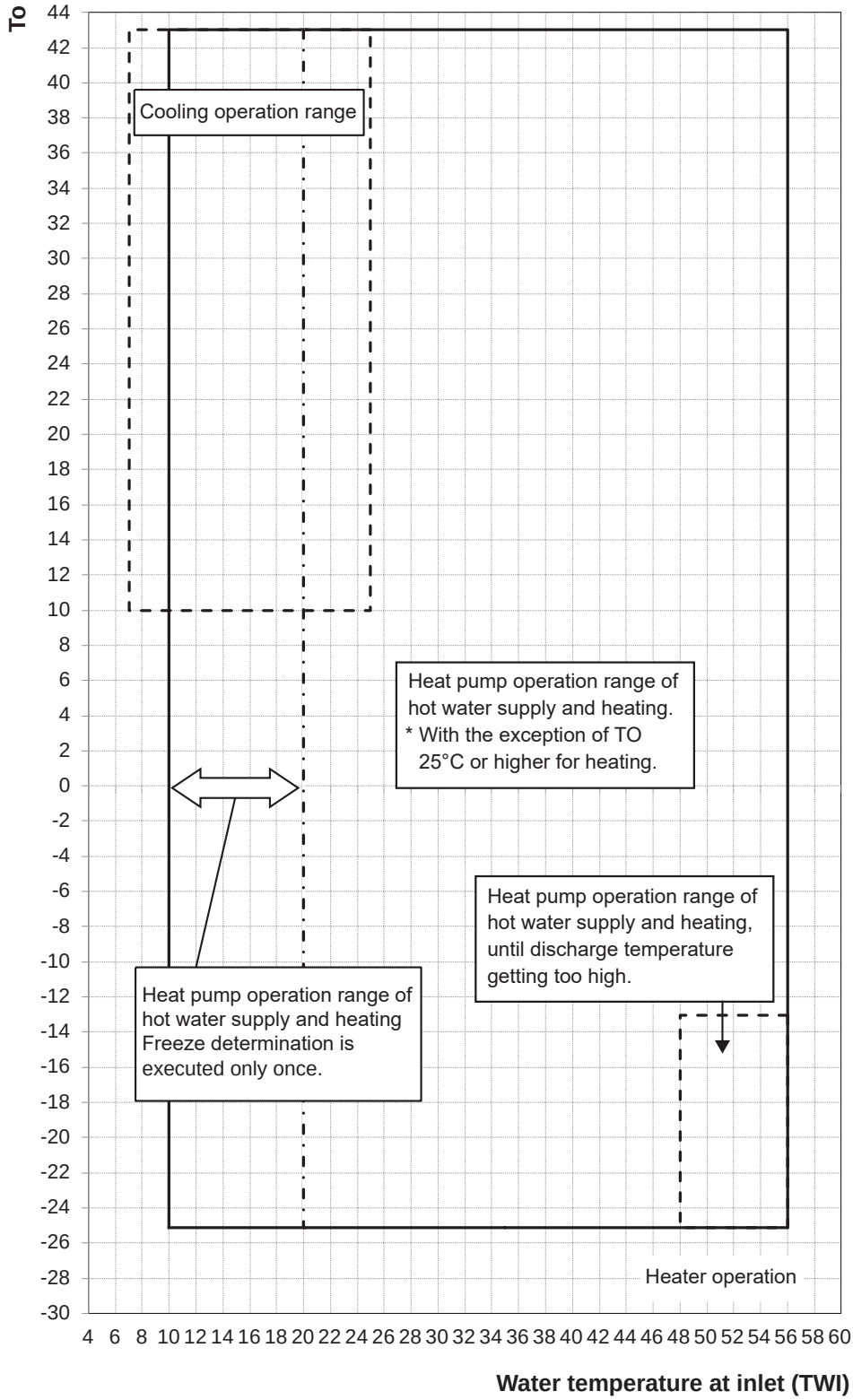
Item	Operation flow and applicable data, etc.	Operation description
7-1. Basic Operation	4) Cooling operation 	1. Purpose Cooling 2. Details This section performs cooling operation according to cooling conditions specified for the steps on the left. 3. Operations 1) By pressing the [F1] button on the remote controller, the hydro unit controller starts to transmit a cooling operation signal to the outdoor unit. 2) The hydro unit controller performs the operation controls shown on the left while also controlling the circulation pump, water 2-way valve, and water 3-way valve. 3) The outdoor unit controls the compressor, outdoor fan motor, pulse motor valve, and 4-way valve based on the operation signals transmitted by the hydro unit.

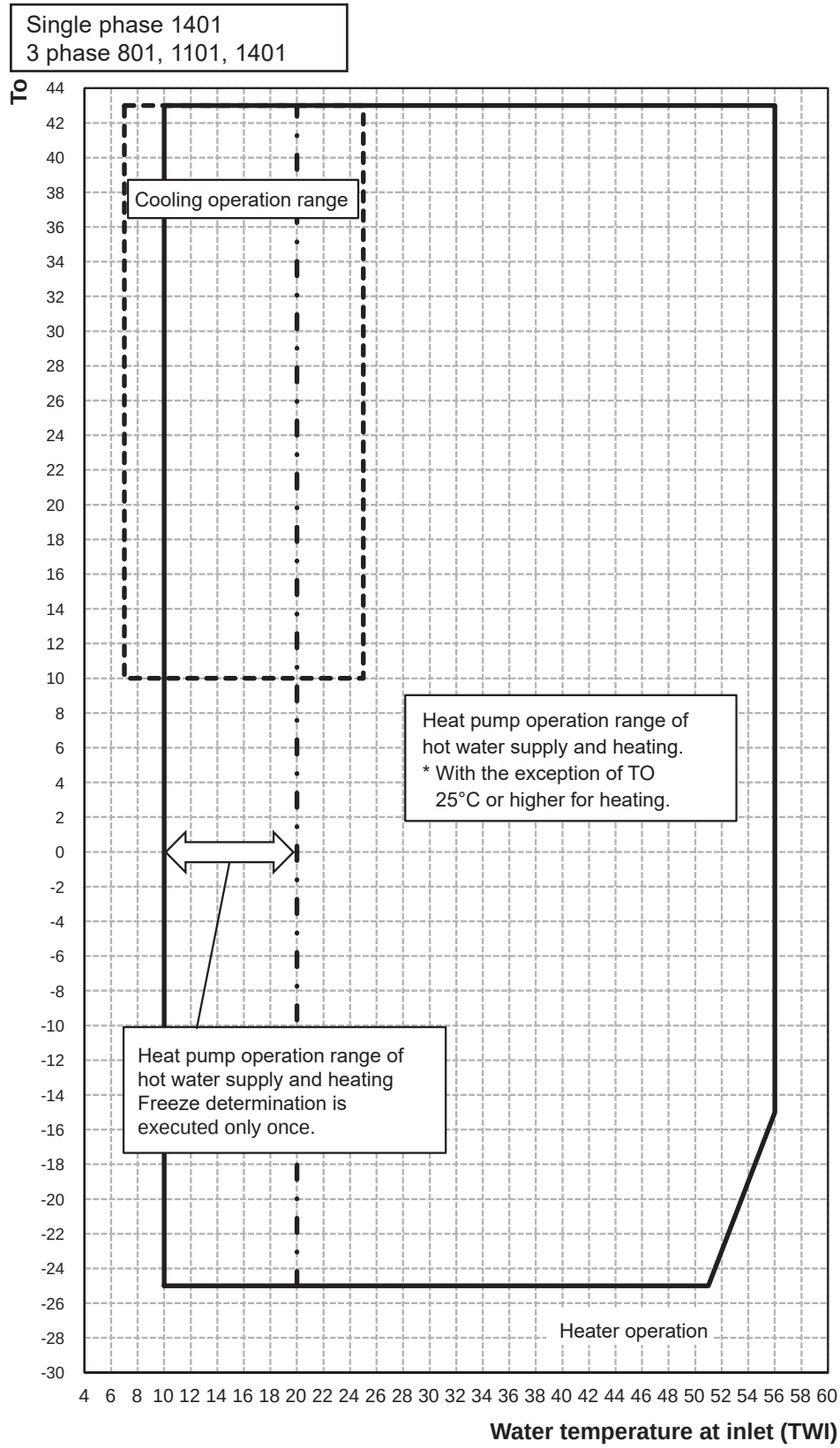
Item	Operation flow and applicable data, etc.
7-2. Operation Mode and Control Method	1) Heat pump operation range of hot water supply, heating and cooling The heat pump operation range of hot water supply, heating and cooling is shown on the figures below.

401, 601



Item	Operation flow and applicable data, etc.
7-2. Operation Mode and Control Method	Single phase 801, 1101



Item	Operation flow and applicable data, etc.
7-2. Operation Mode and Control Method	

Item	Operation flow and applicable data, etc.
7-2. Operation Mode and Control Method	The following shows the operation modes and controlled objects.

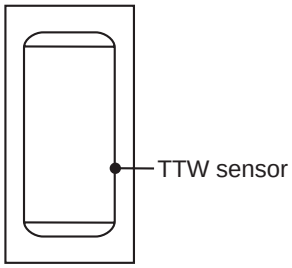
Operation mode / Controlled object	Cooling only	Heating only	Hot water supply only	Heating and Hot water both operate				Cooling and Hot water both operate			
				Heat pump select for heating		Heat pump select for hot water supply		Heat pump select for cooling		Heat pump select for hot water supply	
				Heating side	Hot water supply side	Heating side	Hot water supply side	Cooling side	Hot water supply side	Cooling side	Hot water supply side
Heat pump	O	O	O	O	×	×	O	O	×	×	O
Backup heater	×	O	×	O	×	×	×	×	×	×	×
Hot water cylinder heater	×	×	O	×	O	×	O	×	O	×	O

O Possible
× Not possible

2) Hot water supply operation

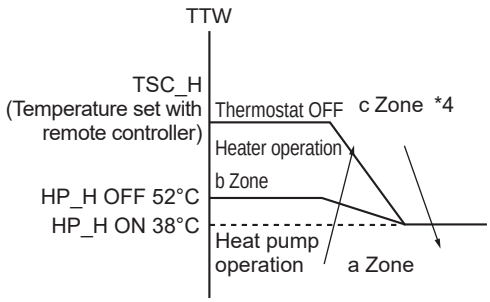
1) Operation start condition
When the [F2] remote controller button is pressed and the following operation start condition is met, the operation starts.
- TTW < 38°C is detected.

2) Operation mode determination
An operation mode is determined according to the temperature of TTW sensor.
- Heat pump operation selection *1 *2
- When TTW < 38°C (a zone in the right figure) is met, the heat pump operation is selected.
- Heater operation selection
When 52°C ≤ TTW < TSC_H (b zone in the right figure) is met, the heater operation is selected.
- Thermostat status “OFF” selection
When TTW ≥ TSC_H is met, the thermostat status “OFF” is selected.



(Hot water cylinder unit)

3) Operation stop
The operation stops in the following cases.
- The remote controller gives a stop instruction.
- TTW ≥ TSC_H is met.



TSC_H is hot water temperature set with remote controller

*1: When the outside temperature is -20 (-25) °C or below, the heater operation is selected even if the TTW temperature falls into “a zone”.
*( ):801, 1101, 1401

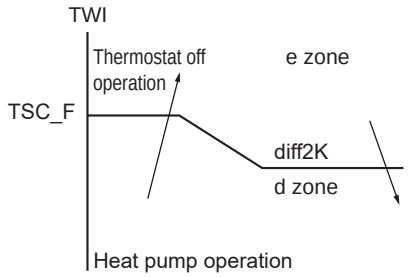
*2: When “Hot water supply” and “Heating” are simultaneously in operation, the heater operation may be selected depending on the outside air temperature.

Related DN

DN	Setting item	Default	Setting available range
1E	Upper limit of hot water supply temperature	75°C	60 - 80°C
1F	Lower limit of hot water supply temperature	40°C	40 - 60°C
20	Heat pump start temperature	38°C	20 - 45°C
21	Heat pump end temperature	52°C	40 - 65°C
24	Outside air correction start temperature for hot water supply*3	0°C	-20 - 10°C
25	Outside air correction temperature for hot water supply*3	3 degree	0 - 15 degree

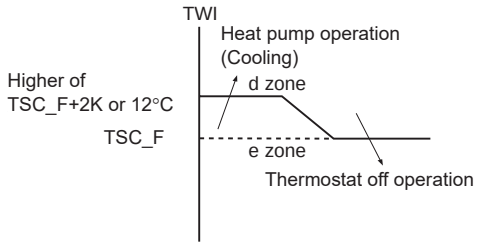
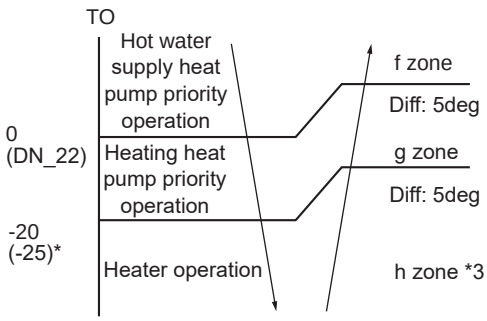
*3: When the outside temperature is 0°C or below, the boil-up temperature will be higher that setting temperature in hot water supply mode.

*4: When the hot water supply mode does not operate for certain period, to prevent water temperature drop, hot water supply mode will operate even TTW is in c Zone, it’s operation cycle is depend on DN_6AC setting (default 24H).

Item	Operation flow and applicable data, etc.
7-2. Operation Mode and Control Method	3) Heating operation <Operation only for ZONE1> • This operation is enabled when DN_6B9 is set to "0000" (default). • The remote controller displays [ZONE1] settings, and only the set temperature of [ZONE1] can be changed. <Operation for ZONE1 and ZONE2 (2 temperatures control)> • This operation is enabled when DN_6B9 is set to “0000” (default) and DN_6BA to “0001”. • The remote controller displays [ZONE1] [ZONE2] settings, and the set temperatures of [ZONE1] [ZONE2] can be changed. • To set temperatures for [ZONE1] and [ZONE2], use SELECT to switch between [ZONE1] and [ZONE2] • For 2 zone temperatures control, the flow adjustment of MIXING VALVE controls the water temperature of [ZONE2]. For details, see the description on MIXING VALVE control in 7-3-5.
	1) Operation start condition Pressing the [F1] button of remote controller starts a heating operation. *1 *2 2) Operation mode selection An operation mode is determined according to the temperature of TWI sensor. • Heat pump operation selection *1 *2 When TWI < TSC_F (d zone in the right figure) is met, the heat pump operation is selected. • Thermostat status "OFF" When TWI ≥ TSC_F (e zone in the right figure) is met, the thermostat status "OFF" is selected. 3) Operation stop condition When the following condition is met, the heating operation stops. • The remote controller gives a stop instruction.  TSC_F is a heating temperature set with remote controller
	*1: When the outside temperature is -20 (-25) °C or below, the heater operation is selected even if the TWI temperature falls into “d zone”. * ( ): 801, 1101, 1401 *2: When “Hot water supply” and “Heating” are simultaneously in operation, the heater operation may be selected depending on the outside air temperature. Related DN

DN	Setting item	Default	Setting available range
1A	Upper limit of heating (Zone1) limited temperature	55 (65)	37 - 55 (65) °C
1B	Lower limit of heating (Zone1) limited temperature	20	20 - 37°C
1C	Upper limit of heating (Zone2) limited temperature	55 (65)	37 - 55 (65) °C
1D	Lower limit of heating (Zone2) limited temperature	20	20 - 37°C

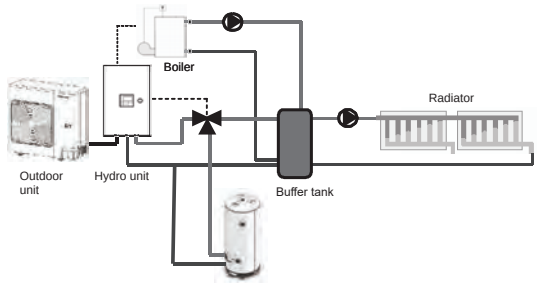
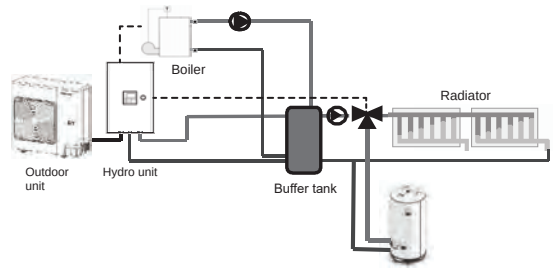
* ( ): 801, 1101, 1401

Item	Operation flow and applicable data, etc.
7-2. Operation Mode and Control Method	4) Cooling operation Pressing the [F1] button twice, starts a cooling operation. 1) Operation start condition Pressing the [F1] button twice, starts a cooling operation. 2) Operation mode selection An operation mode is determined according to the temperature of TWI sensor. • Heat pump operation selection *1 When TWI ≥ TSC_F (d zone in the right figure) is met, the heat pump operation is selected. • Thermostat status "OFF" When TWI < TSC_F (e zone in the right figure) is met, the thermostat status "OFF" is selected. 3) Operation stop condition When either of the following conditions is met, the cooling operation stops. • The remote controller gives a stop instruction. • The operation is switched to heating. *1: When the outside temperature is 10°C or below, cooling does not start even if the TWI temperature falls into "d zone". Related DN **DN** / **Setting item** / **Default** / **Setting available range** 02 / Cooling mode availability / 0 / 0: Permitted 18 / Upper limit of cooling setting temperature / 25 / 18 - 30°C 19 / Lower limit of cooling setting temperature / 7 / 7 - 20°C  TSC is a cooling temperature set with the remote controller 5) Simultaneous operations of "hot water supply" and "heating" At the time of "Hot water supply" and "Heating" simultaneous operation, the operation mode is select as follows depending on the outside air temperature. • f zone Operation with hot water supply priority A heat pump operation is performed in the hot water supply side. The heat pump maintains a supply of hot water for up to 30 minutes during a simultaneous operation. • g zone Operation with heating priority A heat pump operation is performed in the heating side, and a cylinder heater operation in the hot water supply side.  * ( ): 801, 1101, 1401 Operation mode by zone **Zone** / **Hot water supply side** / **Heating side** f / Heat pump *2 / Stop *2 g / Heater / Heat pump h / Heater *3 / Heater *3 *2: Note that after a heat pump operation for "Hot water supply" is selected in f zone, when the operation moves to a heater operation for "hot water" and then 5 minutes has passed (Hot water supply operation in b zone), the operation mode changes as follows. **Zone** / **Hot water supply side** / **Heating side** f' / Heater / Heat pump When TTW < 38°C (DN_20) is met, the operation ends f' zone and returns to f zone. *3: If the h-zone operation starts while external temperature is higher than -25°C, the h-zone operation continues for 60 minutes.

<table>
<tr><th>Item</th><th>Operation flow and applicable data, etc.</th></tr>
<tr><td>7-2.
Operation Mode and Control Method</td><td>
Related DN
<table>
<tr><th>DN</th><th>Setting item</th><th>Default</th><th>Setting available range</th></tr>
<tr><td>22</td><td>Priority mode switch temperature</td><td>0°C</td><td>-40 - 20°C</td></tr>
</table>
* Note: When user selects “hot water supply” and “ZONE1,2”, and Heat pump selects hot water supply mode, the Maximum operating time of heat pump is 30 min.

6) Simultaneous operations of "hot water supply" and "cooling"
For simultaneous operations of "hot water supply" and "cooling", basically cooling runs by a heat pump operation, and hot water supply by a heater operation.
<table>
<tr><th></th><th>Hot water supply side</th><th>Cooling side</th></tr>
<tr><td>Normal</td><td>Heater *</td><td>Heat pump *</td></tr>
</table>
* By setting DN_0F to “1”, heat pump operation for “hot water supply” is permitted. Under the setting, the heat pump runs for the hot water supply side when TTW is less than 38°C.
<table>
<tr><th></th><th>Hot water supply side</th><th>Cooling side</th></tr>
<tr><td>TTW < 38°C</td><td>Heat pump</td><td>stop</td></tr>
</table>
The operation mode returns to normal when TTW become 52°C or more (DN_21).

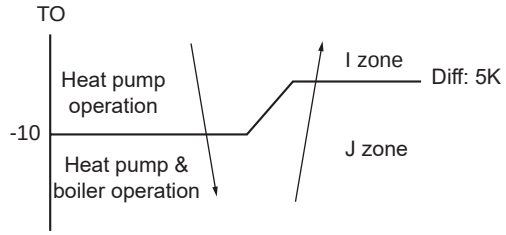
Related DN
<table>
<tr><th>DN</th><th>Setting item</th><th>Default</th><th>Setting available range</th></tr>
<tr><td>0F</td><td>Heat pump operation for hot water supply permitted / not permitted</td><td>0: Not permit</td><td>1: Permitted (Heat pump may run for hot water supply.)</td></tr>
</table>
</td></tr>
</table>

Item	Operation flow and applicable data, etc.
7-2. Operation Mode and Control Method	7) Boiler control The boiler assists the hot water supply operation and heating operation according to the boiler's position. 7-1) Boiler setting • Connect its connection cable to CN22 port on the PC board of the hydro unit. • DN_6B0 = "0/1" switches "Not using boiler (Default) / Using boiler". Set the DN_6B0 to "1" when using the boiler. • The temperature switching the boiler and heat pump: DN_23 = -10°C (Default) See the next item. The boiler output becomes effective when the outside air temperature is -10°C or less. • Boiler position setting: DN_6B1 = "0/1" must be switched in accordance with the boiler position from the 3-way valve; before the 3-way valve / after the 3-way valve and in the heating side (Default). When the DN_6B1 is set to "1", the boiler runs in the hot water supply operations or heating operation. The action of the 3-way valve depends on heat pump's action and the boiler follows their action. When the DN_6B1 is set to "0", the boiler runs in heating operation. Also, the boiler runs when the heat pump is running for heating while heating and supplying hot water simultaneously. • Priority setting between the boiler and hydro unit: DN_3E = "0/1" switches the running priority; hydro unit (Default) /boiler. When DN_3E is set to "0" (Default), the hydro unit has priority, the boiler stops as inlet water temperature reaches the hydro unit's temperature setting. When DN_3E is set to "1", the boiler continues to run even after inlet water temperature reaches the hydro unit's temperature setting. (The setting of DN_3E is effective during the HP+Boiler operation.) • Coordination setting of the boiler and heat pump: when DN_5B = "0", the boiler and heat pump runs simultaneously. When DN_5B = "1", only the boiler runs, pump ON. (However, if the external air temperature becomes the boiler-HP switching temperature or more within 60 minutes) When DN_5B = "2", the heater runs. (the heater may run instead for up to 60 minutes.) When DN_5B = "3", only the boiler runs. (Pump OFF: Default) DN_6B5 should be "0 (Default)" <Installation example> DN_6B1 = "0" (The boiler is placed after the 3-way valve and in the heating side.)  * Boiler & HP switching temp setting DN_23 = -10 ** Boiler control / functionality setting DN_5B = 0 (HP+Boiler) *** Hot water & cooling priority setting (DN_0F = "1" hot water priority is necessary.) DN_6B1 = "1" (The boiler is placed before the 3-way valve.)  * Boiler & HP switching temp setting DN_23 = -10 ** Boiler control / functionality setting DN_5B = 0 (HP+Boiler) *** Hot water & cooling priority setting (DN_0F = "1" hot water priority is necessary.)

	TO <= -10*	-10* < TO
HEATING	Boiler + HP**	HP
HOT WATER	HP	HP
HEATING & HOT WATER	Boiler for heating HP for hot water or heating	HP
COOLING	–	HP (TO ≥ 10)
COOLING & HOT WATER	HP for cooling Heater for hot water***	HP for cooling Heater for hot water***

	TO <= -10*	-10* < TO
HEATING	Boiler + HP**	HP
HOT WATER	Boiler + HP**	HP
HEATING & HOT WATER	Boiler + HP**	HP
COOLING	–	HP (TO ≥ 10)
COOLING & HOT WATER	HP for cooling Heater for hot water***	HP for cooling Heater for hot water***

Item	Operation flow and applicable data, etc.
7-2. Operation Mode and Control Method	7-2) Boiler-output control • I zone: heat pump operation Normally the heat pump operation is executed in the zone. • J zone: heat pump operation and boiler operation *1 In the zone, the heat pump + boiler operation (*2) is executed and the heater operation is executed in the hot water supply side.



*2:Operation mode is not changed with the outside temperature when an external signal to control the limit of heat pump limit operation (see 7-3-10) is input.

7-3) Boiler output limit control
The boiler power output is limited depending on the settings of boiler position (DN_6B1) and DN_62.

Boiler position (DN_6B1)	DN_62 (Activate/deactivate A02 failure detection)	Temperature range in which the boiler signal is output (Detected temperature of TWI, TWO or THO)
OFF (After 3-way valve, heating side)	0	TWI and TWO and THO < 67°C
	1	TWI and TWO and THO < 67°C
ON (Before 3-way valve)	0	TWI and TWO and THO < 70°C
	1	No limit *1

7-4) A02 failure detection while the boiler is running
A02 failure detection is deactivated depending on the settings of DN_62 and whether the boiler is installed or not (DN_6B0).

Boiler is installed or not (DN_6B0)	DN_62 (Activate/deactivate A02 failure detection)	Temperature recognized as A02 failure (Detected temperature of TWI, TWO or THO)
OFF (Not installed)	0	TWI or TWO or THO ≥ 70°C (Beep)
	1	TWI or TWO or THO ≥ 70°C (Beep)
ON (Installed)	0	TWI or TWO or THO ≥ 70°C (Beep)
	1	No failure detection *1 (No beep)

*1 If a user runs the boiler under the condition that no limit has been set, and hot water from the boiler has damaged parts inside of the hydro unit, the user is fully responsible for the damage.

7-5)2 zone temperature control while the boiler is running
2 zone temperature control by boiler with P1 OFF is required DN_6B5 OFF

Boiler is installed (DN_6B0)	ZONE2 operation is using (DN_6BA)	P2 synchronize with P1 (DN_6B5)	DN_5B Coordination of the boiler and heat pump	2 zone temperature control P1 / P2 / Mixing Valve control
ON (Installed)	ON (Using)	OFF (No synchronize, Always ON)	0 (Boiler and heat pump)	ON / ON / ON
			1 (Boiler only)	
			2 (Heater only)	
			3 (Boiler only (P1 OFF))	OFF / ON / ON
		ON (Synchronize)	0 (Boiler and heat pump)	ON / ON / ON
			1 (Boiler only)	
			2 (Heater only)	
			3 (Boiler only (P1 OFF))	OFF / OFF / OFF

Item	Operation flow and applicable data, etc.
7-2. Operation Mode and Control Method	Related DN

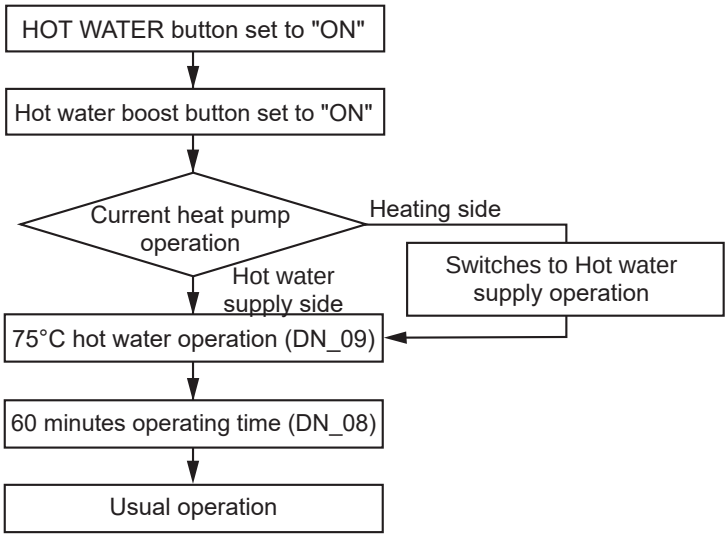
DN	Setting item	Default	Variable range
23	Boiler-heat pump switching temperature	-10°C	-20 - 20°C
3E	Control priority between the hydro unit and boiler (Control valid for operating heat pump mode)	0: Hydro unit control	Independent temperature control for the hydro unit and boiler
5B	Coordination of the boiler and heat pump	3: Boiler only (Pump OFF)	0: Boiler and Heat pump 1: Boiler only 2: Heater only
62	Activate/deactivate A02 failure detection	0: Activate	1: Deactivate

8) Hot water boost operation

A Hot water boost operation heats the water quickly to the set temperature TSC_H = 75°C (DN_09).

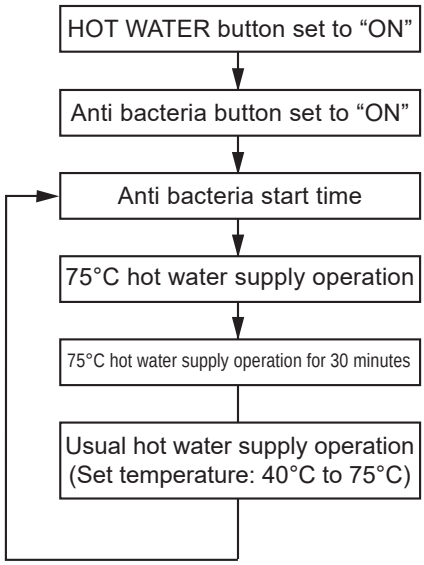
1) How to operate

- When hot water boost “ON” after pressing the remote controller [F2] button, a heat pump operation in progress in the heating side switches to in the hot water side, and continues the operation regardless of the hot water supply start condition, TTW < 38°C. In addition, the hot water cylinder heater is immediately energized to start a Hot water supply operation under TSC_H = 75°C.
- A Hot water boost operation returns to the usual operation after 60 minutes passed or reached 75°C.
- The remote controller display during a Hot water boost operation is the same as the set temperature display of a usual Hot water supply operation.
- The usual set temperature change is used for changing the set temperature during a Hot water boost operation. Change the BOOST set temperature with DN_09, if necessary.



Related DN

DN	Setting item	Default	Setting available range
09	Hot water boost set temperature	75°C	40 - 80°C
08	Hot water boost operation time	60 min	30 - 180 min Every 10 min

Item	Operation flow and applicable data, etc.
7-2. Operation Mode and Control Method	9) Anti bacteria operation An Anti bacteria operation regularly performs a Hot water supply operation with the set temperature TSC_H = 75°C (can be set with DN_0A). 1) How to operate • Pressing the [F2] button and then the remote controller Anti bacteria "ON" changes the setting to TSC_H = 75°C at the set cycle and time (both can be set with the remote controller DN) to start Anti bacteria operation. • The first Anti bacteria operation starts when press the Anti bacteria "ON" and starting time come. • When the set temperature 75°C is reached after the Anti bacteria operation started, the set temperature remains another 30 minutes (can be set with DN_0B). • The priority zone determined by the outside temperature selects an operation, Hot water heat pump or hot water supply heater. • The hot water heat pump operation, when selected, ignores the hot water supply start condition (TTW < 38°C) and forcibly performs a hot water operation. • During Anti bacteria operation (Forcible hot water operation at 75°C), the hot water set temperature display is not changed. If it is changed from the remote controller, the normal hot water set temperature will be changed.  **⚠ Caution** • During a 75°C hot water supply operation with Anti bacteria, the remote controller does not display 75°C. • Be careful not to burn yourself; Output water may be hotter than that displayed on the remote controller. Related DN

DN	Setting item	Default	Setting available range
0A	Anti bacteria set temperature	75°C	65 - 80°C
0B	Anti bacteria holding time	30 min	0 - 250 min
Remote controller 0C	Anti bacteria start time	22:00	0:00 - 23:00
Remote controller 0D	Anti bacteria operation cycle	7 days	Every day to 10 days

Item	Operation flow and applicable data, etc.
7-2. Operation Mode and Control Method	10) Night setback operation A Night setback operation performs heating at 5K lower and cooling at 5K higher temperatures against the remote controller set temperature from the setting start time (22:00) to the end time (6:00) every day. **Note)** • Set the remote controller time before starting a Night setback operation. • The set time can be changed with remote controller DN. (See 9-8) Related DN

DN	Setting item	Default	Setting available range
Remote controller 0E	Night setback start Time setting	22:00	0:00 - 23:00
Remote controller 0F	Night setback end Time setting	6:00	0:00 - 23:00
26	Night setback setting Temperature width	5 degree	3 - 20 degree
58	Night setback setting activate	0. Zone 1 & 2	1. Zone 1 only

11) Frost protection operation
A Frost protection operation performs heating at the set temperature RSC_F = 15°C (DN).

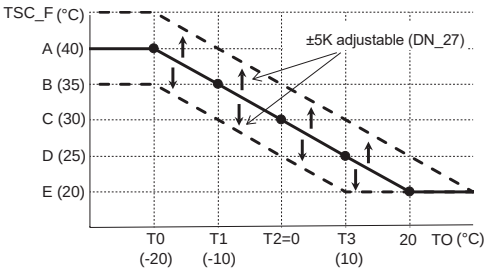
1) How to operate
- Pressing the remote controller [F1] button and then Frost protection “ON” starts a heating operation at the set temperature of 15°C.
- Set Frost protection “OFF” cancels the Frost protection operation.
- The remote controller displays "F" as the temperature during Frost protection.
- A set temperature change during a Frost protection operation cancels the operation.

2) Automatic stop of Frost protection operation
- The operation period of Frost protection can be set at DN_12 and 13 on the remote controller.
  Longest period available: 20 days and 23 hours
- By entering the operation period (day and hour) at DN_12 and 13 on the remote controller and set Frost protection “ON”, the operation period is set and the Frost protection operation will automatically be finished after the period has passed.
- The operation period setting (day and hour) is stored in the memory.

Related DN

DN	Setting item	Default	Setting available range
3A	Frost protection Yes / No	1: Yes	0: No
3B	Frost protection Set temperature	15°C	8 - 20°C
12 (Remote controller)	FROST running period (days)	0	0 - 20 days
13 (Remote controller)	FROST running period (hours)	0	0 - 23 hours

Item	Operation flow and applicable data, etc.
7-2. Operation Mode and Control Method	12) Auto operation An Auto operation sets the water temperature TSC_F depending on the outside air temperature TO. 1) How to operate • Pressing the remote controller [F1] button and then setting Auto mode "ON" starts Auto operation for heating. • During an Auto operation, setting Auto mode "OFF" returns to the usual manual set heating operation. • The remote controller displays "A" as the temperature during an Auto operation. (When 2-temperature control is enabled, the remote controller displays "A".) • Long-pressing the [F1] button in menu display activates the Auto-Curve DN change mode, enabling the set Auto-Curve water temperature to be shifted by ±5K range (DN_27). When using the auto curve shift function please note the maximum and minimum water temperature at 55 (65) °C and 20°C respectively. * ( ): 801, 1101, 1401 • Even if the temperature setting is changed during an Auto operation, the operation continues. • An Auto operation works with a heating operation only, not with a cooling or a hot water supply operation. <ZONE1> • An operation starts at the set temperature of straight -line approximation for the following: water temperature A°C with the outside temperature T0°C, B°C with T1°C, C°C with T2°C, D°C with T3°C, and E°C with 20°C.



Related DN

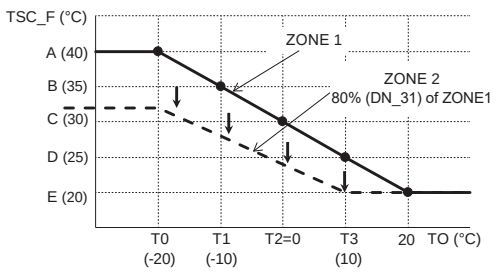
DN	Setting item	Default	range
2C	Setting temperature A at T0	40	20 - 55 (65) °C
2D	Setting temperature B at T1	35	20 - 55 (65) °C
2E	Setting temperature C at T2 (= 0°C)	30	20 - 55 (65) °C
2F	Setting temperature D at T3	25	20 - 55 (65) °C
30	Setting temperature E at 20°C	20	20 - 55 (65) °C
A1	Outside temperature T0	-20	-30 - -20°C
29	Outside temperature T1	-10	-15 - 0°C
2B	Outside temperature T3	10	0 - 15°C
27	Set temperature shift with heating set to auto	0	-5 to 5K

* ( ): 801, 1101, 1401

<ZONE2>
• Set temperature of the ZONE2 can be selected from two methods (DN_A2). One is a percentage of ZONE1, the other is a fixed value.

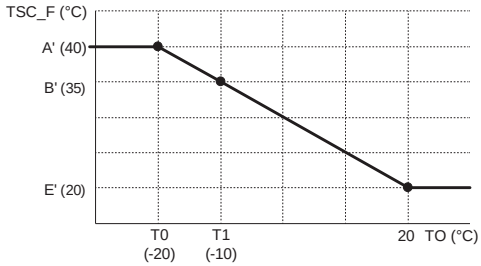
DN_A2 = "0": Percentage method that is set by DN_31.
DN_A2 = "1": Fixed value method that is set by DN_A3, A4 and A5.
However, it is automatically controlled the set temperature of ZONE1 to be the ZONE2 or more.

DN_A2 = 0 Percentage method



Auto-Curve in ZONE2 shows 80% (DN) of that of ZONE1, the water temperature setting does not fall below 20°C.

DN_A2 = 1 Fixed value method



The ZONE2 set temperature A'°C with the outside temperature T0°C, B'°C with T1°C, E'°C with 20°C.

Related DN

DN	Setting item	Default	range
A2	The choice of how to set ZONE2	0	0 or 1
A3	Setting temperature A' at T0	40	20 - 55 (65) °C
A4	Setting temperature B' at T1	35	20 - 55 (65) °C
A5	Setting temperature E' at 20 °C	20	20 - 55 (65) °C
31	Auto-Curve ratio of ZONE2	80	0 - 100%

* ( ): 801, 1101, 1401

Item	Operation flow and applicable data, etc.
7-2. Operation Mode and Control Method	13) Night time low-noise operation A night time low-noise operation reduces operation frequency and the number of outdoor fan rotations for a certain period during night time as noise control for urban operation.

Single phase (outdoor unit)	401		601		801		1101		1401			
									Mode1 (default)		Mode2	
	Heating/ Hot water supply	Cooling	Heating/ Hot water supply	Cooling	Heating/ Hot water supply	Cooling	Heating/ Hot water supply	Cooling	Heating/ Hot water supply	Cooling	Heating/ Hot water supply	Cooling
Compressor Hz	42.6	50.4	55.2	50.4	56.4	48.0	64.2	48.0	42.0	44.4	52.8	51.0
FAN rpm	320	400	320	400	410	540	410	540	450	600	450	600

3 phase (outdoor unit)	801				1101				1401			
	Mode1 (default)		Mode2		Mode1 (default)		Mode2		Mode1 (default)		Mode2	
	Heating/ Hot water supply	Cooling	Heating/ Hot water supply	Cooling	Heating/ Hot water supply	Cooling	Heating/ Hot water supply	Cooling	Heating/ Hot water supply	Cooling	Heating/ Hot water supply	Cooling
Compressor Hz	36.6	33.6	39.0	37.2	36.6	37.2	39.0	44.4	42.0	44.4	52.8	51.0
FAN rpm	450	600	450	600	450	600	450	600	450	600	450	600

* When ambient temperature is very low, compressor frequency and fan rotations will get to high for prevention the product damage.

The night time low-noise operation is enabled / disabled by changing the remote controller DN_09.

<How to set> - Refer to “9-11. Night time Low-noise Setting”.

Select “Silent mode” in menu display, and set to “ON”.

Mode 2 cannot be set for the following models. (Single phase outdoor unit 401, 601, 801, 1101).

The night time low-noise operations mode1 / mode2 can be changed by using DN_6FC.

0:mode1, 1:mode2

7-3. Hydro Unit Control

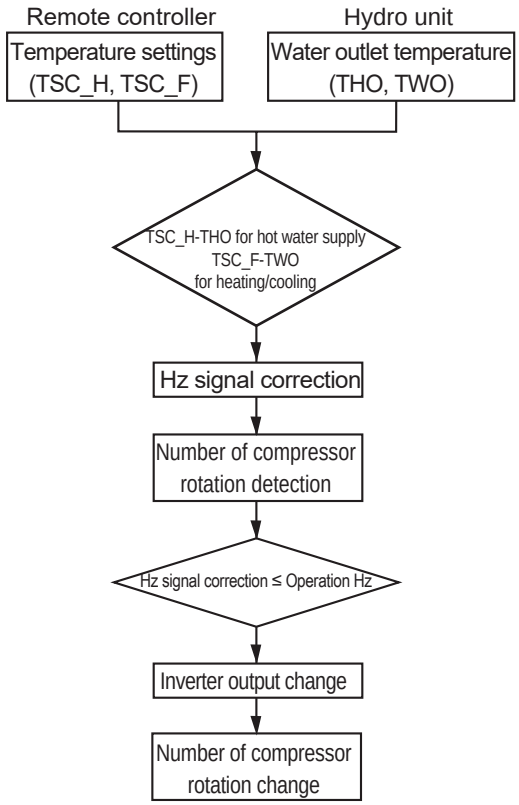
1) Capacity control (compressor, high-temperature release, low-temperature release)

This unit controls the compressor frequency and heater output so that the water outlet temperature matches the remote controller set temperature.

1-1) Compressor control

- Calculates the different between the remote controller set temperature (TSC_H, TSC_F) and the water outlet temperature (Hot water supply: THO, Heating: TWO).
- Sets the Hz signal correction amount that determines the number of compressor rotations by the temperature difference.
- Detects the number of compressor rotations.
- Compares the Hz signal correction amount and the current operation Hz, and changes the compressor output according to the difference.

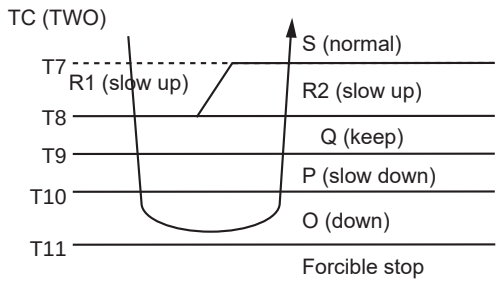
* The control details are the same for hot water supply, heating, and cooling.



Single phase outdoor unit	Compressor frequency changeable range
401	10 Hz to 80 Hz
601	10 Hz to 99 Hz
801	10 Hz to 89 Hz
1101	10 Hz to 99 Hz
1401	10 Hz to 82 Hz

3 phase outdoor unit	Compressor frequency changeable range
801	10 Hz to 53 Hz
1101	10 Hz to 68 Hz
1401	10 Hz to 82 Hz

Item	Operation flow and applicable data, etc.
7-3. Hydro Unit Control	1-2) Low temperature release control A heat pump operation is performed as shown in the table below according to the TC sensor detecting temperature. • For the detected temperature, TC = TWO of a heat pump operation is used. The values of T7 through T10 varies depending on TWI. (See the table below) • If the compressor frequency instruction from the hydro unit is less than 10 Hz, the compressor stops. • TC < 3°C causes the compressor to stop abnormally. When the compressor restarts when 140 seconds has passed after the stop and TC < 3°C is not detected for 20 minutes, the abnormal stop counter is cleared. 10 times of compressor abnormal stop stops the operation of heat pump, and fault code A11 is displayed on the remote controller. * If the heat pump operation is switched to other operation, the abnormality detection counter is reset to 0.

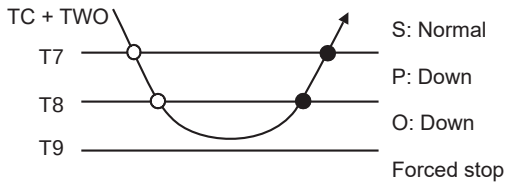


Zone	Control operation
R1	Increase compressor frequency by 0.8 Hz every 60 sec.
R2	Increase compressor frequency by 0.4 Hz every 60 sec.
O	Decrease compressor frequency by 4.5 Hz every 10 sec.
P	Decrease compressor frequency by 2.4 Hz every 10 sec.
Q	Keep compressor frequency.

TC = TWO (°C)

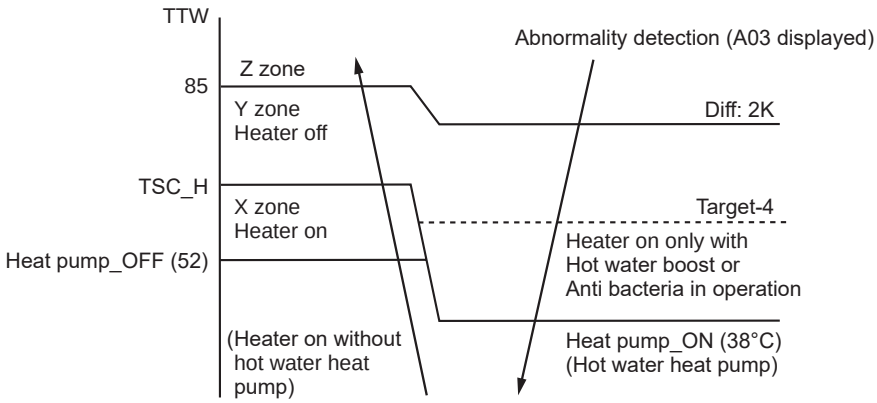
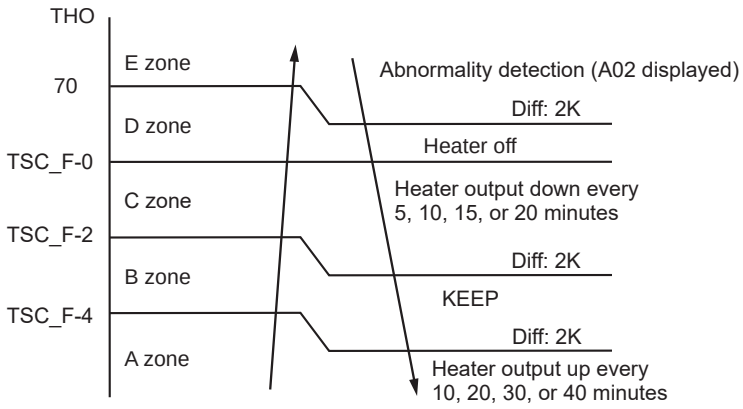
TWI	T7	T8	T9	T10	T11
TWI < 10	8.0	6.0	4.0	3.0	2.5
10 ≤ TWI < 15	8.5	6.5	4.5	3.5	2.5
15 ≤ TWI < 20	9.0	7.0	5.0	4.0	2.5
20 ≤ TWI	9.5	7.5	5.5	4.5	2.5

1-3) Freeze release control (TC + TWO release control)
For freeze prevention, the compressor is controlled during cooling operation as shown in the table below according to the calculated values of TC and TWO.
• If TC + TWO falls below -15 for a total of 10 times, the compressor stops abnormally and fault code A10 is displayed on the remote controller.
• When cooling operation has lasted normally for 10 minutes, the abnormality detection counter is reset to 0.



Zone	Control operation
S (normal)	Normal cooling operation
P (slowdown)	Decrease compressor frequency by approx. 2.0 Hz every 10 sec.
O (down)	Decrease compressor frequency by approx. 4.5 Hz every 10 sec.
(Forced stop)	Stop the compressor.

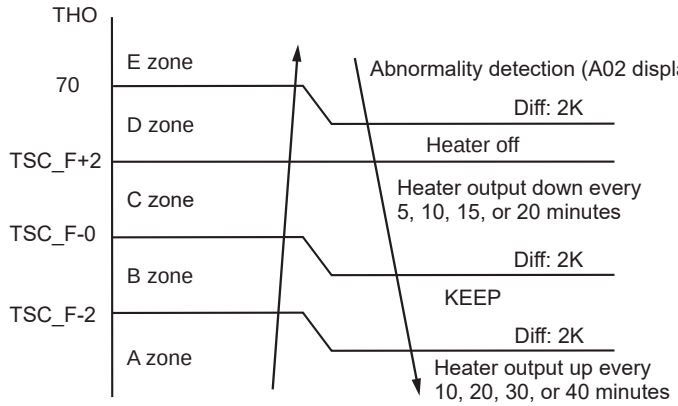
	T7	T8	T9
TC + TWO	6.0	4.0	-15

Item	Operation flow and applicable data, etc.
7-3. Hydro Unit Control	2) Heater control 2-1) Hot water supply operation During a hot water heat pump operation, the unit energizes the hot water cylinder heater (2.7 kW) when any of following conditions are met. Note that when the hot water supply set temperature (TSC_F) is reached, the unit stops energizing the heater. • When 120 minutes has passed after the hot water heat pump operation started. • The water inlet temperature (TWI) reaches 52 (56) °C. *( ):801, 1101, 1401 • The hot water cylinder sensor reaches the HP_OFF temperature (52°C-DN). • The HP_ON temperature (38°C-DN) is reached without the hot water HP status. • Hot water boost operation is in progress.  2-2) Heating operation 1) Heater control at the time of heat pump operation • Object to be controlled: Backup heater The backup heater control starts when 13 minutes has passed after the heating heat pump operation started and select the ZONE (A-D). The backup heater control increases, decreases, or maintains the number of heaters every 10 minutes (DN) depending on the difference between the heating set temperature (TSC_F) and the heater outlet temperature (THO). When the heating set temperature (TSC_F) is reached, the hydro stops energizing the backup heater.  (1) HWT-**M3W-E model has the backup heater 1 of 3 kW only. (2) HWT-**T6W-E model has the backup heater 2 of 3 kW. (Total 6 kW) • Restriction of backup heater energization during heating mode (For energy saving) When outdoor temperature is higher than the reference valve, the backup heater is forcibly off during heating mode. Related DN

Status	Heater ON/OFF
Heater 1	Backup-heater 3 kW = ON
Heater 2	Backup-heater 6 kW = ON
Heater 3	Backup-heater 9 kW = ON

DN	Setting item	Default	Setting available range
B8	Forcibly heater off at TO ≥ A°C	no restriction	-5 - 20°C

Item	Operation flow and applicable data, etc.
7-3. Hydro Unit Control	2) Control at the time of heating heater operation • Controlled Object: Backup heater, Booster heater The backup heater control starts when 3 minutes has passed after the heating heater operation started. The backup heater control increases, decreases, or maintains the number of heaters every 10 minutes (DN) depending on the difference between the heating set temperature (TSC_F) and the heater outlet temperature (THO). Note that when the heating set temperature (TSC_F) +2K is reached, the unit stops energizing the heater.



Status	Heater ON/OFF
Heater 1	Backup-heater 3 kW = ON
Heater 2	Backup-heater 6 kW = ON
Heater 3	Backup-heater 9 kW = ON
Heater 4	Heater 3 + Booster heater

HWT-**M3W-E model has the backup heater 1 of 3 kW only.
HWT-**T6W-E model has the backup heater 2 of 3 kW. (Total 6 kW)
Booster heater operation come only output signal. (Booster heater activate under heater only mode).

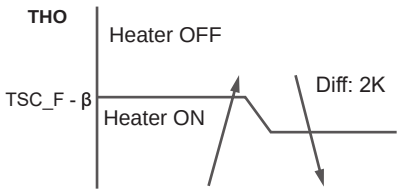
Related DN

DN	Setting item	Default	Setting available range
20	Hot water supply heat pump start temperature	38°C	20 - 45°C
21	Hot water supply heat pump stop temperature	52°C	40 - 65°C
33	Heater control of down time	1:10 min	0: 5 min 2: 15 min 3: 20 min
34	Heater control of up time	0:10 min	1: 20 min 2: 30 min 3: 40 min

2-3) Heater control at the time of defrosting
• Object to be controlled: Backup heater
When a defrosting operation starts during the heating heat pump operation, the unit energizes a backup heater (3 kW) according to the heater outlet temperature sensor (THO) and the set temperature (TSC_F) as shown in Figure.

1) When the heater outlet temperature sensor (THO) drops to the temperature of 2°C below the TSC_F-β, the backup heater is energized.
β can be changed for energy saving.

Defrosting ends according to the usual heater control.



Status	Heater ON/OFF
Heater 1	Backup heater 3 kW = ON

Related DN

DN	Setting item	Default	Setting available range
B8	β: 0 = 0K, ..., 4 = 40K Recommendation: β = 2 (20K)	0K	0K - 40K

2-4) Forcible heater energization
To prevent freeze, the unit energizes or stops energizing a backup heater (3 kW) regardless of the unit status, not operated or in operation.
• Object to be controlled: Backup heater
1) Energization start condition: TWO < 4 or TWI < 4 or THO < 4
2) Energization stop condition: TWO ≥ 5 and TWI ≥ 5 and THO ≥ 5
Defrosting ends according to the usual heater control.

Item	Operation flow and applicable data, etc.
7-3. Hydro Unit Control	2-5) No heater operation According to the DN setting, the unit switches the energize / not energize for the hot water cylinder, backup heater, and booster. For details, see 9-1. (Caution) All heater should be added to this Air to water system. The system has been designed to operate with all electrical heaters energized.

3) Circulation pump controlObject to be controlled: Backup heater

One circulation pump (external circulation pump P2) can be connected to the unit in addition to the built-in circulation pump P1.

You can change the settings of the built-in pump P1 and the external circulation pump P2 using DN_5A, DN_6D0, DN_6B5, DN_6D1.Defrosting ends according to the usual heater control.

Item	Operation	Initial value
Circulation pump Related DN	5A: Built-in circulation pump P1's action during hot water supply operation: HP operation only / Always energized	0: HP operation only
	6D0: Built-in circulation pump P1's action during heating operation: Always energized / Turned off when TO sensor detect over than 20°C.	0: Always energized
	6B5: External circulation pump P2's action: Non-synchronous / Synchronous with the built-in circulation pump P1	0: Non-synchronous
	6D1: Built-in circulation pump P1 ON/OFF cycling (During long periods of system off)	0: None

If the external circulation pump P2 is set to Non-synchronous, the pump P2 is always energized.

3-1) Controlling the built-in circulation pump P1

The pump operation starts under the condition below:

- When the [F2] or [F1] button is pressed.
- The pump speed changes to adjust the water flow rate. Pump speed control period is 1 [sec].

Basic flow rate

Heating / Hot water supply: FLrH = Capacity / 5 * 60 / 4.15 [L/min]
Cooling: FLrC = Capacity / 5 * 60 / 4.19 [L/min]

	Heating capacity [kW]	Hot water suuply capacity[kW]	Cooling capacity [kW]	Minimum flow rate	
				Heating/Hot water supply mode[L/min]	Cooling/Defrost mode[L/min] *
401	4.0	4.0	4.0	5.5	11.0
601	6.0	4.0	5.0	5.5	11.0
801	8.0	8.0	6.0	6.0	14.0
1101	11.0	8.0	8.0	6.0	14.0
1401	14.0	14.0	10.0	6.0	18.0

* See the pump Q-H characteristic. Design the water pipe length within the characteristic of the pump.

Target flow rate is finally determined with considering the correction according to ambient temperature and other operation condition. And, target flow rate can be corrected by DN_6A7 setting, for example, considered pump operation noise.

The minimum target value (FL_min): (Minimum flow rate) + 2 [L/min]
The maximum target value (FL_max): 33 [L/min] 401, 601, 1101
40 [L/min] 1401

When set DN_6A6 to "0000", pump speed is fixed, it's speed is depend on DN:A0 setting.

DN	Setting item	Default	Setting available range
6A6	Pump speed control	0000: Fixed speed 0001: Variable speed	0001: Variable speed
6A7	Pump speed control correction	0000: 100% 0001: 90% 0002: 75% 0003: 50%	0000: 100%

DN code A0	Pump flow rate
0 (Default)	100%
1	90%
2	80%
3	70%
4	60%
5	50%

Item	Operation flow and applicable data, etc.
7-3. Hydro Unit Control	Example of pump speed control (heating and hot water supply mode including defrost operation)

Item	Status
Target flow rate	FL_max Heating target considered TO X°C Heating target considered TO Y°C Hot water supply target FL_min 0 L/min
Defrost	ON OFF
Heating	Compressor ON Comp. OFF / Thermostat OFF Operation STOP
Hot water supply	Compressor ON Comp. OFF / Heater operation Operation STOP
Ambient temperature	TO: X°C TO: Y°C

When the target flow rate is changed, pump speed changes slowly in actual working, it is because of considering for noise by pump speed changing quickly.

3-2) Controlling the built-in circulation pump P1 during the hot water supply operation
You can change the action of the built-in circulation pump P1 during the hot water supply operation using DN_5A.
- DN_5A = “0” (Default): The pump stops as the HP for hot water supply stops.
- DN_5A = “1”: The pump is always energized.

3-3) Controlling the built-in circulation pump P1 during the heating operation
You can change the action of the built-in circulation pump P1 during the heating operation using DN_6D0.
- DN_6D0 = “0” (Default): The pump is always energized.
- DN_6D0 = “1”: The pump stops when To ≥ 20°C. (Practically the HP for heating is turned off.)

3-4) Synchronized external circulation pump P2
Pump type: DC motor, rated voltage 220-240 V, connectable directly up to 200W rated power output.
You can select whether the pump P2 is synchronized with the pump P1 using DN_6B5. The pump P2 is always energized if the pump P2 is not synchronized.
- DN_6B5 = “0” (Default): Non-synchronous

NOTE:
2 zone temperature control by boiler with P1 OFF is required DN_6B5 OFF

3-5) Controlling the external circulation pump P2
You can change the action of the external circulation pump P2 during cooling operation by setting DN_64.
- DN_64 = “00” (Default): The pump is always energized.
- DN_64 = “01”: The pump is always stopped.

Item	Operation flow and applicable data, etc.
7-3. Hydro Unit Control	3-6) Controlling the built-in circulation pump P1 during cooling operation controlled with the room temperature thermostat or room temperature remote controller. You can change the action of the built-in circulation pump P1 by setting DN_65. • DN_65 = “00” (Default): The pump is always energized. • DN_65 = “01”: The pump is stopped when the thermostat is turned off. 3-7) Interval operation of the pump P1 during thermostat off operation (For energy saving) The pump of the hydro unit performs intermittent operation according to the outdoor temperature during thermostat off (compressor off) operation. **NOTE:** When boiler is installed (DN_6B0 = “1”), do NOT set intermittent operation or do NOT set the valve of A (DN_BA) lower than the Boiler-heat pump switching temperature (DN_23). A, lower limit of TO during the heating operation, must be higher than the Boiler-heat pump switching temperature. Because when TO is lower than the Boiler-heat pump switching temperature, the boiler output is ON state. But if the pump stops due to the intermittent operation, the boiler output is also turned OFF. Related DN

DN	Setting item	Default	Setting value
5A	Control of the pump P1 during the hot water supply operation	0: synchronized with HP	1: Always energized
64	Control of the pump P2 during in cooling operation	0: Always ON	1: Always stopped
65	Control of the pump P1 while using the room temperature control or room temperature thermostat	0: Always ON	1: Stopped when the thermostat is OFF
9E	Turn off the P1 when TO sensor detect over than this temperature	20°C	10 - 30°C
6E	Pump P1 restart diff TO sensor temperature, when turn off the P1 by to sensor detection.	2: 2K	1 - 5K
BA	intermittent operation at TO ≥ A°C (heating)	0: continuous operation	-5 - 20°C
BB	intermittent operation at TO < B°C (cooling)	0: continuous operation	25 - 35°C

Item	Operation flow and applicable data, etc.
7-3. Hydro Unit Control	4) Control by the flow sensor Whether water flows or not is judged with the valve of water flow sensor. Without water-flow determination from the flow sensor after the hot water supply operation, heating operation, or cooling operation, The HP, backup heater and booster heater are not energized. Similarly, the “A01” failure indication flashes if the flow sensor judged that water does not flow. The specification of the flow sensor is the same in all model. The flow setting differs due to the specification of piping in the hydro unit.

5) Mixing Valve control (2-temperature heating control)

To set different radiator unit supply temperatures or floor heating supply temperatures, the unit performs Mixing Valve control.

When Mixing Valve "Yes" is selected, the unit controls Mixing Valve every 2 minutes (DN) based on the difference TSC_ΔT between the Zone2 set temperature and TFI (floor inlet water temperature sensor) temperature as follows:

TSC_ΔT	2 < TSC_ΔT	-2 ≤ TSC_ΔT ≤ 2	-2 > TSC_ΔT
Control value	+ 1 step (Open)	± 0 step	- 2 step (Close)

Initial value	Driving range	1 step	Control cycle
0	0 - 24	3 WV move 3.75 degrees	2 min (DN)

To enable 2 zone temperature control switch change DN_6BA to “1”.

NOTE:

The mixing valve will automatically be reset if 24 hours pass with the valve fully closed.

2 zone temperature control by boiler with P1 OFF is required DN_6B5 = “0”.

Related DN

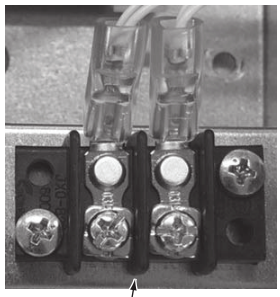
DN	Setting item	Default	Setting available range
0C	Mixing Valve operation time	60	30 - 240 sec
59	Mixing Valve control time	2	30 sec, 1 - 30 min

6) Room temperature control

You can install a sub remote controller (separately purchased) in a room to control room temperature.

6-1) Installing the sub remote controller

- Wiring with the main unit (See the figure on the right): After detaching the front panel, connect the sub remote controller to the right terminal on the main remote controller, which is connected with the hydro unit. (No polarity)
- Place to install (inside a room): At the height of 100 cm - 150 cm on a wall Opposite to the radiator or fan coil installed
  No assignment when floor heating is used on the room.

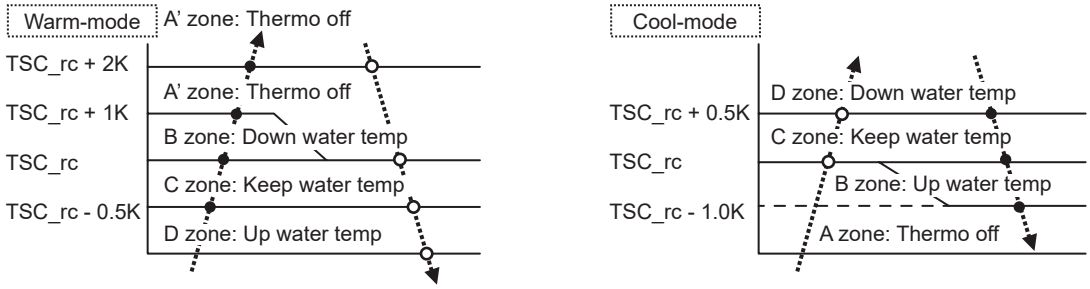


Right terminal on the main remote controller

6-2) Room temperature control settings

- Set one of remote controller as the header remote controller.
  (Remote controller of Hydro unit is preset as Header.)
  You can set “Header / Second” in “Initial setting” on the setting screen.
- Set DN_40 to “1” to control room temperature instead of water temperature.
- Set the “Temperature control” to “ON” in Initial setting MENU with the remote controller to control room temperature.

Item	Operation flow and applicable data, etc.
7-3. Hydro Unit Control	6-3) Control method • The water temperature setting at starting operation is 40°C (DN_9D) at heating and 20°C (DN_96) at cooling. If the temperature setting calculated by Auto curve at starting operation will be used instead of the fixed temperature 40°C (DN_9D), DN_B5 should be set to "1". • The target water outlet temperature is adjusted by 1deg every 30 minutes based on the TSC_rc, the temperature setting on the remote controller, and the room temperature (temperature indicated on the remote controller: T_rc). The adjustable range of water temperature is set with DN_18 - 1B. • The temperature set on the remote controller and actual room temperature may differ depending on the place of the remote controller or room space. In that case, adjust temperature detection using DN_02 (for heating) and DN_03 (for cooling) on the remote controller.



How to shift up/down the temperature by remote controller DN_02, 03

- Ambient temperature (remote controller) is higher than room temperature: example. 1deg
  Change remote controller DN_02, 03 = "-1K" to "-2K"
- Ambient temperature (remote controller) is lower than room temperature: example. 1deg
  Change remote controller DN_02, 03 = "-1K" to "0"

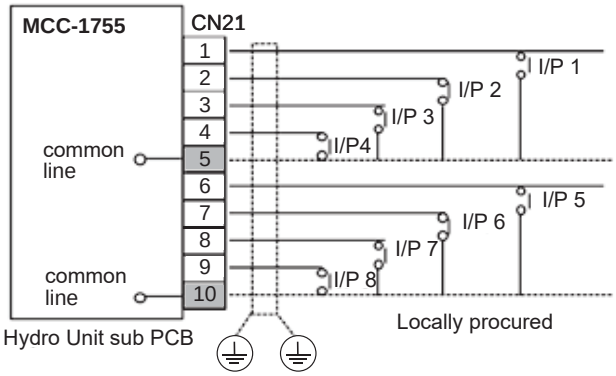
T_rc	Correction control	
	Heating	Cooling
D zone	Setting is corrected upward. Water temperature setting is up by 1deg every 30 minutes.	Setting is corrected downward. Water temperature setting is down by 1deg every 30 minutes.
C zone	No correction	No correction
B zone	Setting is corrected downward. Water temperature setting is down by 1deg every 30 minutes.	Setting is corrected upward. Water temperature setting is up by 1deg every 30 minutes.
A zone	Setting is corrected downward. Water temperature setting is down by 1deg every 30 minutes.	Setting is corrected upward. Water temperature setting is up by 1deg every 30 minutes.
	Thermo off. But if inlet water detected less 25°C, then heat pump restart.	Thermo off.
A' zone	Setting is corrected downward. Water temperature setting is down by 1deg every 30 minutes.	
	Thermo off.	

Related DN

DN	Setting item	Default	Variable range
18	Upper limit of cooling temperature setting	25	18 - 30°C
19	Lower limit of cooling temperature setting	7	7 - 20°C
1A	Upper limit of heating temperature setting (Zone 1)	55 (65)	37 - 55 (65) °C
1B	Lower limit of heating temperature setting (Zone 1)	20	20 - 37°C
40	Room temperature control	0	0: Not permitted 1: Permitted
96	Initial water temperature setting when controlling cooling by the room temperature remote controller and room temperature thermostat	20	5 - 30°C
9D	Initial water temperature setting when controlling heating by the room temperature remote controller and room temperature thermostat	40	20 - 55 (65) °C
02 (Remote controller)	Room temperature correction (at heating)	-1	-10K - +10K, 1K step
03 (Remote controller)	Room temperature correction (at heating)	-1	-10K - +10K, 1K step
B2	Heat pump restart water condition in A zone.	25	20 - 37°C
B5	Choose of the initial setting temperature. Either use the temperature set in DN_9D, or use the temperature calculated by Auto curve. This applies heating operation only.	0	0: Use the temperature set in DN_9D 1: Use the temperature calculated by Auto curve

*( ):801, 1101, 1401

Item	Operation flow and applicable data, etc.
7-3. Hydro Unit Control	7) Room temperature control with the thermostat You can install a commercially available thermostat to control room temperature. 7-1) Installing the room temperature thermostat • Connect its connection cable to CN21 port on the PC board (MCC-1755) of the hydro unit. • Thermostat for heating: Connect the input between the terminals (1) and (5). Thermostat for cooling: Connect the input between the terminals (2) and (5). • Place to install (inside a room): At the height of 120 cm - 180 cm on a wall Opposite to the radiator or fan coil installed No assignment when floor heating is used on the room. Optional inputs to Hydro Unit This unit has eight input ports. 2 ports of them are selectable by DN. Table2 shows the selectable input functions and default settings. Non-voltage contacts



Input items (Default setting)	
I/P 1	Room thermostat input for heating
I/P 2	Room thermostat input for cooling
I/P 3	Hot water tank thermostat input
I/P 4	Heating/cooling mode switching input
I/P 5	Heating/cooling operation ON/OFF
I/P 6	Hot water operation ON/OFF
I/P 7 (DN_B6)	0: Emergency shutdown input
I/P 8 (DN_B6)	0: None

7-2) Room temperature thermostat control setting
- Setting of DN_6B3 = “1” (Default “0”)

I/P1 & I/P2: Room thermostat input
- Setting of DN_6B3 = “1”
- Non-voltage contacts

Thermostat operation

CN21	Heating		Cooling	
	Reach	Not reach	Reach	Not reach
1-5 (I/P1)	open	close	-	-
2-5 (I/P2)	-	-	close	open

7-3)Heating thermostat operation

When the heating thermostat does not reach the assigned temperature (the circuit between (1) and (5) is closed), heating starts under the setting that water temperature for heating is 40°C (DN_9D). If the heating thermostat has not reached the assigned temperature 30 minutes after heating had started, the water temperature setting is turned up 1 degree, and the same action will be repeated every 30 minutes until the thermostat reaches the assigned temperature. The backup heater and booster heater are controlled in the same way as in the normal HP operation.

When the heating thermostat reaches the assigned temperature (the circuit between (1) and (5) is open), the heat pump shifts to the “thermostat off” operation. During the operation, the water temperature setting is turned down by 1 degree every 30 minutes. The backup heater and booster heater are tuned off as the heat pump shifts to the “thermostat off” operation.

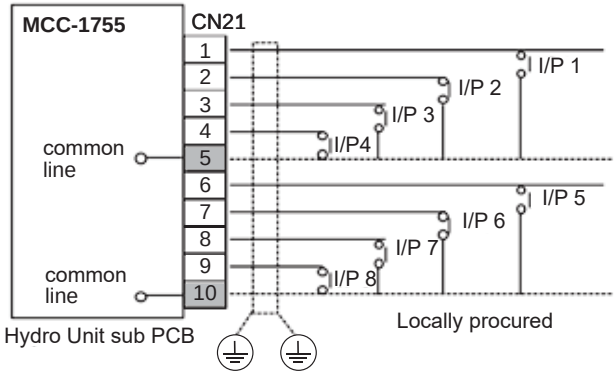
Item	Operation flow and applicable data, etc.
7-3. Hydro Unit Control	7-4)Cooling thermostat operation When the cooling thermostat does not reach the assigned temperature (the circuit between (2) and (5) is open), cooling starts under the setting that water temperature for cooling is 20°C (DN_96). If the cooling thermostat has not reached the assigned temperature 30 minutes after cooling had started, the water temperature setting is turned down 1 degree, and the same action will be repeated every 30 minutes until the thermostat reaches the assigned temperature. When the cooling thermostat reaches the assigned temperature (the circuit between (2) and (5) is closed), operation shifts to the “thermostat off” operation. During the operation, the water temperature setting is turned up by 1 degree every 30 minutes.

Room thermostat	Correction control	Heating operation	Cooling operation
CLOSE	Setting is corrected upward	Thermo on The water temperature setting is turned up by 1 degree every 30 minutes.	Thermo off The water temperature setting is turned up by 1 degree every 30 minutes.
OPEN	Setting is corrected downward.	Thermo off The water temperature setting is turned down by 1 degree every 30 minutes.	Thermo on The water temperature setting is turned down by 1 degree every 30 minutes.

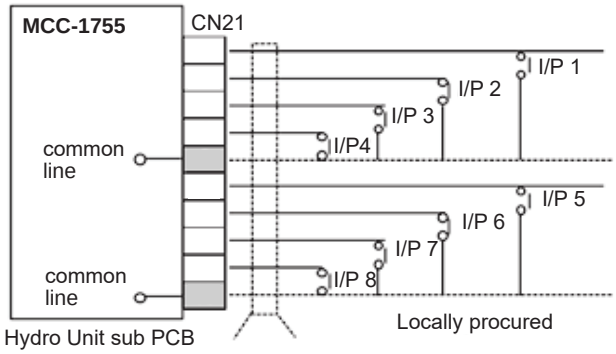
Related DN

DN	Setting item	Default	Variable range
9D	Initial water temperature setting when controlling heating by the room temperature remote controller and room temperature thermostat.	40	20 - 55 (65) °C
96	Initial water temperature setting when controlling cooling by the room temperature remote controller and room temperature thermostat.	20	5 - 30°C
B5	Choose of the initial setting temperature. Either use the temperature set in DN_9D, or use the temperature calculated by Auto curve. This applies heating operation only.	0	0 : Use the temperature set in DN_9D 1 : Use the temperature calculated by Auto curve

*( ):801, 1101, 1401

Item	Operation flow and applicable data, etc.
7-3. Hydro Unit Control	8) Hot water cylinder thermostat control Hot water can be supplied using an existing hot water cylinder with a thermostat. 8-1) Installing the hot water cylinder thermostat • Connect its connection cable to CN21 port on the PC board (MCC-1755) of the hydro unit. • Hot water cylinder heating thermostat: Connect this thermostat between (3) and (5). • Place to install the thermostat (hot water cylinder): At a height of 30 to 50 cm from the base. • Hot water heater: A hot water heater is required. (Without a hot water heater, the hydro unit will not work.) Optional inputs to Hydro Unit This unit has eight input ports. 2 ports of them are selectable by DN. Table2 shows the selectable input functions and default settings. Non-voltage contacts  **Input items (Default setting)** I/P 1 — Room thermostat input for heating I/P 2 — Room thermostat input for cooling I/P 3 — Hot water tank thermostat input I/P 4 — Heating/cooling mode switching input I/P 5 — Heating/cooling operation ON/OFF I/P 6 — Hot water operation ON/OFF I/P 7 (DN_B6) — 0: Emergency shutdown input — 0: None 8-2) Setting the hot water cylinder thermostat I/P3: Hot water tank thermostat input • This function is used with DN_6B2 is “1”, when the customer use the local hot water tank. • Setting of DN_6B2 = “1” • Non-voltage contacts Open: Reached setting temperature Close: Not reached setting temperature 8-3) Hot water thermostat operation (hot water supply operation only) If hot water is used when the hot water thermostat is at the assigned temperature (the circuit between (3) and (5) is open), the hot water heat pump starts with the hot water thermostat closed. After 120 minutes, the hot water cylinder heater turns on, but the hot water heat pump continues running until the hot water cylinder thermostat becomes open. It should be noted, however, that the hot water heat pump might stop if the water input temperature becomes high. 8-4) Hot water thermostat operation (hot water supply + heating operation) If hot water is used when the hot water thermostat is at the assigned temperature (the circuit between (3) and (5) is open), the hot water heat pump starts with the hot water thermostat closed. In 30 minutes, the hot water heat pump stops. After that, only the hot water cylinder heater is used to raise water temperature. The heat pump switches to heating operation. Unless the hot water cylinder thermostat temperature rises, the hot water heat pump will never take over. 8-5) Hot water thermostat operation (hot water supply + cooling operation) For automatic switching to hot water supply plus cooling operation, DN_0F is required. If hot water is used when the hot water thermostat is at the assigned temperature (the circuit between (3) and (5) is open), the hot water heat pump starts with the hot water thermostat closed. In 30 minutes, the hot water heat pump stops. After that, only the hot water cylinder heater is used to raise water temperature. The heat pump switches to cooling operation. Unless the hot water cylinder thermostat temperature rises, the hot water heat pump will never take over. Related DN **DN** | **Setting item** | **Default** | **Setting value** 0F | Hot water HP allowance while cooling + hot water supply | 0: Not allow | 1: Allow 73 | Hot water tank heater start time of heat-pump while operating | 3: 120 min passed | 0: 30 min passed

Item	Operation flow and applicable data, etc.
7-3. Hydro Unit Control	9) Control of Mode selection and forced stop & restart You can change the operation mode and force the operation ON/OFF. • Connect its connection cable to CN21 port on the PC board (MCC-1755) of the hydro unit. Non-voltage contacts



Input items (Default setting)	
I/P 1	Room thermostat input for heating
I/P 2	Room thermostat input for cooling
I/P 3	Hot water tank thermostat input
I/P 4	Heating/cooling mode switching input
I/P 5	Heating/cooling operation ON/OFF
I/P 6	Hot water operation ON/OFF
I/P 7 (DN_B6)	0: Emergency shutdown input
	0: None

9-1)Setting the inputs

I/P4: Heating/cooling mode switching input
- Non-voltage contact
  Open: Heating mode
  Close: Cooling mode

I/P5: Heating/cooling operation ON/OFF input
- Non-voltage contact
  Open: Operation OFF (Remote controller OFF)
  Close: Operation ON (Remote controller ON)

I/P6: Hot water operation ON/OFF input
- Non-voltage contact
  Open: Operation OFF (Remote controller OFF)
  Close: Operation ON (Remote controller ON)

I/P7: Emergency Shutdown input
- DN_B6 = “0”
- Non-voltage contacts
  Open: Normal operation
  Close: Emergency shutdown

0: The terminals are opened, 1: The terminals are closed

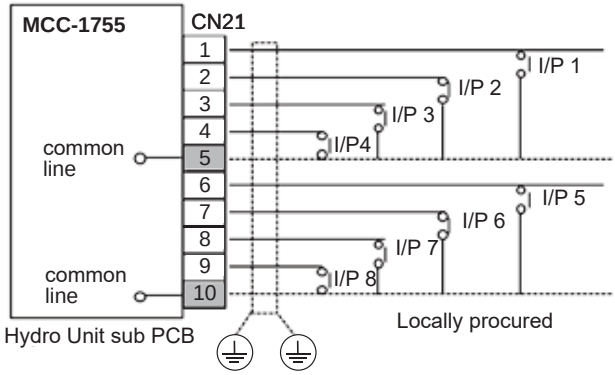
I/P 4	I/P 5	Control
0	0	Heating mode OFF
0	1	Heating mode ON
1	0	Cooling mode OFF
1	1	Cooling mode ON

It is possible to change the input signal when using I/P5, 6.
- DN_61 = “0”: Starts ESTIA as the circuit between the terminals I/P5, 6 is closed.
  Stops ESTIA as the circuit between the terminals I/P5, 6 is opened. (Default)
- DN_61 = “1”: Starts/Stops ESTIA as the circuit between the terminals I/P5, 6 is received closed pulse signal.

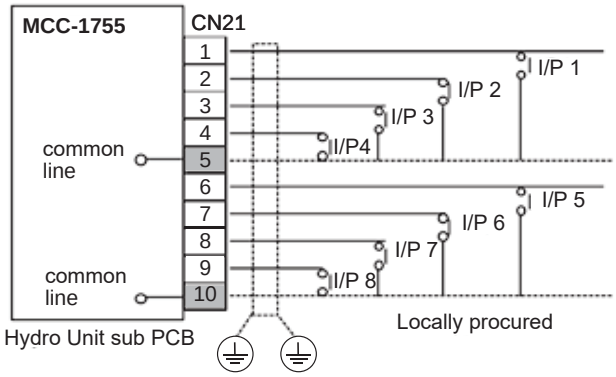
It is possible to change the input signal when using I/P7.
- DN_52 = “0”: Stops ESTIA as the circuit between the terminals I/P7 is closed. (Default)
- DN_52 = “1”: Stops ESTIA as the circuit between the terminals I/P7 is opened.

Related DN

DN	Setting item	Default	Setting value
61	Input signal setting when using I/P5, 6 (CN21)	0: Statics input	1: Pulse input
52	Input signal setting when using I/P7 (CN21)	0: Stop as I/P7 is closed	1: Stop as I/P7 is opened
B6	Setting the objects to control of I/P7, 8	0: I/P7 ··· Emergency Shutdown input I/P8 ··· None	

Item	Operation flow and applicable data, etc.
7-3. Hydro Unit Control	10) Control of limit of heat pump operation (Tempo1, 2) When the peak period of electric power charge is set due to the contract or other conditions, you can limit heat pump operation and give priority to boiler operation using an external input signal. (This control functions only during the period the signal is input.) • Connect its connection cable to the CN21 I/P7 port on the PC board (MCC-1755) of the hydro unit. Non-voltage contacts  10-1)Setting the control method Select an operation mode by setting DN_B6. • DN_B6 = “1” (Tempo1): Hot water cylinder heater = OFF, backup heater = OFF (Built-in circulation pump is ON.) • DN_B6 = “2” (Tempo2): Hot water cylinder heater = OFF, backup heater = OFF, heat pump = OFF, Built-in circulation pump is stopped. 10-2)Control summary When the TEMPO signal is input (the circuit is closed), the boiler signal is output regardless the outside temperature and devices are turned off following the setting on DN_B6. 1. Basic operation: heating operation using the boiler. 2. Switching to hot water supply: the water circuit is switched to the hot water supply side as the unit detect that TTW is less than 38°C. 3. Switching to heating: the water circuit is switched to the heating side as the unit detect that TTW is 52°C or more, or 30 minutes has passed since operation started. Heating operation continues at least 30 minutes. 4. The LED on the PC board lights up when the input signal is ON. Related DN **DN** | **Setting item** | **Default** | **Setting value** B6 | Setting the objects to control of I/P7, 8 | 0: I/P7 ⋯ Emergency Shutdown input I/P8 ⋯ None | 1: I/P7 ⋯ TEMPO1, I/P8 ⋯ None 2: I/P7 ⋯ TEMPO2, I/P8 ⋯ None

Item	Operation flow and applicable data, etc.
7-3. Hydro Unit Control	11) Connection to a Smart Grid network (SG ready) The operating mode is controlled through volt free contacts incorporated into the energy meter. • Connect its connection cable to CN21 port on the PC board of the hydro unit. Optional inputs to Hydro Unit This unit has eight input ports. 2 ports of them are selectable by DN. Table2 shows the selectable input functions and default settings. Non-voltage contacts



Input items (Default setting)	
I/P 1	Room thermostat input for heating
I/P 2	Room thermostat input for cooling
I/P 3	Hot water tank thermostat input
I/P 4	Heating/cooling mode switching input
I/P 5	Heating/cooling operation ON/OFF
I/P 6	Hot water operation ON/OFF
I/P 7 (DN_B6)	0: Emergency shutdown input
	0: None

11-1)The Settings

I/P7 & I/P8: Connection to a Smart Grid network (SG Ready)

- Non-voltage contacts
- The operating mode is controlled through volt free contacts incorporated into the energy meter.
- Setting: DN_B6 = “4”

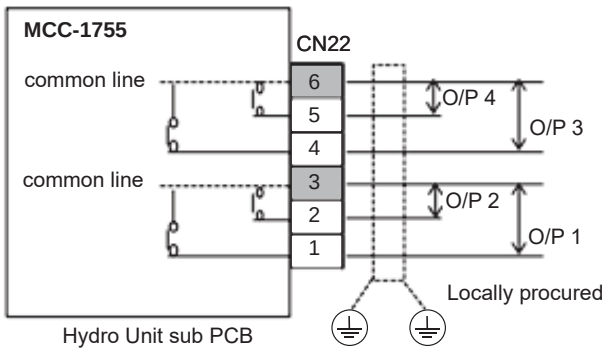
DN_6CE = “0”: HP and backup heaters ON when “System Forced ON” mode
DN_6CE = “1”: HP operation only when “System Forced ON” mode
DN_AC = “0-10”: Setting to increase the space heating set point temperature when “System Forced ON” mode

11-2)The operation mode and control summary

0: The terminals are opened , 1: The terminals are closed

I/P 7	I/P 8	Mode	Control summary
0	0	Restricted Operation	• Normal operation but with maximum compressor frequency limited to certain value (night time operation) • Backup heater control is active • Boiler output control active
1	0	System OFF	• The heat pump and electric heaters are FORCED OFF for a maximum of 2 hours during this period. • The space heating and DHW set points will continue to be displayed on the remote controller. • System safety controls (e.g. freeze protection) will remain active. • Boiler output control will remain active.
0	1	Normal Operation	• This signal is not a START signal – only a recommendation to start • The heat pump and electric heaters are available to operate under normal control if there is a heating or DHW demand • There is no restriction on the compressor frequency – the compressor can operate at maximum frequency if requested by the outdoor unit control software
1	1	System Forced ON	• During this period the system is FORCED ON to allow the heat pump and backup heater to operate • The space heating set point temperature is increased during this period. The temperature increase can be adjusted using DN_AC. • If there is a DHW demand during this FORCED ON period then the DHW set point is increased to the set point used for the DHW boost function • The hydro unit backup heaters will continue to operate with a modified control where by the ON/OFF heater delay will be removed • All other controls will remain active (e.g. DN_22, DN_1A etc.) * Backup heater is not energized during boiler output is ON.

Item	Operation flow and applicable data, etc.
7-3. Hydro Unit Control	12) Output signal control (Connect its connection cable to the CN22 terminal on the PC board (MCC-1755) in the hydro unit.) Additional Hydro Unit outputs This unit has four output ports. They are selectable by DN. Table1 shows the selectable output functions and default settings. Volt free contact – specification show below: AC230 V; 0.5 A (maximum) DC24 V; 1 A (maximum) Minimum current; 10 mA



Default setting	
O/P 1 (DN_6CA)	Alarm output
O/P 2 (DN_6CC)	Defrost operation output
O/P 3 (DN_6CD)	Boiler control output
O/P 4 (DN_6CB)	Compressor operation output

Selectable output items (DN_6CA - 6CD)	
0	Alarm output
1	Compressor operation output
2	Defrost operation output
3	Boiler control output
4	Safety or protection control running
5	During backup heater running
6	During hot water cylinder heater running
7	Heating operation output
8	Cooling operation output
9	Hot water operation output

0: Alarm output
- Open: No alarm
- Close: Alarm

1: Compressor operation output
- Open: Compressor is stopping
- Close: Compressor is operating

2: Defrost operation output
- Open: Unit is not defrost operating
- Close: Unit is defrost operating

3: Boiler control output
- Open: Normal operation
- Close: Boiler operation output

4: During safety or protection control running (Only indoor unit safety or protection control)
- Open: Normal operation
- Close: Release control running

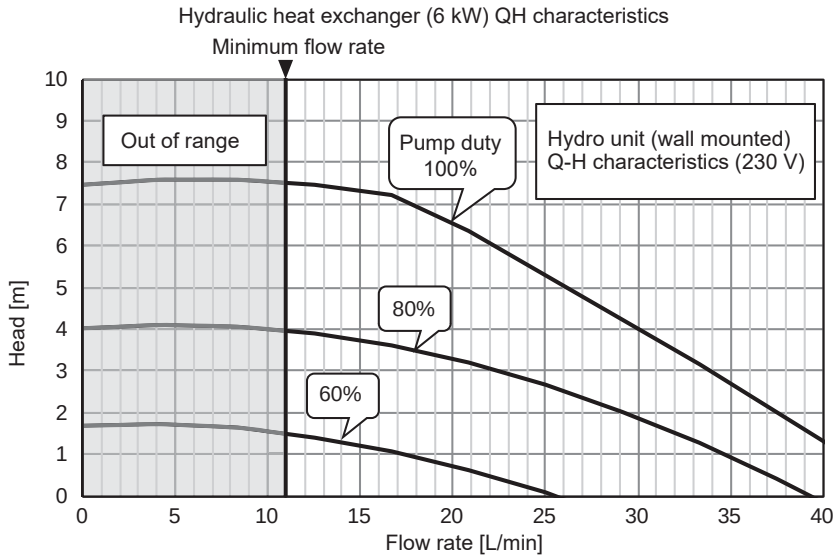
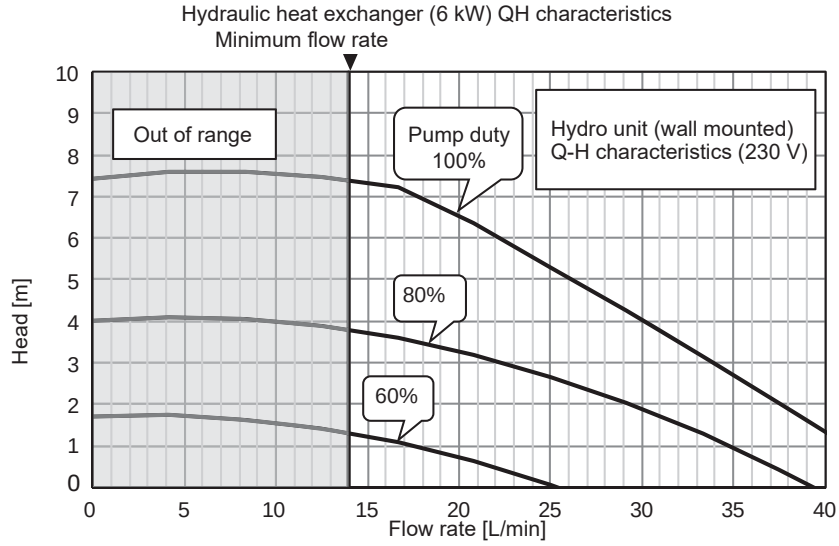
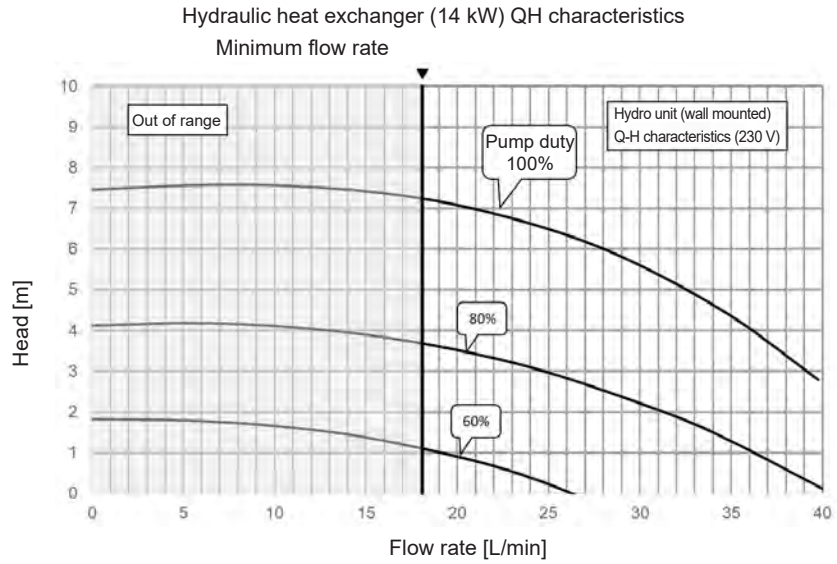
5: During backup heater running
- Open: Backup heater not running
- Close: Backup heater running

6: During hot water cylinder heater running
- Open: Hot water cylinder heater not running
- Close: Hot water cylinder heater running

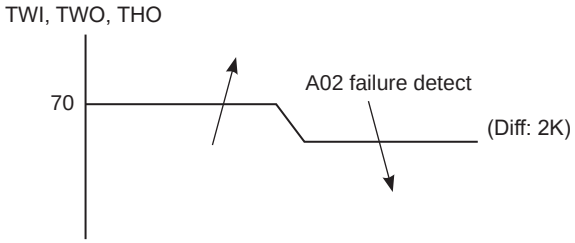
7: Heating operation output
- Open: Not heating operation
- Close: Heating operation
  (Include HP, Heater and thermo off, except failure occurring.)

8: Cooling operation output
- Open: Not cooling operation
- Close: Cooling operation
  (Include HP and thermo off, except failure occurring.)

9: Hot water operation output
- Open: Not hot water operation
- Close: Hot water operation
  (Include HP, Heater and thermo off, except failure occurring.)

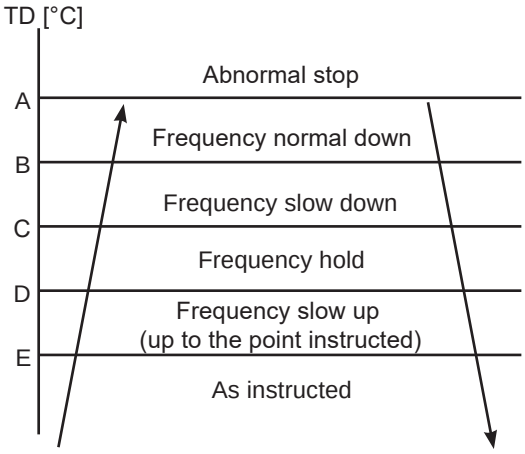
Item	Operation flow and applicable data, etc.
7-3 Hydro Unit Control	13) Q-H characteristics of hydro unit The following shows the Q-H characteristics. 13-1)HWT-601XWHM3W-E, M6W-E, T6W-E  13-2)HWT-1101XWHM3W-E, M6W-E, T6W-E, T9W-E  13-3)HWT-1401XWHM3W-E, M6W-E, T6W-E, T9W-E 

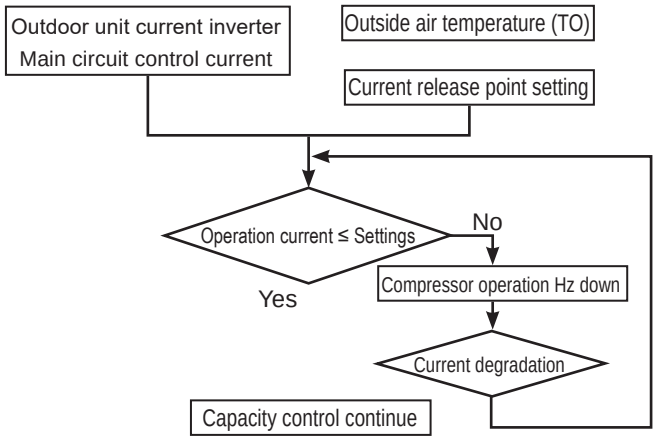
Item	Operation flow and applicable data, etc.
7-3. Hydro Unit Control	14) Automatic restart control The unit records operation information before a power outage and retrieves the information after the power is restored to restart automatically the operation with the information. 14-1)Operation during remote controller • The operation status before a power outage automatically restarts after the power is restored. (The merit functions are also enabled) • Approximately 6 hours or more after a power outage The operation status before a power outage automatically restarts after the power is restored. But the merit functions (Night setback, Anti bacteria) are disabled. • The remote controller time displays “00:00”. (The merit functions are disabled) 14-2)Operation during forcible automatic operation A forcible automatic operation is performed when the power is restored after a power outage. 14-3) Operation during defrosting operation When the power is restored after a power outage, the usual operation restarts. Note: The operation details recorded before a power outage Operation mode: Hot water supply, Heating, Cooling, Hot water supply + Heating, Hot water supply + Cooling Set temperature: Hot water set temperature, Heating set temperature, Cooling set temperature Merit function: Hot water supply operation (Anti bacteria) Heating operation (Night setback)
	15) Piping freeze prevention control This control operates when the power is on regardless the remote controller setting ON or OFF. To prevent frost bursting of the water piping for hot water supply and heating, the unit flows water with the circulation pump when the temperature sensor value falls below a certain temperature. 15-1)Piping freeze prevention control 1 1) Start condition: TWO < 4°C or TWI < 4°C or THO < 4°C 2) End condition: TWO ≥ 5°C and TWI ≥ 5°C and THO ≥ 5°C 3)-1 How to operate (circulation pump) • When the circulation pump is not in operation, if the sensor detects the freeze prevention control start temperature, the unit operate the circulation pump. • During a freeze prevention operation, a heat pump operation does not start. • When neither [Hot water supply] nor [heating/cooling] is in operation, if the end condition is not met when 3 minutes has passed after an operation starts, the unit performs the operation in 3)-2 to prevent freeze. 3)-2 How to operate (circulation pump + backup heater) • When neither [Hot water supply] nor [heating/cooling] is in operation, if the end condition is not met when 3 minutes has passed after an operation starts. • End condition: TWO ≥ 5°C and TWI ≥ 5°C and THO ≥ 5°C • Heating with the set temperature 30°C operates. 3)-3 Abnormal stop • If a freeze prevention operation continues for 30 minutes and does not meet the end condition, the operation stops as abnormal stop. (Remote controller check code: A05) • After failure occurring, it is cleared automatically when the end condition is met. • End condition (After failure occurring): TWO ≥ 8°C and TWI ≥ 8°C and THO ≥ 8°C 15-2)Piping freeze prevention control 2 TC and TWO activates freeze prevention regardless of a heat pump operation mode. 1) Determination condition: TWO > 20°C. 2*TC + TWO < -12°C is continuously detected for 180 (120) seconds or longer. Or TWO ≤ 20°C. TC + TWO < 4°C is continuously detected for 180 (120) seconds or longer. * ( ): Heating operation of single phase 1401 and 3 phase 801, 1101, 1401 models. 2) Determination cancellation conditions • The stop or operation mode is changed by the remote controller • The mode is defrosting at the time of determination At the next time of defrosting, the start condition is not met. • The mode is other than defrosting at the time of determination After cooling, heat pump restarts, the start condition is not met for 10 minutes. 3) Failure display • If freeze determination cancellation condition is not met, A04 failure is displayed 15-3)Piping freeze prevention control 3 This control applies only when defrosting is in operation. 1) Determination condition: During defrosting, TWI ≤ 15°C is continuously detected for 30 seconds or longer (After the stop, the unit restarts.) 2) Determination cancellation condition • At the next time of defrosting, the start condition is not met. 3) Failure display • If freeze determination cancellation condition is not met, A04 failure is displayed.

<table>
<tr><th>Item</th><th>Operation flow and applicable data, etc.</th></tr>
<tr><td rowspan="2">7-3.
Hydro Unit Control</td><td>15-4)Piping freeze prevention control 4
When the value of Ps sensor is low, freeze prevention is activated regardless of a heat pump operation mode.
1) Determination condition: Low pressure sensor detects PS < 0.2 MPa and 180 seconds passes (defrosting and cooling)
Low pressure sensor detects PS < 0.2 MPa and 10 minutes passes (heating and hot water supply operation)
2) Determination cancellation condition
• After a restart, the start condition is not met for 30 minutes.
• At the next time of defrosting, the start condition is not met. (Defrosting operation for heating or hot water supply)
3) Failure display
• If freeze determination cancellation condition is not met, A08 failure is displayed.</td></tr>
<tr><td>16) High return water protect control
The hydro unit protects against high return water which made by separate boiler system.
 

When A02 failure appeared, the built-in circulation pump will stop.

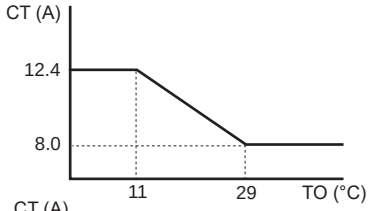
Related DN
<table>
<tr><th>DN</th><th>Setting item</th><th>Default</th><th>Setting available range</th></tr>
<tr><td>62</td><td>Activate/deactivate A02 failure detection</td><td>0: Activate</td><td>1: Deactivate</td></tr>
</table>
This DN_62 function is valid when DN_6B0 is “1”. (See 9.1. Hydro unit Setting)</td></tr>
</table>

Item	Operation flow and applicable data, etc.
7-4. Outdoor unit control	1) PMV (Pulse motor valve) control Valve opening is controlled using the expansion valve with a pulse motor according to a heat pump operation status. • PMV is controlled between 30 and 500 pulses during an operation. • At the time of a cooling operation, PMV is controlled with the usual target value of 1 to 4 K temperature difference between TS sensor and TC sensor. • At the time of a hot water supply or heating operation, PMV is controlled with the usual target value of -1 to 4 K temperature difference between TS sensor and TE sensor. • For both cooling and heating, if the cycle is overheated, PMV is controlled using the TD sensor. * A defective sensor may cause liquid back flow or abnormal overheat of the compressor, significantly shortening the compressor life. If the compressor or other equipment is repaired, first check that the resistance of each sensor or the refrigerant cycle has no problem, then start the operation.
	2) Discharge temperature release control This control detects an abnormality of the refrigerant cycle or compressor to perform failure prevention. • This control reduces operation frequency if the PMV control does not lower the outlet temperature or if the outlet temperature rapidly rises. The frequency control is broken down to the unit of 0.6 Hz to stabilize the cycle. • If the discharge temperature detects the abnormal stop zone, the compressor stops and then restarts after 150 seconds. The abnormality detection counter is cleared when the operation continues for 10 minutes. If detected 4 times, the check code is displayed and the compressor does not restart. * An abnormality could occur due to too less refrigerant, PMV defective, or cycle stuck. • For details about an failure displayed, see the check code list.  **401 601** / **801 1101 1401** A: 111 / 111 B: 109 / 109 C: 103 / 106 D: 100 / 103 E: 93 / 96

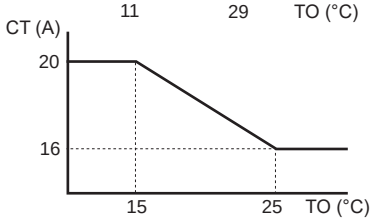
Item	Operation flow and applicable data, etc.
7-4. Outdoor unit control	3) Current release control The number of compressor rotation is controlled so that current value of the compressor drive circuit does not exceed the specified value. • The outdoor unit detects the input current. • The outside air temperature is detected and used to set the specified value of current. • The number of compressor rotation instructed by the hydro unit is used to determine whether the current value exceeds the specified value. • If exceeds, the number of compressor rotation is reduced to the most approximate number instructed by the hydro unit within the specified value range. 

Item	Operation flow and applicable data, etc.
7-4. Outdoor unit control	Single phase outdoor unit Heating, Hot water supply

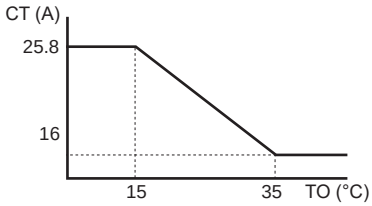
Outside temperature TO (degree °C)	Current release value (A)
	401 / 601
29 ≤ TO	8.0
11 < TO < 29	12.4 - (TO - 11) × 4.4 / 18
TO ≤ 11	12.4



Outside temperature TO (degree °C)	Current release value (A)
	801 / 1101
25 ≤ TO	16.0
15 < TO < 25	20.0 - (TO - 15.0) × 0.4
TO ≤ 15	20.0

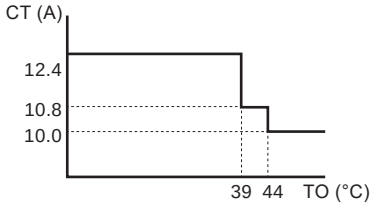


Outside temperature TO (degree °C)	Current release value (A)
	1401
35 ≤ TO	16.0
15 < TO < 35	25.8 - (To - 15) × 0.49
TO ≤ 15	25.8

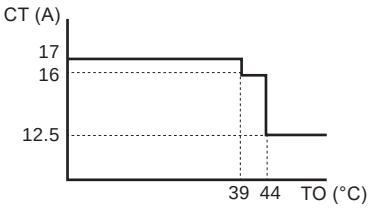


Cooling

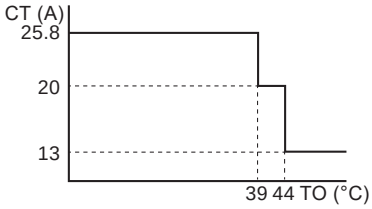
Outside temperature TO (degree °C)	Current release value (A)
	401 / 601
44 ≤ TO	10.0
39 ≤ TO < 44	10.8
10 ≤ TO < 39	12.4



Outside temperature TO (degree °C)	Current release value (A)
	801 / 1101
44 ≤ TO	12.4
39 ≤ TO < 44	16.0
10 ≤ TO < 39	17.0



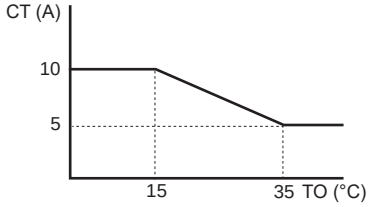
Outside temperature TO (degree °C)	Current release value (A)
	1401
44 ≤ TO	13.0
39 ≤ TO < 44	20.0
10 ≤ TO < 39	25.8



No cooling operation available for TO < 10°C.

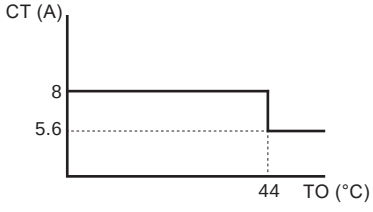
3 phase outdoor unit
Heating, Hot water supply

Outside temperature TO (degree °C)	Current release value (A)
	801 / 1101 / 1401
35 ≤ TO	5.0
15 < TO < 35	10.0 - (TO - 15) × 0.25
TO ≤ 15	10.0



Cooling

Outside temperature TO (degree °C)	Current release value (A)
	801 / 1101 / 1401
44 ≤ TO	5.6
39 ≤ TO < 44	8.0
10 ≤ TO < 39	8.0



No cooling operation available for TO < 10°C.

Item	Operation flow and applicable data, etc.
7-4. Outdoor unit control	4) Outdoor fan control The outdoor side control part controls the number of fan motor rotations by receiving an operation instruction from the Hydro side (Hydro unit) control part. For sensing the true outside temperature, fan is operated without compressor operation. * Although the fan motor is a DC motor, which has non-step variable numbers of rotations, it is limited to some steps for convenience of control. The number of fan tap rotation allocation [rpm]

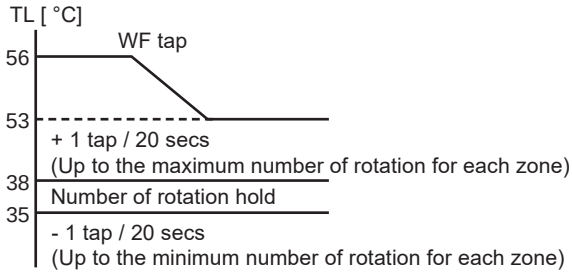
Single phase outdoor unit	W1	W2	W3	W4	W5	W6	W7	W8	W9	WA	WB	WC	WD	WE	WF
401, 601	240	320	320	390	400	470	510	550	560	570	570	650	700	750	830
801, 1101	200	200	200	230	260	290	330	360	410	450	480	500	540	570	600
1401	200	200	200	200	230	290	370	450	490	550	600	660	720	760	800

3 phase outdoor unit	W1	W2	W3	W4	W5	W6	W7	W8	W9	WA	WB	WC	WD	WE	WF
801, 1101, 1401	200	200	200	200	230	290	370	450	490	550	600	660	720	760	800

4-1) Cooling fan control

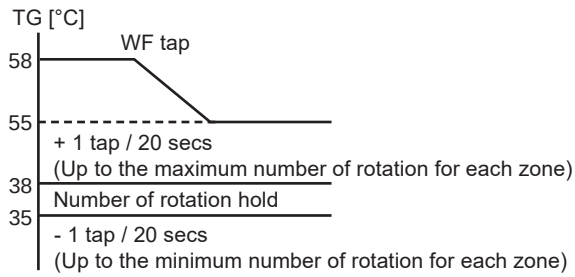
- The TL sensor, TO sensor and operation frequency control the outdoor fan. The control is performed by 1 tap of the DC fan control (14 taps).
- For 60 seconds after the start, the maximum fan tap for each zone that is shown in the following table is fixed. After that, the fan is controlled according to the TL sensor (401, 601), TG (801,1101,1401). (TG: temperature converted from PD)

Single phase outdoor unit 401, 601

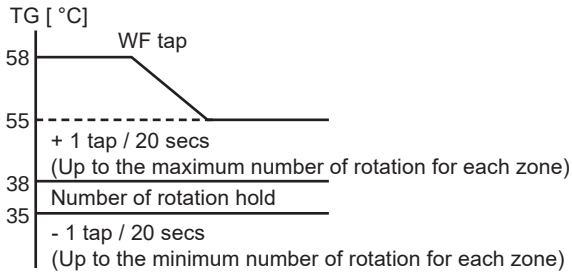


Temperature range	Less than 20 Hz		20 Hz or more to less than 45 Hz		45 Hz or more	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
38°C ≤ TO	W6	WC	W8	WF	WA	WF
29°C ≤ TO < 38°C	W5	WB	W7	WD	W9	WD
15°C ≤ TO < 29°C	W4	W8	W6	WA	W8	WC
5°C ≤ TO < 15°C	W3	W6	W5	W8	W7	WA

Single phase outdoor unit 801, 1101

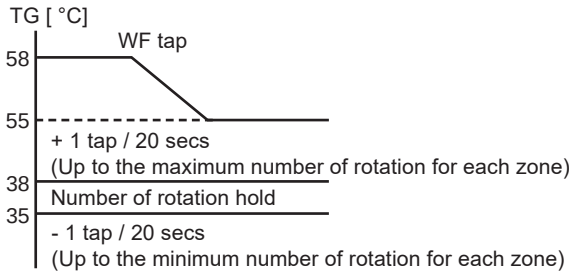


Temperature range	Less than 20 Hz		20 Hz or more to less than 45 Hz		45 Hz or more	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
38°C ≤ TO	W6	WC	W8	WF	WA	WF
29°C ≤ TO < 38°C	W5	WB	W7	WD	W9	WD
15°C ≤ TO < 29°C	W4	W8	W6	WA	W8	WC
5°C ≤ TO < 15°C	W3	W6	W5	W8	W7	WA

Item	Operation flow and applicable data, etc.
7-4. Outdoor unit control	Single phase outdoor unit 1401 

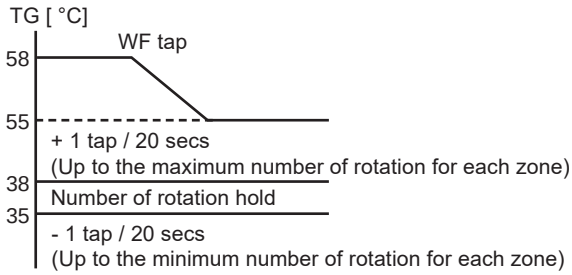
Temperature range	Less than 20 Hz		20 Hz or more to less than 45 Hz		45 Hz or more	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
38°C ≤ TO	W6	WC	W8	WF	WA	WF
29°C ≤ TO < 38°C	W5	WB	W7	WF	W9	WF
15°C ≤ TO < 29°C	W4	W8	W6	WA	W8	WC
5°C ≤ TO < 15°C	W3	W6	W5	W8	W7	WA

3 phase outdoor unit 801, 1101



Temperature range	Less than 20 Hz		20 Hz or more to less than 45 Hz		45 Hz or more	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
38°C ≤ TO	W6	WC	W8	WF	WA	WF
29°C ≤ TO < 38°C	W5	WB	W7	WD	W9	WD
15°C ≤ TO < 29°C	W4	W8	W6	WA	W8	WC
5°C ≤ TO < 15°C	W3	W6	W5	W8	W7	WA

3 phase outdoor unit 1401



Temperature range	Less than 20 Hz		20 Hz or more to less than 45 Hz		45 Hz or more	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
38°C ≤ TO	W6	WC	W8	WF	WA	WF
29°C ≤ TO < 38°C	W5	WB	W7	WF	W9	WF
15°C ≤ TO < 29°C	W4	W8	W6	WA	W8	WC
5°C ≤ TO < 15°C	W3	W6	W5	W8	W7	WA

Item	Operation flow and applicable data, etc.
7-4. Outdoor unit control	4-2) Hot water supply and heating fan control 1) The TE sensor, TO sensor and operation frequency control the outdoor fan. (The minimum W1 to the maximum are controlled according to the table below.) 2) For 3 minutes after the start, the maximum fan tap for each zone that is shown in the following table is fixed. After that, the fan is controlled according to the TE sensor temperature. 3) If TE ≥ 24 (30)* °C continues for 5 minutes, the operation stops. No check code is displayed for this; the status is the same as the usual thermostat off. The operation restarts after 150 seconds. This intermittent running is not abnormal. *( ):801, 1101, 1401 **NOTE** If the heat-pump was thermo-off, the out-door fan motor (up/down) continue to run 10 min with W3 rotation. When the water pump of hydro unit turns on, the fan motor will operate sensing value of outside air temperature (TO). TE [°C] A: -2 tap / 20 secs (to W1 (W5)*) Stop time count B: -2 tap / 20 secs (to W1 (W5)*) C: -1 tap / 20 secs (to W1 (W5)*) D: Number of revolutions hold + 1 tap / 20 secs (Up to the maximum tap for each zone) *( ): 3 phase out door unit.

	401 601	801 1101 1401
A	24	30
B	21	21
C	18	18
D	15	15

Single phase outdoor unit.

401, 601

Temperature range	Less than 20 Hz	20 Hz or more to less than 45 Hz	45 Hz or more
	Maximum	Maximum	Maximum
30°C ≤ TO	W5	W5	W8
25°C ≤ TO < 30°C	W6	W6	WA
20°C ≤ TO < 25°C	W8	W9	WC
10°C ≤ TO < 20°C	WA	WA	WC
5°C ≤ TO < 10°C	WC	WC	WC
-3°C ≤ TO < 5°C	WC	WC	WF
-10°C ≤ TO < -3°C	WF	WF	WF
TO < -10°C	WF	WF	WF
TO abnormal	WF	WF	WF

801

Temperature range	Less than 20 Hz	20 Hz or more to less than 45 Hz	45 Hz or more
	Maximum	Maximum	Maximum
30°C ≤ TO	W4	W4	W6
25°C ≤ TO < 30°C	W5	W5	W7
20°C ≤ TO < 25°C	W6	W7	W8
10°C ≤ TO < 20°C	W7	W8	W9
5°C ≤ TO < 10°C	W9	WB	WD
-3°C ≤ TO < 5°C	WD	WD	WF
-10°C ≤ TO < -3°C	WF	WF	WF
TO < -10°C	WF	WF	WF
TO abnormal	WF	WF	WF

Item	Operation flow and applicable data, etc.
7-4. Outdoor unit control	

1101

Temperature range	Less than 20 Hz	20 Hz or more to less than 45 Hz	45 Hz or more
	Maximum	Maximum	Maximum
30°C ≤ TO	W4	W4	W6
25°C ≤ TO < 30°C	W5	W5	W7
20°C ≤ TO < 25°C	W6	W7	W8
10°C ≤ TO < 20°C	W7	W8	W9
5°C ≤ TO < 10°C	W9	WB	WF
-3°C ≤ TO < 5°C	WF	WF	WF
-10°C ≤ TO < -3°C	WF	WF	WF
TO < -10°C	WF	WF	WF
TO abnormal	WF	WF	WF

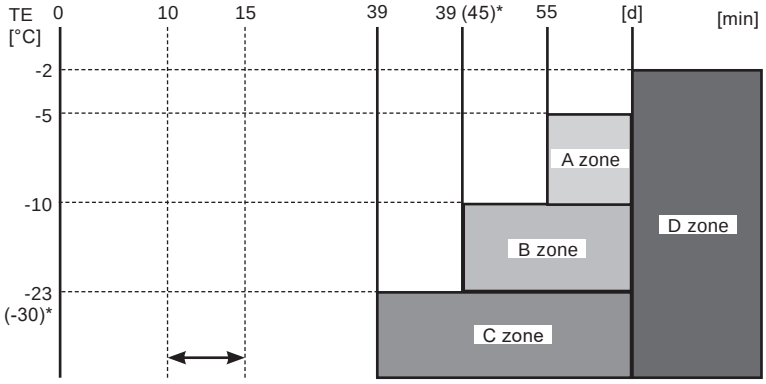
1401

Temperature range	Less than 20 Hz	20 Hz or more to less than 45 Hz	45 Hz or more
	Maximum	Maximum	Maximum
30°C ≤ TO	W6	W6	W7
25°C ≤ TO < 30°C	W7	W7	W8
20°C ≤ TO < 25°C	W7	W8	W9
10°C ≤ TO < 20°C	W9	WA	WB
5°C ≤ TO < 10°C	WB	WB	WF
-3°C ≤ TO < 5°C	WB	WB	WF
-10°C ≤ TO < -3°C	WF	WF	WF
TO < -10°C	WF	WF	WF
TO abnormal	WF	WF	WF

3 phase outdoor unit.

801, 1101, 1401

Temperature range	Less than 20 Hz	20 Hz or more to less than 45 Hz	45 Hz or more
	Maximum	Maximum	Maximum
30°C ≤ TO	W6	W6	W7
25°C ≤ TO < 30°C	W7	W7	W8
20°C ≤ TO < 25°C	W7	W8	W9
10°C ≤ TO < 20°C	W9	WA	WB
5°C ≤ TO < 10°C	WB	WB	WF
-3°C ≤ TO < 5°C	WB	WB	WF
-10°C ≤ TO < -3°C	WF	WF	WF
TO < -10°C	WF	WF	WF
TO abnormal	WF	WF	WF

Item	Operation flow and applicable data, etc.
7-4. Outdoor unit control	5) Defrosting control 5-1) Defrost operation This control defrosts the outdoor heat exchanger. The temperature sensor (TE sensor) of the outdoor heat exchanger determines frost formation, and then defrosting is performed in the 4-way valve reverse defrosting method. 1) During a heating operation, defrosting is performed when the TE sensor meets any of the conditions in A through D zones. 2) During defrosting, when TE sensor maintains 12°C or higher for 3 seconds or 7°C ≤ TE < 12°C for a minute, the defrosting ends. Also, when defrosting continues for 10 minutes even if the TE sensor temperature is below 7°C, the defrosting ends. 3) After the defrosting, stop the compressor for approx. 40 seconds before starting a heating operation. 4) Switching the jumper “J805” and “J806” of the outdoor control board can change the time of d above mentioned. (Factory default: 150 minutes) **Heating operation starts**  *1 In 10 to 15 minutes after the heating operation starts, the lowest value of TE is recorded as TEO, and the lowest temperature of To as ToO. ***( ):801, 1101, 1401** | | To Normal | |---|---| | A Zone | Maintain “(TEO - TE) - (ToO - To) ≥ 3°C” for 20 sec | | B Zone | Maintain “(TEO - TE) - (ToO - To) ≥ 2°C” for 20 sec | | C Zone | Maintain “TE ≤ -23 (-30)* °C” for 20 sec | | D Zone | Accumulate compressor operation status of TE < -2°C for 150 min | *( ):801, 1101, 1401

Item	Operation flow and applicable data, etc.
7-4. Outdoor unit control	Jumper switching O: Short circuit ×: Open

J805	J806	[d]
O	O	150 min (Factory default)
O	×	90 min
×	O	60 min
×	×	30 min

5-2) Advance defrost operation

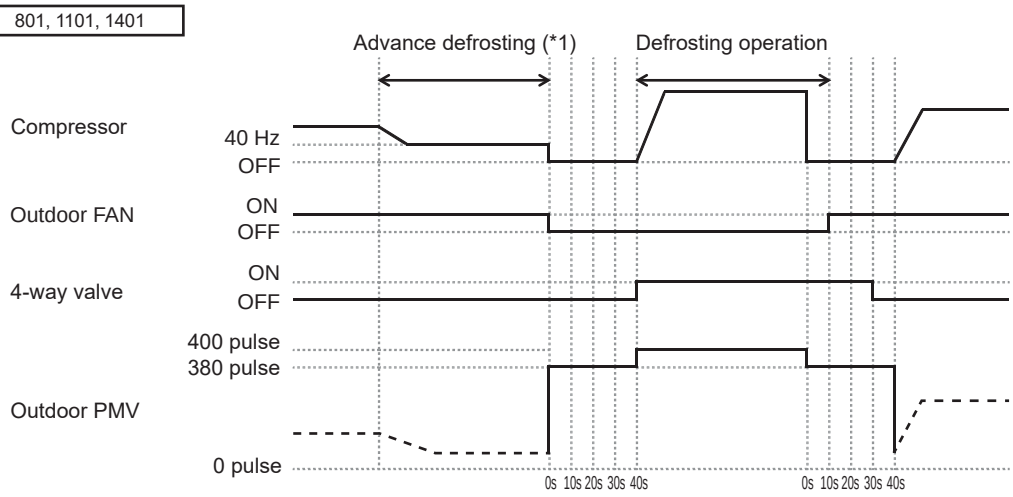
When compressor temperature is low, defrosting preliminary operation will be carried out to carry defrosting smoothly in effect.

1) Start condition of advance defrosting
   - TD < 50ºC and A, B, C or D zone detected.

2) Conditions for changing over from defrosting preliminary operation to defrosting.
   - When TD ≥ 50°C is detected during defrosting preliminary operation.
   - When thermostat is turned off during defrosting preliminary operation.
   - When defrosting preliminary operation is carried out more than 10 minutes.

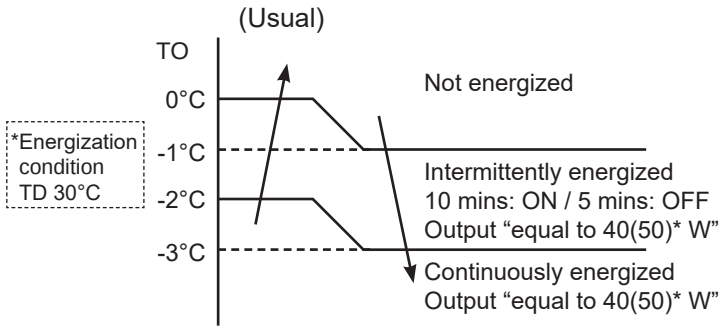
3) Control details
   - Target SH during defrosting preliminary operation will be 6 to 10 K. (refer to 7-4-1)
   - PMV control interval will be shorter than normal.
   - Operation frequency will be fixed.

801, 1101, 1401

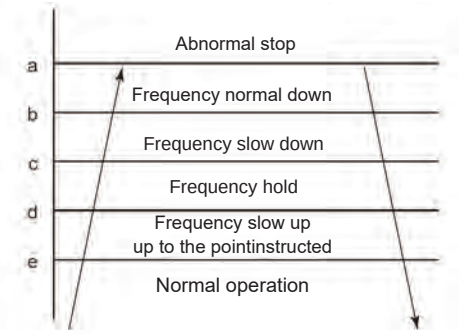


Dotted line shows an operating image.

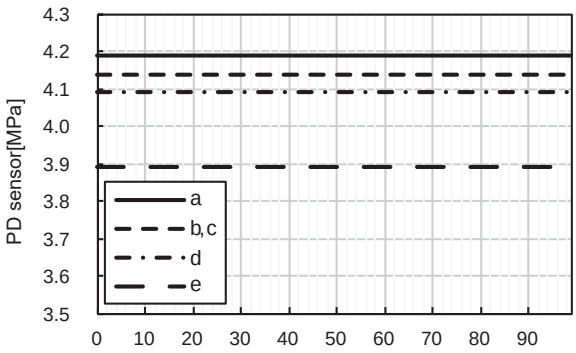
*1. When TD ≥ 50°C, Advance defrosting will be skipped.

Item	Operation flow and applicable data, etc.
7-4. Outdoor unit control	6) Winding heating control 1) This control energizes the inactive compressor instead of the case heater to warm the compressor. The purpose is to prevent the refrigerant from staying inside the compressor. 2) After the unit is installed, failure to perform energization for the given time period may cause the compressor to fail. Also, when starting an operation long after the power left off, first energize the compressor before starting the operation in the same way as a trial run. 3) Energization is determined by the TD sensor and TO sensor. 4) If TD is 30°C or higher, the energization stops.  *( ): 3 phase outdoor unit. Notes During winding energization, energizing noise may be heard, but this is not abnormal.
	7) Short circuit operation prevention control 1) In 11 minutes after the operation start, the compressor may not stop for protection. This status is not abnormal. (The operation duration time of the compressor varies depending on an operation status.) 2) If the operation stops with the remote controller, the operation does not continue.
	8) Over current protection control 1) A detection of abnormal current with the over current protection control stops the compressor. 2) Set the abnormality detection counter to 1, and restarts the compressor after 150 seconds. 3) When the stop by over current protection control counts 8 times, check code is displayed and the compressor does not restart. (Remote controller check code display: H01)

Item	Operation flow and applicable data, etc.
7-4. Outdoor unit control	9) High pressure release control 1) To prevent excessive high pressure rise, operating frequency is controlled by the PD sensor. 2) If the PD sensor detects an abnormal stop zone pressure, the compressor stops and the abnormality detection counter increments. 3) When the compressor stops in 2), the heat-pump operation restarts when the pressure decrease to zone “e” (normal operation) after 150 seconds passed. 4) When the compressor stops in 2), the abnormality detection counter is cleared when the operation continues for 10 minutes. If the counter counts 10 times, check code is displayed on the remote-controller and the compressor does not restart. 5) For details about an check code displayed, see the check code list. (8-3-4)



801, 1101, 1401



401, 601*

	Heating TC (TWO + 2)	Cooling TL
a	64	61
b	62	58
c	60	58
d	58	56
e	54	54

* Use the temperature sensor for determination the zone.

10) High pressure switch

The high pressure switch detects abnormal high pressure (higher than 4.15 MPa (4.60 MPa)*) in refrigeration cycle and protect the compressor.

*( ):801, 1101, 1401

- The high pressure switch stops the compressor as the pressure in the refrigeration cycle becomes higher than above value.
- The compressor will restart three minutes after stopping.
- If the high pressure switch functions again after restarting, the compressor stops and the “P04” check code is indicated.

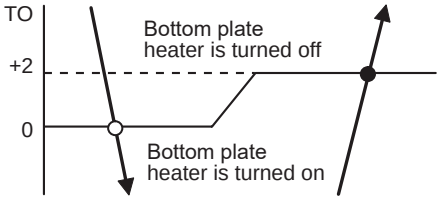
11) Compressor case thermostat

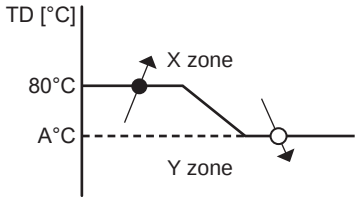
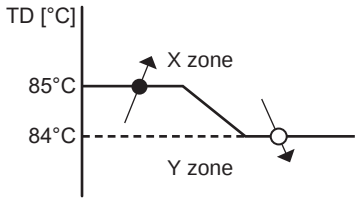
The compressor case thermostat functions to protect the compressor when the blow-out temperature from the compressor is too high.

- The compressor case thermostat on the upper part of compressor stops the compressor.
- The compressor will restart three minutes after stopping.
- If the compressor case thermostat functions again after restarting (functions at 125°C), compressor stops and the “H04” check code is indicated.

12) Compressor case thermostat

Control ON and OFF of the bottom plate heater using the outdoor temperature sensor (TO).



Item	Operation flow and applicable data, etc.
7-4. Outdoor unit control	13) Start up from hibernation This control operates at startup, in order to warm up the compressor by the heat from the water. System is operated at a defrost cycle when the start condition is satisfied. System is switched to the normal heating operation when the end condition is satisfied. 13-1)Start conditions This control is operated when starting the compressor in a state that all of the following conditions is satisfy. •Compressor off time is 2 hours (30 minute)* or more (Also start up at the first time after turn on the power.) •TD ≤ 40°C and TWI ≥ 25°C and TO ≤ 3°C * ( ):801, 1101, 1401 13-2)End conditions When one of the following conditions is satisfy, operation is switched to the normal heating. •10 minutes has passed since operation started. •TD ≥ TWI + 10°C •TG ≥ TWI TG: Condensing temperature calculated from the Pd •TWI < 25°C 14) Liquid injection control In discharge temperature high condition, for example ambient temperature is low or circulation water temperature is high, controlling INJ_2-way valve and INJ_PMV will work. 1)INJ_2-way valve control The operation start in the following cases. * Heating operation and hot water supply operation only. (except defrost operation) •10 sec passed since compressor ON and TD is in X zone. The operation stop in the following cases. When the INJ_2-way valve turned on once, it does NOT turn off for 15 minutes. •When the compressor is stopped. •During defrost operation. •INJ_PMV opening value is small and TD is in Y zone (*). * A°C is 60°C or 70°C, it is depend on PD [MPa].  2)INJ_PMV control The operation start in the following cases. * Heating operation and hot water supply operation only. (except defrost operation) •20 sec passed since compressor ON and TD is in X zone. INJ_PMV is controlled between 5 and 300 pulses during an operation. INJ_PMV is controlled with temperature difference between TD sensor and target TD temperature TD0. TD0 is 85°C just after INJ_PMV control starts, and changes to 86°C, 87°C, 88°C, ..., up to 95°C in every minute. After TD0 reach to 95°C, INJ_PMV is controlled with temperature difference between TD sensor and target TD0 95°C. The operation stop in the following cases. •When the compressor is stopped. •During defrost operation. •TD is in Y zone. 

8 Method of defect diagnosis

In order to diagnose the defective part of the heat pump system, first understand the symptom of the defect.
(1) Check the operation status. (It does not move, or it moves but stops, etc.)
(2) Flashing display on the display part of the hydro unit.
(3) Check the “check code” by the remote controller.

Please refer to the following procedure of defect diagnosis for the identification.

No.	Procedure of defect diagnosis		Remark
8-1	Matters to be confirmed first	8-1-1. Check the power supply voltage 8-1-2. Check for any miswiring of the connection cables between the hydro unit and the outdoor unit 8-1-3. About the installation of the temperature sensor	Check the power supply for the heat pump hot water heater, the crossover between the hydro unit and the outdoor unit, and the installation of temperature sensors.
8-2	Non-defective operation (program operation)		Non-defective program operations for the protection of the heat pump unit.
8-3	Outline of the determination diagram	8-3-1. Procedure of defect diagnosis 8-3-2. How to determine from the check code on the remote controller 8-3-3. How to cancel a check code on the remote controller 8-3-4. How to diagnose by check code	With reference to the "check code", roughly identify the defect from the defect diagnosis for the heat pump hot water heater and determine the defective part from individual symptoms.
8-4	Diagnosis flow chart for each check code	8-4-1. Hydro unit failure detection 8-4-2. Outdoor unit failure detection 8-4-3. Temperature sensor, temperature-resistance characteristic table	
8-5	Operation check by PC board	8-5-1. Operation check mode	The operation check mode allows to determine good or not by checking the operation of the 4-way valve, 2-way valve and pulse motor valve.
8-6	Brief method for checking the key components	8-6-1. Hydro unit 8-6-2. Outdoor unit	How to determine the presence of any defect particularly in functional parts.

8-1. Matters to be confirmed first

8-1-1. Check the power supply voltage

Check that the power supply voltage is AC220-240 V± 10% (signal phase) or AC380-415 V± 10% (three phase). If the power supply voltage is not in this range, it may not operate normally.

8-1-2. Check for any miswiring of the connection cables between the hydro unit and the outdoor unit

The hydro unit and the outdoor unit are connected with three connection cables. Make sure the interconnecting connections between the hydro unit and the outdoor unit terminal blocks are connected to the correct terminal numbers. If not connected correctly, the heat pump system does not operate. However, a miswiring would not cause damage to the equipment.

8-1-3. About the installation of the temperature sensor

If each sensor is removed due to the replacement of the water heat exchange or inverter board, or the replacement of the refrigeration cycle parts, make sure to put the sensor back to the position where it was before.

- Each sensor position has a marking. Make sure to put it back to the exact position.
- Make sure to install it with a sensor holder so that the temperature sensing part of the sensor and the straight part of the copper piping are attached with each other tightly.
- If the installation of the sensor is incomplete or the installed position is wrong, it will not perform a normal control operation and may cause a defect such as a malfunction of the equipment or an occurrence of an abnormal sound, etc.

8-2. Non-defective operation (program operation) … No check code display appears.

In order to control the heat pump unit, there are the following operations as the built-in program operations in the microcomputer. If a claim occurs about the operation, please confirm whether it falls under any of the contents in the following table.
If it does, please understand that the symptom is not a defect of the equipment, and it is an operation necessary for the control and maintenance of the heat pump unit.

Table 8-2-1 Non-defective operation

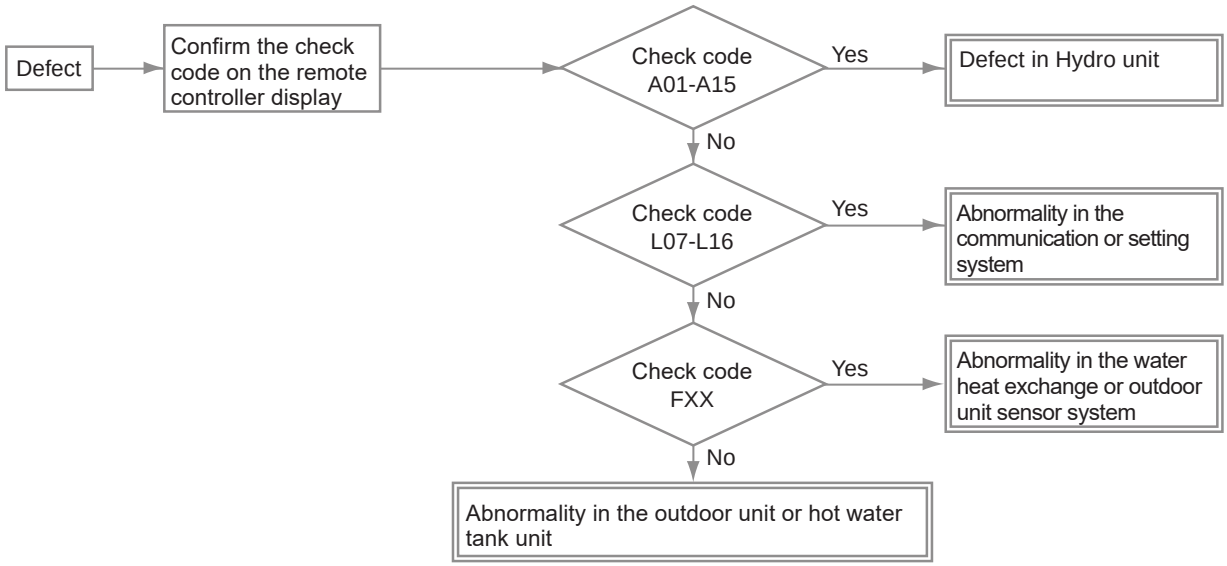
No.	Operation of the heat pump system	Explanation
1	The compressor sometimes does not operate even within the range of compressor “ON”.	The compressor does not operate during the operation of the compressor reboot timer (3 min). Even after the power activation, the compressor reboot timer continues to be active.
2	During the hot water supply or heating operation, without reaching the set temperature, the compressor operation frequency stays at a frequency of less than the maximum Hz or lowers down.	It may be caused by the high temperature release control (release protection control by the temperature of the water heat exchanger) or the current release control, or the high pressure release control.
3	The “Stop” operation on the remote controller will not stop the circulation pump. (The same for hot water supply, heating and cooling)	In order to deal with the temperature increase in the heat exchanger after stopping, the operation continues for 1 min after the compressor is stopped.
4	“ON” on the remote controller will not operate the compressor. (It will not operate even after the reboot delay timer elapsed)	When the outdoor temperature (TO sensor detection temperature) is -20 (-25)* °C or lower, the heat pump will not operate in order to protect the compressor, and the heater will operate instead. *( ):801, 1101, 1401
5	When the power is turned on, it starts operation without operating the remote controller.	• The auto restart operation may be working. • The antifreeze operation may be working. • If the TWI, TWO or THO sensor detects a temperature below 4°C, the operation changes from circulation pump --->> circulation pump + heater.)

8-3. Outline of the determination diagram

The first determination of whether a defective part is in the hydro unit or the outdoor unit can be performed by the following method.

8-3-1. Procedure of defect diagnosis

In the case of a defect, please apply the following procedure in order to find the defective part.



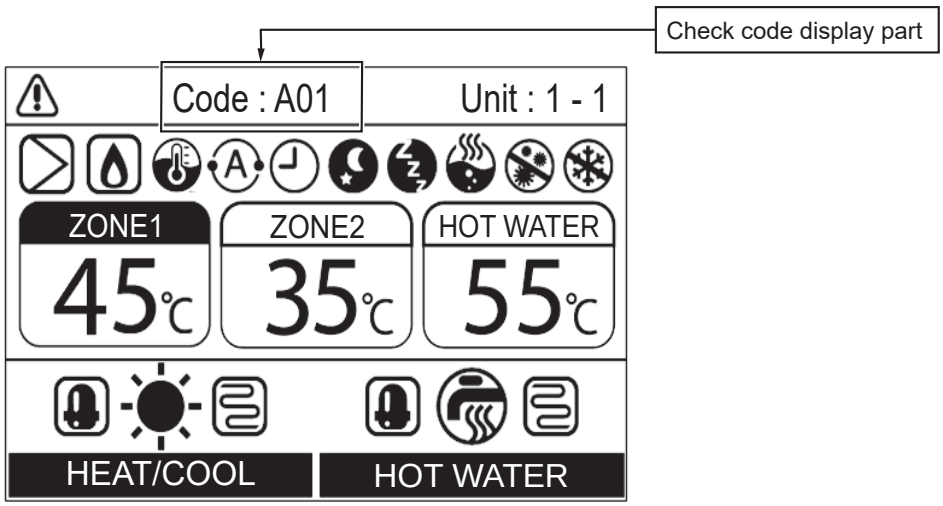
8-3-2. How to determine from the check code on the remote controller

If the defect is limited by the check code displayed on the remote controller, please repair the defect based on the table on the next page.

The check codes are separated into two groups: software and hardware failure.

Since a hardware failure cannot be cancelled without a part replacement etc., please perform a repair.

If its abnormality is determined, the abnormality is noticed by indicating the check code on the remote controller check code display part while sounding off a buzzer.



8-3-3. How to cancel a check code on the remote controller

Press [F1] or [F2] button (on the operation side) to clear the check code.

Although the above procedure cancels the check code, the hardware failure will be displayed again until the hardware repair is completed.

8-3-4. How to diagnose by check code

Defect mode detected by the Hydro Unit

O ... Possible
× .... Not possible

Check code	Diagnostic functional operation			Determination and action	Number of abnormalities for confirmation	Detailed item
	Operational cause	Backup operation	Automatic reset			
A01	**Flowing quantity failure** Detected by flow rate abnormality	Heating X Hot water O	X	1. Almost no or little water flow. • Not enough vent air • Dirt clogging in the water piping system. • The water piping is too long. • Installation of buffer tank and secondary pump	8	106
A02	**Temperature increase failure** (heating) When one of the TWI, TWO and THO sensors exceeds 70°C.	Heating X Hot water O	O	1. Check the water inlet, water outlet and heater outlet (TWI, TWO, THO) sensors. 2. Defect of the backup heater (defect automatic reset thermostat).	1	107
A03	**Temperature increase failure** (hot water supply) When the TTW sensor exceeds 85°C.	Heating O Hot water X	O	1. Check the hot water cylinder sensor (TTW). 2. Check the hot water cylinder thermal cut-out.	1	108
A04	**Antifreeze operation (1)** 1)TWO > 20°C condition: 2 × TC + TWO ≤ -12°C is detected. 2)TWO ≤ 20°C condition: TC + TWO ≤ 4°C is detected. 3)TWI ≤ 15°C is detected during defrosting.	O	X	1. Almost no or little water flow. • Dirt clogging in the water piping system. • The water piping is too long, or too short. 2. Check the heater power circuit. • Power supply voltage, breaker, • power supply connection 3. Set the presence of the backup heater. 4. Check the water inlet, water outlet and heat exchange (TWI, TWO, TC) sensors and flow sensor.	Heating 8 Hot water 8 Cooling 4	109
A05	**Piping antifreeze operation** Activating the heater under the condition of TWO < 4 or TWI < 4 or THO < 4 does not achieve TWO, TWI, THO ≥ 5°C after 30 min elapsed.	O	O	1. Check the heater power circuit. Power supply voltage, breaker, power supply connection 2. Check the water inlet, water outlet and heater outlet sensors (TWI, TWO, THO). 3. Disconnection of the backup heater.	1	110
A08	**Low pressure sensor operation failure** The low pressure sensor detected 0.2 MPa or less.	O	X	1. Almost no or little water flow. 2. Defect of the flow sensor. 3. On-load cooling or prolonged defrosting (a lot of frost formation) under the above conditions. 4. Defect in the low pressure sensor. 5. Check the refrigeration cycle (gas leak)	8	111

Check code	Diagnostic functional operation			Determination and action	Number of abnormalities for confirmation	Detailed item
	Operational cause	Backup operation	Automatic reset			
A09	**Overheat protection operation** When the thermostat of the backup heater activates during the operation of the heat pump or backup heater. When the thermostat operation is activated while it has been stopped.	Heating X Hot water O	X	1. No water (heating without water) or no water flow. 2. Defect of the flow sensor.	2	112
				3. Defect of the backup heater (poor automatic reset thermostat).	1	
A10	**Antifreeze operation (2)** When TC + TWO < -15K detected in cooling mode.	O	X	1. Almost few water flow. 2. Defect of the flow sensor. 3. Low refrigerant.	10	113
A11	**Operation of the release protection** When the TWO release counts to 10.	Heating X Hot water O	X	1. Almost no water flow. 2. Defect of the flow sensor. 3. Check the water outlet temperature 4. sensor (TWO).	10	114
A12	**Heating, hot water heater failure** The antifreeze control is detected under the condition of TWI < 15°C while TWI ≥ 15°C, TTW ≥ 20°C is not detected after the heater backup.	O	O	1. Activated by a large load of heating or hot water supply. 2. Check the heater power circuit (backup or hot water cylinder heater). • Power supply voltage, breaker, power supply connection	1	115
A13	**Pump failure**	Heating X Hot water O	X	1. Pump has stopped by a certain cause. • Low supply voltage. • High humidity around the electric box of the pump. • Dew condensation to the electric board of the pump. • Pump lock due to clogging or dust. • Once turn off the power supply to the system and turn on again and operate the system. **Mainly low voltage to the system.**	2	116
A14	**Pump failure**	Heating X Hot water O	X	1. Pump has stopped by a certain cause. • Low supply voltage. • High humidity around the electric box of the pump. • Dew condensation to the electric board of the pump. • Pump lock due to clogging or dust. • Once turn off the power supply to the system and turn on again and operate the system. **Mainly except low voltage to the system.**	2	116
E03	**Regular communication failure between hydro unit and remote controller** When there is no regular communication from the remote controller for 3 min, or when no remote controller is equipped.	X	O	1. Check remote controller connection. 2. Defect in the remote controller.	1	—

Check code	Diagnostic functional operation			Determination and action	Number of abnormalities for confirmation	Detailed item
	Operational cause	Backup operation	Automatic reset			
E04	**Regular communication failure between hydro unit and outdoor unit** The serial signal cannot be received from outdoor.	O	O	1. Check the serial circuit. • Miswiring of the crossover between the water heat exchanger and the outdoor unit	1	117
E08	**Duplicate address of Hydro unit, or Duplicate master Hydro unit during Group control**	X	O	1. Set the address No. of DN_12 - 14 correctly for each Hydro unit.	1	—
E14	**Regular communication failure between hydro unit and 0-10 V-IF** When there is no regular communication from the 0-10 V interface for 3 min, or when no 0-10 V interface is equipped.	X	X	1. Check the 0-10 V-IF connection. 2. Defect in the 0-10 V-IF.	1	—
E18	**Regular communication failure between master Hydro unit and slave Hydro unit during Group control**	X	O	1. Check the Hydro unit connection. • Miswiring of the master and slave Hydro unit.	1	—
F03	**TC sensor failure** Open or short circuit in the heat exchange temperature sensor.	O	O	1. Check the resistance value and connection of the heat exchange temperature sensor (TC).	1	117
F10	**TWI sensor failure** Open or short circuit in the water inlet temperature sensor.	O	O	1. Check the resistance value and connection of the water inlet temperature sensor (TWI).	1	119
F11	**TWO sensor failure** Open or short circuit in the water outlet temperature sensor.	Heating X Hot water O	O	1. Check the resistance value and connection of the water outlet temperature sensor (TWO).	1	119
F14	**TTW sensor failure** Open or short circuit in the hot water cylinder sensor.	Heating O Hot water X	O	1. Check the resistance value and connection of the hot water cylinder sensor (TTW).	1	120
F17	**TFI sensor failure** Open or short circuit in the floor temperature sensor. (Only when zone 2 is used)	Heating X Hot water O	O	1. Check the resistance value and connection of the floor-inlet temperature sensor (TFI).	1	120
F18	**THO sensor failure** Open or short circuit in the heater outlet temperature sensor.	Heating X Hot water O	O	1. Check the resistance value and connection of the heater outlet temperature sensor (THO).	1	120
F19	**Detection of THO disconnection failure** When TWO – THO > 15K is detected and 30 sec elapsed.	Heating X Hot water O	X	1. Check for any disconnection of the heater outlet temperature sensor (THO). 2. Defect of the flow sensor.	1	121
F20	**TFI sensor failure** When TWO – TFI > 50K is detected and TFI < TWI – 5K is detected 20 min.	Heating X Hot water O	X	1. Check the connection of the floorinlet temperature sensor (TFI).	1	122
F23	**Low pressure sensor failure** Open circuit in the low pressure sensor.	O	O	1. Check the connection (body or connection wiring) of the low pressure sensor. 2. Check the refrigeration cycle (gas leak)	1	123

Check code	Diagnostic functional operation			Determination and action	Number of abnormalities for confirmation	Detailed item
	Operational cause	Backup operation	Automatic reset			
F30	**Extended IC failure** When the extended IC is abnormal.	X	X	1. Replace the water heat exchange control board.	1	123
F32	**Flow sensor failure**	Heating X Hot water O	O	1. Check the connection of flow sensor. 2. Check the flow rate detected by flow sensor and actual flow.	1	124
F33	**Flowing quantity failure** 1)Detected by TC sensor TC ≥ 68°C is detected in the heating or hot water supply heat pump operation (except for defrosting).	Heating X Hot water O	X	• No or little water flow • Defect of the flow sensor	4	124
	2)Detected **by** flowing quantity When the stopped built-in circulation pump starts its operation, the flow sensor status is detecting “water flow”.			• Defect of the flow sensor • Misconnection of flow sensor and low pressure sensor • Check the water flow from the external pump.	2	
L02	**Combination failure** Model name of the outdoor unit is different.	X	X	1. Check the model name of the outdoor unit.	1	125
L03	**Duplicate main Hydro unit during Group control** There are more than one header units in group.	X	X	1. Check Hydro Unit addresses. (DN_14) 2. Check for any change made to remote control connection (group / individual) since hydro address setting.	1	—
L07	**Communication failure** Individual hydro units have a group line.	X	X	1. Replace the water heat exchange control board.	1	125
L08	**Hydro Unit group / Address unset** Address setting has not been performed for Hydro units.	X	X	1. Check Hydro Unit addresses. Note: This code is displayed when power is turned on for the first time after installation.	1	—
L09	**Communication failure** The capability code for the hydro unit has not been set.	X	X	1. Check the setting of the DN_11 capability specifications. 601 Hydro = 0010 1101, 1401 Hydro = 0015	1	125
L16	**Setting failure** When ZONE1 has not been set, while ZONE2 has been set.	X	X	1. Check the DN_6B9, 6BA and set correctly.	1	125
L22	**0-10 V Setting failure** DN680 settings in group control are not the same for all units.	X	X	1. Check the 0-10 V setting for all units. (DN_680)	1	125
P31	**Slave Hydro unit failure which occurs when failure occurs in master Hydro unit**	X	O	1. Check the remote controller connection. 2. Defect in the remote controller. 3. Set the address No. of DN_12 - 14 correctly for each Hydro unit.	1	—

Defect mode detected by the outdoor unit

O ... Possible
× .... Not possible

Check code	Diagnostic functional operation			Determination and action	Number of abnormalities for confirmation	Detailed item
	Operational cause	Backup operation	Automatic reset			
F04	**TD sensor failure** Open or short circuit in the discharge temperature sensor.	O	X	1. Check the resistance value and connection of the discharge sensor (TD).	4	118 135
F06	**TE sensor failure** Open or short circuit in the heat exchange temperature sensor.	O	X	1. Check the resistance value and connection of the heat exchange temperature sensor (TE).	4	118 135
F07	**TL sensor failure** Open or short circuit in the heat exchange temperature sensor.	O	X	1. Check the resistance value and connection of the heat exchange temperature sensor (TL).	4	118 135
F08	**TO sensor failure** Open or short circuit in the outdoor temperature sensor.	O	X	1. Check the resistance value and connection of the outdoor temperature sensor (TO).	1	119 135
F12	**TS sensor failure** Open or short circuit in the suction temperature sensor.	O	X	1. Check the resistance value and connection of the suction temperature sensor (TS).	4	136
F13	**TH sensor failure** Open or short circuit in the heat sink temperature sensor.	O	X	1. Replace the outdoor control board.	8	136
F15	**TE, TS sensors failure** TE, TS sensor connections are opposite.	O	X	1. Check for any wrong installation of the heat exchange temperature sensor (TE) and the suction temperature sensor (TS).	4	136
F24	**PD sensor failure** Open or short circuit the high pressure sensor.	O	X	1. Check the value of PD sensor by the remote controller. 2. Check the connection of PD sensor.	4	136
F31	**EEPROM failure**	O	X	1. Replace the outdoor control board. PC board <401, 601> MCC-1768 <801, 1101, 1401> MCC-1675 <801, 1101, 1401>MCC-1781 (3 phase)	1	136
H01	**Compressor breakdown** Although operation has started, operation frequency decreases and operation stops.	O	X	1. Check the power supply voltage (3 phase) <801,1101,1401> : AC380-415V ±10% Other than the above : AC220-240V ±10% 2. Over-loaded condition of the refrigeration cycle. 3. Check that the service valve is fully open.	8	127
H02	**Compressor lock** Over-current detection after compressor start-up.	O	X	1. Defect of compressor (lock) – Replace the compressor. 2. Defect of compressor wiring (open phase).	8	127

Check code	Diagnostic functional operation			Determination and action	Number of abnormalities for confirmation	Detailed item
	Operational cause	Backup operation	Automatic reset			
H03	**Defect in the current detection circuit**	O	X	1. Check the connection of the connector and wiring. 2. Check the power supply voltage and frequency. (3 phase) <801,1101,1401> : AC380-415V ±10% Other than the above : AC220-240V ±10% frequency 50Hz±5% 3. Replace the outdoor control board. <401,601> MCC-1768 <801,1101> MCC-1705 <1401> MCC-1758 (3 phase)<801,1101,1401> MCC-1780	8	—
H04	**Operation of case thermostat** When the case thermostat exceeds 125°C.	O	X	1. Check the refrigeration cycle (gas leak). 2. Check the case thermostat and connector. 3. Check that the service valve is fully open. 4. Defect of the pulse motor valve. 5. Check for kinked piping.	10	128
L10	**Unset service PC board jumper** Jumpers have not been cut.	O	X	1. Cut jumpers (3 phase) <801,1101,1401> : Cut J800-J802 of MCC-1781. Other than the above : Cut J800-J803.	1	128
L15	**Combination failure** Model name of the Hydro unit is different.	X	X	1. Check the model name of the Hydro unit. 2. Check the DN_6BD.	1	128
L29	**The communication between the outdoor PC board MCUs failure** No communication signal between Interface CDB and Compressor, fan IPDU.	O	X	1. Check the connection of connector and wiring. 2. Check the outdoor control board.	1	128
P02	Converter circuit failure	O	X	1. Check the power supply voltage and frequency . (AC380 - 415 V±10%, frequency 50Hz±5%) 2. Replace the outdoor control board. (3 phase)<801,1101,1401> MCC-1780”	8	

Check code	Diagnostic functional operation			Determination and action	Number of abnormalities for confirmation	Detailed item
	Operational cause	Backup operation	Automatic reset			
P03	**Discharge temperature failure** 1)High temperature When the discharge temperature sensor (TD) exceeds 111°C.	O	X	1. Check the refrigeration cycle (gas leak). 2. Defect of the pulse motor valve. 3. Check the resistance value of the discharge temperature sensor (TD).	4	129
	2)INJ_2-way valve failure (801, 1101, 1401) When the INJ_2-way valve opening is detected in heating or hot water supply mode even in situation INJ_2-way valve not working.			1. Defect of the INJ_2-way valve. 2. Dirt clogging in the refrigeration cycle.	8	
	3)INJ_PMV failure (801, 1101, 1401) When too big INJ_PMV opening value is detected in heating or hot water supply mode.			1. Defect of the INJ_PMV. 2. Dirt clogging in the refrigeration cycle.	8	
P04	**The high pressure switch failure**	O	X	1. Almost no or little water flow. 2. Defect of the flow sensor. 3. Defect in the high pressure switch. 4. Failure of a refrigerant valve to open.	10	130
P05	**The power supply voltage failure** When the power supply voltage is extremely high or low.	O	X	1. Check the power supply voltage. (3 phase) <801,1101,1401> : AC380-415V ±10% Other than the above : AC220-240V ±10%	8	131
P07	**Overheating of heat sink failure** When the heat sink exceeds 105°C.	O	X	1. Check the thread fastening and heat sink grease between the outdoor control board and the heat sink. 2. Check the heat sink fan duct.	4	131
P15	**Detection of gas leak** When the discharge temperature sensor (TD) exceeds 106°C for consecutive 10 min. When the suction temperature sensor (TS) exceeds 60°C for cooling or 40°C for heating for 10 consecutive min. When TG ≤ TC -10 K is detected and TG ≤ TWI-15 K is detected 10min. (hot water supply, heating) When TG ≤ TE -12 K is detected for 10min. (cooling)	O	×	1. Check the refrigeration cycle (gas leak). 2. Check that the service valve is fully open. 3. Defect of the pulse motor valve. 4. Check for kinked piping. 5. Check the resistance value of the discharge temperature sensor (TD) and the suction temperature sensor (TS). 6. Check the PD sensor by remote controller.	8	131
P19	**The 4-way valve inversion failure** When the heat exchange temperature sensor (TE) exceeds 30°C or the suction temperature sensor (TS) exceeds 50°C during the heat pump operation.	O	×	1. Check the operation of the 4-way valve unit or the coil characteristics. 2. Defect of the pulse motor valve. 3. Check the resistance value of the heat exchange temperature sensor (TE) and the suction temperature sensor (TS).	4	132

Check code	Diagnostic functional operation			Determination and action	Number of abnormalities for confirmation	Detailed item
	Operational cause	Backup operation	Automatic reset			
P20	**High pressure protection operation** When an abnormal stop occurs due to the high pressure release control. When the high pressure sensor (PD) detects 4.19 MPa.	O	×	1. Check that the service valve is fully open. 2. Defect of the pulse motor valve. 3. Check the outdoor fan system (including clogging). 4. Over-filling of refrigerant. 5. Check the value of the high pressure sensor (PD). 6. The water piping is too short. Install a buffer tank, or set the setting temperature lower.	10	133
P22	**Outdoor fan system failure** When a DC fan rotor position detection NG, element short circuit, loss of synchronization, or abnormal motor current occurs.	O	×	1. Check the lock status of the motor fan. 2. Check the connection of the fan motor cable connector. 3. Check the power supply voltage. (AC220-240 V± 10% (single phase) or AC380-415 V± 10% (three phase))	8	134
P26	**Short circuit of the compressor driver element failure** When an abnormal short circuit of IGBT is detected.	O	×	1. P26 abnormality occurs when operating with the compressor wiring disconnected … Check the outdoor control board. 2. No abnormality occurs when operating with the compressor wiring disconnected … Compressor rare short.	8	134
P29	**Compressor rotor position failure** The rotor position in the compressor cannot be detected.	O	×	1. Even if the connection lead wire of the compressor is disconnected, it stops due to an abnormality in the position detection … Replace the outdoor control board. 2. Check the wire wound resistor of the compressor. Short circuit … Replace the compressor.	8	134

Check code: H04, P04, P29

After the failure is detected, It takes approximately 40 - 50 minutes while the check code is displayed on the remote controller.

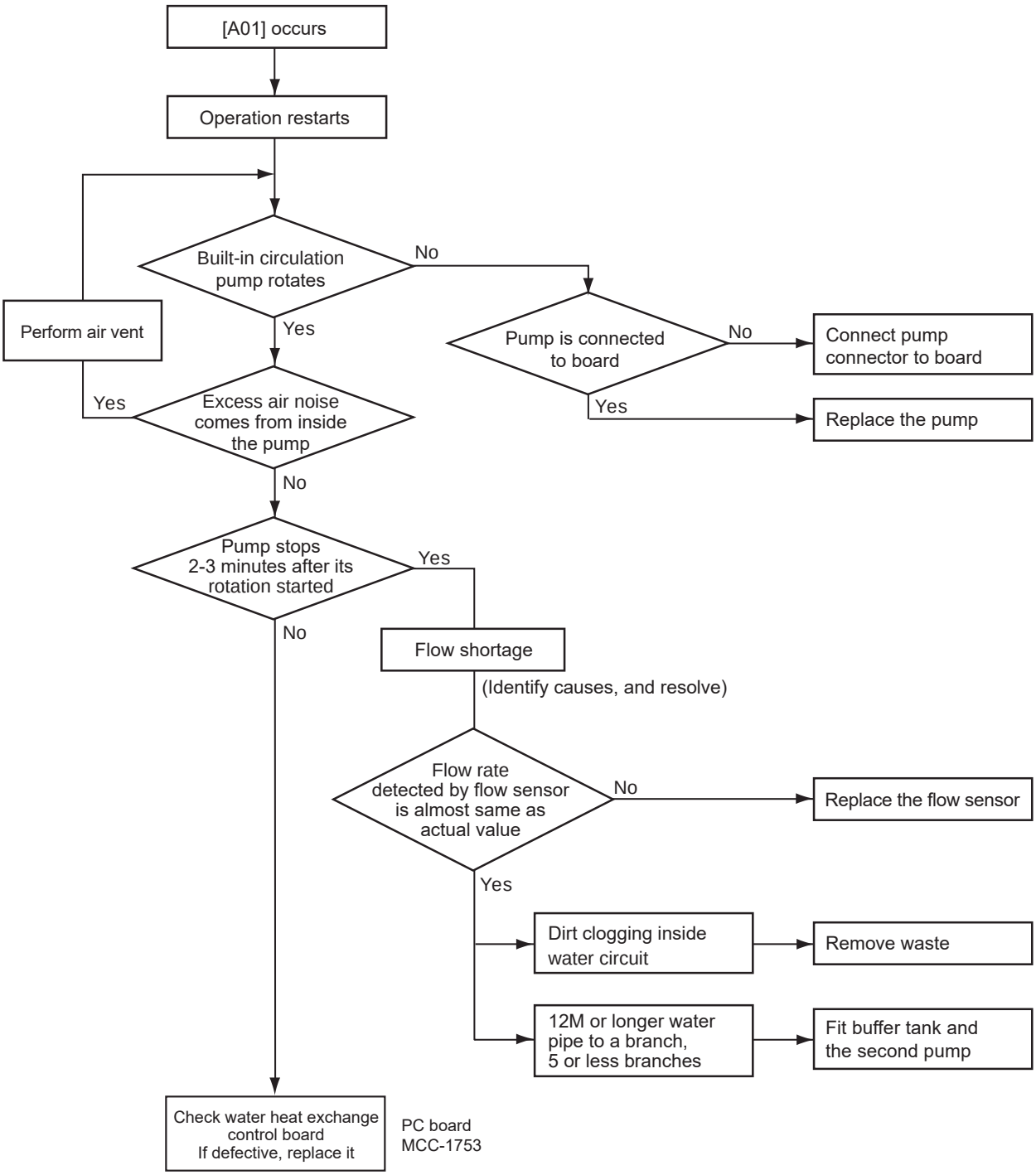
Defect mode detected by the remote controller

Check code	Diagnostic functional operation			Determination and action
	Operational cause	Status of air to water heat pump	Condition	
Not displaying at all (cannot operate by the remote controller)	**No communication between hydro unit an remote controller** • The remote controller wiring is not connected correctly. • The hydro unit has not been turned on.	Stop	–	Defect in the remote controller power supply 1. Check the remote controller wiring. Check the remote controller. 2. Check the hydro unit power supply wiring. 3. Check the water heat exchange control board.
E01	**No communication between hydro unit and remote controller** • Disconnection of the crossover between the remote controller and the base unit of the Hydro unit (detected on the remote controller side).	Stop (Automatic reset)	Displayed when the abnormality is detected.	Defect in the reception of the remote controller 1. Check the remote controller crossover. 2. Check the remote controller. 3. Check the hydro power supply wiring. 4. Check the water heat exchanger board.
E02	**Defect in the signal transmission to the hydro unit.** (Detected on the remote controller side)	Stop (Automatic reset)	Displayed when the abnormality is detected.	Defect in the transmission of the remote controller 1. Check the transmitter circuit inside the remote controller. … Replace the remote controller.
E09	**Several remote controller base units** (Detected on the remote controller side)	Stop (The handset continues)	Displayed when the abnormality is detected.	1.2 Check several base units with the remote controller … The base unit is only one, and others are handsets.

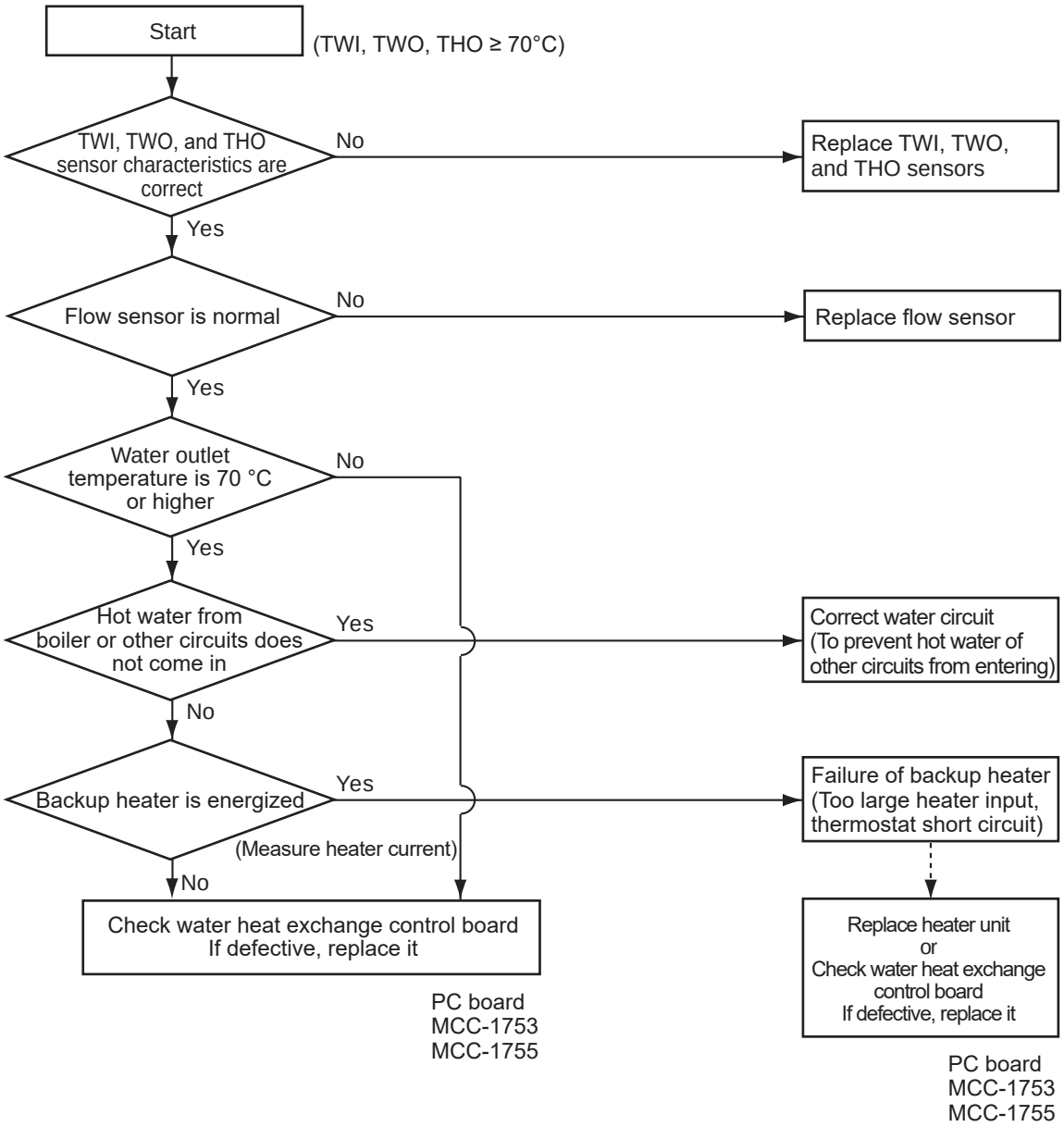
8-4. Diagnosis flow chart for each check code

8-4-1. Hydro unit failure detection

[A01] Flowing quantity failure

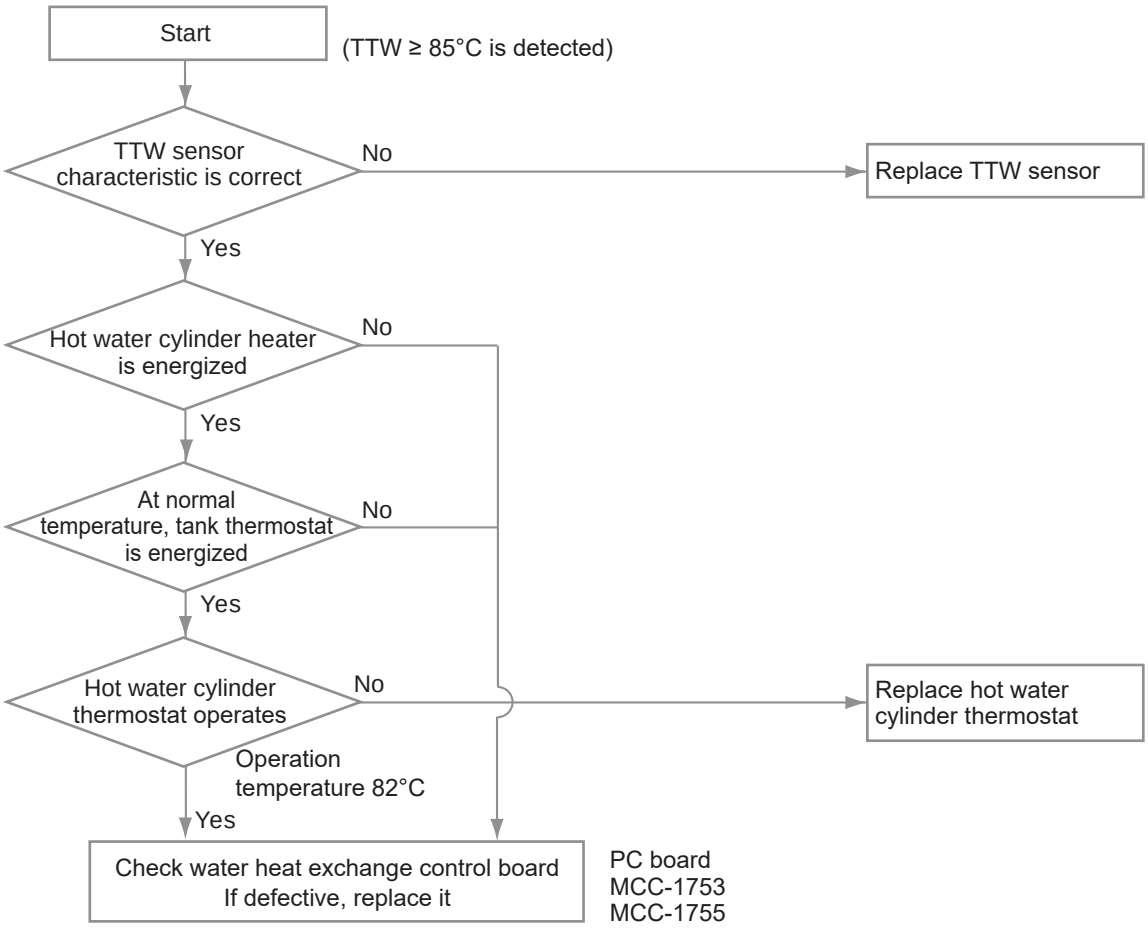


[A02] Temperature increase failure (heating)



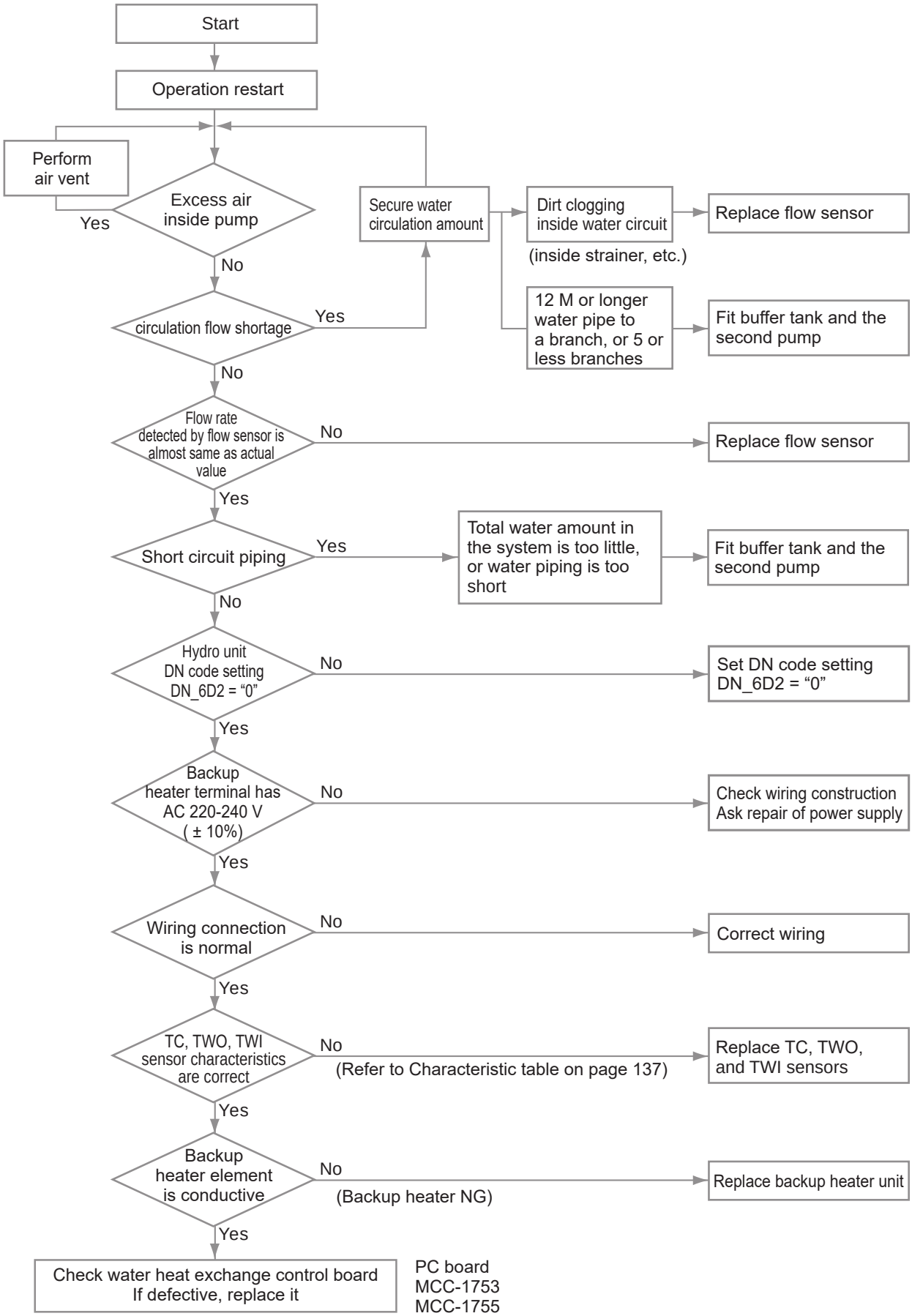
- If boiler setting is ON (DN_6B0 is “1”) and DN_62 is “1” and actual boiler output is “ON”, the A02 failure is not detected.

[A03] Temperature increase failure (hot water supply)

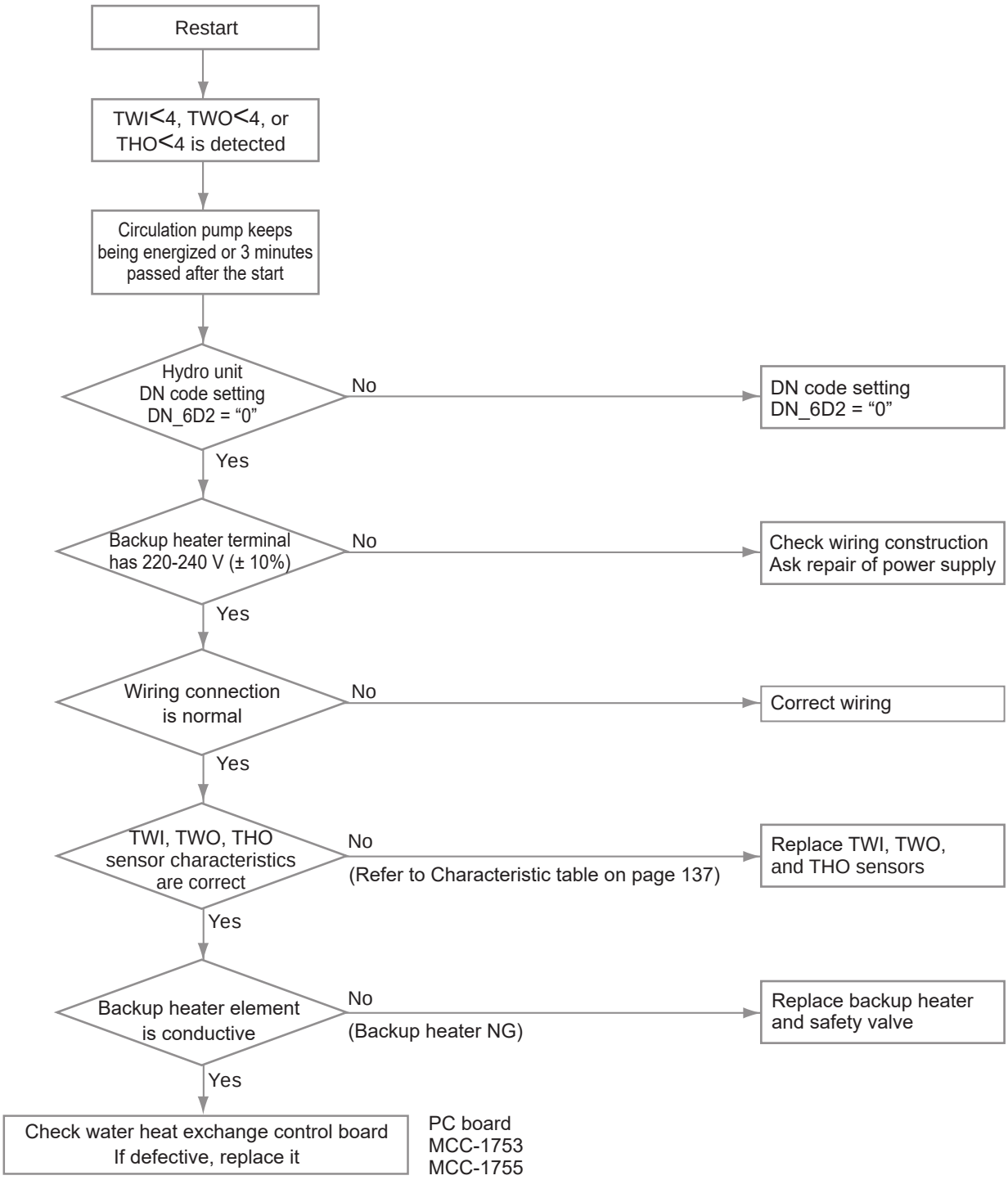


[A04] Antifreeze operation (1)

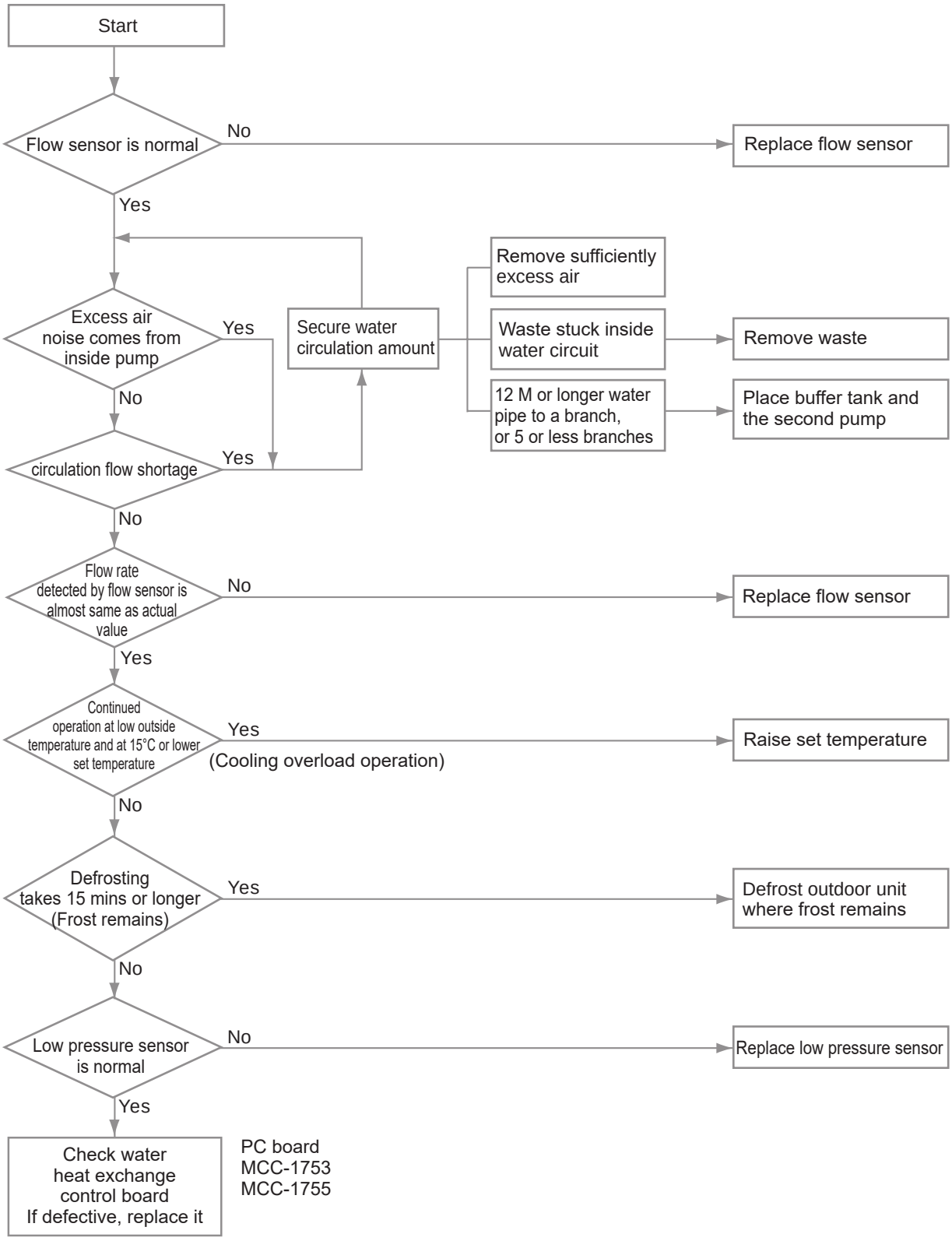
When the outside temperature and inlet water temperature is low (approx. 20°C or lower) and the room load is large (operation frequency ≥ rating), the freeze prevention control may be activated.



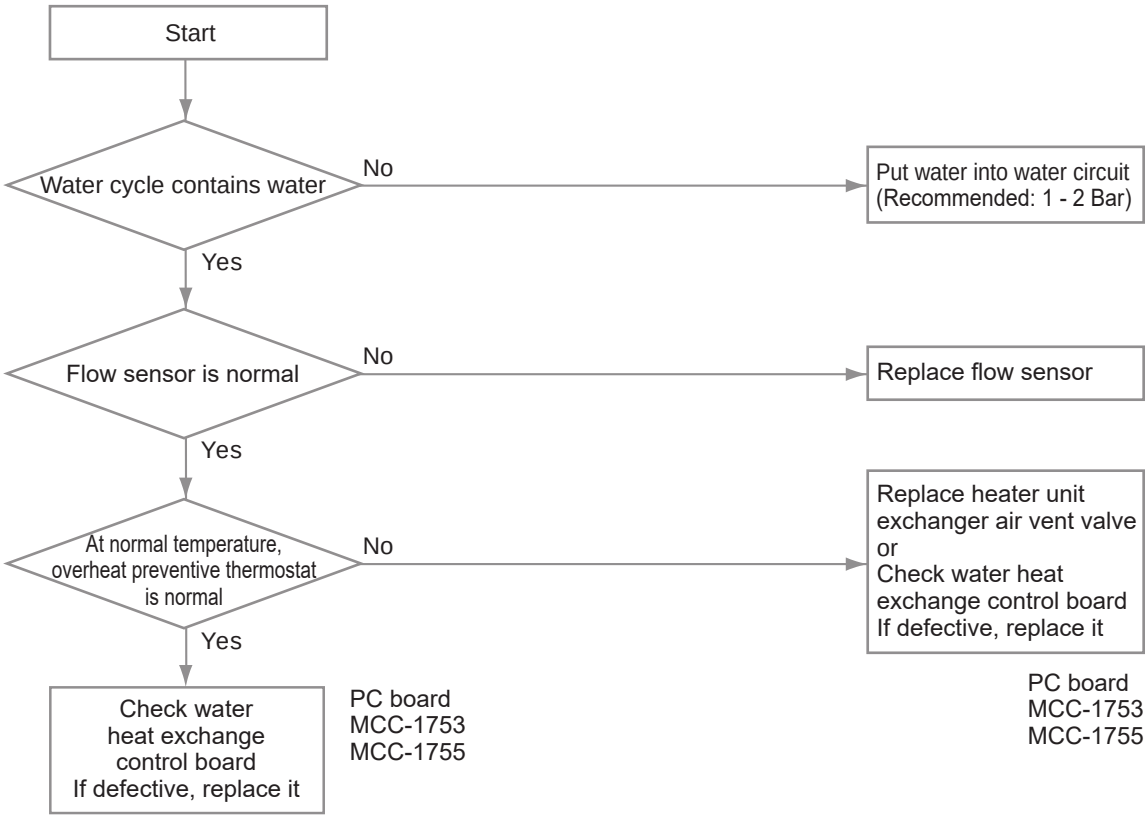
[A05] Piping antifreeze operation



[A08] Low pressure sensor operation failure

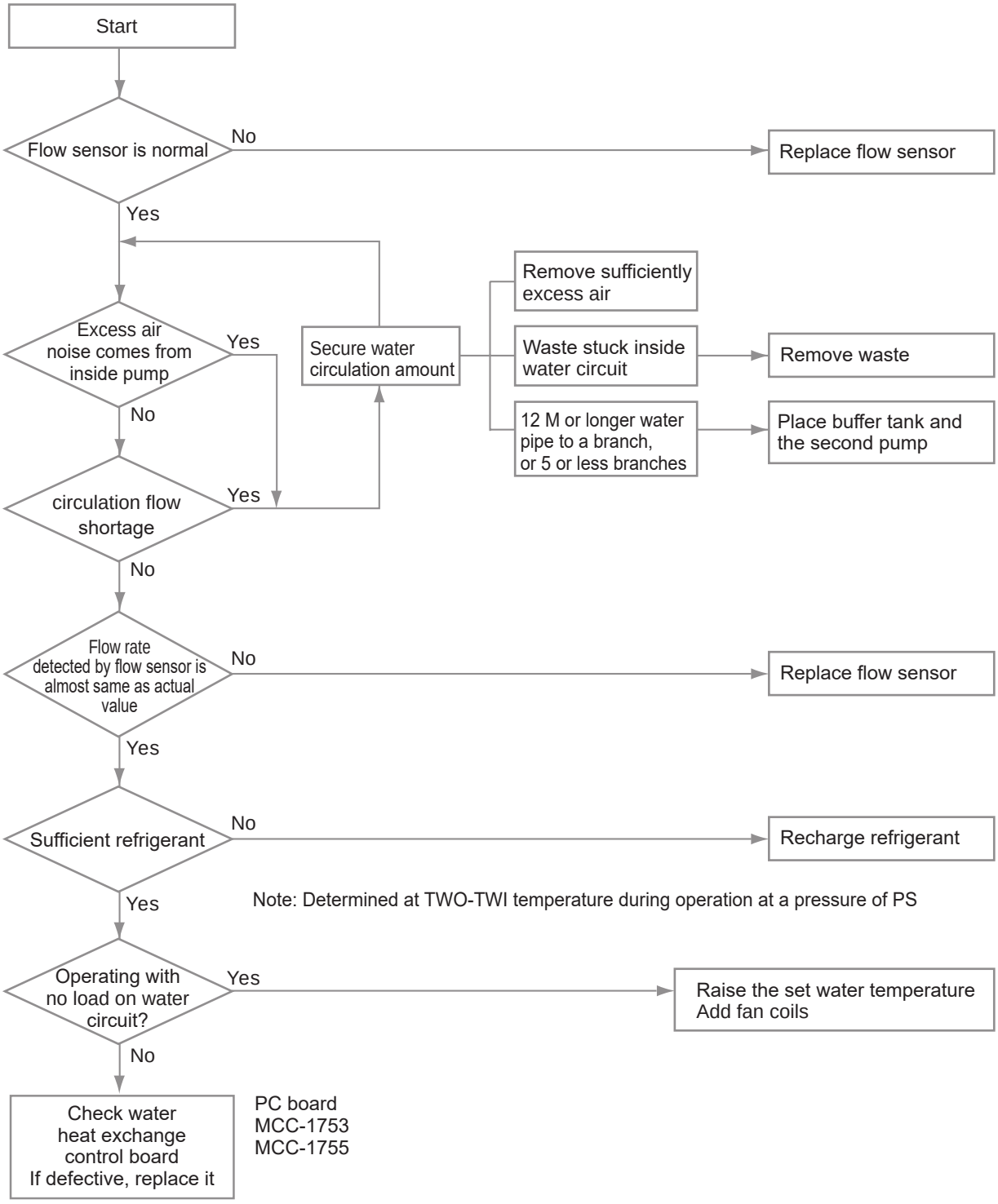


[A09] Overheat protection operation

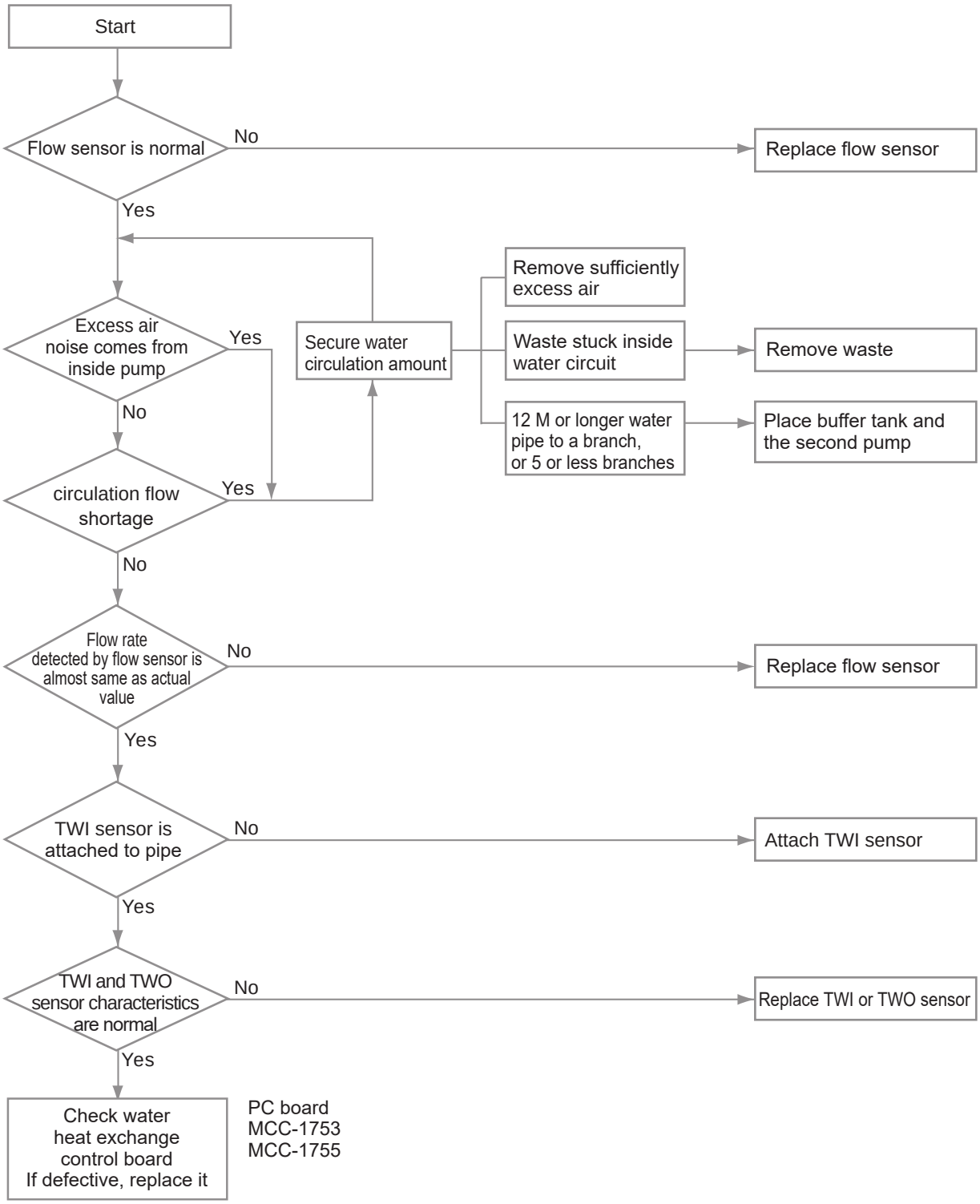


* Replace water heat exchange control board or overheat preventive thermostat failure: After the control board is replaced, if the same operation repeats, the overheat preventive thermostat is determined as defective (does not operate at 75°C).

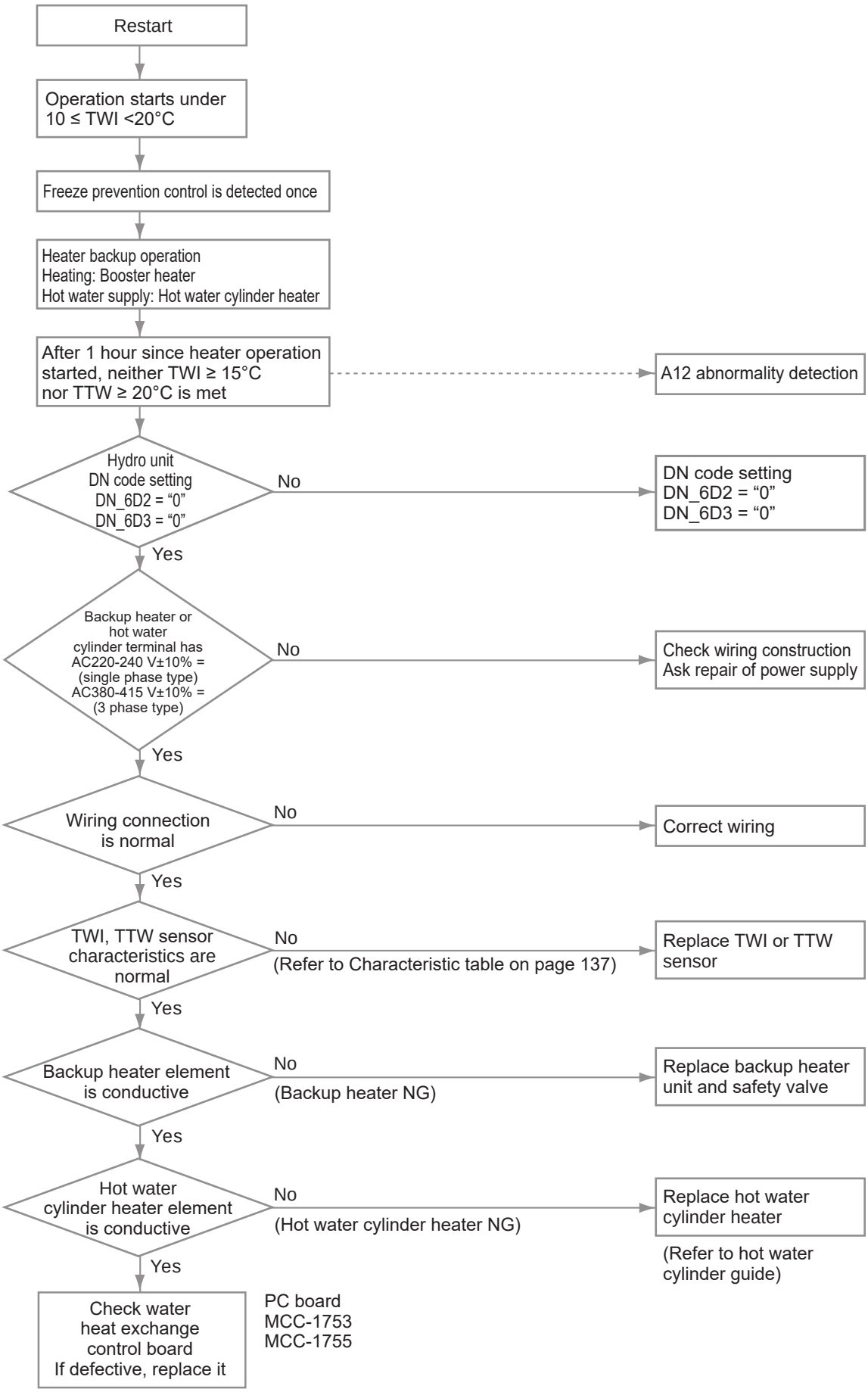
[A10] Antifreeze operation (2)



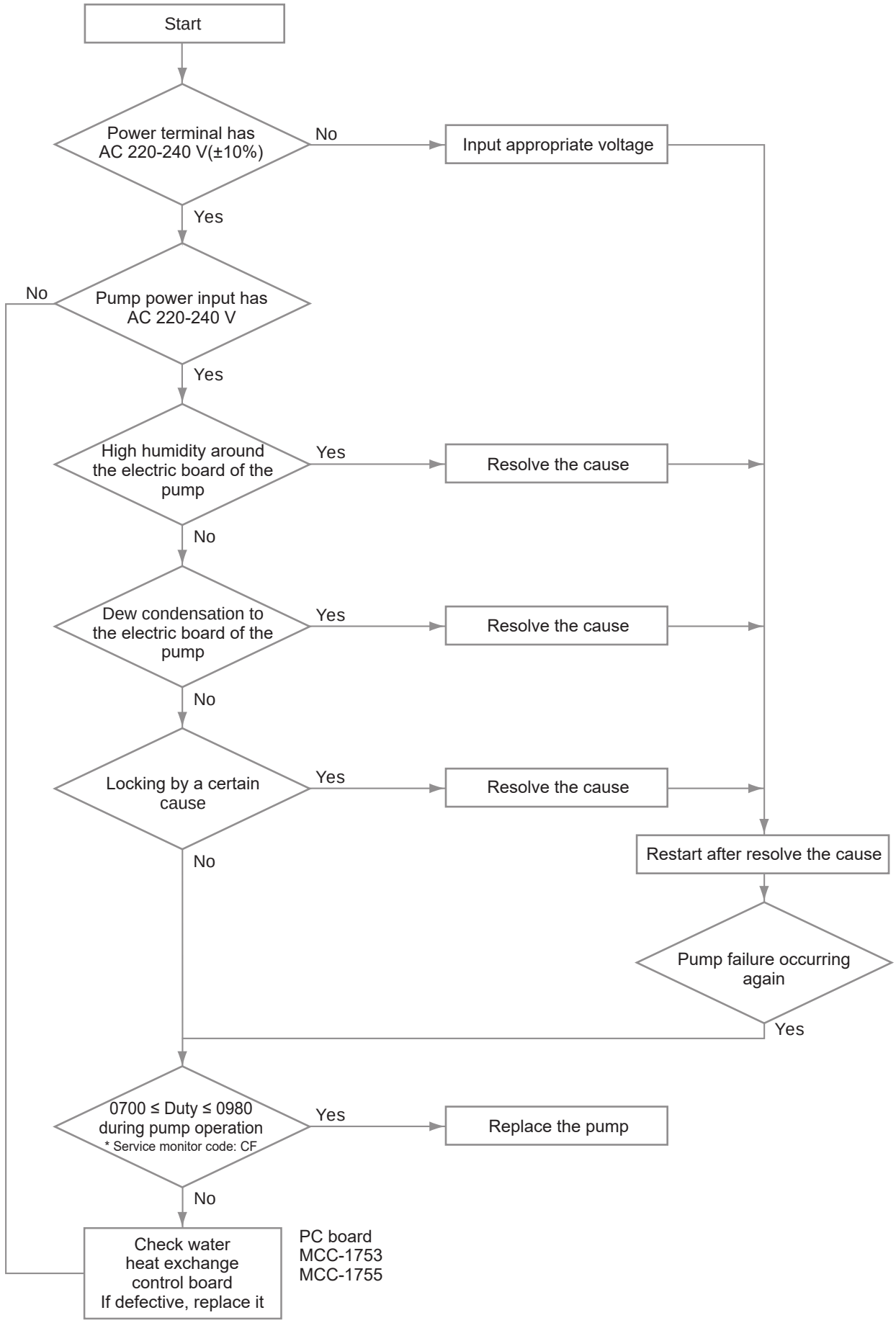
[A11] Operation of the release protection



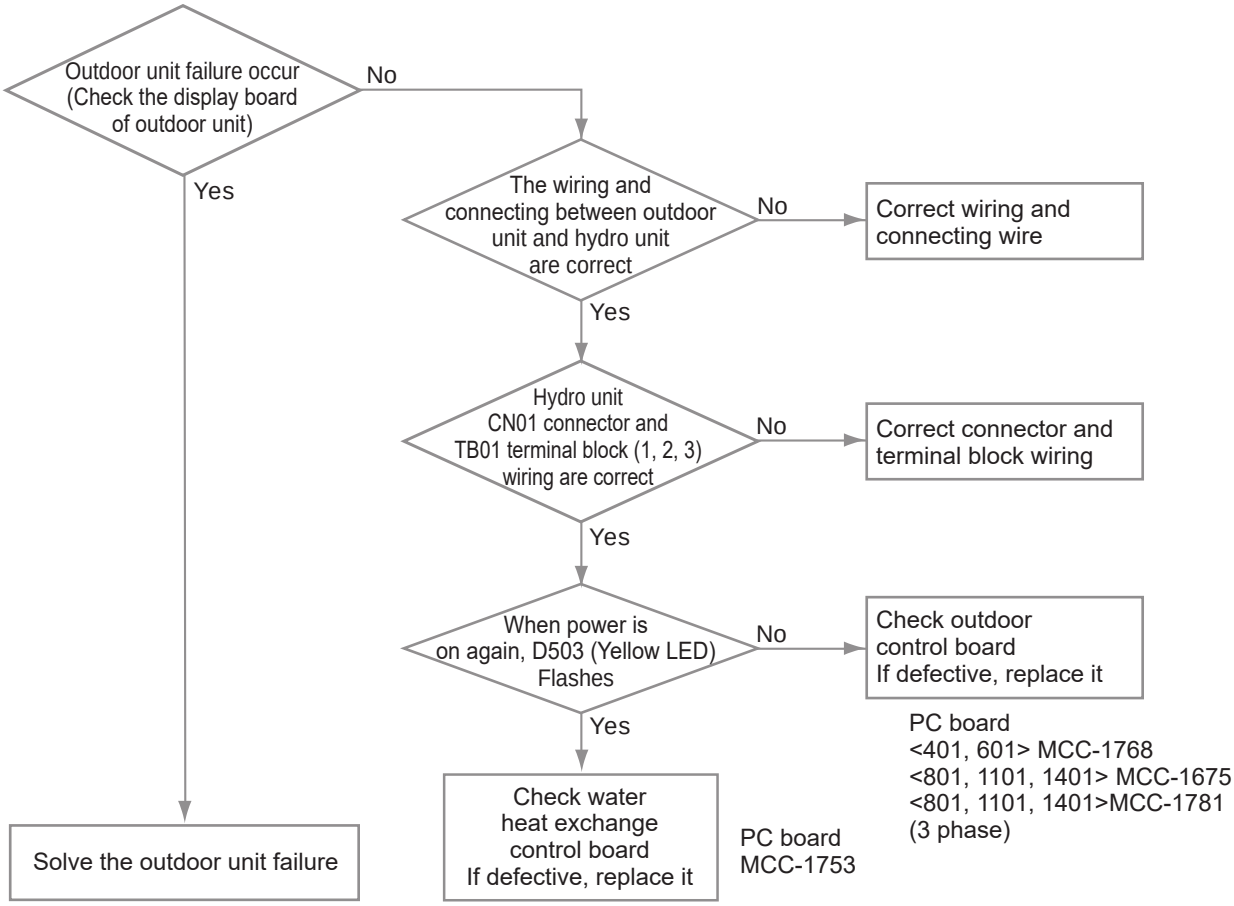
[A12] Heating, hot water heater failure



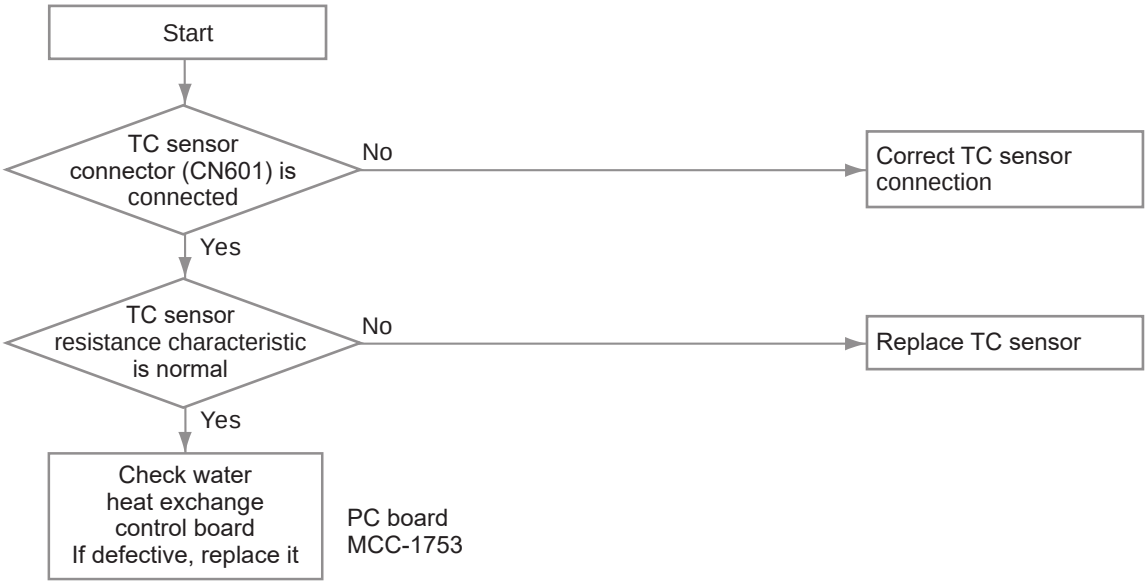
[A13] [A14] Pump failure



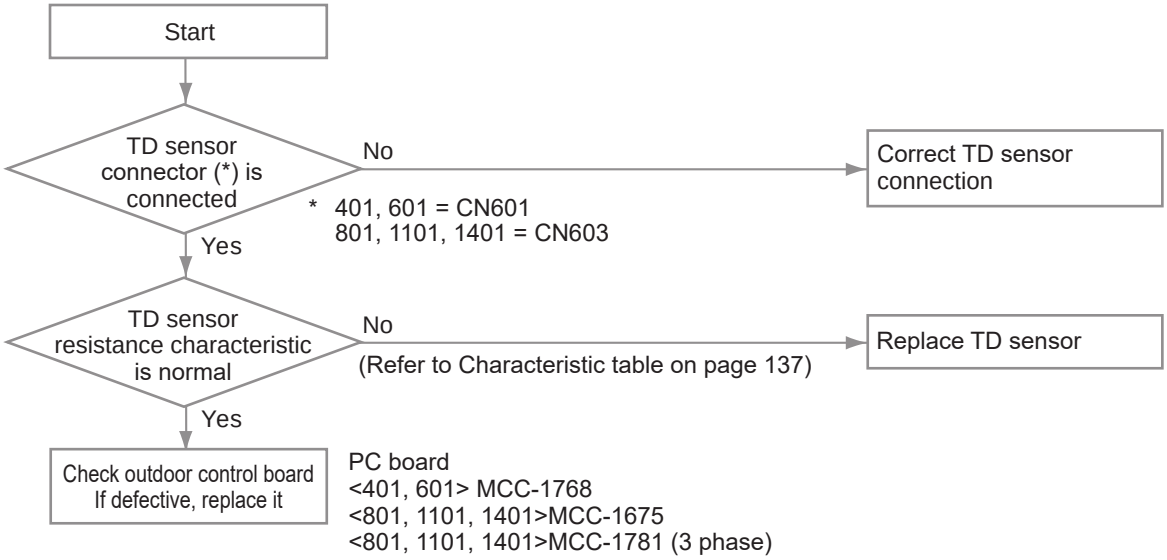
[E04] Regular communication failure between hydro unit and outdoor unit



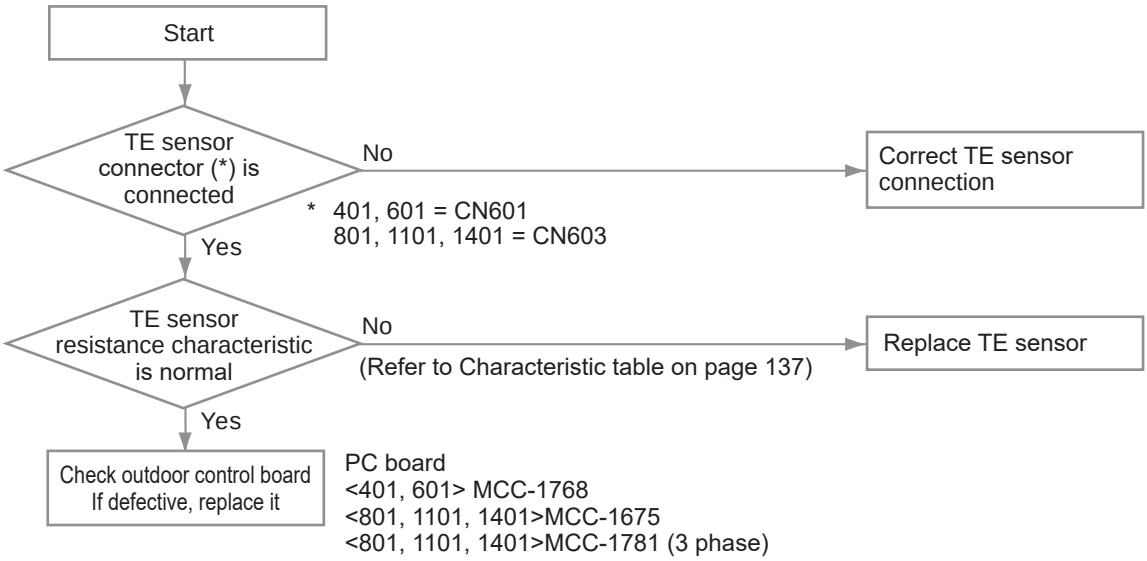
[F03] TC sensor failure



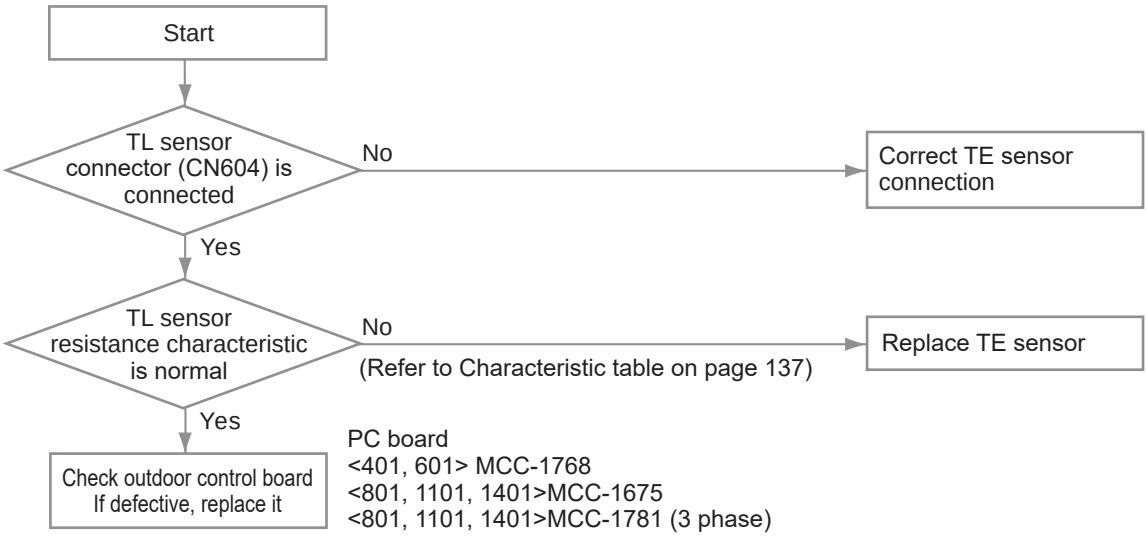
[F04] TD sensor failure



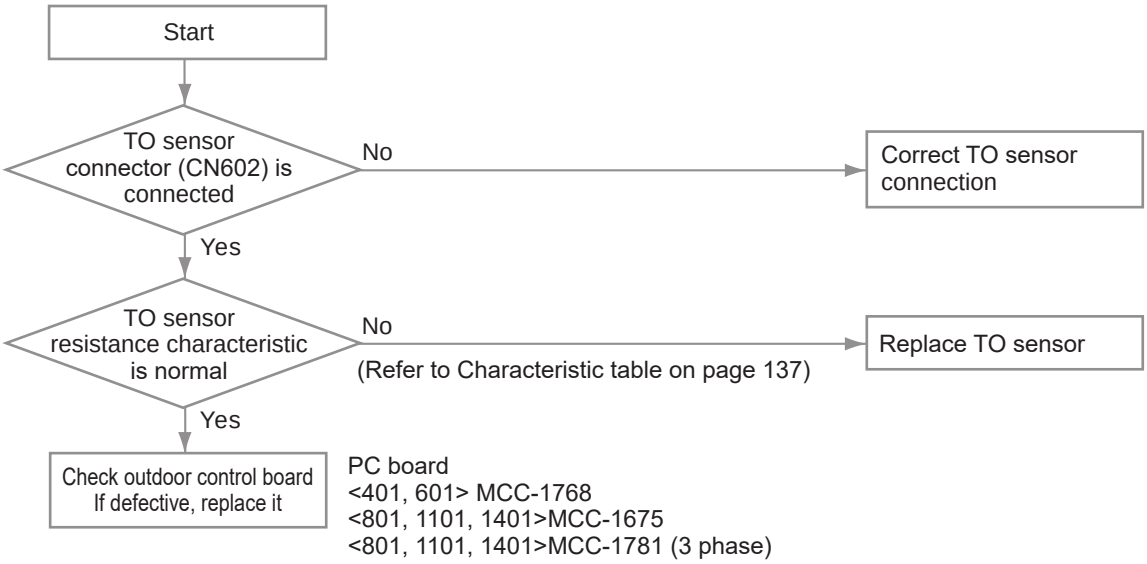
[F06] TE sensor failure



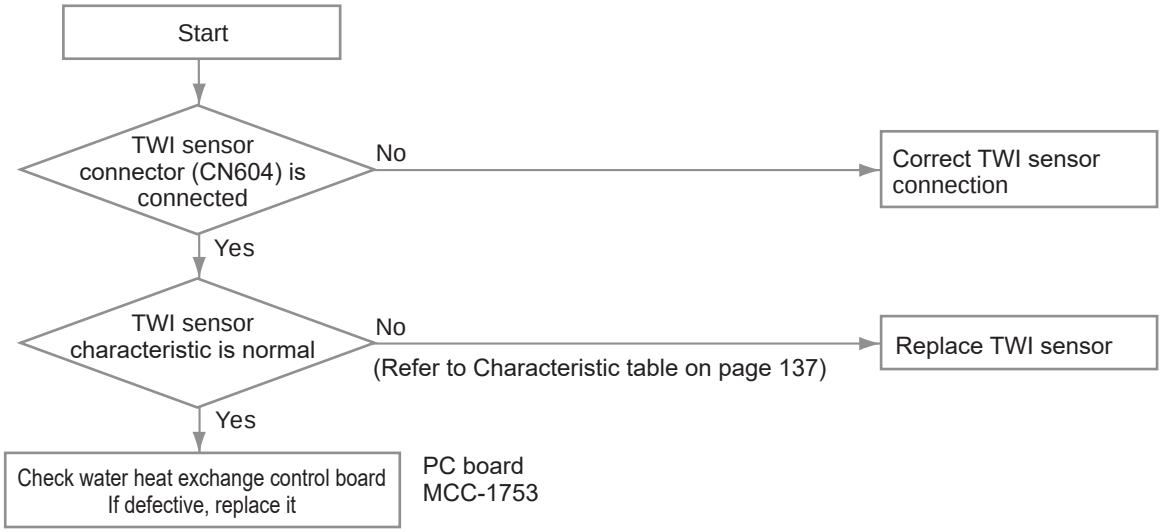
[F07] TL sensor failure



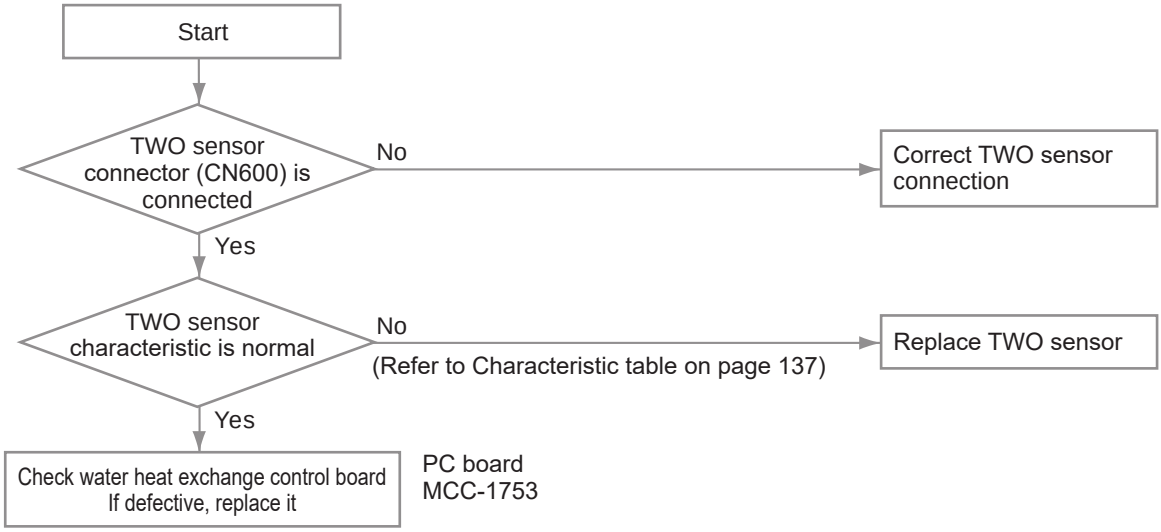
[F08] TO sensor failure



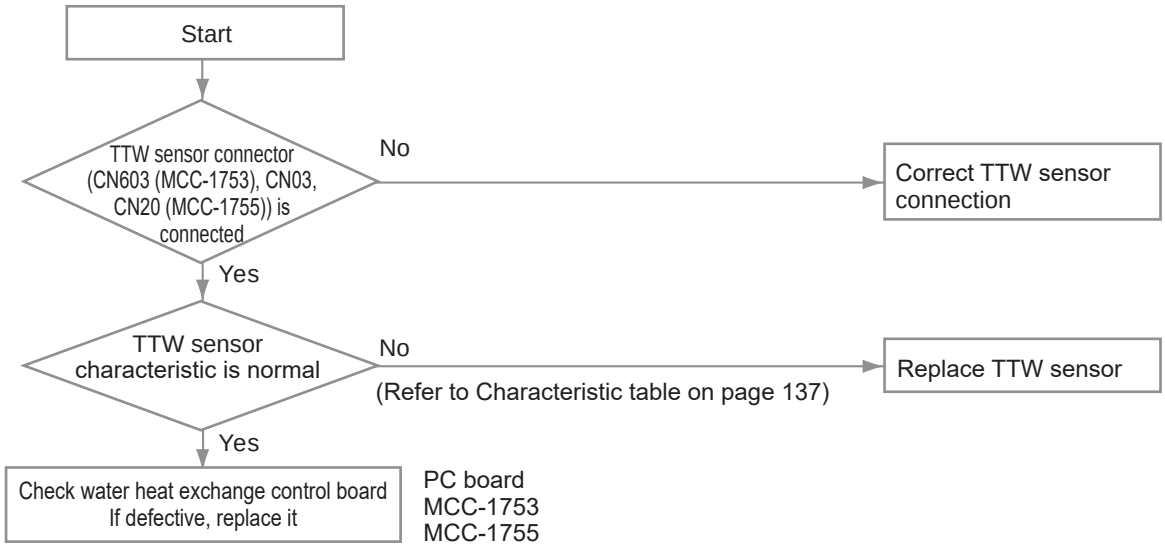
[F10] TWI sensor failure



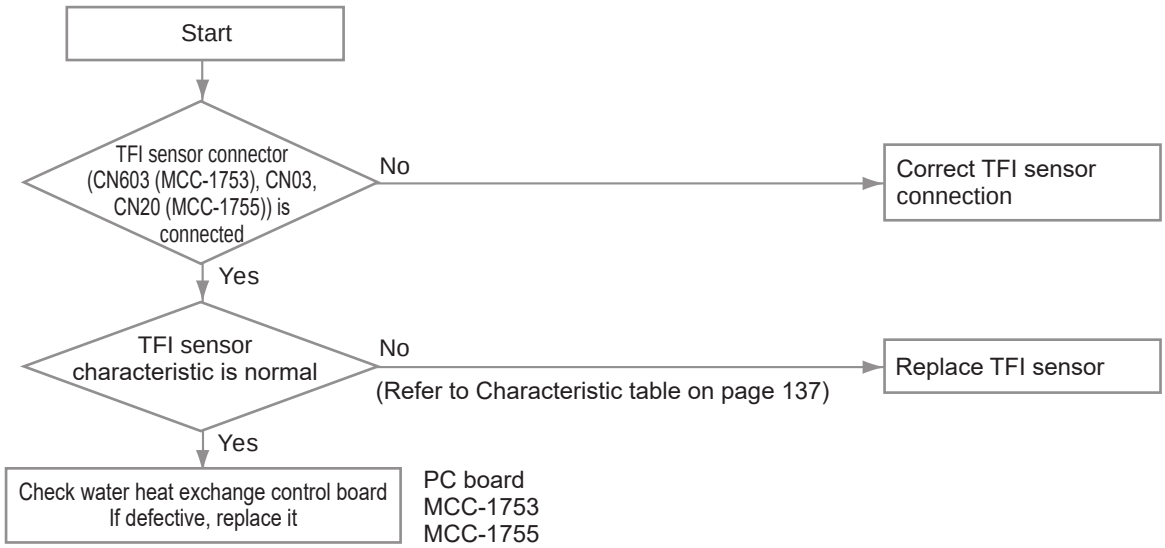
[F11] TWO sensor failure



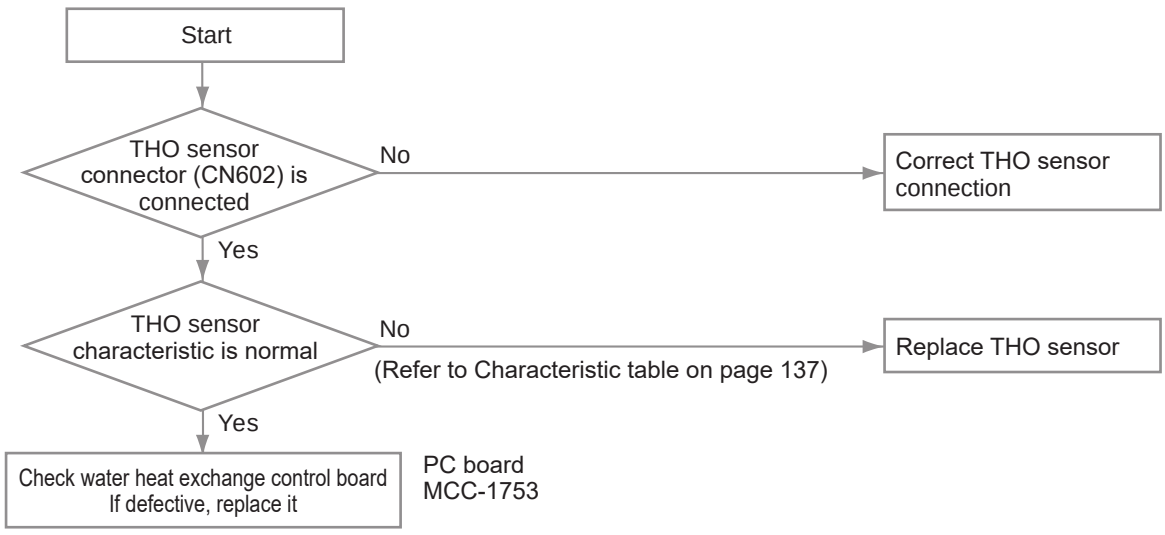
[F14] TTW sensor failure



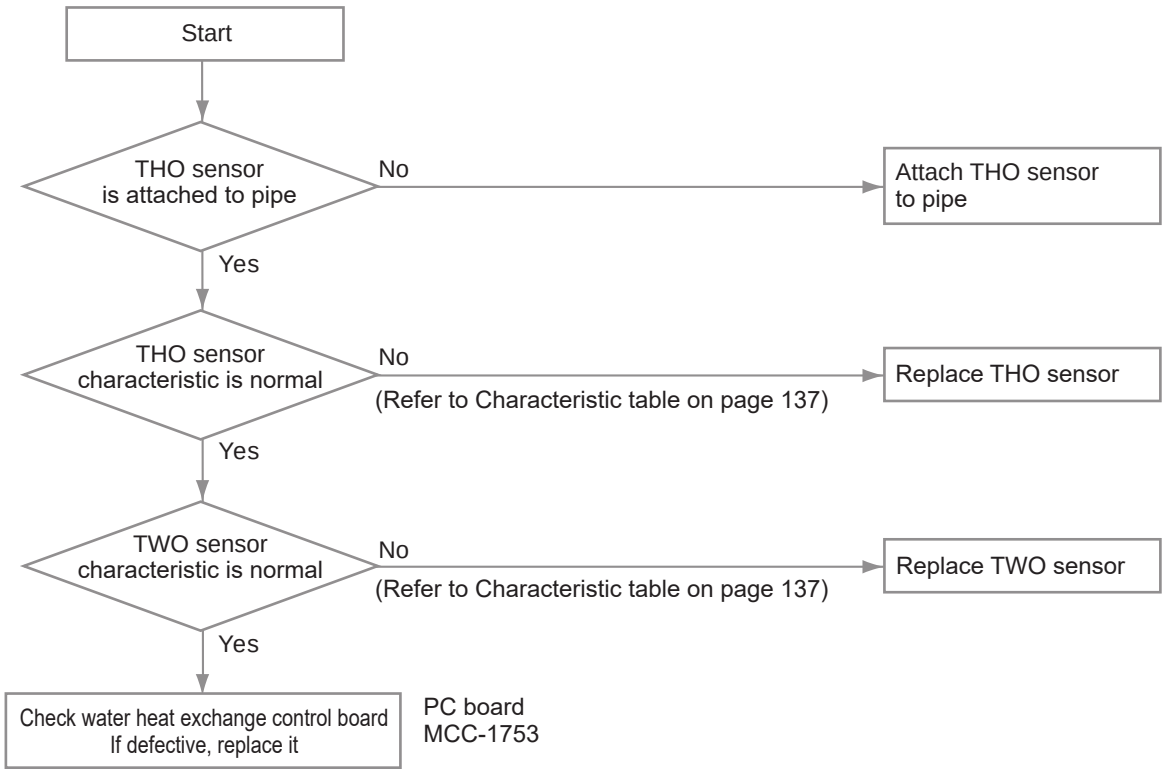
[F17] TFI sensor failure



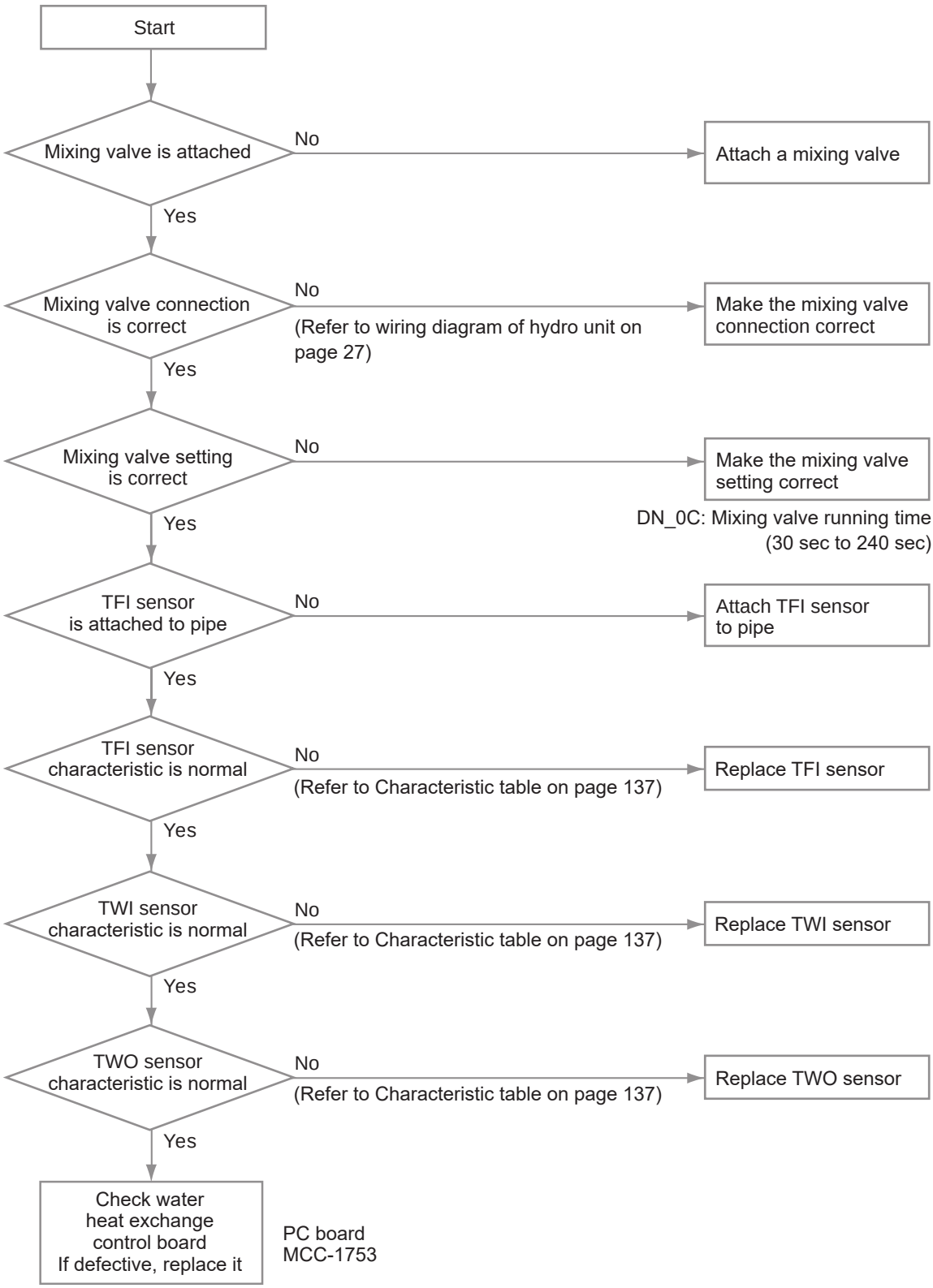
[F18] THO sensor failure



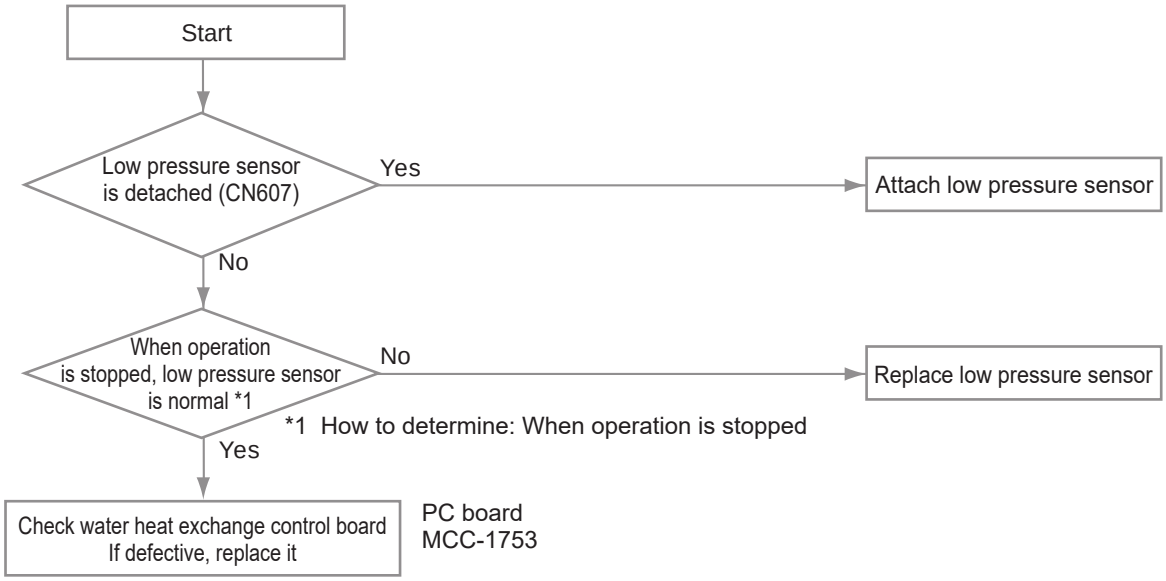
[F19] Detection of THO disconnection failure



[F20] TFI detach failure



[F23] Low pressure sensor failure

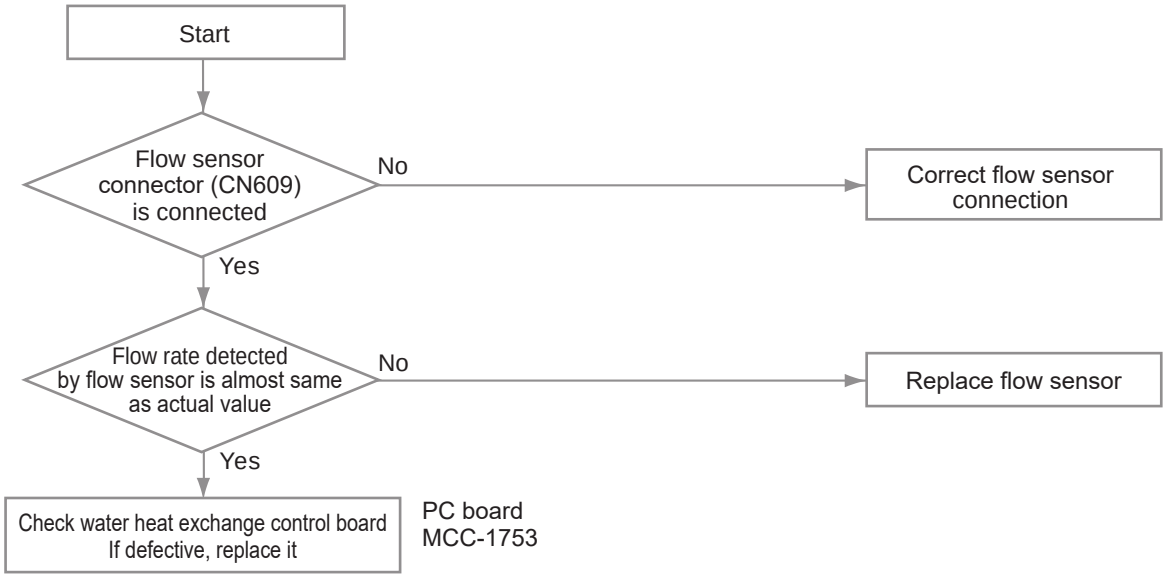


[F30] Enhanced IC failure

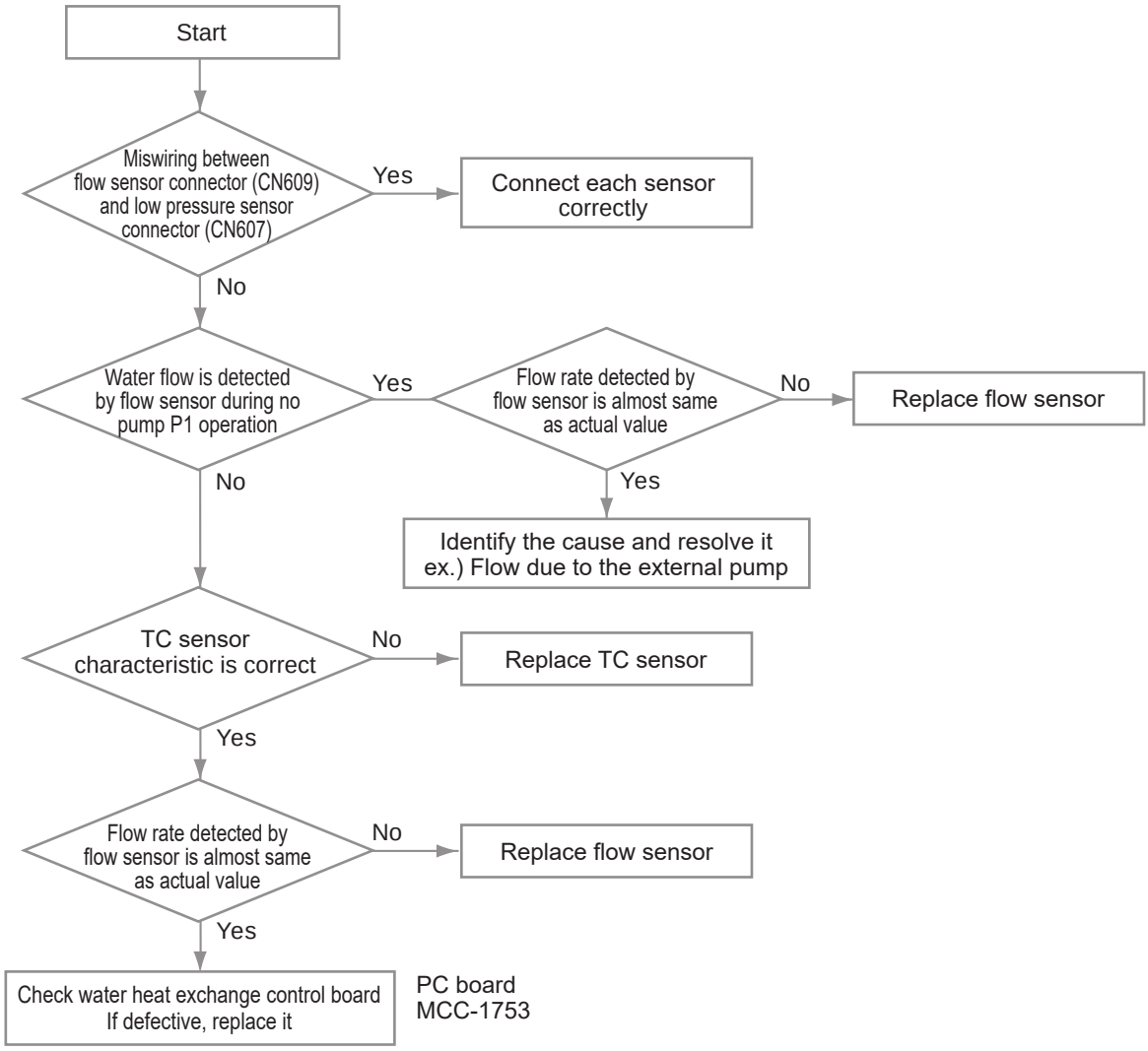
Enhanced IC on water heat exchanger control board is abnormal.
Check water heat exchange control board.
If defective, replace it.

PC board
MCC-1753

[F32] Flow sensor failure



[F33] Flowing quantity failure



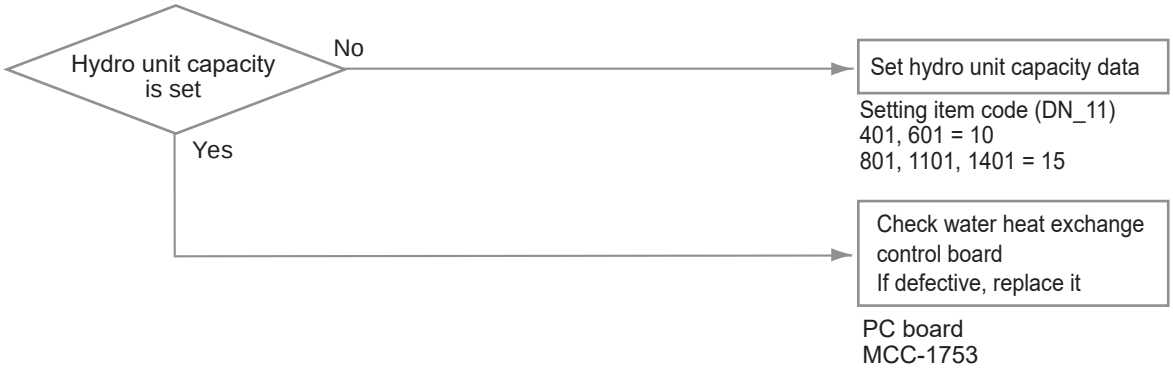
[L02] Combination failure

The model name of the outdoor unit is not HWT-xxxxH(8)(R)W-E.
Replace the outdoor unit with the proper model.
And check the combination of INJ type or not is correct.

[L07] Communication failure

At the time of power on, detecting the above failure automatically activates the automatic address setting mode.
(Check code is not output)
Note that if the above failure is detected in the automatic address setting mode, a check code may be output.

[L09] Communication failure



[L16] Failure

In DN_6B9, 6BA of Hydro unit DN code, if ZONE1 is not set and ZONE2 is set, [L16] displays abnormality.
Set correctly DN_6B9, 6BA.

[L22] Failure

DN_680 setting in group control are not the same for all units, [L22] displays abnormality.
Set correctly DN_680.

8-4-2. Outdoor unit failure detection

Diagnosis procedure for each check code

- One check code may indicate multiple symptoms. In such a case, see the LED indication on the outdoor board to narrow down the check details.
- The handy remote controller displays a check code only when the same failure repeatedly occurs while the LED
- on the outdoor board indicates an failure even if it occurs only once. This may cause indication inconsistency between the remote controller and LED.

How to check the LED display on the outdoor PC board

[Service switch operation]

Currently occurring trouble indication

If any of D800 to D804 is rapidly flashing, it indicates currently occurring trouble. If any of D800 to D804 is slowly flashing or D805 is flashing then press and hold down SW01 and SW02 at the same time for at least 5 seconds. Currently occurring trouble will be indicated.

D800 (YEL)	D801 (YEL)	D802 (YEL)	D803 (YEL)	D804 (YEL)	D805 (GRN)	
●	●	●	●	●	○	No trouble
◎	●	●	●	●	○	Trouble detected (Example. Discharge temp. sensor trouble) (Refer to (2) -1-1.Current trouble indication)

●: Off ○: Light ◎: Flash (5 times/sec)

Latest trouble indication

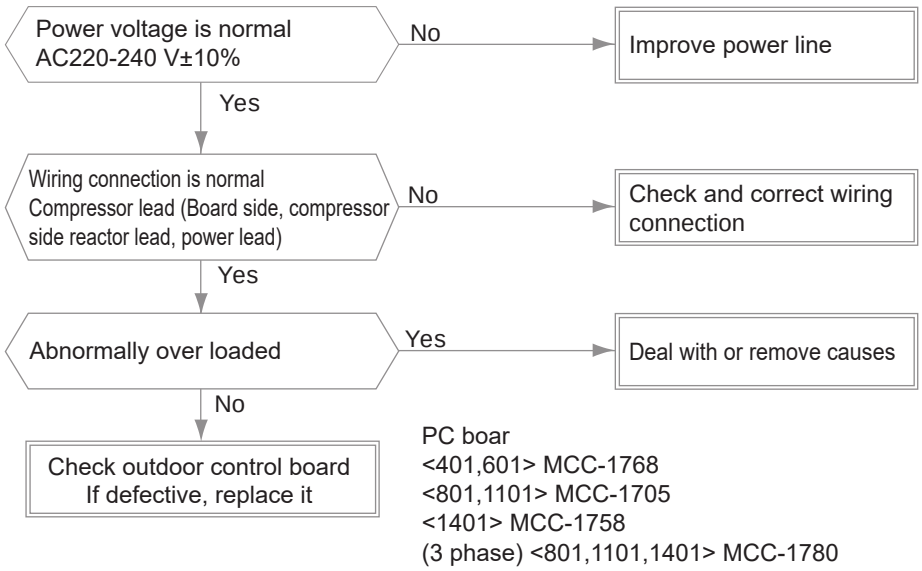
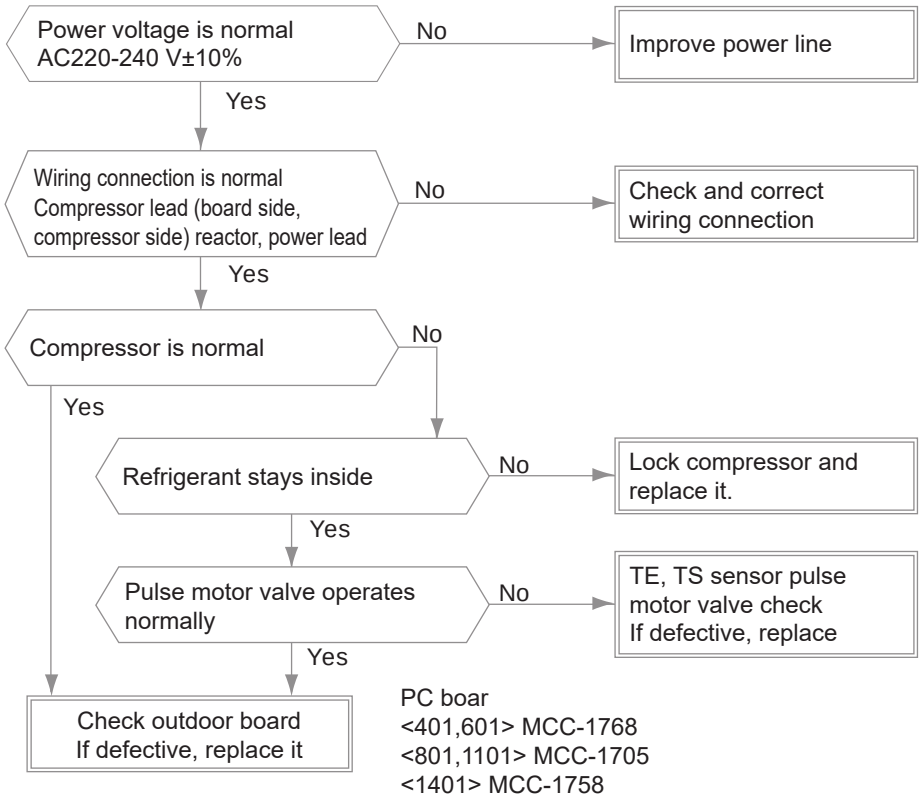
- The following operation results in the latest trouble being indicated. It is retained in the memory and hence can be confirmed even when the power supply has been turned off.

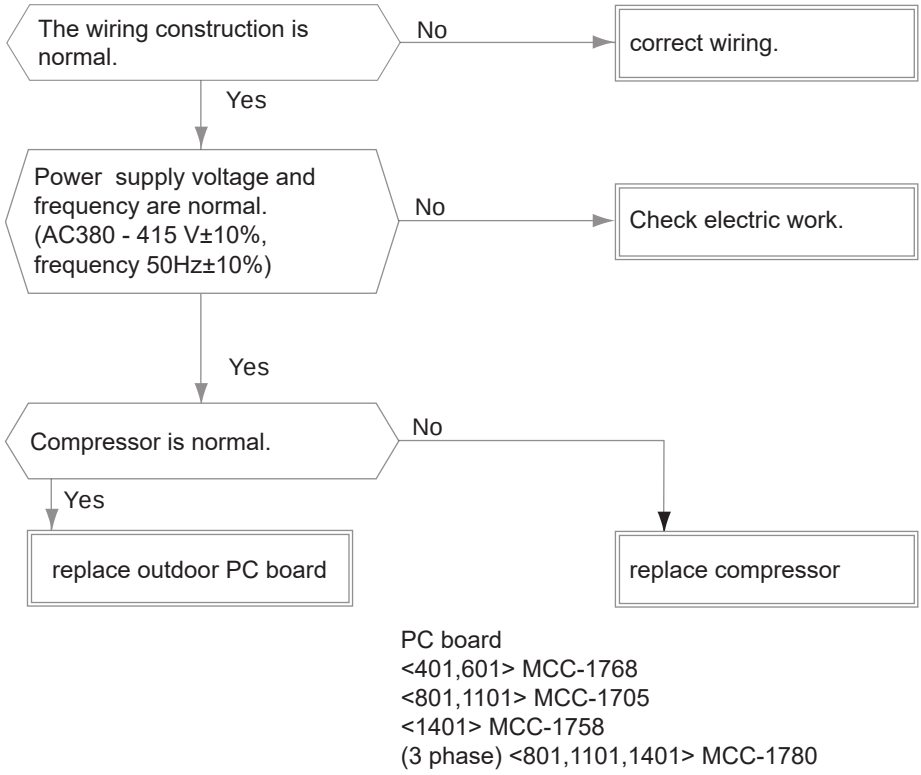
1. Confirm D800 to D804 are off (or rapidly flashing) and that D805 is lit up. If D800 to D804 are slowly flashing or D805 is flashing then push and hold down SW01 and SW02 at the same time for at least 5 seconds. D800 to D804 will turn off (or be rapidly flashing) and D805 will change to on.
2. Push SW01 several times until reaching the LED indication (D800 to D805) of ‘Latest (including current) trouble indication’.
3. Push SW02. The latest trouble will be indicated.
4. Confirm to carry out step 1) to set the LEDs to the initial state (current occurring trouble) when finished and then exit.

Latest (including current) trouble indication

D800 (YEL)	D801 (YEL)	D802 (YEL)	D803 (YEL)	D804 (YEL)	D805 (GRN)	
○	●	●	●	●	◎	Trouble detected (Example. Discharge temp. sensor trouble) (Refer to (2) -1-2.Latest (including current) trouble indication)

●: Off ○: Light ◎: Flash (5 times/sec)

Check code	Outdoor LED indication	Check and Action procedure (No specific description indicates outdoor unit parts.)
[H01]	◎◎●◎●○	**[Compressor break down]**  PC boar <401,601> MCC-1768 <801,1101> MCC-1705 <1401> MCC-1758 (3 phase) <801,1101,1401> MCC-1780
[H02]	●●◎◎●○	**[Compressor lock]**  PC boar <401,601> MCC-1768 <801,1101> MCC-1705 <1401> MCC-1758 (3 phase) <801,1101,1401> MCC-1780

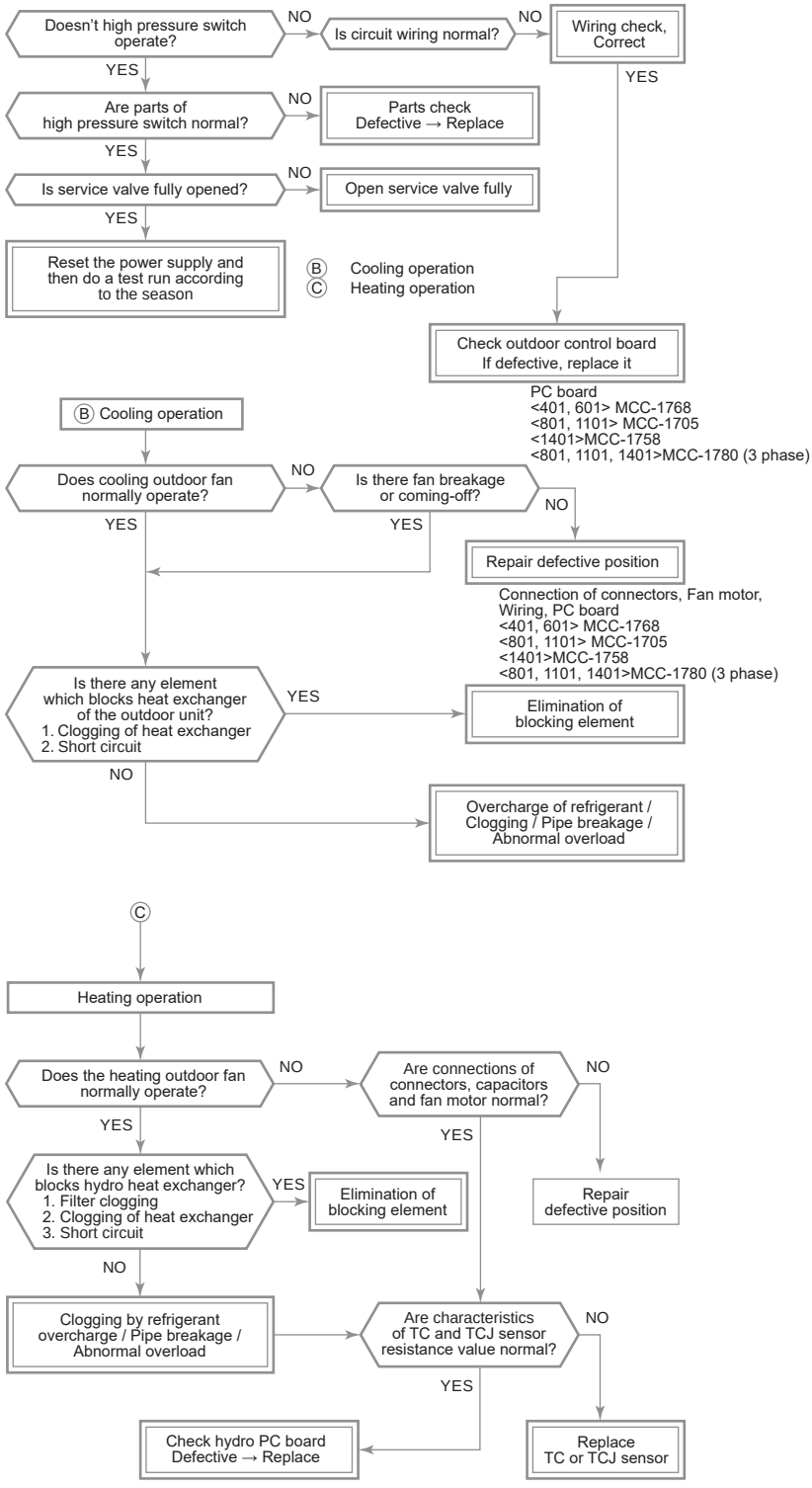
Check code	Outdoor LED indication	Check and Action procedure (No specific description indicates outdoor unit parts.)
[H03]	◎●◎◎●○	**[Defect in the current detection circuit]** 

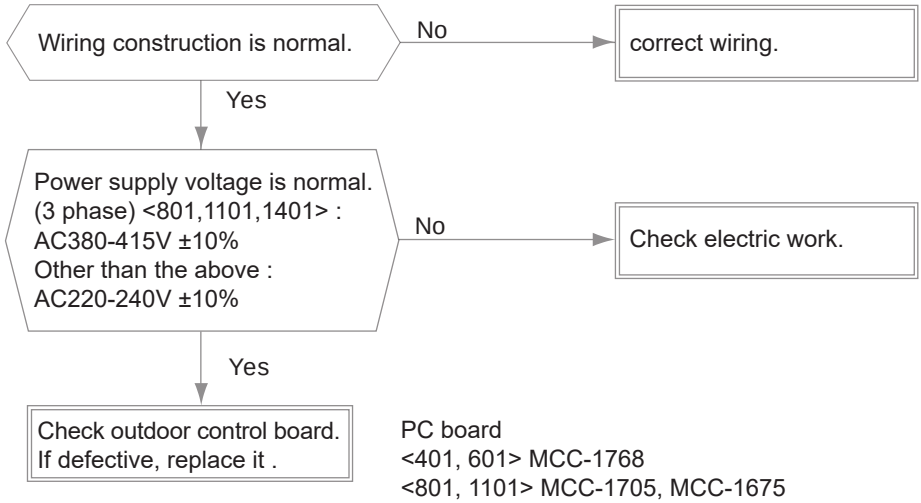
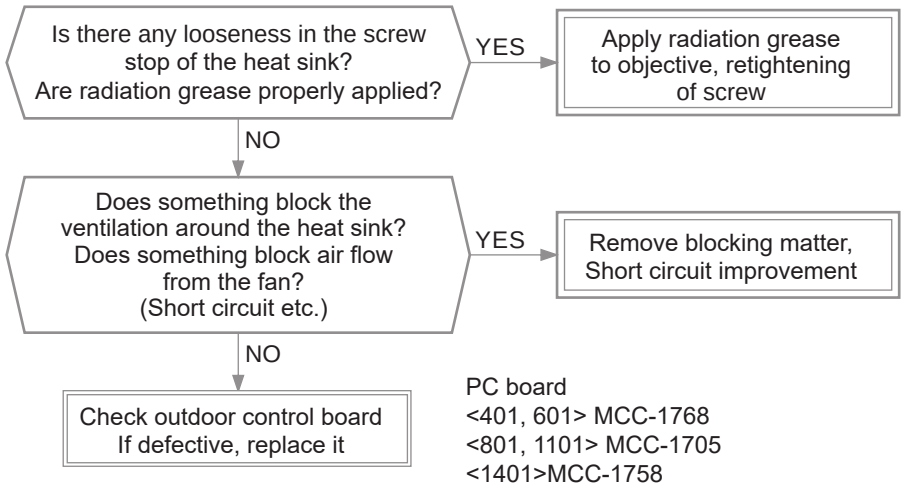
PC board
<401,601> MCC-1768
<801,1101> MCC-1705
<1401> MCC-1758
(3 phase) <801,1101,1401> MCC-1780

Check code	Outdoor LED indication	Check and Action procedure (No specific description indicates outdoor unit parts.)
[H04]	●◎◎◎●○	**[Case thermostat operation]** <401, 601> CN500, <801, 1101, 1401> CN609 connector and case thermostat is normal — No → Correct connector / Replace case thermostat Yes If case thermostat is short circuited, cooling and heating can operate — No → Check outdoor board / If defective, replace it Yes PC board <401, 601> MCC-1768 <801, 1101> MCC-1705 <1401> MCC-1758 <801, 1101, 1401>MCC-1781 (3 phase) No gas leakage / Enough Refrigerant — No → Correct defective portion / Re-charge refrigerant Yes Service valve is fully opened — No → Open fully service valve Yes Pulse motor valve is normal — No → Correct defective portion / Replace defective parts Yes Check for piping collapse and break / If defective, repair or replace it
[L10]	●●●●◎○	**[Unset model type]** Cut jumper line by following the instruction comes with the service board package
[L15]	◎◎◎◎◎○	**[Combination failure between the hydro unit]** Replace the hydro unit with the proper model
[L29]	◎●●●◎○	**[Communication trouble between MCUs]** Is the communication line connected? <801, 1101> between the MCC-1705(CN805) and the MCC-1675(CN805) <1401> between the MCC-1758(CN881) and the MCC-1675(CN805) <801, 1101, 1401(3 phase)> between the MCC-1780(CN805) and the MCC-1781(CN802) — NO → Correct wiring YES Check outdoor control board / If defective, replace it PC board <801, 1101> MCC-1705, MCC-1675 <1401> MCC-1758, MCC-1675 <801, 1101, 1401>MCC-1780, MCC-1781 (3 phase)

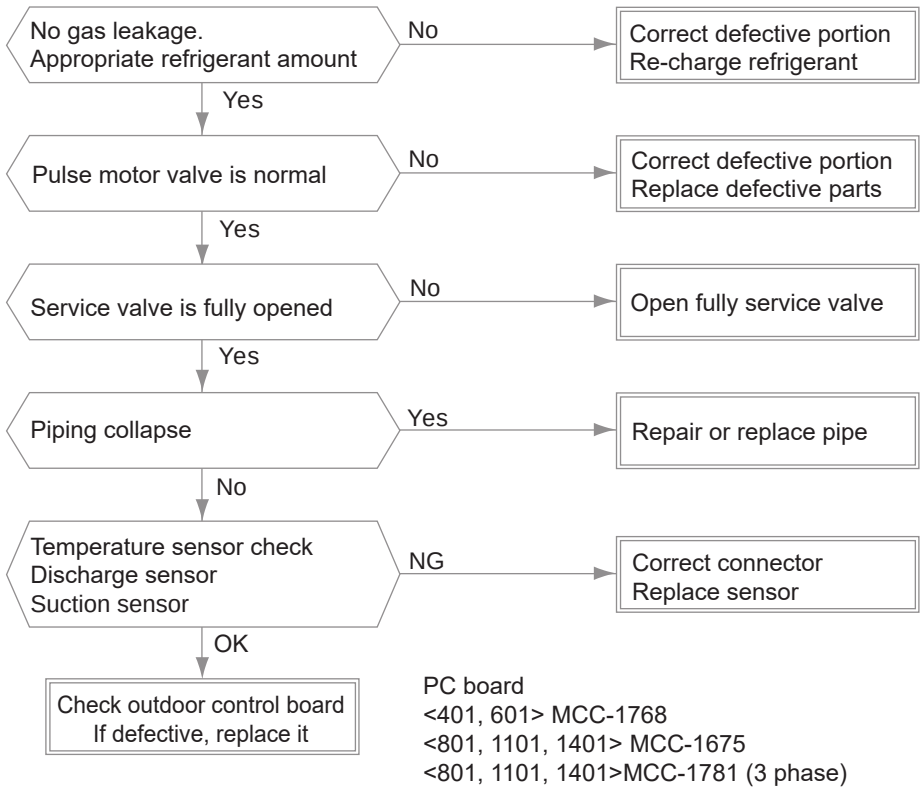
Check code	Outdoor LED indication	Check and Action procedure (No specific description indicates outdoor unit parts.)
[P02]	●◎◎◎◎○	**[Converter circuit failure]** Wiring construction is normal. → No → correct wiring. Yes ↓ Power supply voltage and frequency are normal. (AC380 - 415 V±10%, frequency 50Hz±10%) → No → Check electric work. Yes ↓ Check outdoor control board. If defective, replace it . PC board (3 phase) <801,1101,1401> MCC-1780
[P03]	●◎●●◎○	**[Discharge temp trouble]** No gas leakage Appropriate refrigerant amount → No → Correct defective portion Re-charge refrigerant Yes ↓ Pulse motor valve is normal → No → Correct defective portion Replace defective parts Yes ↓ Abnormally over loaded → Yes → Deal with or remove causes No ↓ TD sensor connector is normal TD sensor resistance is normal → No → Correct connector Replace sensor Yes ↓ 2-way valve is normal (801, 1101, 1401) → No → Correct defective portion Replace defective parts Yes ↓ PMV (INJ) is normal (801, 1101, 1401) → No → Correct defective portion Replace defective parts Yes ↓ Check outdoor control board If defective, replace it PC board <401, 601> MCC-1768 <801, 1101, 1401> MCC-1675 <801, 1101, 1401>MCC-1781 (3 phase)

Check code	Outdoor LED indication	Check and Action procedure (No specific description indicates outdoor unit parts.)
[P04]	* Any of the following abnormality may occur. Seeing the LED on the outside board can determine which abnormality occurs. 1.High pressure sensor activated. 2.Power source failure (Vdc) 3.High pressure protection operation 4.Case thermostat operation	
	◎◎●●◎○	**[High pressure SW operation]** Power supply failure (Vdc), High pressure protective operation, Case thermostat operation.

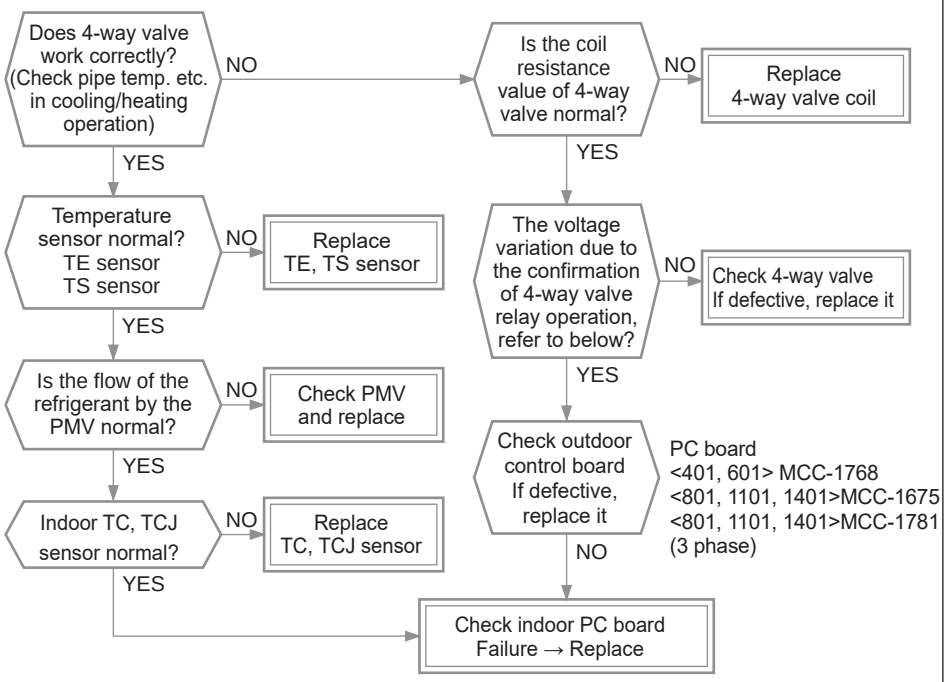


Check code	Outdoor LED indication	Check and Action procedure (No specific description indicates outdoor unit parts.)
[P05]	●●◎●◎○	**[Power supply voltage failure]**  PC board <401, 601> MCC-1768 <801, 1101> MCC-1705, MCC-1675 <1401> MCC-1758, MCC-1675 (3 phase) <801,1101,1401> MCC-1780, MCC-1780
[P07]	●◎◎●◎○	**[Heat sink overheat trouble]**  PC board <401, 601> MCC-1768 <801, 1101> MCC-1705 <1401>MCC-1758 <801, 1101, 1401>MCC-1780 (3 phase)

Check code	Outdoor LED indication	Check and Action procedure (No specific description indicates outdoor unit parts.)
[P15]	◎◎◎●◎○	**[Gas leak detection]**



Check code	Outdoor LED indication	Check and Action procedure (No specific description indicates outdoor unit parts.)
[P19]	●●●◎◎○	**[4-way valve reversal trouble]**



[4-way valve relay operation check]

Service switches SW01 and SW02 can be used to check the operation of the 4-way valve relay.

Use to check whether there are any problems with the 4-way valve or 4-way valve coil.

[Method of operation]

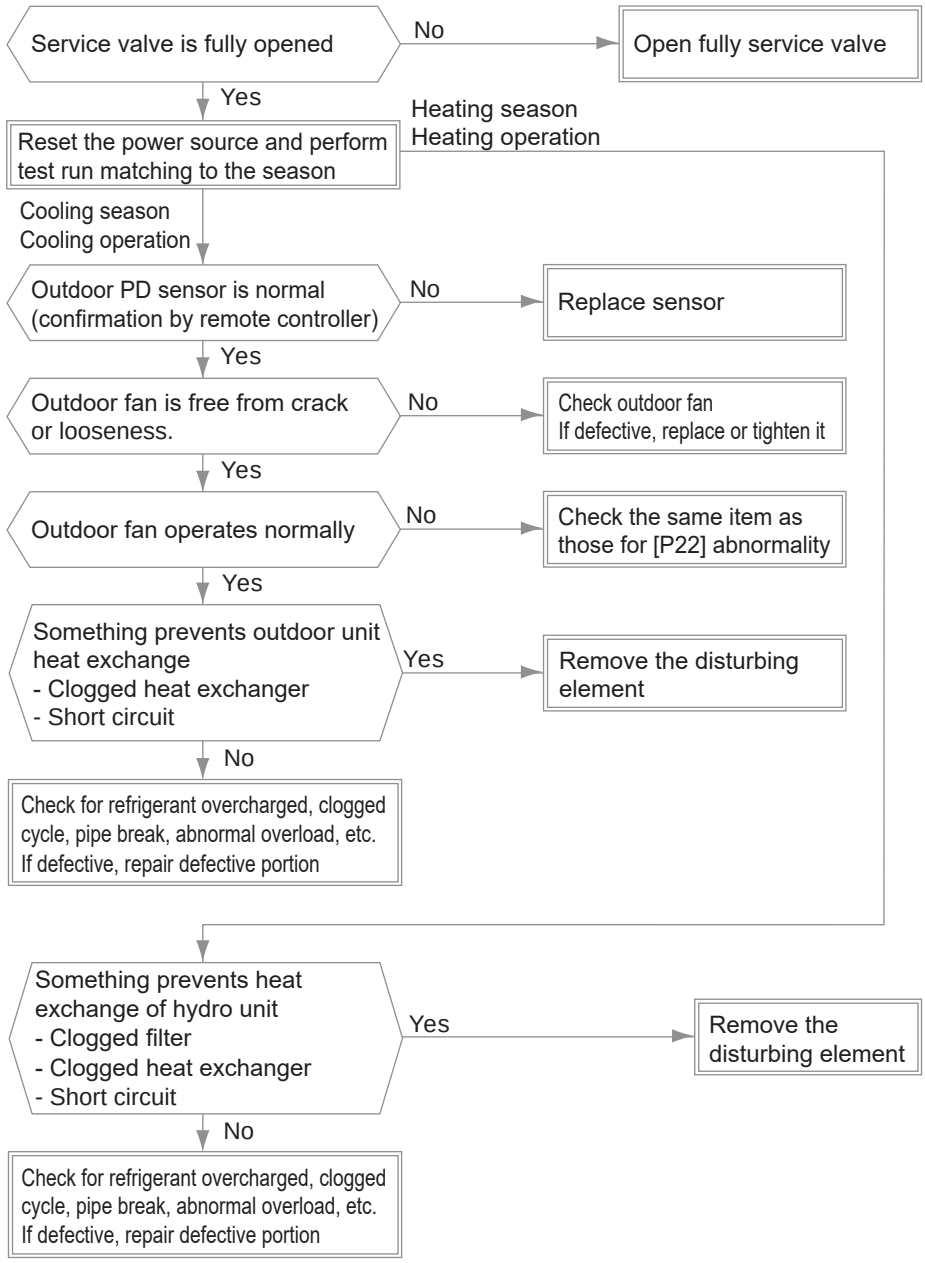
1) Confirm D800 to D804 are off (or rapidly flashing) and that D805 is lit up. If D800 to D804 are slowly flashing or D805 is flashing then push and hold down SW01 and SW02 at the same time for at least 5 seconds. D800 to D804 will turn off (or rapidly flash) and D805 turn on.
2) Push and hold down SW01 for at least 5 seconds. D804 will start slowly flashing.
3) Push SW01 until reaching the below [Self-preservation valve operation].

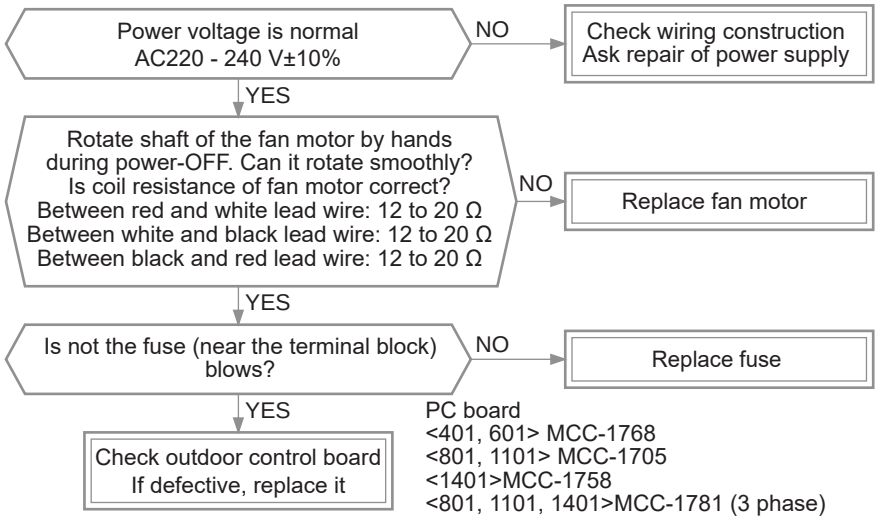
Self-preservation valve suck operation (Heating)	D800	D801	D802	D803	D804
	○	●	○	○	◎
Self-preservation valve secession operation (Cooling)	D800	D801	D802	D803	D804
	●	○	○	○	◎

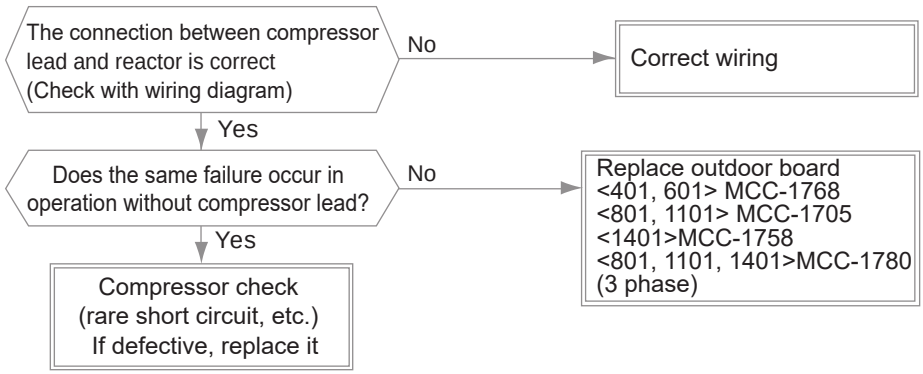
●: Off ○: Light ◎: Flash (5 times/sec)

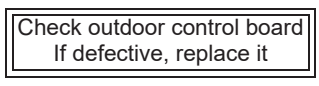
4) Push SW02 until D805 starts rapidly flashing.
5) Push and hold down SW02 for at least 5 seconds. D804 will start slowly flashing, D805 will turn on, and the 4-way valve will be operated.
6) Push and hold down SW01 and SW02 at the same time for at least 5 seconds or wait 2 minutes to return to normal control.

Check code	Outdoor LED indication	Check and Action procedure (No specific description indicates outdoor unit parts.)
[P20]	◎●●◎◎○	**[High pressure protection operation]**



<table>
<tr><th>Check code</th><th>Outdoor LED indication</th><th>Check and Action procedure
(No specific description indicates outdoor unit parts.)</th></tr>
<tr><td>[P22]</td><td>●◎●◎◎○</td><td>
[Fan system trouble]


PC board
<401, 601> MCC-1768
<801, 1101> MCC-1705
<1401>MCC-1758
<801, 1101, 1401>MCC-1781 (3 phase)
[Single operation check for outdoor fan]
A single operation of the outdoor fan can be confirmed by handling the service switches SW01 and SW02. Use this method to check whether there is trouble on the fan or not.
[Method of operation]
1) Confirm D800 to D804 are off (or rapidly flashing) and that D805 is lit up. If D800 to D804 are slowly flashing or D805 is flashing then please push and hold down SW01 and SW02 at the same time for at least 5 seconds. D800 to D804 will turn off (or rapidly flash) and D805 turn on.
2) Push and hold down SW01 for at least 5 seconds. D804 will start slowly flashing.
3) Push SW01 until reaching the below [Forced fan motor operation] LED indication.
<table>
<tr><td rowspan="2">Forced fan motor operation</td><td>D800</td><td>D801</td><td>D802</td><td>D803</td><td>D804</td></tr>
<tr><td>○</td><td>●</td><td>○</td><td>○</td><td>◎</td></tr>
</table>
●: Off ○: Light ◎: Flash (5 times/sec)
4) Push SW02 until D805 starts rapidly flashing.
5) Push and hold down SW02 for at least 5 seconds. D804 will start slowly flashing, D805 will turn on, and the fan rotates.
6) Push and hold down SW01 and SW02 at the same time for at least 5 seconds or wait 2 minutes to return to normal control.
</td></tr>
<tr><td>[P26]</td><td>◎◎●◎◎○</td><td>
[Short-circuit of compressor drive element]


</td></tr>
<tr><td>[P29]</td><td>●●◎◎◎○</td><td>
[Compressor motor position detection circuit trouble]


PC board
<401, 601> MCC-1768
<801, 1101> MCC-1705
<1401>MCC-1758
<801, 1101, 1401>MCC-1780 (3 phase)
</td></tr>
</table>

Check code	Outdoor LED indication	Check and Action procedure (No specific description indicates outdoor unit parts.)
[F04]	◎●●●●○	**[Discharge temperature sensor (TD) failure]** TD sensor connector is connected → No → Correct TD sensor connection Yes ↓ TD sensor resistance characteristic is normal → No → Replace TD sensor Refer to the characteristic table on page 137 Yes ↓ Replace outdoor control board PC board <401, 601> MCC-1768 <801, 1101, 1401> MCC-1675 <801, 1101, 1401>MCC-1781 (3 phase)
[F06]	●◎●●●○	**[Heat exchanger temperature sensor (TE) failure]** TE sensor connector is connected → No → Correct TE sensor connection Yes ↓ TE sensor resistance characteristic is normal → No → Replace TE sensor Refer to the characteristic table on page 137 Yes ↓ Replace outdoor control board PC board <401, 601> MCC-1768 <801, 1101, 1401> MCC-1675 <801, 1101, 1401>MCC-1781 (3 phase)
[F07]	◎◎●●●○	**[Heat exchanger temperature sensor (TL) failure]** TL sensor connector is connected → No → Correct TL sensor connection YES ↓ TL sensor resistance characteristic is normal → No → Replace TL sensor Refer to the characteristic table on page 137 YES ↓ Replace outdoor control board PC board <401, 601> MCC-1768 <801, 1101, 1401> MCC-1675 <801, 1101, 1401>MCC-1781 (3 phase)
[F08]	●●◎●●○	**[Outside air temperature sensor (TO) failure]** TO sensor connector is connected → No → Correct TO sensor connection Yes ↓ TO sensor resistance characteristic is normal → No → Replace TO sensor Refer to the characteristic table on page 137 Yes ↓ Replace outdoor control board PC board <401, 601> MCC-1768 <801, 1101, 1401> MCC-1675 <801, 1101, 1401>MCC-1781 (3 phase)

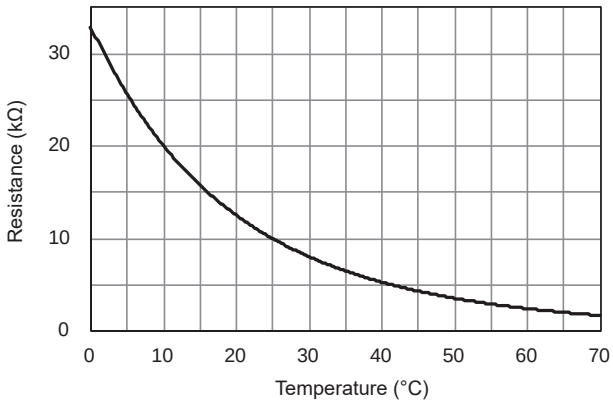
Check code	Outdoor LED indication	Check and Action procedure (No specific description indicates outdoor unit parts.)
[F12]	◎●◎●●○	**[Suction temperature sensor (TS) failure]** TS sensor connector is connected → No → Correct TS sensor connection ↓ Yes TS sensor resistance characteristic is normal → No → Replace TS sensor Refer to the characteristic table on page 137 ↓ Yes Replace outdoor control board PC board <401, 601> MCC-1768 <801, 1101, 1401> MCC-1675 <801, 1101, 1401>MCC-1781 (3 phase)
[F13]	●◎◎●●○	**[Heat sink temperature sensor (TH) failure]** Replace outdoor control board PC board <401, 601> MCC-1768 <801, 1101> MCC-1705 <1401>MCC-1758 <801, 1101, 1401>MCC-1781 (3 phase)
[F15]	◎◎◎●●○	**[Heat exchanger sensor (TE, TS) wrong wiring]** TE and TS sensor is attached to the correct position. → No → Correct sensor attaching position ↓ Yes TE sensor resistance characteristic is normal → No → Replace TE sensor Refer to the characteristic table on page 137 ↓ Yes TS sensor resistance characteristic is normal → No → Replace TS sensor Refer to the characteristic table on page 137 ↓ Yes Replace outdoor control board PC board <401, 601> MCC-1768 <801, 1101, 1401> MCC-1675 <801, 1101, 1401>MCC-1781 (3 phase)
[F24]	◎●●◎●○	**[High pressure sensor (PD) failure]** PD sensor connector is connected → No → Correct PD sensor connection ↓ Yes PD sensor is normal → No → Replace PD sensor ↓ Yes Replace outdoor control board PC board <401, 601> MCC-1768 <801, 1101, 1401> MCC-1675 <801, 1101, 1401>MCC-1781 (3 phase)
[F31]	●◎●◎●○	**[EEPROM failure]** Check outdoor control board If defective, replace it PC board <401, 601> MCC-1768 <801, 1101, 1401> MCC-1675 <801, 1101, 1401>MCC-1781 (3 phase)

8-4-3. Temperature sensor, temperature-resistance characteristic table

TWI, TFI, TTW sensors

Typical value

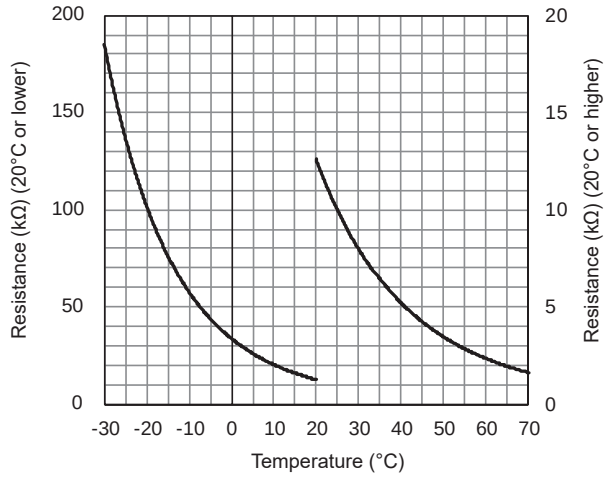
Temperature (°C)	Resistance value (kΩ)		
	(Minimum)	(Standard)	(Maximum)
0	31.18	32.82	34.46
10	19.12	19.95	20.78
20	12.08	12.50	12.92
25	9.700	10.00	10.30
30	7.808	8.050	8.291
40	5.155	5.314	5.474
50	3.482	3.590	3.698
60	2.380	2.478	2.583
70	1.659	1.744	1.838



TC, TWO, THO, TE, TS, TO sensors

Typical value

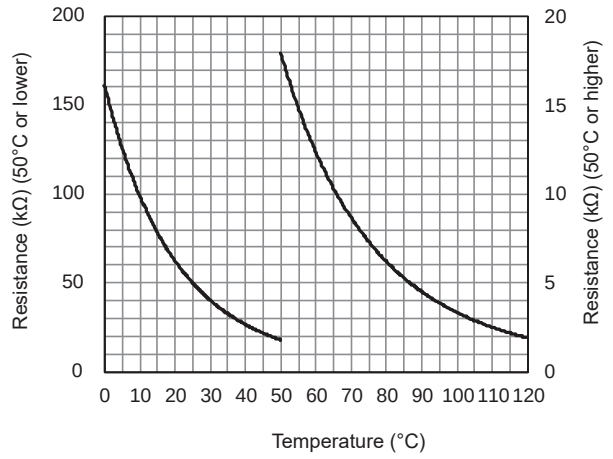
Temperature (°C)	Resistance value (kΩ)		
	(Minimum)	(Standard)	(Maximum)
-30	172.0	184.8	198.5
-20	95.54	101.7	108.1
-10	54.77	57.73	60.82
0	32.33	33.80	35.30
10	19.63	20.35	21.09
20	12.23	12.59	12.95
25	9.750	10.00	10.25
30	7.764	7.990	8.218
40	5.013	5.192	5.375
50	3.312	3.451	3.594
60	2.236	2.343	2.454
70	1.540	1.623	1.709



TD, TL sensors

Typical value

Temperature (°C)	Resistance value (kΩ)		
	(Minimum)	(Standard)	(Maximum)
0	150.5	161.3	172.7
10	92.76	99.05	105.6
20	58.61	62.36	66.26
25	47.01	49.93	52.97
30	37.93	40.22	42.59
40	25.12	26.55	28.03
50	17.00	17.92	18.86
60	11.74	12.34	12.95
70	8.269	8.668	9.074
80	5.925	6.195	6.470
90	4.321	4.507	4.696
100	3.205	3.336	3.468
110	2.411	2.504	2.598
120	1.838	1.905	1.972



8-5. Operation check by PC board switch

8-5-1. Operation check mode

This mode allows to check the operations of the water 2-way valve, water 3-way valve, mixing valve, and circulation pump. This operation is valid when the hydro unit and the outdoor unit are turned on the power.

Operation check mode

(1) Preparation

1) Turn all of the remote controllers “OFF” for the hot water supply and heating.
2) Turn off the hydro unit and the outdoor unit.
3) Remove the front panel of the hydro unit.
4) Set DIP_SW705_3 “ON”.

(2) Operation check

1) Turn on the hydro unit and the outdoor unit.
2) Rotate the rotary SW700 to position “0” and press tactile switch SW703 for 5 sec. or longer.
3) Rotating the rotary SW700 allows to check each operation.
4) Set the DIP_SW705_3 “OFF” to finish.

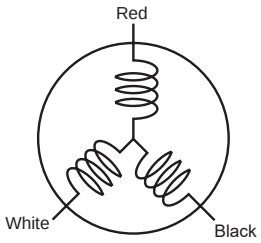
Rotary switch	Check contents		Remark
0	None		OP.CH
1	2WV_W	Alive for approx. 2 sec, not alive for 3 sec	2.ON ↔ 2.OFF
2	3WV_W	Alive for 4 min in the heating / cooling direction Alive for 4 min in the hot water direction	7 segment display ON → heating, OFF → hot water 3.ON ↔ 3.OFF
3	Mixing valve	Alive for 30 sec in the forward direction Alive for 30 sec in the reverse direction	F.ON ↔ F.OFF
4	Built-in circulation pump	Alive / not alive for 20 sec	P.ON ↔ P.OFF
5	External circulation pump 2	Alive / not alive for 20 sec	P2.ON ↔ P2.OFF
6	None		
7	Water heat exchange backup heater	Repeat heater 1, heater 2, and OFF every 20 sec	The built-in circulation pump operates. H.ON ↔ H.OFF
8	Hot water cylinder heater	Alive / not alive for 20 sec	dH.ON ↔ dH.OFF
9	Booster heater	Alive / not alive for 20 sec	The built-in circulation pump and external circulation pump operate. bH.ON ↔ bH.OFF
A	Check the alarm output.	Output for 20 sec / no output for 20 sec	01.ON ↔ 01.OFF
B	Check the boiler output.	Output for 20 sec / no output for 20 sec	02.ON ↔ 02.OFF
C	Check the defrost output.	Output for 20 sec / no output for 20 sec	03.ON ↔ 03.OFF
D	Check the operation output.	Output for 20 sec / no output for 20 sec	04.ON ↔ 04.OFF
E	None		
F	Built-in circulation pump continuous operation	Continuously alive	Do not operate the circulation pump alive continuously without any water in hydro unit. P1.ON ↔ Flow rate display

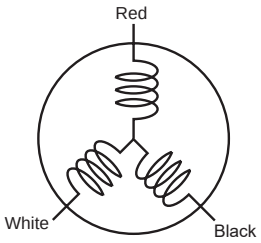
8-6. Brief method for checking the key components

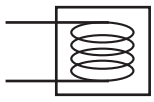
8-6-1. Hydro unit

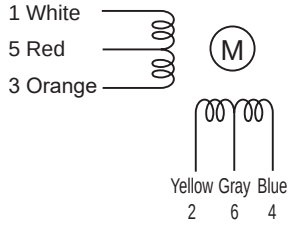
<table>
<tr><th>No.</th><th>Component name</th><th>Check procedure</th></tr>
<tr><td>1</td><td>Water heat exchange temperature (TC) sensor
Water inlet temperature (TWI) sensor
Water outlet temperature (TWO) sensor
Water heater outlet temperature (THO) sensor
Hot water cylinder temperature (TTW) sensor
Floor inlet temperature (TFI) sensor</td><td>Remove the connector and measure the resistance value with a tester. (Normal temperature)
<table>
<tr><th>Temperature / Sensor (kΩ)</th><th>0°C</th><th>10°C</th><th>20°C</th><th>30°C</th></tr>
<tr><td>Water heat exchange temperature (TC) sensor</td><td rowspan="3">33.8</td><td rowspan="3">20.4</td><td rowspan="3">12.6</td><td rowspan="3">8.0</td></tr>
<tr><td>Water outlet temperature (TWO) sensor</td></tr>
<tr><td>Water heater outlet temperature (THO) sensor</td></tr>
<tr><td>Water inlet temperature (TWI) sensor</td><td rowspan="3">32.8</td><td rowspan="3">20.0</td><td rowspan="3">12.5</td><td rowspan="3">8.1</td></tr>
<tr><td>Hot water cylinder temperature (TTW) sensor</td></tr>
<tr><td>Floor inlet temperature (TFI) sensor</td></tr>
</table>
</td></tr>
</table>

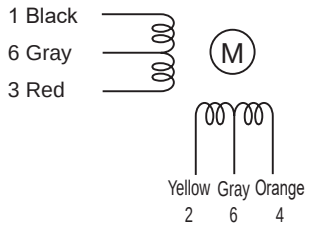
8-6-2. Outdoor unit

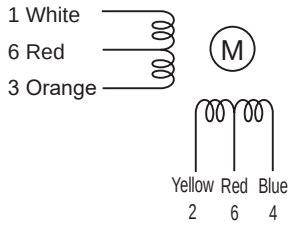
<table>
<tr><th>No.</th><th>Component name</th><th>Check procedure</th></tr>
<tr><td>1</td><td>Compressor
Type
DX150A1T-21F
(401HW-E, 601HW-E)
NX220A1FJ-20N
(801HW-E, 1101HW-E)
DX380A2TJ-20M
(1401HW-E)
RX380A2TJ-20M
(801H8W-E, 1101H8W-E,
1401H8W-E)</td><td>Measure the resistance value of each winding with a tester.
 

401HW-E, 601HW-E
<table>
<tr><th>Location</th><th>Resistance value</th></tr>
<tr><td>Red ─ White</td><td>1.04 - 1.16 Ω</td></tr>
<tr><td>White ─ Black</td><td>1.04 - 1.16 Ω</td></tr>
<tr><td>Black ─ Red</td><td>1.04 - 1.16 Ω</td></tr>
</table>
At 20°C
801HW-E, 1101HW-E
<table>
<tr><th>Location</th><th>Resistance value</th></tr>
<tr><td>Red ─ White</td><td>1.16 - 1.28 Ω</td></tr>
<tr><td>White ─ Black</td><td>1.16 - 1.28 Ω</td></tr>
<tr><td>Black ─ Red</td><td>1.16 - 1.28 Ω</td></tr>
</table>
At 20°C
1401HW-E
<table>
<tr><th>Location</th><th>Resistance value</th></tr>
<tr><td>Red ─ White</td><td>0.338 - 0.374 Ω</td></tr>
<tr><td>White ─ Black</td><td>0.338 - 0.374 Ω</td></tr>
<tr><td>Black ─ Red</td><td>0.338 - 0.374 Ω</td></tr>
</table>
At 20°C
801H8W-E, 1101H8W-E, 1401H8W-E
<table>
<tr><th>Location</th><th>Resistance value</th></tr>
<tr><td>Red ─ White</td><td>1.351 - 1.493 Ω</td></tr>
<tr><td>White ─ Black</td><td>1.351 - 1.493 Ω</td></tr>
<tr><td>Black ─ Red</td><td>1.351 - 1.493 Ω</td></tr>
</table>
At 20°C</td></tr>
<tr><td>2</td><td>Outdoor fan motor
Type
ICF-140-A43-1
(401HW-E, 601HW-E)
ICF-280-A60-1
(801HW-E, 1101HW-E)
ICF-280-A100-1
(1401HW-E, 801H8W-E,
1101H8W-E, 1401H8W-E)</td><td>Measure the resistance value of each winding with a tester.
 

401HW-E, 601HW-E
<table>
<tr><th>Location</th><th>Resistance value</th></tr>
<tr><td>Red ─ White</td><td rowspan="3">21.00 ± 1.05 Ω</td></tr>
<tr><td>White ─ Black</td></tr>
<tr><td>Black ─ Red</td></tr>
</table>
801HW-E, 1101HW-E
<table>
<tr><th>Location</th><th>Resistance value</th></tr>
<tr><td>Red ─ White</td><td rowspan="3">32.6 ± 3.3 Ω</td></tr>
<tr><td>White ─ Black</td></tr>
<tr><td>Black ─ Red</td></tr>
</table>
1401HW-E, 801H8W-E, 1101H8W-E, 1401H8W-E
<table>
<tr><th>Location</th><th>Resistance value</th></tr>
<tr><td>Red ─ White</td><td rowspan="3">14.8 ± 1.5 Ω</td></tr>
<tr><td>White ─ Black</td></tr>
<tr><td>Black ─ Red</td></tr>
</table></td></tr>
<tr><td>3</td><td>4-way valve coil
Type
DXQ-1233</td><td>Measure the resistance value.
9 ± 0.9 Ω
  </td></tr>
</table>

<table>
<tr><th>No.</th><th>Component name</th><th>Check procedure</th></tr>
<tr><td>4</td><td>Pulse motor valve coil
Type
PQ-M10012-000313
(401, 601)
UKV-A040
FAM-MD12TF-1
(801, 1101, 1401)</td><td>PQ-M10012-000313
 

<table>
<tr><td>Location</td><td>Resistance value</td></tr>
<tr><td>Red − White, Orange</td><td rowspan="2">46 ± 3.7 Ω</td></tr>
<tr><td>Gray − Yellow, Blue</td></tr>
</table>
UKV-A040
 

<table>
<tr><td>Location</td><td>Resistance value</td></tr>
<tr><td>Gray ─ Black, Red</td><td rowspan="2">46 ± 3 Ω</td></tr>
<tr><td>Gray ─ Yellow, Orange</td></tr>
</table>
FAM-MD12TF-1
 

<table>
<tr><td>Location</td><td>Resistance value</td></tr>
<tr><td>Red − White, Orange</td><td rowspan="2">46 ± 3 Ω</td></tr>
<tr><td>Red ─ Yellow, Blue</td></tr>
</table></td></tr>
<tr><td>5</td><td>2-way valve coil
Type
TEV-SMOAJ2170A1
(801, 1101, 1401)</td><td>Measure the resistance value.
2163 ± 151 Ω</td></tr>
<tr><td>6</td><td>Suction temperature (TS) sensor
Heat exchange temperature (TE) sensor
Outdoor temperature (TO) sensor</td><td>Remove the connector and measure the resistance value with a tester.
10-20 kΩ (Normal temperature)
<table>
<tr><td>Temperature / Sensor (kΩ)</td><td>0°C</td><td>10°C</td><td>20°C</td><td>30°C</td></tr>
<tr><td>Suction temperature (TS) sensor</td><td rowspan="3">33.8</td><td rowspan="3">20.4</td><td rowspan="3">12.6</td><td rowspan="3">8.0</td></tr>
<tr><td>Heat exchange temperature (TE) sensor</td></tr>
<tr><td>Outdoor temperature (TO) sensor</td></tr>
</table></td></tr>
<tr><td>7</td><td>Discharge temperature (TD) sensor
Heat exchanger coil temperature (TL) sensor</td><td>Remove the connector and measure the resistance value with a tester.
<table>
<tr><td>Temperature / Sensor (kΩ)</td><td>0°C</td><td>10°C</td><td>20°C</td><td>30°C</td></tr>
<tr><td>Discharge temperature (TD) sensor</td><td rowspan="2">161.3</td><td rowspan="2">99.0</td><td rowspan="2">62.4</td><td rowspan="2">40.2</td></tr>
<tr><td>Heat exchanger coil temperature (TL) sensor</td></tr>
</table></td></tr>
</table>

9 Hydro unit and outdoor unit settings

Hydro unit

1. Hydro unit Setting

DN code	DN Description	Default	After Commissioning	Change 1	Change 2	Change 3
6B0	Used to activate external boiler output. 0 = external boiler output de-activated; 1 = external boiler output activated	0				
6B1	Boiler install location 0 = Heating side after 3 way valve 1 = Before 3 way valve	0				
6B2	Used to when an external cylinder thermostat is connected 0 = No external cylinder thermostat; 1 = External tank thermostat connected	0				
6B3	Used to when an external room thermostat is connected 0 = No external room thermostat; 1 = External room thermostat connected	0				
6B4	Used to determine type of 3 way diverting valve used on system. 0 = 2 wire/spring return or SPST type valve; 1 = SPDT type valve	0				
6B5	Synchronisation of Pump P2. 0 = P2 continuous operation (pump off when remote controller switched off) 1 = Pump P2 off during heating and cooling mode is off or hot water HP operation.	0				
6B8	Used when a hot water cylinder is connected to system. 0 = hot water cylinder connected; 1 = hot water cylinder not connected	0				
6B9	Used to activate Zone 1 Operation. 0 = Zone 1 activated; 1 = Zone 1 de-activated	0				
6BA	Used to activate Zone 2 Operation. 0 = Zone 2 de-activated; 1 = Zone 2 activated	0				
6D0	P1 Pump operation for heating 0 = Normally run 1 = Stopped at the outside temperature over 20°C	0				
6D1	Pump P1 power of regular, When long-term thermo off. 0 = None operation 1 = regular power	0				
6D2	Used to activate Hydro Unit backup heaters. 0 = Backup heaters activated; 1 = Backup heaters de-activated	0				
6D3	Used to activate hot water cylinder electrical heater. 0 = hot water cylinder heater activated; 1 = hot water cylinder heater de-activated	0				
6D4	Used to activate external booster heater output. 0 = external booster heater output activated; 1 = external booster heater output de-activated	0				
28	Used to activate system auto restart after power failure. 0 = auto restart de-activated 1 = auto restart activated	1				
5A	P1 Pump operation for hot water 0 = synchronised with heat pump 1 = Normally run	0				
B6	Setting the objects to control of I/P 7, 8 0 = I/P 7 Emergency shutdown input, I/P 8 None 1 = I/P 7 TEMPO 1 input, I/P 8 None 2 = I/P 7 TEMPO 2 input, I/P 8 None 3 = I/P 7 Forcibly turn off the backup heater, I/P 8 Forcibly turn off the hot water tank heater 4 = I/P 7 SG network input 1, I/P 8 SG network input 2	0				

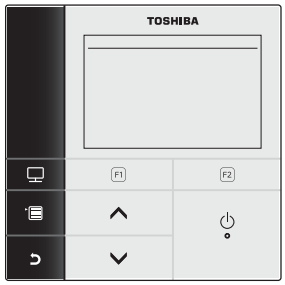
2. DN Setting

- Hydro unit DN code setting is available only for the header remote controller.
- Set DN codes for various operation modes with the remote controller.

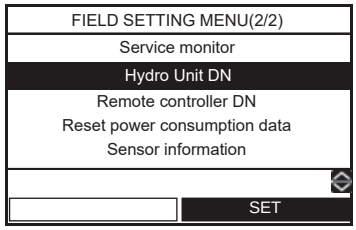
2-1. How to set hydro unit DN

<Procedure> Perform the following when no operation is in progress.

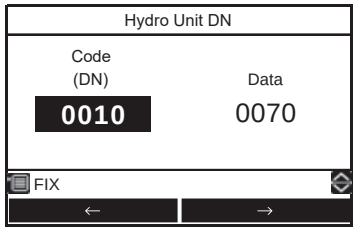
1 **Press the [▤] button and the [∨] button at same time for 4 seconds or longer on the top screen to display the "FIELD SETTING MENU".**



2 **Press the [∧] / [∨] button to select "Hydro Unit DN" on the FIELD SETTING MENU screen, then press the [F2] button.**



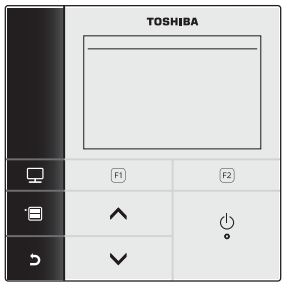
3 **Press the [F1] / [F2] button to select DN or Data, then press the [∧] / [∨] button to set the value.**



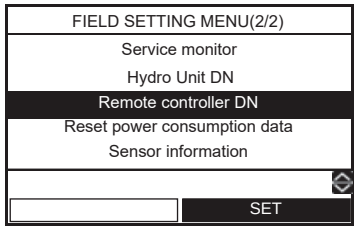
4 **Press the [▤] button. The set value is registered.**

2-2. How to set remote controller DN
<Procedure> Perform the following when no operation is in progress.

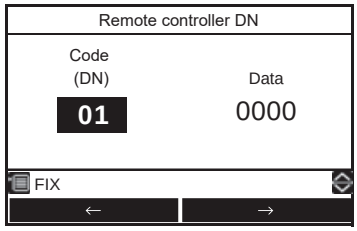
1 **Press the [ ] button and the [ ] button at same time for 4 seconds or longer on the top screen to display the "FIELD SETTING MENU".**



2 **Press the [ ] / [ ]button to select "Remote controller DN" on the FIELD SETTING MENU screen, then press the [F2] button.**



3 **Press the [F1] / [F2] button to select DN or Data, then press the [ ] / [ ] button to set the value.**



4 **Press the [ ] button. The set value is registered.**

DN table

DN	Item	Details			Factory default
02	Cooling/Non-cooling switching	0000: Cooling		0001: Not cooling	0000: Cooling
03	Central control address	0001	-	0128	None
08	Hot water boost operation time (operating time)	0003: 30 min	-	0018: 180 min	0006: 60 min
09	Hot water boost set temperature	0040: 40°C	-	0080: 80°C	0075: 75°C
0A	Anti bacteria set temperature	0065: 65°C	-	0080: 80°C	0075: 75°C
0B	Anti bacteria holding time	0000: 0 min	-	0250: 250 min	0030: 30 min
0C	Mixing valve drive time	0003: 30 sec	-	0024: 240 sec	0006: 60 sec
0F	Hot water HP allowance while cooling + hot water supply	0000: Not allow	-	0001: Allow	0000: Not allow
10	Type setting	0070: Wall mounted type 0071: AIO type			Depend on type
11	Water heat exchanger capacity	0010: 601 0017: 1401		0015: 1101	Depend on type
12	Line address	0001	-	0128	None
13	Indoor address	0001	-	0128	None
14	Group address	0000: Individual (Not group control) 0001: Header unit 0002: Follower unit			None
18	Upper limit of cooling set temperature	0018: 18°C	-	0030: 30°C	0025: 25°C
19	Lower limit of cooling set temperature	0007: 7°C	-	0020: 20°C	0007: 7°C
1A	Upper limit of heating (ZONE1) set temperature	0037: 37°C	-	0055: 55°C (401 / 601), 0065: 65°C (801 / 1101 / 1401)	0055: 55°C (401 / 601) 0065: 65°C (801 / 1101 / 1401)
1B	Lower limit of heating (ZONE1) set temperature	0020: 20°C	-	0037: 37°C	0020: 20°C
1C	Upper limit of heating (ZONE2) set temperature	0037: 37°C	-	0055: 55°C (401 / 601), 0065: 65°C (801 / 1101 / 1401)	0055: 55°C (401 / 601) 0065: 65°C (801 / 1101 / 1401)
1D	Lower limit of heating (ZONE2) set temperature	0020: 20°C	-	0037: 37°C	0020: 20°C
1E	Upper limit of hot water set temperature	0060: 60°C	-	0080: 80°C	0075: 75°C
1F	Lower limit of hot water set temperature	0040: 40°C	-	0060: 60°C	0040: 40°C
20	Hot water HP start temperature	0020: 20°C	-	0045: 45°C	0038: 38°C
21	Hot water HP stop temperature	0040: 40°C	-	0065: 65°C	0052: 52°C
22	Priority mode Hot water supply/Heating switching temperature	-0040: -40°C	-	0020: 20°C	0000: 0°C
23	Boiler output enable switching temperature	-0020: -20°C	-	0020: 20°C	-0010: -10°C
24	Outside air temperature for hot water temperature compensation start	-0020: -20°C	-	0010: 10°C	0000: 0°C
25	Hot water temperature compensation value	0000: 0K	-	0015: 15K	0003: 3K
26	Night setback change temperature range	0003: 3K	-	0020: 20K	0005: 5K
27	Set temperature shift with heating Auto	-0005: -5K	-	0005: 5K	0000: 0K
28	Auto Restart of power outage after system power failure	0000: No		0001: Yes	0001: Yes
29	Outside air temperature T1 temperature	-0015: -15°C	-	0000: 0°C	-0010: -10°C
2B	Outside air temperature T3 temperature	0000: 0°C	-	0015: 15°C	0010: 10°C
2C	Set temperature A with outside air temperature of T0	0020: 20°C	-	0055: 55°C (401 / 601), 0065: 65°C (801 / 1101 / 1401)	0040: 40°C
2D	Set temperature B with outside air temperature of T1	0020: 20°C	-	0055: 55°C (401 / 601), 0065: 65°C (801 / 1101 / 1401)	0035: 35°C
2E	Set temperature C with outside air temperature of 0°C	0020: 20°C	-	0055: 55°C (401 / 601), 0065: 65°C (801 / 1101 / 1401)	0030: 30°C
2F	Set temperature D with outside air temperature of T3	0020: 20°C	-	0055: 55°C (401 / 601), 0065: 65°C (801 / 1101 / 1401)	0025: 25°C
30	Set temperature E with outside air temperature of 20°C	0020: 20°C	-	0055: 55°C (401 / 601), 0065: 65°C (801 / 1101 / 1401)	0020: 20°C
31	Zone2 ratio with Zone1 as Auto	0000: 0%	-	0100: 100%	0080: 80%
33	Hydro unit backup heater down time	0000: 5 min 0002: 15 min		0001: 10 min 0003: 20 min	0001: 10 min

* DN_11, 6B8, 6BA, 6BC are needed for PCB replacement or DN code reset procedure has been completed.

DN	Item	Details	Factory default
34	Hydro unit backup heater up time	0000: 10 min 0001: 20 min 0002: 30 min 0003: 40 min	0000: 10 min
3A	Frost protection function Invalid/Valid	0000: Invalid 0001: Valid	0001: Valid
3B	Frost protection set temperature	0008: 8°C - 0020: 20°C	0015: 15°C
3C	2-way valve operation (logical reverse) control	0000: Activate during cooling 0001: Deactivate during cooling	0000: Activate during cooling
3E	Heating HP/Boiler priority switching when using boiler	0000: Priority on HP 0001: Priority on boiler	0000: Priority on HP
40	Activate/deactivate room temperature control	0000: Deactivate 0001: Activate	0000: Deactivate
42	P2 pump display on Wireless Adapter screen (NOT on remote controller screen)	0000: Invalid 0001: Valid	0000: Invalid
52	External input setting when using I/P 7, 8 (CN21) as Emergency shutdown input (DN_B6 = “0”)	0000: CLOSE to stop system 0001: OPEN to stop system	0000: CLOSE to stop
54	Logic of 3-way valve’s action when powered (Single return only)	0000: Not reversed (Hot water mode when powered) 0001: Reversed (Heating when powered)	0000: Not reversed (Hot water mode when powered)
58	Night setback is activated	0000: Zone 1 & 2 0001: Zone 1 only	0000: Zone1 & 2
59	Interval of Mixing Valve control	0000: 30 seconds 0001: 1 minute - 0030: 30 minutes	0002: 2 minutes
5A	P1 setting while in hot water supply mode	0000: While running HP only 0001: P1 continues running	0000: While running HP only
5B	Boiler running setting	0000: Boiler and HP 0001: Boiler only with pump running 0002: Heater 0003: Boiler only (Pump stopping)	0003: Boiler only
61	External input setting when using I/P 5, 6 (CN21)	0000: Starts as the circuit is closed Stops as the circuit is opened 0001: Starts / stops as the circuit is received closed pulse signal	0000: Closed: Starts Opened: Stops
62	Activate/deactivate A02 failure detection	0000: Activate 0001: Deactivate	0000: Activate
64	Continuously run or stop the P2 pump while cooling	0000: Continuously run P2 0001: Stop P2	0000: Continuous running
65	P1 pump setting when the thermostat is deactivated in the room temperature remote controller and room temperature thermostat settings	0000: Continuously run P1 0001: Stop P1 when the thermostat is OFF	0000: Continuous running
6E	TO diff temperature, when pump P1 stop at TO 20°C	0001: 1K 0005: 5K	0002: 2K
73	Hot water tank heater start time of heat-pump while operating	0000: 30 min passed 0003: 120 min passed	0003: 120 min passed
92	Upper room temperature limit when cooling	0000: 0°C - 0055: 55°C	0029: 29°C
93	Lower room temperature limit when cooling	0000: 0°C - 0055: 55°C	0018: 18°C
94	Upper room temperature limit when heating	0000: 0°C - 0055: 55°C	0029: 29°C
95	Lower room temperature limit when heating	0000: 0°C - 0055: 55°C	0018: 18°C
96	Initial water temperature setting when controlling cooling by the room temperature remote controller and room temperature thermostat	0005: 5°C 0030: 30°C	0020: 20°C
9D	Initial water temperature setting when controlling heating by the room temperature remote controller and room temperature thermostat	0020: 20°C 0055: 55°C (401 / 601), 0065: 65°C (801 / 1101 / 1401)	0040: 40°C
9E	TO temperature setting to stop the P1 pump during the middle period heating	0010: 10°C - 0030: 30°C	0020: 20°C
A0	P1 pump speed control changes the percentage duty of the PWM control	0000: 100% 0005: 50%	0000: 100%
A1	Outside air temperature T0 temperature	-0020: -20°C (401 / 601), -0030: -30°C (801 / 1101 / 1401) - -0015: -15°C (401 / 601), -0020: -20°C (801 / 1101 / 1401)	-0020: -20°C
A2	Zone2 temperature setting method	0000: Percentage (DN_31) 0001: Fixed value (DN_A3 - A5)	0000: Percentage
A3	Set temperature A’ with outside temperature of T0	0020: 20°C - 0055: 55°C (401 / 601), 0065: 65°C (801 / 1101 / 1401)	0040: 40°C

* DN_11, 6B8, 6BA, 6BC are needed for PCB replacement or DN code reset procedure has been completed.

DN	Item	Details	Factory default
A4	Set temperature B' with outside temperature of T1	0020: 20°C - 0055: 55°C (401 / 601), 0065: 65°C (801 / 1101 / 1401)	0035: 35°C
A5	Set temperature E' with outside temperature of 20°C	0020: 20°C - 0055: 55°C (401 / 601), 0065: 65°C (801 / 1101 / 1401)	0020: 20°C
AB	Group control	0000: TTW value of each Hydro Unit 0001: TTW value transmitted from Master Unit	0000: each Hydro Unit
AC	The temperature increase during "Forced ON" mode (SG Ready control)	0000: 0K - 0010: 10K	0000: 0K
B2	HP restart water temperature in A zone. (Valid only room temp control using 2nd remote controller)	0020: 20°C - 0037: 37°C	0025: 25°C
B5	Initial water temperature setting method when controlling heating by the room temperature remote controller and room temperature thermostat	0000: The fixed temperature by DN_9D 0001: The calculated temperature by Auto curve	0000: The fixed
B6	Setting the objects to control of I/P 7, 8	0000: I/P 7 Emergency shutdown input, I/P 8 None 0001: I/P 7 TEMPO 1 input, I/P 8 None 0002: I/P 7 TEMPO 2 input, I/P 8 None 0003: I/P 7 Forcibly turn off the backup heater, I/P 8 Forcibly turn off the hot water tank heater 0004: I/P 7 SG network input 1, I/P 8 SG network input 2	0000: I/P 7 Emergency shutdown input, I/P 8 None
B8	Forcibly heater off at T0 ≥ A°C	0000: no restriction, 0001: 20°C 0002: 15°C, ▪▪▪, 0006: -5°C	0000: no restriction
B9	Backup heater energization temperature during defrosting.	Correction coefficient B 0000: 0K, ▪▪▪, 0004: 40K	0000: 0K
BA	Intermittent operation at T0 ≥ A°C (heating mode)	0000: continuous operation 0001: 20°C, ▪▪▪, 0006: -5°C	0000: continuous operation
BB	Intermittent operation at T0 < B°C (cooling mode)	0000: continuous operation 0001: 35°C, ▪▪▪, 0003: 25°C	0000: continuous operation
BC	Pump off time during thermostat off operation	0000: 5 min, ▪▪▪, 0005: 30 min	0001: 10 min
680	0 - 10 V input setting	0000: Not use 0001: Temperature setting 0002: Capacity setting of Heating / Cooling 0003: Capacity setting of Hot water supply 0004: Capacity setting of Heating / Cooling + Hot water supply	0000: Not use
681	0 - 10 V Hot water supply temperature setting	0000: Not use AI 0001: AI 1 0002: AI 2 0003: AI 3	0000: Not use AI
682	0 - 10 V Heating ZONE1 temperature setting	0000: Not use AI 0001: AI 1 0002: AI 2 0003: AI 3	0000: Not use AI
683	0 - 10 V Heating ZONE2 temperature setting	0000: Not use AI 0001: AI 1 0002: AI 2 0003: AI 3	0000: Not use AI
684	0 - 10 V Cooling temperature setting	0000: Not use AI 0001: AI 1 0002: AI 2 0003: AI 3	0000: Not use AI
685	0 - 10 V Hot water supply temperature upper limit	0040: 40°C - 0080: 80°C	0065: 65°C
686	0 - 10 V Heating ZONE1 temperature upper limit	0020: 20°C - 0055: 55°C (401 / 601), 0065: 65°C (801 / 1101 / 1401)	0055: 55°C
687	0 - 10 V Heating ZONE2 temperature upper limit	0020: 20°C - 0055: 55°C (401 / 601), 0065: 65°C (801 / 1101 / 1401)	0055: 55°C
688	0 - 10 V Cooling temperature upper limit	0007: 7°C - 0029: 29°C	0020: 20°C
689	0 - 10 V Hot water supply temperature setting resolution	0001: 1°C - 0005: 5°C	0005: 5°C
68A	0 - 10 V Heating ZONE1 temperature setting resolution	0001: 1°C - 0005: 5°C	0003: 3°C
68B	0 - 10 V Heating ZONE2 temperature setting resolution	0001: 1°C - 0005: 5°C	0003: 3°C
68C	0 - 10 V Cooling temperature setting resolution	0001: 1°C - 0005: 5°C	0001: 1°C
6A6	P1 pump speed control	0000: P1 pump fixed speed (depend on DN_A0 setting) 0001: P1 pump variable speed	0001: Variable speed
6A7	Pump speed control correction	0000: 100% 0001 :90% 0002: 75% 0003: 50%	0000: 100%
6AC	Hot water supply mode operation cycle to prevent water temperature drop	0000: Invalid 0001: 1H - 0050: 50H	0024: 24H

* DN_11, 6B8, 6BA, 6BC are needed for PCB replacement or DN code reset procedure has been completed.

DN	Item	Details	Factory default
6B0	Boiler output enabled	0000: No 0001:Yes	0000: No
6B1	Boiler install position after 3WV heating side / before 3WV	0000: After 3WV heating side 0001: Before 3WV	0000: After 3WV heating side
6B2	External cylinder thermostat connected	0000: No 0001: Yes	0000: No
6B3	External room thermostat connected	0000: No 0001: Yes	0000: No
6B4	3WV SPST / SPDT specification switching	0000: SPST 0001: SPDT	0000: SPST
6B5	Synchronisation of pump P1 and P2	0000: Non-synchronous 0001: Synchronous	0000: Non-synchronous
6B8	Hot water supply is using	0000: Yes 0001: No	0000: Yes
6B9	ZONE1 operation is using	0000: Yes 0001: No	0000: Yes
6BA	ZONE2 operation is using	0000: No 0001: Yes	0000: No
6BC	Backup heater capacity	0000: 3 kW 0001: 6 kW 0002: 9 kW	Depend on type
6BD	Outdoor unit type setting	0000: 401 / 601 0001: 801 / 1101 / 1401 0002 - 0003: None	Depend on type
6CA	Output1 item	0000: Alarm 0001: Compressor 0002: Defrost 0003: Boiler 0004: Release 0005: Backup heater 0006: Cylinder heater 0007: Heating 0008: Cooling 0009: Hot water supply	0000: Alarm
6CB	Output4 item		0001: Compressor
6CC	Output2 item		0002: Defrost
6CD	Output3 item		0003: Boiler
6CE	SG ready forced operation heater control	0000: Heater output allowed 0001: Heater output not allowed	0000: Heater output allowed
6D0	P1 pump stop or not using outside air temperature	0000: Continuous run 0001: Pump P1 stop when TO > 20°C (Available to change the temperature setting by DN_9E)	0000: Continuous run
6D1	Pump P1 ON/OFF cycling (During long periods of system OFF)	0000: OFF 0001: ON	0000: OFF
6D2	Hydro unit backup heater energized Yes / No	0000: Energized 0001: Not energized	0000: Energized
6D3	Hot water cylinder heater energized Yes / No	0000: Energized 0001: Not energized	0000: Energized
6D4	External booster heater output enabled Yes / No	0000: Enabled 0001: Not enabled	0000: Enabled
6F1	Temperature difference for mixing valve opening value changing	0001: 1K 0002: 2K 0003: 3K	0002: 2K
6F2	Mixing valve maximum steps	0012: 12 step - 0060: 60 step	0024: 24 step
6FC	CDU Night Time Low Noise Operation	“Mode select for silent mode 0 = mode1 1 = mode2 2 = Do not use”	0000: mode1
6FD	Cooling Zone2 set temperature (Shift value from Zone1 set temperature)	0000: 0K 0001: +1K 0002: +2K - 0023: +23K	0010: 10K

* DN_11, 6B8, 6BA, 6BC are needed for PCB replacement or DN code reset procedure has been completed.

Remote controller DN table

DN	Item	Details	Fist shipment
02	Temperature correction by the room temperature sensor (heating)	-10K - +10K: By 1K steps	-1: -1K correction
03	Temperature correction by the room temperature sensor (cooling)	-10K - +10K: By 1K steps	-1: -1K correction
09	Night time low-noise mode	0: Invalid 1: Valid	0: Invalid
0A	Night time low-noise start time	0 - 23 (0:00 to 23:00)	22: 22:00
0B	Night time low-noise end time	0 - 23 (0:00 to 23:00)	06: 06:00
0C	Anti bacteria start time	0 - 23 (0:00 to 23:00)	22: 22:00
0D	Anti bacteria start cycle	1 - 10 (Every day to 10-day cycle)	07: 7-day cycle
0E	Starting time of Night setback	0 - 23 (0:00 to 23:00)	22: 22:00
0F	Ending time of Night setback	0 - 23 (0:00 to 23:00)	06: 06:00
11	Remote controller Alarm Tone.	0: Alarm Tone OFF 1: Alarm Tone ON	1: Alarm Tone ON
12	Frost running period (days)	(0 days – 20 days)	00: No setting
13	Frost running period (hours)	(0 hours – 23 hours)	00: No setting
14	Start and End temperature	20 - 55 (20°C - 55°C)	00: No setting
15	Max temperature	20 - 55 (20°C - 55°C)	00: No setting
16	Continuation days for every step up to Max temperature	1 - 7 (1 day - 7 days)	00: No setting
17	Temperature difference for every step up to Max temperature	1 - 10 (1 K - 10 K)	00: No setting
18	Continuation days for every step down to End temperature	1 - 7 (1 day - 7 days)	00: No setting
19	Temperature difference for every step down to End temperature	1 - 10 (1 K - 10 K)	00: No setting
1A	Continuation days in Max temperature	1 - 50 (1 day - 50 days)	00: No setting
1B	Power consumption function is using	0000: No 0001: Yes	0001: Yes
1C	Language setting	0000: English 0001: Turkish 0002: French 0003: German 0004: Spanish 0005: Italian 0006: Dutch 0007: Finnish 0008: Czech 0009: Hungarian 0010: Croatian 0011: Slovenian 0012: Portuguese 0013: Polish 0014: Danish 0015: Swedish	0000: English
1D	Floor drying setting	0000: OFF 0001: ON	0000: OFF
1E	Temperature sensor using in room temperature control	0000: OFF 0001: ON	0000: OFF

* 14-1A: for floor drying function

2-3. How to reset hydro DN

(1) Procedure

1) Proceed the hydro DN setting screen. * See 9-2-1. Hydro DN setting
2) Press the [^] [v] [↩] long time in DN setting screen, and select “YES”.

NOTE

- After DN reset, it will take few minutes to back normal screen. First communication screen will continue for few minutes, but it is NOT trouble.
- After DN reset, it is necessary to confirm and set again some item below.

DN	Item	Details	Factory default
11	Water heat exchanger capacity	0010: 601 0015: 1101 0017: 1401	Depend on type
6B8	Hot water supply is using	0000: Yes 0001: No	0000: Yes
6BA	ZONE2 operation is using	0000: No 0001: Yes	0000: No
6BC	Backup heater capacity	0000: 3 kW 0001: 6 kW 0002: 9 kW	Depend on type
6BD	Outdorr unit type setting	0000: 401 / 601 0001: 801 / 1101 / 1401 0002 - 0003: None	0000: 401 / 601

2-4. How to reset remote controller DN

(1) Procedure

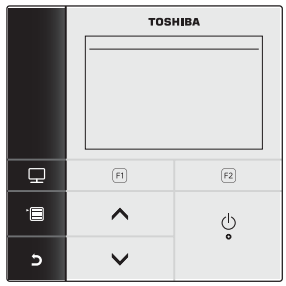
1) Proceed the remote controller DN setting screen. * See 9-2-2. Remote controller DN setting
2) Press the [^] [v] [↩] long time in DN setting screen, and select “YES”.

3. Test run

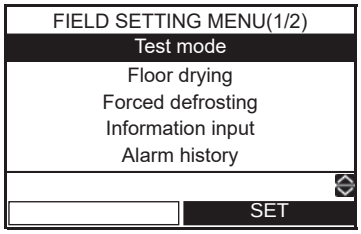
- Even if the outside air temperature or water temperature is outside the setting value range, Heating, Cooling and Hot water supply operation become possible.
- Since the protection setting is disabled in the TEST mode, do not continue a test run longer than 10 minutes.

<Procedure>

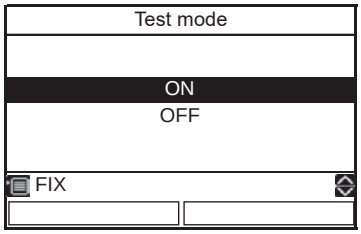
1 **Press the [▤] button and the [∨] button at same time for 4 seconds or longer on the top screen to display the "FIELD SETTING MENU".**



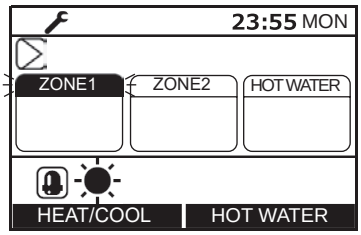
2 **Press the [∧] / [∨] button to select "Test mode" on the FIELD SETTING MENU screen, then press the [F2] button.**



3 **Press the [∧] button to select ON, then press the [▤] button. The 🔧 mark appears on the top screen.**



4 **Start the heating or cooling or Hot water operation on the top screen, then the selected mode mark is blinking during Test mode.**



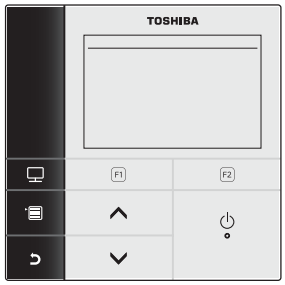
- The pump is activated in 30 seconds. If air is not released completely, the flow sensor value is activated to stop operation. Release air again according to the piping procedure. Little air entrainment is discharged from the purge valve.
- Check that the hydraulic pressure has become the predetermined pressure 0.1 to 0.2 MPa (1 to 2 bar). If the hydraulic pressure is insufficient, replenish water.
- Heating operation starts. Check that the hydro unit starts heating.
- Press the [F1] button to select the Cooling operation, in a few second, the operation starts.
- Check that the hydro unit starts cooling and that the floor heating system is not cooled.
- Press the [F1] button to stop the operation.
- Press the [F2] button to start the Hot water supply operation.
- Check that there is no air entrainment.
- Check that hot water is present at the connection port of the hot water cylinder.
- Press the [F2] button or [⏻ ON/OFF] button to stop the operation.

4. Auto Curve Setting

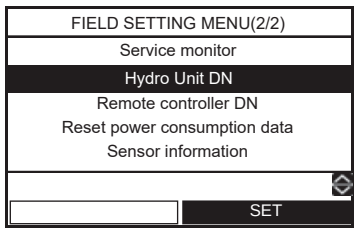
- This function is available only for the header remote controller.
- Set DN for various operation modes with the remote controller.

<Procedure> Perform the following when no operation is in progress.

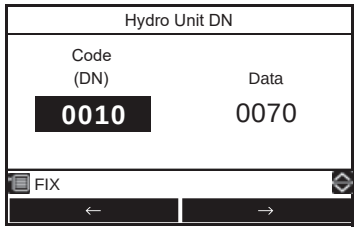
1 **Press the [ ] button and the [ ] button at same time for 4 seconds or longer on the top screen to display the "FIELD SETTING MENU".**



2 **Press the [ ] / [ ] button to select "Hydro Unit DN" on the FIELD SETTING MENU screen, then press the [F2] button.**



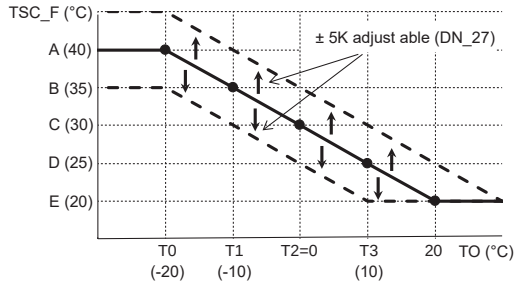
3 **Press the [F1] / [F2] button to select DN number or Data, then press the [ ] / [ ] button to set the value.**



4 **Press the [ ] button. The set value is registered.**

<ZONE1>

• An operation starts at the set temperature of straight -line approximation for the following: water temperature A°C with the outside temperature T0°C, B°C with T1°C, C°C with T2°C, D°C with T3°C, and E°C with 20°C.



Related DN

DN	Setting item	Default	range
2C	Setting temperature A at T0	40	20 - 55 (65)* °C
2D	Setting temperature B at T1	35	20 - 55 (65)* °C
2E	Setting temperature C at T2 (= 0°C)	30	20 - 55 (65)* °C
2F	Setting temperature D at T3	25	20 - 55 (65)* °C
30	Setting temperature E at 20°C	20	20 - 55 (65)* °C
A1	Outside temperature T0	-20	-30 - -20°C
29	Outside temperature T1	-10	-15 - 0°C
2B	Outside temperature T3	10	0 - 15°C
27	Set temperature shift with heating set to auto	0	-5 to 5K

* ( ): 801, 1101, 1401

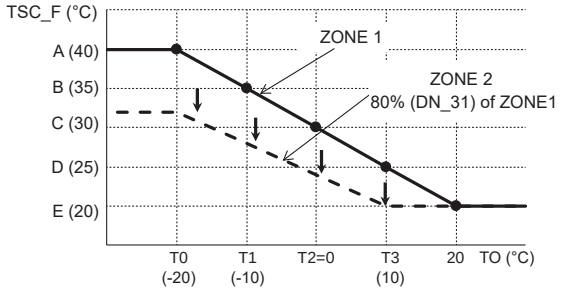
<ZONE2>

• Set temperature of the ZONE2 can be selected from two methods (DN_A2). One is a percentage of ZONE1, the other is a fixed value.

DN_A2 = "0" : Percentage method that is set by DN_31.

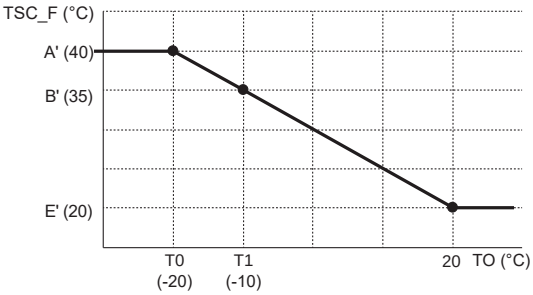
DN_A2 = "1" : Fixed value method that is set by DN_A3, A4 and A5.
However, it is automatically controlled the set temperature of ZONE1 to be the ZONE2 or more.

DN_A2 = 0 Percentage method



Auto-Curve in ZONE2 shows 80% (DN) of that of ZONE1, the water temperature setting does not fall below 20°C.

DN_A2 = 1 Fixed value method



The ZONE2 set temperature A'°C with the outside temperature T0°C, B'°C with T1°C, E'°C with 20°C.

Related DN

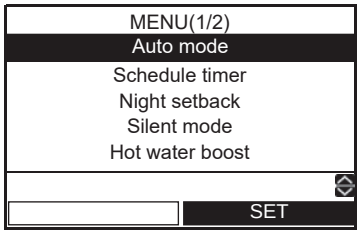
DN	Setting item	Default	range
A2	The choice of how to set ZONE2	0	0 or 1
A3	Setting temperature A' at T0	40	20 - 55 (65)* °C
A4	Setting temperature B' at T1	35	20 - 55 (65)* °C
A5	Setting temperature E' at 20 °C	20	20 - 55 (65)* °C
31	Auto-Curve ratio of ZONE2	80	0 - 100%

* ( ): 801, 1101, 1401

Auto-Curve temperature shift

- This function is available only for the header remote controller.
- The set temperature can be shifted in the range of ±5K of the current setting.

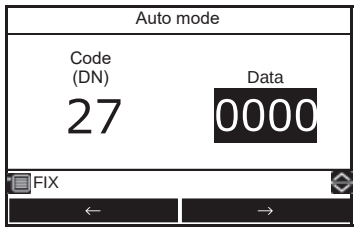
1 **Press the [^] / [v] button to select “Auto mode” on the MENU screen.**



2 **Press the [F1] button for 4 seconds or longer to enter the setting mode. The DN code setting screen appears.**
DN_27: Shifted temperature (Range: -5 - +5, Default: 0)

3 **Press the [F2] button to select Data value, then press the [^] / [v] button to adjust the temperature between -5K to +5 K.**

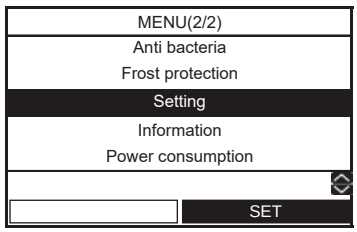
4 **Press the [▣] button. The set temperature is registered.**



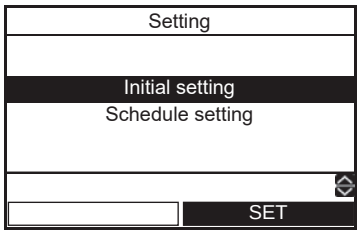
5. Clock Setting

- Setting for the clock (date, month, year, time)

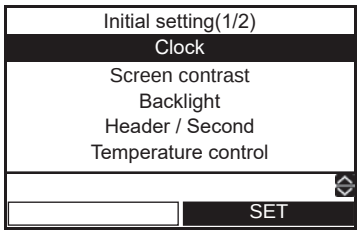
1 **Press the [^] / [v] button to select “Setting” on the MENU screen, then press the [F2] button.**



2 **Press the [^] / [v] button to select “Initial setting” on the Setting screen, then press th [F2] button.**



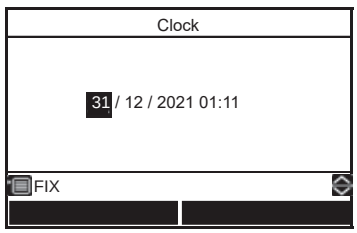
3 **Press the [^] / [v] button to select “Clock” on the Initial setting screen, then press the [F2] button.**



4 **Press the [F1] / [F2] button to select the date, month, year, and, time.**

5 **Press the [^] / [v] button to set the value, then press the [▤] button.**

- The clock display appears on the top screen.
- The clock display blinks if the clock setting has been reset due to power failure or other cause.



6. Scheduled Operation Setting

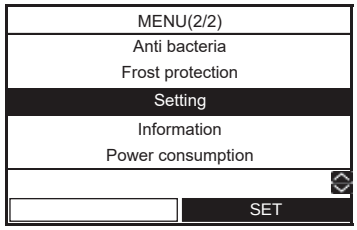
6-1. How to set scheduled operation

- This function is available only for the header remote controller.
- Schedule setting makes the following modes to be flexibly set: hot water supply, heating, cooling, hot water supply and heating, hot water supply and cooling, and stop, and set temperature.
- Set the unit clock and the schedule condition setting before schedule timer setting.

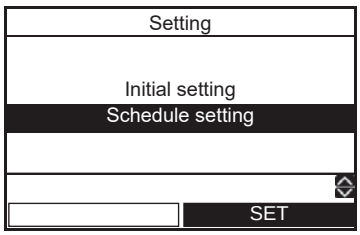
<Preparation>

Set the remote controller time at first.

1 **Press the [^] / [v] button to select “Setting” on the MENU screen, then press the [F2] button.**



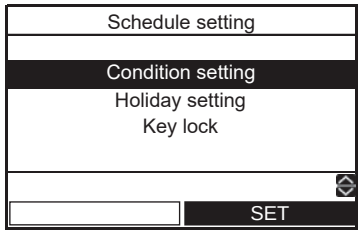
2 **Press the [^] / [v] button to select “Schedule setting” on the setting screen, then press th [F2] button.**



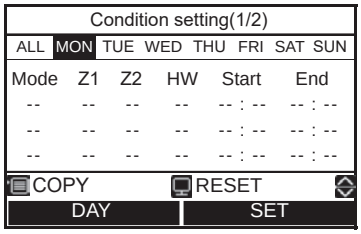
Condition setting

- Up to 6 different running patterns per day can be programmed.

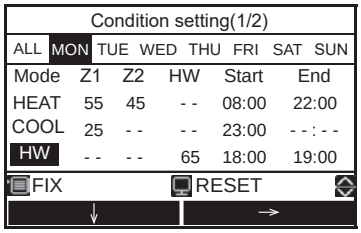
1 **Press the [^] / [v] button to select “Condition setting” on the Schedule setting screen, then press the [F2] button.**



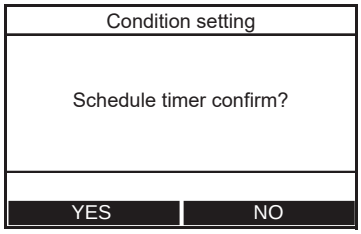
2 **Press the [F1] button to select the day, then press the [F2] button to input running pattern.**



3 **Press [F1] / [F2] button to select the change item, then press the [^] / [v] button.**



4 **Press the [▤] button.**



5 **Press the [F1] button to Fix.**

Mode : Operation mode (HEAT, COOL, HW (Hot water))
Z1 : ZONE1 setting temperature
Z2 : ZONE2 setting temperature
HW : Hot water supply operation setting temperature
Start : Operation start time (0:00 - 23:59)
End : Operation end time (0:00 - 24:00, -- : --)
• “-- : --” means the operation continues.

If End time is set earlier than Start time, an failure is displayed.

To set up ranging over a day

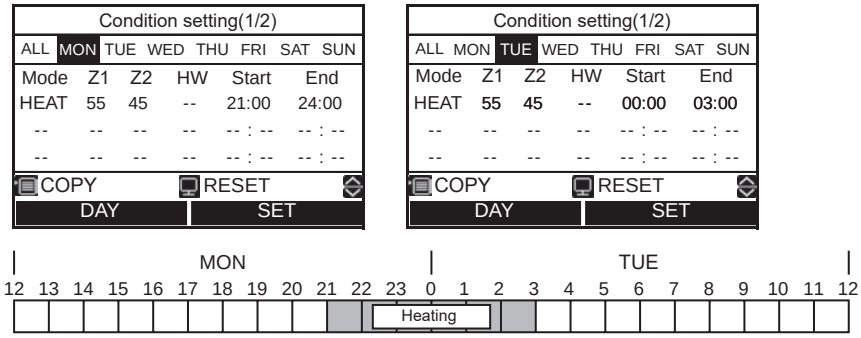
There are two methods.

1.If “24:00” is set to “END” and “00:00” is set to “START” next day, the previous operation status will be continued. And set the time you want to stop to “END”.

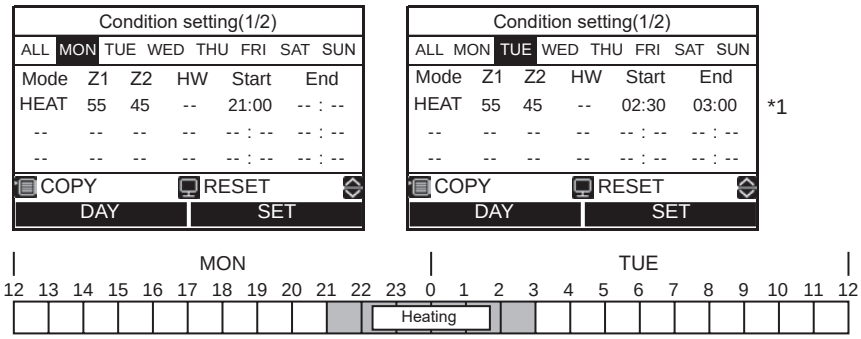
2.If “--” is set to “END”, the previous operation status will be continued next day. And set the time you want to stop to “END”. Any “START” time is sufficient if it is earlier than “END” time.

In the case of heating operation from 21:00 of Monday night to 3:00 of Tuesday morning.

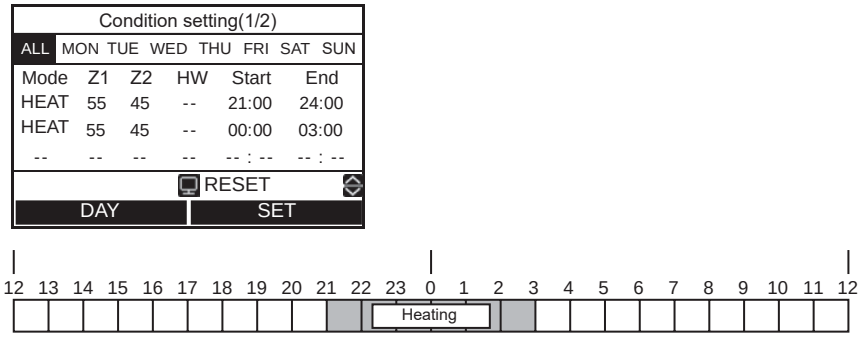
Example of set up (1)



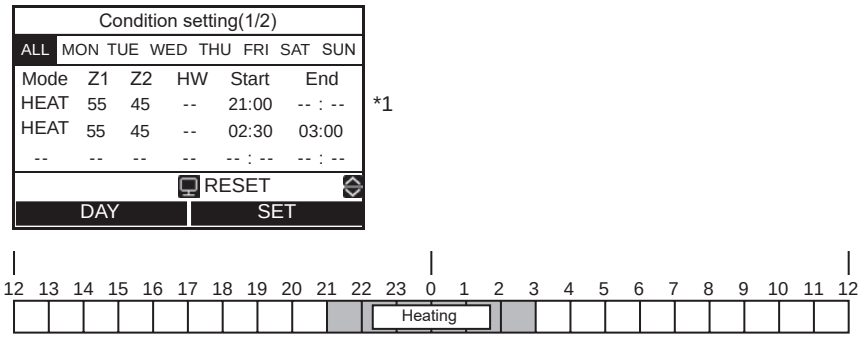
Example of set up (2)



Example of set up (3) (ALL DAY)



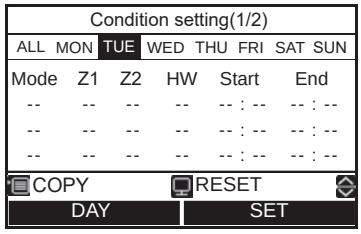
Example of set up (4) (ALL DAY)



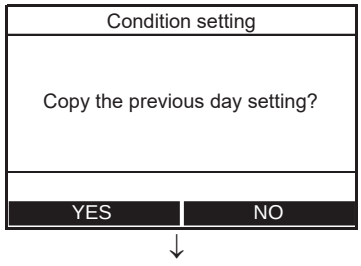
*1: “START” time is permissible 00:00 - 02:59 in this example.

To copy the settings of the previous day

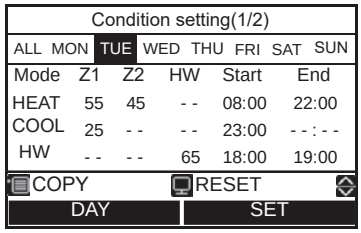
1 **Press the [F1] button to select the day, then press the [▤] button to copy the settings of the previous day.**



2 **Press the [F1] button, then the contents of the setting is displayed.**



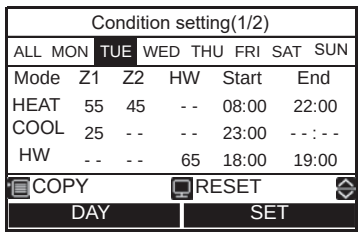
↓



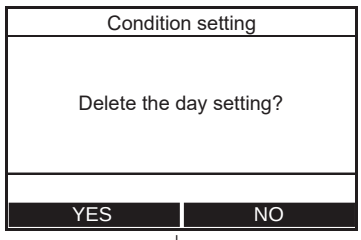
- If the [▤] button is pressed in the state where “MON” is selected, the contents of the setting of “SUN” is copied.

To reset the settings for each day.

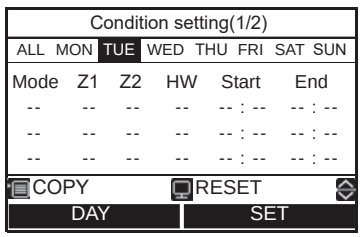
1 **Press the [F1] button to select the day, then press the [▤] button to reset the settings of the day.**



2 **Press the [F1] button, then the contents of the setting is cleared.**



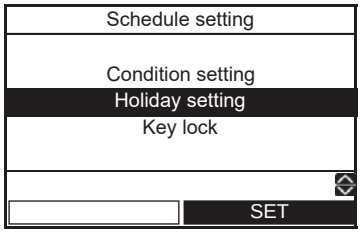
↓



Holiday setting

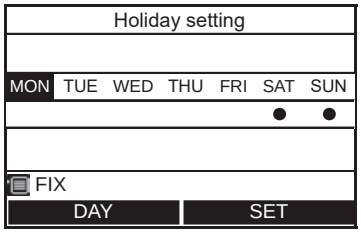
- Set the days of the week when the schedule timer not used.

1 **Press the [^] / [v] button to select “Holiday setting” on the Schedule setting screen, then press the [F2] button.**



2 **Press the [F1] button to select the day, then press the [F2] button to set.**

●: Schedule timer is not used.



3 **Press the [▣] button to Fix.**

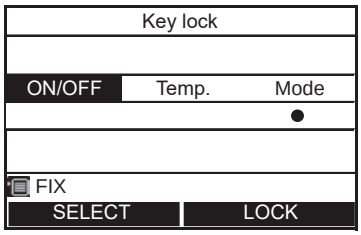
Key lock

- Select whether to “LOCK” / “UNLOCK” for “ON/OFF”, “Temp.”, “Mode” during the schedule timer.

1 **Press the [^] / [v] button to select “Key lock” on the Schedule setting screen, then press the [F2] button.**

2 **Press the [F1] button to select object, then press the [F2] button to select LOCK or UNLOCK.**

●: LOCK

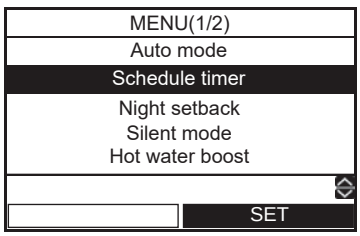


3 **Press the [▣] button to Fix.**

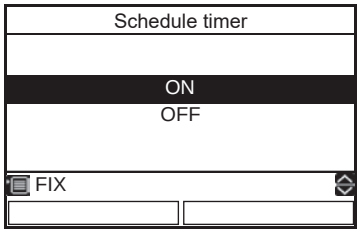
- When “LOCK” is selected, the key cannot be used during Key lock and schedule timer.
- The factory default is “UNLOCK”.

To enable the Schedule timer function

1 **Press the [^] / [v] button to select “Schedule timer” on the MENU screen, then press the [F2] button.**



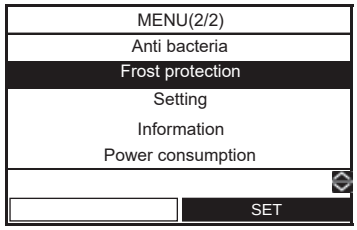
2 **Press the [^] button to select “ON” on the Schedule timer screen, then press the [▣] button. The ◷ mark appears on the top screen.**



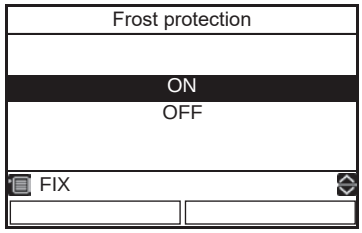
7. Frost protection Setting

- This function performs operation with the minimum capacity (target water temperature:15°C) to prevent pipes from freezing in case the unit is not used for a long period due to absence.
- Cancel schedule timer to start Frost protection operation. When Frost protection is operated with schedule timer on, it may stop during its operation.
- The minimum capacity can be changed, ask the installation company to make the required changes to the settings.
- This function takes precedence over the Night setback operation that is set separately.
- Start the heating operation before making the setting.
  It may not be able to go to the setting screen immediately after start. In that case, select “Frost protection” again after tens of seconds.

1 **Press the [^] / [v] button to select “Frost protection” on the MENU screen, then press the [F2] button.**

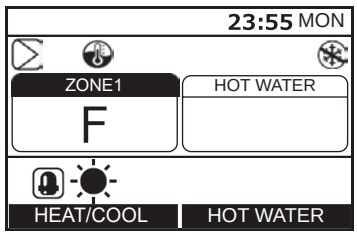


2 **Press the [^] button to select “ON” on the Frost protection screen, then press the [▤] button.**



3 **The temperature indication change to “F” and ❄ mark appears on the top screen.**

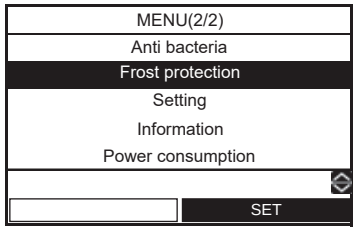
- When the set period has passed, the Frost protection operation ends automatically.



<How to set Frost protection operation end time>

- This function is available only for the header remote controller.

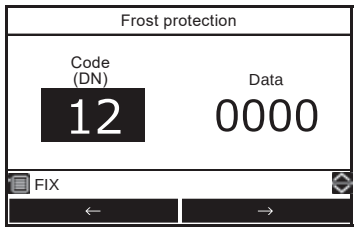
1 **Press the [^] / [v] button to select “Frost protection” on the MENU screen.**



2 **Press the [F1] button for 4 seconds or longer to enter the setting mode. The DN code setting screen appears.**
DN_12: End days (Range: 0-20, Default: 0)
13: End times (Range: 0-23, Default: 0)
ex)
Code No. 12: 05
13: 13 = 5 days 13 hours

3 **Press the [F1] / [F2] button to select DN or Data, then press the [^] / [v] button to set the value.**

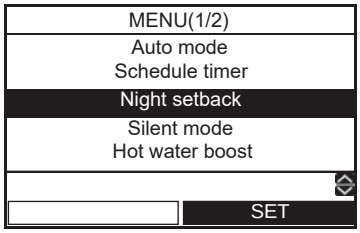
4 **Press the [▣] button. The set value is registered.**



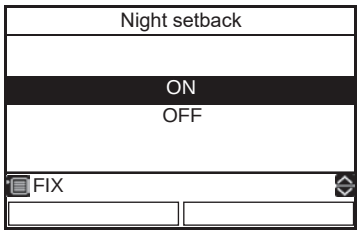
8. NIGHT Operation Setting

- This function is used for energy saving during specified time zone (sleeping hours, etc.).
- For night time hours (sleeping hours, etc.), this function shifts the set temperature of heating or cooling by 5K.

1 **Press the [^] / [v] button to select an “Night setback” on the MENU screen, then press the [F2] button.**



2 **Press the [^] button to select “ON” on the Night setback screen, then press the [▤] button.**

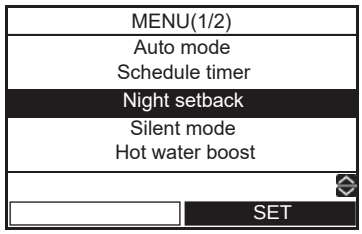


3 **Start the heating or cooling operation, then the mark appears on the top screen.**

<How to set NIGHT operation start and end time>

- This function is available only for the header remote controller.

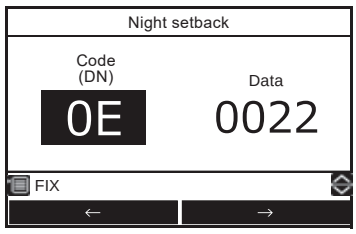
1 **Press the [^] / [v] button to select an “Night setback” on the MENU screen.**



2 **Press the [F1] button for 4 seconds or longer to enter the setting mode. The DN code setting screen appears.**
DN_0E: Start time (Range: 0-23, Default: 22)
0F: End time (Range: 0-23, Default: 06)

3 **Press the [F1] / [F2] button to select DN or Data, then press the [^] / [v] button to set the value.**
The same value cannot be set to 0E and 0F.

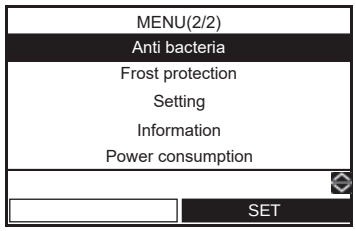
4 **Press the [▤] button. The set time is registered.**



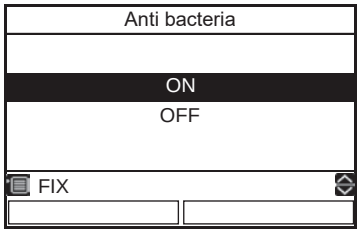
9. Anti bacteria Setting

- This setting regularly raises the hot water cylinder temperature to prevent bacteria from growing.
- The Anti bacteria operation is performed to maintain the temperature (75°C) for the period (30 minutes) when the preset start time (22:00) comes according to the preset cycle (7 days).
- The maintain temperature and the period can be changed, ask the installation company to make the required changes to the settings.

1 **Press the [∧] / [∨] button to select “Anti bacteria” on the MENU screen, then press the [F2] button.**



2 **Press the [∧] button to select “ON” on the Anti bacteria screen, then press the [▣] button.**



3 **Start the hot water operation, then the ♨ mark appears on the top screen.**

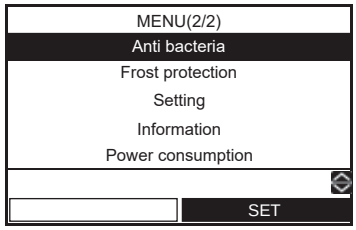
<How to set Anti bacteria temperature and holding time>

In DN_0A or 0B, the set temperature and holding time can be changed.
DN_0A: Set temperature change range 70 to 80°C (75°C: default)
DN_0B: Holding time change range 0 to 250 minutes (30 minutes: default)

<How to set Anti bacteria start time and cycle>

- This function is available only for the header remote controller.

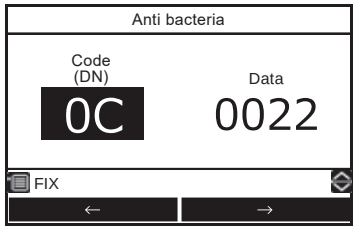
1 **Press the [∧] / [∨] button to select “Anti bacteria” on the MENU screen.**



2 **Press the [F1] button for 4 seconds or longer to enter the setting mode. The DN code setting screen appears.**
DN_0C: Start time (Range: 0-23, Default: 22)
0D: cycle (Range: 1-10, Default: 07)

3 **Press the [F1] / [F2] button to select DN or Data, then press the [∧] / [∨] button to set the value.**

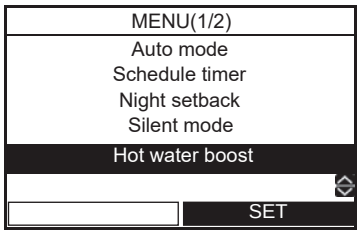
4 **Press the [▣] button. The set value is registered.**



10. Hot water boost Setting

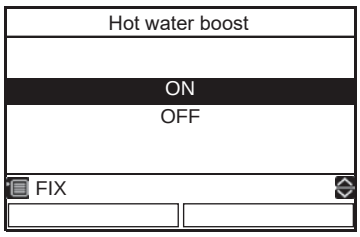
- This function is used when temporarily giving priority to the hot water supply operation. The hot water supply operation is performed in preference to other operations with a target of the preset time (60 minutes) or the preset temperature (75°C). Use this function when hot water is not used for a long time or before using a large amount of hot water.
- The preset time and temperature settings can be changed to values with in a range of 30 to 180 minutes and 40 to 80°C. Ask the installation company to make the required changes to the settings.
- Start the hot water operation before making the setting.
  It may not be able to go to the setting screen immediately after start. In that case, select “Hot water boost” again after tens of seconds.

1 **Press the [^] / [v] button to select “Hot water boost” on the MENU screen, then press the [F2] button.**



2 **Press the [^] button to select “ON” on the Hot water boost screen, then press the [▤] button. The mark appears on the top screen.**

- When the set time period has passed or the water temperature has reached the set temperature, the Hot water boost operation ends automatically.



Hot water boost operation with the heat pump and heater ends when the water temperature reaches 75°C; however, the normal hot water supply operation automatically starts after 60 minutes even if the temperature is not as high as 75°C.

<How to set Hot water boost operation time and temperature>

In DN_08 or 09, the operation time and set temperature can be changed.

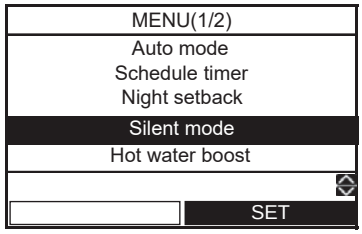
DN_08: Operation time change range 30 to 120 minutes (60 minutes: default)

DN_09: Set temperature change range 40 to 80°C (75°C: default)

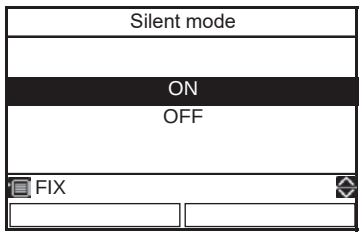
11. Night time Low-noise Setting

- This function is available only for the header remote controller.
- This setting is used to reduce noise output, from the outdoor unit, during night time for neighbors. Night time lownoise operates with lower operation frequency and fan tap than normal operation only for the set time period.

1 **Press the [∧] / [∨] button to select “Silent mode” on the MENU screen, then press the [F2] button.**



2 **Press the [∧] button to select “ON” on the Silent mode screen, then press the [▣] button.**

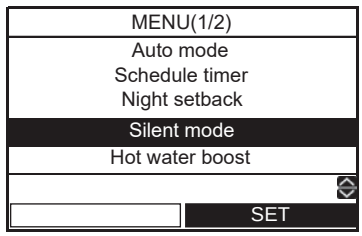


3 **Start the heating, cooling or hot water operation. The mark appears on the top screen during the set-up time zone.**

<How to enable, set start time and end time of night time low-noise>

- This function is available only for the header remote controller.

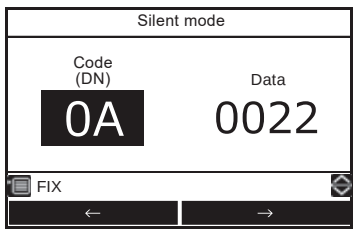
1 **Press the [∧] / [∨] button to select “Silent mode” on the MENU screen.**



2 **Press the [F1] button for 4 seconds or longer to enter the setting mode. The DN code setting screen appears.**
DN_0A: Start time (Range: 0-23, Default: 22)
0B: End time (Range: 0-23, Default: 06)

3 **Press the [F1] / [F2] button to select DN or Data, then press the [∧] / [∨] button to set the value.**
The same value cannot be set to 0A and 0B.

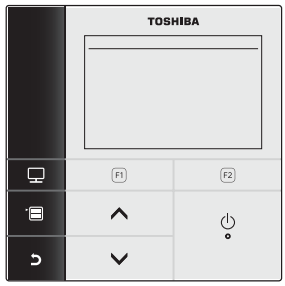
4 **Press the [▣] button. The set time is registered.**



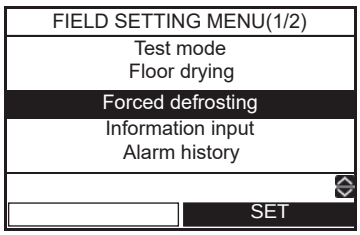
12. Forced Defrosting Setting

- This function is available only for the header remote controller.
- This function can active the forced defrosting mode for the outdoor unit.

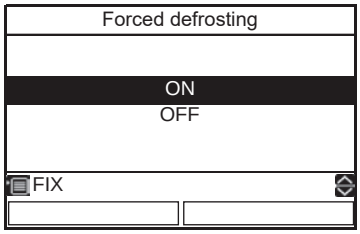
1 **Press the [▤] button and the [∨] button at same time for 4 seconds or longer on the top screen to display the "FIELD SETTING MENU".**



2 **Press the [∧] / [∨] button to select "Forced defrosting" on the FIELD SETTING MENU screen, then press the [F2] button.**



3 **Press the [∧] button to select ON, then press the [▤] button.**



4 **Start the heating operation on the top screen.**

(Operation)

- Press the F1 button.
- Set the operation to the heating mode.
- After a while, forced defrosting signals are transmitted to the outdoor unit, and the unit starts defrosting. (Forced defrosting lasts for up to 10 minutes.)
- After the defrosting, the heating operation starts.
- To perform defrosting again, start with ***1*** above. (Performing the forced defrosting once cancels the forced defrosting setting above described.)

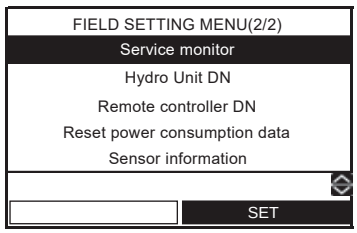
13. Display Function of Set Temperature and Other Settings

- The sensor sensing temperature is displayed on the remote controller.
- This function allows you to make sure whether the sensor is installed properly.

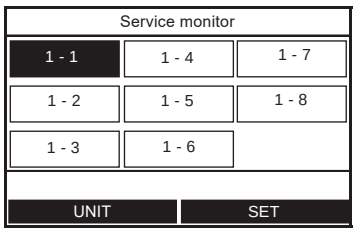
▼Sensor temperature display calling
<Procedure>

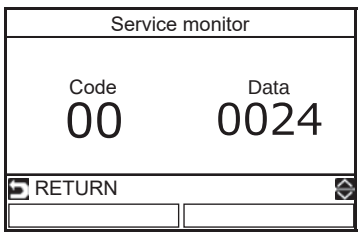
1 **Press the [▤] button and the [∨] button at same time for 4 seconds or longer on the top screen to display the "FIELD SETTING MENU".**

2 **Press the [∧] / [∨] button to select "Service monitor" on the FIELD SETTING MENU screen, then press the [F2] button.**



3 **Press the [F1] button to select the unit, then press the [F2] button to display the status.**





	Item code	Data name	Unit
Hydro unit data	00	Target temperature for hot water supply	°c
	01	Target water temperature for Zone1	°c
	02	Target water temperature for Zone2	°c
	03	Remote controller sensor temperature	°c
	04	Condensed temperature (TC)	°c
	06	Water inlet temperature (TWI)	°c
	07	Water outlet temperature (TWO)	°c
	08	Water heater outlet temperature (THO)	°c
	09	Floor inlet temperature (TFI)	°c
	0A	Hot water cylinder temperature (TTW)	°c
	0B	Mixing valve position	step
	0E	Low pressure (Ps) × 1/10	kPa
	0F	Hydro soft Ver.	–
	10	Control temperature (Hot water cylinder)	°c
	11	Control temperature (Zone1)	°c
	12	Control temperature (Zone2)	°c

	Item code	Data name	Unit
Outdoor unit data	60	Heat exchange temperature (TE)	°c
	61	Outside air temperature (TO)	°c
	62	Discharge temperature (TD)	°c
	63	Suction temperature (TS)	°c
	65	Heat sink temperature (THS)	°c
	6A	Current × 10	A
	6D	Heat exchanger coil temperature (TL)	°c
	70	Compressor operation Hz	Hz
	72	Number of revolutions of outdoor fan (lower or 1 fan model)	rpm
	73	Number of revolutions of outdoor fan (upper)	rpm
	74	Outdoor PMV position × 1/10	pls
	7A	Discharge pressure (PD) × 1/10	kPa

	Item code	Data name	Unit
Service data	F0	Micro computer energized accumulation time × 1/100	h
	F1	Hot water compressor ON accumulation time × 1/100	h
	F2	Cooling compressor ON accumulation time × 1/100	h
	F3	Heating compressor ON accumulation time × 1/100	h
	F4	Built-in circulation pump operation accumulation time × 1/100	h
	F5	Hot water cylinder heater operation accumulation time × 1/100	h
	F6	Backup heater operation accumulation time × 1/100	h
	F7	Booster heater operation accumulation time × 1/100	h

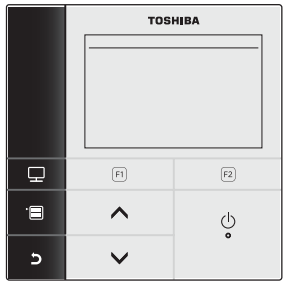
- Some sensors (temperature / pressure) or fan are not displayed, because not connected.

14. Alarm History Calling Function

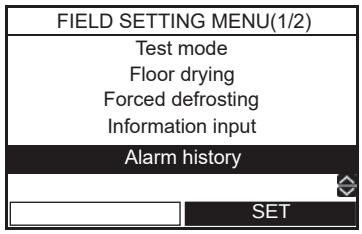
- List of latest 10 alarm data: failure information of failure code, date and time is displayed.

<Procedure>

1 **Press the [▤] button and the [∨] button at same time for 4 seconds or longer on the top screen to display the "FIELD SETTING MENU".**

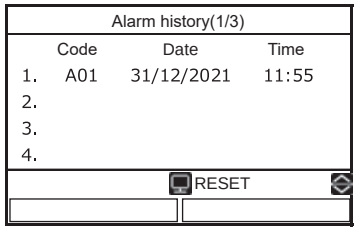


2 **Press the [∧] / [∨] button to select "Alarm history" on the FIELD SETTING MENU screen, then press the [F2] button.**

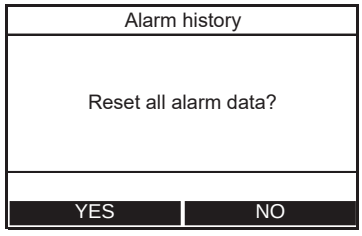


To reset the alarm history

1 **Press the [▤] button to reset the alarm history.**



2 **Press the [F1] button, then all alarm data is cleared.**



NOTE

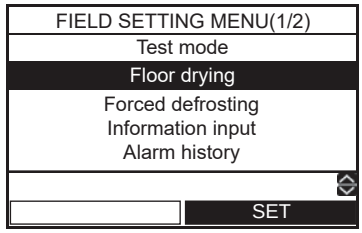
If the current failure is the same as the one occurred last time before deleted, the history may not record the current failure.

15. Floor drying

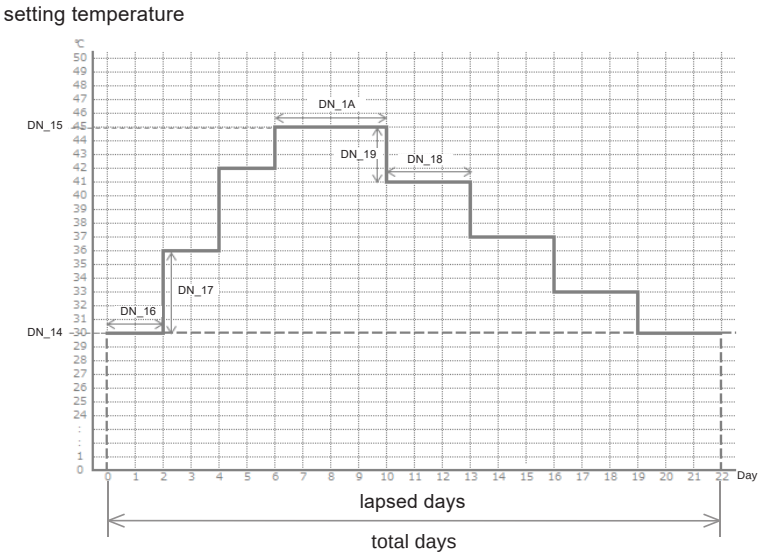
- This function is available only for the header remote controller.
- This function is used for drying concrete etc.
- Service personnel must operate the unit after setting the related DN code.
- Operation is not started unless All the related DN codes are set.
- Refer to the following for the settings of the related items. Please setup on the responsibility for an installer. An unsuitable setup may cause a crack of concrete etc.
- When the operation starts, the unit operates as follows.

1 **Press the [▤] button and the [∨] button at same time for 4 seconds or longer on the top screen to display the "FIELD SETTING MENU".**

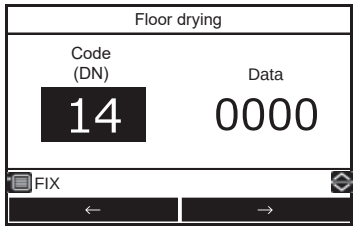
2 **Press the [∧] / [∨] button to select "Floor drying" on the FIELD SETTING MENU, then press the [F1] button for 4 seconds or longer.**



DN_14 setting start and End temperature [20-55°C]
DN_15 setting Max temperature [20-55°C]
DN_16 continuation days for every step up to Max temperature [1-7 days]
DN_17 temperature difference for every step up to Max temperature [1-10 K]
DN_18 continuation days for every step down to End temperature [1-7 days]
DN_19 temperature difference for every step down to End temperature [1-10 K]
DN_1A Continuation days in Max temperature [1-50 days]



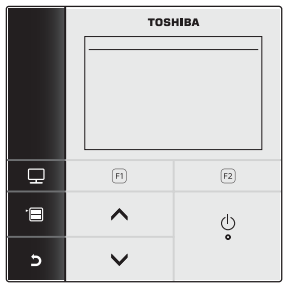
3 **Press the [F1] / [F2] button to select DN or Data, then press the [∧] / [∨] button to set the value.**



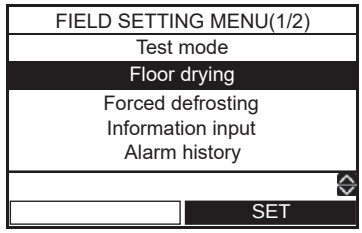
4 **Press the [▤] button. The set value is registered.**

To start the operation

1 **Press the [▤] button and the [∨] button at same time for 4 seconds or longer on the top screen to display the "FIELD SETTING MENU".**

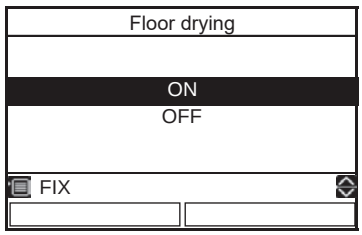


2 **Press the [∧] / [∨] button to select "Floor drying" on the FIELD SETTING MENU, then press the [F2] button.**



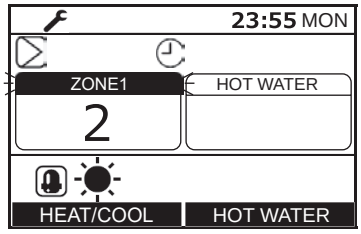
3 **Press the [∧] button to select the ON, then press the [▤] button.**

- Check the total days for Floor drying operation, then press [F1] button. The 🔧 mark and 🕘 mark appears on the Top screen.



4 **Start the heating operation on the top screen.**

- Then ZONE1 mark blinks during Floor drying operation and lapsed days are displayed.

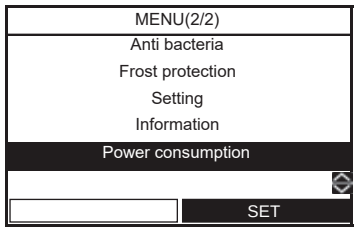


- If some abnormalities occur during Floor drying operation, the System stops and Alarm history screen is displayed.
- After heating operation is stopped by operating the remote controller during Floor drying operation, if heating operation is again started within 30 minutes, Floor drying operation is started from the time of stopping.

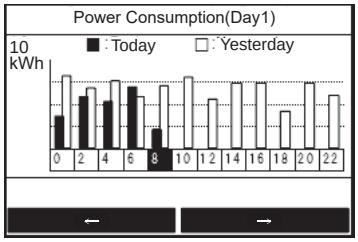
16. Power consumption

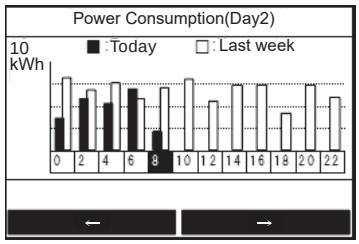
- Shows latest power consumption.
- This function is available only for the header remote controller.

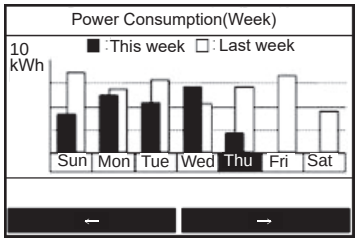
1 **Press the [^] / [v] button to select “Power consumption” on the MENU screen, then press the [F2] button.**



2 **Press the [F1] / [F2] button to change display pattern.**





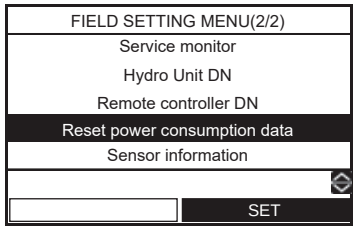


17. Reset power consumption data

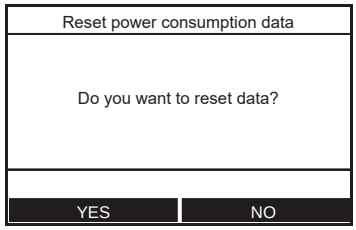
- This function is available only for the header remote controller.

1 **Press the [▤] button and the [∨] button at same time for 4 seconds or longer on the top screen to display the "FIELD SETTING MENU".**

2 **Press the [∧] / [∨] button to select "Reset power consumption data" on the FIELD SETTING MENU, then press the [F2] button.**



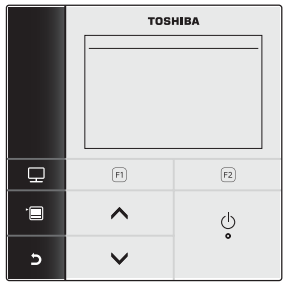
3 **Press the [F1] button, then power consumption data is cleared.**



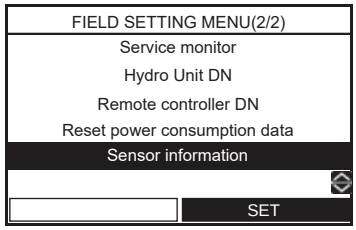
18. Sensor information

- Shows the value of sensor.

1 **Press the [ ] button and the [ ] button at same time for 4 seconds or longer on the top screen to display the "FIELD SETTING MENU".**

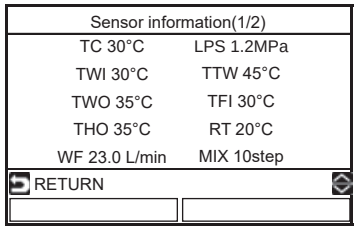


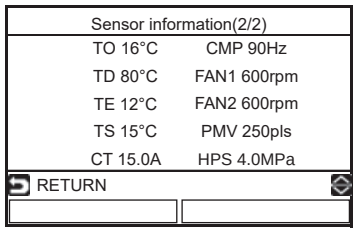
2 **Press the [ ] / [ ] button to select "Sensor information" on the FIELD SETTING MENU, then press the [F2] button.**



3 **Select display number.**

- Display 1 is Hydro Unit sensor
- Display 2 is Outdoor Unit sensor





Outdoor unit

19. Outdoor Unit Setting

19-1. Refrigerant recovery control

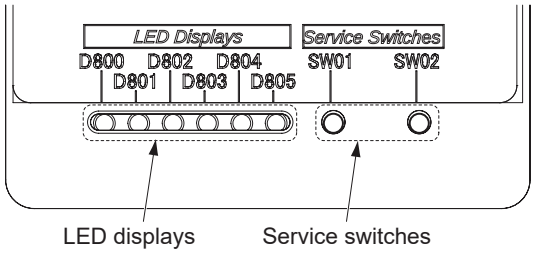
Although HFC refrigerant is "Ozone depletion potential = 0", emission control is applied to it as a greenhouse effect gas.

This model has a switch for the outdoor unit to perform an environment-friendly refrigerant recovery operation (pump down) when the model is replaced or discarded.

[How to operate]

1 **Remove the water in the hydro unit.**
(With the water remained in the hydro unit, performing refrigerant recovery may freeze the water and burst the unit.) *1

2 Confirm the LED display of the outdoor unit shows the initial state. If not then please return it to the initial state (*2). Push and hold down SW01 for at least 5 seconds. D804 will start slowly flashing. Push SW01 several times until the LED display becomes as follows. Push SW02, then D805 will start flashing. Push and hold down SW02 for at least 5 seconds. D804 will start slow flashing and D805 will change to on. The air to water heat pump enters the forced cooling mode.



D800	D801	D802	D803	D804
○	●	●	●	◎

●: Off ○: Light ◎: Flash (5 times/sec)

3 **After 3 minutes has passed, close the liquid-side valve.**

4 **After the refrigerant recovery is completed, close the gas-side valve.**

5 Press and hold down SW01 and SW02 at the same time for at least 5 seconds to stop operation.

*1: If can not remove the water
Operate the circulation pump, to prevent freezing.
1.Turn off the power. (hydro and outdoor unit)
2.Set DIP_SW705_3 “ON” on the hydro control board.
3.Turn on the power. (hydro and outdoor unit)
4.Rotate the rotary SW700 to position “1” and press tactile switch SW703 for 5 sec, or longer.
5.Rotating the rotary SW700 to position “F”.
6.If you finish refrigerant recovery operation, set DIP_SW705_3 “OFF”.

*2: Hold down the SW01 and SW02 simultaneously for at least 5 seconds.

19-2. Service support functions (LED indication, Switch operation method)

The following settings are available with switches.

(1) Overview

Using 2 push-button switches (SW01, SW02) can make settings available and confirm operations.

For operation

Part number	Specification	Operation details
SW01	Press button switch	This switch switches the indications of LED (D800 to D804) on the outdoor control board.
SW02	Press button switch	This switch enables users to perform a special operation for maintenance and inspection.

For display

Part number	Specification	Operation details
D800 to D804	Yellow LED	**Abnormality indication** The lit status of any of D800 to D804 indicates that the outdoor control unit detects an abnormality.
D805	Green LED	**Energization indication** This LED lights when the outdoor unit is energized. During a special operation this LED flashes.

Note: All the LEDs have no colour when off.

(2) LED indication switching
(2) -1. Abnormality indication

Diagnostic Procedure for Each Check Code (Outdoor Unit)

1) This section describes the diagnostic method for each check code displayed on the wired remote controller.
2) In some cases, a check code indicates multiple symptoms.
In this case, confirm the LED display of the outdoor unit to narrow the contents to be confirmed.
3) The check code on the remote controller is displayed only when the same trouble occurred continuously by multiple times while the LED display of the outdoor unit displays even an trouble which occurred once. Therefore the display on the remote controller may differ from that of LED.

How to check the LED display on the outdoor PC board

[Service switch operation]

Currently occurring trouble indication

If any of D800 to D804 is rapidly flashing, it indicates currently occurring trouble. If any of D800 to D804 is slowly flashing or D805 is flashing then press and hold down SW01 and SW02 at the same time for at least 5 seconds. Currently occurring trouble will be indicated.

D800 (YEL)	D801 (YEL)	D802 (YEL)	D803 (YEL)	D804 (YEL)	D805 (GRN)	
●	●	●	●	●	○	No trouble
◎	●	●	●	●	○	Trouble detected (Example. Discharge temp. sensor trouble) (Refer to (2) -1-1.Current trouble indication)

●: Off ○: Light ◎: Flash (5 times/sec)

Latest trouble indication

- The following operation results in the latest trouble being indicated. It is retained in the memory and hence can be confirmed even when the power supply has been turned off.

1) Confirm D800 to D804 are off (or rapidly flashing) and that D805 is lit up. If D800 to D804 are slowly flashing or D805 is flashing then push and hold down SW01 and SW02 at the same time for at least 5 seconds. D800 to D804 will turn off (or be rapidly flashing) and D805 will change to on.
2) Push SW01 several times until reaching the LED indication (D800 to D805) of 'Latest (including current) trouble indication'.
3) Push SW02. The latest trouble will be indicated.
4) Confirm to carry out step 1) to set the LEDs to the initial state (current occurring trouble) when finished and then exit.

Latest (including current) trouble indication

D800 (YEL)	D801 (YEL)	D802 (YEL)	D803 (YEL)	D804 (YEL)	D805 (GRN)	
○	●	●	●	●	◎	Trouble detected (Example. Discharge temp. sensor trouble) (Refer to (2) -1-2.Latest (including current) trouble indication)

●: Off ○: Light ◎: Flash (5 times/sec)

(2) -1-1.Current trouble indication

LED indication						Name of trouble	Wired remote control trouble code
D800	D801	D802	D803	D804	D805		
●	●	●	●	●	○	Normal	—
◎	●	●	●	●	○	Discharge temp. sensor (TD) trouble	F04
●	◎	●	●	●	○	Heat exchanger temp. sensor (TE) trouble	F06
◎	◎	●	●	●	○	Heat exchanger temp. sensor (TL) trouble	F07
●	●	◎	●	●	○	Outside temp. sensor (TO) trouble	F08
◎	●	◎	●	●	○	Suction temp. sensor (TS) trouble	F12
●	◎	◎	●	●	○	Heat sink temp. sensor (TH) trouble	F13
◎	◎	◎	●	●	○	Miswiring of heat exchanger temp. sensor (TE, TS)	F15
●	●	●	◎	●	○	Low pressure sensor (Ps) trouble	F23
●	◎	●	◎	●	○	EEPROM trouble	F31
◎	◎	●	◎	●	○	Compressor break down	H01
●	●	◎	◎	●	○	Compressor lock	H02
◎	●	◎	◎	●	○	Current detection circuit trouble	H03
●	◎	◎	◎	●	○	Case thermostat operation	H04
◎	◎	◎	◎	●	○	Low pressure protective operation	H06
●	●	●	●	◎	○	Unset model type	L10
◎	●	●	●	◎	○	Communication trouble between MCUs	L29
●	◎	●	●	◎	○	Discharge temp. trouble	P03
◎	◎	●	●	◎	○	High pressure SW operation	P04
●	●	◎	●	◎	○	Power supply trouble	P05
●	◎	◎	●	◎	○	Heat sink overheat trouble	P07
◎	◎	◎	●	◎	○	Gas leak detection	P15
●	●	●	◎	◎	○	4-way valve reversal trouble	P19
◎	●	●	◎	◎	○	High pressure protective operation	P20
●	◎	●	◎	◎	○	Fan system trouble	P22
◎	◎	●	◎	◎	○	Short-circuit of compressor drive element	P26
●	●	◎	◎	◎	○	Compressor motor position detection circuit trouble	P29
◎	●	●	◎	●	○	High pressure sensor (Pd) trouble	F24
◎	◎	◎	◎	◎	○	Combination failure between the hydro unit	L15

●: Off ○: Light ◎: Flash (5 times/sec)

(2) -1-2.Latest (including current) trouble indication

LED indication						Name of trouble
D800	D801	D802	D803	D804	D805	
●	●	●	●	●	◇	Normal
◎	●	●	●	●	◇	Discharge temp. sensor (TD) trouble
●	◎	●	●	●	◇	Heat exchanger temp. sensor (TE) trouble
◎	◎	●	●	●	◇	Heat exchanger temp. sensor (TL) trouble
●	●	◎	●	●	◇	Outside temp. sensor (TO) trouble
◎	●	◎	●	●	◇	Suction temp. sensor (TS) trouble
●	◎	◎	●	●	◇	Heat sink temp. sensor (TH) trouble
◎	◎	◎	●	●	◇	Miswiring of heat exchanger temp. sensor (TE, TS)
●	●	●	◎	●	◇	Low pressure sensor (Ps) trouble
●	◎	●	◎	●	◇	EEPROM trouble
◎	◎	●	◎	●	◇	Compressor break down
●	●	◎	◎	●	◇	Compressor lock
◎	●	◎	◎	●	◇	Current detection circuit trouble
●	◎	◎	◎	●	◇	Case thermostat operation
◎	◎	◎	◎	●	◇	Low pressure protective operation
●	●	●	●	◎	◇	Unset model type
◎	●	●	●	◎	◇	Communication trouble between MCUs
●	◎	●	●	◎	◇	Discharge temp. trouble
◎	◎	●	●	◎	◇	High pressure SW operation
●	●	◎	●	◎	◇	Power supply trouble
●	◎	◎	●	◎	◇	Heat sink overheat trouble
◎	◎	◎	●	◎	◇	Gas leak detection
●	●	●	◎	◎	◇	4-way valve reversal trouble
◎	●	●	◎	◎	◇	High pressure protective operation
●	◎	●	◎	◎	◇	Fan system trouble
◎	◎	●	◎	◎	◇	Short-circuit of compressor drive element
●	●	◎	◎	◎	◇	Compressor motor position detection circuit trouble
◎	●	●	◎	●	◇	High pressure sensor (Pd) trouble
◎	◎	◎	◎	◎	◇	Combination failure between the hydro unit

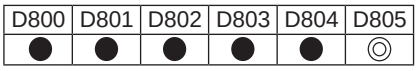
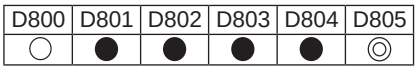
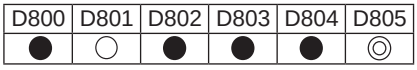
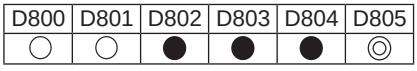
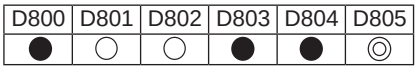
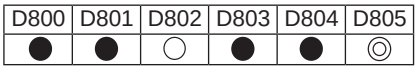
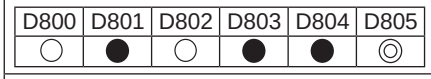
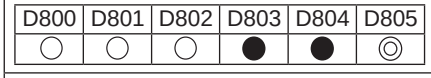
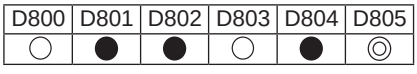
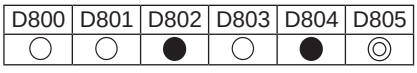
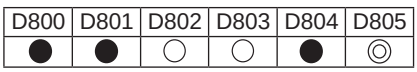
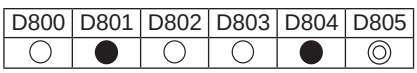
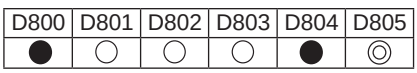
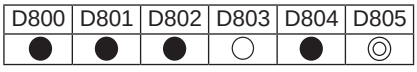
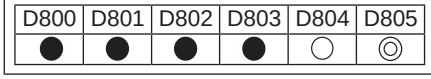
●: Off ○: Light ◎: Flash (5 times/sec) ◇: Flash (1 time/sec)

(2)-2. Sensor, Current, Compressor operation frequency, PMV position indication
The values detected by controller, such as temperature sensor or current values, can be easily checked.

[Method of Operation]

1) Confirm D800 to D804 are off (or rapidly flashing) and that D805 is lit up. If D800 to D804 are slowly flashing or D805 is flashing then push and hold down SW01 and SW02 at the same time for at least 5 seconds. D800 to D804 will turn off (or be rapidly flashing) and D805 will change to on.
2) Push SW01 several times until the LED indication (D800 to D805) reaches the desired display item (Refer to (2) -2-1.).

(2) -2-1.

LED display	Control content
	Trouble indication (Current trouble) Displays the current trouble. Will not appear if no trouble has occurred. (Refer to (2)-1-1)
	Trouble indication (Latest trouble: latest and including current trouble) Previous trouble can be checked using this setting, for example, after previous trouble has been resolved (and even after the power has been turned off). * If trouble is currently occurring then the same content will be displayed.
	Discharge temperature sensor (TD) indication Displays the discharge temperature sensor (TD) value. (Refer to (2)-2-2)
	Outdoor heat exchanger temperature sensor (TE) indication Displays the outdoor heat exchanger temperature sensor (TE) value. (Refer to (2)-2-2)
	Outdoor heat exchanger temperature sensor (TL) indication Displays the outdoor heat exchanger sensor (TL) value. (Refer to (2)-2-2)
	Inlet temperature sensor (TS) indication. Displays the inlet temperature sensor (TS) value. (Refer to (2)-2-2)
	Outside temperature sensor (TO) indication. Displays the outside temperature sensor (TO) value. (Refer to (2)-2-2)
	Heat sink temperature sensor (TH) indication. Displays the heat sink temperature sensor (TH) value. (Refer to (2)-2-2)
	Current indication. Displays the outdoor unit current sensor (CT) detected value. (Refer to (2)-2-2)
	Compressor operation frequency indication. Displays the operating frequency of the compressor. (Refer to (2)-2-2)
	PMV opening indication. Displays the degree to which the PMV is open. (Refer to (2)-2-2)
	Indoor suction temperature sensor (TA) indication. Displays the indoor suction temperature sensor (TA) value. TA = TWI (Refer to (2)-1-1)
	Indoor heat exchange temperature sensor (TC) indication. Displays the indoor heat exchange temperature sensor (TC) value. Heating, hot water supply: TC = TWO + 2 Cooling: TC = TWO (Refer to (2)-2-2)
	Indoor heat exchanger sensor (TCJ) indication. Displays the indoor heat exchanger sensor (TCJ) value. TCJ is actual water heat exchange temperature (TC) sensor value. (Refer to (2)-2-2)
	—
	—
	High pressure sensor (Pd) indication. Displays the High pressure sensor (Pd) value.

●: Off ○: Light ◎: Flash (5 times/sec)

3) Push SW02 to switch to the desired display item (Refer to (2) -2-2.).
4) To access the other display items repeat steps 1) to 3).
5) Before exiting ensure to perform step 1) and set the LED to the initial state (current abnormality indication).

(2) -2-2.

LED indication						Temperature (˚C)	Current (A)	Compressor frequency (rps)	Degree of PMV opening (pls)	Pressure (MPa)
D800 (YEL)	D801 (YEL)	D802 (YEL)	D803 (YEL)	D804 (YEL)	D805 (GRN)					
●	●	●	●	●	◇	Less than -25	0 -	0 -	0 - 19	0 -
○	●	●	●	●	◇	-25 -	1 -	5 -	20 - 39	0.2 -
●	○	●	●	●	◇	-20 -	2 -	10 -	40 - 59	0.4 -
○	○	●	●	●	◇	-15 -	3 -	15 -	60 - 79	0.6 -
●	●	○	●	●	◇	-10 -	4 -	20 -	80 - 99	0.8 -
○	●	○	●	●	◇	-5 -	5 -	25 -	100 - 119	1.0 -
●	○	○	●	●	◇	0 -	6 -	30 -	120 - 139	1.2 -
○	○	○	●	●	◇	5 -	7 -	35 -	140 - 159	1.4 -
●	●	●	○	●	◇	10 -	8 -	40 -	160 - 179	1.6 -
○	●	●	○	●	◇	15 -	9 -	45 -	180 - 199	1.8 -
●	○	●	○	●	◇	20 -	10 -	50 -	200 - 219	2.0 -
○	○	●	○	●	◇	25 -	11 -	55 -	220 - 239	2.2 -
●	●	○	○	●	◇	30 -	12 -	60 -	240 - 259	2.4 -
○	●	○	○	●	◇	35 -	13 -	65 -	260 - 279	2.6 -
●	○	○	○	●	◇	40 -	14 -	70 -	280 - 299	2.8 -
○	○	○	○	●	◇	45 -	15 -	75 -	300 - 319	3.0 -
●	●	●	●	○	◇	50 -	16 -	80 -	320 - 339	3.2 -
○	●	●	●	○	◇	55 -	17 -	85 -	340 - 359	3.4 -
●	○	●	●	○	◇	60 -	18 -	90 -	360 - 379	3.6 -
○	○	●	●	○	◇	65 -	19 -	95 -	380 - 399	3.8 -
●	●	○	●	○	◇	70 -	20 -	100 -	400 - 419	4.0 -
○	●	○	●	○	◇	75 -	21 -	105 -	420 - 439	4.2 -
●	○	○	●	○	◇	80 -	22 -	110 -	440 - 459	4.4 -
○	○	○	●	○	◇	85 -	23 -	115 -	460 - 479	4.6 -
●	●	●	○	○	◇	90 -	24 -	120 -	480 - 499	4.8 -
○	●	●	○	○	◇	95 -	25 -	125 -	500	5.0 -
●	○	●	○	○	◇	100 -	26 -	130 -	—	5.2 -
○	○	●	○	○	◇	105 -	27 -	135 -	—	5.4 -
●	●	○	○	○	◇	110 -	28 -	140 -	—	5.6 -
○	●	○	○	○	◇	115 -	29 -	145 -	—	5.8 -
●	○	○	○	○	◇	120 -	30 -	150 -	—	6.0 -
○	○	○	○	○	◇	Sensor trouble	31 or more	155 or more	—	6.2 or more

●: Off ○: Light ◇: Flash (1 time/sec)

(3) Special operation for maintenance and inspection

[Method of Operation]

1) Confirm the LED display shows the initial state. If not then return it to the initial state.
2) Push and hold down SW01 for at least 5 seconds. D804 will start slowly flashing.
3) Push SW01 until reaching the LED display function you wish to set.

Special operations	LED display	Control content
Refrigerant recovery operation	D800 ○ D801 ● D802 ● D803 ● D804 ◎	The outdoor unit performs cooling operations. The indoor units do not operate with just this operation and hence do any pump only operations in advance.
PMV fully open operation	D800 ○ D801 ● D802 ○ D803 ● D804 ◎	PMV (Pulse Motor Valve) fully opens. Perform step 6) below or returns to normal control after 2 minutes. (→ Note 1)
PMV fully close operation	D800 ● D801 ○ D802 ○ D803 ● D804 ◎	PMV (Pulse Motor Valve) fully opens. Perform step 6) below or returns to normal control after 2 minutes. (→ Note 1)
PMV intermediate open operation	D800 ○ D801 ○ D802 ○ D803 ● D804 ◎	Sets the PMV (Pulse Motor Valve) to intermediate open (250 pulses). Perform step 6) below or returns to normal control after 2 minutes. (→ Note 1)
Indoor heating test command	D800 ○ D801 ● D802 ● D803 ○ D804 ◎	Performs a heating test run. Carrying out step 6) below returns to normal control. (→ Note 2)
Indoor heating test command	D800 ● D801 ○ D802 ● D803 ○ D804 ◎	Performs a cooling test run. Carrying out step 6) below returns to normal control. (→ Note 2)
Forced fan motor operation	D800 ○ D801 ○ D802 ● D803 ○ D804 ◎	Forcibly operates the fan motor. Perform step 6) below or returns to normal control after 2 minutes. (→ Note 1)
4 way valve position operation (Heating position)	D800 ○ D801 ● D802 ○ D803 ○ D804 ◎	Forces the 4 way valve to move to the heating position. After 15 seconds returns to normal control. (→ Note 1)
4 way valve position operation (Heating position)	D800 ● D801 ○ D802 ○ D803 ○ D804 ◎	Forces the 4 way valve to move to the cooling position. After 15 seconds returns to normal control. (→ Note 1)
INJ_2-way valve opening / closing (801, 1101, 1401)	D800 ● D801 ◎ D802 ● D803 ● D804 ◎	Forces the INJ_2-way valve to move to the opposite position to the current position. After 2 minutes returns to normal control. (→ Note 1)
Heater output relay operation	D800 ◎ D801 ● D802 ◎ D803 ● D804 ◎	Turns on the heater output relay. (→ Note 2)

●: Off ○: Light ◎: Flash (5 times/sec)

Note 1: The operations can take place while the equipment is on but it is better if it has been turned off first. A sudden change in pressure could occur while the operations are taking place, which can be dangerous.

Note 2: Trial indoor cooling operation request/trial indoor heating operation request

Caution) Forced test operations using this setting cannot be cancelled using the indoor remote control. Refer to (6) below.

4) Push SW02, and D805 will start rapidly flashing.
5) Push and hold down SW02 for at least 5 seconds. D804 will start slowly flashing and D805 will turn on and the special operation will take effect.
6) To invalidate any of the various settings push and hold down SW01 and SW02 at the same time for at least 5 seconds. D800 to D804 will be off (or rapidly flashing) and D805 lit up (initial state: current trouble indication) and the special operation will have been disabled (normal control).

* If any uncertainty arises then push and hold down SW01 and SW02 at the same time for at least 5 seconds. You will return to step 1).

10 Replacement of the service PC board

⚠ WARNING
Don't open the PC board cover before 1 minute after power has been turned off beacuse an electric shock may be occurred.

In the case of replacing the PC board, also confirm the chapter "11 How to exchange main parts".

1. Hydro unit

■ Setting the DN code (MCC-1753)

In the memory of the Hydro unit Main PC board before replacement, the type and the capacity code of the model have been stored at the factory, and the customer setup data have been stored after installation.

Set the DN code according to the "PC board replacement Procedure Manual" which included in the package of the service PC board.

2. Outdoor unit

■ Setting the jumper wires (MCC-1768, MCC-1675, MCC-1781)

Since the service PC board is available for several models, cut the jumper wires according to the "PC board replacement Procedure Manual" which included in the package of the service PC board.

If they are not cut correctly, a certain check code appears on the remote controller and the operation is disabled.

* The contents of the "PC board replacement Procedure Manual" are also described in item 15 Appendix.

11 How to exchange main parts

⚠ WARNING

<Turn off the power breaker>
Because the electrical components are energized with high voltage, always turn off the power breaker before starting to work.

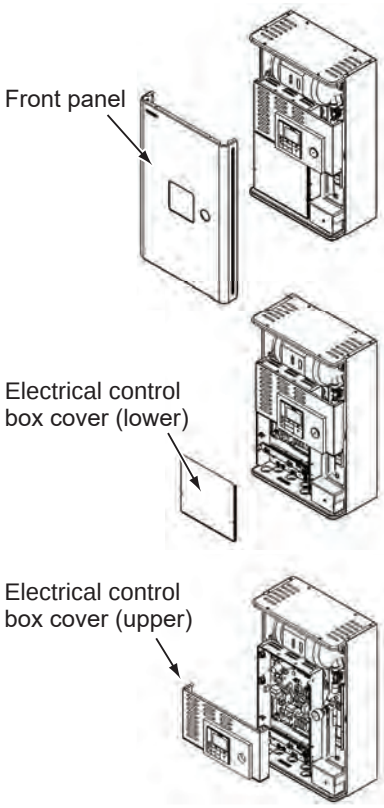
<Check>
Ensure that no water pressure is present when replacing the water circuit (circulation pump, heater unit, flow sensor, etc). After a repair is complete, perform a test run (after attaching the front panel, upper and lower cabinets, and side cabinet) and check that no abnormality including smoke or abnormal noise occurs. Failure to do so may cause a fire or an electric shock. Place the cabinets before making a test run.

<Watch out for fire>
Observe the following instructions when repairing the refrigerant cycle.
(1) Watch out for surrounding fire. Always put out the fire of stove burner or other devices before starting the repair.
Should the fire fail to be put out, the oil mixed with refrigerant gas could catch fire.
(2) Do not use a welder in a closed room.
A room with no ventilation may cause carbon monoxide poisoning.
(3) Keep away flammable materials.
The materials may catch the fire of a welder.

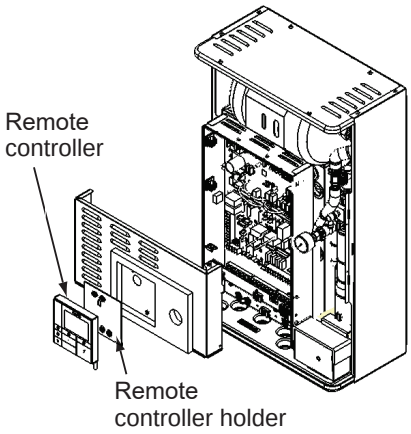
⚠ CAUTION

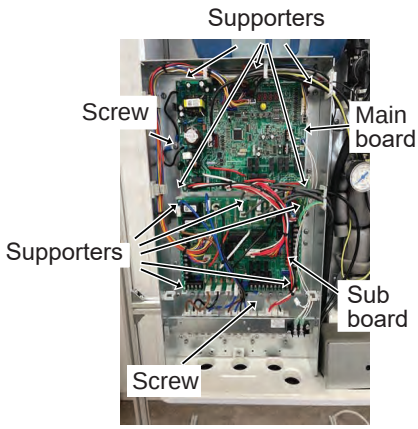
<Wear gloves>
Wear gloves (∗) when performing repair.
Failure to do so may cause an injury when accidentally contacting the parts.
∗: Thick gloves such as cotton work gloves
<Change O-ring>
If you disconnect the O-ring connection, be sure to replace it with a new O-ring. It may cause water leakage.

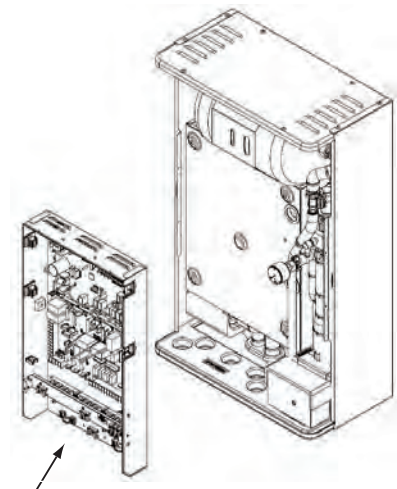
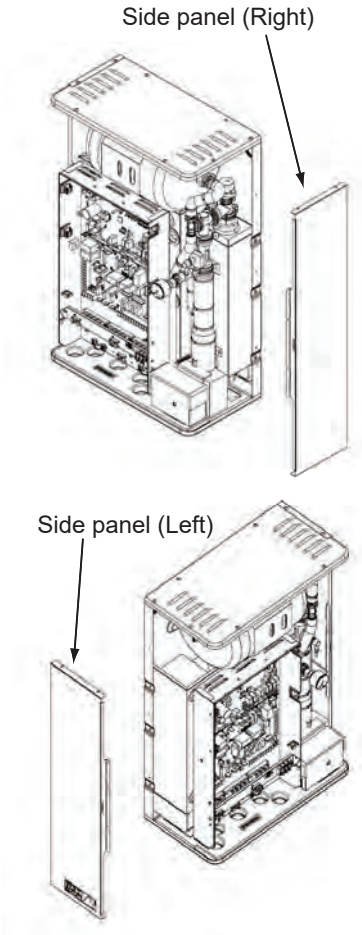
1. Hydro Unit

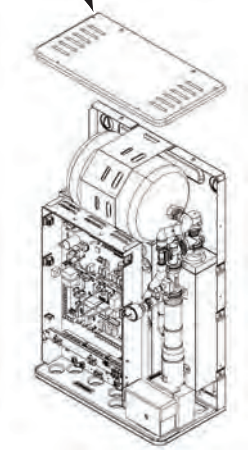
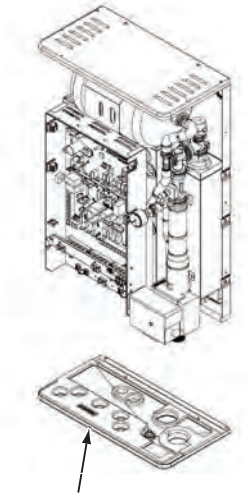
No.	Exchange parts name	Work procedure	Remarks
1	Common procedure	Wear gloves when performing the work. Failure to do so may cause an injury when accidentally contacting the parts.	
	Front panel	1. How to remove 1) Stop the hydro unit operation, and turn off the power breaker. 2) Remove the front panel. (Ø4 × 8, 4 screws) 3) Remove the electrical control box cover (lower). (Ø4 × 8, 2 screws)	
	Electrical control box cover (lower)	4) Disconnect the power source cable, outdoor unit connecting cable and hot water cylinder cable from the terminal block. 5) Remove the electrical control box cover (upper). (Ø4 × 8, 2 screws) 6) Disconnect the remote controller connecting cable from the Relay connector of the terminal block (TB04).	
	Electrical control box cover (upper)	2. How to attach 1) Connect the remote control connection cable to the relay connector on the terminal block (TB04). 2) Attach the electrical control box cover (upper). 3) Connect the power source cable and outdoor unit connecting cable to the terminal block, and fix with the cord clamp. 4) Attach the electrical control box cover (lower). 5) Attach the front panel.	

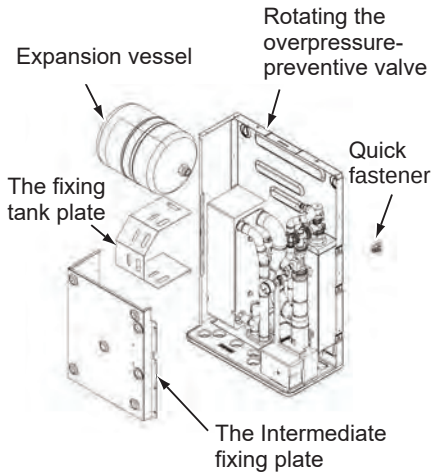
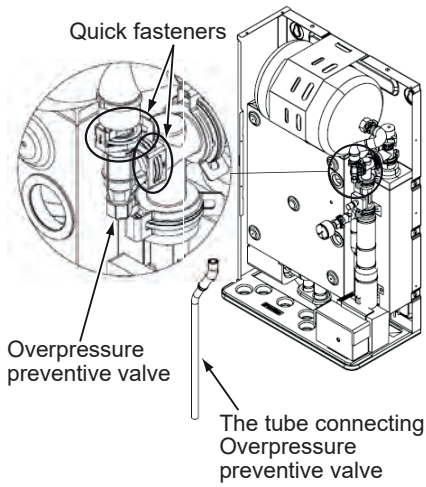
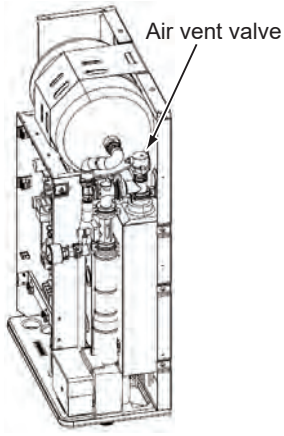
<table>
<tr><th>No.</th><th>Exchange parts name</th><th>Work procedure</th><th>Remarks</th></tr>
<tr><td>2</td><td>Remote controller</td><td>1.How to remove
1) Perform the step 1-1.
2) Remove the remote controller from the holder using a flat-head screwdriver. (Release the stopper.)
3) Disconnect the remote controller cable from the terminal block on the back side of the remote controller.

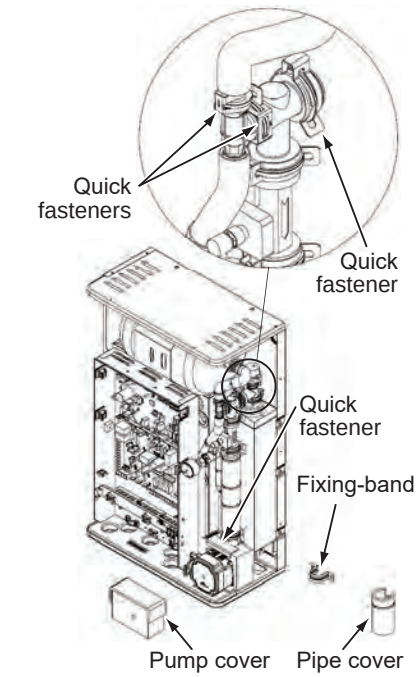
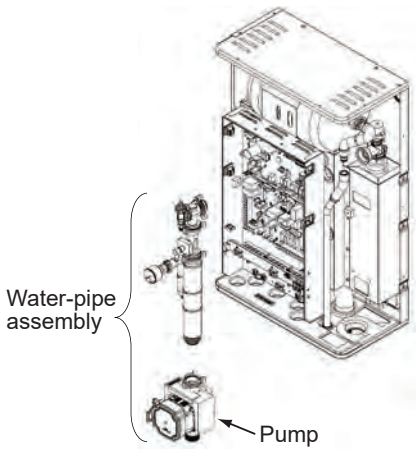
2.How to attach
1) Attach it in the reverse order of the removal.</td><td> 
</td></tr>
<tr><td>3</td><td>Water heat exchange control board</td><td>1. Main board (MCC-1753)
Detachment (Main board)
1) Perform the step 1-1.
⚠ WARNING
For 1 minute after the power is turned off, do not disassemble the inverter to prevent an electric shock.
2) Remove all connectors connected to the main board and a screw. (Ø4 × 6, 1 screw)
3) Detach the main board from 5 supporters.
NOTE
When removing the connectors, release the safety lock of the housing.
Attachment (Main board)
Attach the new main board in the reverse process of “Detachment (Main board)”.
NOTE
Refer to the wiring diagram for connector connections.

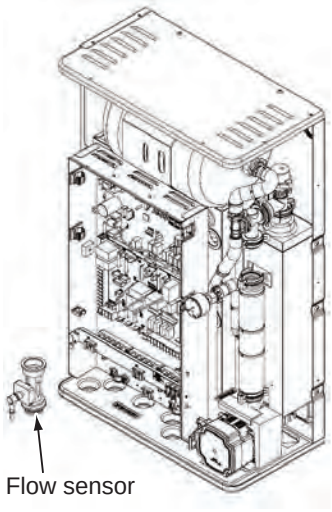
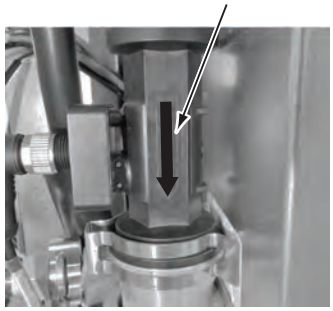
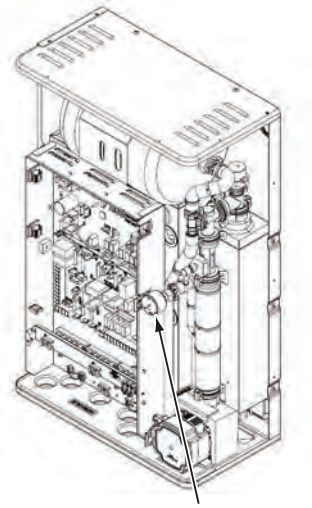
2. Sub board (MCC-1755)
Detachment (Sub board)
1) Perform the step 1-1.
⚠ WARNING
For 1 minute after the power is turned off, do not disassemble the inverter to prevent an electric shock.
2) Remove all connectors connected to the sub board and a screw. (Ø4 × 6, 1 screw)
3) Detach the sub board from 5 supporters.
NOTE
When removing the connectors, release the safety lock of the housing.
Attachment (Sub board)
Attach the new Sub board in the reverse process of “Detachment (Sub board)”.
NOTE
Refer to the wiring diagram for connector connections.</td><td> 
</td></tr>
</table>

No.	Exchange parts name	Work procedure	Remarks
4	Electric parts assembly	1. How to remove 1) Perform the step 1-1. 2) Disconnect the connectors and lead cables connected to other parts from the water heat exchanger board. **NOTE** When removing the connectors, release the safety lock of the housing. 3) Remove the fixed screws. (Ø4 × 8, 4 screws)	 Electric parts assembly
5	Side panel	1. Side panel (Right) 1) Perform the step 1-1-1), 2), 3), 4), 5). 2) Remove the fixed screws of the side panel (Right). (Ø4 × 8, 4 screws) 2. Side panel (Left) 1) Remove the fixed screws of the side panel (Left). (Ø4 × 8, 4 screws)	 Side panel (Right) Side panel (Left)

No.	Exchange parts name	Work procedure	Remarks
6	Upper panel	1) Perform the step 1-1-1), 2), 3), 4), 5). 2) Remove the fixed screws of the upper panel. (Ø4 × 8, 2 screws)	Upper panel 
7	Bottom panel	1) Perform step1-1, step 5. 2) Remove the fixed screws of the bottom panel. (Ø4 × 8, 2 screws) * Removal is required if water and refrigerant piping are connected. (Use the outdoor unit to recover the refrigerant.)	 Bottom panel

No.	Exchange parts name	Work procedure	Remarks
8	Expansion vessel	*1)To replace water circuit parts, open the drain cook and reduce the water puressure in the Hydro unit. (Check that the water puressure 0 bar on the meter.) Wait about 5 minutes to drain the water in the Hydro unit. * Even if drained, remaining water may come out from the connection parts. 1) Perform the step 1-1, step 4, step 5-1, step 6. 2) Remove the Intermediate fixing plate. (Ø4 × 8, 7 screws) 3) Remove the quick fastener at the Expansion vessel connection port. Remove the connection port of the expansion vessel by rotating the overpressure preventive valve. 4) Remove the fixing tank plate. (Ø4 × 8, 2 screws) 5) Remove the Expansion vessel. *2)After the replacing the parts, close the drain cook and open the water supply valve. When the specified water pressure is reached, close the water supply valve and check for water leaks.	
9	Overpressure preventive valve	Please be sure to read step 8. *1) 1) Perform the step 1-1, step 5-1. 2) Remove the tube connecting Overpressure preventive valve by cutting the cable-tie. 3) Remove the 2 quick fasteners. 4) Remove the Overpressure preventive valve. The Overpressure preventive valve connection uses an O-ring for water seal. Be careful not to scratch the O-ring; otherwise, water leakage may occur. Please be sure to read step 8. *2)	
10	Air vent valve	Please be sure to read step 8. *1) 1) Perform the step 1-1, step 5-1. 2) Remove the quick fastener connecting the Air vent valve. 3) Remove the Air vent valve. The Air vent valve connection uses an O-ring for water seal. Be careful not to scratch the O-ring; otherwise, water leakage may occur. *After the replacement, turn the knob of the air vent valve to open the valve. Please be sure to read step 8. *2)	

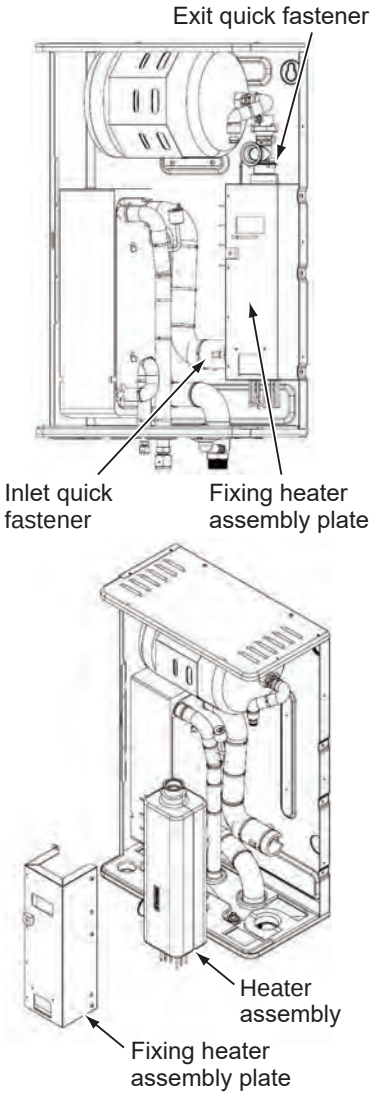
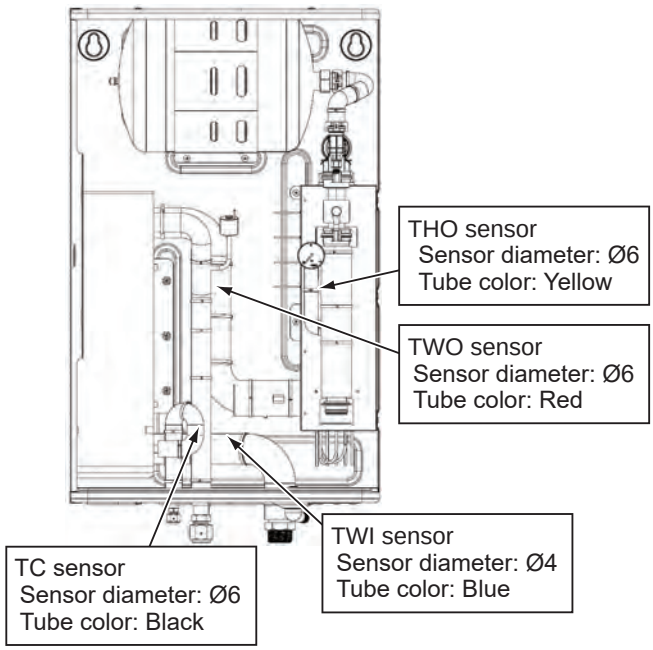
No.	Exchange parts name	Work procedure	Remarks
11	Pump	Please be sure to read step 8. *1) 1. How to remove 1) Perform the step 1-1, step 5-1. 2) Remove the connector and wire of the Pump from electrical parts assembly. (CN200 on the PCB MCC-1753 and CN07 on the PCB MCC-1755, one ground wire on E-BOX) 3) Remove the following parts around the pump. • Pump cover (attached with double-sided tape) • The pipe-cover above the pump (the cable-tie) • The fixing-band (Ø4 × 8, 2 screws) • The 4 quick fasteners 4) Remove the water-pipe assembly containing the pump from the product. 5) Remove the pump. 2. How to attach 1) Attach a new pump in the reverse order of the removal. Please be sure to read step 8. *2)	 

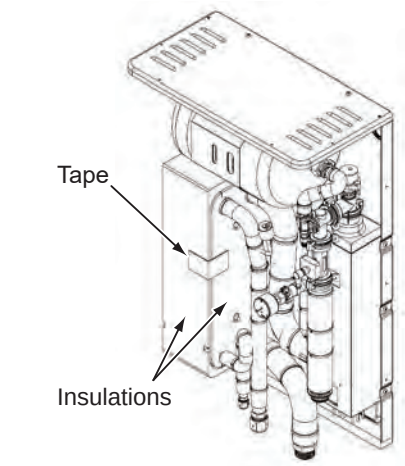
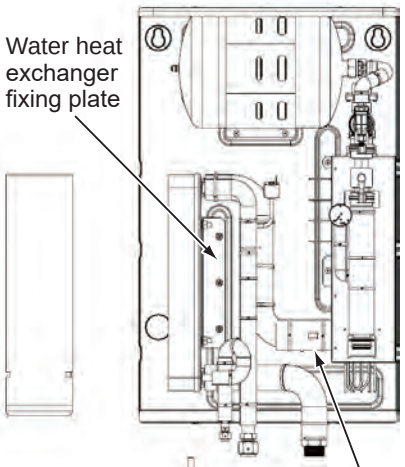
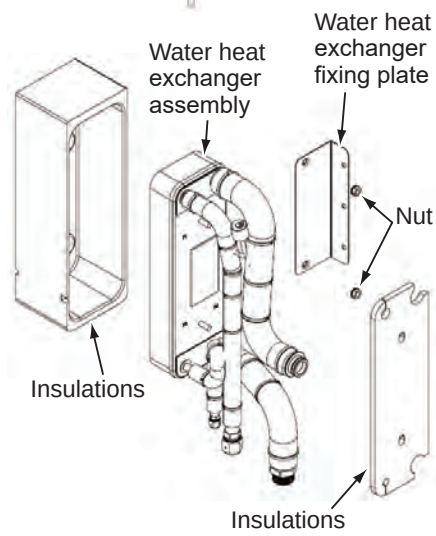
No.	Exchange parts name	Work procedure	Remarks
12	Flow sensor	Please be sure to read step 8. *1) 1. How to remove 1) Perform the step 1-1, step 5-1. 2) Remove the quick fasteners connecting the flow sensor. 3) Remove the flow sensor. The flow sensor connection uses an O-ring for water seal. Be careful not to scratch the O-ring; otherwise, water leakage may occur. 2. How to attach 1) Attach a new flow sensor in the reverse order of the removal. **NOTE** As shown on the right, connect the flow sensor according to the water flow direction. Please be sure to read step 8. *2)	 Flow sensor • Water flow • Flow sensor direction 
13	Manometer	Please be sure to read step 8. *1) 1. How to remove 1) Perform the step 1-1. 2) Remove the manometer. (by removing the quick fastener) Please be sure to read step 8. *2)	 Manometer

<table>
<tr><th>No.</th><th>Exchange parts name</th><th>Work procedure</th><th>Remarks</th></tr>
<tr><td>14</td><td>Heater assembly</td><td>Please be sure to read step 8. *1)

1. How to remove
1) Perform the step 1-1, step 4, step5-1, step 8-2).
2) Perform the step 11-2) - 4).
3) Remove the inlet and exit quick fasteners.
4) Remove the fixing heater assembly plate.
(Ø4 × 8, 5 screws)
5) Remove the Heater assembly.

2. How to attach
1) Attach a new heater in the reverse order of the removal.

Please be sure to read step 8. *2)</td><td> 
</td></tr>
<tr><td>15</td><td>TC sensor
TWI sensor
TWO sensor
THO sensor</td><td>1. How to remove
1) Perform the step 1-1, step 4, step 8-2).
2) Take the sensor out.
 
</td></tr>
</table>

No.	Exchange parts name	Work procedure	Remarks
16	Water heat exchanger assembly	Please be sure to read step 8. *1) 1. How to remove 1) Perform the step 1-1, step 4, step 5, step 7 and step 8-2). 2) Remove the two insulations attached to the Water heat exchanger by peeling off the tape. 3) Disconnect the water heat exchanger and the Heater assemnbly. The connection is the quick fastener covered with a pipe cover. * Cut the cable tie of the pipe cover and remove the pipe cover. 4) Remove the Water heat exchanger fixing plate. (Ø5 × 10, 3 hexagon screws) 5) Remove the water heat exchanger assembly. Install the following parts in the new Water heat exchanger assembly. • The insulations removed in the step 2) • The Water heat exchanger fixing plate removed in 6) (Remove from the old Water heat exchanger assembly. (two nuts) The tightening torque of the nut is 6N.) The heater connection uses a packing for water seal. Be careful not to scratch the packing; otherwise, water leakage may occur. 2. How to attach 1) Attach a new water heat exchanger assembly in the reverse order of the removal. 2) Restore all piping and wiring as in the original state, and check that there is no water or refrigerant leakage. Please be sure to read step 8. *2)	  

2. Outdoor Unit

2-1. HWT-401HW-E(TR), HWT-601HW-E(TR)

<table>
<tr><th>No.</th><th>Exchange parts name</th><th>Work procedure</th><th>Remarks</th></tr>
<tr><td>①</td><td>Common procedure</td><td>

1. Detachment

NOTE

Wear gloves for this job. Otherwise, you may injure your hands on the parts, etc.

1) Stop operation of the Air to water heat pump system and turn off the power breaker.
2) Remove the valve cover. (Φ4 × 10, 3 hexagon screws)
   • After removing screw, remove the valve cover pulling it downward.
3) Remove the wiring cover. (Φ4 × 10, 1 screw)
   * It is fixed with a special screw. Be careful not to make a mistake.
   • After removing screw, remove the wiring cover pulling it upward.
4) Remove cord clamp (Φ4 × 14, 3 screws) and then remove connecting cable.
5) Remove the upper cabinet. (Φ4 × 10, 5 hexagon screws)
   • After removing screws, remove the upper cabinet pulling it upward.

2. Attachment

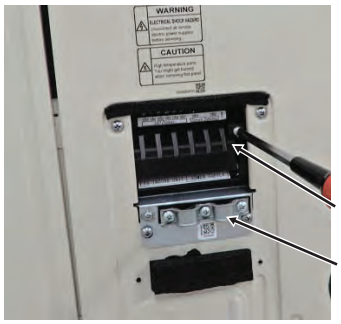
1) Attach the water-proof cover.

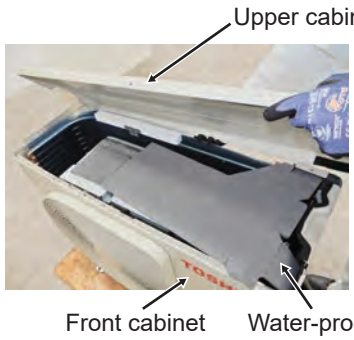
NOTE

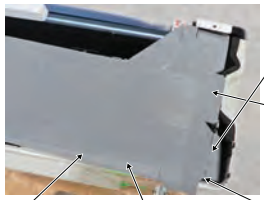
The water-proof cover must be attached without fail in order to prevent rain water, etc. from entering inside the indoor unit.

2) Attach the upper cabinet. (Φ4 × 10, 5 hexagon screws)
3) Perform cabling of connecting cable, and attach the cord clamp.
   • Fix the cord clamp by tightening the screws (Φ4 × 14, 3 screws) fitting 2 concave parts of the cord clamp to each connecting cables.
4) Attach the valve cover. (Φ4 × 10, 3 hexagon screws)
   • Insert the upper part into the square hole of the side cabinet, set hook claws of the valve cover to square holes (at three positions) of the main unit, and attach it pushing upward.

</td><td>







How to mount the water-proof cover

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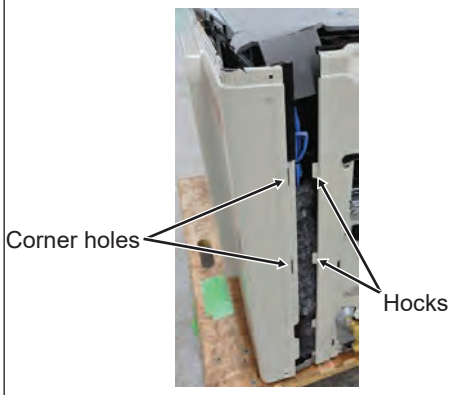
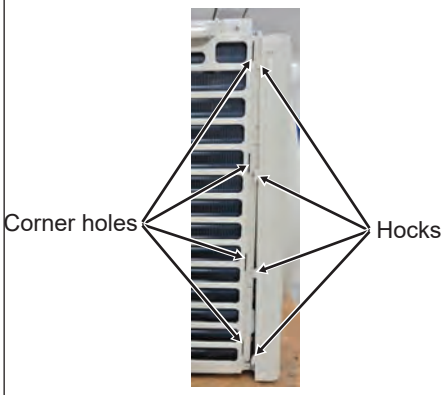
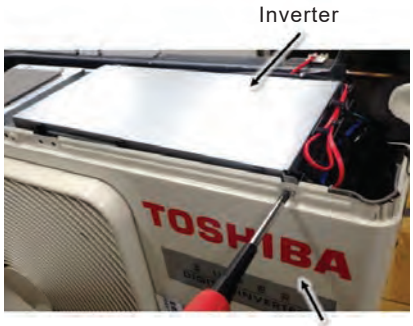
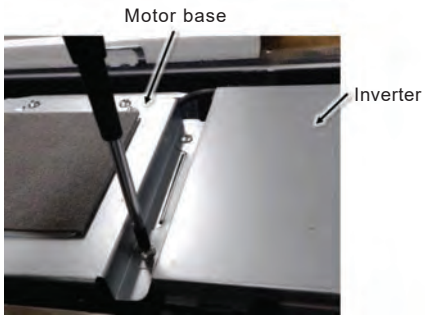
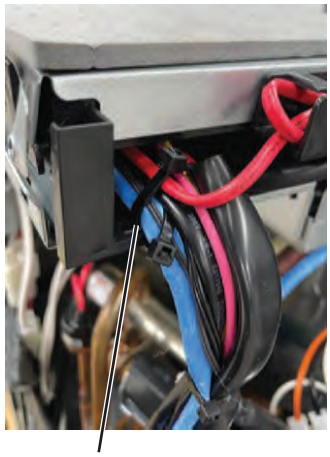
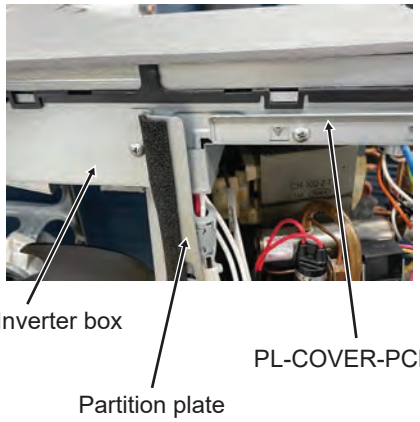
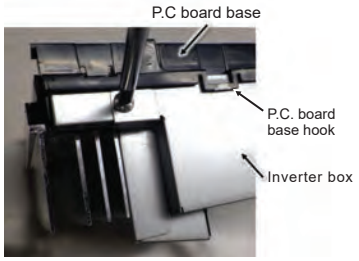
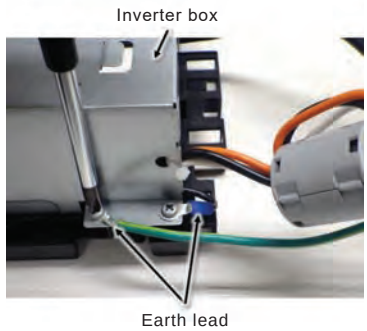
</table>

No.	Exchange parts name	Work procedure	Remarks
②	Front cabinet	**1. Detachment** 1) Perform step 1 in ①. 2) Remove the fixing screws (Φ4 × 8, 1 screw) used to secure the front cabinet and inverter cover, the screws (Φ4 × 10, 4 hexagon screws) used to secure the front cabinet at the bottom, and the fixing screws (Φ4 × 8, 2 screws) used to secure the motor base. • The front cabinet is fitted into the side cabinet (left) at the front left side so pull up the top of the front cabinet to remove it. **2. Attachment** 1) Insert the claw on the front left side into the side cabinet (left). 2) Hook the bottom part of the front right side onto the concave section of the bottom plate. Insert the claw of the side cabinet (right) into the square hole in the front cabinet. 3) Return the screws that were removed their original positions and attach them.	 

No.	Exchange parts name	Work procedure	Remarks
③	Inverter assembly	“Detachment (Inverter)” 1) Perform step 1 in ②. 2) Remove the fixing screw (Φ4 × 8, 1 screw) securing PL-COVER-PCB and the inverter box. 3) Remove the fixing screws (Φ4 × 8, 2 screws) for securing the motor base and the inverter box. 4) Remove various lead wires from the holder at upper part of the inverter box. 5) Cut Binding bands that fix the leads. 6) Pull the inverter box upward. 7) Disconnect connectors of various lead wires. 8) Remove the inverter. **Requirement** **As each connectors have a lock mechanism, avoid to remove the connector by holding the lead wire, but by holding the connector.** “Leads” • Lead connected to compressor: Disconnect the connector (3P). • Lead connected to reactor: Disconnect the two connectors (2P). “Connectors” CN300: Outdoor fan motor (3P: white) CN500: Bimetal thermostat (2P: blue) CN501: High pressure switch (2P: green) CN600: TE sensor (2P: white) CN601: TD sensor (3P: white) CN602: TO sensor (2P: yellow) CN603: TS sensor (3P: white) CN604: TL sensor (2P: white) CN700: PMV (6P: white) CN704: 4 Way valve (2P: white) “Attachment (Inverter)” Attach new inverter in the reverse process of “Detachment (Inverter)”.	    Be sure to remove the connector by holding the connector, not by pulling the lead wire.

No.	Exchange parts name	Work procedure	Remarks
③	Inverter assembly	"How to check outdoor control board" 1) Perform step ② in "Detachment (Inverter)". 2) Remove the fixing screws (Φ4 × 8, 2 screws) for securing the motor base and the inverter box. **WARNING** **Be careful to check the inverter because high-voltage circuit is incorporated in it.** 3) Perform discharging by connecting ⊕, ⊖ polarity by discharging resistance (approx. 100Ω40W) or plug of soldering iron to ⊕, ⊖ terminals of C10 (printed "WARNING HIGH VOLTAGE" is attached.) electrolytic capacitor (500μF) on P.C. board. **WARNING** **Be careful to discharge the capacitor because the electrolytic capacitor cannot naturally discharge and voltage remains according to trouble type in some cases.** **NOTE** **This capacitor is one with mass capacity. Therefore, it is dangerous that a large spark generates if short-circuiting between ⊕, ⊖.**	  

<table>
<tr><th>No.</th><th>Exchange parts name</th><th>Work procedure</th><th>Remarks</th></tr>
<tr>
<td>④</td>
<td>Control board assembly</td>
<td>
“Detachment (outdoor control board)”
1) Remove the screws (Φ4 × 10, 2 screws) fixing inverter box and P.C. board base.
2) Remove the earth screw fixing inverter box and earth lead.
And remove the inverter box.
NOTE
Use a flat-blade screwdriver to remove the inverter box from P.C. board base hook.
Be careful not to break that the hook when use the flat-blade screwdriver.
3) Remove the outdoor control board from the P.C. board base. (Remove the heat sink and the outdoor control board assembly while keeping them screwed together.)
NOTE
Disengage hooks of the P.C. board base, hold the heat sink, and lift to remove it.
4) Remove the two fixing screws (Φ4 × 8, 2 screws) used to secure the heat sink and sub heat sink.
And remove the heat sink.
“Attachment (outdoor control board)”
Attach the new outdoor control board in the reverse process of “Detachment”.
NOTE
When mounting new outdoor control board, confirm that outdoor control board is inserted properly into the P.C. board base.
Coat the heat sink on the outdoor board with the heat sink silicone uniformly before installing the heat sink.
Please following below tighten torque of screws.
<table>
<tr><th></th><th>Tightening torque</th></tr>
<tr><td>Heat sink ↔ Sub heat sink</td><td>1.3-1.5 N•M</td></tr>
<tr><td>Earth screw</td><td>0.8-0.9 N•M</td></tr>
</table>
</td>
<td>




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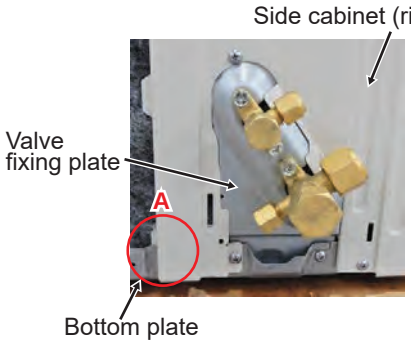
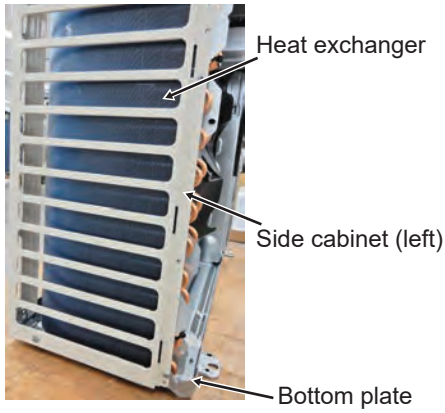
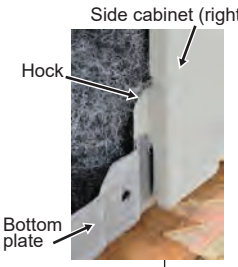
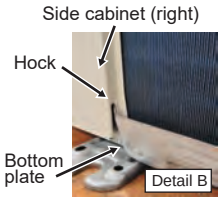
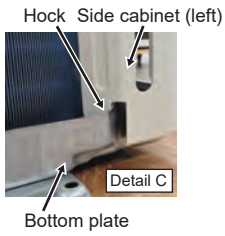
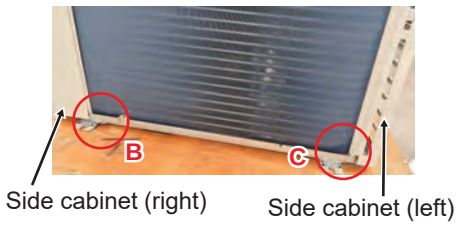
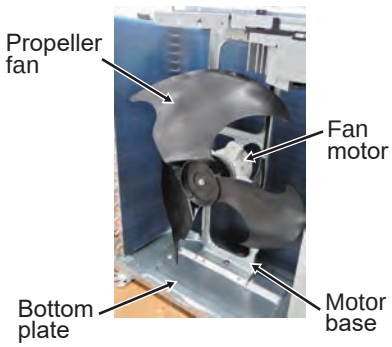
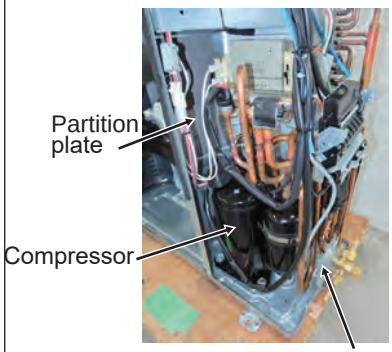
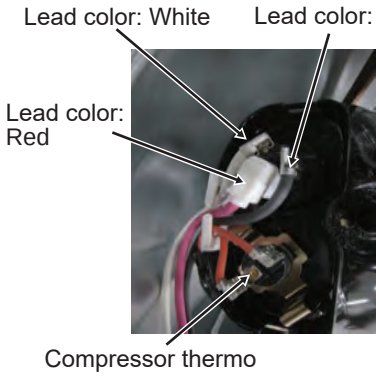
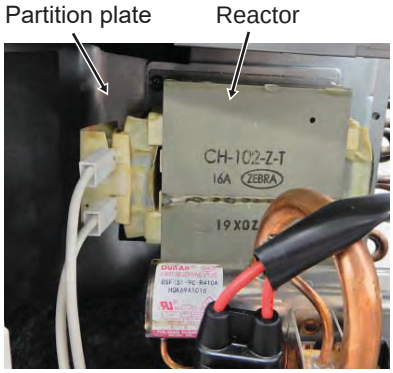
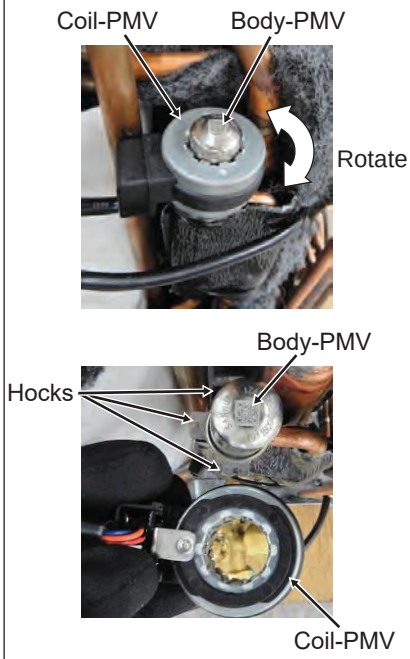
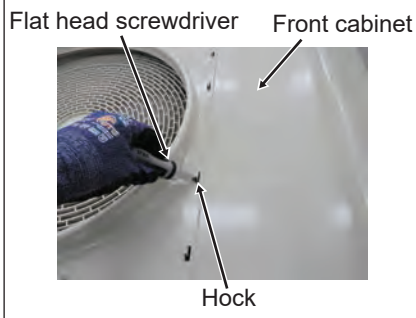
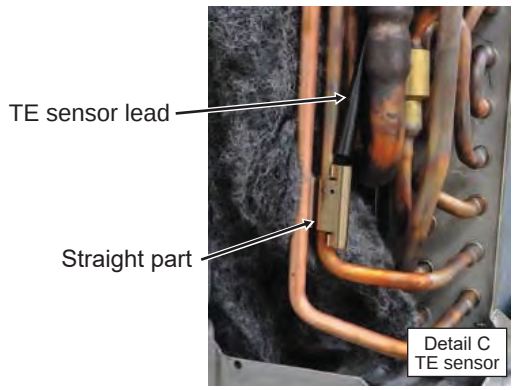
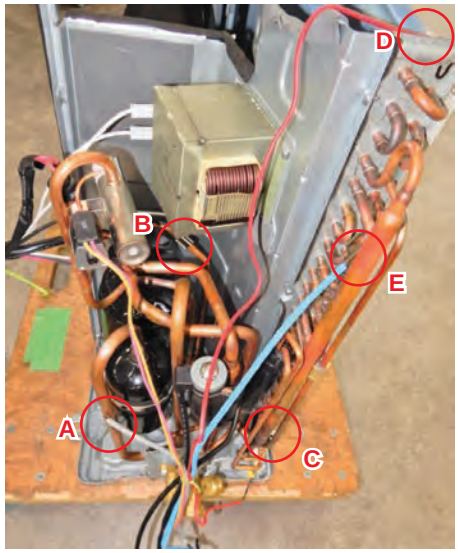
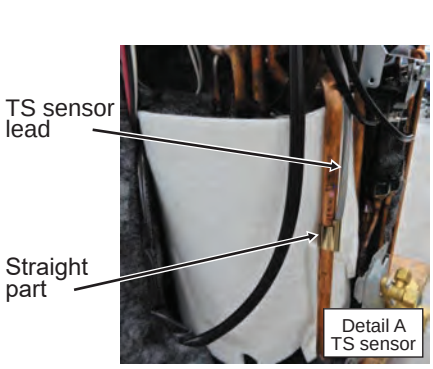
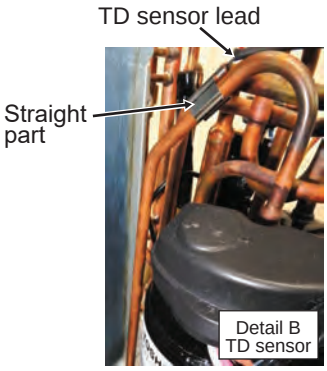
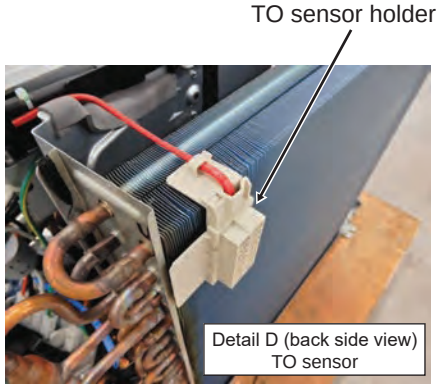
</table>

No.	Exchange parts name	Work procedure	Remarks
⑤	Side cabinet	**1. Detachment** **Side cabinet (right)** 1) Perform step 1 in ②. 2) Remove the fixing screw (Φ4 × 8, 3 screws) used for securing the side cabinet (right) to the bottom plate and valve fixing plate. **Side cabinet (left)** 1) Perform step 1 in ②. 2) Remove the fixing screw (Φ4 × 8, 2 screws, and Φ4 × 10, 1 hexagon screw) used for securing the side cabinet to the bottom plate and heat exchanger.	     
⑥	Fan motor	**1. Detachment** 1) Perform step 1 in ② 2) Remove the flange nut fixing the fan motor and the propeller. • Flange nut is loosened by turning clock-wise. (To tighten the flange nut, turn counterclockwise.) 3) Remove the propeller fan. 4) Disconnect the connector for fan motor from the inverter. 5) Remove the fixing screws (Φ4 × 20, 3 screws) holding by hands so that the fan motor does not fall. * Precautions when assembling the fan motor Tighten the flange nut using a tightening torque of 4.9 N•m.	

No.	Exchange parts name	Work procedure	Remarks
⑦	Compressor	**1. Detachment** 1) Perform step 1 in ①, ②, ③, ④, ⑤. 2) Extract refrigerant gas. 3) Remove the partition plate. (Φ4 × 8, 4 screws) 4) Remove the sound-insulation material. 5) Remove terminal cover of the compressor, and disconnect lead wire of the compressor from the terminal. **NOTE** **Never reuse the compressor lead which you disconnected. Use the new one. If you reuse it, it may malfunction.** 6) Remove pipe connected to the compressor with a burner. • Take care to keep the 4-way valve away from naked flames. (Otherwise, it may malfunction.) 7) Remove the fixing screw of the bottom plate and heat exchanger. (Φ4 × 8, 1 screw) 8) Remove the fixing screw of the bottom plate and valve fixing plate. (Φ4 × 8, 2 screws) 9) Pull upward the refrigeration cycle. 10) Remove Comp bolt (3 pcs.) fixing the compressor to the bottom plate.	 
⑧	Reactor	**1. Detachment** 1) Perform step 1 in ② and ③. 2) Remove screws fixing the reactor. (Φ4 × 8, 2 screws)	

No.	Exchange parts name	Work procedure	Remarks
⑨	Electronic expansion valve coil	**1. Detachment** 1) Perform step 1 in ② and ⑤ side cabinet (right). 2) Remove the coil by pulling it up from the electronic control valve body. **2. Attachment** 1) When assembling the coil into the valve body, ensure that the coil anti-turn lock is installed properly in the pipe. **<Handling precaution>** When handling the parts, do not pull the leads. When removing the coil from the valve body, use your hand to secure the body in order to prevent the pipe from being bent out of shape.	
⑩	Fan guard	**1. Detachment** 1) Perform step 1 in ②. 2) Remove the front cabinet, and put it down so that fan guard side directs downward. **Perform work on a corrugated card board, cloth, etc. to prevent flaw to the product.** 3) Remove the hooking claws by pushing minus screwdriver according to the arrow mark in the right figure, and remove the fan guard. **2. Attachment** 1) Insert claws of the fan guard in the holes of the front cabinet. Push the hooking claws (9 positions) by hands and fix the claws. **Check that all the hooking claws are fixed to the specified positions.**	

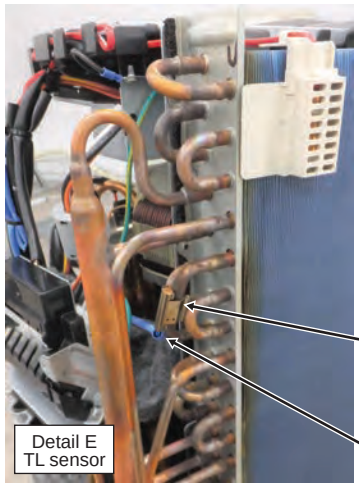
No.	Exchange parts name	Work procedure	Remarks
⑪	TE sensor (outdoor heat exchanging temperature sensor) • **Attachment** Install the sensor onto the straight pipe part of the condenser outlet pipe.  		
⑫	TS sensor (Suction pipe temperature sensor) • **Attachment** Install the sensor onto the straight pipe part of the suction pipe. Be careful for the lead direction of the sensor.		
⑬	TD sensor (Discharge pipe temperature sensor) • **Attachment** Install the sensor onto the straight pipe part of the discharge pipe. Be careful for the leas direction of the sensor.		
⑭	TO sensor (Outside air temperature sensor) • **Attachment** Insert the outdoor air temperature sensor into the holder, and install the holder onto the heat exchanger.    	

CAUTION

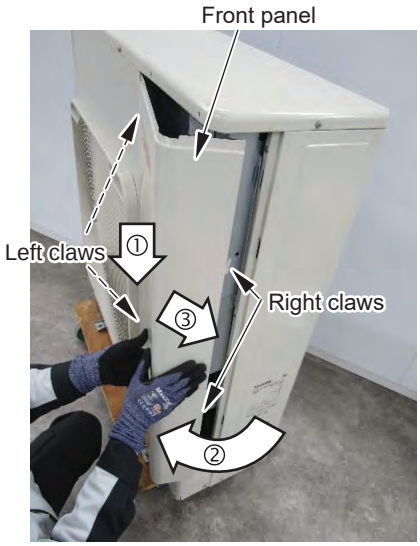
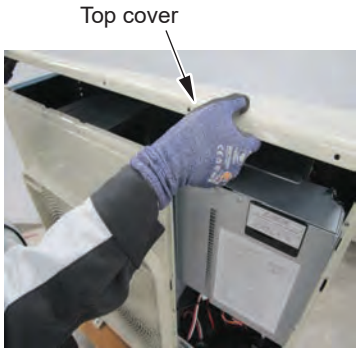
During the installation work (and on its completion), take care not to damage the coverings of the sensor leads on the edges of the metal plates or other parts. It is dangerous for these coverings to be damaged since damage may cause electric shocks and/or a fire.

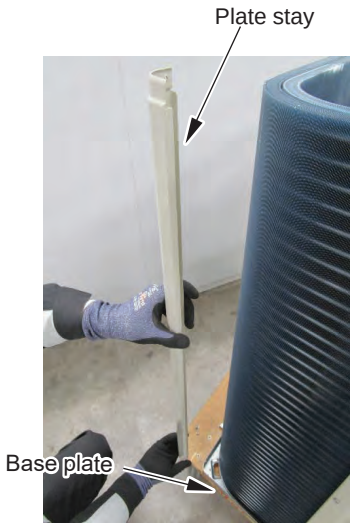
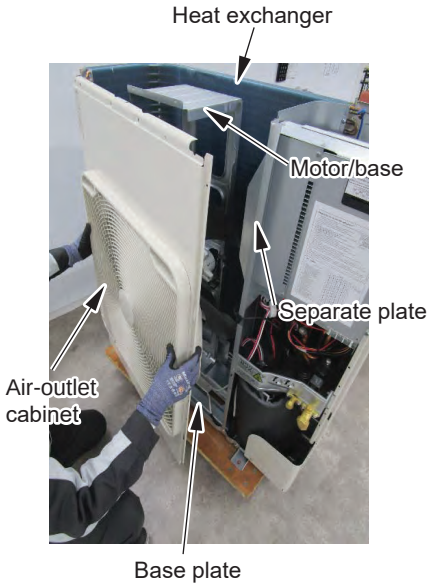
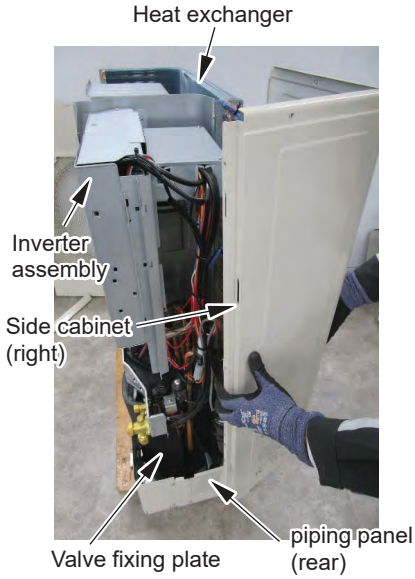
CAUTION

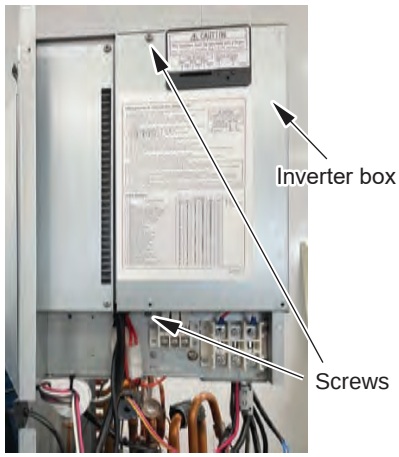
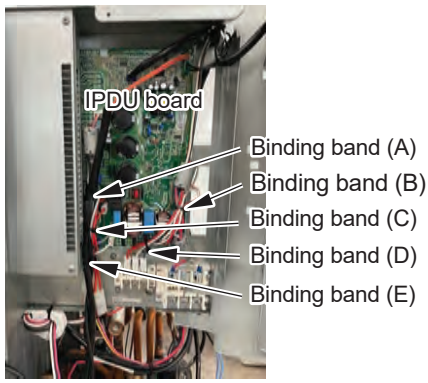
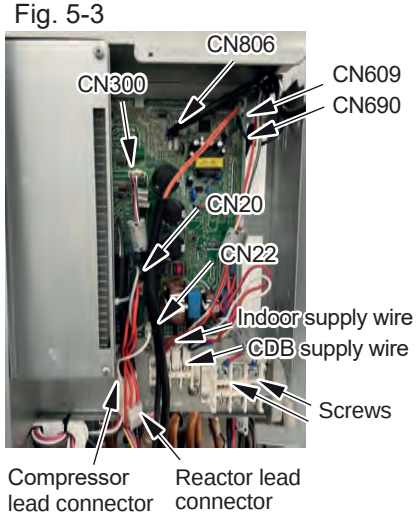
After replacing the parts, check whether the positions where the sensors were installed are the proper positions as instructed. The product will not be controlled properly and trouble will result if the sensors have not been installed in their proper positions.

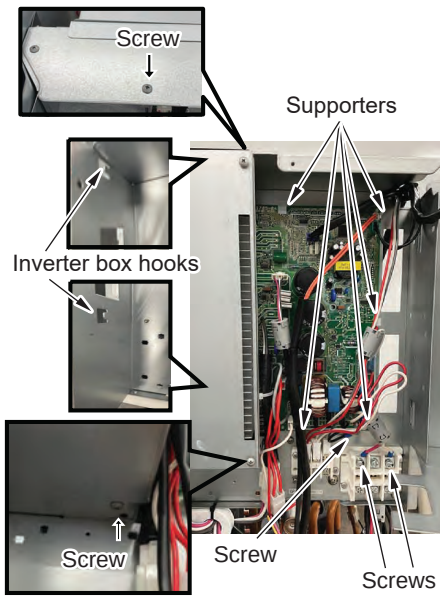
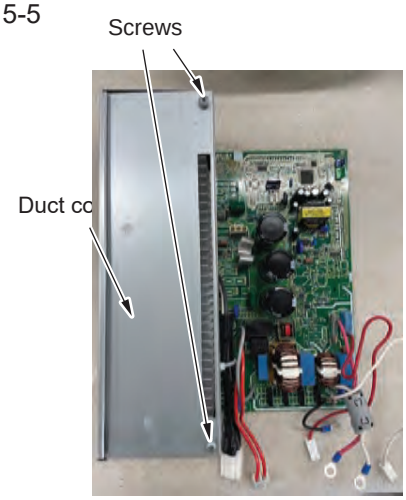
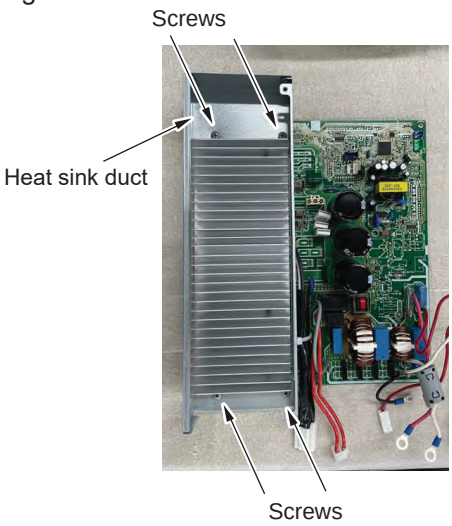
No.	Exchange parts name	Work procedure	Remarks
⑮	TL sensor (outdoor heat exchanging temperature sensor) • **Attachment** Install the sensor onto the straight pipe part of the condenser outlet pipe.  		

2-2. HWT-801HW-E(TR), HWT-1101HW-E(TR), HWT-801HRW-E, HWT-1101HRW-E

No.	Exchange parts name	Work procedure	Remarks
①	Common procedures Front panel Top cover	**⚠ WARNING** Stop operation of the Air to water heat pump system and turn off breaker switch. **⚠ CAUTION** Ensure wearing of gloves when performing any work in order to avoid injury from parts, etc. **1. Detachment** 1) Stop operation of the Air to water heat pump system, and turn off the main switch of the breaker for Air to water heat pump system. 2) Remove the front panel. (Φ4 × 10, 3 hexagon screws) (1) After removing the screws slide the front panel downwards. (2) Pull the front panel forwards and then loosen the right claw. (3) Pull the front panel to the right, loosen the left claw, and then remove the front panel. 3) Remove the terminal cover. (Φ4 × 8, 2 screws and claw) 4) Remove the power and indoor/outdoor connection wires from the terminals. 5) Remove the top cover. (Φ4 × 10, 6 hexagon screws) **2. Attachment** 1) Attach the top cover. (Φ4 × 10, 6 hexagon screws) 2) Connect the power and indoor/outdoor connection wires to the terminal. **NOTE** The power and indoor/outdoor connection wires should be fixed in place along the crossing pipes using commercially available code clamps so as to avoid any contact with the compressor, gas side valve, gas side piping, and discharge pipe. 3) Attach the terminal cover. (Φ4 × 8, 2 screws and claw) 4) Attach the front panel. (Φ4 × 10, 3 hexagon screws)	  

No.	Exchange parts name	Work procedure	Remarks
②	Plate stay	**1. Detachment** 1) Following to work of Detachment of ①. 2) Remove the plate stay and base plate screws. (Φ4 × 10, 2 hexagon screws) 3) Remove plate stay. **2. Attachment** Attach the plate stay in the reverse process of "**1. Detachment**".	
③	Air-outlet cabinet	**1. Detachment** 1) Following to work of Detachment of ①. 2) Remove the screws from the Air-outlet cabinet and separate plate. (Φ4 × 8, 3 screws) 3) Remove the screws from the Air-outlet cabinet and base plate. (Φ4 × 10, 2 hexagon screws) 4) Remove the screws from the Air-outlet cabinet and motor base. (Φ4 × 8, 2 screws) 5) Remove the screws from the Air-outlet cabinet and heat exchanger. (Φ4 × 8, 3 screws) **2. Attachment** Attach the Air-outlet cabinet in the reverse process of **"1. Detachment".**	
④	Side cabinet (right)	**1. Detachment** 1) Following to work of Detachment of ①. 2) Remove the screws securing the inverter assembly and side cabinet (right). (Φ4 × 8, 2 screws) 3) Remove the screws form the side cabinet (right) and valve fixing plate. (Φ4 × 8, 2 screws) 4) Remove the screws form the side cabinet (right) and piping panel (rear). (Φ4 × 10, 2 hexagon screws) 5) Remove the screws form the side cabinet (right) and base plate. (Φ4 × 10, 1 hexagon screw) 6) Remove the screws from the side cabinet (right) and heat exchanger. (Φ4 × 10, 3 hexagon screws) **2. Attachment** Attach the side cabinet (right) in the reverse process of **"1. Detachment".**	

No.	Exchange parts name	Work procedure	Remarks
⑤	Electrical IPDU (MCC-1705)	**1. Compressor, Fan IPDU (MCC-1705)** "Detachment (Compressor, Fan IPDU)" 1).Following to work of Detachment of ①. **⚠ WARNING** For 1 minute after the power is turned off, do not disassemble the inverter to prevent an electric shock. 2).Remove the fixed screws of inverter box. (Φ4 × 8, 2 screws) [Fig. 5-1] 3).Cut the Binding bands (A), (B), (C), (D), (E). [Fig. 5-2] 4).Remove all connectors connected to the IPDU board and screws. (Φ4 × 8, 3 screws, Φ6 × 14, 2 screws) [Fig. 5-3] **NOTE** When removing the connectors, release the safety lock of the housing. 5).Detach the IPDU board from 5 supporters and Inverter box hooks. [Fig. 5-4] 6).Remove the screws and remove the Duct cover. (Φ4 × 8, 4 screws) [Fig. 5-5] 7).Remove the screws and remove the heat sink duct. (Φ3 × 14, 3 screws) [Fig. 5-6] 8).Remove the heat sink screws and remove the heat sink. [Fig. 5-7] "Attachment (Compressor, Fan IPDU)" Attach the new IPDU board in the reverse process of "Detachment (Compressor, Fan IPDU)". **NOTE** Coat the heat sink on the IPDU board with the heat sink silicone uniformly before installing the heat sink. Fix cables with binding band as shown fig "Fix cables with binding band". Please following below tighten torque of screws. | | Tightening torque | |---|---| | Heat sink screw (Φ3) | 0.5 N • M | | Screw of Φ4 | 1.2 N • M | | Screw of Φ6 | 2.5 N • M |	Fig. 5-1  Fig. 5-2  Fig. 5-3 

No.	Exchange parts name	Remarks
⑤	Electrical IPDU (MCC-1705) (continued)	Fig. 5-4  Fig. 5-5   Fig. 5-6  Fig. 5-7 

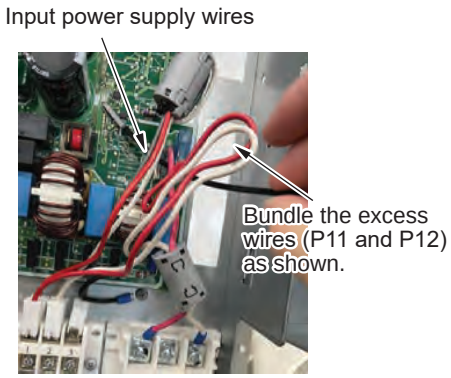
No.	Exchange parts name	Remarks
⑤	Electrical IPDU (MCC-1705) (continued)	“Fix cables with binding band”

[Binding band (A)]

Fix cables.
(Board wires (P200, P201, P202) and connecters (CN300, CN609)

[Binding band (B)]

Fix cables.
(Board wires (P01, P11, P12) and input power supply wires)



[Binding band (C)]

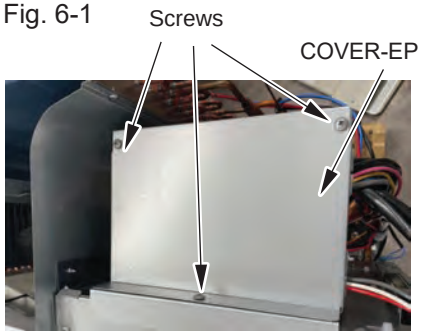
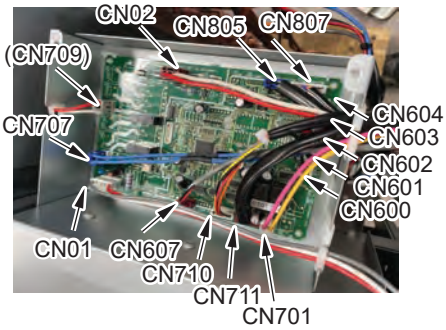
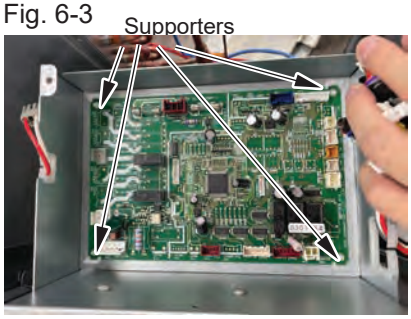
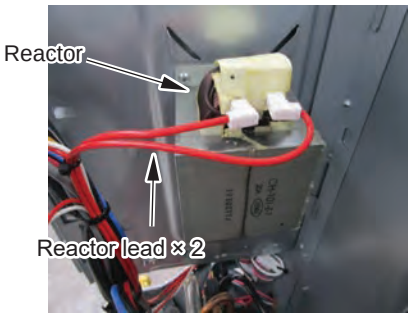
Fix cables.
(Board wires (P20, P21, P22 - P23, P200, P201, P202) and connecters (CN20, CN300, CN609)

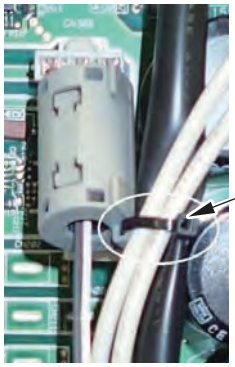
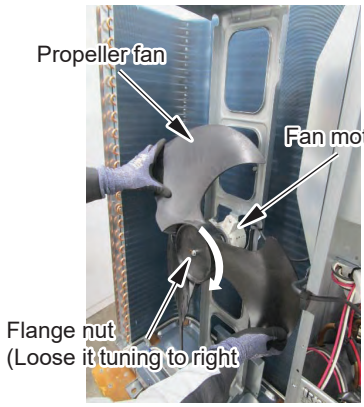
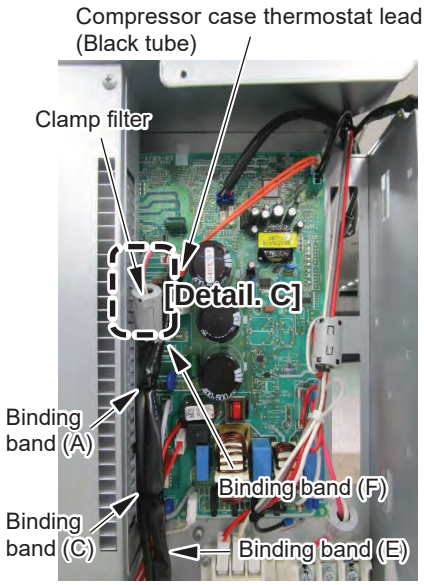
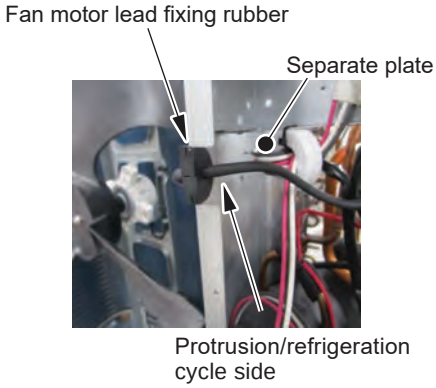
[Binding band (D)]

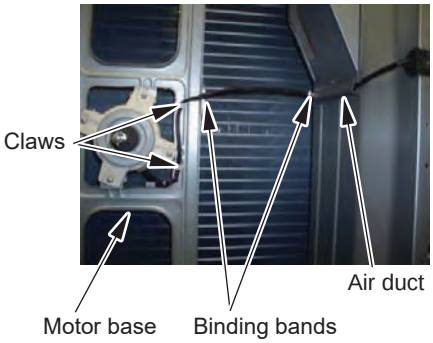
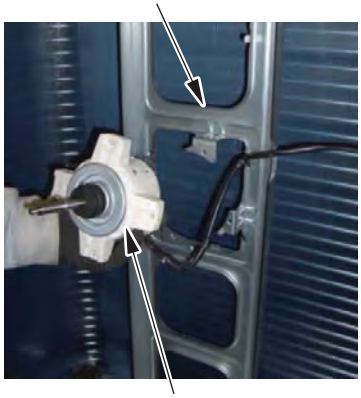
Fix cables.
(Board wires (P05, P11, P12) and input power supply wires)

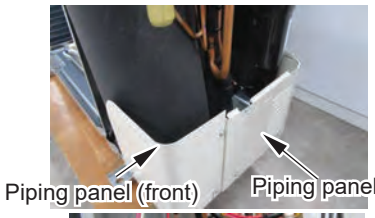
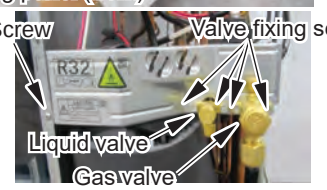
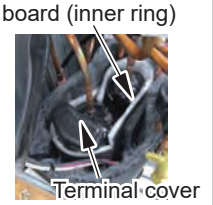
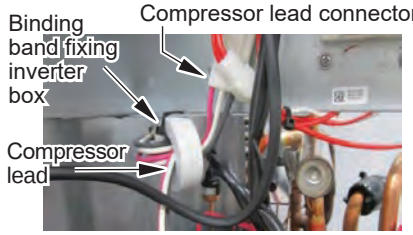
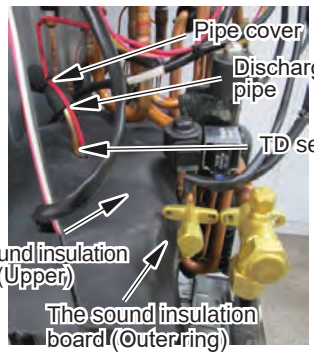
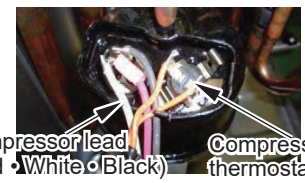
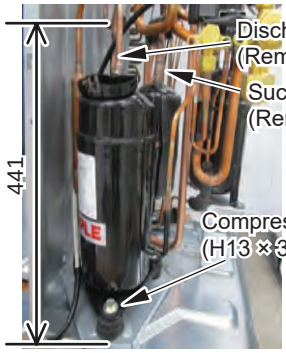
[Binding band (E)]

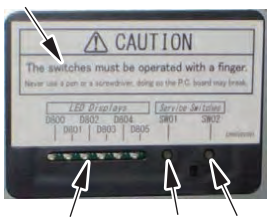
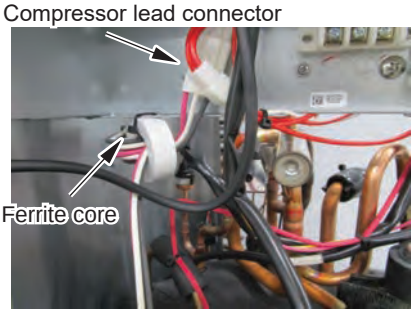
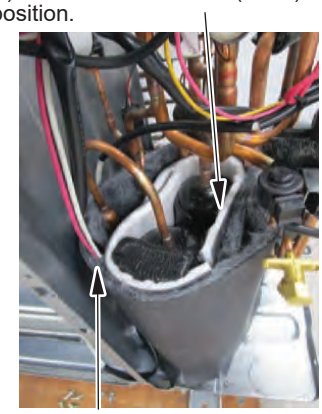
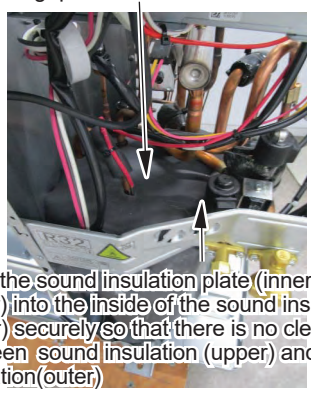
Fix cables.
(Board wires (P20, P21, P200, P201, P202) and connecters (CN20, CN22)

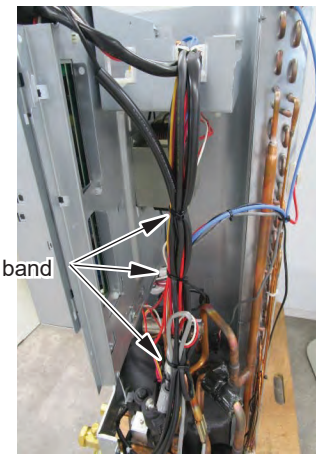
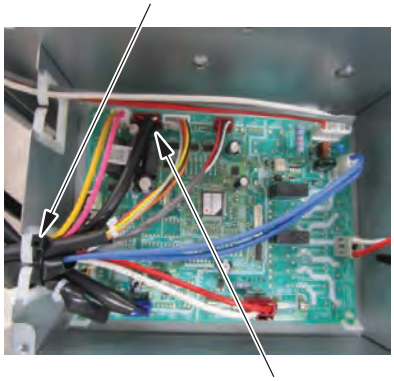
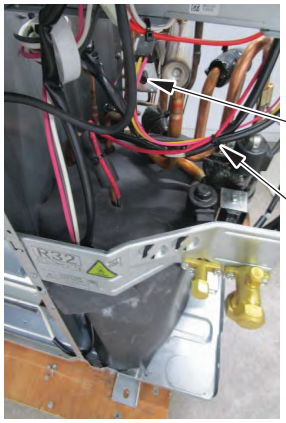
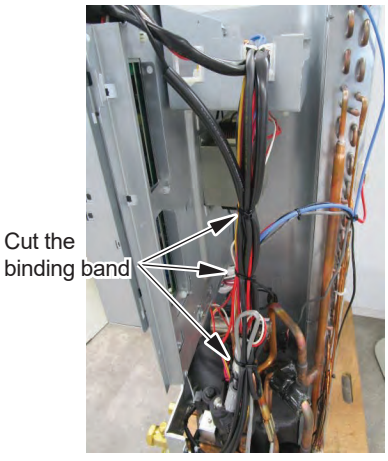
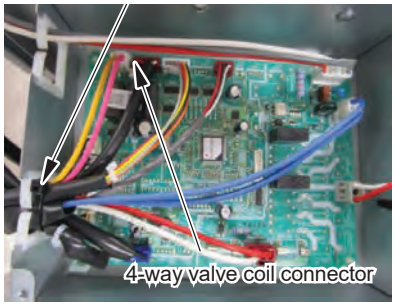
No.	Exchange parts name	Work procedure	Remarks
⑥	Electrical part CDB (MCC-1675) P.C.board	**1. Interface CDB (MCC-1675)** "Detachment (Interface CDB)" 1).Following to work of Detachment of ①. **⚠ WARNING** For 1 minute after the power is turned off, do not disassemble the inverter to prevent an electric shock. 2).Remove the fixed screws of the COVER-EP and remove the COVER-EP. (Φ4 × 8, 3screws) [Fig. 6-1] 3).Remove all connectors connected to the Interface CDB. [Fig. 6-2] 4).Detach the Interface CDB from 4 supporters. [Fig. 6-3] **NOTE** When removing the connectors, release the safety lock of the housing. "Attachment (Interface CDB)" Attach the new Interface CDB in the reverse process of the "Detachment (Interface CDB)".	Fig. 6-1  Fig. 6-2  Fig. 6-3 
⑦	Reactor	**1. Detachment (Reactor)** 1) Following to work of Detachment of ④ 2) Remove the connector of the reactor lead wire connected to the reactor. (2 positions) 3) Remove the reactor. (Φ4 × 8, 2 screws) **2. Attachment (Reactor)** Attach the reactor in the reverse process of the "**1. Detachment (Reactor)**".	

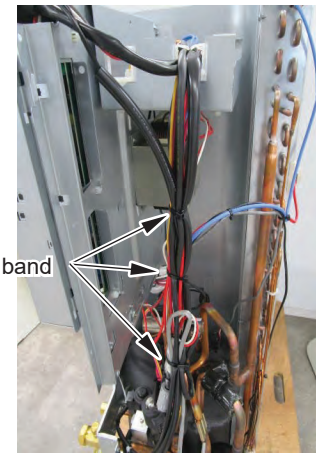
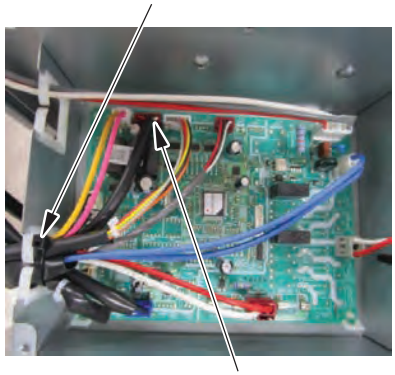
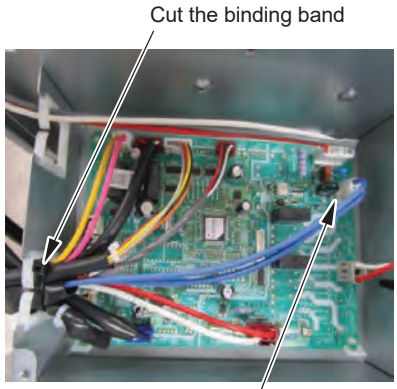
No.	Exchange parts name	Work procedure	Remarks
⑧	Fan motor	**1.Detachment** 1) Following to work of Detachment of ③. 2) Make sure that the fan motor and the propeller fan stop. Remove the flange nut from the fan motor and propeller fan. • Loose e nut by turning clock wise. (To tighten the flange nut, turn it counter clockwise) 3) Remove the propeller fan. 4) Following to work of Detachment of ⑤, 1) to 3). 5) Cut the binding band (F) (Thickness: 1.1 mm, Width: 2.5 mm) bundling the compressor case thermostat lead. **[Detail.C]**  Pass the binding band through the hole on the clamp filter, and then bundle compressor case thermostat lead. 6) Cut the binding band (A), (C), (E). 7) Remove the connector for the fan motor lead. (The clamp filter is removed and used when installing) 8) Remove the fan motor lead from the fixing rubber for separate plate.	  

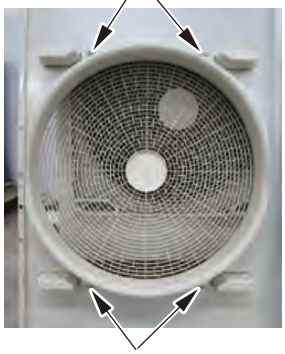
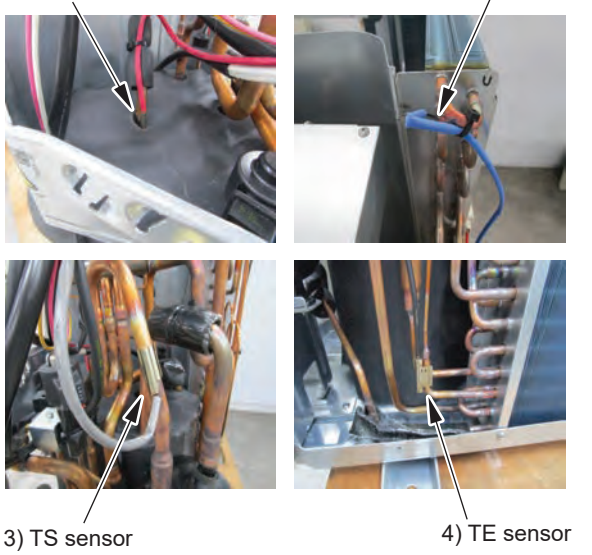
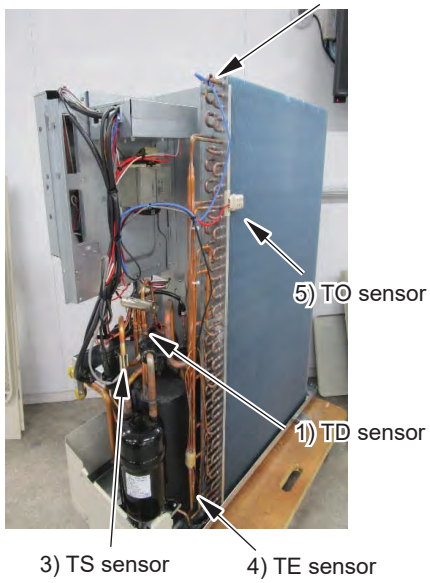
No.	Exchange parts name	Work procedure	Remarks
⑧	Fan motor (continued)	9) Cut the binding bands for the air duct fixing fan motor and the motor base (2 position). 10) Loosen the two claws on the motor base. 11) Remove the fixing screws (4 positions) while holding the fan motor so as not to fall it. (Shoulder screw with captive washer Φ4 × 20, 4 screws) **2. Attachment** Attach the Fan motor in the reverse process of "**1. Detachment**". * Precautions when assembling the fan motor • Tighten the flange nut to 4.95 N*m (50 kgf-cm). • To prevent the fan motor leads from coming in contact with the propeller fan ensure to adjust the length of the fan motor lead fixing rubber so that the fan motor lead has no slack. Attach the fan motor lead fixing rubber to the separate plate so that the projection is on the refrigeration cycle side. • Ensure to bundle in the part where a binding band was removed with a commercially available binding band. • Fix the clamp filter again in the place where it has been removed.	 

No.	Exchange parts name	Work procedure	Remarks
⑨	Compressor and compressor lead	**1.Detachment** **⚠ WARNING** When removing the brazing part of the suction / discharge pipe of the compressor, remove the brazing part in a well-ventilated place after recovering the refrigerant. If recovery is insufficient, the refrigerant and refrigerating machine oil may blow, causing injury. 1) Recover refrigerant gas. 2) Following to work of Detachment of ④. 3) Remove the piping panel (front). Remove the screws from piping panel (front) and base plate. (Φ4 × 10, 2 hexagon screws) Remove the screws from the piping panel (front) and piping panel (rear). (Φ4 × 10, 1 hexagon screw) 4) Remove the piping panel (rear). Remove the screws on the piping panel (rear) and the bottom plate. (Φ4 × 10, 2 hexagon screws) 5) Remove the valve fixing plate Remove the screws for the valve fixing plate and partition plate. (Φ4 × 8, 1 screw) Remove two bolts at liquid valve side and valve fixing plate. (DELTITE screw M6 × 15: 2 pcs) Remove two bolts at gas valve side and valve fixing plate. (DELTITE screw M6 × 15: 2 pcs) 6) Remove the pipe cover and TD sensor fixed with the discharge pipe with a binding band. 7) Remove the sound insulation board (upper, inner, and outer). 8) Remove the compressor' terminal cover (two claws) and compressor lead and compressor case thermostat (one claw). 9) Cut the binding band fixing to the inverter box. 10) Remove the connector for the compressor lead to remove the compressor lead. (Keep the ferrite core attached to the electric parts box.) 11) Remove the discharge and suction pipes connected to the compressor using a burner. **⚠ WARNING** Ensure extreme caution when removing piping by melting the weld with a burner as fire may result if there is any oil within the piping. **NOTE** Carefully avoid contact with the 4-way valve and 2-way valve and PMV with the flame (could result in a malfunction). 12) Remove the refrigeration cycle discharge and suction pipes by pulling them upwards. 13) Remove the compressor bolts securing the compressor to the base plate. (H13 × 3 positions) 14) Pull the compressor forwards. **NOTE** The compressor weighs at least 15 kg. Ensure two people carry out the work.	       

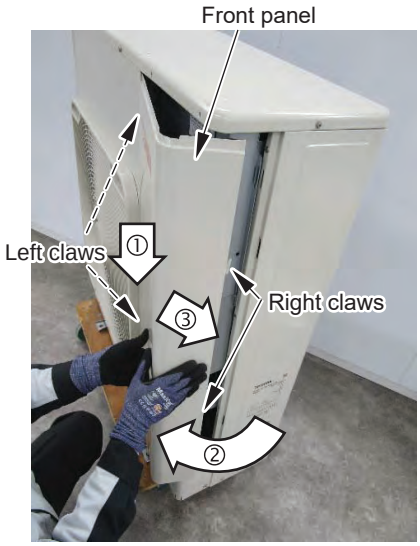
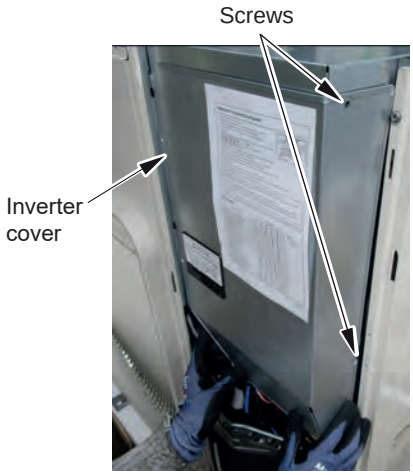
No.	Exchange parts name	Work procedure	Remarks
⑨	Compressor and compressor lead (continued)	**2. Attachment** 1) Attach the compressor in the reverse process of **"1. Detachment".** • Also ensure to replace the compressor lead after replacing the compressor. • Install the sound insulation board (inner and outer) through the space between the compressor and the piping, and between the pipes and separate plate as shown on the right. **3. Vacuum** 1) Connect the vacuum pump to the charge port of the liquid and gas pipe valves and the check joint on the high pressure side, and then operate the vacuum pump. 2) Vacuum until the vacuum low pressure gauge reaches 1 (mmHg). **NOTE** Fully open the electronic control valve before the vacuum process. If closed the vacuum pipe between the liquid pipe valve and electronic control valve of the outdoor unit may not be able to be drawn through. Method for forcibly fully opening the electronic control valve • Turn on the power supply breaker. • Ensure that D805 of the LED indication of the outdoor is lit up. If D805 is not lit up (off or flashing) then push and hold down SW01 and SW02 at the same time for at least 5 seconds and check that D805 lights up. • Push and hold SW01 down for at least 5 seconds or to confirm that D804 is slowly flashing (once/second). • Push SW01 several times until the LED indications (D800 to D804) become the following. D800: ○ D801: ● D802: ○ D803: ● D804: ◎ ○: Go ON, ●: Go OFF, ◎: flash (5 times/sec.) • Push SW02 and D805 will start rapidly flashing. • Push and hold SW02 down for at least 5 seconds and D804 will start slowly flashing. Once D805 lights up the PMV will start to open. After 30 seconds turn off the power breaker. LED indicator  **4. Refrigerant encapsulation** 1) Add the amount of refrigerant determined by the pipe length using the charge port of the valve.	Compressor lead connector  Pull out the compressor lead and compressor case thermostat lead from this gap.  Wrap the seam of the sound insulation (inner) and sound insulation (outer) about this position.  Push redundant compressor lead, compressor case thermostat lead into a clearance between sound insulation board (inner) and sound insulation board (outer). Pull out the compressor lead, the compressor case thermostat lead from the gap of the sound insulation  Push the sound insulation plate (inner and upper) into the inside of the sound insulation (outer) securely so that there is no clearance between sound insulation (upper) and sound insulation (outer)

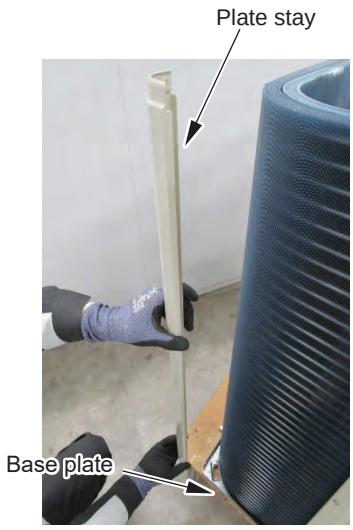
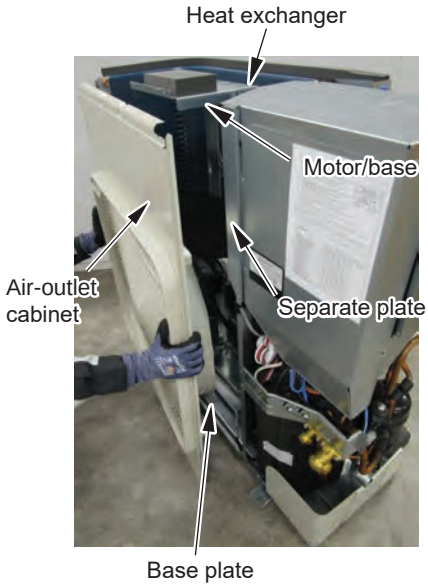
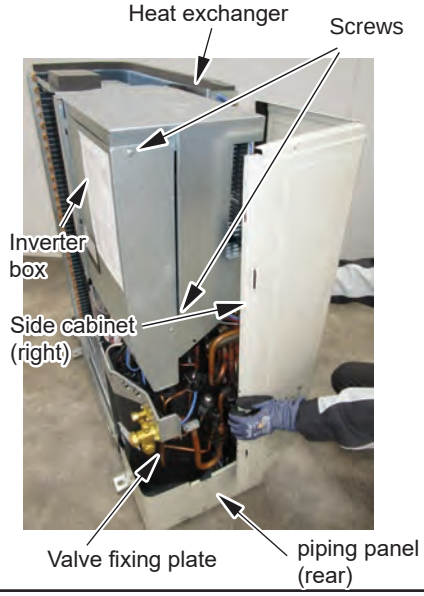
No.	Exchange parts name	Work procedure	Remarks
⑩	PMV coil	**1. Detachment** 1) Following to work of Detachment of ④. 2) Cut the binding band (4 positions) on the back surface 3) Pull the connector for PMV coil out of CDB 4) Remove the coil from the PMV body by rotating the coil (about 45°) while drawing the coil upward. **2. Attachment** Attach the PMV coil in the reverse process of **"1. Detachment"** 1) Fix the coil positioning protrusions securely in the concavities of the PMV body. (Fix the coil in the direction where lead wire comes out at the body's left diagonally behind.) 2) Attach the PMV coil connector to the CDB P.C. board.  	 
⑪	4-way valve coil	**1. Detachment** 1)Following to work Detachment ④ 2)Cut the binding band (5 positions) on the back surface. 3)Pull the connector for 4-way valve coil out of CDB P.C.board. 4)Remove the 4-way valve coil.(M5 screw) **2. Attachment** Attachment the 4-way valve coil in the reverse process of "1.Detachment" *Fix the 4-way valve coil with its lead wire upward. *Be sure to fix it with the removed screw.  	 

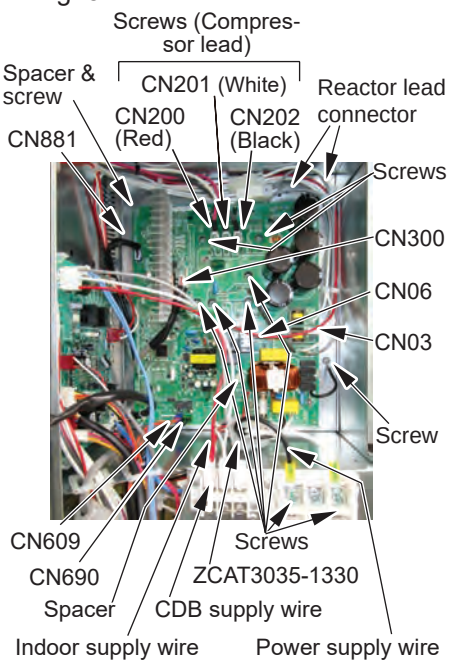
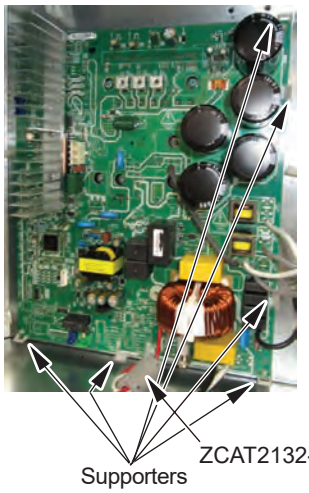
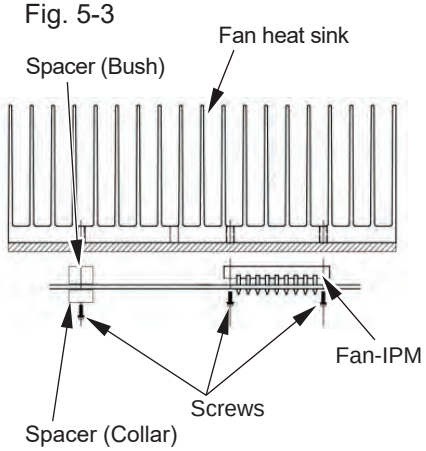
No.	Exchange parts name	Work procedure	Remarks
⑫	Liquid injection line PMV coil	**1. Detachment** 1) Following to work of Detachment of ④. 2) Cut the binding band (4 positions) on the back surface 3) Pull the connector for PMV coil out of CDB P.C. board. **2. Attachment** Attach the PMV coil in the reverse process of **"1. Detachment"** 1) Fix the coil positioning protrusions securely in the concavities of the PMV body. (Fix the coil in the direction where lead wire comes out at the body's left diagonally behind.) 2) Attach the PMV coil connector to the CDB P.C. board.  	 
⑬	2-way valve coil	**1. Detachment** 1) Following to work Detachment ④ 2) Cut the binding band (4 positions) on the back surface. 3) Pull the connector for 2-way valve coil out of CDB P.C.board. 4) Remove the 2-way valve coil.(M4 screw) **2. Attachment** Attachment the 2-way valve coil in the reverse process of "1.Detachment"  	

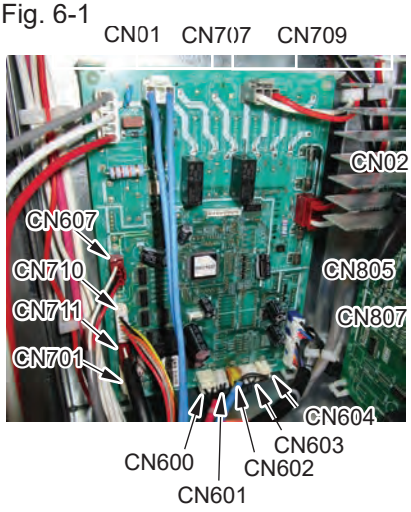
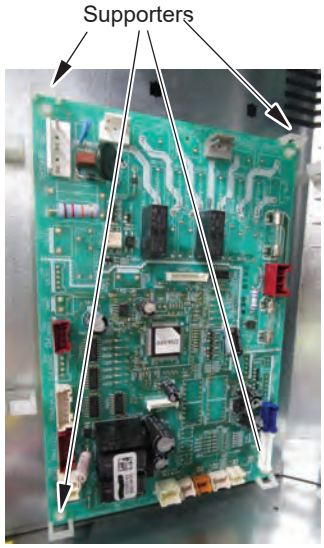
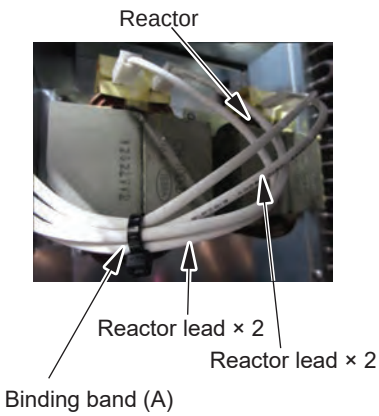
No.	Exchange parts name	Work procedure	Remarks
⑭	Fan guard	**1. Detachment** 1) Following to work of Detachment of ③ **NOTE** Do the work on a cardboard or a cloth to prevent the product from being scratched. 2) Remove the 4 screws that secure the fan guard. (Φ4 × 10, hexagonal screws) 3) Remove the Air outlet cabinet and place the fan guard side facing down. 4) Remove the craws (4 places) of the fan guard. **2. Attachment** 1) Hook the hooking claws from the front side and press the craws (4 places) by hand to fix them in place. 2) Fix the fan guard to the air outlet cabinet with 4 screws. (Φ 4 × 10, hexagon screws) **NOTE** Ensure that all the claws are fixed in their specified position.	Screws  Screws Hooking craws  Hooking craws
⑮	[Reference] Sensor mount positions	1) TD sensor: discharge pipe 2) TL sensor: heat exchanger upside 3) TS sensor: 4-way valve - between accumulator 4) TE sensor: lowest capillary joint 5) TO sensor: Heat exchange surface 	

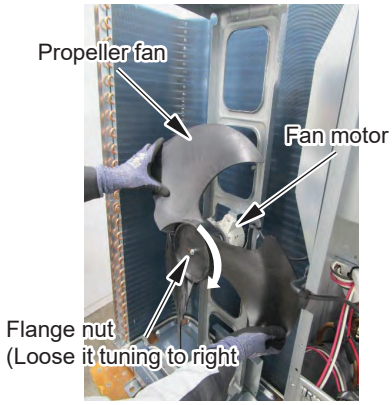
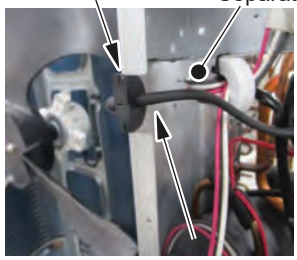
2-3. HWT-1401HW-E(TR), HWT-1401HRW-E

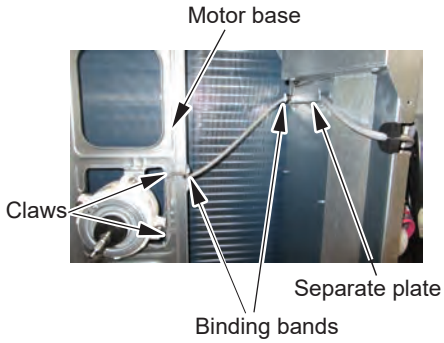
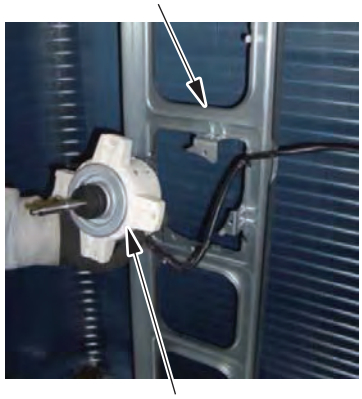
No.	Exchange parts name	Work procedure	Remarks
①	Common procedures Front panel Top cover	**⚠ WARNING** Stop operation of the Air to water heat pump system and turn off breaker switch. **⚠ CAUTION** Ensure wearing of gloves when performing any work in order to avoid injury from parts, etc. **1. Detachment** 1) Stop operation of the Air to water heat pump system, and turn off the main switch of the breaker for Air to water heat pump system. 2) Remove the front panel. (Φ4 × 10, 3 hexagon screws) (1) After removing the screws slide the front panel downwards. (2) Pull the front panel forwards and then loosen the right claw. (3) Pull the front panel to the right, loosen the left claw, and then remove the front panel. 3) Remove the terminal cover. (Φ4 × 8, 2 screws) 4) Remove the power and indoor/outdoor connection wires from the terminals. 5) Remove the top cover. (Φ4 × 10, 6 hexagon screws) **2. Attachment** 1) Attach the top cover. (Φ4 × 10, 6 hexagon screws) 2) Connect the power and indoor/outdoor connection wires to the terminal. **NOTE** The power and indoor/outdoor connection wires should be fixed in place along the crossing pipes using commercially available code clamps so as to avoid any contact with the compressor, gas side valve, gas side piping, and discharge pipe. 3) Attach the terminal cover. (Φ4 × 8, 2 screws and claw) 4) Attach the front panel. (Φ4 × 10, 3 hexagon screws)	  

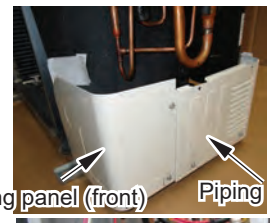
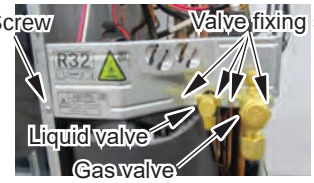
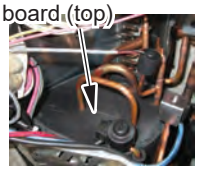
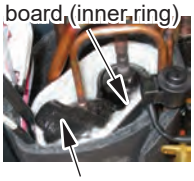
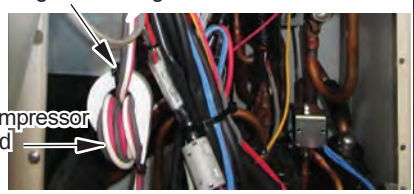
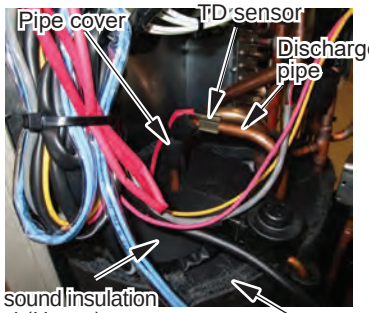
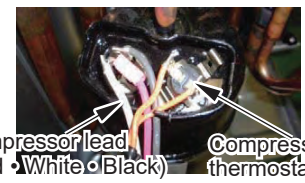
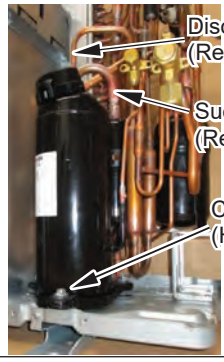
No.	Exchange parts name	Work procedure	Remarks
②	Plate stay	**1. Detachment** 1) Following to work of Detachment of ①. 2) Remove the plate stay and base plate screws. (Φ4 × 10, 2 hexagon screws) 3) Remove plate stay. **2. Attachment** Attach the plate stay in the reverse process of "**1. Detachment**".	
③	Air-outlet cabinet	**1. Detachment** 1) Following to work of Detachment of ①. 2) Remove the screws from the Air-outlet cabinet and separate plate. (Φ4 × 8, 3 screws) 3) Remove the screws from the Air-outlet cabinet and base plate. (Φ4 × 10, 2 hexagon screws) 4) Remove the screws from the Air-outlet cabinet and motor base. (Φ4 × 8, 2 screws) 5) Remove the screws from the Air-outlet cabinet and heat exchanger. (Φ4 × 8, 3 screws) **2. Attachment** Attach the Air-outlet cabinet in the reverse process of **"1. Detachment".**	
④	Side cabinet (right)	**1. Detachment** 1) Following to work of Detachment of ①. 2) Remove the screws securing the inverter assembly and side cabinet (right). (Φ4 × 8, 2 screws) 3) Remove the screws form the side cabinet (right) and valve fixing plate. (Φ4 × 8, 2 screws) 4) Remove the screws form the side cabinet (right) and piping panel (rear). (Φ4 × 10, 2 hexagon screws) 5) Remove the screws form the side cabinet (right) and base plate. (Φ4 × 10, 1 hexagon screw) 6) Remove the screws from the side cabinet (right) and heat exchanger. (Φ4 × 10, 3 hexagon screws) 7) Remove the fixed screws of inverter box. (φ4 ×8, 2 screws) **2. Attachment** Attach the side cabinet (right) in the reverse process of **"1. Detachment".**	

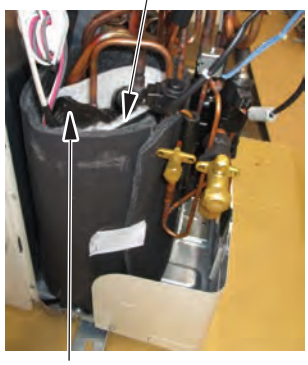
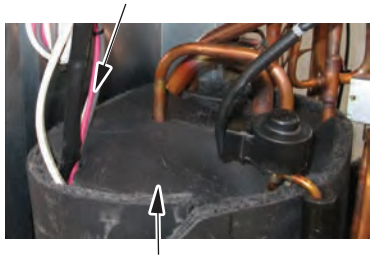
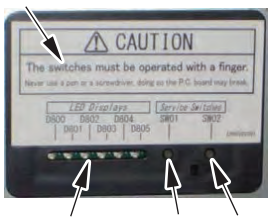
No.	Exchange parts name	Work procedure	Remarks
⑤	Electrical IPDU (MCC-1758)	**1. Compressor, Fan IPDU (MCC-1758)** "Detachment (Compressor, Fan IPDU)" 1).Following to work of Detachment of ①. **⚠WARNING** For 1 minute after the power is turned off, do not disassemble the inverter to prevent an electric shock. 2).Remove all connectors connected to the IPDU board and screws. (φ3 × 15, 4 screws, φ3 × 20, 1 screw, φ4 × 8, 1 screw, φ4 × 15, 2 screws, φ4 × 8, 3 screws (compressor lead), φ6 × 14, 2 screws (power supply wire)) [Fig. 5-1] 3).Remove 6 supporters. [Fig. 5-2] 4).Remove 2 clamp filters (ZCAT2132-1130 [Fig.5-2], ZCAT3035-1330 [Fig.5-1]) 5) Remove 2 spacers. [Fig.5-1] 6) Remove all Fan IPDU parts. (Fan heat sink, spacers (bush, collar), screws [Fig5-3]) **NOTE** When removing the connectors, release the safety lock of the housing. "Attachment (Compressor, Fan IPDU)" Attach the new IPDU board in the reverse process of "Detachment (Compressor, Fan IPDU)". **NOTE** Coat the heat sink on the IPDU board with the heat sink silicone uniformly before installing the heat sink. Please following below tighten torque of screws. Tightening torque Heat sink screw (Φ3) 0.5 N • M Heat sink screw (Φ4) 1.2 N • M Screw of Φ4 1.2 N • M Screw of Φ4 (Compressor lead) 1.2 N • M Screw of Φ6 2.5 N • M	Fig. 5-1  Fig. 5-2  Fig. 5-3 

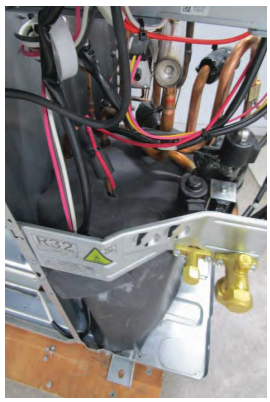
No.	Exchange parts name	Work procedure	Remarks
⑥	Electrical part CDB (MCC-1675) P.C.board	**1. Interface CDB (MCC-1675)** "Detachment (Interface CDB)" 1).Following to work of Detachment of ①. **⚠ WARNING** For 1 minute after the power is turned off, do not disassemble the inverter to prevent an electric shock. 2).Remove all connectors connected to the Interface CDB. [Fig. 6-1] 3).Detach the Interface CDB from 4 supporters. [Fig. 6-2] **NOTE** When removing the connectors, release the safety lock of the housing. "Attachment (Interface CDB)" Attach the new Interface CDB in the reverse process of the "Detachment (Interface CDB)".	Fig. 6-1  Fig. 6-2 
⑦	Reactor	**1. Detachment (Reactor)** 1) Cut the binding band (A) (Thickness: 1.0 mm, Width: 3.5 mm) bundling the reactor leads. 2) Remove the connector of the reactor lead wire connected to the reactor. (each 2 positions) 3) Remove the reactor. (Φ4 × 8, each 2 screws) **2. Attachment (Reactor** Attach the reactor in the reverse process of the "**1. Detachment (Reactor)**".	

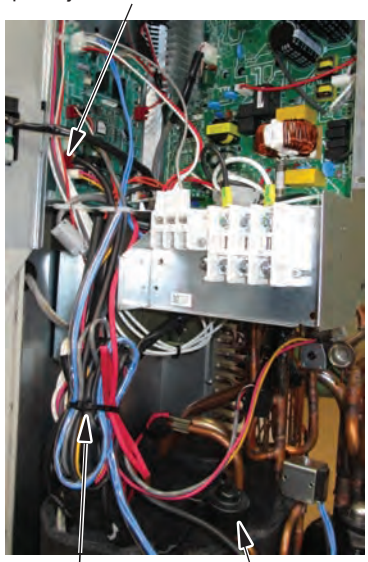
No.	Exchange parts name	Work procedure	Remarks
⑧	Fan motor	**1.Detachment** 1) Following to work of Detachment of ③. 2) Make sure that the fan motor and the propeller fan stop. Remove the flange nut from the fan motor and propeller fan. • Loosen the flange nut by turning clock wise. (To tighten the flange nut, turn it counter clockwise) 3) Remove the propeller fan. 4) Following to work of Detachment of ⑤, 1) to 3). 5) Cut the binding band (B) (Thickness: 1.0 mm, Width: 3.5 mm) bundling the leads. 6) Remove the connector for the fan motor lead. (The clamp filter is removed and used when installing) 7) Remove the fan motor lead from the fixing rubber for separate plate.	  

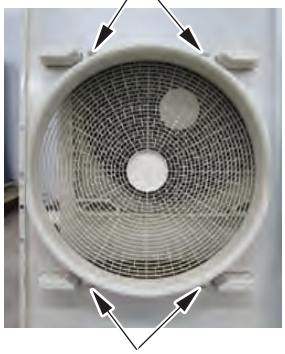
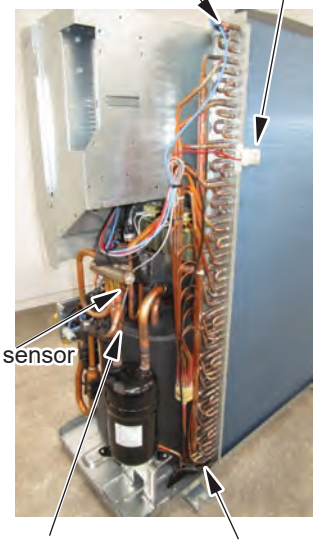
No.	Exchange parts name	Work procedure	Remarks
⑧	Fan motor (continued)	8) Cut the binding bands for the air duct fixing fan motor and the motor base (2 position). 9) Loosen the two claws on the motor base. 10) Remove the fixing screws (4 positions) while holding the fan motor so as not to fall it. (Shoulder screw with captive washer Φ4 × 20, 4 screws) **2. Attachment** Attach the Fan motor in the reverse process of "**1. Detachment**". * Precautions when assembling the fan motor • Tighten the flange nut to 4.95 N*m (50 kgf-cm). • To prevent the fan motor leads from coming in contact with the propeller fan ensure to adjust the length of the fan motor lead fixing rubber so that the fan motor lead has no slack. Attach the fan motor lead fixing rubber to the separate plate so that the projection is on the refrigeration cycle side. • Ensure to bundle in the part where a binding band was removed with a commercially available binding band. • Fix the clamp filter again in the place where it has been removed.	 

No.	Exchange parts name	Work procedure	Remarks
⑨	Compressor and compressor lead	**1.Detachment** **⚠ WARNING** When removing the brazing part of the suction / discharge pipe of the compressor, remove the brazing part in a well-ventilated place after recovering the refrigerant. If recovery is insufficient, the refrigerant and refrigerating machine oil may blow, causing injury. 1) Recover refrigerant gas. 2) Following to work of Detachment of ④. 3) Remove the piping panel (front). Remove the screws from piping panel (front) and base plate. (Φ4 × 10, 2 hexagon screws) Remove the screws from the piping panel (front) and piping panel (rear). (Φ4 × 10, 1 hexagon screw) 4) Remove the piping panel (rear). Remove the screws on the piping panel (rear) and the bottom plate. (Φ4 × 10, 2 hexagon screws) 5) Remove the valve fixing plate Remove the screws for the valve fixing plate and partition plate. (Φ4 × 8, 1 screw) Remove two bolts at liquid valve side and valve fixing plate. (DELTITE screw M6 × 15: 2 pcs) Remove two bolts at gas valve side and valve fixing plate. (DELTITE screw M6 × 15: 2 pcs) 6) Remove the pipe cover and TD sensor fixed with the discharge pipe with a binding band. 7) Remove the sound insulation board (upper, inner, and outer). 8) Remove the compressor' terminal cover (two claws) and compressor lead and compressor case thermostat (one claw). 9) Cut the binding band fixing to the inverter box. 10) Remove the compressor lead. (Keep the ferrite core attached to the electric parts box.) 11) Remove the discharge and suction pipes connected to the compressor using a burner. **⚠ WARNING** Ensure extreme caution when removing piping by melting the weld with a burner as fire may result if there is any oil within the piping. **NOTE** Carefully avoid contact with the 4-way valve and 2-way valve and PMV with the flame (could result in a malfunction). 12) Remove the refrigeration cycle discharge and suction pipes by pulling them upwards. 13) Remove the compressor bolts securing the compressor to the base plate. (H13 × 3 positions) 14) Pull the compressor forwards. **NOTE** The compressor weighs at least 15 kg. Ensure two people carry out the work.	       

No.	Exchange parts name	Work procedure	Remarks
⑨	Compressor and compressor lead (continued)	**2. Attachment** 1) Attach the compressor in the reverse process of **"1. Detachment".** • Also ensure to replace the compressor lead after replacing the compressor. • Install the sound insulation board (inner and outer) through the space between the compressor and the piping, and between the pipes and separate plate as shown on the right.	
		3. Vacuum 1) Connect the vacuum pump to the charge port of the liquid and gas pipe valves and the check joint on the high pressure side, and then operate the vacuum pump. 2) Vacuum until the vacuum low pressure gauge reaches 1 (mmHg).	Pull out the compressor lead and compressor case thermostat lead from this gap. 
		NOTE Fully open the electronic control valve before the vacuum process. If closed the vacuum pipe between the liquid pipe valve and electronic control valve of the outdoor unit may not be able to be drawn through.	
		Method for forcibly fully opening the electronic control valve • Turn on the power supply breaker. • Ensure that D805 of the LED indication of the outdoor is lit up. If D805 is not lit up (off or flashing) then push and hold down SW01 and SW02 at the same time for at least 5 seconds and check that D805 lights up. • Push and hold SW01 down for at least 5 seconds or to confirm that D804 is slowly flashing (once/second). • Push SW01 several times until the LED indications (D800 to D804) become the following.	Wrap the seam of the sound insulation (inner) and sound insulation (outer) about this position. 
		D800: ○ D801: ● D802: ○ D803: ● D804: ◎ ○: Go ON, ●: Go OFF, ◎: flash (5 times/sec.) • Push SW02 and D805 will start rapidly flashing. • Push and hold SW02 down for at least 5 seconds and D804 will start slowly flashing. Once D805 lights up the PMV will start to open. After 30 seconds turn off the power breaker.	Push redundant compressor lead, compressor case thermostat lead into a clearance between sound insulation board (inner) and sound insulation board (outer). Pull out the compressor lead, the compressor case thermostat lead from the gap of the sound insulation 
		LED indicator  D800-D805 SW01 SW02	
		4. Refrigerant encapsulation 1) Add the amount of refrigerant determined by the pipe length using the charge port of the valve.	Push the sound insulation plate (inner and upper) into the inside of the sound insulation (outer) securely so that there is no clearance between sound insulation (upper) and sound insulation(outer)

No.	Exchange parts name	Work procedure	Remarks
⑩	PMV coil	**1. Detachment** 1) Following to work of Detachment of ④. 2) Cut the binding band (C) (Thickness: 1.5 mm, Width: 4.6 mm) bundling the leads. 3) Pull the connector for PMV coil out of CDB 4) Remove the coil from the PMV body by rotating the coil (about 45°) while drawing the coil upward. **2. Attachment** Attach the PMV coil in the reverse process of **"1. Detachment"** 1) Fix the coil positioning protrusions securely in the concavities of the PMV body. (Fix the coil in the direction where lead wire comes out at the body's left diagonally behind.) 2) Attach the PMV coil connector to the CDB P.C. board. 	PMV coil connector  Cut the binding band (C) PMV coil
⑪	4-way valve coil	**1. Detachment** 1)Following to work Detachment 2)Cut the binding band (C) (Thickness: 1.5 mm, Width: 4.6 mm) bundling the leads. 3)Pull the connector for 4-way valve coil out of CDB P.C.board. 4)Remove the 4-way valve coil.(M5 screw) **2. Attachment** Attachment the 4-way valve coil in the reverse process of "1.Detachment" *Fix the 4-way valve coil with its lead wire upward. *Be sure to fix it with the removed screw.	4-way valve coil connector  Cut the binding band (C) 4-way valve coil

No.	Exchange parts name	Work procedure	Remarks
⑫	Liquid injection line PMV coil	**1. Detachment** 1) Following to work of Detachment of ④. 2) Cut the binding band (C) (Thickness: 1.5 mm, Width: 4.6 mm) bundling the leads. 3) Pull the connector for PMV coil out of CDB P.C. board. **2. Attachment** Attach the PMV coil in the reverse process of **"1. Detachment"** 1) Fix the coil positioning protrusions securely in the concavities of the PMV body. (Fix the coil in the direction where lead wire comes out at the body's left diagonally behind.) 2) Attach the PMV coil connector to the CDB P.C. board.	Liquid injection line PMV coil connector  Cut the binding band (C) Liquid injection line PMV coil
⑬	2-way valve coil	**1. Detachment** 1) Following to work Detachment ④ 2) Cut the binding band (C) (Thickness: 1.5 mm, Width: 4.6 mm) bundling the leads. 3) Pull the connector for 2-way valve coil out of CDB P.C.board. 4) Remove the 2-way valve coil.(M4 screw) **2. Attachment** Attachment the 2-way valve coil in the reverse process of "1.Detachment"	2-way valve coil connector  Cut the binding band (C) 2-way valve coil

No.	Exchange parts name	Work procedure	Remarks
⑭	Fan guard	**1. Detachment** 1) Following to work of Detachment of ③ **NOTE** Do the work on a cardboard or a cloth to prevent the product from being scratched. 2) Remove the 4 screws that secure the fan guard. (Φ4 × 10, hexagonal screws) 3) Remove the Air outlet cabinet and place the fan guard side facing down. 4) Remove the craws (4 places) of the fan guard. **2. Attachment** 1) Hook the hooking claws from the front side and press the craws (4 places) by hand to fix them in place. 2) Fix the fan guard to the air outlet cabinet with 4 screws. (Φ4 × 10, hexagon screws) **NOTE** Ensure that all the claws are fixed in their specified position.	Screws  Screws Hooking craws  Hooking craws
⑮	[Reference] Sensor mount positions	1) TD sensor: discharge pipe 2) TL sensor: heat exchanger upside 3) TS sensor: 4-way valve - between accumulator 4) TE sensor: lowest capillary joint 5) TO sensor: Heat exchange surface 1) TD sensor  2) TL sensor   3) TS sensor  4) TE sensor	2) TL sensor 5) TO sensor  1) TD sensor 3) TS sensor 4) TE sensor

2-4. HWT-801H8(R)W-E, HWT-1101H8(R)W-E, HWT-1401H8(R)W-E

<table>
<tr><th>No.</th><th>Exchange parts name</th><th>Work procedure</th><th>Remarks</th></tr>
<tr><td>①</td><td>Common procedures

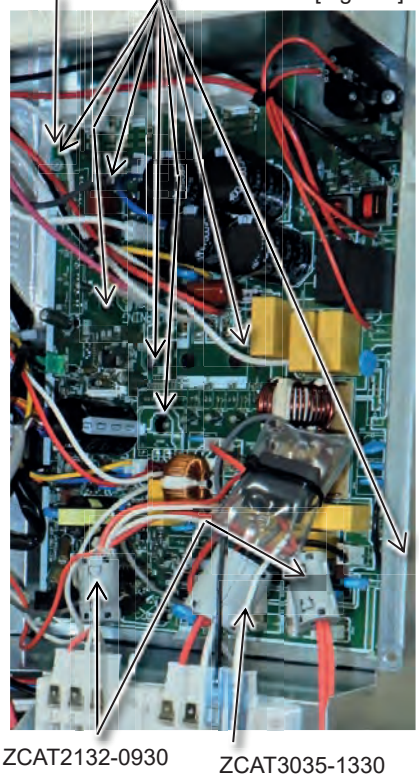
Front panel
Top cover</td><td>* Refer to procedure No.① of “2-3. HWT-1401HW-E(TR), HWT-1401HRW-E”.</td><td></td></tr>
<tr><td>②</td><td>Plate stay</td><td>* Refer to procedure No.② of “2-3. HWT-1401HW-E(TR), HWT-1401HRW-E”.</td><td></td></tr>
<tr><td>③</td><td>Air-outlet cabinet</td><td>* Refer to procedure No.③ of “2-3. HWT-1401HW-E(TR), HWT-1401HRW-E”.</td><td></td></tr>
<tr><td>④</td><td>Side cabinet (right)</td><td>* Refer to procedure No.④ of “2-3. HWT-1401HW-E(TR), HWT-1401HRW-E”.</td><td></td></tr>
<tr><td>⑤</td><td>Electrical IPDU (MCC-1780)</td><td>
1. Compressor IPDU(MCC-1780)
“Detachment(Compressor IPDU)”
1) Following to work of Detachment of ①.

⚠ WARNING
Turn off the power supply of the outdoor unit and wait at least 5 minutes for the capacitor to discharge.

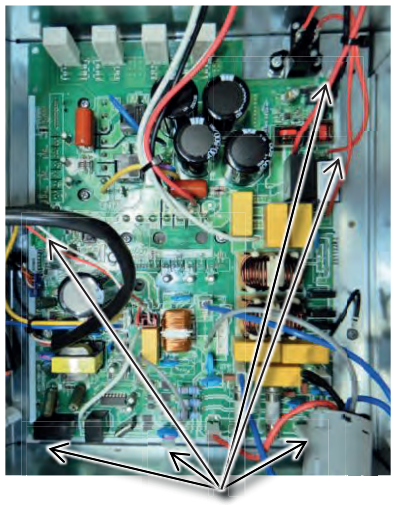
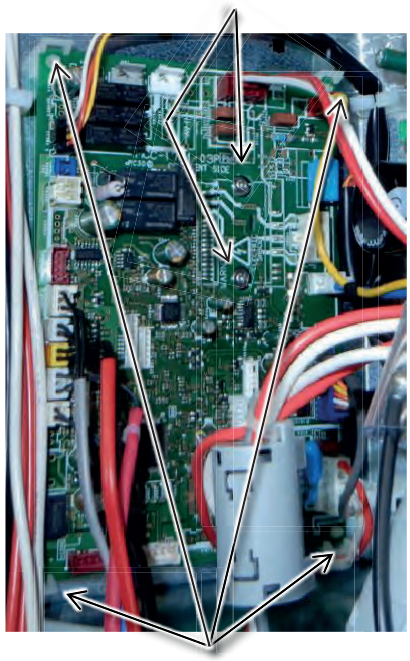
2) Remove all conectors connected to the IPDU board and screws.
(Φ3×20, 1 screw, Φ3×14, 1 screw, Φ4×16, 4 screws, Φ4×8, 1 screw) [Fig. 5-1]
3) Remove 6 suppoters. [Fig. 5-2]
4) Remove 3 clamp filters.
(ZCAT2032-0930×2, ZCAT3035-1330×1) [Fig. 5-1]
5) Remove 2 spacers. [Fig. 5-1]
6) Remove Compressor IPDU from INV-BOX.

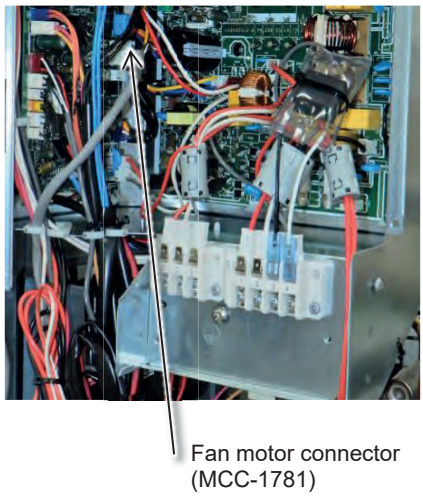
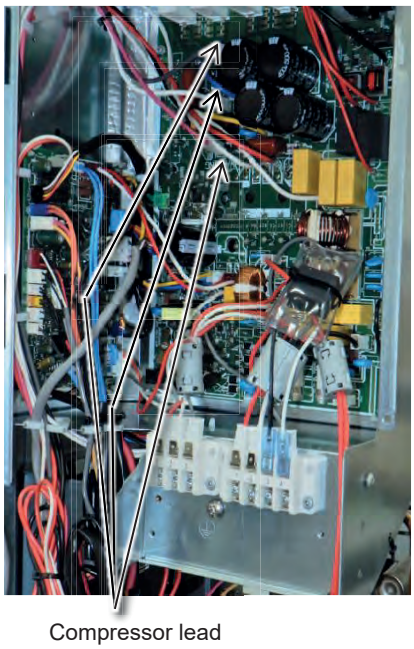
NOTE
When removing the connectors, release the safety lock of the housing.

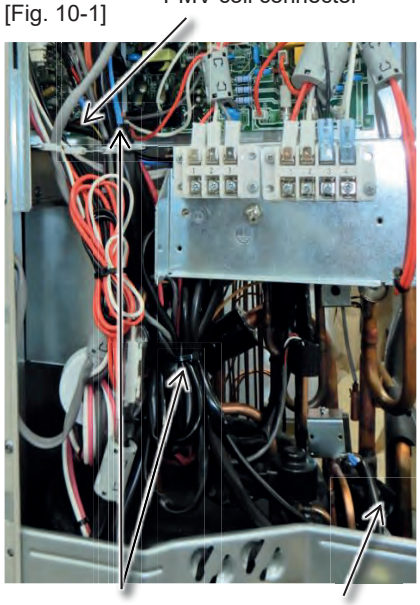
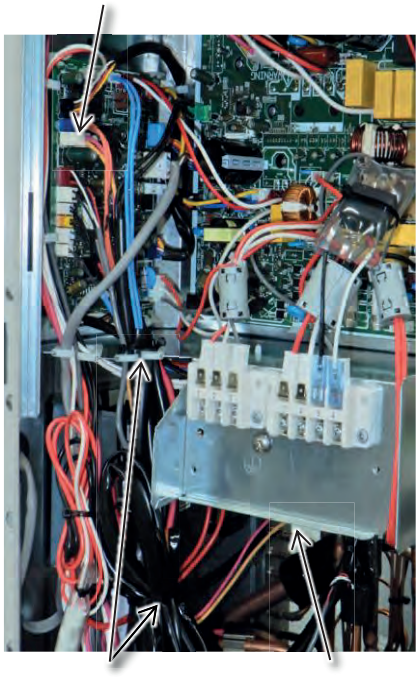
“Attachment(Compressor IPDU)”
Attach the new IPDU board in the reverse process of “Detachment (Compressor IPDU)”.

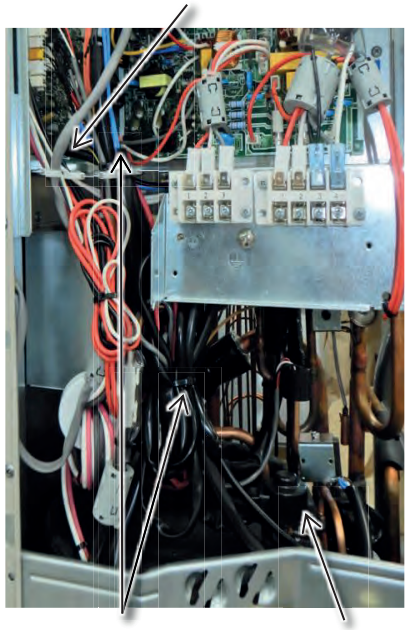
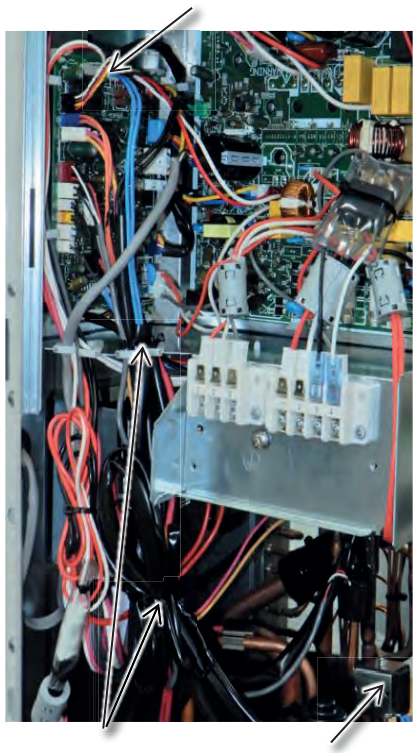
NOTE
Coat the heat sink on the IPDU board with the heat sink silicone uniformly before installing the heat sink. Please following below tighten torque of screws.
<table>
<tr><th></th><th>Tightening torque</th></tr>
<tr><td>Screw of Φ3</td><td>0.55N • m</td></tr>
<tr><td>Screw of Φ4</td><td>1.20N • m</td></tr>
</table>
</td><td>
* See “5-5. Outdoor control board” - MCC-1780” for the location of each connector.
Spacer Screw [Fig. 5-1]


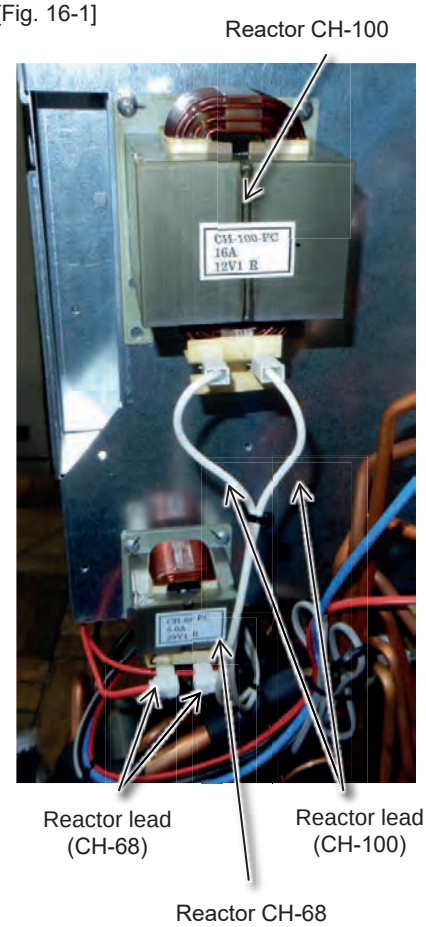
</td></tr>
</table>

<table>
<tr><th>No.</th><th>Exchange parts name</th><th>Work procedure</th><th>Remarks</th></tr>
<tr><td>⑤</td><td>Electrical IPDU (MCC-1780)</td><td></td><td>[Fig. 5-2]
 
Suppoters</td></tr>
<tr><td>⑥</td><td>Electrical IPDU (MCC-1781)</td><td>1. Interface CDB & FAN IPDU(MCC-1781)
“Detachment(Interface CDB & FAN IPDU)”
1) Following to work of Detachment of ①.
⚠ WARNING
Turn off the power supply of the outdoor unit and wait at least 5 minutes for the capacitor to discharge.
2) Remove all connectors connected to the Interface CDB & FAN IPDU. [Fig. 6-1].
3) Detach the Interface CDB & FAN IPDU from 4 suppoters. [Fig. 6-1]
4) Remove the heat sink from the Interface CDB & FAN IPDU by removing the 2 screws(Φ3×14).[Fig. 6-1]
* Use this heat sink as it is after replacing IPDU.
NOTE
When removing the connectors, release the safety lock of the housing.
“Attachment(Interface CDB & FAN IPDU)”
Attach the new CDB & IPDU board in the reverse process of “Detachment(Interface CDB & FAN IPDU)”.
NOTE
Coat the heat sink on the IPDU board with the heat sink silicone uniformly before installing the heat sink. Please following below tighten torque of screws.
<table><tr><td></td><td>Tightening torque</td></tr><tr><td>Screw of Φ3</td><td>0.55N • m</td></tr></table></td><td>* See “5-5. Outdoor control board” - MCC-1781” for the location of each connector.
[Fig. 6-1] Screw (for heat sink)
 
Suppoters</td></tr>
</table>

No.	Exchange parts name	Work procedure	Remarks
⑦	Reactor (Attached to the partition plate)	* Refer to procedure No.⑦ of “2-3. HWT-1401HW-E(TR), HWT-1401HRW-E”.	
⑧	Fan motor	Refer to procedure No.⑧ of “2-3. HWT-1401HW-E(TR), HWT-1401HRW-E”. However, refer to Fig. 8-1 for the connector position on the board of the Fan motor.	[Fig. 8-1] 
⑨	Compressor and compressor lead	Refer to procedure No.⑨ of “2-3. HWT-1401HW-E(TR), HWT-1401HRW-E”. However, refer to Fig. 9-1 for the connector position on the board of the Compressor lead.	[Fig. 9-1] 

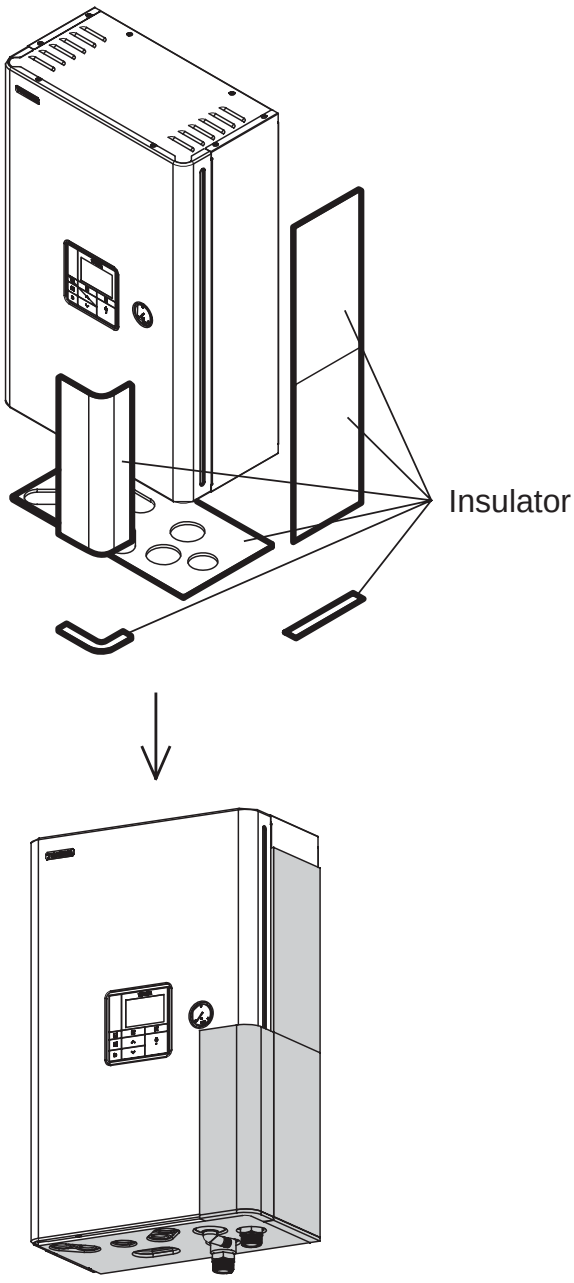
No.	Exchange parts name	Work procedure	Remarks
⑩	PMV coil (Cycle)	Refer to procedure No.⑩ of “2-3. HWT-1401HW-E(TR), HWT-1401HRW-E”. However, refer to Fig. 10-1 for the connector position on the board of the PMV coil lead and the binding band (B).	[Fig. 10-1] PMV coil connector  Cut the binding band (B) PMV coil
⑪	4-way valve coil	Refer to procedure No.⑪ of “2-3. HWT-1401HW-E(TR), HWT-1401HRW-E”. However, refer to Fig. 11-1 for the connector position on the board of the PMV coil lead and the binding band (B).	[Fig. 11-1] 4-way valve coil connector  Cut the binding band (B) 4-way valve coil

No.	Exchange parts name	Work procedure	Remarks
⑫	Liquid injection line PMV coil	Refer to procedure No.⑫ of “2-3. HWT-1401HW-E(TR), HWT-1401HRW-E”. However, refer to Fig. 12-1 for the connector position on the board of the PMV coil lead and the binding band (B).	[Fig. 12-1] PMV coil connector  Cut the binding band (B) PMV coil
⑬	2-way valve coil	Refer to procedure No.⑬ of “2-3. HWT-1401HW-E(TR), HWT-1401HRW-E”. However, refer to Fig. 13-1 for the connector position on the board of the PMV coil lead and the binding band (B).	[Fig. 13-1] 2 way valve coil  Cut the binding band (B) 4-way valve coil

No.	Exchange parts name	Work procedure	Remarks
⑭	Fan guard	Refer to procedure No.⑭ of “2-3. HWT-1401HW-E(TR), HWT-1401HRW-E”.	
⑮	[Reference] Sensor mount positions	Refer to procedure No.⑮ of “2-3. HWT-1401HW-E(TR), HWT-1401HRW-E”.	
⑯	Reactor (Attached to the INV-BOX back) CH-100 CH-68	**Reactor CH-100** **1. Detachment(Reactor CH-100)** 1) Following to work of Detachment of ④. 2) Disconnect the reactor lead from the reactor. 3) Remove the reactor. (Φ4×8, 2 screws) **2. Attachment(Reactor CH-100)** Attach the reactor in the reverse process of the “1. Detachment (Reactor CH-100)”. **Reactor CH-68** **1. Detachment(Reactor CH-68)** 1) Following to work of Detachment of ④. 2) Disconnect the reactor lead from the reactor. 3) Remove the reactor. (Φ4×8, 2 screws) **2. Attachment(Reactor CH-68)** Attach the reactor in the reverse process of the “1. Detachment (Reactor CH-68)”.	[Fig. 16-1] 

12 For cooling installation

If user install the Hydro unit to place humidity location or high humidity region, also user use cooling mode, please attach moisture- proof parts which parts are contained in Hydro unit.



• Stick the optional insulator for cooling to the bottom of the Hydro Unit.

13 Periodic inspection items

For a long-term safe operation of this equipment, perform periodic inspection and parts replacement.

<Inspection items>

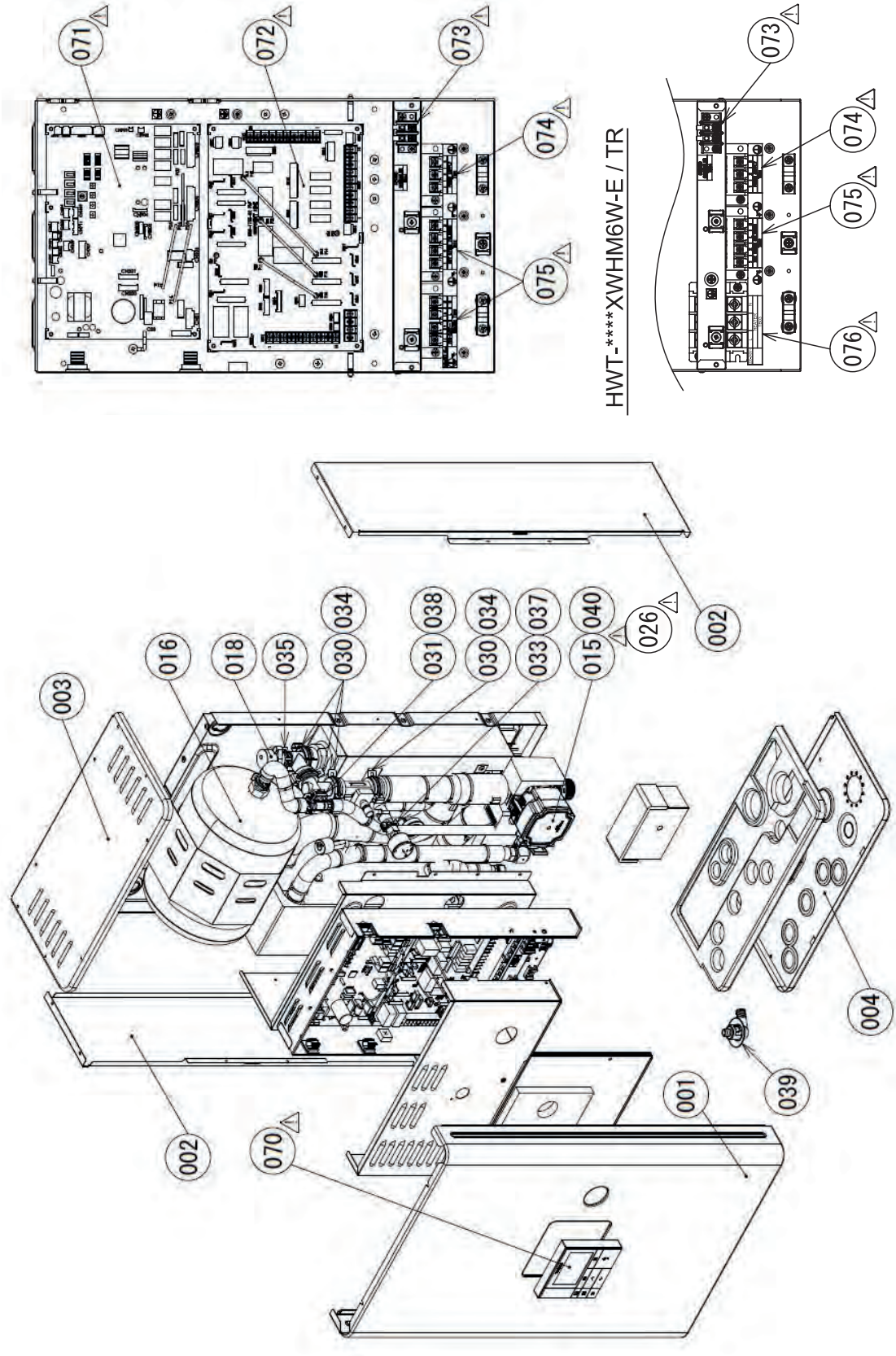
Hydro unit	Frequency	Periodic inspection details
1. Insulation measurement (Power source circuit / Heater circuit)	Annually	Insulation measurement with a mega tester
2. Power source measurement (No-load voltage)	Annually	Electronic voltage measurement: 220-240 V ±10%
3. Operation check	Annually	Hot water supply / Heating / *-Cooling operation check with remote controller
4. Refrigerant leakage / Water leakage inspection	Annually	Visual inspection and check with a leak tester: No leakage must be found
5. Water heat exchanger inspection (Internal dirt and clogging)	Annually	Checking for water dirtiness in a closed cycle, Cleaning
6. Inlet / Outlet water temperature measurement	Annually	Temperature measurement: Temperature measurement during an operation
7. Circulation pump inspection	Annually	No leakage or abnormal noise must be found (Replacement every 10 years: Charged)
8. Air vent valve inspection	Annually	Water leakage, Air vent
9. Expansion vessel	Annually	Visual check for charge pressure abnormality, water leakage, or corrosion
10. Heater assembly	Annually	Check for appearance damage, deformation, or loose terminal
11. Flow sensor	Annually	Operation check while running
12. Manometer	Annually	Water leakage, water pressure check
13. Safety valve	Annually	Water leakage, Appearance check, Drainage check
14. Water heat exchanger control board, Terminal block	Annually	Check for loose connector and connecting terminal

Outdoor unit	Frequency	Periodic inspection details
1. Insulation measurement (Power source circuit / Compressor)	Annually	Insulation measurement with a mega tester
2. Power source measurement (No-load voltage / Rated operation)	Annually	Electronic voltage measurement: 220-240 V ±10% (Single phase type) 380-415 V ±10% (3 phase type)
3. Operation frequency (Outdoor unit operation check)	Annually	Frequency check by sensor information
4. Refrigerant leakage inspection	Annually	Visual inspection and check connection with a leak tester: No leakage must be found
5. Air heat exchanger inspection (Dirt and clogging)	Annually	Visual inspection, Clear clogging
6. Fan inspection (Scratch, damage)	Annually	Check for scratches or damages to the fan or abnormal motor sound
7. Cycle parts (Compressor, 4-way valve, Pulse motor valve)	Annually Annually	Operation check by trial run
8. Inverter control board, Terminal block	Annually	Check for loose connector and connecting terminal

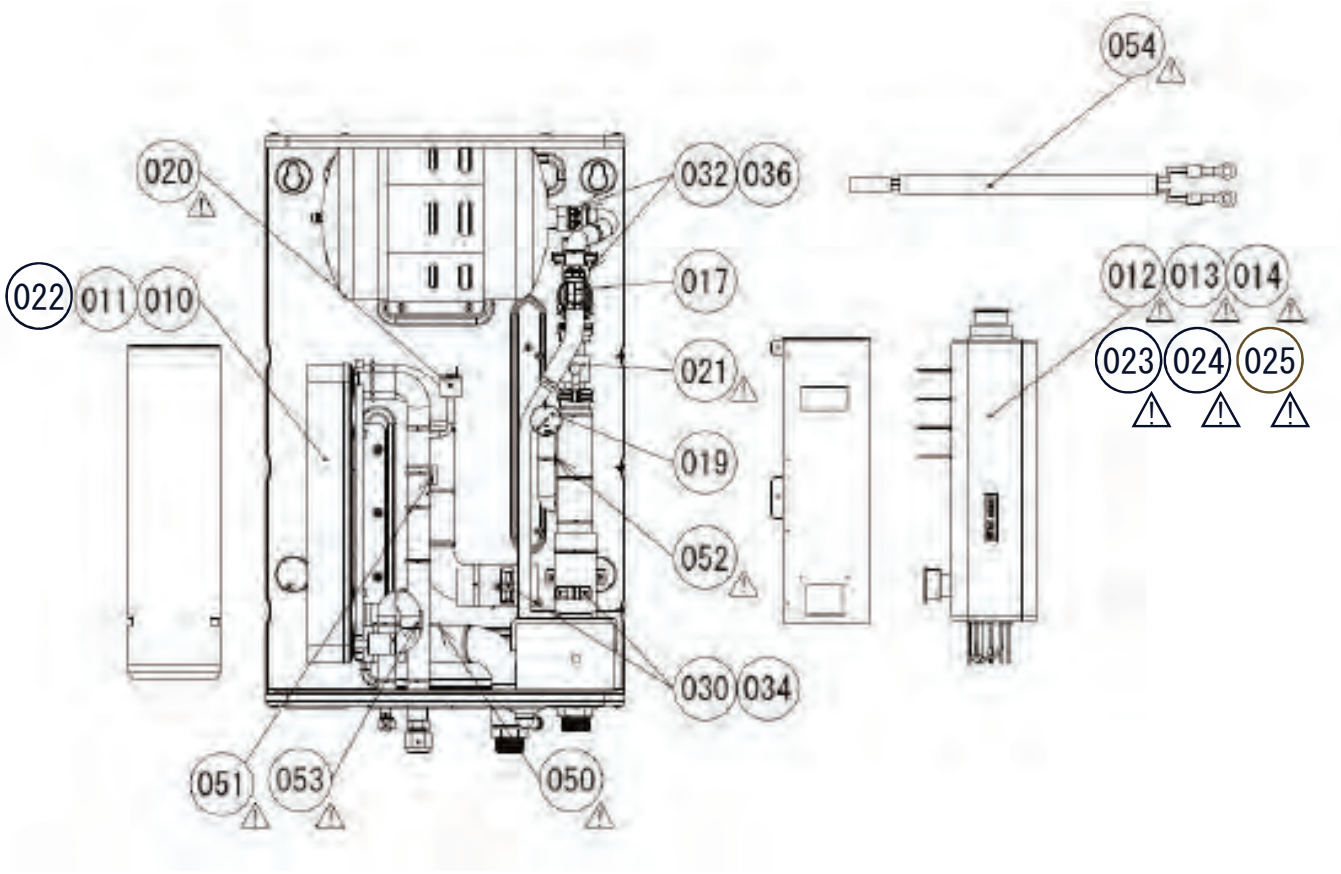
Hot water cylinder (HWS-150CSHM3-E(-UK), 210CSHM3-E(-UK), 300CSHM3-E(-UK))	Frequency	Periodic inspection details
1. Insulation measurement (Power source circuit)	Annually	Insulation measurement with a mega tester
2. Power source measurement (No-load voltage)	Annually	Electronic voltage measurement: 220-240 V ±10%
3. Water leakage inspection	Annually	Visual inspection for leakage: No leakage must be found
4. Terminal block	Annually	Check for loose connector and connecting terminal
5. Heater assembly	Annually	Check for appearance damage, deformation, or loose terminal
6. Temperature. Pressure relief valve (Specification for UK only)	Annually	Drainage check

14 Part exploded view, part list

Hydro Unit



Hydro Unit


054
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HWT-601XWH***-E /-TR

Safety ⚠	Location No.	Part No.	Description	Number of pieces per unit		
				HWT-601XWH M3W-E / TR	HWT-601XWH M6W-E / TR	HWT-601XWH T6W-E / TR
	001	43P00003	PANEL, FRONT, ASSY	1	1	1
	002	43P00004	PANEL, SIDE, ASSY	2	2	2
	003	43P00001	PANEL, UPPER	1	1	1
	004	43P00002	PANEL, LOWER	1	1	1
	011	43P44002	HEAT EXCHANGER, PIPE ASSY	1	1	1
⚠	012	43P57001	HEATER ASSY, 3KW	1		
⚠	013	43P57002	HEATER ASSY, 6KW			1
⚠	015	43P77001	PUMP, WATER, ASSY	1	1	1
	016	43P48001	VESSEL ,EXPANSION, ASSY	1	1	1
	017	43P79005	VALVE, OVER PRESSURE, ASSY	1	1	1
	018	43P79006	VALVE, AIR VENT	1	1	1
	019	43P70007	METER, PRESSURE, ASSY	1	1	1
⚠	020	43P51002	"SENSOR, PRESSURE, NSK-BH010J-872"	1	1	1
⚠	021	43P50006	SENSOR, FLOW, ASSY	1	1	1
⚠	024	43P57005	HEATER ASSY, 6KW		1	
	030	43P95001	RING, O	6	6	6
	031	43P95002	RING, O	1	1	1
	032	43P95003	RING, O	2	2	2
	033	43P95004	RING, O	1	1	1
	034	43P79010	FASTENER, QUICK	6	6	6
	035	43P79002	FASTENER, QUICK	1	1	1
	036	43P79003	FASTENER, QUICK	2	2	2
	037	43P79004	FASTENER, QUICK	1	1	1
	038	43P79011	FASTENER, QUICK	1	1	1
	039	43P19001	NIPPLE, DRAIN	1	1	1
	040	43P95005	GASKET	2	2	2
⚠	050	43P50008	SENSOR, TWI	1	1	1
⚠	051	43P50009	SENSOR, TWO	1	1	1
⚠	052	43P50014	SENSOR, THO	1	1	1
⚠	053	43P50015	SENSOR, TC	1	1	1
⚠	054	43P60006	SENSOR, TTF	1	1	1
⚠	070	43P66001	REMOTE CONTROLLER	1	1	1
⚠	071	43P69003	PC BOARD ASSY, MCC1753	1		1
⚠	071	43P69014	PC BOARD ASSY, MCC1753		1	
⚠	072	43P69004	PC BOARD ASSY, MCC1755	1		1
⚠	072	43P69015	PC BOARD ASSY, MCC1755		1	
⚠	073	43P60004	TERMINAL, JXO-B2D	1	1	1
⚠	074	43P60002	TERMINAL BLOCK, 3P, 20A	1	1	1
⚠	075	43P60005	TERMINAL BLOCK, 4P	2	1	2
⚠	076	43P60003	TERMINAL BLOCK, 3P, 60A		1	

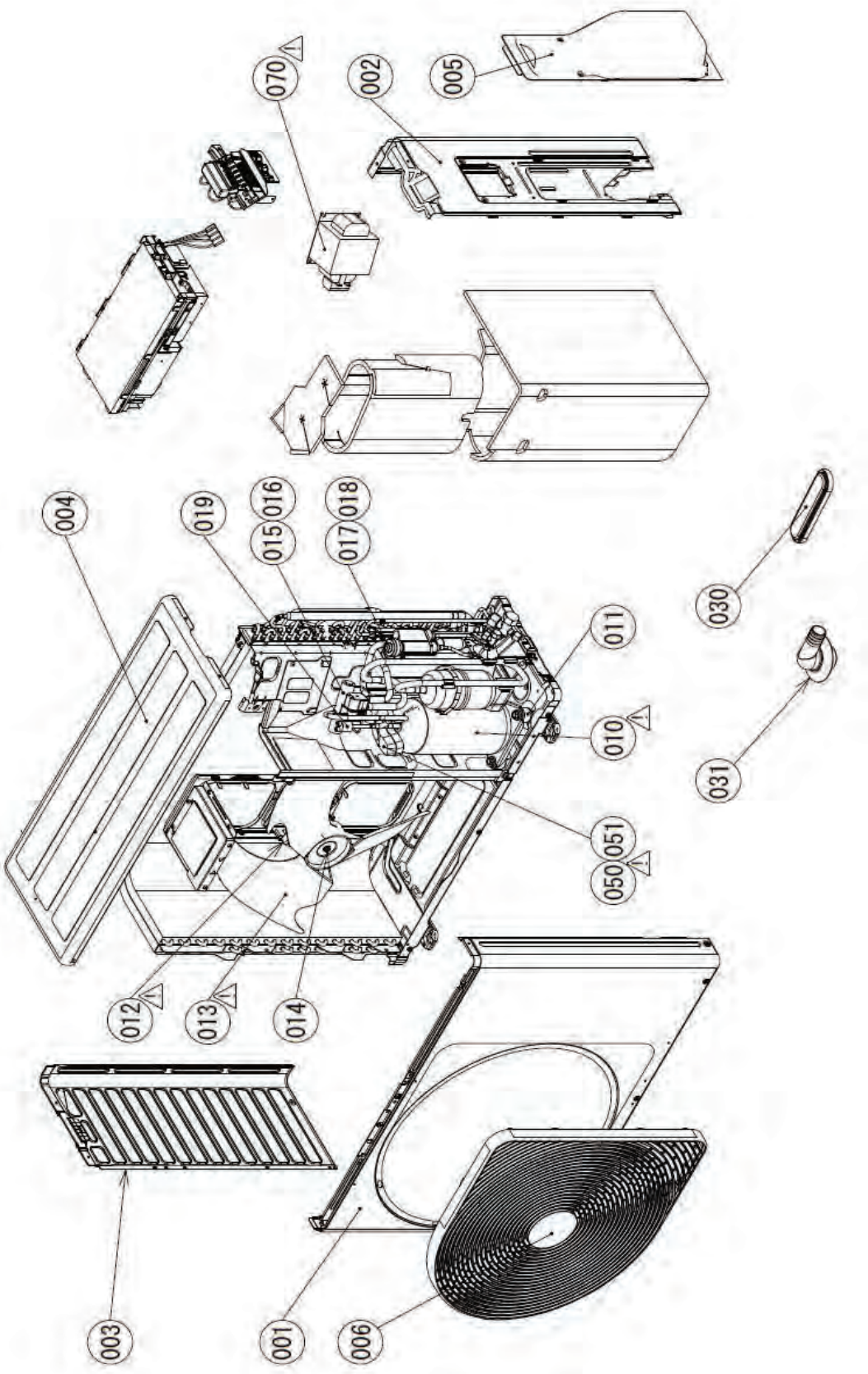
HWT-1101XWH***-E /-TR

Safety ⚠	Location No.	Part No.	Description	Number of pieces per unit			
				HWT-1101XWH M3W-E / TR	HWT-1101XWH M6W-E / TR	HWT-1101XWH T6W-E / TR	HWT-1101XWH T9W-E / TR
	001	43P00003	PANEL, FRONT, ASSY	1	1	1	1
	002	43P00004	PANEL ,SIDE, ASSY	2	2	2	2
	003	43P00001	PANEL, UPPER	1	1	1	1
	004	43P00002	PANEL, LOWER	1	1	1	1
	010	43P44001	HEAT EXCHANGER, PIPE ASSY	1	1	1	1
⚠	012	43P57001	HEATER ASSY, 3KW	1			
⚠	013	43P57002	HEATER ASSY, 6KW			1	
⚠	014	43P57003	HEATER ASSY, 9KW				1
⚠	015	43P77001	PUMP, WATER, ASSY	1	1	1	1
	016	43P48001	VESSEL ,EXPANSION, ASSY	1	1	1	1
	017	43P79005	VALVE, OVER PRESSURE, ASSY	1	1	1	1
	018	43P79006	VALVE, AIR VENT	1	1	1	1
	019	43P70007	METER, PRESSURE, ASSY	1	1	1	1
⚠	020	43P51002	"SENSOR, PRESSURE, NSK-BH010J-872"	1	1	1	1
⚠	021	43P50006	SENSOR, FLOW, ASSY	1	1	1	1
⚠	024	43P57005	HEATER ASSY, 6KW		1		
	030	43P95001	RING, O	6	6	6	6
	031	43P95002	RING, O	1	1	1	1
⚠	032	43P95003	RING, O	2	2	2	2
	033	43P95004	RING, O	1	1	1	1
	034	43P79010	FASTENER, QUICK	6	6	6	6
	035	43P79002	FASTENER, QUICK	1	1	1	1
	036	43P79003	FASTENER, QUICK	2	2	2	2
	037	43P79004	FASTENER, QUICK	1	1	1	1
	038	43P79011	FASTENER, QUICK	1	1	1	1
	039	43P19001	NIPPLE, DRAIN	1	1	1	1
	040	43P95005	GASKET	2	2	2	2
⚠	050	43P50008	SENSOR, TWI	1	1	1	1
⚠	051	43P50009	SENSOR, TWO	1	1	1	1
⚠	052	43P50014	SENSOR, THO	1	1	1	1
⚠	053	43P50015	SENSOR, TC	1	1	1	1
⚠	054	43P60006	SENSOR, TTF	1	1	1	1
⚠	070	43P66001	REMOTE CONTROLLER	1	1	1	1
⚠	071	43P69003	PC BOARD ASSY, MCC1753	1		1	1
⚠	071	43P69014	PC BOARD ASSY, MCC1753		1		
⚠	072	43P69004	PC BOARD ASSY, MCC1755	1		1	1
⚠	072	43P69015	PC BOARD ASSY, MCC1755		1		
⚠	073	43P60004	TERMINAL, JXO-B2D	1	1	1	1
⚠	074	43P60002	TERMINAL BLOCK, 3P, 20A	1	1	1	1
⚠	075	43P60005	TERMINAL BLOCK, 4P	2	1	2	2
⚠	076	43P60003	TERMINAL BLOCK, 3P, 60A		1		

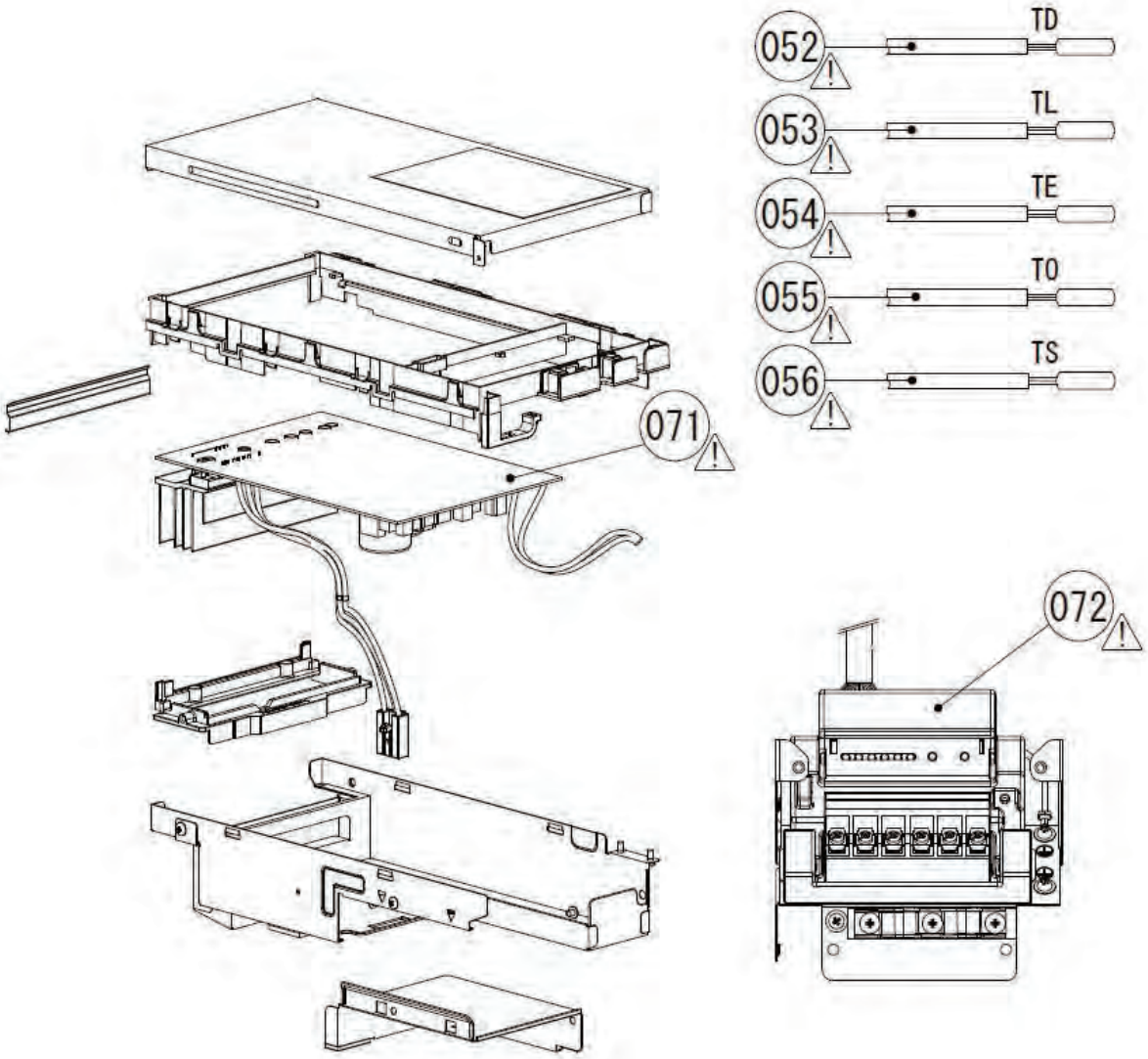
HWT-1401XWH***-E /-TR

Safety ⚠	Location No.	Part No.	Description	Number of pieces per unit			
				HWT-1401XWH M3W-E / TR	HWT-1401XWH M6W-E / TR	HWT-1401XWH T6W-E / TR	HWT-1401XWH T9W-E / TR
	001	43P00003	PANEL, FRONT, ASSY	1	1	1	1
	002	43P00004	PANEL ,SIDE, ASSY	2	2	2	2
	003	43P00001	PANEL, UPPER	1	1	1	1
	004	43P00002	PANEL, LOWER	1	1	1	1
	016	43P48001	VESSEL ,EXPANSION, ASSY	1	1	1	1
	017	43P79005	VALVE, OVER PRESSURE, ASSY	1	1	1	1
	018	43P79006	VALVE, AIR VENT	1	1	1	1
	019	43P70007	METER, PRESSURE, ASSY	1	1	1	1
⚠	020	43P51002	"SENSOR, PRESSURE, NSK-BH010J-872"	1	1	1	1
⚠	021	43P50006	SENSOR, FLOW, ASSY	1	1	1	1
⚠	022	43P44003	HEAT EXCHANGER, PIPE ASSY	1	1	1	1
⚠	023	43P57004	HEATER ASSY, 3KW	1			
⚠	024	43P57005	HEATER ASSY, 6KW		1	1	
⚠	025	43P57006	HEATER ASSY, 9KW				1
⚠	026	43P77002	PUMP, WATER, ASSY	1	1	1	1
	030	43P95001	RING, O	6	6	6	6
	031	43P95002	RING, O	1	1	1	1
	032	43P95003	RING, O	2	2	2	2
	033	43P95004	RING, O	1	1	1	1
	034	43P79010	FASTENER, QUICK	6	6	6	6
	035	43P79002	FASTENER, QUICK	1	1	1	1
	036	43P79003	FASTENER, QUICK	2	2	2	2
	037	43P79004	FASTENER, QUICK	1	1	1	1
	038	43P79011	FASTENER, QUICK	1	1	1	1
	039	43P19001	NIPPLE, DRAIN	1	1	1	1
	040	43P95005	GASKET	2	2	2	2
⚠	050	43P50008	SENSOR, TWI	1	1	1	1
⚠	051	43P50009	SENSOR, TWO	1	1	1	1
⚠	052	43P50014	SENSOR, THO	1	1	1	1
⚠	053	43P50015	SENSOR, TC	1	1	1	1
⚠	054	43P60006	SENSOR, TTF	1	1	1	1
⚠	070	43P66001	REMOTE CONTROLLER	1	1	1	1
⚠	071	43P69014	PC BOARD ASSY, MCC1753	1	1	1	1
⚠	072	43P69015	PC BOARD ASSY, MCC1755	1	1	1	1
⚠	073	43P60004	TERMINAL, JXO-B2D	1	1	1	1
⚠	074	43P60002	TERMINAL BLOCK, 3P, 20A	1	1	1	1
⚠	075	43P60005	TERMINAL BLOCK, 4P	2	1	2	2
⚠	076	43P60003	TERMINAL BLOCK, 3P, 60A		1		

Outdoor Unit (HWT-401HW-E(TR), HWT-601HW-E(TR))

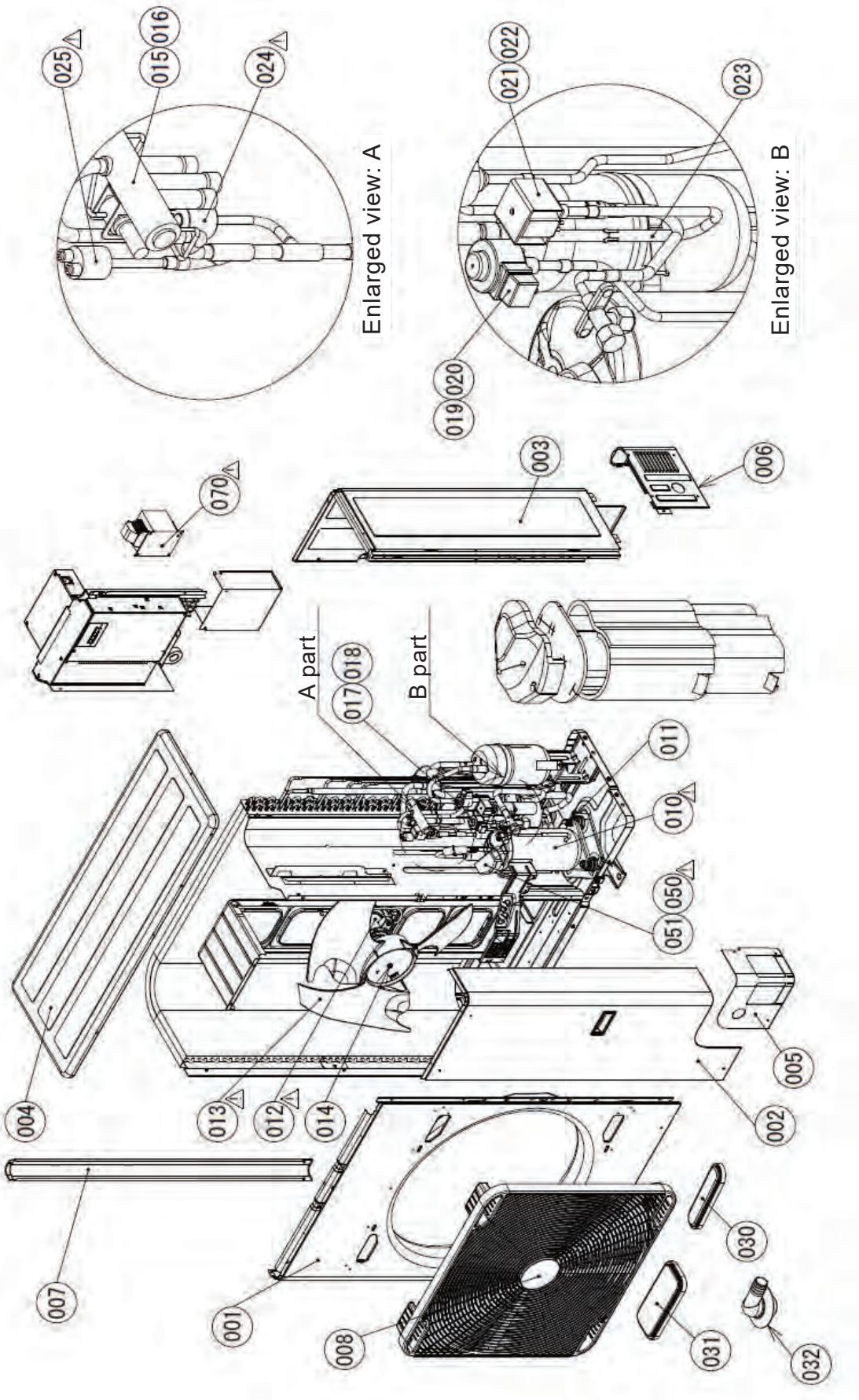


Inverter Assembly (HWT-401HW-E(TR), HWT-601HW-E(TR))

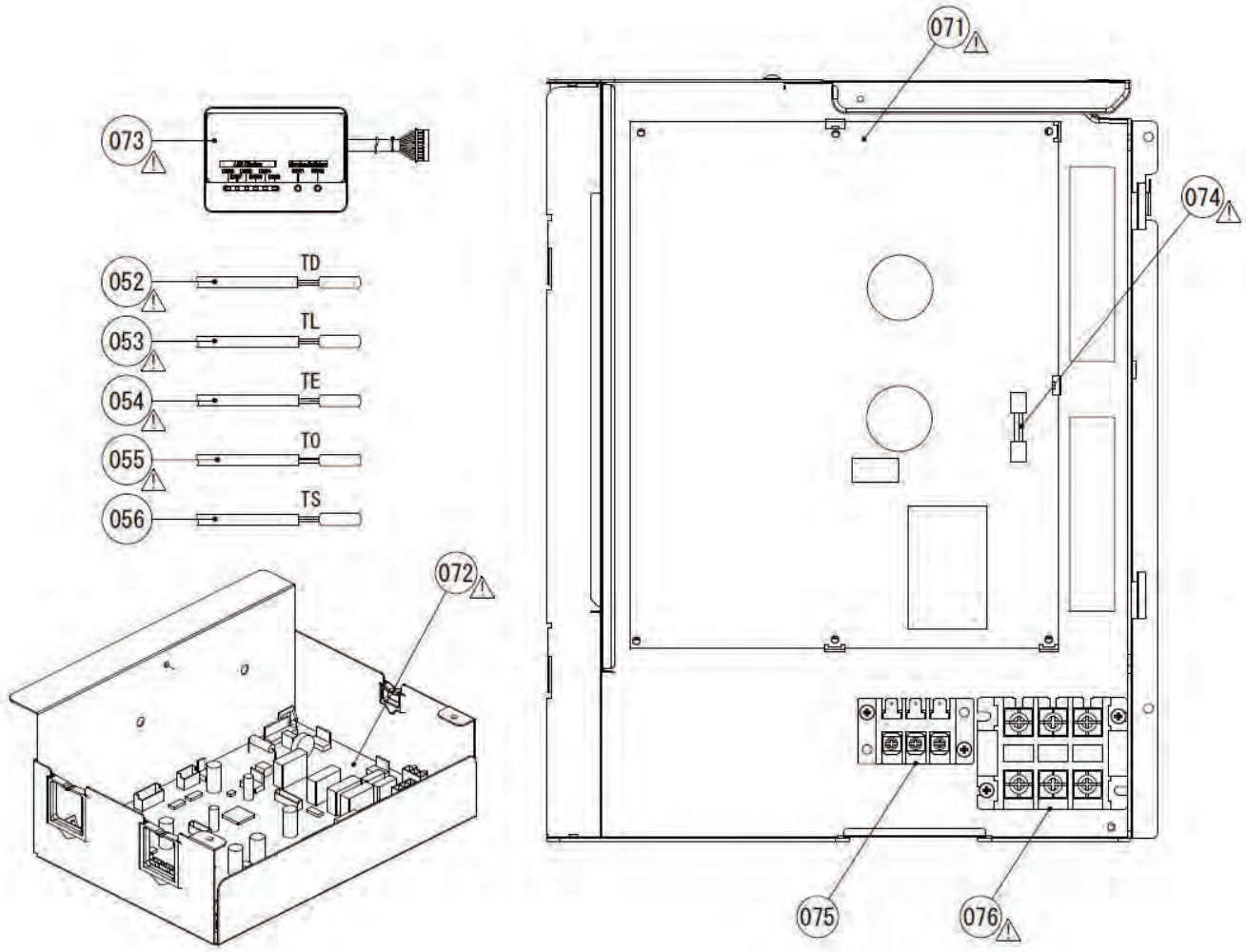


Safety ⚠	Location No.	Part No.	Description	Number of pieces per unit	
				HWT-401HW-E / TR	HWT-601HW-E / TR
	001	43P00012	PANEL, AIR OUTLET, ASSY	1	1
	002	43P00013	PANEL, SIDE, RIGHT, ASSY	1	1
	003	43P00014	PANEL, SIDE, LEFT, ASSY	1	1
	004	43P00015	PANEL, ROOF, ASSY	1	1
	005	43P00016	COVER, PACKED, VALVE	1	1
	006	43P19003	GUARD, FAN	1	1
⚠	010	43P42004	"COMPRESSOR, ASSY, DX150A1T-21F"	1	1
	011	43P42003	BOLT, COMPRESSOR	3	3
⚠	012	43P21002	MOTOR, FAN, ICF-140-A43-1	1	1
⚠	013	43P20002	FAN, PROPELLER, PJ441-E	1	1
	014	43P97001	NUT, FLANGE	1	1
	015	43P46011	VALVE, 4WAY, DSF-9C-R410A	1	1
	016	43P46010	COIL, VALVE, 4WAY, DXQ-1233	1	1
	017	43P46008	VALVE, PMV, DPF1.5C-0.4	1	1
	018	43P46009	COIL, PMV, PQ-M10012-000313	1	1
⚠	019	43P51004	SWITCH, PRESSURE, ACB-4UB154W	1	1
	030	43P79008	CAP, WATER-PROOF	1	1
	031	43P19002	NIPPLE, DRAIN	4	4
⚠	050	43P50007	THERMOSTAT, BIMETAL	1	1
	051	43P42002	HOLDER, THERMO	1	1
⚠	052	43P50012	SENSOR, TD	1	1
⚠	053	43P50013	SENSOR, TL	1	1
⚠	054	43P50010	SENSOR, TE	1	1
⚠	055	43P50004	SENSOR, TO	1	1
⚠	056	43P50011	SENSOR, TS	1	1
⚠	070	43P58002	REACTOR, CH-102	1	1
⚠	071	43P69001	PC BOARD ASSY, MCC1768	1	1
⚠	072	43P69002	"PC BOARD ASSY, MCC1646, TERMINAL BLOCK"	1	1

Outdoor Unit
(HWT-801HW-E(TR), HWT-1101HW-E(TR), HWT-801HRW-E, HWT-1101HRW-E)

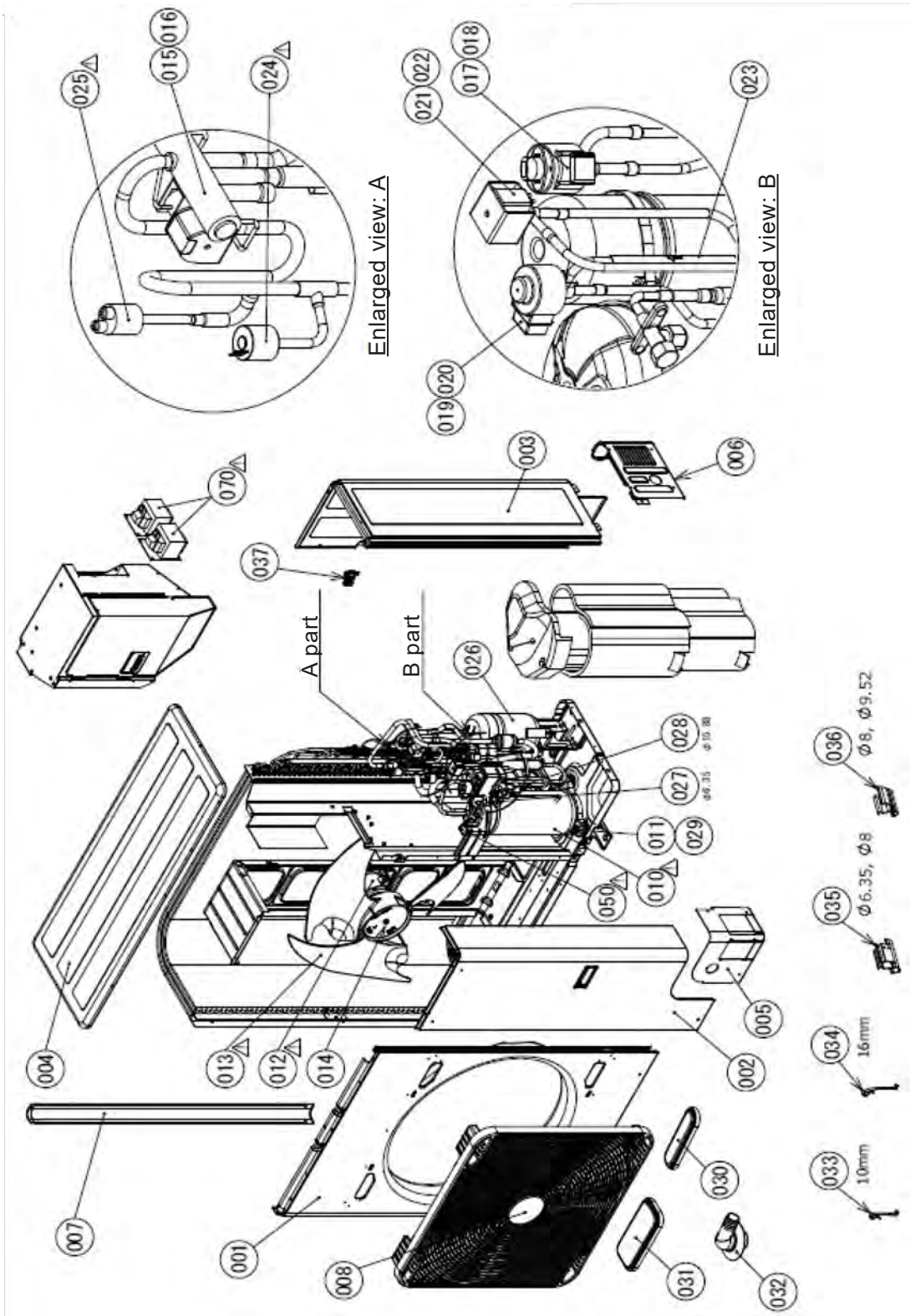


Inverter Assembly
(HWT-801HW-E(TR), HWT-1101HW-E(TR), HWT-801HRW-E, HWT-1101HRW-E)

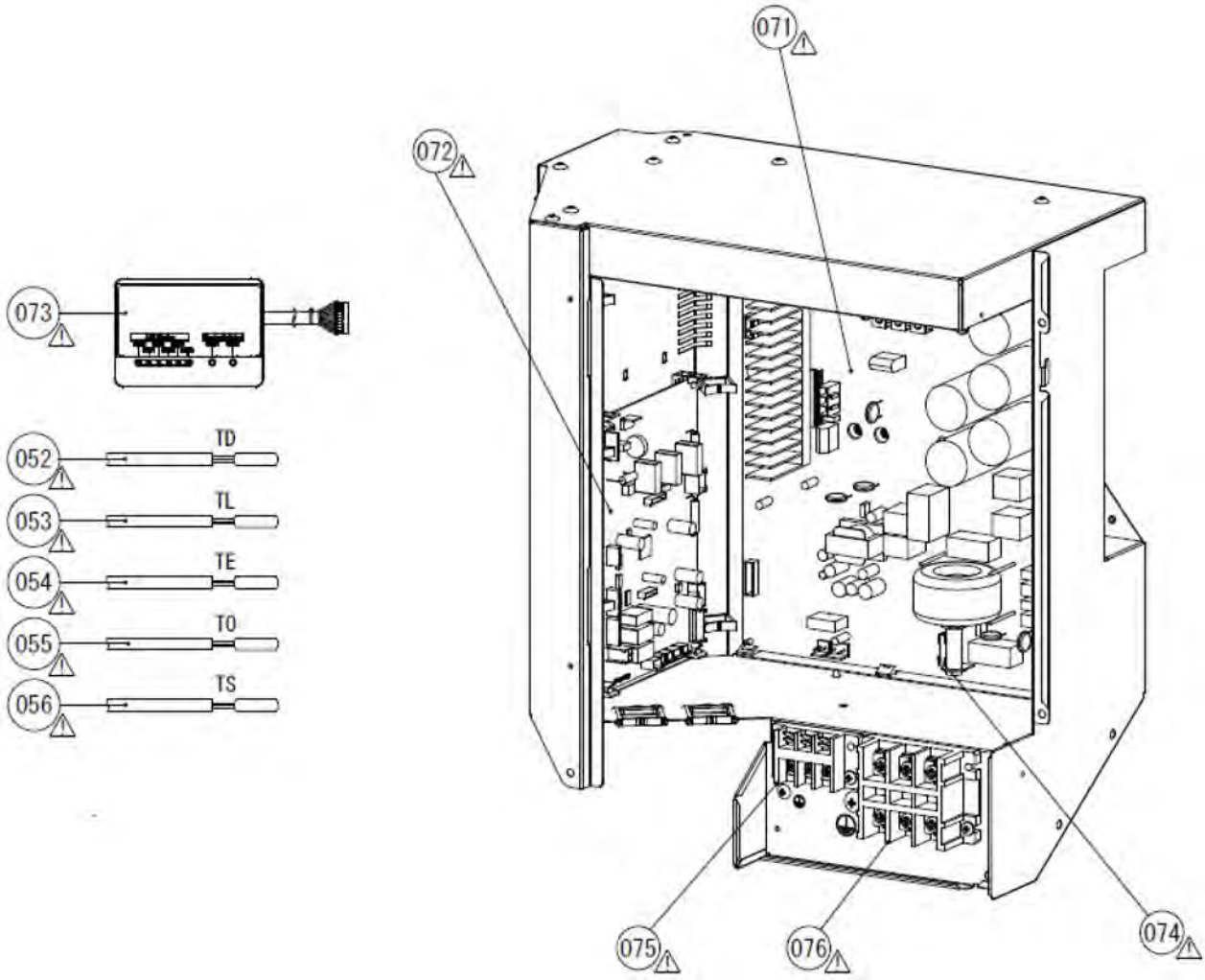


Safety ⚠	Location No.	Part No.	Description	Number of pieces per unit			
				HWT-801HW-E / TR	HWT-801HRW-E	HWT-1101HW-E / TR	HWT-1101HRW-E
	001	43P00005	PANEL, AIR OUTLET	1	1	1	1
	002	43P00017	PANEL, FRONT, ASSY	1	1	1	1
	003	43P00020	PANEL, SIDE, RIGHT, ASSY	1	1	1	1
	004	43P00008	PANEL, ROOF, ASSY	1	1	1	1
	005	43P00009	PANEL, FRONT, PIPING	1	1	1	1
	006	43P00010	PANEL, BACK, PIPING, ASSY	1	1	1	1
	007	43P00011	STAY	1	1	1	1
	008	43P09001	GUARD, FAN	1	1	1	1
⚠	010	43P42005	"COMPRESSOR, ASSY, NX220A1FJ-20N"	1	1	1	1
	011	43P42001	BOLT, COMPRESSOR	3	3	3	3
⚠	012	43P21001	MOTOR, FAN, ICF-280-A60-1	1	1	1	1
⚠	013	43P20001	FAN, PROPELLER, PS561-E	1	1	1	1
	014	43P97001	NUT, FLANGE	1	1	1	1
	015	43P46011	VALVE, 4WAY, DSF-9C-R410A	1	1	1	1
	016	43P46012	COIL, VALVE, 4WAY, DXQ-1604	1	1	1	1
	017	43P46001	VALVE, PMV, UKV-18D301	1	1	1	1
	018	43P46002	COIL, PMV, UKV-A040	1	1	1	1
	019	43P46003	VALVE, PMV, FAM-BD14TF	1	1	1	1
	020	43P46004	COIL, PMV, FAM-12TF-1	1	1	1	1
	021	43P46005	VALVE, 2WAY, TEV-S1220DQ50	1	1	1	1
	022	43P46007	"COIL, VALVE, 2WAY, TEV-SM0AG2260A1"	1	1	1	1
	023	43P46006	VALVE, CHECK	1	1	1	1
⚠	024	43P51003	"SENSOR, PRESSURE, NSK-BH042J-873"	1	1	1	1
⚠	025	43P51001	"SWITCH, PRESSURE, ACB-4UB231W"	1	1	1	1
	030	43P79008	CAP, WATERPROOF	1		1	
	031	43P79009	CAP, WATERPROOF	4		4	
	032	43P19002	NIPPLE, DRAIN	1		1	
⚠	050	43P50007	THERMOSTAT, BIMETAL	1	1	1	1
	051	43P42002	HOLDER, THERMO	1	1	1	1
⚠	052	43P50002	SENSOR, TD	1	1	1	1
⚠	053	43P50001	SENSOR, TL	1	1	1	1
⚠	054	43P50003	SENSOR, TE	1	1	1	1
⚠	055	43P50004	SENSOR, TO	1	1	1	1
⚠	056	43P50005	SENSOR, TS	1	1	1	1
⚠	070	43P58001	REACTOR, CH-101	1	1	1	1
⚠	071	43P69005	PC BOARD ASSY, MCC1705	1	1	1	1
⚠	072	43P69006	PC BOARD ASSY, MCC1675	1	1	1	1
⚠	073	43P69007	PC BOARD ASSY, MCC1646	1	1	1	1
⚠	074	43P60001	FUSE, 10A	1	1	1	1
⚠	075	43P60002	TERMINAL BLOCK, 3P, 20A	1	1	1	1
⚠	076	43P60003	TERMINAL BLOCK, 3P, 60A	1	1	1	1

Outdoor Unit
(HWT-1401HW-E (TR), HWT-1401HRW-E)

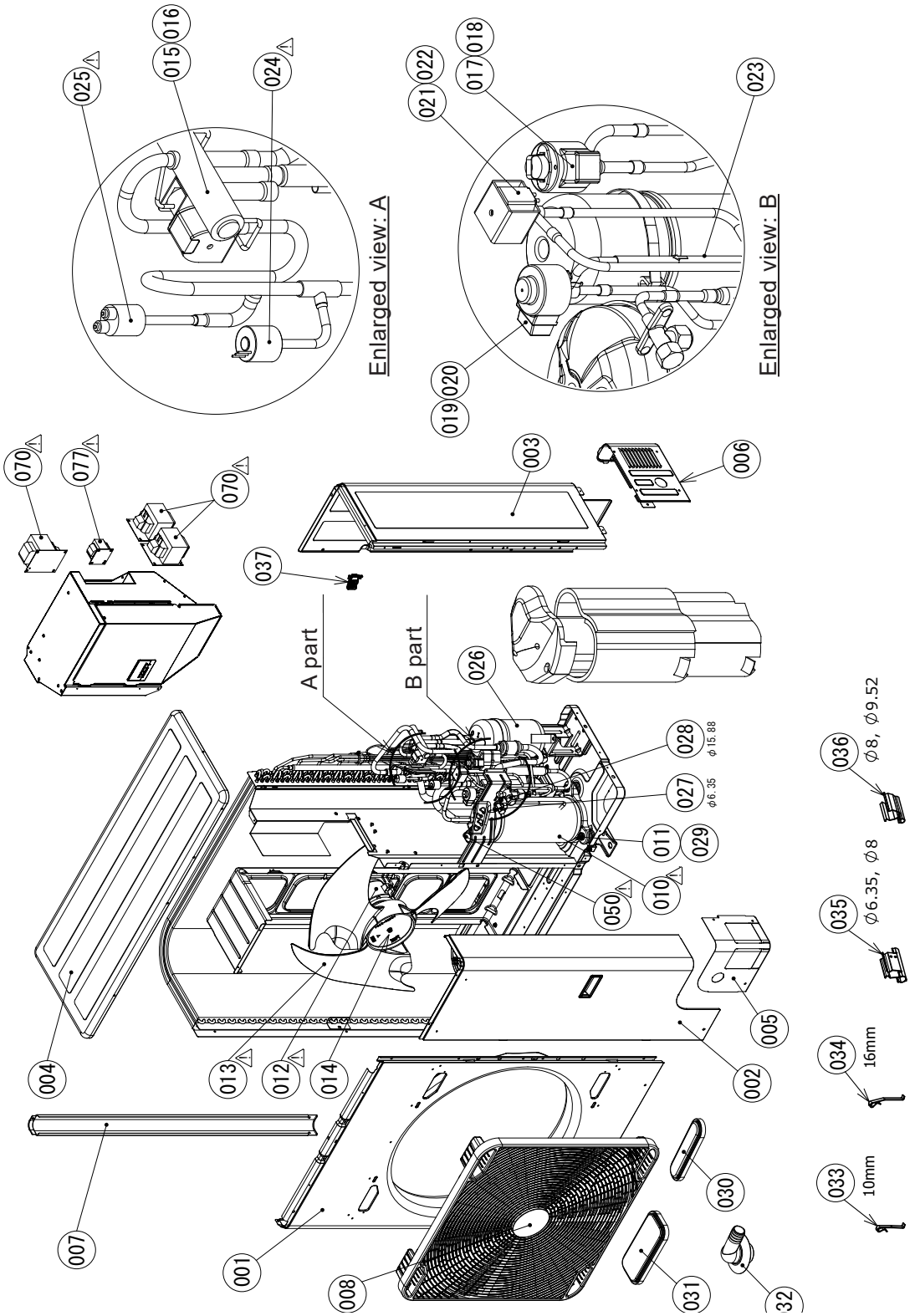


Inverter Assembly
(HWT-1401HW-E (TR), HWT-1401HRW-E)

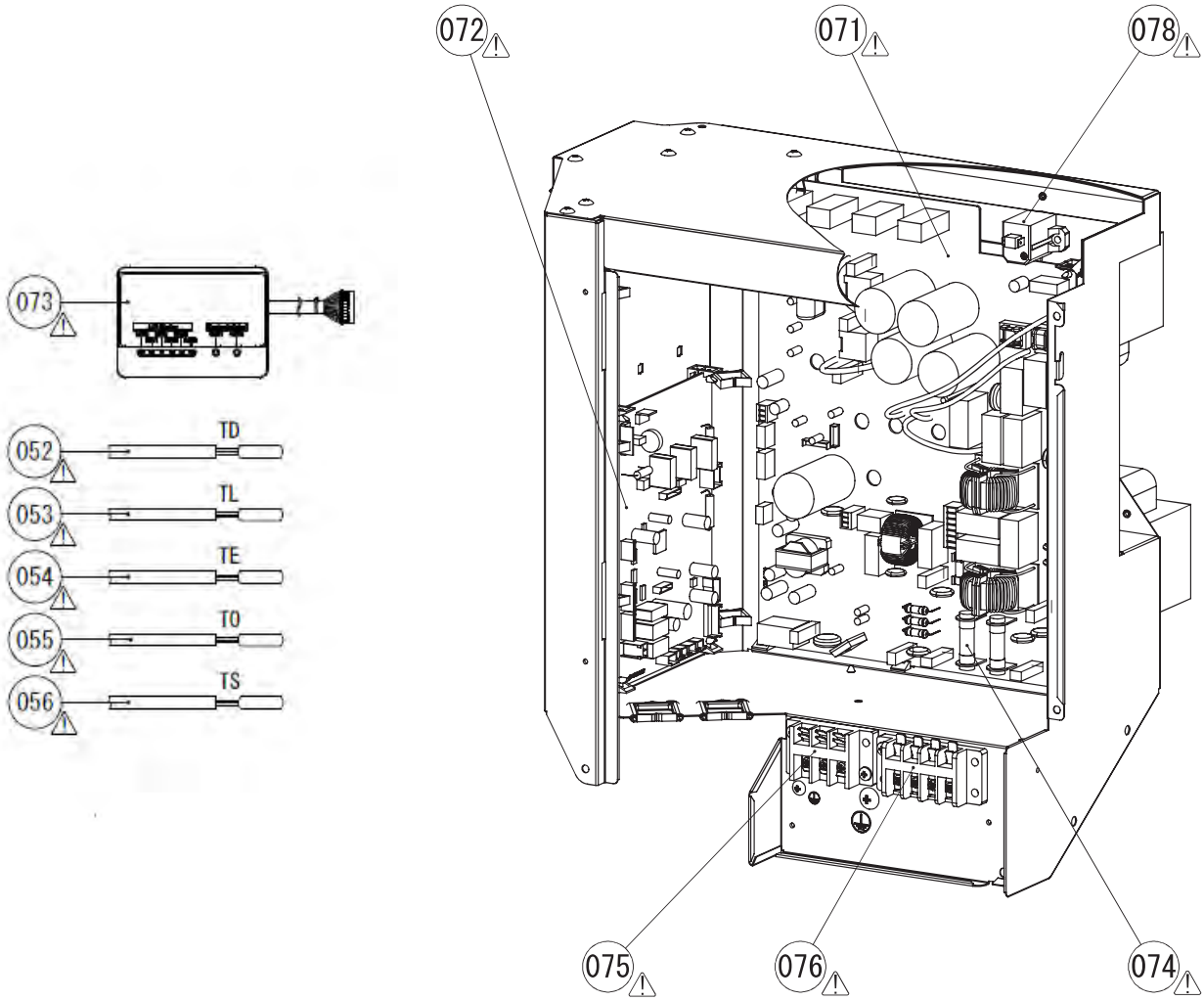


Safety ⚠	Location No.	Part No.	Description	Number of pieces per unit	
				HWT-1401HW-E / TR	HWT-1401HRW-E
	001	43P00005	PANEL, AIR OUTLET	1	1
	002	43P00017	PANEL, FRONT, ASSY	1	1
	003	43P00020	PANEL, SIDE, RIGHT, ASSY	1	1
	004	43P00008	PANEL, ROOF, ASSY	1	1
	005	43P00009	PANEL, FRONT, PIPING	1	1
	006	43P00010	PANEL, BACK, PIPING, ASSY	1	1
	007	43P00011	STAY	1	1
	008	43P09001	GUARD, FAN	1	1
⚠	010	43P42014	COMPRESSOR, ASSY, DX380A2TJ-20M	1	1
	011	43P42001	BOLT, COMPRESSOR	3	3
⚠	012	43P21003	MOTOR, FAN, ICF-280-A100-1	1	1
⚠	013	43P20001	FAN, PROPELLER, PS561-E	1	1
	014	43P97001	NUT, FLANGE	1	1
	015	43P46011	VALVE, 4WAY, DSF-9C-R410A	1	1
	016	43P46012	COIL, VALVE, 4WAY, DXQ-1604	1	1
	017	43P46033	VALVE, PMV, UKV-25D302	1	1
	018	43P46002	COIL, PMV, UKV-A040	1	1
	019	43P46003	VALVE, PMV, FAM-BD14TF	1	1
	020	43P46004	COIL, PMV, FAM-12TF-1	1	1
	021	43P46005	VALVE, 2WAY, TEV-S1220DQ50	1	1
	022	43P46007	COIL, VALVE, 2WAY, TEV-SM0AG2260A1	1	1
	023	43P46006	VALVE, CHECK	1	1
⚠	024	43P51003	SENSOR, PRESSURE, NSK-BH042J-873	1	1
⚠	025	43P51001	SWITCH, PRESSURE, ACB-4UB231W	1	1
	026	43P48003	ACCUMULATOR	1	1
	027	43P46035	VALVE, PACKED, φ6.35	1	1
	028	43P46026	VALVE, PACKED, φ15.88	1	1
	029	43P42008	RUBBER, CUSHION, A2	3	3
	030	43P79008	CAP, WATERPROOF	1	
	031	43P79009	CAP, WATERPROOF	1	
	032	43P19002	NIPPLE, DRAIN	1	
	033	43P63005	HOLDER, SENSOR, 10mm	1	1
	034	43P63001	HOLDER, SENSOR, 16mm	1	1
	035	43P63003	HOLDER, SENSOR, φ6.35, φ8	1	1
	036	43P63004	HOLDER, SENSOR, φ8, φ9.52	1	1
	037	43P63002	HOLDER, SENSOR (TO)	1	1
⚠	050	43P50016	THERMOSTAT, BIMETAL, ASSY	1	1
⚠	052	43P50002	SENSOR, TD	1	1
⚠	053	43P50001	SENSOR, TL	1	1
⚠	054	43P50003	SENSOR, TE	1	1
⚠	055	43P50004	SENSOR, TO	1	1
⚠	056	43P50017	SENSOR, TS	1	1
⚠	070	43P58003	REACTOR, CH-100	2	2
⚠	071	43P69016	PC BOARD ASSY, MCC1758	1	1
⚠	072	43P69013	PC BOARD ASSY, MCC1675	1	1
⚠	073	43P69007	PC BOARD ASSY, MCC1646	1	1
⚠	074	43P60001	FUSE, 10A	1	1
⚠	075	43P60002	TERMINAL BLOCK, 3P, 20A	1	1
⚠	076	43P60003	TERMINAL BLOCK, 3P, 60A	1	1

Outdoor Unit
(HWT-801H8(R)W-E, HWT-1101H8(R)W-E, HWT-1401H8(R)W-E)



Inverter Assembly
(HWT-801H8(R)W-E, HWT-1101H8(R)W-E, HWT-1401H8(R)W-E)



Safety ⚠	Location No.	Part No.	Description	Number of pieces per unit	
				HWT-801H8W-E HWT-1101H8W-E HWT-1401H8W-E	HWT-801H8RW-E HWT-1101H8RW-E HWT-1401H8RW-E
	001	43P00005	PANEL, AIR OUTLET	1	1
	002	43P00017	PANEL, FRONT, ASSY	1	1
	003	43P00020	PANEL, SIDE, RIGHT, ASSY	1	1
	004	43P00008	PANEL, ROOF, ASSY	1	1
	005	43P00009	PANEL, FRONT, PIPING	1	1
	006	43P00010	PANEL, BACK, PIPING, ASSY	1	1
	007	43P00011	STAY	1	1
	008	43P09001	GUARD, FAN	1	1
⚠	010	43P42016	COMPRESSOR, ASSY, RX380A2TJ-20M	1	1
	011	43P42001	BOLT, COMPRESSOR	3	3
⚠	012	43P21003	MOTOR, FAN, ICF-280-A100-1	1	1
⚠	013	43P20001	FAN, PROPELLER, PS561-E	1	1
	014	43P97001	NUT, FLANGE	1	1
	015	43P46011	VALVE, 4WAY, DSF-9C-R410A	1	1
	016	43P46012	COIL, VALVE, 4WAY, DXQ-1604	1	1
	017	43P46033	VALVE, PMV, UKV-25D302	1	1
	018	43P46002	COIL, PMV, UKV-A040	1	1
	019	43P46003	VALVE, PMV, FAM-BD14TF	1	1
	020	43P46004	COIL, PMV, FAM-12TF-1	1	1
	021	43P46005	VALVE, 2WAY, TEV-S1220DQ50	1	1
	022	43P46007	COIL, VALVE, 2WAY, TEV-SM0AG2260A1	1	1
	023	43P46006	VALVE, CHECK	1	1
⚠	024	43P51003	SENSOR, PRESSURE, NSK-BH042J-873	1	1
⚠	025	43P51001	SWITCH, PRESSURE, ACB-4UB231W	1	1
	026	43P48003	ACCUMULATOR	1	1
	027	43P46035	VALVE, PACKED, φ6.35	1	1
	028	43P46026	VALVE, PACKED, φ15.88	1	1
	029	43P42008	RUBBER, CUSHION, A2	3	3
	030	43P79008	CAP, WATERPROOF	1	
	031	43P79009	CAP, WATERPROOF	1	
	032	43P19002	NIPPLE, DRAIN	1	
	033	43P63005	HOLDER, SENSOR, 10mm	1	1
	034	43P63001	HOLDER, SENSOR, 16mm	1	1
	035	43P63003	HOLDER, SENSOR, φ6.35, φ8	1	1
	036	43P63004	HOLDER, SENSOR, φ8, φ9.52	1	1
	037	43P63002	HOLDER, SENSOR (TO)	1	1
⚠	050	43P50016	THERMOSTAT, BIMETAL, ASSY	1	1
⚠	052	43P50002	SENSOR, TD	1	1
⚠	053	43P50001	SENSOR, TL	1	1
⚠	054	43P50003	SENSOR, TE	1	1
⚠	055	43P50004	SENSOR, TO	1	1
⚠	056	43P50017	SENSOR, TS	1	1
⚠	070	43P58006	REACTOR, CH-100, DOUBLE VARNISH	3	3
⚠	071	43P69019	PC BOARD ASSY, MCC1780	1	1
⚠	072	43P69020	PC BOARD ASSY, MCC1781	1	1
⚠	073	43P69007	PC BOARD ASSY, MCC1646	1	1
⚠	074	43P60001	FUSE, 10A	1	1
⚠	075	43P60002	TERMINAL BLOCK, 3P, 20A	1	1
⚠	076	43P60005	TERMINAL BLOCK, 4P	1	1
⚠	077	43P58005	REACTOR, CH-68, DOUBLE VARNISH	1	1
⚠	078	43P50018	PTC-THERMISTOR	1	1

15 Appendix

REPLACEMENT OF SERVICE PC BOARD (MCC-1753)

[Requirement of replacing the Hydro unit Main PC board assembly]
In the memory of the Hydro unit Main PC board before replacement, the type and the capacity code of the model have been stored at the factory, and the customer setup data have been stored after installation.
Replace the Hydro unit Main PC board assembly according to the following procedure.
After replacement, conduct a test run.

<REPLACEMENT PROCEDURE>

CASE 1

Before replacement, power of the Hydro unit can be turned on and the setup data can be readout by the wired remote controller.

Readout & note the memory data (see ❒1 in Page 2) , and power off

⇓

Replace the old main PC board to the service main PC board & power ON again (see ❒2 in Page 3)

⇓

Set the readout data to the service main PC board (see ❒3 in Page 4)

⇓

Power reset

CASE 1

Before replacement, power of the Hydro unit can be turned on and the setup data can be readout by the wired remote controller.

Replace the old main PC board to the service main PC board & power ON (see ❒2 in Page 3)

⇓

Set the DN code data to the service main PC board (see ❒3 in Page 4)
(According to the customers' information)

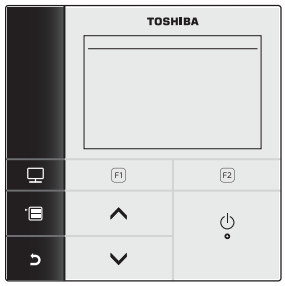
⇓

Power reset

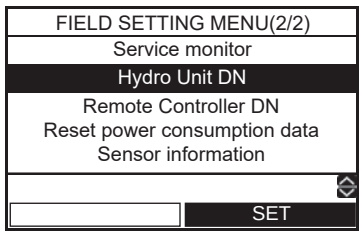
❒1 Readout of the setup data from the memory

Readout of the Memory (factory setup data and customer setup data)

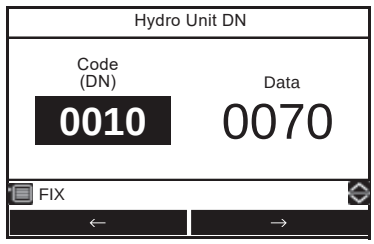
1 **Press the [▤] button and the [∨] button at same time for at least 4 sec. “FIELD SETTING MENU” will be displayed on the top of the screen.**



2 **Press the [∧] / [∨] button to select “Hydro Unit DN” on the “FIELD SETTING MENU” screen, then press the [F2] button.**



3 **Using the [∧] / [∨] button, the DN code Number can be increased or decreased one by one. Make a note of the setup data displayed in this step.**



4 **Repeat item 3. and make a note of the setup data as shown in the later table.**

5 **Press the [↩] button to return the status to usual stop status. (Approx. 1 minute is required to start up of the remote controller.)**

❒2 Replacement of service main PC board

Refer to the Service Manual for more detail.

WARNING

For 1 minute after the power is turned off, do not disassemble the inverter to prevent an electric shock.

Detachment

1. Remove all connectors connected to the main PC board and remove a screw of earth lead wire.

2. Detach the main board from 5 supporters.

NOTE

When removing the connectors, release the safety lock of the connector housing.

Attachment

1. Attach the service main PC board in the reverse process of Detachment.

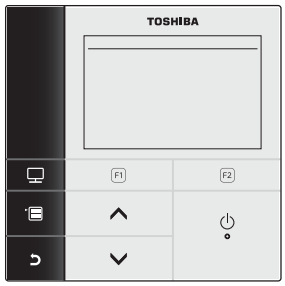
NOTE

Refer to the wiring diagram for the wiring connection.

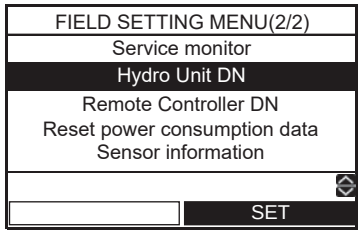
❒3 Setting of the setup data to the memory

The default setup data are stored in the memory of the service main PC board.

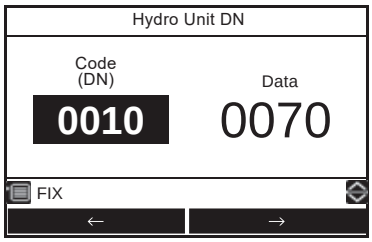
1 **Press the [▤] button and the [∨] button at same time for at least 4 sec. "FIELD SETTING MENU" will be displayed on the top of the screen.**



2 **Press the [∧] / [∨] button to select "Hydro Unit DN" on the "FIELD SETTING MENU" screen, then press the [F2] button.**



3 **Press the [F1] / [F2] button to select DN code or Data, then press the [∧] / [∨] button to change the value. Press the [▤] button. The set value is registered.**



*First, make the initial settings as shown in the table below.

DN	Item	Details		remarks	
				Wall Mouned type	All In One type 2 series
10	Type setting	0070: Wall mounted type 0071: All In One type		0070: Wall mounted type	0071: All In One type
11	Water heat exchanger capacity (Hydro unit type setting)	0010: 60 0017:140	0015: 110	Depend on type ※Check the model name of Hydro unit and set the correct data.	
6B8	Hot water supply is using	0000: Yes	0001: No	0000: Yes	
6BA	ZONE2 operation is using	0000: No	0001: Yes	0000: No	Depend on type ※Check the model name of Hydro unit and set the correct data.
6BC	Back up heater capacity	0000: 3 kW 0002: 9 kW	0001: 6kW	Depend on type ※Check the model name of Hydro unit and set the correct data.	
6BD	Outdoor unit type setting	0000: 401 / 601	0001: 801 / 1101/1401	Depend on Outdoor unit type ※Check the model name of Outdoor unit and set the correct data.	
6D1	Pump P1 ON/OFF cycling (During long periods of system OFF)	0000: OFF	0001: ON	0000: OFF (Until Mar-2023) 0001: ON (From April-2023) ※Set DN[6D1] to "0001" to privent pump lock	

Hydro Unit DN table

DN	Item	Details	Factory default	
			Wall Mouned type	All In One type 2 series
02	Cooling/Non-cooling switching	0000: Cooling 0001: Non cooling	0000: Cooling	
03	Central control address	0001 - 0128	None	
08	Hot Water boost operation time (operating time)	0003: 30 min - 0018: 180 min	0006: 60 min	
09	Hot Water boost set temperature	0040: 40 °C - 0065: 65 °C (All In One type) 0080: 80 °C (Wall Mouned type)	0075:75 °C	0065:65 °C
0A	Anti bacteria set temperature	0065: 65 °C - 0070: 70 °C (All In One type)	0075:75 °C	0065:65 °C
		0065: 60 °C - 0070: 80 °C (Wall Mouned type)		
0B	Anti bacteria holding time	0000: 0 min - 0250: 250 min	0030: 30 min	
0C	Mixing valve drive time	0003: 30 sec - 0024: 240 sec	0006: 60 sec	
0F	Hot water HP allowance while cooling + hot water supply	0000: Not allow - 0001: Allow	0000: Not allow	0001: Allow
10	Type setting	0070: Wall mounted type 0071: All In One type	0070: Wall mounted type	0071: All In One type
11	Water heat exchanger capacity (Hydro unit type setting)	0010: 601 0015: 1101 0017:1401	Depend on type	
12	Line address	0001 - 0128	None	
13	Indoor address	0001 - 0128	None	
14	Group address	0000: Individual (Not group control) 0001: Header unit 0002: Follow er unit	None	
18	Upper limit of cooling set temperature	0018: 18 °C - 0030: 30 °C	0025: 25 °C	
19	Lower limit of cooling set temperature	0007: 7 °C - 0020: 20 °C	0007: 7 °C	
1A	Upper limit of heating (ZONE1) set temperature	0037: 37 °C - 0055: 55 °C (401/601), 0065:65 °C (801/1101/1401)	0055: 55 °C(401/601) 0065: 65°C(801/1101/1401)	
1B	Lower limit of heating (ZONE1) set temperature	0020: 20 °C - 0037: 37 °C	0020: 20 °C	
1C	Upper limit of heating (ZONE2) set temperature	0037: 37 °C - 0055: 55 °C (401/601), 0065:65°C (801/1101/1401)	0055: 55 °C(401/601) 0065: 65 °C(801/1101/1401)	
1D	Lower limit of heating (ZONE2) set temperature	0020: 20 °C - 0037: 37 °C	0020: 20 °C	
1E	Upper limit of hot water set temperature	0040: 40 °C - 0065: 65 °C (All In One type) 0080: 80 °C (Wall Mouned type)	0075:75°C	0065:65°C
1F	Lower limit of hot water set temperature	0040: 40 °C - 0060: 60 °C	0040: 40 °C	
20	Hot water HP start temperature	0020: 20 °C - 0045: 45 °C	0038: 38 °C	
21	Hot water HP stop temperature	0040: 40 °C - 0065: 65 °C	0038: 52 °C	
22	Priority mode Hot water supply/Heating switching temperature	-0040: -40 °C - 0020: 20 °C	0000: 0 °C	Not use
23	Boiler output enable switching temperature	-0020: -20 °C - 0020: 20 °C	-0010: -10 °C	
24	Outside air temperature for hot water temperature compensation start	-0020: -20 °C - 0010: 10 °C	0000: 0 °C	
25	Hot water temperature compensation value	0000: 0K - 0015: 15K	0003: 3K	
26	Night set back change temperature range	0003: 3K - 0020: 20K	0005: 5K	
27	Set temperature shift with heating Auto	-0005: -5K - 0005: 5K	0000: 0K	
28	Auto Restart of pow er outage after system pow er failure	0000: No - 0001: Yes	0001: Yes	
29	Outside air temperature T1 temperature	-0015: -15 °C - 0000: 0 °C	-0010: -10 °C	
2C	Set temperature A with outside air temperature of T0	0020: 20 °C - 0055: 55 °C (401/601), 0065: 65 °C (801/1101/1401)	0040:40 °C	
2D	Set temperature B with outside air temperature of T1	0020: 20 °C - 0055: 55 °C (401/601), 0065: 65 °C (801/1101/1401)	0040:35 °C	
2E	Set temperature C with outside air temperature of 0 °C	0020: 20 °C - 0055: 55 °C (401/601), 0065: 65 °C (801/1101/1401)	0040:30 °C	
2F	Set temperature D with outside air temperature of T3	0020: 20 °C - 0055: 55 °C (401/601), 0065: 65 °C (801/1101/1401)	0040:25 °C	
30	Set temperature E with outside air temperature of 20 °C	0020: 20 °C - 0055: 55 °C (401/601), 0065: 65 °C (801/1101/1401)	0040:20 °C	
31	Zone2 ratio with Zone1 as Auto	0000: 0% - 0100: 100%	0080: 80%	
33	Hydro unit backup heater down time	0000: 5 min 0001: 10 min 0002: 15 min 0003: 20 min		

* DN:10,11, 6BA, 6BC, 6BD,6D1 should be set when the PCB has been replaced or DN code reset procedure has been completed.

DN	Item	Details	Factory default	
			Wall Mouned type	All In One type 2 series
34	Hydro unit backup heater up time	0000: 10 min 0001 20 min 0002: 30 min 0003: 40 min	0000:10 min	
3A	Frost protection function Invalid/Valid	0000: In valid 0001: Valid	0001: Valid	
3B	Frost protection set temperature	0008: 8 °C - 0020: 20 °C	0015: 15 °C	
3C	2-way valve operation (logical reverse) control	0000: Activate during cooling 0001: Deactivate during cooling	0000 Activate during cooling	
3E	Heating HR Boiler priority switching when using boiler	0000: Priority on HP 0001: Priority on HP	0000: Priority on HP	
40	Activate/deactivate room temperature control	0000: Deactivate 0001: Activate	0000: Deactivate	
42	P2 pump display on Wireless Adapter screen (NOT on remote controller screen)	0000: Invalid 0001: Valid	0000: Invalid	
52	External input setting when using VP 7, 8 (CN21) as Emergency shutdown input (DN B6 = “0”)	0000: CLOSE to stop system 0001: OPEN to stop system	0000: CLOSE to stop	
54	Logic of 3-way valve’s action when powered (Single return only)	0000: Not reversed (How water mode when powered) 0001: Reversed (Healing w hen powered)	0000: Not reversed (Hot water mode when powered)	0001 Reversed (Heating when powered)
58	Night set back is activated	0000: Zone 1 &2 0001: Zone 1 only	0000: Zone 1&2	
59	Interval of Mixing Valve control	0000: 30 seconds 0001: 1 minute - 0030: 30 minutes	0002: 2 minutes	
5A	P1 setting while in hot water supply mode	0000: While running HP only 0001: P1 continues running	0000: While running HP only	
5B	Boiler running setting	0000: Boiler and HP 0001: Boiler only with pump running 0002: Heater 0003: Boiler only (Pump stopping)	0003: Boiler only	
61	External input setting when using VP 5, 6 (CN21)	0000: Starts as the circuit is closed Stops as the circuit is opened 0001: Starts /stops as the circuit is received closed pulse signal	0000: Closed: Starts Opened: Stops	
62	Activate/deactivate A02 failure detection	0000: Activate 0001: Deactivate	0000: Activate	
64	Continuously run or stop the P2 pump while cooling	0000: Continuously run P2 0001: Stop F2	0000: Continuous running R2	
65	P1 pump setting when the thermostat is deactivated in the room temperature remote controller and room temperature thermostat settings	0000: Continuously run P1 0001: Stop PI w hen the thermostat is OFF	0000: Continuous running P1	
6E	To diff temperature, w hen pump P1 stop at TO 20 °C	0001: 1K 0005: 5K	0002: 2K	
73	Hot water tank heater start time of heat-pump while operating	0000: 30 min passed - 0003: 120 min passed	0003: 120 min passed	
92	Upper room temperature limit when cooling	0000: 0 °C - 0055: 55 °C	0029:29 °C	
93	Low er room temperature limit when cooling	0000: 0 °C - 0055: 55 °C	0018:18 °C	
94	Upper room temperature limit when heating	0000: 0 °C - 0055: 55 °C	0029:29 °C	
95	Low er room temperature limit when heating	0000: 0 °C - 0055: 55 °C	0018:18 °C	
96	Initial water temperature setting when controlling cooling by the room temperature remote controller and room temperature thermostat	0005 : 5 °C - 0030: 30 °C	0020:20 °C	
9D	Initial water temperature setting when controlling heating by the room temperature remote controller and room temperature thermostat	0020 20 °C - 0055: 55 °C (401/601), 0065: 65 °C (801/1101/1401)	0020: 40 °C	
9E	TO temperature setting to stop the P1 pump during the middle period heating	0010: 10 °C - 0030:30 °C	0020:20 °C	
A0	P1 pump speed control changes the percentage duty of the PWM control	0000:100% - 0005:50%	0000: 100%	
A1	Outside air temperature T0 temperature	-0020: -20°C (401 /601), -0030: -30°C (801/1101/1401) - -0015: -15°C (401 /601), -0020:-20°C (801/1101/1401)	-0020: -20 °C	
A2	Zone2 temperature setting method	0000: Percentage (DN_31) 0001: Fixed value (DN_A3 - 5)	0000: Percentage	
A3	Set temperature A' with outside temperature of T0	0020: 20 °C - 0055: 55°C (401/601) 0065:65 °C (801/1 101/1401)		

* DN:10,11, 6BA, 6BC, 6BD,6D1 should be set when the PCB has been replaced or DN code reset procedure has been completed.

DN	Item	Details	Factory default	
			Wall Mouned type	All In One type 2 series
A4	Set temperature B' with outside temperature of T1	0020: 20 °C - 0055: 55 °C(401/601), 0065: 65 °C(801/1101/1401)	0035: 35°C	
A5	Set temperature E' with outside temperature of 20 °C	0020: 20 °C - 0055: 55 °C(401/601), 0065: 65 °C(801/1101/1401)	0020: 20°C	
AB	Group control	0000: TTW value of each Hydro Unit 0001: TTW value transmitted from Master Unit	0000: each Hydro Unit	
AC	The temperature increase during "Forced ON" mode (SG Ready control)	0000:0K - 0010: 10K	0000: 0K	
B2	HP restart water temperature in A zone. (Valid only room temp control using 2nd remote controller)	0020: 20 °C - 0037: 37 °C	0020: 25°C	
B5	Initial water temperature setting method w hen controlling heating by the room temperature remote controller and room temperature thermostat	0000: The fixed temperature by DN_9D 0001: The calculated temperature by Auto curve	0000: The fixed	
B6	Setting the objects to control of I/P 7, 8	0000: I/P 7 Emergency shutdown input, I/P 8 None 0001: I/P 7 TEMPO 1 input, I/P 8 None 0002: I/P 7 TEMPO 2 input, I/P 8 None 0003: I/P 7 Forcibly turn off the backup heater, I/P 8 Forcibly turn off the hot water tank heater 0004: I/P 7 SG network input 1, I/P 8 SG network input 2	0000: I/P 7 Emergency shutdown input, I/P 8 None	
B8	Forcibly heater off at T0 ≥ A °C	0000: no restriction, 0001: 20 °C 0002: 15 °C, ⋯, 0006: -5 °C	0000: no restriction	
B9	Backup heater energization temperature during defrosting.	Correction coefficient B	0000: 0K	
		0000: 0K - 0004: 40K		
BA	Intermittent operation at T0 ≥ A °C (heating mode)	0000:continuous operation	0000: continuous operation 0001: 20 °C - 0006: -5 °C	Not use
		0001:20°C - 0003: 25°C		
BB	Intermittent operation at T0 < B °C (cooling mode)	0000: continuous operation	0000: continuous operation	Not use
		0001: 35 °C - 0003: 25 °C		
680	0 - 10 V input setting	0000: Not use 0001: Temperature setting 0002: Capacity setting of Heating / Cooling 0003: Capacity setting of Hot water supply 0004: Capacity setting of Heating / Cooling + Hot water supply	0000: Not use	
681	0 - 10 V Hot water supply temperature setting	0000: Not use AI 0001: AI 1 0002: AI 2 0003: AI 3	0000: Not use AI	
682	0 - 10 V Heating ZONE1 temperature setting	0000: Not use AI 0001: AI 1 0002: AI 2 0003: AI 3	0000: Not use AI	
683	0 - 10 V Heating ZONE2 temperature setting	0000: Not use AI 0001: AI 1 0002: AI 2 0003: AI 3	0000: Not use AI	
684	0 - 10 V Cooling temperature setting	0000: Not use AI 0001: AI 1 0002: AI 2 0003: AI 3	0000: Not use AI	
685	0 - 10 V Hot water supply temperature upper limit	0040: 40 °C - 0065: 65 °C (All In One type) 0080: 80 °C (Wall Mouned type)	0065: 65 °C	
686	0 - 10 V Heating ZONE1 temperature upper limit	0020: 20 °C - 0055: 55 °C(401/601), 0065: 65 °C(801/1101/1401)	0055: 55 °C	
687	0 - 10 V Heating ZONE2 temperature upper limit	0020: 20 °C - 0055: 55 °C(401/601), 0065: 65 °C(801/1101/1401)	0055: 55 °C	
688	0 - 10 V Cooling temperature upper limit	0007: 7 °C - 0029: 29 °C	0020: 20 °C	
689	0 - 10 V Hot water supply temperature setting resolution	0001: 1 °C - 0005: 5 °C	0005: 5 °C	
68A	0 - 10 V Heating ZONE1 temperature setting resolution	0001: 1 °C - 0005: 5 °C	0003: 3 °C	
68B	0 - 10 V Heating ZONE2 temperature setting resolution	0001: 1 °C - 0005: 5 °C	0003: 3 °C	
68C	0 - 10 V Cooling temperature setting resolution	0001: 1 °C - 0005: 5 °C	0001: 1 °C	
6A6	P1 pump speed control	0000: P1 pump fixed speed (depend on DN_A0 setting) 0001: P1 pump variable speed	0001: Variable speed	
6A7	Pump speed control correction	0000: 100% 0001 :90% 0002: 75% 0003: 50%	0000: 100%	
6AC	Hot water supply mode operation cycle to prevent water temperature drop	0000: Invalid	0024: 24H	
		0001: 1H - 0050: 50H		

* DN:10,11, 6BA, 6BC, 6BD,6D1 should be set when the PCB has been replaced or DN code reset procedure has been completed.

DN	Item	Details	Factory default	
			Wall Mouned type	All In One type 2 series
6B0	Boiler output enabled	0000: No 0001:Yes	0000: No	
6B1	Boiler install position after 3WV heating side / before	0000: After 3WV heating side 0001: Before 3WV	0000: After 3WVheating side	
6B2	External cylinder thermostat connected	0000: No 0001: Yes	0000: No	
6B3	External room thermostat connected	0000: No 0001: Yes	0000: No	
6B4	3WV SPST / SPDT specification switching	0000: SPST 0001: SPDT	0000: SPST	Not Use
6B5	Synchronization of pump P1 and P2	0000: Non-synchronous 0001: Synchronous	0000: Non-synchronous	0001: Synchronous
6B8	Hot water supply is using	0000: Yes 0001: No	0000: Yes	
6B9	ZONE1 operation is using	0000: Yes 0001: No	0000: Yes	
6BA	ZONE2 operation is using	0000: No 0001: Yes	0000: No	Depend on type
6BC	Back up heater capacity	0000: 3 kW 0001: 6kW 0002: 9 kW	Depend on type	
6BD	Outdoor unit type setting	0000: 401 / 601 0001: 801 / 1101/1401 0002 - 0003: None	Depend on type	
6CA	Output1 item	0000: Alarm 0001: Compressor 0002: Defrost 0003: Boiler 0004: Release 0005: Buck up heater 0006: Cylinder heater 0007: Heating 0008:Cooling 0009: Hot water supply	0000: Alarm	
6CB	Output4 item		0001: Compressor	
6CC	Output2 item		0002: Defrost	
6CD	Output3 item		0003: Boiler	
6CE	SG ready forced operation heater control	0000: Heater output allowed 0001: Heater output not allowed	0000: Heater output allowed	
6D0	P1 pump stop or not using outside air temperature	0000: Continuous run 0001: Pump P1 stop w hen TO > 20°C (Available to change the temperature setting by DN_9E)	0000: Continuous run	
6D1	Pump P1 ON/OFF cycling (During long periods of system OFF)	0000: OFF 0001: ON	0000: OFF (Until Mar-2023) 0001: ON (From April-2023) ※Set DN [6D1] to “0001” to privent pump lock	
6D2	Hydro unit backup heater energized Yes / No	0000: Energized 0001: Not energized	0000: Energized	
6D3	Hot water cylinder heater energized Yes / No	0000: Energized 0001: Not energized	0000: Energized	
6D4	External booster heater output enabled Yes / No	0000: Enabled 0001: Not enabled	0000: Enabled	
6F1	Temperature difference for mixing valve opening value changing	0001: 1K 0002: 2K 0003: 3K	0002: 2K	
6F2	Mixing valve maximum steps	0012: 12 step - 0060: 60 step	0012: 24 step	0060: 60 step
6FC	Mode select for silent mode	0000: mode1 0001: mode2 0002: Do not use	0000: mode1	
6FD	Cooling ZONE2 set temperature (Shift value from ZONE1 set temperature)	0000: 0K 0001: +1K 0002: +2K 0023: +23K	0010:+10K	

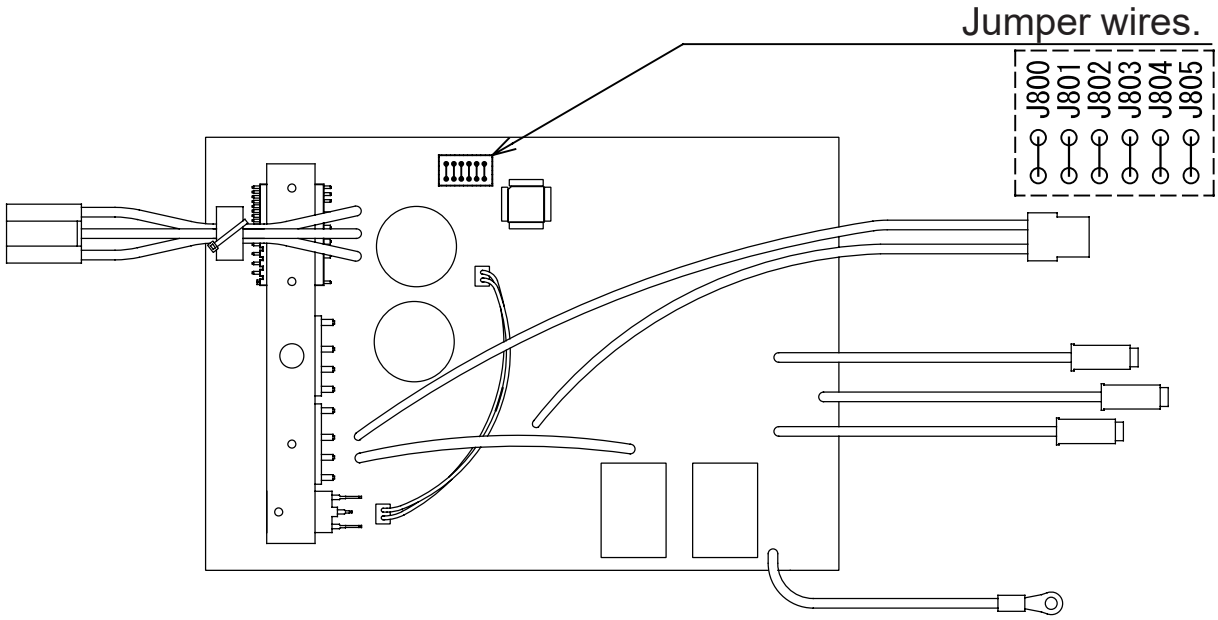
* DN:10,11, 6BA, 6BC, 6BD,6D1 should be set when the PCB has been replaced or DN code reset procedure has been completed.

P.C. Board (MCC - 1768)
Replacement Procedure Manual

⚠ WARNING

Don't open the inverter cover before 1 minute after power has been turned off because an electric shock may be occurred.

Replacement steps:



1 Jumper wires **"J800~J803"**

Cut the jumper wires of the service board, as instructed in the table below.

The jumper setting of J800~J803 differs from original supplied P.C.Board, therefore be sure to configure the jumpers as in the table below. If the model is not specified, the equipment will not operate.

Model name	J800	J801	J802	J803	
Service P.C. Board	○	○	○	○	○: Connected
HWT-401HW-＊	×	○	○	○	× Cut
HWT-601HW-＊	○	×	○	○	

Note: In the table above, "-＊" stands for "-E", "-TR", etc.
(Example : HWT-401HW-E)

2 Jumper wires **"J804~J805"**

Set the jumper wires J804~J805 of the service board to the same as settings of the P.C.board before replacement.

REPLACEMENT OF SERVICE PC BOARD

⚠ WARNING

Don't open the inverter cover before 1 minute after power has been turned off because an electric shock may be occurred.

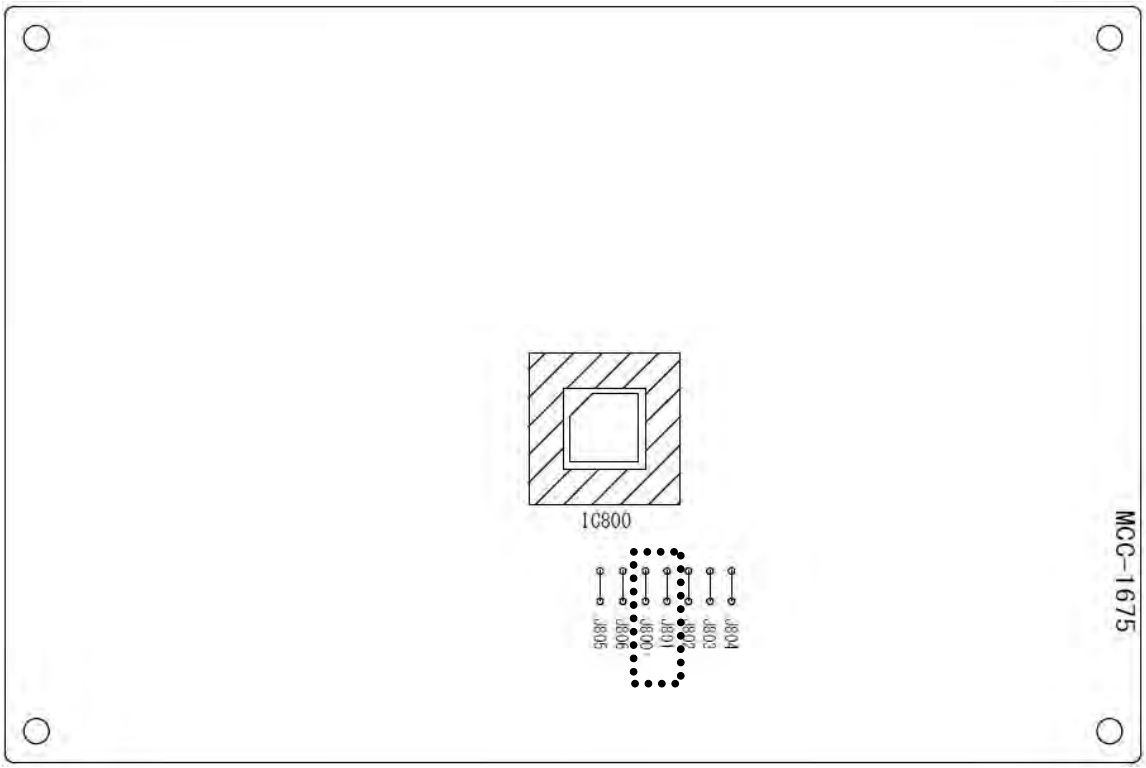
Setting the jumper wires

Part name		Function	Setting
Jumper wire	J800~ J801	Model switching	Cut these jumper wires according to the following table.

Since this service PC board is available for several models, cut the jumper wires according to the following table.

If they are not cut correctly, a certain check code appears on the remote controller and the unit not operate.

Model name	J 800	J 801
Factory setting (default)	○	○
HWT-801HW*, HWT-801HRW*	×	○
HWT-1101HW*, HWT-1101HRW*	○	×
*: Characters indicate the country code(-E),(-TR) and etc.	○: Connected ×: Cut	



REPLACEMENT OF SERVICE PC BOARD

⚠ WARNING

Don't open the inverter cover before 5 minute after power has been turned off because an electric shock may be occurred.

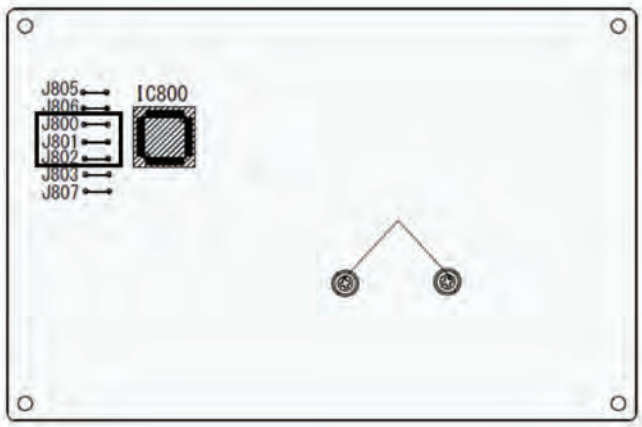
Setting the jumper wires

Part name		Function	Setting
Jumper wire	J800~ J801	Model switching	Cut these jumper wires according to the following table.

Since this service PC board is available for several models, cut the jumper wires according to the following table.

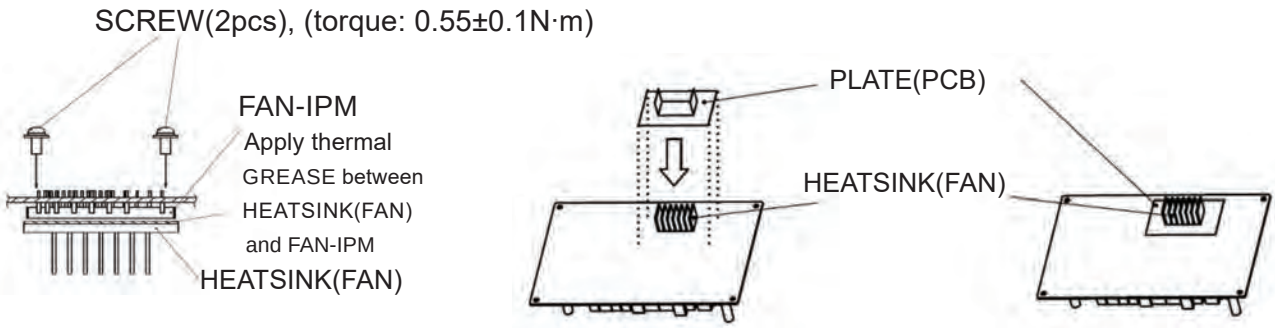
If they are not cut correctly, a certain check code appears on the remote controller and the unit not operate.

Model name	J802	J801	J800
Factory setting (default)	○	○	○
HWT-801H8W-E HWT-801H8RW-E	×	○	○
HWT-1101H8W-E HWT-1101H8RW-E	×	○	×
HWT-1401H8W-E HWT-1401H8RW-E	×	×	○
	○: Connected ×: Cut		



Detach and attach PC BOARD

- Remove the SCREW(2pcs), HEATSINK (FAN) and PLATE(PCB) from the current PC board.
- Apply thermal GREASE between HEATSINK (FAN) and FAN(IPM), and attach the SCREW(2pcs), HEATSINK(FAN) and PLATE(PCB) to the service PC board.



Use the following thermal grease.

- Manufacturer. Shin-etsu Chemical Co.,Ltd. Type: G746 or G747
- Manufacturer. Toray DOW CORNING Co.,Ltd. Type: SC102
- Manufacturer. Aica Kogyo Co.,Ltd. Type: SE-HR1

HWT-401HW-E(TR)

		Pressure				Pipe surface temperature (˚C)				Compressor revolutions per second (rps)	Water Conditions			Indoor / Outdoor temp. conditions (DB/WB) (˚C)	
		(MPa)		(kg/cm^2G)		Discharge	Suction	Outdoor heat exchanger	BPHE		Entering water	Leaving water	Flowrate		
		Pd	Ps	Pd	Ps	(TD)	(TS)	(TE)	(TC)		(TWI)	(TWO)	L/min	Indoor	Outdoor
Heating (Floor Applications)	A7 W30/35	2.20	0.67	22.4	6.8	78	4	2	25	80	26	35	11	20 / -	7/6
Heating (Standard Rating)	A7 W47/55	3.40	0.70	34.7	7.1	94	2	4	45	80	47	55	11	20 / -	7/6
Heating (Low Ambient)	A-7/-8 W**/34	2.18	0.43	22.2	4.4	85	-10	-10	28	78	29	34	12	20 / -	-7 / -8
Cooling (Standard Rating)	A35 W12/7	2.71	0.85	27.6	8.7	82	8	43	7	65	12	7	13	20 / -	35 / -
Cooling (Floor Applications)	A35 W23/18	2.90	1.13	29.6	11.5	82	20	45	16	65	23	18	18	20 / -	35 / -

HWT-601HW-*

		Pressure				Pipe surface temperature (˚C)				Compressor revolutions per second (rps)	Water Conditions			Indoor / Outdoor temp. conditions (DB/WB) (˚C)	
		(MPa)		(kg/cm^2G)		Discharge	Suction	Outdoor heat exchanger	BPHE		Entering water	Leaving water	Flowrate		
		Pd	Ps	Pd	Ps	(TD)	(TS)	(TE)	(TC)		(TWI)	(TWO)	L/min	Indoor	Outdoor
Heating (Floor Applications)	A7 W30/35	2.23	0.67	22.7	6.8	78	3	2	28	80	29	35	17	20 / -	7/6
Heating (Standard Rating)	A7 W47/55	3.46	0.67	35.3	6.8	98	1	3	46	92	49	55	17	20 / -	7/6
Heating (Low Ambient)	A-7/-8 W**/34	2.14	0.41	21.8	4.2	84	-11	-10	28	93	29	34	16	20 / -	-7 / -8
Cooling (Standard Rating)	A35 W12/7	2.81	0.83	28.7	8.5	85	6	44	7	76	12	7	15	20 / -	35 / -
Cooling (Floor Applications)	A35 W23/18	3.02	1.06	30.8	10.8	89	19	46	14	76	23	18	20	20 / -	35 / -

HWT-801HW-*

		Pressure				Pipe surface temperature (˚C)				Compressor revolutions per second (rps)	Water Conditions			Indoor / Outdoor temp. conditions (DB/WB) (˚C)	
		(MPa)		(kg/cm^2G)		Discharge	Suction	Outdoor heat exchanger	BPHE		Entering water	Leaving water	Flowrate		
		Pd	Ps	Pd	Ps	(TD)	(TS)	(TE)	(TC)		(TWI)	(TWO)	L/min	Indoor	Outdoor
Heating (Floor Applications)	A7 W30/35	2.23	0.67	22.7	6.8	78	3	2	28	80	29	35	17	20 / -	7/6
Heating (Standard Rating)	A7 W47/55	3.46	0.67	35.3	6.8	98	1	3	46	92	49	55	17	20 / -	7/6
Heating (Low Ambient)	A-7/-8 W**/34	2.14	0.41	21.8	4.2	84	-11	-10	28	93	29	34	16	20 / -	-7 / -8
Cooling (Standard Rating)	A35 W12/7	2.81	0.83	28.7	8.5	85	6	44	7	76	12	7	15	20 / -	35 / -
Cooling (Floor Applications)	A35 W23/18	3.02	1.06	30.8	10.8	89	19	46	14	76	23	18	20	20 / -	35 / -

HWT-1101HW-*

		Pressure				Pipe surface temperature (˚C)				Compressor revolutions per second (rps)	Water Conditions			Indoor / Outdoor temp. conditions (DB/WB) (˚C)	
		(MPa)		(kg/cm^2G)		Discharge	Suction	Outdoor heat exchanger	BPHE		Entering water	Leaving water	Flowrate		
		Pd	Ps	Pd	Ps	(TD)	(TS)	(TE)	(TC)		(TWI)	(TWO)	L/min	Indoor	Outdoor
Heating (Floor Applications)	A7 W30/35	2.34	0.66	23.9	6.7	88	1	0	29	99	29	35	32	20 / -	7/6
Heating (Standard Rating)	A7 W47/55	3.64	0.72	37.1	7.3	96	3	2	50	80	50	55	32	20 / -	7/6
Heating (Low Ambient)	A-7/-8 W**/34	2.58	0.39	26.3	4.0	95	-12	-13	29	99	29	35	24	20 / -	-7 / -8
Cooling (Standard Rating)	A35 W12/7	2.82	0.78	28.8	8.0	95	5	45	5	80	12	7	22	20 / -	35 / -
Cooling (Floor Applications)	A35 W23/18	3.04	1.06	31.0	10.8	93	17	48	15	82	23	18	29	20 / -	35 / -

HWT-1401HW-*

		Pressure				Pipe surface temperature (˚C)				Compressor revolutions per second (rps)	Water Conditions			Indoor / Outdoor temp. conditions (DB/WB) (˚C)	
		(MPa)		(kg/cm²G)		Discharge	Suction	Outdoor heat exchanger	BPHE		Entering water	Leaving water	Flowrate		
		Pd	Ps	Pd	Ps	(TD)	(TS)	(TE)	(TC)		(TWI)	(TWO)	L/min	Indoor	Outdoor
Heating (Floor Applications)	A7 W30/35	2.46	0.59	25.1	6.0	92	-1	-2	30	82	30	36	46	20 / -	7/6
Heating (Standard Rating)	A7 W47/55	3.54	0.68	36.1	6.9	95	1	1	47	65	47	55	26	20 / -	7/6
Heating (Low Ambient)	A-7/-8 W**/34	2.49	0.35	25.4	3.6	96	-15	-15	29	82	29	35	31	20 / -	-7 / -8
Cooling (Standard Rating)	A35 W12/7	2.87	0.71	29.3	7.2	95	1	44	6	71	12	7	30	20 / -	35 / -
Cooling (Floor Applications)	A35 W23/18	3.06	0.91	31.2	9.3	100	15	47	14	70	23	18	39	20 / -	35 / -

HWT-801H8W-*

		Pressure				Pipe surface temperature (˚C)				Compressor revolutions per second (rps)	Water Conditions			Indoor / Outdoor temp. conditions (DB/WB) (˚C)	
		(MPa)		(kg/cm²G)		Discharge	Suction	Outdoor heat exchanger	BPHE		Entering water	Leaving water	Flowrate		
		Pd	Ps	Pd	Ps	(TD)	(TS)	(TE)	(TC)		(TWI)	(TWO)	L/min	Indoor	Outdoor
Heating (Floor Applications)	A7 W30/35	2.36	0.70	24.1	7.1	78	2	0	30	52	30	35	35	20 / -	7/6
Heating (Standard Rating)	A7 W47/55	3.58	0.73	36.5	7.4	95	3	1	47	53	47	55	22	20 / -	7/6
Heating (Low Ambient)	A-7/-8 W**/34	2.27	0.44	23.1	4.5	81	-11	-12	28	51	29	34	21	20 / -	-7 / -8
Cooling (Standard Rating)	A35 W12/7	2.65	0.76	27.0	7.7	90	3	42	5	48	12	7	21	20 / -	35 / -
Cooling (Floor Applications)	A35 W23/18	2.81	1.04	28.7	10.6	86	16	44	15	48	23	18	28	20 / -	35 / -

HWT-1101H8W-E

		Pressure				Pipe surface temperature (˚C)				Compressor revolutions per second (rps)	Water Conditions			Indoor / Outdoor temp. conditions (DB/WB) (˚C)	
		(MPa)		(kg/cm²G)		Discharge	Suction	Outdoor heat exchanger	BPHE		Entering water	Leaving water	Flowrate		
		Pd	Ps	Pd	Ps	(TD)	(TS)	(TE)	(TC)		(TWI)	(TWO)	L/min	Indoor	Outdoor
Heating (Floor Applications)	A7 W30/35	2.46	0.65	25.1	6.6	85	-1	-1	30	68	30	35	43	20 / -	7/6
Heating (Standard Rating)	A7 W47/55	3.63	0.68	37.0	6.9	95	0	0	47	68	47	55	27	20 / -	7/6
Heating (Low Ambient)	A-7/-8 W**/34	2.24	0.42	22.8	4.3	84	-11	-13	26	64	28	33	27	20 / -	-7 / -8
Cooling (Standard Rating)	A35 W12/7	2.78	0.74	28.3	7.5	94	2	44	6	57	12	7	25	20 / -	35 / -
Cooling (Floor Applications)	A35 W23/18	2.96	1.02	30.2	10.4	91	16	46	16	57	23	18	33	20 / -	35 / -

HWT-1401H8W-E

		Pressure				Pipe surface temperature (˚C)				Compressor revolutions per second (rps)	Water Conditions			Indoor / Outdoor temp. conditions (DB/WB) (˚C)	
		(MPa)		(kg/cm²G)		Discharge	Suction	Outdoor heat exchanger	BPHE		Entering water	Leaving water	Flowrate		
		Pd	Ps	Pd	Ps	(TD)	(TS)	(TE)	(TC)		(TWI)	(TWO)	L/min	Indoor	Outdoor
Heating (Floor Applications)	A7 W30/35	2.51	0.57	25.6	5.8	92	0	-2	30	82	30	36	44	20 / -	7/6
Heating (Standard Rating)	A7 W47/55	3.64	0.62	37.1	6.3	95	-1	-1	47	82	47	56	30	20 / -	7/6
Heating (Low Ambient)	A-7/-8 W**/34	2.40	0.36	24.5	3.7	95	-13	-14	29	82	29	35	30	20 / -	-7 / -8
Cooling (Standard Rating)	A35 W12/7	2.91	0.73	29.7	7.4	94	2	45	7	71	12	7	31	20 / -	35 / -
Cooling (Floor Applications)	A35 W23/18	3.07	0.89	31.3	9.1	102	16	47	13	71	23	18	39	20 / -	35 / -

Toshiba Carrier Air-Conditioning Europe Sp.z o.o.

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Revision record

First issue	–	Mar. 2021
Revised ①	Addition of new models to lineup. • 1ph 14kW capacity models • Hydro Unit with 1ph 6kW Backup Heater	Dec. 2022