TOSHIBA
Leading Innovation >>>

ESTIA

FILE No. A10-1704

AIR TO WATER HEAT PUMP

Service Manual

HFC
R410A

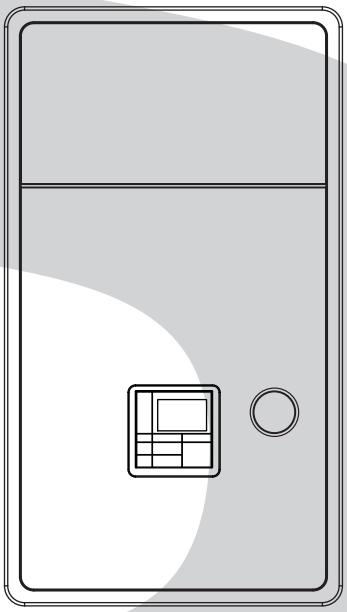
Model name:

Hydro unit

HWS-805XWHM3-E(TR)
HWS-805XWHT6-E(TR)
HWS-805XWHT9-E
HWS-1405XWHM3-E(TR)
HWS-1405XWHT6-E(TR)
HWS-1405XWHT9-E(TR)

Outdoor unit

HWS-805H-E(TR)
HWS-1105H-E(TR)
HWS-1405H-E(TR)
HWS-1105H8-E
HWS-1105H8R-E
HWS-1405H8-E
HWS-1405H8R-E
HWS-1605H8-E(TR)
HWS-1605H8R-E



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1 Safety precautions

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.

[About indication]

Indication	Meaning of Indication
⚠ DANGER	**Indicates that a wrong operation may cause a service engineer and the third persons around to get fatal or serious injuries.**
⚠ WARNING	**Indicates that a wrong operation may cause a service engineer and the third persons around to get fatal or serious injuries, or that unit defective after the operation may cause a user to have a similar serious accident.**
⚠ CAUTION	**Indicates that a wrong operation may cause a service engineer and the third persons around to get injuries or may cause property damage*, or that unit defective after the operation may cause a user to have a similar accident.**

* Property damage indicates extended damage to property, furniture, livestock, or pets.

[About symbols]

Symbols	Meaning of Symbols
⃠	**Indicates a forbidden action.** **Specific forbidden actions are described in text near the symbol.**
●	**Indicates a forcible (must do) action.** **Specific forcible actions are described in text near the symbol.**
△	**Indicates a caution (including danger and warning).** **Specific cautions are described in picture or text inside or near the symbol.**

⚠ DANGER

<Turn off the power breaker>

Turn off the power breaker before removing the front panel and cabinet.
- Failure to do so may cause a high voltage electric shock, leading to death or injury.
- During an operation, the second side circuit of high pressure transmission(*) are applied with a high voltage of 230 V or higher.
- Touching the circuit even with an electrical insulator, let alone a bare hand or body, causes an electric shock.

∗: For details, see the schematic.

<Discharge between terminals>

When the front panel and cabinet are removed, make short-circuit current to discharge between high pressure capacitor terminals.
- Failure to do so may cause a high voltage electric shock, leading to death or injury.
- After the power is turned off, the high pressure capacitor is still charged with high voltage.

<Forbidden>

Do not turn on the power breaker after removing the front panel cabinet.
- Failure to do so may cause a high voltage electric shock, leading to death or injury.

⚠ WARNING

<Check earth ground>

Before starting failure diagnosis or repair, check that the earth wire (∗) is connected to the unit ground terminal.
- An unconnected earth wire could cause an electric shock if electric leakage occurs.
- If the earth ground is not properly connected, ask an electrical worker for rework of the ground connection.

∗: Earth wire of class D grounding

⚠ WARNING

<No modification>

Do not modify the unit.

- Do not disassemble or modify the parts also.
- A fire, an electric shock, or an injury may occur.

<Use specified parts>

Use the specified parts (∗) when replacing them.

- Using parts other than specified ones may cause a fire or an electric shock.

∗: For details, see the parts price list.

<Keep children away from unit>

Keep any person (including children) other than service engineers away from a failure diagnosis or repairing place.

- A tool or disassembled parts may cause an injury.
- Advise the customer to keep the third persons (including children) away from the unit.

<Insulation treatment>

After connecting a cut lead with a crimp contact, discharge by facing the closed side upward.

- Connect lead wires with crimping terminals and turn the closed end upwards to avoid exposure to water.

<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 no 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.

<Use refrigerant carefully>

Check the refrigerant name to use the tools and members appropriate for the refrigerant.

- A product using the refrigerant R410A has the refrigerant name prominently displayed on its outdoor unit. In addition, the diameter of the service port is changed from that of the conventional R22 to prevent incorrect filling.

Never use refrigerant other than R410A for Air to Water Heat Pump using R410A. Also, never use R410A for Air to Water Heat Pump using other refrigerant (such as R22).

- A mixture of R410A with different ones excessively raises the pressure in the refrigerant cycle, leading to an injury due to burst.

Do not make additional charge of the refrigerant.

- An additional charge when refrigerant gas leaks changes the refrigerant composition in the refrigerant cycle, causing the characteristics change of the Air to Water Heat Pump or excessive high pressure in the refrigerant cycle with more than the specified amount of refrigerant charged. This may cause burst or an injury. If the refrigerant gas leaks, perform refrigerant recovery or other operation to make the Air to Water Heat Pump contain no refrigerant, and then perform vacuuming. After that, refill the unit with the defined amount of liquid refrigerant. Never charge refrigerant exceeding the amount specified.

When the refrigerant cycle is refilled with refrigerant, do not enter air or refrigerants other than the specified refrigerant, R410A.

- A mixture of R410A with air or an inappropriate substance causes excessive high pressure inside the refrigerant cycle, leading to an injury due to burst.

Check that there is no refrigerant gas leak after the installation is completed.

- If it catches fire of a fan heater, a space heater, or a stove, poisonous gases may be produced.

<Be careful with wiring>

After a repair is completed, be sure to reassemble the parts and put the wiring back to its original state. In addition, be careful with the internal wiring not to be caught in a cabinet or panel.

- A defective assembly or wiring may cause a disaster at a customer site due to electrical leakage or a fire.

<Check for water leak>

After the repair of a water pathway is completed, check that there is no water leak.

- In using the product, water leak may cause a fire at a customer site due to electrical leakage or an electric shock.

⚠ WARNING

<Check insulation>

After the work is completed, check with an insulating-resistance tester (500V) that the insulation resistance between the live and dead-metal parts is 2 MΩ or higher.

- A low insulation resistance may cause a disaster at a customer site due to electrical leakage or an electric shock.

<Ventilate>

Ventilate if refrigerant gas leaks during service work.

- Should refrigerant gas catch fire, poisonous gases may be produced. A closed room full of leaking refrigerant results in the absence of oxygen; it is dangerous. Make sure to ventilate.

<Caution: electric shock>

When checking a circuit while energized if necessary, use rubber gloves not to contact the live part.

- Contact with the live part may cause an electric shock.
- The unit contains high-voltage circuits. Contact with a part in the control board with your bare hand may cause an electric shock. Take enough care to check circuits.

<Turn off the power breaker>

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

- Failure to do so may cause an electric shock.

<Always do>

Should refrigerant gas leak, find where the gas leaks and properly repair it.

- To stop the repair work because the leakage location cannot be identified, perform refrigerant recovery and close the service valve. Failure to do so may cause the refrigerant gas to leak in a room. Although refrigerant gas alone is harmless, if it catches fire of a fan heater, a space heater, or a stove, poisonous gases may be produced.

When installing the unit or re-installing it after relocation, follow the installation guide for proper operation.

- A defective installation may cause a refrigerant cycle defective, a water leak, an electric shock, or a fire.

<Check after repair>

After a repair is completed, check for any abnormality.

- Failure to do so may cause a fire, an electric shock, or an injury.
- Turn off the power breaker to perform check.

After a repair is completed (and the front panel and cabinet are placed), make a test run to check for any abnormality such as smoke or abnormal sound.

- Failure to do so may cause a fire or an electric shock. Place the front panel and cabinet before making a test run.

<Check after re-installation>

Check that the following are properly performed after re-installation.

(1) The earth wire is properly connected.
(2) The installation is stable without any tilt or wobbles.
Failure to check them may cause a fire, an electric shock, or an injury.

⚠ 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

<Cooling check>

Perform service work when the unit becomes cool enough after the operation.

- High temperature of compressor piping or other equipment after a cooling or heating operation may cause burn.

<Tighten with torque wrench>

Tighten a flare nut with a torque wrench in the specified method.

- A flare nut tightened too much might crack after a long period, causing refrigerant leak.

2 New refrigerant (R410A)

This Air to Water Heat Pump adopts a new refrigerant HFC (R410A) to prevent destruction of the ozone layer. The working pressure of R410A refrigerant is 1.6 times higher than that of the conventional refrigerant R22.The refrigerant oil is also changed for the new refrigeration. Therefore, during installation or service work, be sure that water, dust, former refrigerant, or refrigeration machine oil does not enter the refrigerant cycle of the new type refrigerant Air to Water Heat Pump. A wrong installation or service operation may cause a serious accident. Read carefully the following instructions to use the tools or members for R410A for safety work.

2-1. Safety during installation and service

- Use only the refrigerant R410A for Air to Water Heat Pump using R410A.
  A mixture of R410A with different ones excessively raises the pressure in a refrigerant cycle, leading to an injury due to burst.
- Check the refrigerant name to use the tools and members appropriate for the refrigerant.
  A product using the refrigerant R410A has the refrigerant name prominently displayed on its outdoor unit. In addition, the diameter of the service port is changed from that of the conventional R22 to prevent incorrect filling.
- Ventilate if refrigerant gas leaks during service work.
  Should refrigerant gas catch fire, poisonous gases may be produced. A closed room full of leaking refrigerant results in the absence of oxygen; it is dangerous. Make sure to ventilate.
- When the refrigerant cycle is refilled with refrigerant, do not mix air or refrigerants other than the specified refrigerant, R410A.
  A mixture of R410A with air or an inappropriate substance causes excessive high pressure inside the refrigerant cycle, leading to an injury due to burst.
- Check that no refrigerant gas leaks after the installation is completed.
  Should a refrigerant gas leak in a room and catch fire, poisonous gases may be produced.
- When installing the unit that contains large amount of refrigerant such as Air to Water Heat Pump, take measures to prevent the refrigerant from exceeding the threshold concentration in case it leaks.
  Should leaking refrigerant exceed the threshold concentration could cause an accident due to oxygen deficient.
- When installing the unit or re-installing it after relocation, follow the installation guide for proper operation.
  A defective installation may cause a refrigerant cycle defective, a water leak, an electric shock, or a fire.
- Do not modify the product. Do not disassemble or modify the parts also.
  A fire, an electric shock, or an injury may occur.

2-2. Installing refrigerant pipe

2-2-1. Steel pipe and joint

For refrigerant piping, steel pipe and joints are mainly used. Select those comply with JIS (Japanese Industrial Standards) for a service work. Also, use such clean piping materials that less impurities attach to the inside of pipe and joints.

Copper pipe

Use copper pipe of the “copper and copper alloy seamless pipe” type with attach oil quantity of 40 mg / 10 m or less. Do not use pipe that is cracked, distorted, or discoloured (especially inside).The expansion valve or capillary may get clogged with impurities.
Considering that Air to Water Heat Pump using R410A is higher in pressure than those using the conventional R22, be sure to select the material that comply with the standard.
Table 2-1 shows the thickness of copper pipe used for R410A.
Never use commercially available thin-walled copper pipe of 0.8 mm thick or less.

Table 2-1 Wall thickness of copper pipe

		Wall thickness (mm)
Nominal diameter	**Outer diameter**	**R410A**
3/8	9.52	0.80
5/8	15.88	1.00

Joints

For the joint of copper pipe, flared joint and socket joint are used. Remove impurities from a joint before using it.

- **Flared joint**
  A flared joint cannot be used for the copper pipe whose outer diameter is 20 mm or larger. A socket joint can be used instead in that case.
  Table 2-2-3 and 2-2-4 show the dimensions of flare pipe, the end of flared joint, and flare nuts.
- **Socket joint**
  A socket joint is used to connect the thick-walled pipe of mainly 20 mm or larger in diameter.
  Table 2-2 shows the wall thickness of socket joints.

Table 2-2 The minimum wall thickness of socket joints

Nominal diameter	Reference of outer diameter of copper pipe connected (mm)	Minimum joint wall thickness (mm)
3/8	9.52	0.80
5/8	15.9	1.00

2-2-2. Processing of piping materials

When installing refrigerant pipe, prevent water or dust from entering the pipe, and do not use oil other than lubricant used for Air to Water Heat Pump. Make sure that no refrigerant leak occurs.
If piping needs lubrication, use lubricating oil whose water content is removed.
After the oil is put in, be sure to seal the container with air proof cover or other covers.

Flare and precautions

1) **Cut a pipe.**
   Cut slowly with a pipe cutter so that the pipe is not distorted.
2) **Remove burr and flaw.**
   A burr or flaw in a flare part may cause refrigerant leak. Remove carefully all the burrs, and clean up the cut ends before installation.
3) **Insert a flare nut.**
4) **Flare**
   Check that the clasps and copper pipe are clean. Flare correctly using the clasp. Use a flare tool for R410A or the conventional one. Flare processing dimension varies depending on the flare tool type. When using the conventional flare tool, use a gauge for size adjustment to secure the A dimension.

Figure 2-2-1
Flare dimension

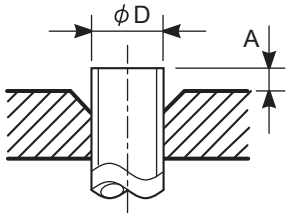


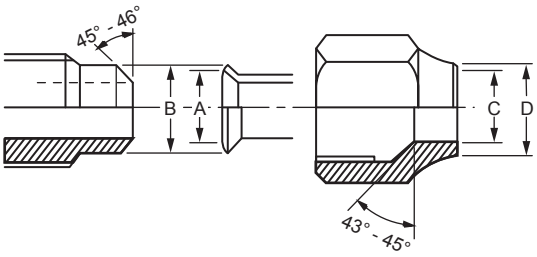
Table 2-2-3 Flare processing related dimension for R410A

Nominal diameter	Outer diameter (mm)	Wall thickness (mm)	A (mm)		
			Flare tool for R410A clutch type	Conventional flare tool	
				Clutch type	Butterfly-nut type
3/8	9.52	0.8	0 to 0.5	1.0 to 1.5	2.0 to 2.5
5/8	15.9	1.0	0 to 0.5	1.0 to 1.5	2.0 to 2.5

Table 2-2-4 Dimension of flare for R410A and flare nut

Nominal diameter	Outer diameter (mm)	Wall thickness (mm)	Dimension (mm)				Flare nut width (mm)
			A	B	C	D	
3/8	9.52	0.8	13.0	13.2	9.7	20	18
5/8	15.9	1.0	19.1	19.7	15.9	24.5	26

Figure 2-2-2 Relationship between flare nut and flare surface



Flare connecting procedure and precautions

1) Make sure that the flare and connecting portions do not have any flaw and dust.
2) Correctly align the flared surface and the connecting axis.
3) Tighten the flare with designated torque by means of a torque wrench. The tightening torque for R410A is the same as that for the conventional R22. If the torque is weak, gas leakage may occur. If it is too strong, the flare nut may crack and may be made non-removable. When choosing the tightening toque, comply with values designated by products. Table 2-2-5 shows reference values.

NOTE

When applying oil to the flare surface, be sure to use oil designated by the product. Using any other oil deteriorates the lubricating oil, possibly causing the compressor to burn out.

Table 2-2-5 Tightening torque of flare for R410A (Reference values)

Nominal diameter	Outer diameter (mm)	Tightening torque N•m (kgf•m)
3/8	9.52	33 to 42 (3.3 to 14.2)
5/8	15.9	66 to 82 (6.8 to 8.2)

2-3. Tools

2-3-1. Necessary tools

In Air to Water Heat Pump using R410A, the service port diameter of packed valve of the outdoor unit is changed to prevent mixing of other refrigerant. To reinforce the pressure resistance, flare dimensions and opposite side dimensions of flare nut (For Ø 12.7 copper pipe) of the refrigerant piping are lengthened.

Because the refrigerating machine oil is changed, mixing of oil may generate sludge, clog capillary, or cause other problems. Accordingly, the tools to be used include:

- tools dedicated for R410A (Those that cannot be used for the conventional refrigerant, R22)
- tools dedicated for R410A, but can be also used for the conventional refrigerant, R22
- tools that can be used for the conventional refrigerant, R22.
  The following table shows the tools dedicated for R410A and their interchangeability.

Tools dedicated for R410A (The following tools must be for R410A)

Tools whose specifications are changed for R410A and their interchangeability

No.	Tool to be used	Usage	R410A Air to Water Hear Pump installation		Conventional refrigerant Air to Water Heat Pump installation
			For R410A Existence of new equipment	Conventional equipment can be used	New equipment can be used with conventional refrigerant
1	Flare tool	Pipe flaring	Yes	*(Note 1)	Yes
2	Copper pipe gauge for adjusting projection margin	Flaring by conventional flare tool	Yes	*(Note 1)	*(Note 1)
3	Torque wrench (For Ø15.9)	Connection of flare nut	Yes	No	No
4	Gauge manifold	Evacuating, refrigerant charge, run check, etc.	Yes	No	No
5	Charge hose				
6	Vacuum pump adapter	Vacuum evacuating	Yes	No	Yes
7	Electrical balance for refrigerant charging	Refrigerant charge	Yes	No	Yes
8	Refrigerant cylinder	Refrigerant charge	Yes	No	No
9	Leakage detector	Gas leakage check	Yes	No	Yes
10	Charging cylinder	Refrigerant charge	*(Note 2)	No	No

* **(Note 1)** Flaring for R410A by using the conventional flare tool requires projection margin adjustment. This adjustment requires copper pipe gauge or other instrument.

* **(Note 2)** A charging cylinder for R410A is currently under development.

General tools (Conventional tools are available)

In addition to the above dedicated tools, the following equipment also available for R22 is necessary as the general tools.

1. Vacuum pump
   Use this by attaching vacuum pump adapter.
2. Torque wrench (For Ø6.35)
3. Pipe cutter
4. Reamer
5. Pipe bender
6. Level vial
7. Screwdriver (+, –)
8. Spanner or Monkey wrench
9. Hole core drill (Ø65)
10. Hexagon wrench
    (Opposite side 4 mm)
11. Tape measure
12. Metal saw

Also prepare the following equipment for other work methods or run check.

1. Clamp meter
2. Thermometer
3. Insulation resistance meter
4. Electroscope

2-4. Recharging of refrigerant

Recharge, if necessary, the specified amount of new refrigerant according to the following procedure.

Recover the refrigerant, and check that no refrigerant remains in the refrigerant cycle.

↓

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

↓

Connect the charge hose to the vacuum pump adapter.

↓

Open fully both packed valves on the liquid and gas sides.

↓

Open fully the handle of gauge manifold Lo, turn on the vacuum pump, and then perform vacuum evacuating.

↓

When the compound gauge's pointer indicates -0.1 MPa (-76 cmHg), close fully the handle Lo and turn off the vacuum pump.

↓

Let the equipment stay as it is for one to two minutes and check that the compound gauge pointer does not return.

↓

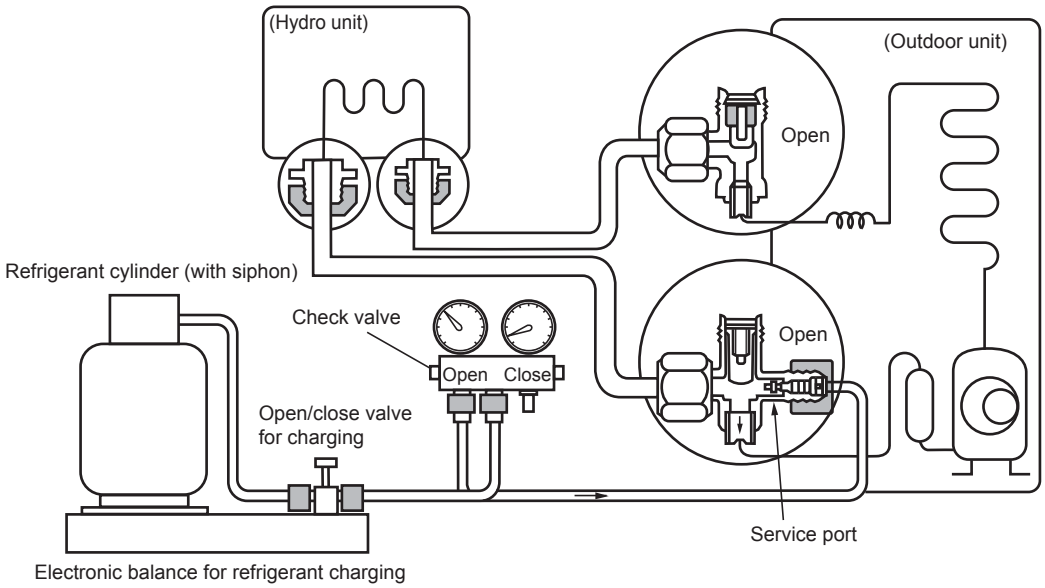
Place the refrigerant cylinder to the electronic balance, connect the connecting hose to the cylinder and the connecting port of the electronic balance, and then charge liquid refrigerant.

(For refrigerant charging, see the figure below)

NOTE

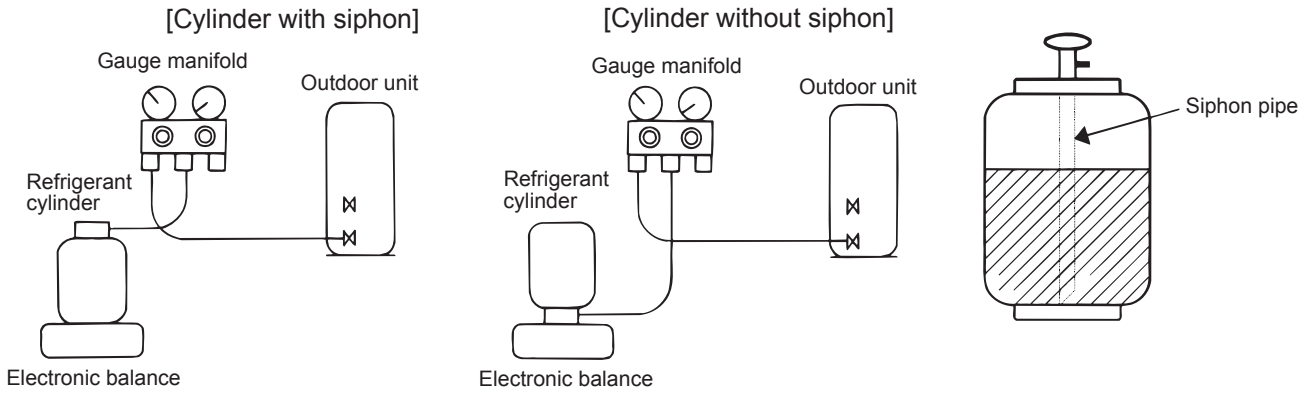
- Never charge refrigerant exceeding the specified amount.
- If the specified amount of refrigerant cannot be charged, charge it a little at a time while running refrigerant recovery (pump down).
- Do not make additional charging.
  An additional charge when refrigerant leaks changes the refrigerant composition in the refrigerant cycle, causing the characteristics change of the Air to Water Heat Pump or excessive high pressure in the refrigerant cycle with more than the specified amount of refrigerant charged. This may cause burst or an injury.

Fig. 2-4-1 Configuration of refrigerant charging



NOTE

- Make sure that the setting is appropriate so that liquid can be charged.
- A cylinder with siphon enables liquid to be charged without the cylinder turned upside down.



NOTE

- Because R410A is HFC mixed refrigerant, charging with gas changes the charged refrigerant composition, causing the equipment characteristics to change.

2-5. Brazing of pipes

2-5-1. Materials of brazing

Silver brazing metal

Silver brazing metal is an alloy mainly composed of silver and copper.
It uses iron, copper, or copper alloy, and is relatively expensive though it excels in soldering.

Phosphor bronze brazing metal

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

Low temperature brazing metal

Low temperature brazing metal is generally called solder, and is an alloy of tin and lead. Do not use it for refrigerant piping because its adhesive capacity is low.

NOTE

- Phosphor bronze brazing metal tends to react with sulfur, producing a fragile compound water solution. This may cause gas leakage. Therefore, use other type of brazing metal at a hot spring resort or similar place, and coat the surface with coatings.
- To braze the pipe again while performing service work, use the same type of brazing metal.

2-5-2. Flux

Why flux is necessary

- Removing all the oxide film and any foreign matter on the metal surface assists the flow of brazing metal.
- Flux prevents the metal surface from being oxidized in the course of brazing.
- Reducing the brazing metal's surface tension enables the brazing metal to adhere for better metal processing.

Characteristics of flux

- The activation temperature of flux matches the brazing temperature.
- A wide effective temperature range makes flux hard to carbonize.
- It is easy to remove slag after brazing.
- The corrosive action to the treated metal and brazing metal is minimum.
- The good performance of flux gives no harm to a human body.
  Since flux works in a complicated manner as described above, select an appropriate type of flux according to metal treatment type, brazing metal and brazing method, or other conditions.

Type of flux

- Non-corrosive flux
  It is generally a compound of borax and boric acid. It is effective when brazing temperature is higher than 800 °C.
- Active solvent
  Most of this type of flux is generally used for silver brazing.
  It features the increase of oxide film while moving the capability to the borax-boric acid compound to add compounds such as potassium fluoride, potassium chloride, or sodium fluoride.

Piping materials for brazing and brazing metal / flux

Piping material	Brazing metal to be used	Flux to be used
Copper - Copper	Phosphor copper	Do not use
Copper - Iron	Silver	Paste flux
Iron - Iron	Silver	Vapour flux

NOTE

- Do not enter flux into the refrigerant cycle.
- If chlorine contained in the flux remains within the pipe, the lubricating oil deteriorates. Because of this, use a flux that does not contain chlorine.
- When adding water to the flux, use water that does not contains chlorine. (e.g. distilled water or ion-exchange water)
- Remove the flux after brazing.

2-5-3. Brazing

Brazing must be performed by a person qualified and experienced with theoretical knowledge since the operation requires sophisticated techniques.
Perform brazing while flowing dry nitrogen gas (N2) to prevent oxide film from forming during brazing application to the inside of the pipe.

NOTE

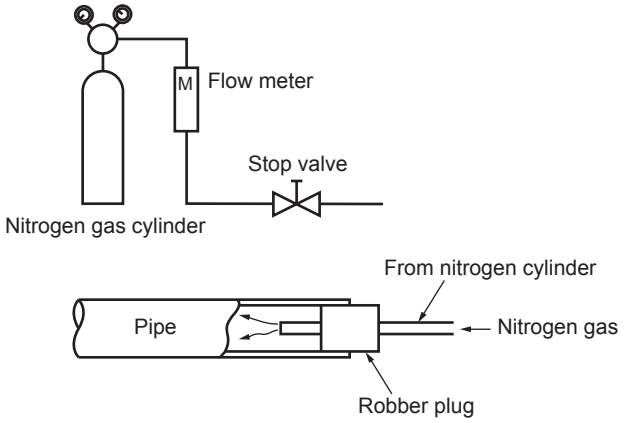
- Never use gas other than nitrogen gas.

Brazing method to prevent oxidation

1) Attach a reducing valve and a flow meter to the nitrogen cylinder.
2) Use a copper pipe to direct the piping material, and attach the flow meter to the balance.
3) Apply a mark to the clearance between the piping material and the copper pipe filled with nitrogen to prevent the back flow of the nitrogen gas.
4) If the nitrogen gas flows out, be sure to keep open the piping end.

5) Use the reducing valve to adjust the nitrogen gas flow speed to 0.05 m^3/hour or 0.02 MPa (0.2 kgf/cm^2).
6) After the steps above, keep the nitrogen gas flowing until the pipe cools down to a certain extent. (Temperature where the pipe is cool enough to be touched by hands)
7) Remove the flux completely after brazing.

Fig 2-5-1
Prevention of oxidation during brazing



3 Specifications

Unit name	Hydro unit		HWS-805XWHM3-E, 805XWHT6-E, 805XWHT9-E	
	Outdoor unit		HWS-805H-E	
Heating capacity *1 (kW)			8.0	
Cooling capacity *2 (kW)			6.0	
Variable range of compressor frequency			10 - 70 Hz	
Power source			Single phase 50 Hz 220-230 V	
Operation mode			Heating	Cooling
Electric characteristic *1 *2	Hydro unit	Current (A)	0.44	0.44
		Power (kW)	0.06	0.06
		Power factor (%)	59.3	59.3
	Outdoor unit	Current (A)	79.7	8.50
		Power (kW)	1.73	1.88
		Power factor (%)	94.4	96.2
	Total	Running current (A)	8.41	8.94
Operating noise sound power level	Hydro unit (dB (A))		41	
	Outdoor unit (dB (A))		66	
Coefficient of performance *1 *2			4.46	3.10
Hydro unit	Outer dimension	Height (mm)	925	
		Width (mm)	525	
		Depth (mm)	355	
	Net weight (kg)		49	
	Color		Silky shade (Munsell 1Y8.5/0.5)	
	Remote controller Outer dimension *3	Height (mm)	120	
		Width (mm)	120	
		Depth (mm)	16	
	Circulation pump	Motor output (W)	125 (MAX)	
		Flow rate (L/min)	22.9	17.2
		Type	Non-self-suction centrifugal pump	
	Heat exchanger		Plate-type heat exchange	
Outdoor unit	Outer dimension	Height (mm)	890	
		Width (mm)	900	
		Depth (mm)	320	
	Net weight (kg)		63	
	Color		Silky shade (Munsell 1Y8.5/0.5)	
	Compressor	Motor output (W)	1400	
		Type	Twin rotary type with DC-inverter variable speed control	
		Model	DA220A2F-22L	
	Fan motor	Standard air capacity (m^3/min)	50.0	
		Motor output (W)	60	
Refrigerant piping	Connection method		Flare connection	
	Hydro unit	Liquid	Ø9.52	
		Gas	Ø15.9	
	Outdoor unit	Liquid	Ø9.52	
		Gas	Ø15.9	
	Maximum length (m)		30	
	Maximum chargeless length (m)		30	
	Maximum height difference (m)		±30	
	Minimum length (m)		5	
Refrigerant	Refrigerant name		R410A	
	Charge amount (kg)		1.8	
Water piping	Pipe diameter		R1 1/4	
	Maximum length (m)		None (Need the flow rate 13ℓ/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 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 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.

Unit name	Hydro unit		HWS-1405XWHM3-E, 1405XWHT6-E, 1405XWHT9-E			
	Outdoor unit		HWS-1105H-E		HWS-1405H-E	
Heating capacity *1 (kW)			11.2		14.0	
Cooling capacity *2 (kW)			10.0		11.0	
Variable range of compressor frequency			10 - 60 Hz		10 - 70 Hz	
Power source			Single phase 50 Hz 220-230 V			
Operation mode			Heating	Cooling	Heating	Cooling
Electric characteristic *1 *2	Hydro unit	Current (A)	0.66	0.66	0.66	0.66
		Power (kW)	0.09	0.09	0.09	0.09
		Power factor (%)	59.2	59.2	59.2	59.2
	Outdoor unit	Current (A)	10.08	14.71	13.74	17.19
		Power (kW)	2.21	3.17	3.02	3.72
		Power factor (%)	95.3	93.7	95.6	94.1
	Total	Running current (A)	10.74	15.37	14.40	17.85
Operating noise sound power level	Hydro unit (dB (A))		43			
	Outdoor unit (dB (A))		66		68	
Coefficient of performance *1 *2			4.88	3.07	4.50	2.89
Hydro unit	Outer dimension	Height (mm)	925			
		Width (mm)	525			
		Depth (mm)	355			
	Net weight (kg)		52			
	Color		Silky shade (Munsell 1Y8.5/0.5)			
	Remote controller Outer dimension *3	Height (mm)	120			
		Width (mm)	120			
		Depth (mm)	16			
	Circulation pump	Motor output (W)	190 (MAX)			
		Flow rate (L/min)	32.1	28.9	40.1	31.5
		Type	Non-self-suction centrifugal pump			
	Heat exchanger		Plate-type heat exchange			
Outdoor unit	Outer dimension	Height (mm)	1340			
		Width (mm)	900			
		Depth (mm)	320			
	Net weight (kg)		92			
	Color		Silky shade (Munsell 1Y8.5/0.5)			
	Compressor	Motor output (W)	2500			
		Type	Twin rotary type with DC-inverter variable speed control			
		Model	DA422A3F-26M			
	Fan motor	Standard air capacity (m^3/min)	103.0			
		Motor output (W)	100 × 2			
Refrigerant piping	Connection method		Flare connection			
	Hydro unit	Liquid	Ø9.52			
		Gas	Ø15.9			
	Outdoor unit	Liquid	Ø9.52			
		Gas	Ø15.9			
	Maximum length (m)		30			
	Maximum chargeless length (m)		30			
	Maximum height difference (m)		±30			
	Minimum length (m)		5			
Refrigerant	Refrigerant name		R410A			
	Charge amount (kg)		2.7			
Water piping	Pipe diameter		R1 1/4			
	Maximum length (m)		None (Need the flow rate 17.5ℓ/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 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 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.

Unit name	Hydro unit		HWS-1405XWHM3-E, 1405XWHT6-E, 1405XWHT9-E					
	Outdoor unit		HWS-1105H8(R)-E		HWS-1405H8(R)-E		HWS-1605H8(R)-E	
Heating capacity *1 (kW)			11.2		14.0		16.0	
Cooling capacity *2 (kW)			10.0		11.0		13.0	
Variable range of compressor frequency			10 - 60 Hz		10 - 66 Hz		10 - 70 Hz	
Power source			3 phase 50 Hz 380-400 V					
Operation mode			Heating	Cooling	Heating	Cooling	Heating	Cooling
Electric characteristic *1 *2	Hydro unit	Current (A)	0.66	0.66	0.66	0.66	0.66	0.66
		Power (kW)	0.09	0.09	0.09	0.09	0.09	0.09
		Power factor (%)	59.2	59.2	59.2	59.2	59.2	59.2
	Outdoor unit	Current (A)	3.73	5.08	5.01	5.71	5.94	7.51
		Power (kW)	2.25	3.17	3.07	3.72	3.63	4.71
		Power factor (%)	87.4	90.4	88.5	94.4	88.6	90.9
	Total	Running current (A)	4.39	5.74	5.67	6.37	6.60	7.60
Operating noise sound power level	Hydro unit (dB (A))		43	43	43	43	43	43
	Outdoor unit (dB (A))		66	66	68	68	69	69
Coefficient of performance *1 *2			4.80	3.07	4.44	2.89	4.30	2.71
Hydro unit	Outer dimension	Height (mm)	925					
		Width (mm)	525					
		Depth (mm)	355					
	Net weight (kg)		52					
	Color		Silky shade (Munsell 1Y8.5/0.5)					
	Remote controller Outer dimension *3	Height (mm)	120					
		Width (mm)	120					
		Depth (mm)	16					
	Circulation pump	Motor output (W)	190 (MAX)					
		Flow rate (L/min)	32.1	28.9	40.1	31.5	45.8	37.3
		Type	Non-self-suction centrifugal pump					
	Heat exchanger		Plate-type heat exchange					
Outdoor unit	Outer dimension	Height (mm)	1340					
		Width (mm)	900					
		Depth (mm)	320					
	Net weight (kg)		93					
	Color		Silky shade (Munsell 1Y8.5/0.5)					
	Compressor	Motor output (W)	2500					
		Type	Twin rotary type with DC-inverter variable speed control					
		Model	DA422A3F-27M					
	Fan motor	Standard air capacity (m^3/min)	103.0					
		Motor output (W)	100 × 2					
Refrigerant piping	Connection method		Flare connection					
	Hydro unit	Liquid	Ø9.52					
		Gas	Ø15.9					
	Outdoor unit	Liquid	Ø9.52					
		Gas	Ø15.9					
	Maximum length (m)		30					
	Maximum chargeless length (m)		30					
	Maximum height difference (m)		±30					
	Minimum length (m)		5					
Refrigerant	Refrigerant name		R410A					
	Charge amount (kg)		2.7					
Water piping	Pipe diameter		R1 1/4					
	Maximum length (m)		None (Need the flow rate 17.5ℓ/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		5 wires: including earth wire (Outdoor unit)					
	Connecting line		4 wires: including earth wire					

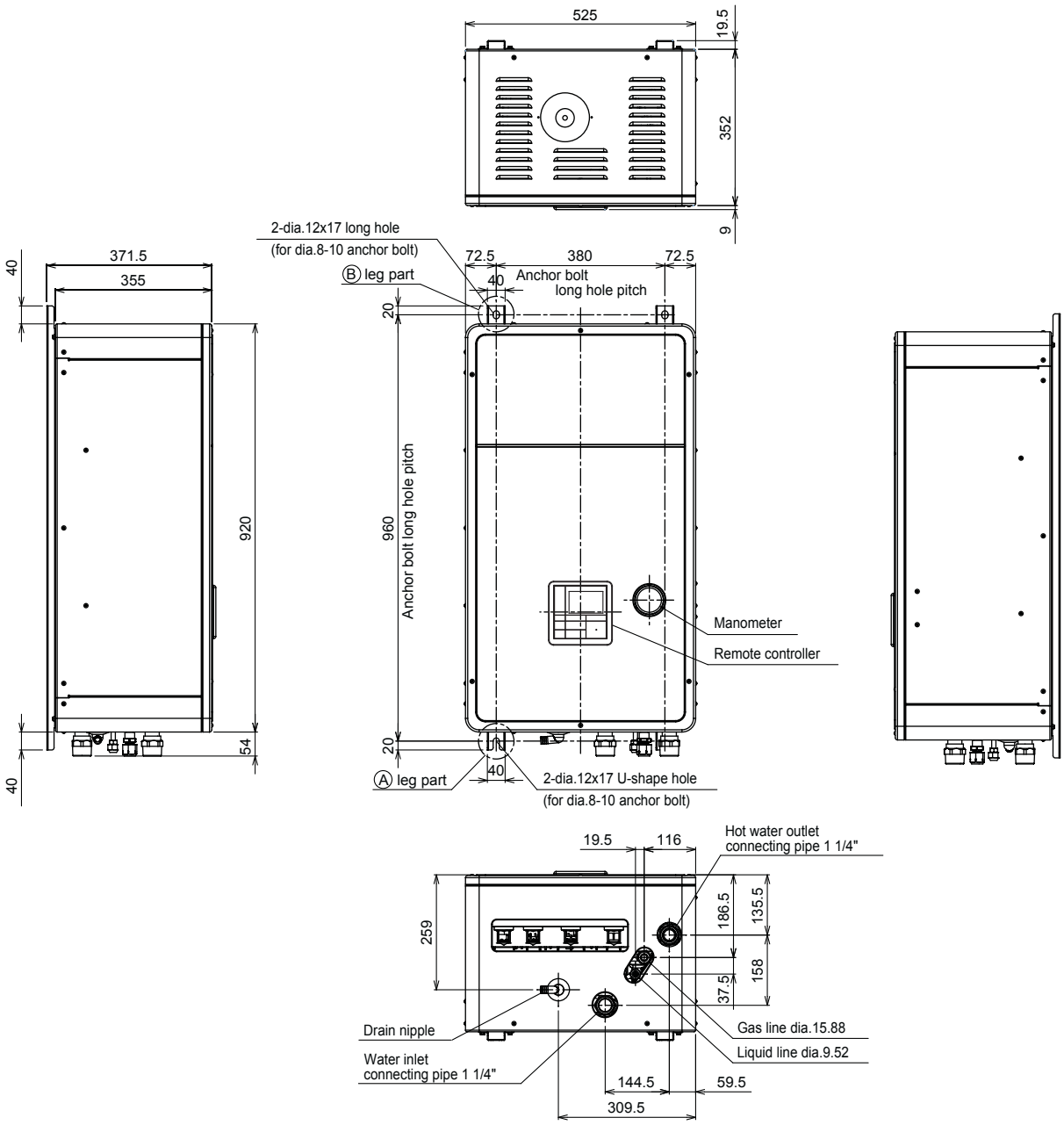
*1 Heating performance measurement conditions: outside air temperature 7 °C, water supply temperature 30 °C, outlet temperature 35 °C, refrigerant piping length 7.5 m (no height difference).
*2 Cooling performance measurement conditions: outside air temperature 35 °C, water supply temperature 12 °C, outlet 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.

4 Outside drawing

4-1. Hydro unit

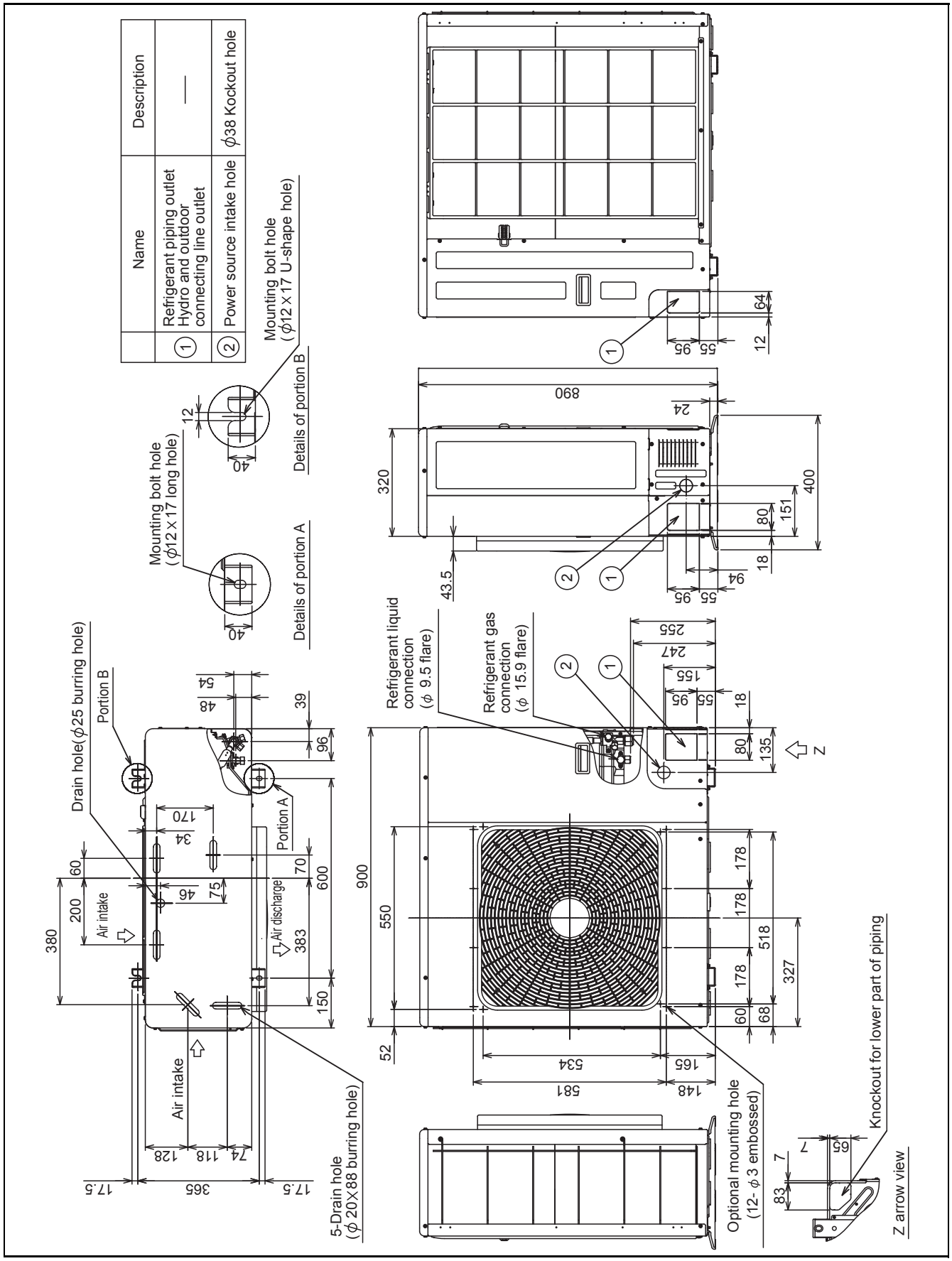
HWS-805XWHM3-E, 805XWHT6-E, 805XWHT9-E

HWS-1405XWHM3-E, 1405XWHT6-E, 1405XWHT9-E

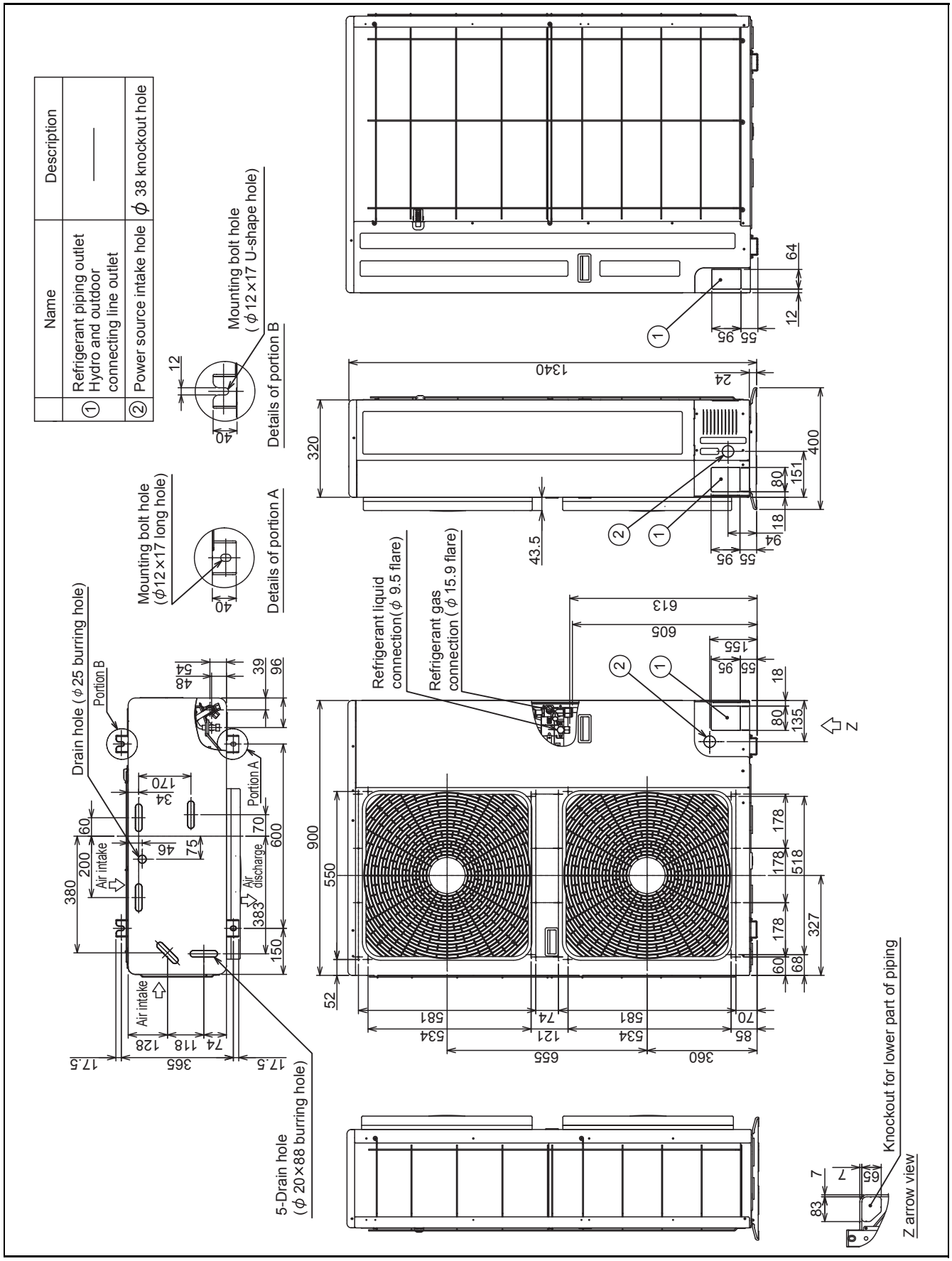


4-2. Outdoor unit

HWS-805H-E

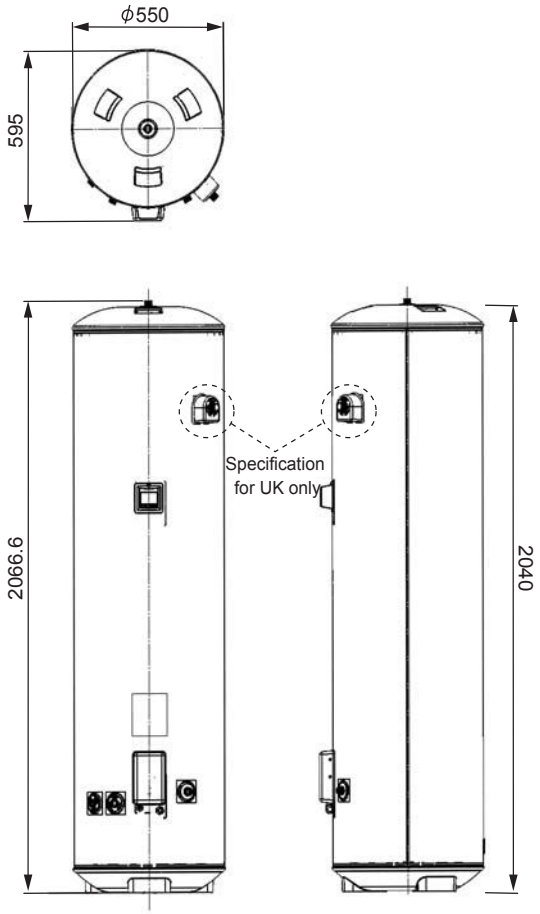


HWS-1105H-E, 1405H-E, 1105H8(R)-E, 1405H8(R)-E, 1605H8(R)-E

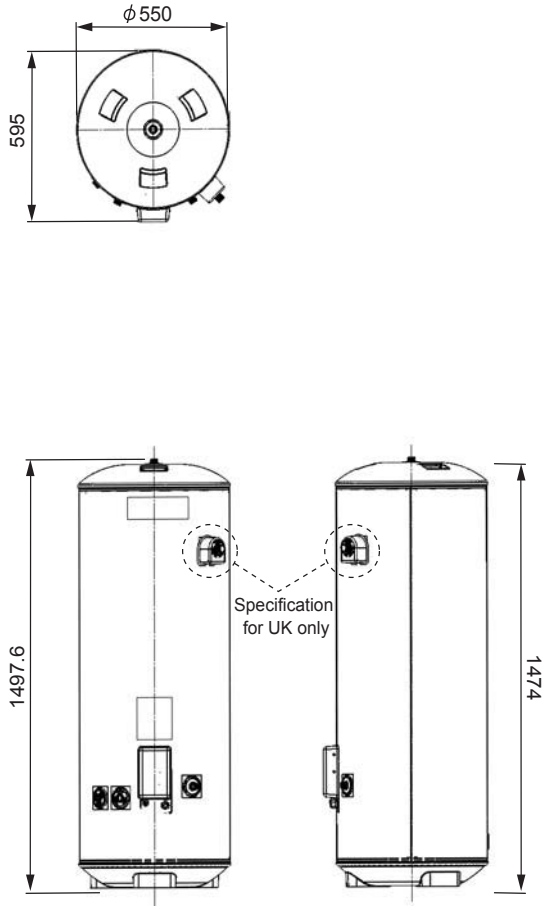


4-3. Hot water cylinder

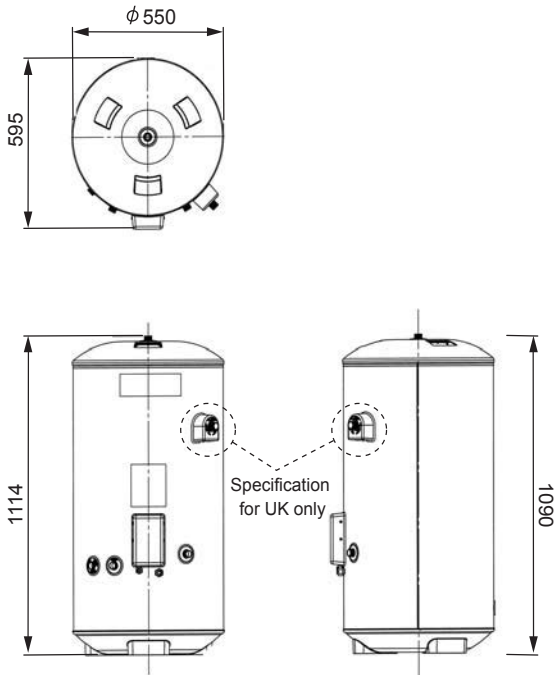
HWS-3001CSHM3-E(-UK)



HWS-2101CSHM3-E(-UK)

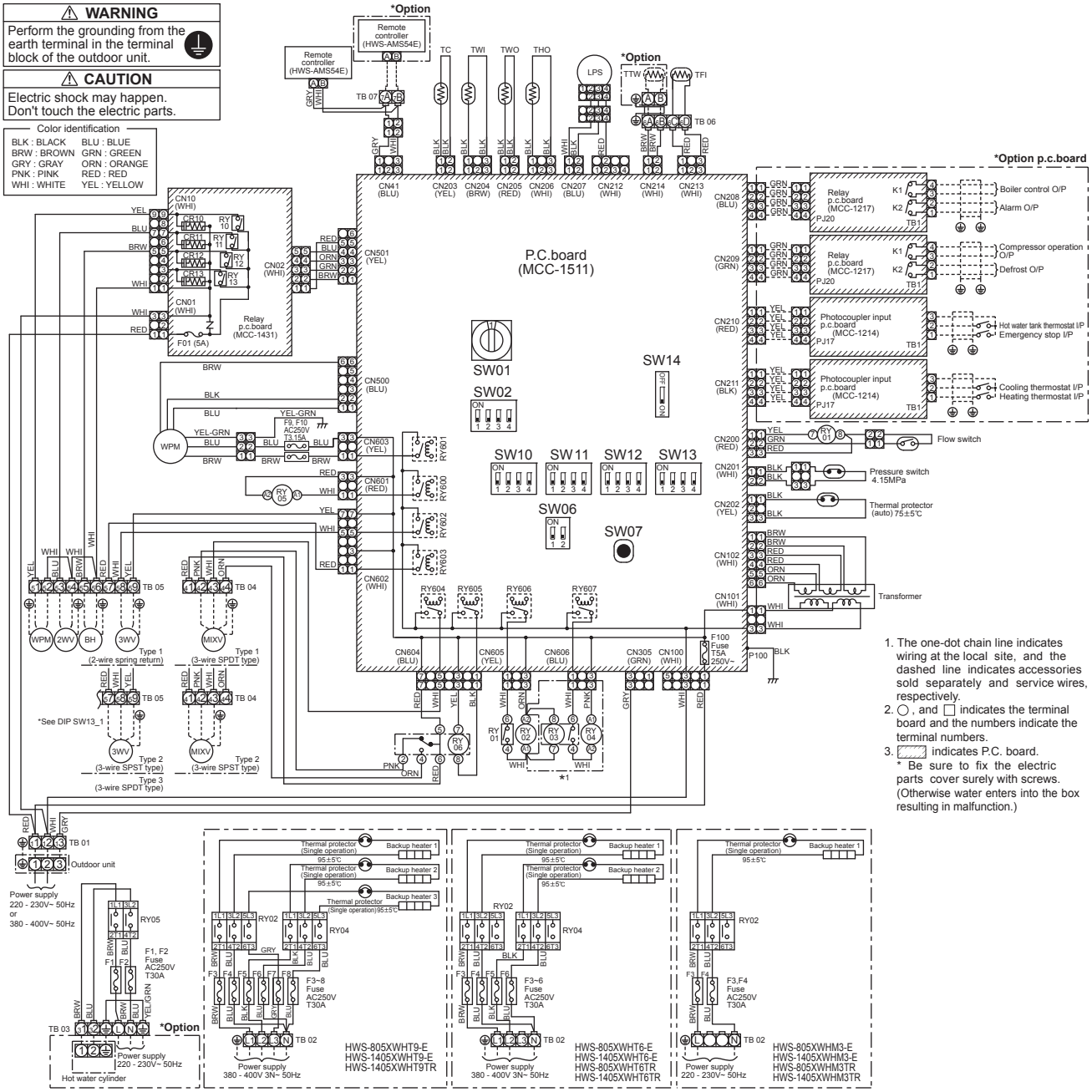


HWS-1501CSHM3-E(-UK)



5 Wiring diagram

5-1. Hydro unit



1. The one-dot chain line indicates wiring at the local site, and the dashed line indicates accessories sold separately and service wires, respectively.
2. ○, and □ indicates the terminal board and the numbers indicate the terminal numbers.
3. ▨ indicates P.C. board.
   * Be sure to fix the electric parts cover surely with screws. (Otherwise water enters into the box resulting in malfunction.)

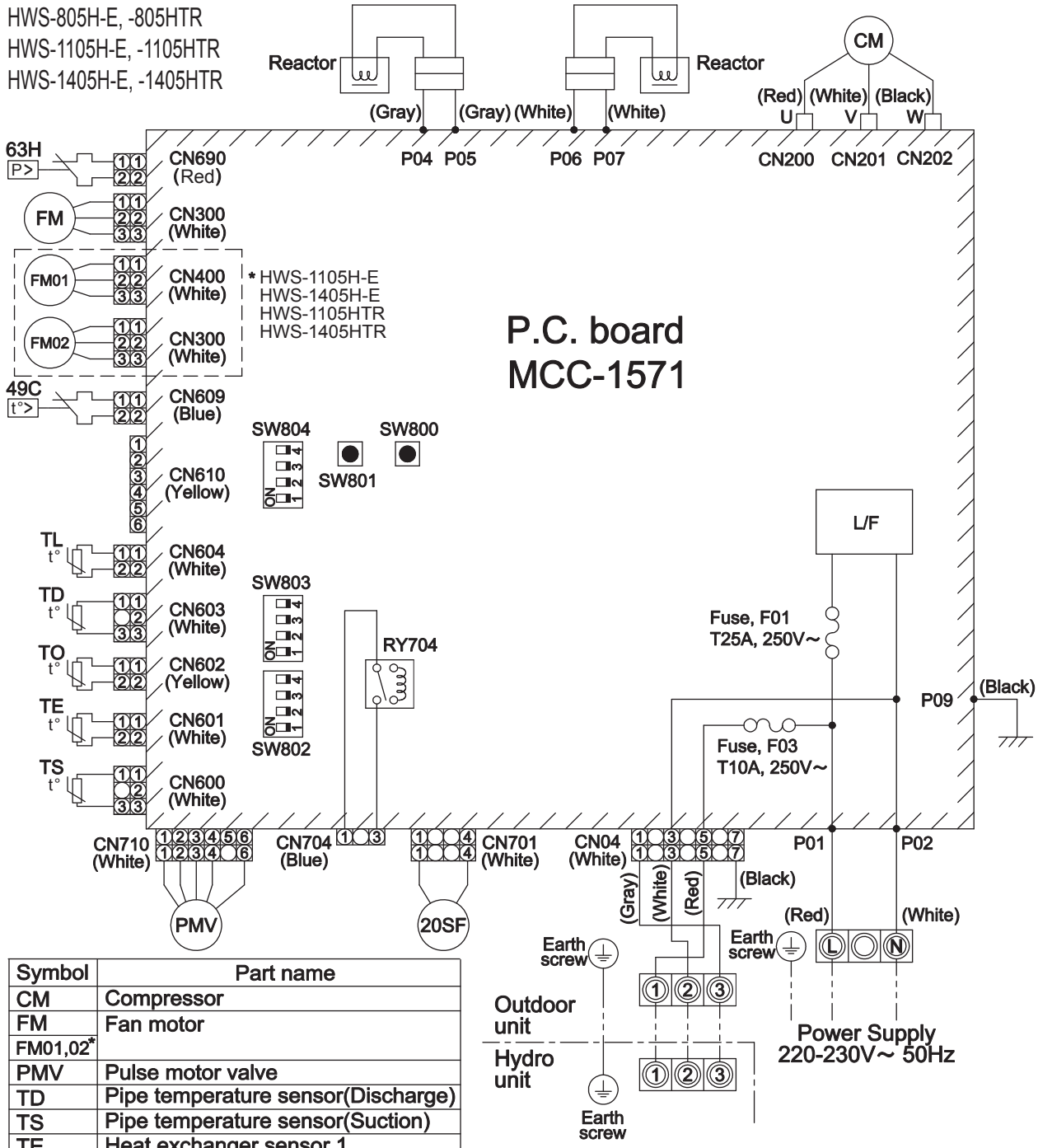
Symbol	Parts name	Symbol	Parts name
WPM	Water pump motor	TC	Water heat exchanger temperature sensor
3WV	3-way valve (local)	TWI	Water heat exchanger inlet temperature sensor
2WV	2-way valve (local)	TWO	Water heat exchanger outlet temperature sensor
MIXV	Mixing valve (local)	THO	Backup heater outlet temperature sensor
BH	Booster heater	TTW	Hot water cylinder temperature sensor
RY01~RY06	Relay01~Relay06	TFI	Floor heating inlet temperature sensor
LPS	Low pressure sensor	TB	Terminal block
Backup heater1, 2, 3	Heater AC230V, 3kW		

*1 HWS-805XWHT6-E : Installed
HWS-1405XWHT6-E : Installed
HWS-805XWHT9-E : Installed
HWS-1405XWHT9-E : Installed
HWS-805XWHM3-E : Not installed
HWS-1405XWHM3-E : Not installed

*1 HWS-805XWHT6TR : Installed
HWS-1405XWHT6TR : Installed
HWS-1405XWHT9TR : Installed
HWS-805XWHM3TR : Not installed
HWS-1405XWHM3TR : Not installed

5-2. Outdoor unit (Single phase type)

HWS-805H-E, HWS-1105H-E, HWS-1405H-E



Symbol	Part name
CM	Compressor
FM	Fan motor
FM01,02*	
PMV	Pulse motor valve
TD	Pipe temperature sensor(Discharge)
TS	Pipe temperature sensor(Suction)
TE	Heat exchanger sensor 1
TL	Heat exchanger sensor 2
TO	Outside temperature sensor
20SF	4-way valve coil
49C	Compressor case thermostat
RY	Relay
L/F	Line Filter
63H	High-pressure switch

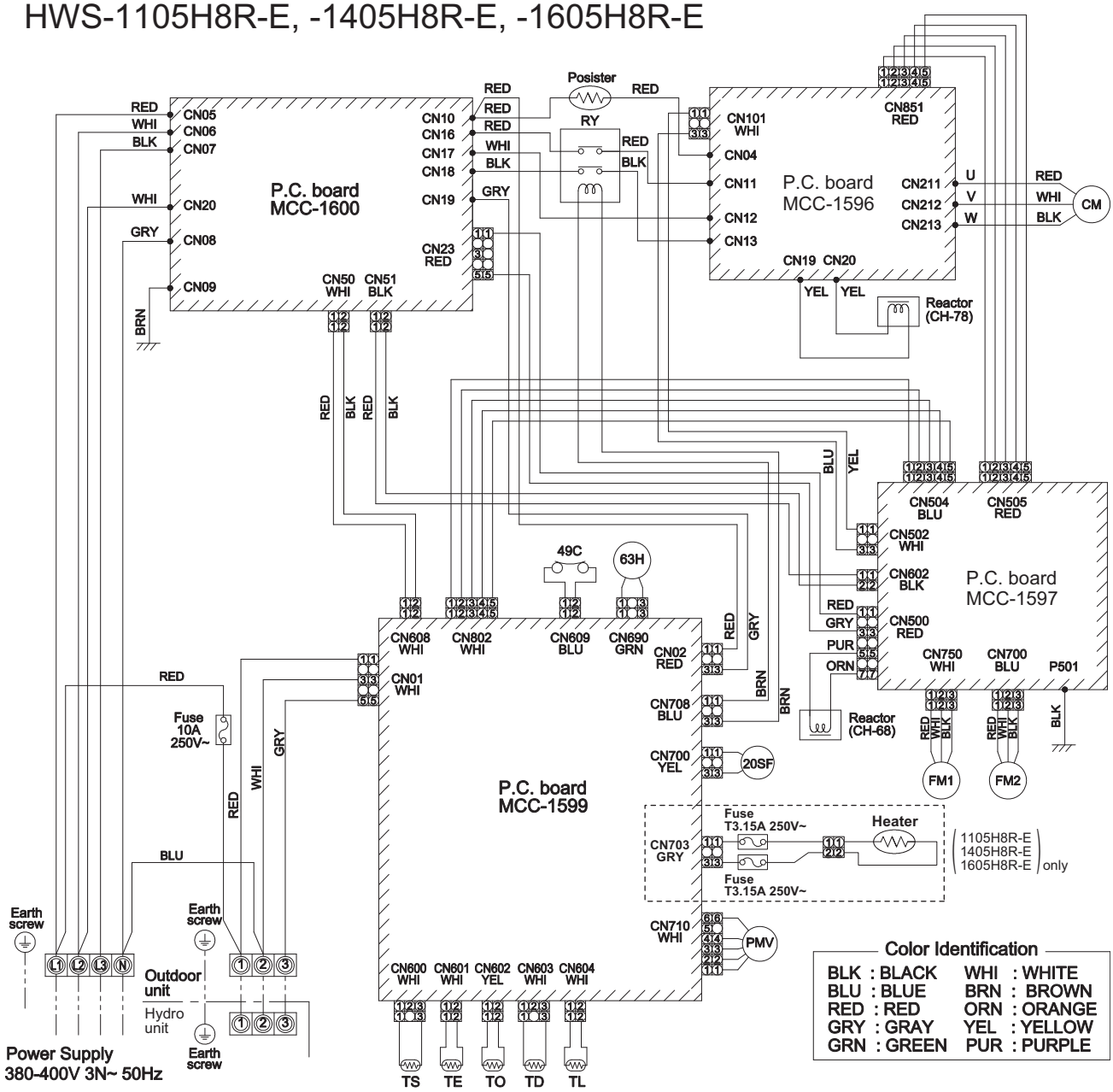
1. ◎ indicates the terminal block. Alphanumeric characters in the cycle indicate the terminal No.
2. The two-dot chain line indicates the wiring procured locally.
3. ▨ indicates the P.C. board.
4. For the hydro unit circuit, refer to the wiring diagram of the hydro unit.

* HWS-1105H-E, HWS-1405H-E
HWS-1105HTR, HWS-1405HTR

5-3. Outdoor unit (3 phase type)

HWS-1105H8(R)-E, HWS-1405H8(R)-E, HWS-1605H8(R)-E

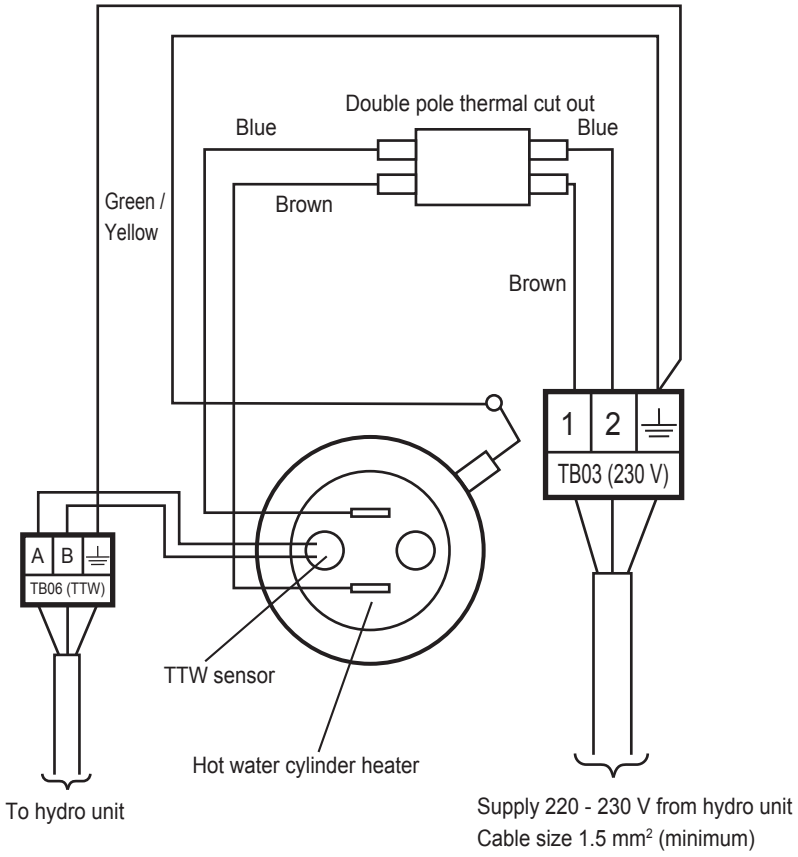
HWS-1105H8R-E, -1405H8R-E, -1605H8R-E



Symbol	Part name
CM	Compressor
FM1,2	Fan motor
PMV	Pulse motor valve
TD	Pipe temperature sensor (Discharge)
TS	Pipe temperature sensor (Suction)
TE	Heat exchanger sensor 1
TL	Heat exchanger sensor 2
TO	Outside temperature sensor
20SF	4-way valve coil
49C	Compressor case thermostat
63H	High-pressure switch
RY	Relay

1. ◎ indicates the terminal block. Alphanumeric characters in the cycle indicate terminal No.
2. The two-dot chain line indicates the wiring procured locally.
3. ▨ indicates the P.C. board.
4. For the hydro unit circuit, refer to the wiring diagram of the hydro unit.

5-4. Hot water cylinder unit



6 Key electric component rating

6-1. Hydro unit

HWS-805XWHM3-E, T6-E, T9-E

No.	Component name	Model name			Type name	Rating
		M3-E	T6-E	T9-E		
1	Circulation pump	O	O	O	UPM 2K 25-60 130	AC230 V 0.40 A (MAX)
2	Backup heater 3 kW	O			SA3-23652B	AC230 V 3 kW
3	Backup heater 6 kW		O		SA3-23652B	AC400 V (3N) 6 kW
4	Backup heater 9 kW			O	SA3-23652B	AC400 V (3N) 9 kW
5	Water heat exchange temperature sensor (TC sensor)	O	O	O	–	10 kΩ (25 °C)
6	Water inlet temperature sensor (TWI sensor)	O	O	O	–	10 kΩ (25 °C)
7	Water outlet temperature sensor (TWO sensor)	O	O	O	–	10 kΩ (25 °C)
8	Heater outlet water temperature sensor (THO sensor)	O	O	O	–	10 kΩ (25 °C)
9	Floor inlet temperature sensor (TFI sensor)	O	O	O	–	10 kΩ (25 °C)
10	Pressure switch	O	O	O	–	Operating pressure 4.15 MPa +0 -0.3 MPa
11	Low pressure sensor	O	O	O	–	Operating pressure 0.20 MPa
12	Bimetal thermostat (auto)	O	O	O	–	Operating temperature 75±3 °C DC12 V / 0.2 A
13	Bimetal thermostat (single operation)	O	O	O	–	Operating temperature 95±5 °C AC250 V / 16 A
14	Flow switch	O	O	O	–	Operating flowing quantity 13 ℓ/min
15	Output board (OP)	OP	OP	OP	TCB-PCIN3E	AC230 V 0.5 A, DC24 V 1 A
16	Input board (OP)	OP	OP	OP	TCB-PCM03E	Contact input
17	Remote controller (Main)	O	O	O	HWS-AMS54E	
18	Remote controller (Sub)	OP	OP	OP	HWS-AMS54E	
19	Water 3-way valve terminal	O	O	O	–	AC230 V 0.1 A 2Wire, 3Wire SPST, SPDT type mountable
20	Water 2-way valve terminal	O	O	O	–	AC230 V 0.1 A 2Wire type mountable
21	Mixing valve terminal	O	O	O	–	AC230 V 0.1 A 3Wire SPST, SPDT type mountable
22	Circulation pump terminal	O	O	O	–	AC230 V 1.0 A
23	Booster heater terminal	O	O	O	–	AC230 V 1.0 A
24	Fuse	O	O	O	–	AC250 V 30 A

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

HWS-1405XWHM3-E, T6-E, T9-E

No.	Component name	Model name			Type name	Rating
		M3-E	T6-E	T9-E		
1	Circulation pump	O	O	O	UPM GEO 25-85 130	AC230 V 0.66 A (MAX)
2	Backup heater 3 kW	O			SA3-23652B	AC230 V 3 kW
3	Backup heater 6 kW		O		SA3-23652B	AC400 V (3N) 6 kW
4	Backup heater 9 kW			O	SA3-23652B	AC400 V (3N) 9 kW
5	Water heat exchange temperature sensor (TC sensor)	O	O	O	–	10 kΩ (25 °C)
6	Water inlet temperature sensor (TWI sensor)	O	O	O	–	10 kΩ (25 °C)
7	Water outlet temperature sensor (TWO sensor)	O	O	O	–	10 kΩ (25 °C)
8	Heater outlet water temperature sensor (THO sensor)	O	O	O	–	10 kΩ (25 °C)
9	Floor inlet temperature sensor (TFI sensor)	O	O	O	–	10 kΩ (25 °C)
10	Pressure switch	O	O	O	–	Operating pressure 4.15 MPa +0 -0.3 MPa
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 switch	O	O	O	–	Operating flowing quantity 18 L/min
15	Output board (OP)	OP	OP	OP	TCB-PCIN3E	AC230 V 0.5 A, DC24 V 1 A
16	Input board (OP)	OP	OP	OP	TCB-PCM03E	Contact input
17	Remote controller (Main)	O	O	O	HWS-AMS54E	
18	Remote controller (Sub)	OP	OP	OP	HWS-AMS54E	
19	Water 3-way valve terminal	O	O	O	–	AC230 V 0.1 A 2Wire, 3Wire SPST, SPDT type mountable
20	Water 2-way valve terminal	O	O	O	–	AC230 V 0.1 A 2Wire type mountable
21	Mixing valve terminal	O	O	O	–	AC230 V 0.1 A 3Wire SPST, SPDT type mountable
22	Circulation pump terminal	O	O	O	–	AC230 V 1.0 A
23	Booster heater terminal	O	O	O	–	AC230 V 1.0 A
24	Fuse	O	O	O	–	AC250 V 30 A

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

6-2. Outdoor unit

HWS-805H-E

No.	Component name	Type name	Rating
1	Compressor	DA220A2F-22L	
2	Outdoor fan motor	ICF-280-A60-1	Output 60 W
3	4-way valve coil	STF-H01AP1874A1	AC220 - 230 V full-wave rectifier input, alive time 10 sec or less
4	Pulse motor valve (PMV) coil	CAM-MD12TF-15	DC12 V
5	Compressor case thermostat	US-622KXTMQO-SS	OFF: 125±4 °C ON: 90±5 °C
6	Reactor	CH-56	5.8 mH, 18.5 A
7	PC board	MCC-1571	Input 1Ø, AC220 - 230 V ± 10%, 50/60 Hz
8	High pressure switch	ACB-4UB83W	OFF = 4.15 +0, -0.3 Mpa

HWS-1105H-E, 1405H-E

No.	Component name	Type name	Rating
1	Compressor	DA422A3F-26M	
2	Outdoor fan motor (x2)	ICF-280-A100-1	Output 100 W
3	Reactor (x2)	CH-44	1.4 mH, 25 A
4	4-way valve coil	STF-H01AP1874A1	AC220 - 230 V full-wave rectifier input, alive time 10 sec or less
5	Pulse motor valve (PMV) coil	UKV-A038	DC12 V
6	Compressor case thermostat	US-622KXTMQO-SS	OFF = 125 ± 4 °C, ON = 90 ± 5 °C
7	PC board	MCC-1571	Input 1Ø, AC220 - 230 V ± 10%, 50/60 Hz
8	High pressure switch	ACB-4UB83W	OFF = 4.15 +0, -0.3 Mpa

HWS-1105H8(R)-E, 1405H8(R)-E, 1605H8(R)-E

No.	Component name	Type name	Rating
1	Compressor	DA422A3F-27M	
2	Outdoor fan motor (x2)	ICF-280-A100-1	Output 100 W
3	Reactor	CH-78	4.2 mH, 16 A
4	Reactor	CH-68	18 mH, 5 A
5	4-way valve coil	STF-H01AJ1736A1	AC220 - 230 V
6	Pulse motor valve (PMV) coil	UKV-A038	DC12 V
7	PC board (Compressor)	MCC-1596	
8	PC board (Fan motor drive)	MCC-1597	
9	PC board (Control)	MCC-1599	
10	PC board (Noise filter)	MCC-1600	
11	High pressure switch	ACB-4UB83W	OFF = 4.15 +0, -0.3 Mpa
12	Compressor case thermostat	US-622	OFF = 125 ± 4 °C, ON = 90 ± 5 °C
13	Relay	EL200/240 A2-F()	Contact = AC480V, 20 A

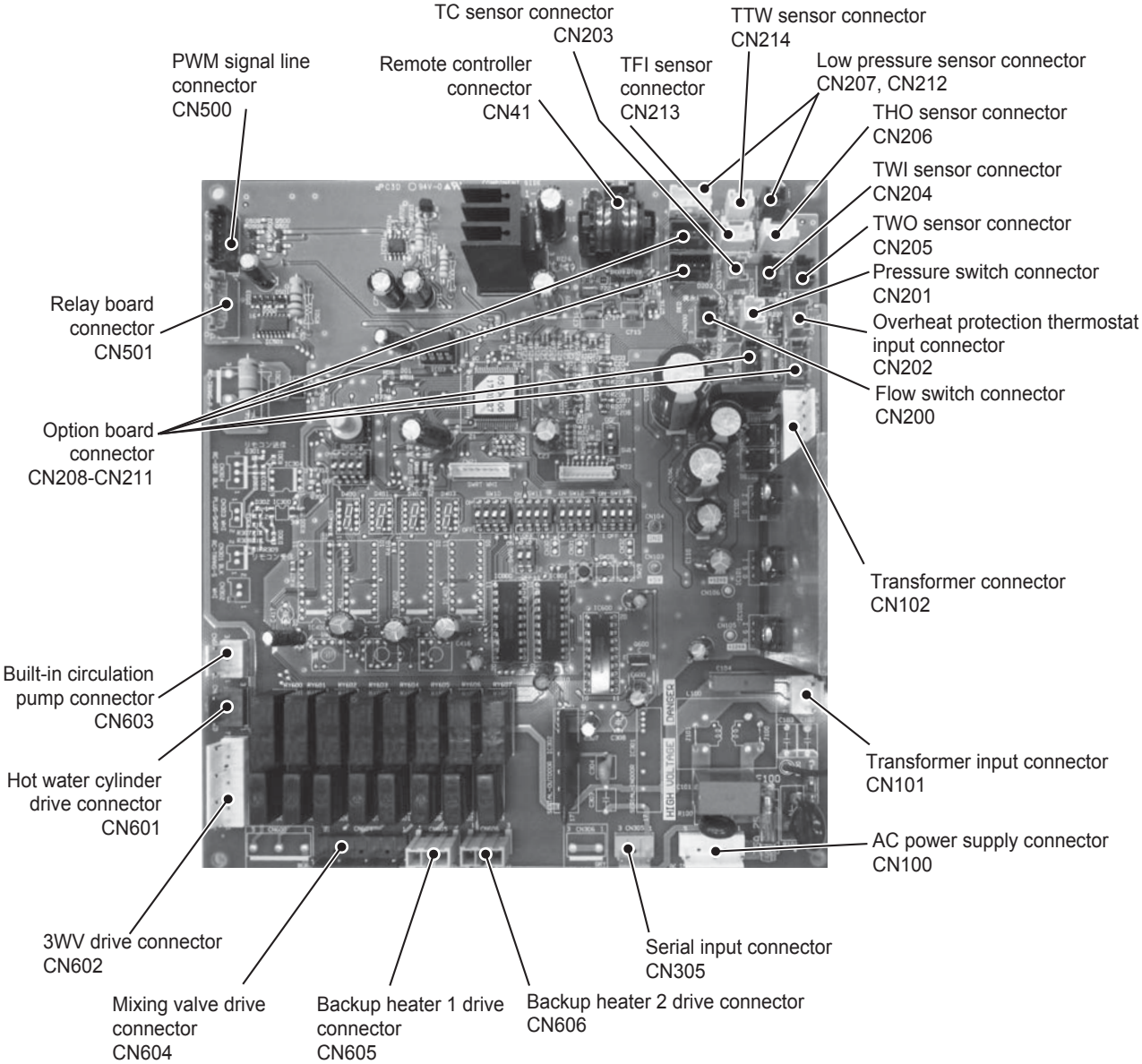
6-3. Hot water cylinder unit

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

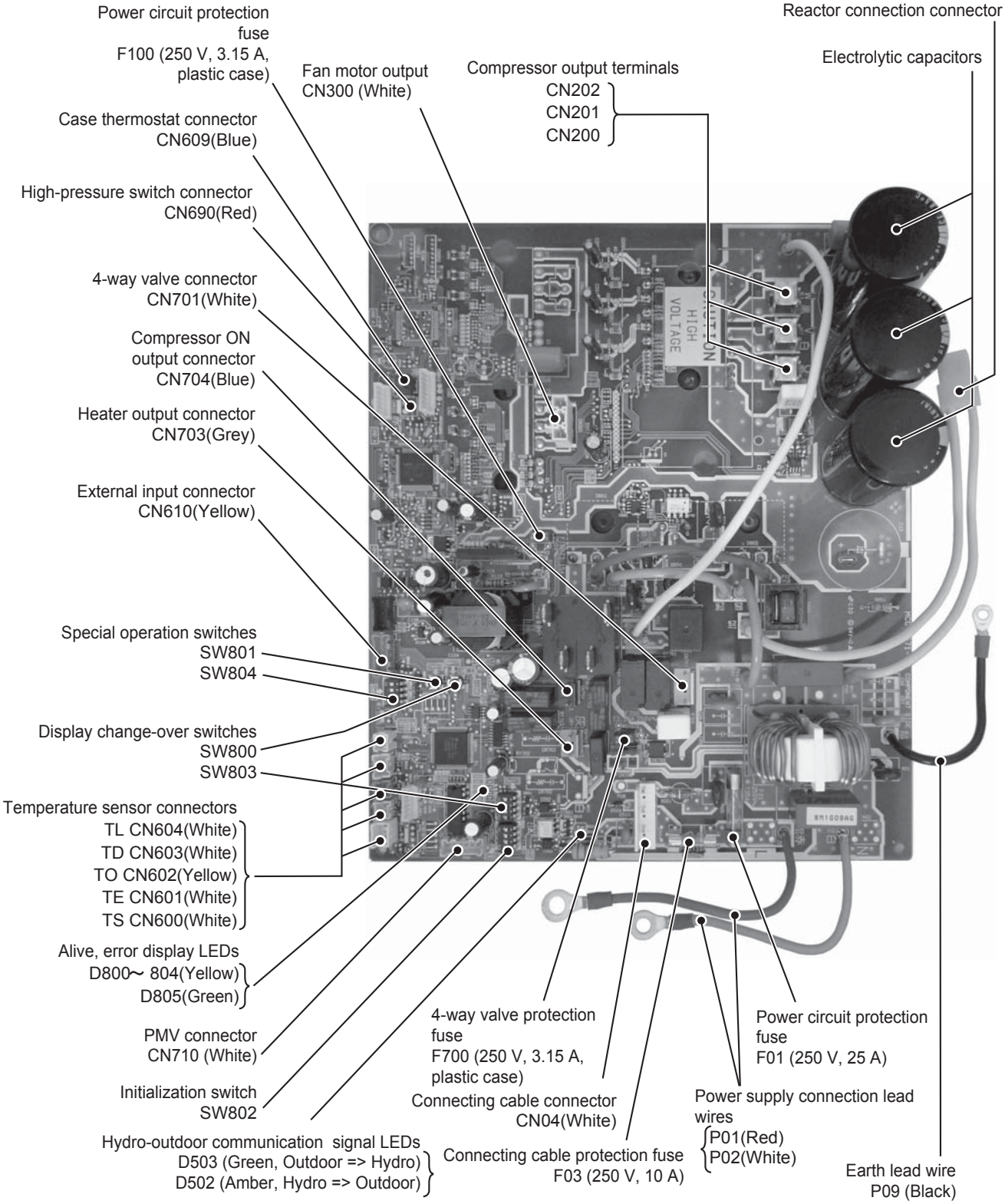
6-4. Water heat exchange control board

HWS-805XWHM3-E, 805XWHT6-E, 805XWHT9-E
HWS-1405XWHM3-E, 1405XWHT6-E, 1405XWHT9-E

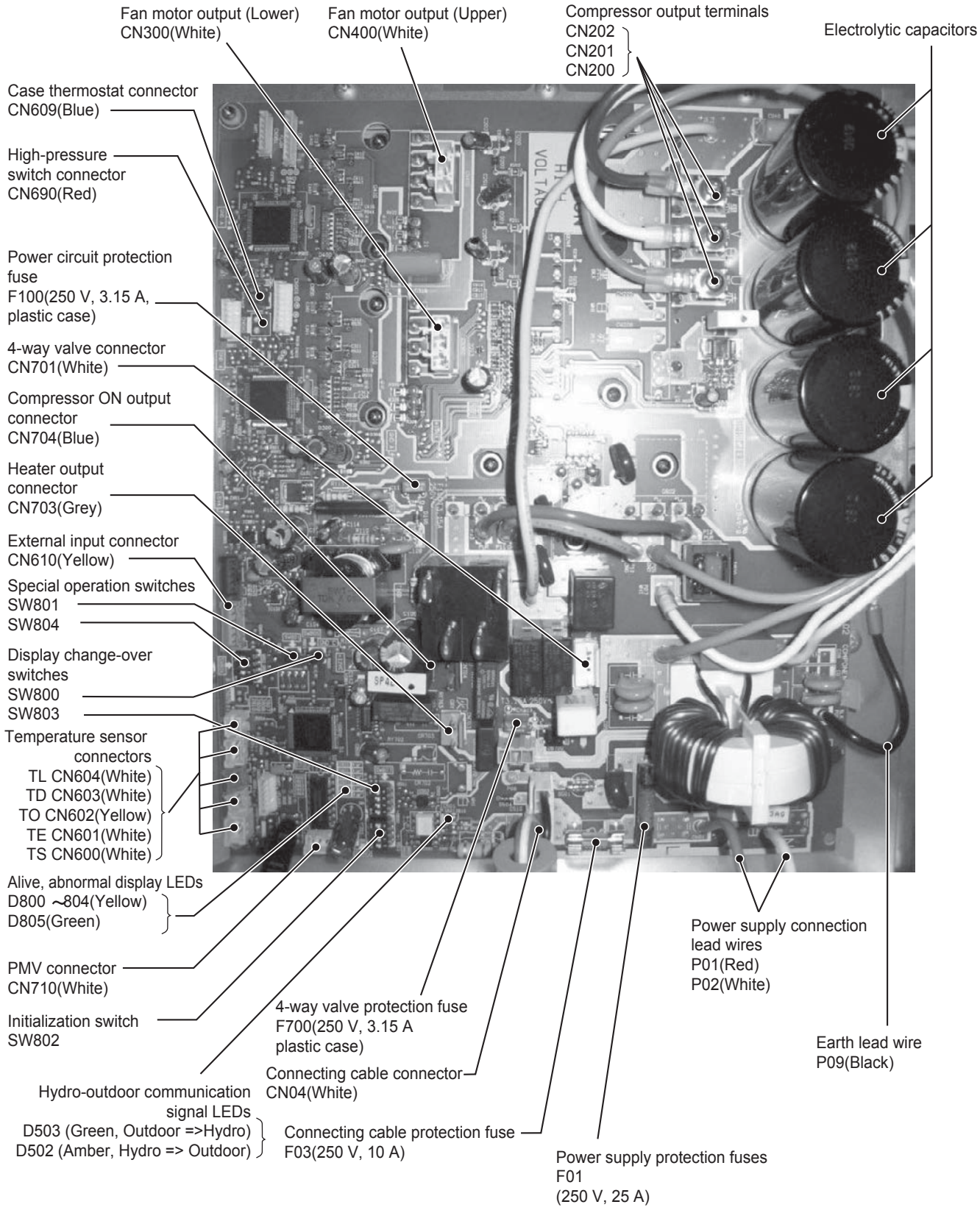


6-5. Outdoor control board (Single phase type)

HWS-805H-E



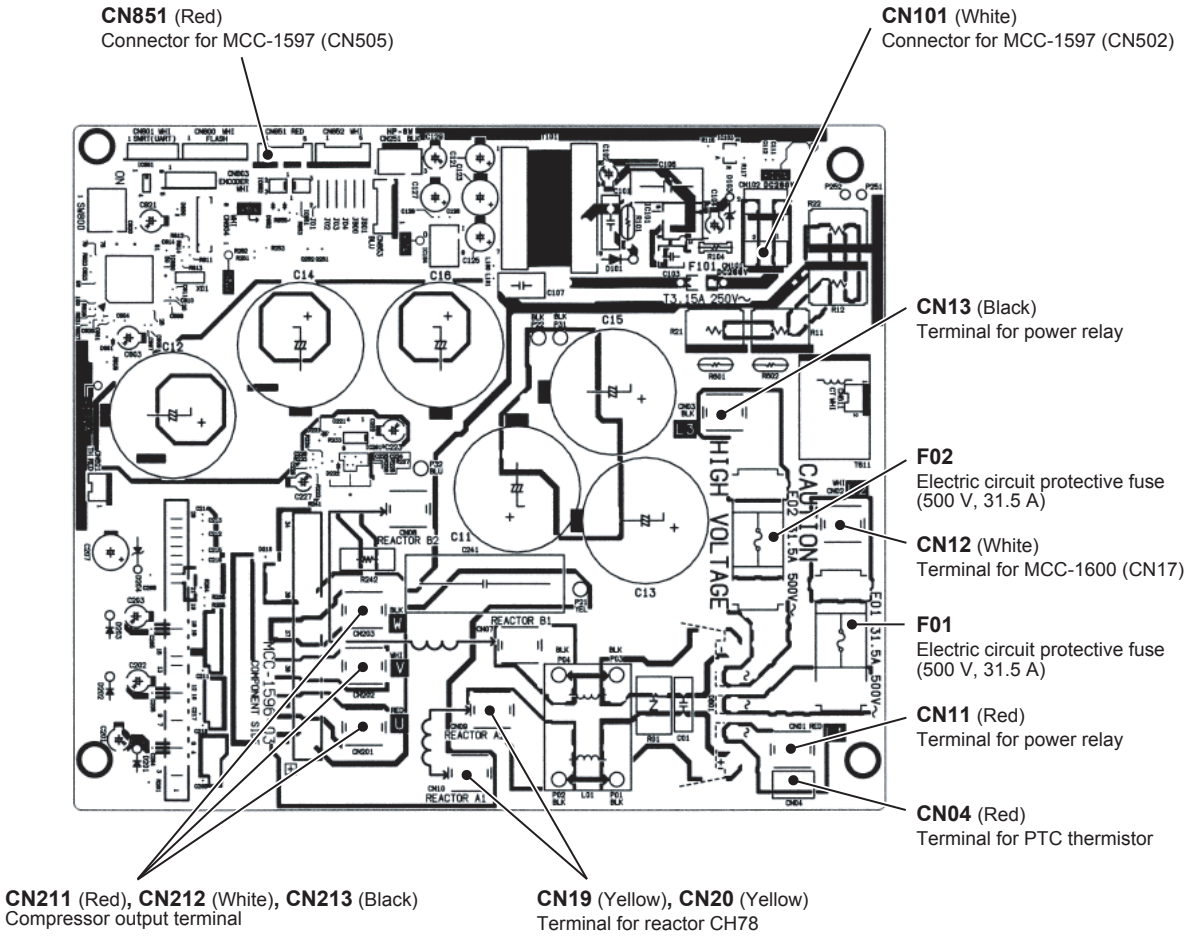
HWS-1105H-E, 1405H-E



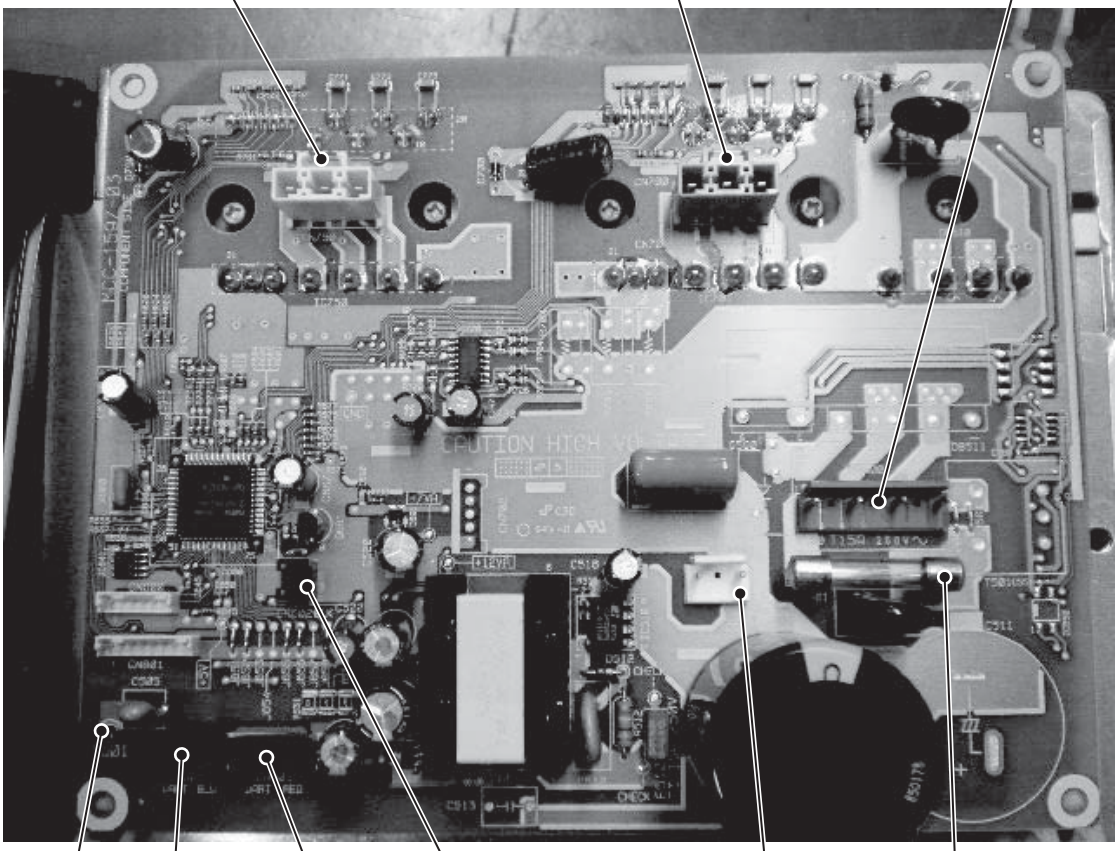
6-6. Outdoor unit control (3 phase type)

HWS-1105H8(R)-E, 1405H8(R)-E, 1605H8(R)-E

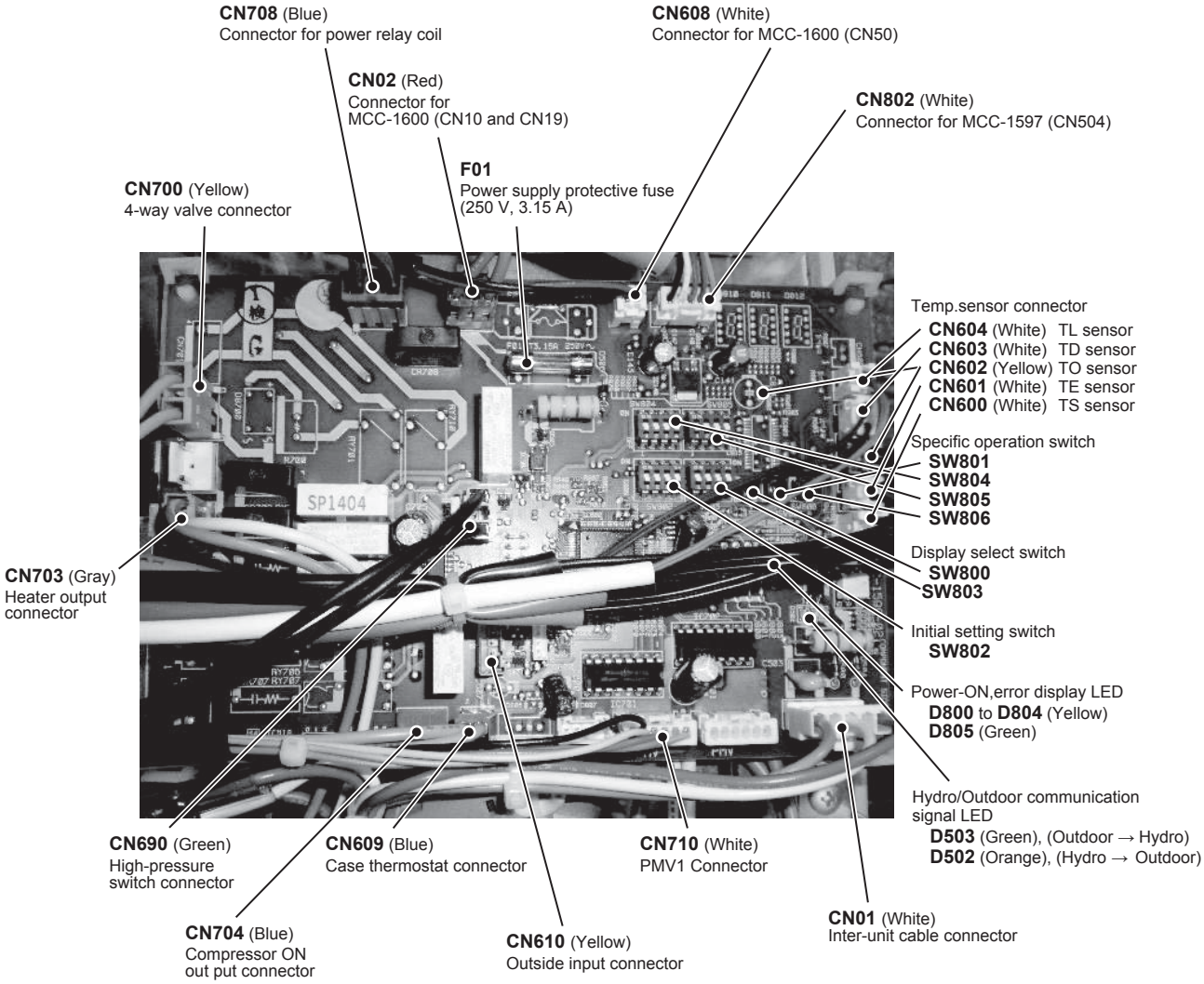
MCC-1596 (Compressor IPDU)



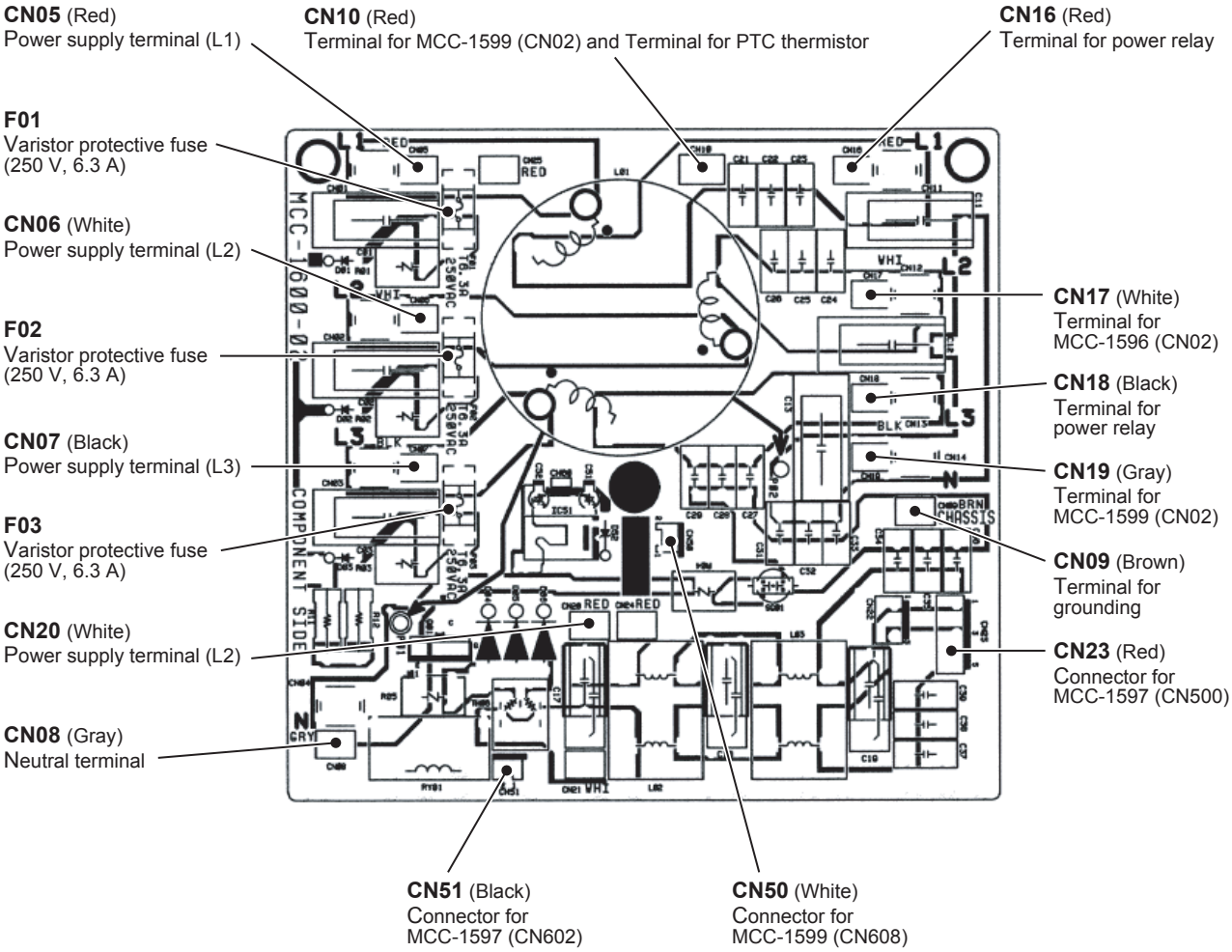
MCC-1597 (Fan Motor IPDU)



MCC-1599 (Interface (CDB))

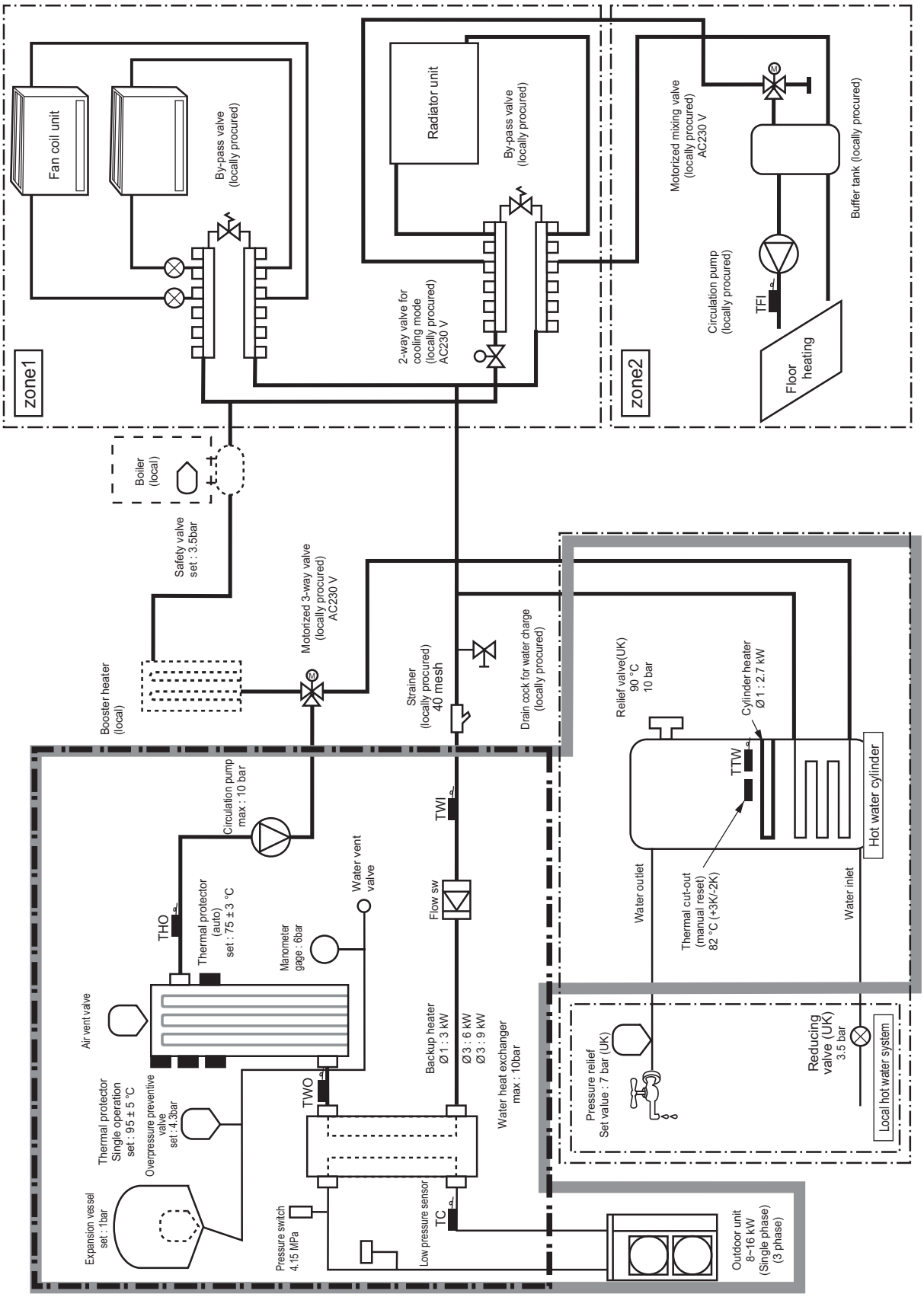


MCC-1600 (Noise Filter)

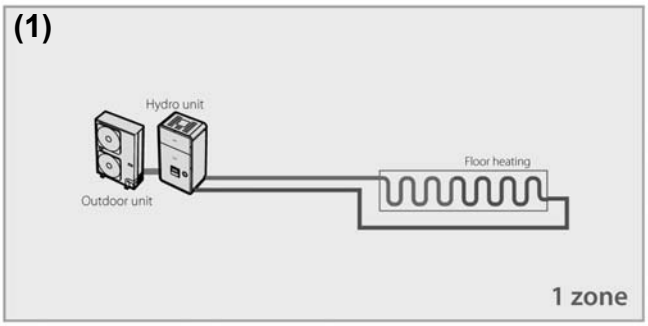


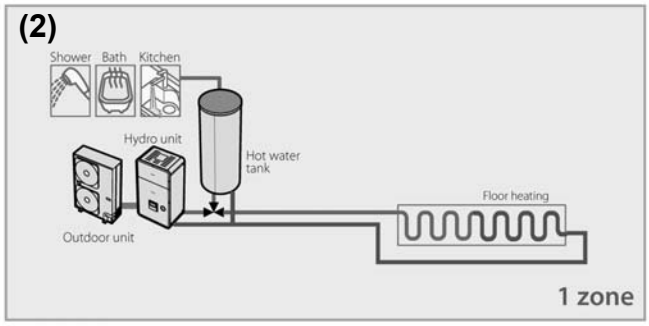
7 Refrigeration cycle / Water system diagram

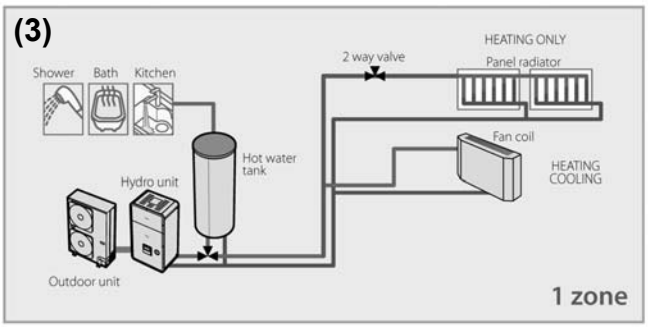
7-1. Water system diagram

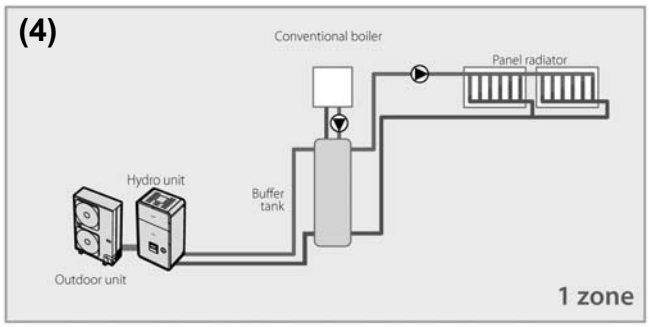


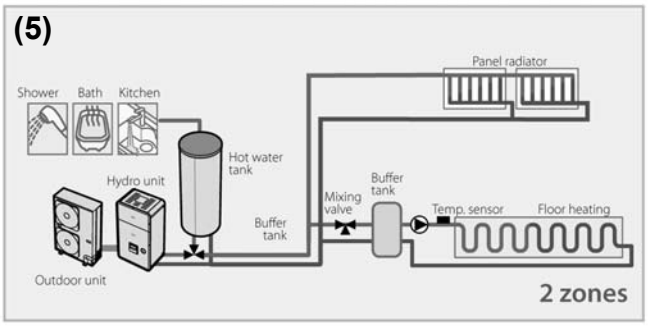
Installation example of water circuit

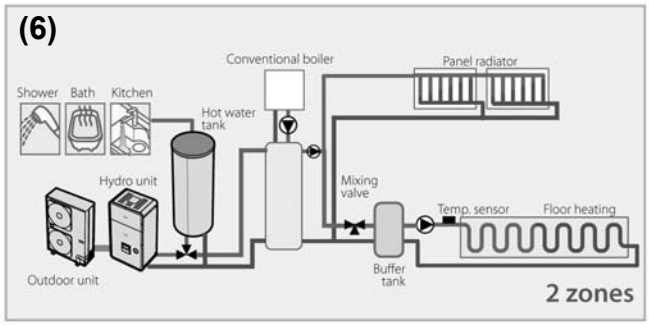








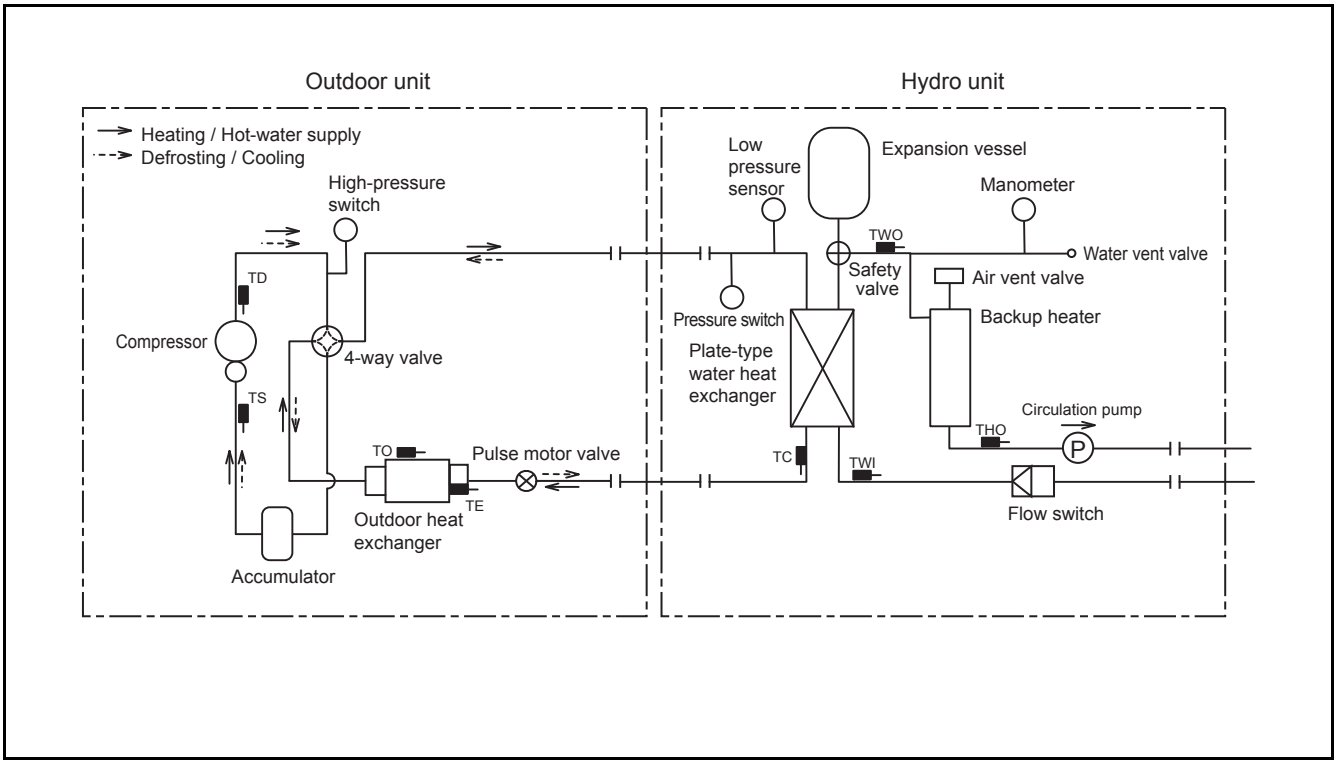




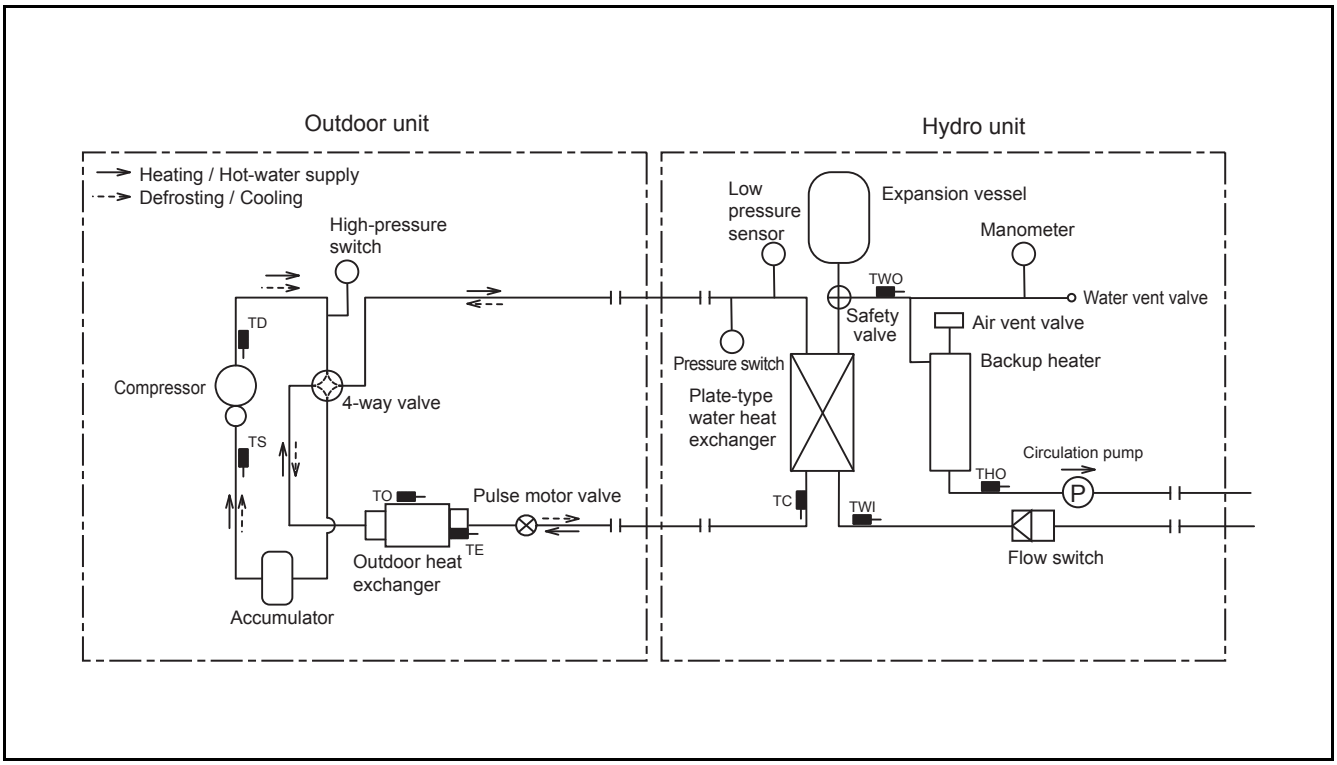
The water flowing for a system without buffer tank ((1), (2), (3), (5)) requires18ℓ/min (805XWH 13ℓ/min) or more.
This water flowing requires 5 or more branches of Floor heating or Radiator etc.
Less than 5 branches may cause a flow deficiency. In this case, please provide a buffer tank and secondary pumps as shown in (4).
Please check how to install the boiler (See page 50)

7-2. Refrigeration cycle system diagram

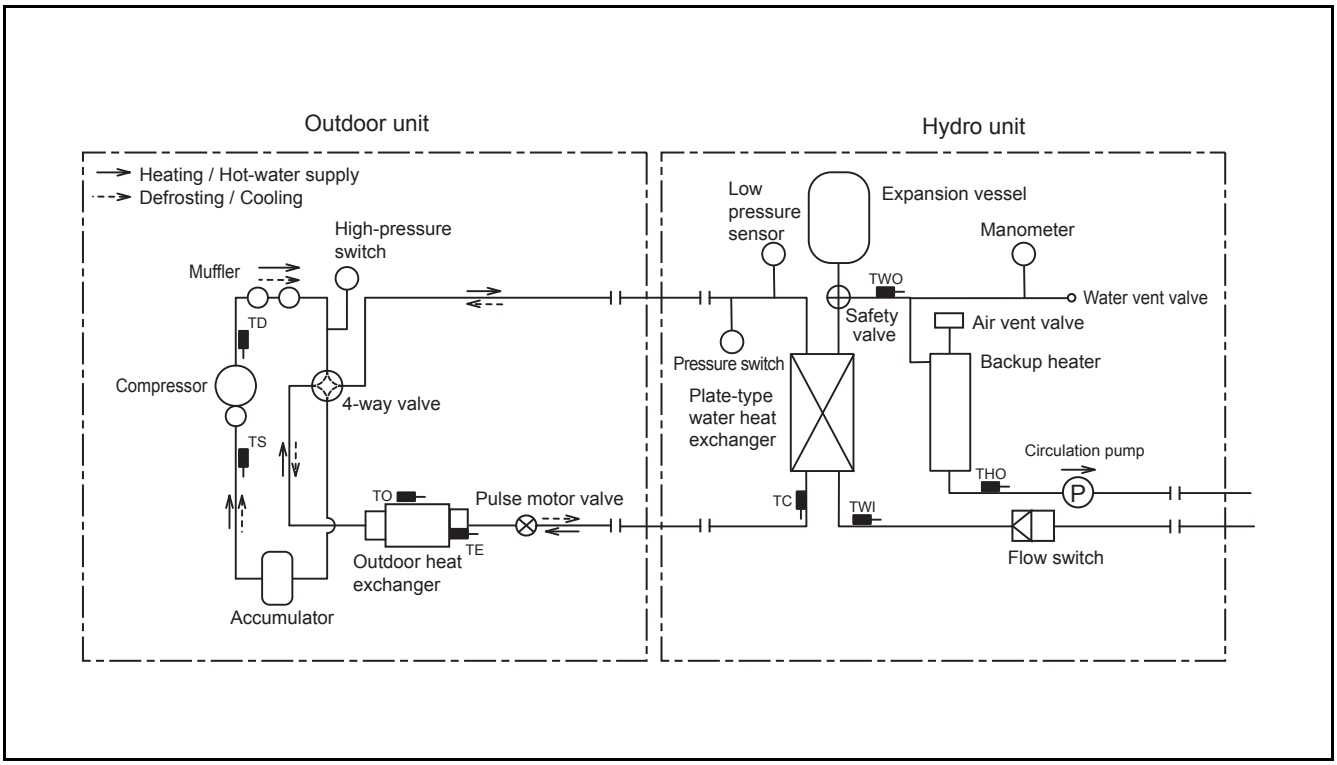
HWS-805XWHM3-E, HWS-805XWHT6-E, HWS-805XWHT9-E / HWS-805H-E



HWS-1405XWHM3-E, HWS-1405XWHT6-E, HWS-1405XWHT9-E / HWS-1105H-E, HWS-1405H-E



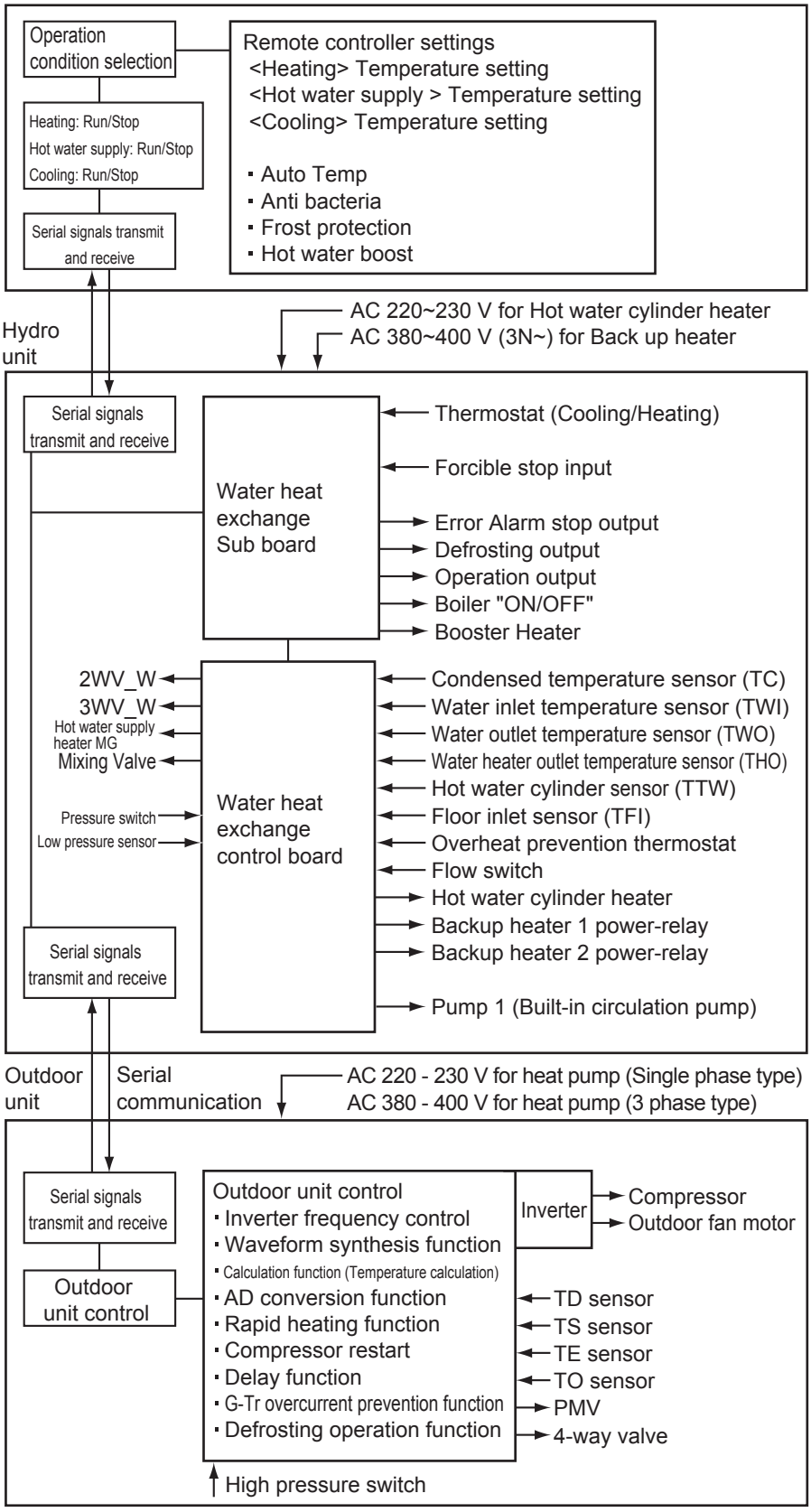
HWS-1405XWHM3-E, HWS-1405XWHT6-E, HWS-1405XWHT9-E / HWS-1105H8(R)-E, HWS-1405H8(R)-E, HWS-1605H8(R)-E

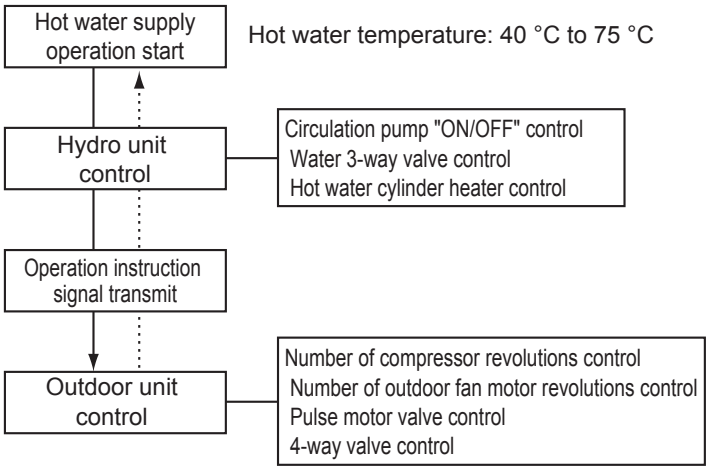
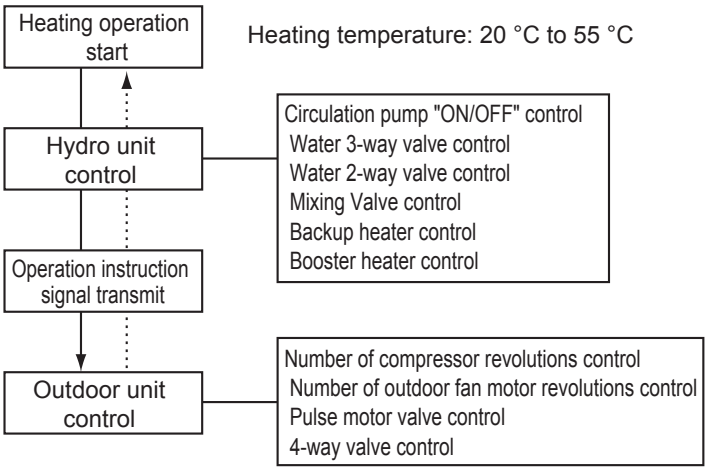


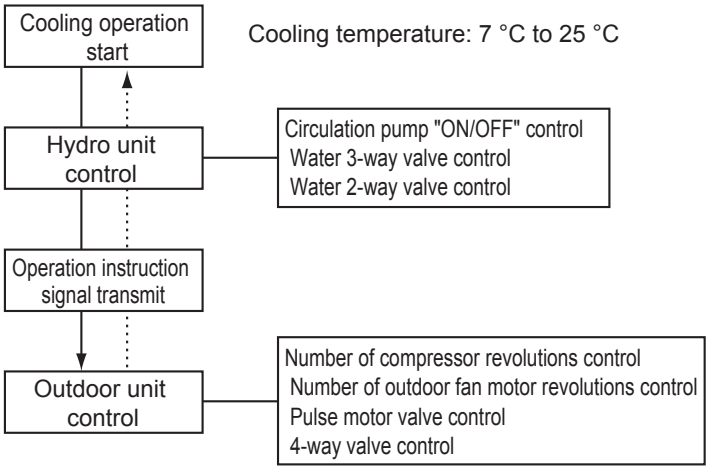
8 Operational description

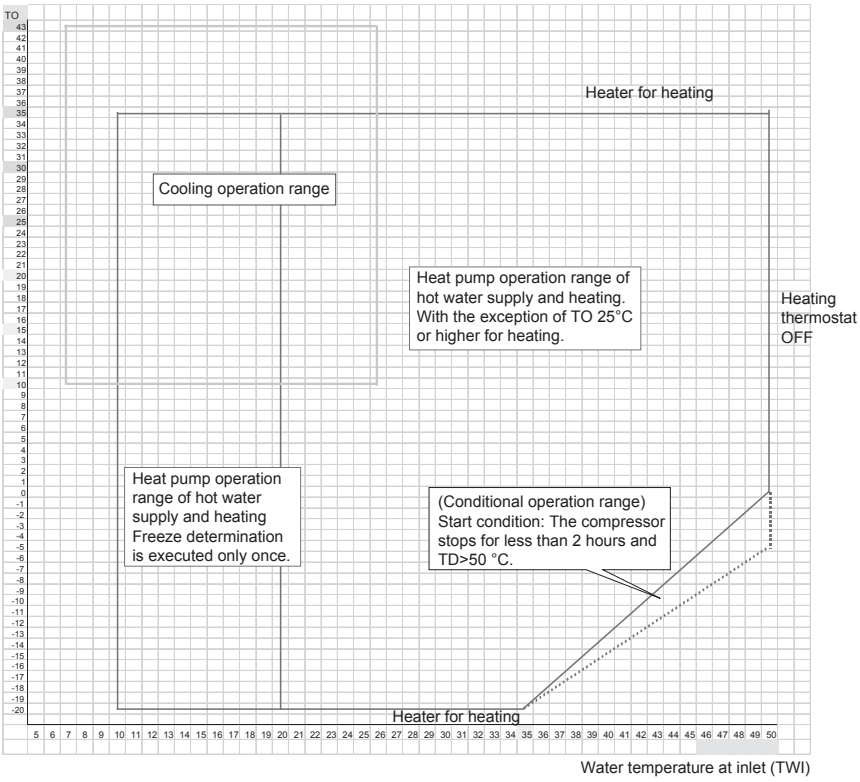
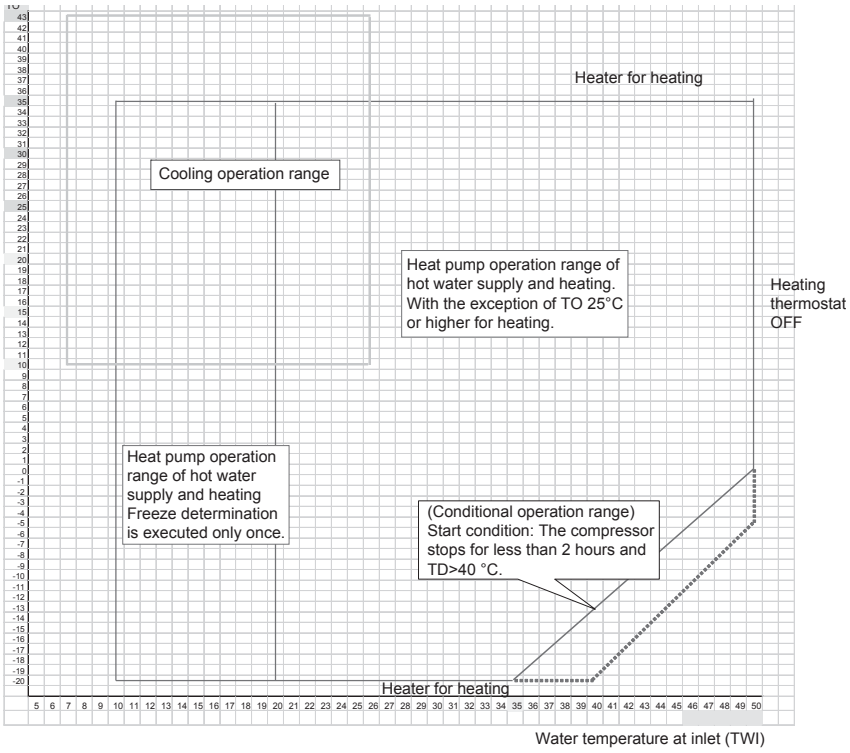
This chapter describes the working circuit and control of Air to Water Heat Pump about the following operations.

	Item	Page
8-1	**8-1. Basic Operation** 1) Operation control 2) Hot water supply operation 3) Heating operation 4) Cooling operation	42 to 44
8-2	**8-2. Operation Mode and Control Method** 1) Heat pump operation range of hot water supply, heating and cooling 2) Hot water supply operation 3) Heating operation 4) Cooling operation 5) Simultaneous operations of "hot water supply" and "heating" 6) Simultaneous operations of "hot water supply" and "cooling" 7) Boiler control 8) Hot water boost operation 9) Anti bacteria operation 10) Night setback operation 11) Frost protection operation 12) Auto operation 13) Night time low-noise operation	45 to 56
8-3	**8-3. Hydro Unit Control** 1) Capacity control (compressor, high-temperature release, low-temperature release) 2) Heater control 3) Circulation pump control 4) Control by the flow switch 5) Mixing Valve control (2-temperature heating control) 6) Room temperature control 7) Room temperature control with the thermostat 8) Hot water cylinder thermostat control 9) Control of force stop and restart 10) Control of limit of heat pump operation 11)Output signal control 1 12)Output signal control 2 13) Q-H characteristics of hydro unit 14) Automatic restart control 15) Piping freeze prevention control 16) High return water protect control	56 to 73
8-4	**8-4. Outdoor unit control** 1) PMV (Pulse motor valve) control 2) Discharge temperature release control 3) Current release control 4) Current releases shift control 5) Outdoor fan control 6) Defrosting control 7) Winding heating control 8) Short circuit operation prevention control 9) Over current protection control 10) High pressure release control 11) High pressure switch 12) Compressor case thermostat 13) Bottom plate heater control	74 to 82

Item	Operation flow and applicable data, etc.	Operation description
8-1. 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, and 4-way valve.

Item	Operation flow and applicable data, etc.	Operation description
8-1. 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 [F1] 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
8-1. 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.
8-2. 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. 1) HWS-805XWH**-E  2) HWS-1405XWH**-E 

Item	Operation flow and applicable data, etc.
8-2. 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

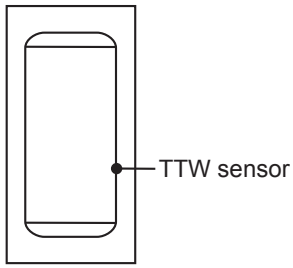
2) Hot water supply operation

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.

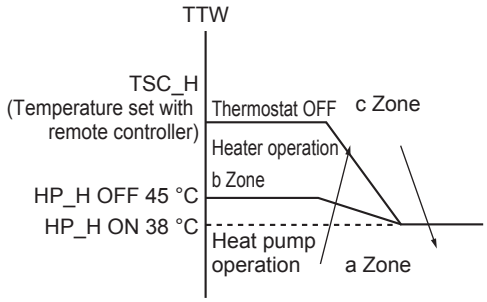
2) Operation mode determination
An operation mode is determined according to the temperature of TTW sensor.
- Heat pump operation selection *1 *2
- When TTW < 38 °C (a zone in the right figure) is met, the heat pump operation is selected.
- Heater operation selection
  When 45 °C ≤ TTW < TSC_H (b zone 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.

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

*1: When the outside temperature is -20 °C or below, the heater operation is selected even if the TTW temperature falls into "a zone".
*2: When "Hot water supply" and "Heating" are simultaneously in operation, the heater operation may be selected depending on the outside air temperature.



(Hot water cylinder unit)

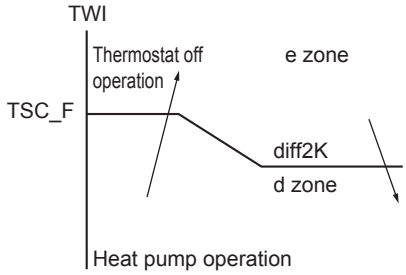


TSC_H is hot water temperature set with remote controller

Related FC

FC No.	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	45 °C	40-50 °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.

Item	Operation flow and applicable data, etc.
8-2. Operation Mode and Control Method	3) Heating operation <Operation only for ZONE1> • This operation is enabled when DP_SW12_2 ZONE1 is set to "OFF" (default). • The remote controller displays [ZONE 1] settings, and only the set temperature of [ZONE 1] can be changed. <Operation for ZONE1 and ZONE2 (2 temperatures control)> • This operation is enabled when DP_SW12_2 ZONE1 is set to "OFF" (default) and DP_SW12_3 ZONE2 to "ON". • The remote controller displays [ZONE 1] [ZONE 2] settings, and the set temperatures of [ZONE 1] [ZONE 2] can be changed. • To set temperatures for [ZONE 1] and [ZONE 2], use SELECT to switch between [ZONE 1] and [ZONE 2]. • For 2 zone temperatures control, the flow adjustment of MIXING VALVE controls the water temperature of [ZONE 2]. For details, see the description on MIXING VALVE control in 8-3-5. 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. *1: When the outside temperature is -20 °C or below, the heater operation is selected even if the TWI temperature falls into "d zone". *2: When "Hot water supply" and "Heating" are simultaneously in operation, the heater operation may be selected depending on the outside air temperature.  TSC_F is a heating temperature set with remote controller Related FC

FC No.	Setting item	Default	Setting available range
1A	Upper limit of heating (Zone1) limited temperature	55	37-55 °C
1B	Lower limit of heating (Zone1) limited temperature	20	20-37 °C
1C	Upper limit of heating (Zone2) limited temperature	55	37-55 °C
1D	Lower limit of heating (Zone2) limited temperature	20	20-37 °C

Item	Operation flow and applicable data, etc.

8-2. Operation Mode and Control Method

4) Cooling operation

Pressing the [F1] button twice, starts a cooling operation.

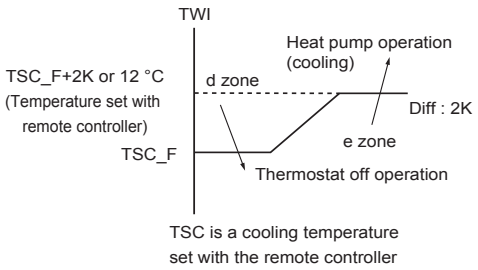
1) Operation start condition

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".

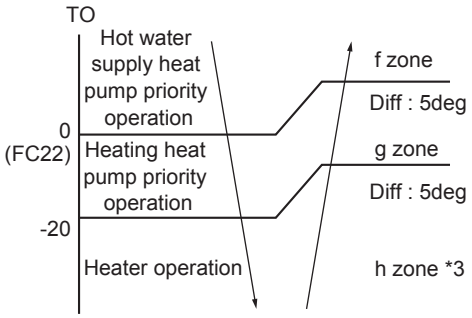
Related FC

FC No.	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

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, and a heating operation in the heating 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.



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.

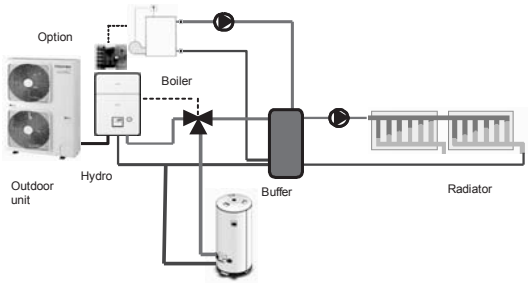
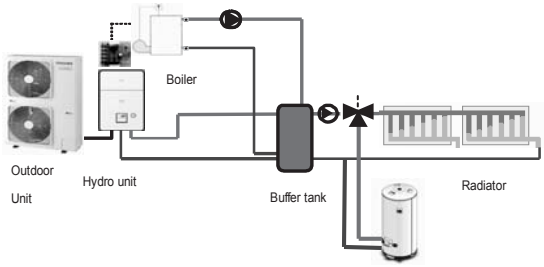
Zone	Hot water supply side	Heating side
f'	Heater	Heat pump

When TTW ≥ 45 °C (FC: 21) 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 -20 °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></td><td>Related FC
<table>
<tr><th>FC No.</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>-20-20 °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.</td></tr>
<tr><td>8-2.
Operation Mode and Control Method</td><td>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 FC_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 45 °C or more (FC: variable).

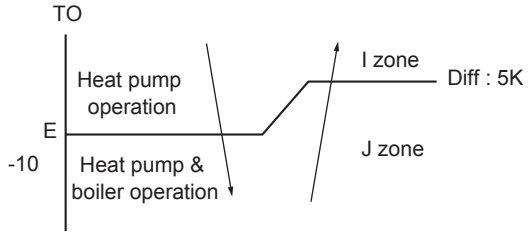
Related FC
<table>
<tr><th>FC No.</th><th>Setting item</th><th>Default</th><th>Setting available range</th></tr>
<tr><td>0F</td><td>Heat pump operation for hot water supply permitted / not permitted</td><td>0: Not permit</td><td>1:Permitted (Heat pump may run for hot water supply.)</td></tr>
</table></td></tr>
</table>

Item	Operation flow and applicable data, etc.
8-2. 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 • TCB-PCIN3E optional PC board is required. Connect its connection cable to CN208 port on the PC board of the hydro unit. • Setting DPSW on the hydro unit: DP_SW13_2="ON/OFF" switches "Using boiler / Not using boiler (Default)". Set the switch to "ON" when using the boiler. • The temperature switching the boiler and heat pump: FC_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: DP_SW02_1="ON/OFF" 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 switch is set to "ON", 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 switch is set to "OFF", the boiler runs in heating operation. Also, the boiler runs when the heat pump is running for hot water supply while heating and supplying hot water simultaneously. • Priority setting between the boiler and hydro unit: FC_3E="0/1" switches the running priority; hydro unit (Default) / boiler. When FC_3E is set to "0" (Default), the hydro unit has priority, the boiler stops as temperature reaches the hydro unit's temperature setting. When FC_3E is set to "1", the boiler continues to run even after temperature reaches the hydro unit's temperature setting. (The setting of FC_3E is effective during the HP+Boiler operation.) • Coordination setting of the boiler and heat pump: when FC_5B="0", the boiler and heat pump runs simultaneously. When FC_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 FC_5B="2", the heater runs. (the heater may run instead for up to 60 minutes.) When FC_5B="3", only the boiler runs. (Pump OFF:Default) DP_SW10_3 should be "OFF (Default)" <Installation example> DP_SW02_1="OFF"(The boiler is placed after the 3-way valve and in the heating side.)  * Boiler & HP switching temp setting FC23= -10 ** Boiler control / functionality setting FC5B= 0 (HP+Boiler) *** Hot water & cooling priority setting (FC_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*** DP_SW02_1="ON"(The boiler is placed before the 3-way valve.)  * Boiler & HP switching temp setting FC23= -10 ** Boiler control / functionality setting FC5B= 0 (HP+Boiler) *** Hot water & cooling priority setting (FC_0F="1" hot water priority is necessary) 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.
8-2. 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 8-3-10) is input.

7-3) Boiler output limit control

The boiler power output is limited depending on the settings of boiler position (DPSW02_1) and FC62.

Boiler position (DPSW02_1)	FC62 (Activate/deactivate A02 error 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 or TWO or THO<58 °C
	1	TWI or TWO or THO<58 °C
ON (Before 3-way valve)	0	TWI or TWO or THO<70 °C
	1	No limit *1

7-4) A02 error detection while the boiler is running

A02 error detection is deactivated depending on the settings of FC62 and whether the boiler is installed or not (DPSW13_2).

Boiler is installed or not (DPSW13_2)	FC62 (Activate/deactivate A02 error detection)	Temperature recognized as A02 error (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 error 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 DPSW10_3 OFF

Boiler is installed (DPSW13_2)	ZONE2 operation is using (DPSW12_3)	P2 synchronize with P1 (DPSW10_3)	FC5B 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.
8-2. Operation Mode and Control Method	

Related FC

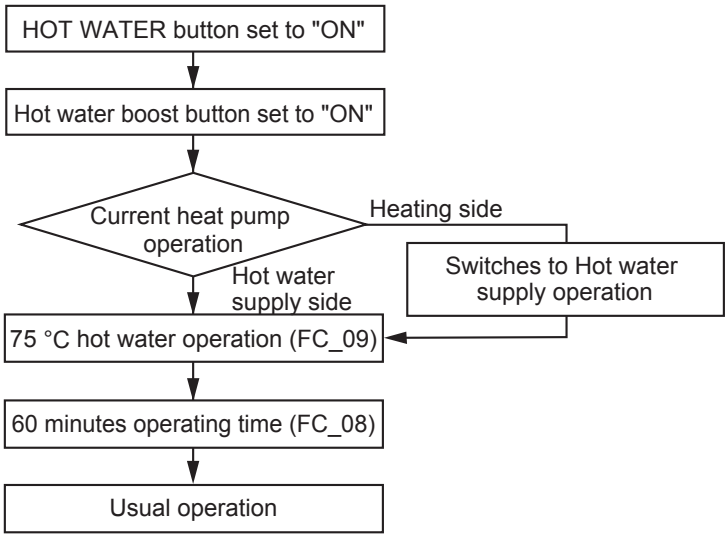
FC No.	Setting item	Default	Variable range
23	Boiler-heat pump switching temperature	-10 °C	-20-20 °C
3E	Control priority between the hydro unit and boiler (Control valid for operating heat pump mode)	0: Hydro unit control	Independent temperature control for the hydro unit and boiler
5B	Coordination 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 error 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 (FC_09).

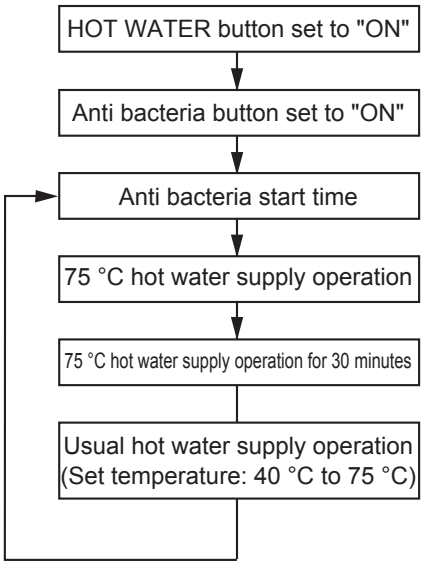
1) How to operate

- When pressing the [Hot water boost] button 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 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.
- <u>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.</u>
- The usual set temperature change is used for changing the set temperature during a Hot water boost operation. Change the BOOST set temperature with FC_09, if necessary.



Related FC

FC No.	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.
8-2. 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 FC_0A). 1) How to operate • Pressing the [F2] button and then the remote controller [Anti bacteria] button changes the setting to TSC_H = 75 °C at the set cycle and time (both can be set with the remote controller FC) to start Anti bacteria operation. • The first Anti bacteria operation starts when press the [Anti bacteria] button 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 FC_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 FC

FC No.	Setting item	Default	Setting available range
0A	Anti bacteria set temperature	75 °C	65-80 °C
0B	Anti bacteria holding time	30 min	0 - 60 min
Remote controller 0C	Anti bacteria start time	22:00	0:00-22:00
Remote controller 0D	Anti bacteria operation cycle	7 days	Every day to 10 days

Item	Operation flow and applicable data, etc.
8-2. 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 FC. (See page 118)

Related FC

FC No.	Setting item	Default	Setting available range
Remote controller OE	Night setback start Time setting	22:00	0:00-23:00
Remote controller OF	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 (FC).

1) How to operate
- Pressing the remote controller [F1] button and then the [Frost protection] button starts a heating operation at the set temperature of 15 °C.
- Pressing again the [Frost protection] button 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 FC 12 and 13 on the remote controller.
  Longest period available: 20 days and 23 hours
- By entering the operation period (day and hour) at FC 12 and 13 on the remote controller and pressing the [Frost protection] button, 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 FC

FC No.	Setting item	Default	Setting available range
3A	Frost protection Yes / No	1: Yes	0: No
3B	Frost protection Set temperature	15 °C	10-20 °C
12 (Remote controller)	FROST running period (days)	0	0-20 days
13 (Remote controller)	FROST running period (hours)	0	0-23hours

Item	Operation flow and applicable data, etc.
8-2. Operation Mode and Control Method	

12) Auto operation

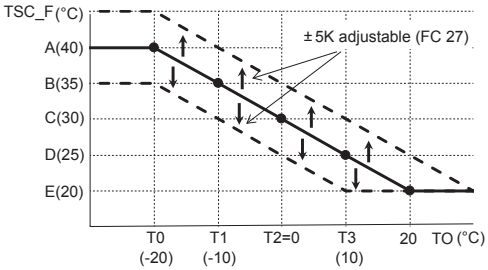
An Auto operation sets the water temperature TSC_F depending on the outside air temperature TO.

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 FC change mode, enabling the set Auto-Curve water temperature to be shifted by ±5K range (FC_27). When using the auto curve shift function please note the maximum and minimum water temperature at 55 °C and 20 °C respectively.
- 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 FC

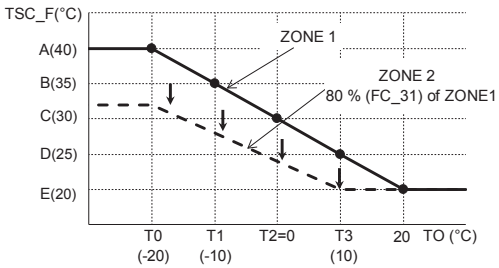
FC No.	Setting item	Default	range
2C	Setting temperature A at T0	40	20~55 °C
2D	Setting temperature B at T1	35	20~55 °C
2E	Setting temperature C at T2 (= 0 °C)	30	20~55 °C
2F	Setting temperature D at T3	25	20~55 °C
30	Setting temperature E at 20 °C	20	20~55 °C
A1	Outside temperature T0	-20	-30~-20 °C
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

<ZONE2>

- Set temperature of the ZONE2 can be selected from two methods (FC_A2). One is a percentage of ZONE1, the other is a fixed value.

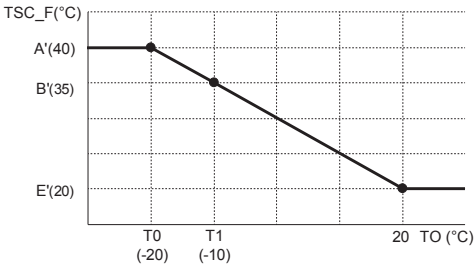
FC_A2 = "0" : Percentage method that is set by FC_31.
FC_A2 = "1" : Fixed value method that is set by FC_A3, A4 and A5.
However, it is automatically controlled the set temperature of ZONE1 to be the ZONE2 or more.

FC_A2=0 Percentage method



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

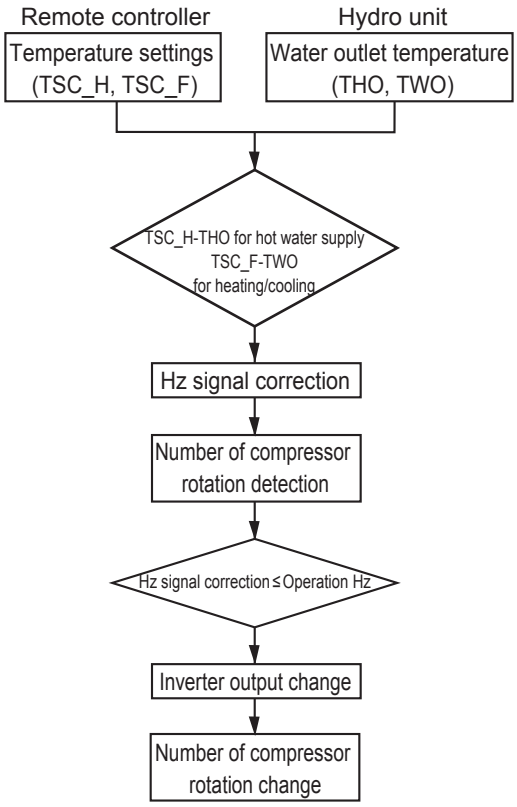
FC_A2=1 Fixed value method



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

Related FC

FC No.	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 °C
A4	Setting temperature B' at T1	35	20~55 °C
A5	Setting temperature E' at 20 °C	20	20~55 °C
31	Auto-Curve ratio of ZONE2	80	0~100%

Item	Operation flow and applicable data, etc.
8-2. 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. Maximum operation frequency 40.2 Hz (Hot water supply/Heating/Cooling) Maximum fan tap 460 rpm (805H-E) 500 rpm (1105H-E, 1405H-E) (1105H8(R)-E, 1405H8(R)-E, 1605H8(R)-E) The night time low-noise operation is enabled / disabled by changing the remote controller FC_09. **<How to set> - Refer to "11. Night time Low-noise Setting" on page 153.** Select "Silent mode" in menu display, and set to "ON".
8-3. 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.  Compressor frequency changeable range 10 Hz to 70 Hz (805, 1405H-E, 1605H8(R)-E) 10 Hz to 60 Hz (1105H-E, 1105H8(R)-E) 10 Hz to 66 Hz (1405H8(R)-E)

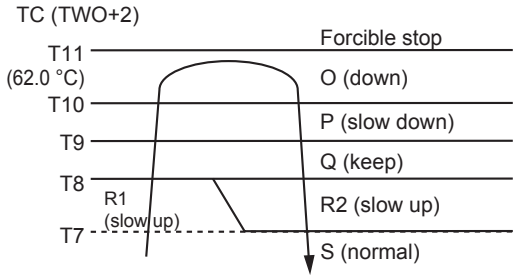
Item	Operation flow and applicable data, etc.
8-3. Hydro Unit Control	

1-2) High 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 + 2 degree) 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 then 10 Hz, the compressor stops.
- TC > 62 °C causes the compressor to stop abnormally. When the compressor restarts 140 seconds after the stop and TC > 62 °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+2degree (°C)

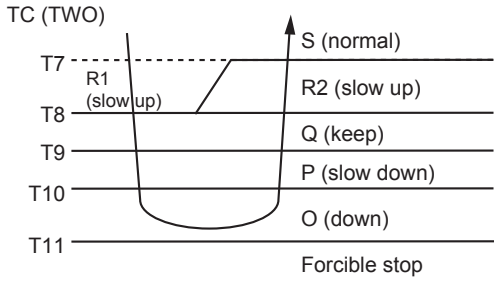
TWI	T7	T8	T9	T10	T11
TWI<30	57.0	59.0	60.0	61.0	62.0
30 ≤ TWI<35	57.0	59.0	60.0	61.0	62.0
35 ≤ TWI<40	56.5	58.5	59.5	60.5	62.0
40 ≤ TWI<45	56.5	58.5	59.5	60.5	62.0
45 ≤ TWI<50	56.0	58.0	59.0	60.0	62.0
50 ≤ TWI	56.0	58.0	59.0	60.0	62.0

1-3) 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 then 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.

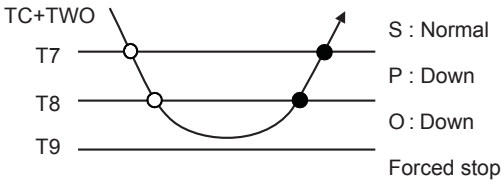


Zone	Control operation
R1	Increase compressor frequency by 0.8 Hz every 60 sec.
R2	Increase compressor frequency by 0.4 Hz every 60 sec.
O	Decrease compressor frequency by 4.5 Hz every 10 sec.
P	Decrease compressor frequency by 2.4 Hz every 10 sec.
Q	Keep compressor frequency.

TC=TWO (°C)

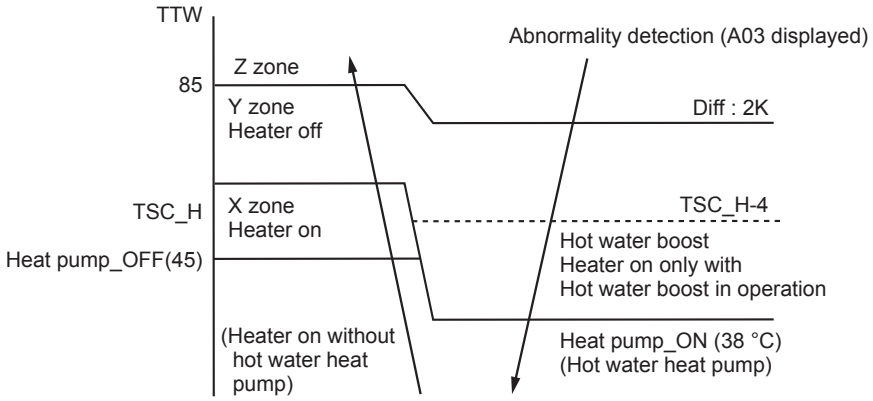
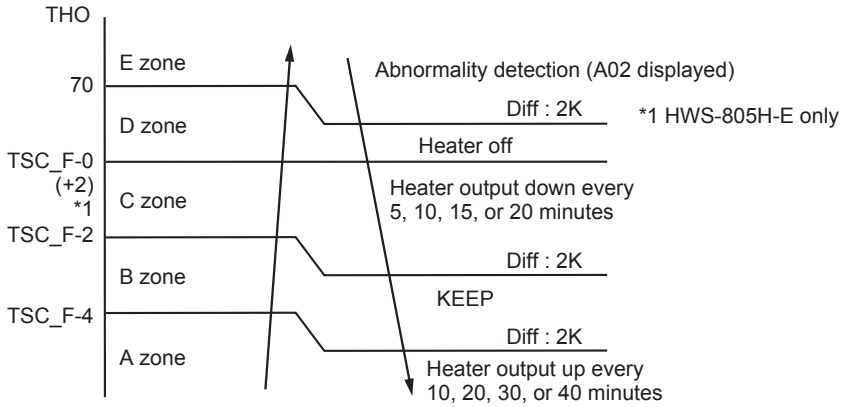
TWI	T7	T8	T9	T10	T11
TWI<10	8.0	6.0	4.0	3.0	2.5
10 ≤ TWI<15	8.5	6.5	4.5	3.4	2.5
15 ≤ TWI<20	9.0	7.0	5.0	4.0	2.5
20 ≤ TWI	9.5	7.5	5.5	4.5	2.5

Item	Operation flow and applicable data, etc.
8-3. Hydro Unit Control	1-4) 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.



	T7	T8	T9
TC+TWO	6.0	4.0	-15

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. 4.0 Hz every 10 sec.
(Forced stop)	Stop the compressor.

Item	Operation flow and applicable data, etc.
8-3. 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 all the following conditions are met. Note that when the hot water supply set temperature (TSC_F) is reached, the unit stops energizing the heater. • When 30 minutes has passed after the hot water heat pump operation started. • The water inlet temperature (TWI) reaches 50 °C. • The hot water cylinder sensor reaches the HP_OFF temperature (45 °C-FC). • The HP_ON temperature (38 °C-FC) 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 (FC) 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) HWS-**M3-E model has the backup heater 1 of 3 kW only. (2) HWS-**T6-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 FC

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

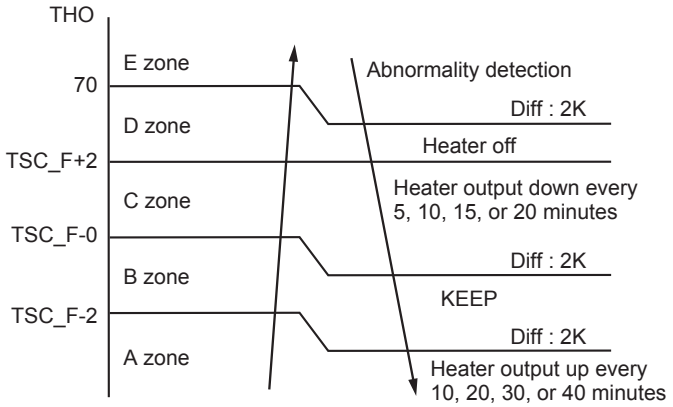
FC No.	Setting item	Default	Setting available range
B8	Forcibly heater off at TO ≥ A °C	no restriction	-5 ~ 20 °C

Item	Operation flow and applicable data, etc.
8-3. Hydro Unit Control	

2) Control at the time of heating heater operation

- Controlled Object: Backup heater, Booster heater

The backup heater control starts when 13 minutes has passed after the heating heat pump operation started. The backup heater control increases, decreases, or maintains the number of heaters every 10 minutes (FC) 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) is reached, the unit stops energizing the heater.



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

The single-phase model of 3 kW has the backup heater 1 only.
The three-phase model of 6 kW has heater 1+2 of 6 kW.
Booster heater operation come only output signal. (Booster heater activate under heater only mode)

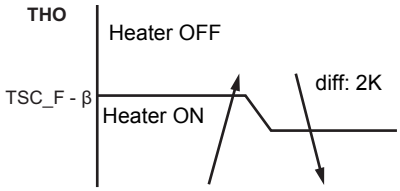
Related FC

FC No.	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	45 °C	40-50 °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 FC

FC No.	Setting item	Default	Setting available range
B9	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.
8-3. Hydro Unit Control	2-5) No heater operation According to the DP_SW11 setting, the unit switches the energize / not energize for the hot water cylinder, backup heater, and booster. For details, see 10-1. (Caution) All heater should be added to this Air to water system. The system has been designed to operate with all electrical heaters energized.

Item	Operation flow and applicable data, etc.
8-3. Hydro Unit Control	

3) Circulation pump control

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 circulation pump P1 and the external circulation pump P2 using DP_SW10-1, 2, and 3 in the hydro unit.

Item	Operation	Initial value	DPSW
Circulation pump DPSW10	01: Built-in circulation pump P1's action during hot water supply operation: HP operation only / Always energized	OFF: HP operation only	SW10-1
	02: Built-in circulation pump P1's action during heating operation: Always energized / Turned off when TO sensor detect over than 20 °C.	OFF: Always energized	SW10-2
	03: External circulation pump P2's action: Non-synchronous / Synchronous with the built-in circulation pump P1	OFF: Non-synchronous*2	SW10-3
	04: Built-in circulation pump P1 ON/OFF cycling (During long periods of system off)	OFF: None	SW10-4

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

Pump type: DC motor, rated voltage 220-230 V, 6 speed (changed manually)

The pump operation starts under the condition below:

- When the [F2] or [F1] button is pressed.

The pump operation stops under the condition below:

- When the [F2] or [F1] button is pressed.
  (Operation will stop fully in about 1 minute.)

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

The pump operation stops/restarts under the conditions shown below.

- When changing operation modes, the pump stops for 30 seconds.

Boiler is installed or not (DPSW13_2)	Boiler position (DPSW02_1)	P1 pump control Stop/restart temperatures (TWI or TWO or THO)
OFF (Not installed)	OFF (After 3-way valve, heating side)	70 °C / 68 °C
	ON (Before 3-way valve)	70 °C / 68 °C
ON (Installed)	OFF (After 3-way valve, heating side)	70 °C / 68 °C
	ON (Before 3-way valve)	58 °C / 55 °C

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 DP_SW10-1.

- DP_SW10-1 OFF (Default): The pump stops as the HP for hot water supply stops.
- DP_SW10-1 ON: 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 DP_SW10-2.

- DP_SW10-2 OFF (Default): The pump is always energized.
- DP_SW10-2 ON : 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 220-230 V, connectable directly up to 200W rated power output.

You can select whether the pump P2 is synchronized with the pump P1 using DP_SW10-3. The pump P2 is always energized if the pump P2 is not synchronized.

- DP_SW10-3 OFF (Default): Non-synchronous

NOTE:

2 zone temperature control by boiler with P1 OFF is required DP_SW10-3 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 FC64.

- FC64="00"(Default): The pump is always energized.
- FC64="01" : The pump is always stopped.

Item	Operation flow and applicable data, etc.
8-3. 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 FC65. • FC65=”00”(Default): The pump is always energized. • FC65=”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 (DPSW13_2 : ON), do NOT set intermittent operation or do NOT set the valve of A (FC_BA) lower than the Boiler-heat pump switching temperature (FC_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 FC

FC No.	Setting item	Default	Setting value
5A	Control of the pump P1 during the hot water supply operation	0: synchronized with HP	1: Always energized Equal to DPSW10-1
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	0: 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.
8-3. Hydro Unit Control	

4) Control by the flow switch

Whether water flows or not is judged with the ON/OFF of the flow switch.

Model	Determined that water flows when:	Determined that water does not flow when:
HWS-805**-E	13L or more water flows per minute	Water less than 13L flows per minute
HWS-1405**-E	18L or more water flows per minute	Water less than 18L flows per minute

Without water-flow determination from the flow switch after the hot water supply operation, heating operation, or cooling operation, The HP, backup heater and booster heater are not energized. Similarly, The “A01” error indication flashes if the flow switch judged that water does not flow.

The specification of the flow switch is the same in 805**-E and 1405**-E. 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 4 minutes (FC) 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	- 1 step (Close)

Initial value	Driving range	1 step	Control cycle
6	0-12	3 WV move 7.5 degrees	4 min (FC)

To enable 2 zone temperature control switch DP_SW12-3 to ON.

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 DP_SW10-3 OFF.

Related FC

FC No.	Setting item	Default	Setting available range
0C	Mixing Valve operation time	60	30 - 240 sec
59	Mixing Valve control time	4	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.

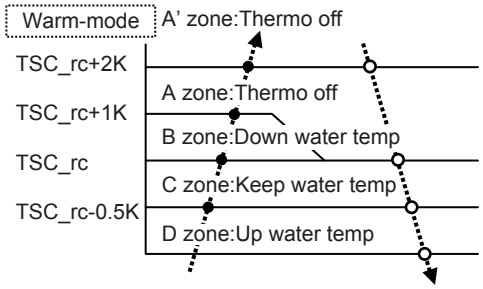
6-2) Room temperature control settings

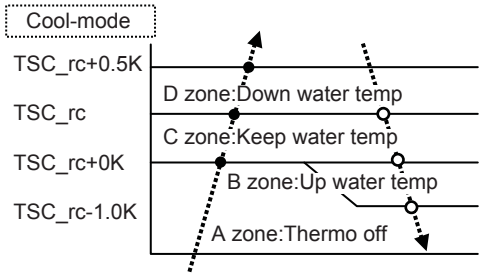
- Function code setting:FC_40="1"
- Setting of the remote controller Temperature control “ON”.
  (Setting → Initial setting → Temperature control)

Item	Operation flow and applicable data, etc.
8-3. Hydro Unit Control	

6-3) Control method

- The water temperature setting at starting operation is 40 °C (FC_9D) at heating and 20 °C (FC_96) at cooling. If the temperature setting calculated by Auto curve at starting operation is used instead of the fixed temperature 40 °C (FC_9D), FC_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 FC18-1B.
- <u>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 FC02 (for heating) and FC03 (for cooling) on the remote controller.</u>





<u>How to shift up/down the temperature by remote controller FC02, 03</u>

- Ambient temperature (remote controller) is higher than room temperature: example. 1deg
  Change remote controller FC02, 03 = “-1K” to “-2K”
- Ambient temperature (remote controller) is lower than room temperature: example. 1deg
  Change remote controller FC02, 03 = “-1K” to “0”

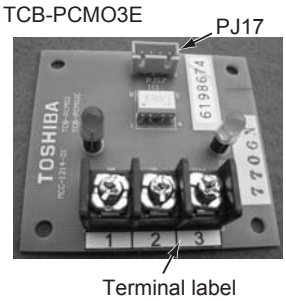
T_rc	Correction control	
	Heating	Cooling
D zone	Setting is corrected upward Water temperature setting is up by 1deg every 30 minutes.	Setting is corrected upward Water temperature setting is down by 1deg every 30 minutes.
C zone	No correction	No correction
B zone	Setting is corrected downward. Water temperature setting is down by 1deg every 30 minutes.	Setting is corrected downward. Water temperature setting is down by 1deg every 30 minutes.
A zone	Thermo off. But if inlet water detect less 25 °C, then heat pump restart.	Thermo off
A’ zone	Setting is corrected downward. Water temperature setting is down by 1deg every 39 minutes.	
	Thermo off	

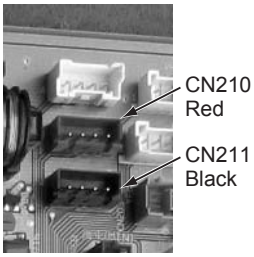
Related FC

FC No.	Setting item	Default	Variable range
18	Upper limit of cooling temperature setting	25	18-25 °C
19	Lower limit of cooling temperature setting	7	7-18 °C
1A	Upper limit of heating temperature setting (Zone 1)	55	37-55 °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	10-25 °C
9D	Initial water temperature setting when controlling heating by the room temperature remote controller and room temperature thermostat	40	20-55 °C
02 (Remote controller)	Room temperature correction (at heating)	-1	-10K - +10K, 1K step
03 (Remote controller)	Room temperature correction (at cooling)	-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 FC_9D, or use the temperature calculated by Auto curve. This applies heating operation only.	0	0 : Use the temperature set in FC_9D 1 : Use the temperature calculated by Auto curve

Item	Operation flow and applicable data, etc.
8-3. 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 • TCB-PCM03E optional PC board is required. Connect its connection cable to CN211 port on the PC board of the hydro unit. • Wiring to the main unit: connect the optional PC board TCB-PCM03E to the hydro unit after detaching the front panel. Thermostat for heating : Connect TCB-PCM03E between the terminals (1) and (3). Thermostat for cooling : Connect TCB-PCM03E between the terminals (2) and (3). • 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.

7-2) Room temperature thermostat control setting
• Setting of DPSW on the hydro unit
:DP_SW02_4="ON"(Default"OFF")





7-3)Heating thermostat operation

When the heating thermostat does not reach the assigned temperature (the circuit between (1) and (3) is closed), heating starts under the setting that water temperature for heating is 40 °C (FC_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 (3) 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.

7-4)Cooling thermostat operation

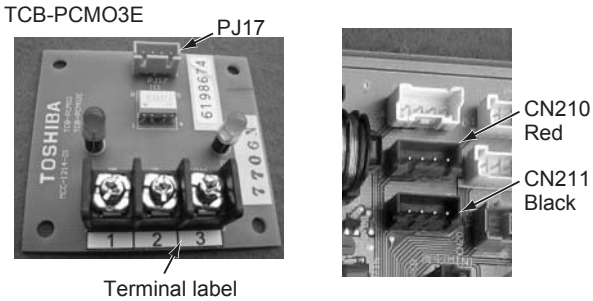
When the cooling thermostat does not reach the assigned temperature (the circuit between (2) and (3) is open), cooling starts under the setting that water temperature fro cooling is 20 °C (FC_96). If the cooling thermostat has not reached the assigned temperature 30 minutes after cooling had started, 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 (3) 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 FC

FC No.	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 °C
96	Initial water temperature setting when controlling cooling by the room temperature remote controller and room temperature thermostat.	20	10-25 °C
B5	Choose of the initial setting temperature. Either use the temperature set in FC_9D, or use the temperature calculated by Auto curve. This applies heating operation only.	0	0 : Use the temperature set in FC_9D 1 : Use the temperature calculated by Auto curve

Item	Operation flow and applicable data, etc.
8-3. 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 • Optional board : TCB-PCM03E optional PC board is required. Connect its connection cable to CN210 port on the PC board of the hydro unit. • Wiring with the main unit : After detaching the front panel, install TCB-PCM03E optional PC board in the hydro unit. Hot-water cylinder heating thermostat : Connect this thermostat between (1) and (2) on TCB-PCM03E. • 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.) 8-2) Setting the hot-water cylinder thermostat Setting of DPSW on the hydro unit : DP_SW02_3 = “ON” (Default “OFF”)  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 (1) and (2) is open), the hot-water heat pump starts with the hot-water thermostat closed. After 30 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 (1) and (2) 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, FC-0F is required. If hot water is used when the hot-water thermostat is at the assigned temperature (the circuit between (1) and (2) 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 FC

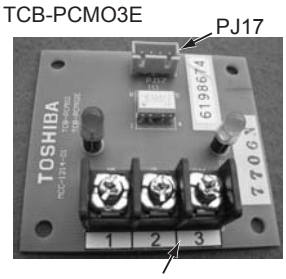
FC No.	Setting item	Default	Setting value
0F	Hot water HP allowance while cooling + hot water supply	0:Not allow	1:Allow

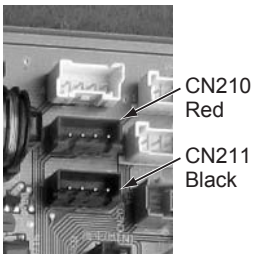
Item	Operation flow and applicable data, etc.
8-3. Hydro Unit Control	

9) Control of force stop and restart

The unit can be stopped and restarted with external input. By setting FC52, FC61 and FCB6, you can set an operation mode to run/stop or can run/stop the unit in the mode assigned on the remote controller.

- TCB-PCM03E optional PC board is required. Connect its connection cable to CN210 port on the PC board of the hydro unit.





9-1)Setting the control method

Select a control method by setting FC52.

- FC52=”0”:Stops ESTIA as the circuit between the terminals (1) and (3) is closed. (Default)
- FC52=”1”:Stops ESTIA as the circuit between the terminals (1) and (3) is opened.
- FC52=”2”: Starts ESTIA as the circuit between the terminals (1) and (3) is closed.
  Stops ESTIA as the circuit between the terminals (1) and (3) is closed.
- FC52=”3”:Starts/Stops ESTIA as the circuit between the terminals (1) and (3) is received closed plus.

9-2)Setting the object to control

Select an operation mode by setting FC61.

- FC61=”0”:Hot water supply and heating (Default)
- FC61=”1”:Follows the setting on the remote controller (If the hot water supply operation, heating operation, or hot water supply + heating operation is started manually after the unit was stopped with an external input, the new status is reflected to the setting on the remote controller.)
- FC61=”2”:Hot water supply only
- FC61=”3”:Heating only

It is possible to control each of the heating and hot water supply with the following settings:

- FCB6=“1” (Default “0”) and FC61=“3” and DP_SW02_3=“OFF” (Default “OFF”)
  The terminals (1) and (3) is the heating control.
  The terminals (2) and (3) is the hot water supply control.
  Both of control method is selected by FC52.

9-3)Cautions

The circuit between the external input terminals (1) and (3) is also used to control the limit of heat pump operation. You cannot use the forced stop control when the circuit is configured to control the limit of heat pump operation. (See page 70)

9-4)Setting example

- When you want to turn on/off the unit with static external input reflecting the operation setting on the remote controller (hot water supply, heating, or hot water supply and heating).
  FC52=”2”, FC61=”1”

○ RC on condition
× RC off condition

	FC61=1 & FC52=2				
		Operation pattern			
Operation status 1	Heating	○	○	×	×
	Hot water	○	×	○	×
	↓ open signal input				
Operation status 2	Heating	×	×	×	×
	Hot water	×	×	×	×
	↓ close signal input				
Operation status 3	Heating	○	○	×	×
	Hot water	○	×	○	×
	↓ open signal input				
Operation status 4	Heating	×	×	×	×
	Hot water	×	×	×	×

Manually ON/OFF change by remote controller

close signal input

Item	Operation flow and applicable data, etc.
8-3. Hydro Unit Control	

Basic operation logic

There are 4 operation combination pattern for Heating & Hot water
When open signal is input, the operation status change to the next status.
For example, if current operation status is heating ON and hot water OFF, then next status to be heating OFF & hot water OFF when pulse is input Hydro unit memorize the status of the operation pattern before changing OFF status by close signal.
If pulse is input at operation status 2, the operation pattern in the status 3 is same pattern in the status 1.

Manually ON/OFF

If customer change operation pattern manually by remote controller, change then operation pattern will not be same as the basic logic.

1. If customer stop operation (Heating off and hot water off) by the controller, then both heating& hot water are <u>not to be ON with close or open signal</u>.
2. If the unit is stopped (Heating off and hot water off) by open signal, operation pattern will be referred to the pattern before the unit OFF by close signal.

- When you want to turn on/off with the pulse input reflecting the operation setting on the remote controller (hot water supply, heating, or hot water supply and heating).
  FC52=”3”, FC61=”1”

○ RC on condition
× RC off condition

	FC61=1 & FC52=3				
		Operation pattern			
Operation status 1	Heating	○	○	×	×
	Hot water	○	×	○	×
↓ Pulse input					
Operation status 2	Heating	×	×	×	○
	Hot water	×	×	×	○
↓ Pulse input					
Operation status 3	Heating	○	○	×	×
	Hot water	○	×	○	×
↓ Pulse input					
Operation status 4	Heating	×	×	×	○
	Hot water	×	×	×	○

Manually ON/OFF change by remote controller

Pulse input

There are 4 operation combination pattern for Heating & Hot water
When pulse signal is input, the operation status change to the next status.
For example, if current operation status is heating ON and hot water OFF, then next status to be heating OFF & hot water OFF when pulse is input Hydro unit memorize the status of the operation pattern before changing OFF status by pulse signal.
If pulse is input at operation status 2, the operation pattern in the status 3 is same pattern in the status 1.

If customer change operation pattern manually by remote controller, then operation pattern will not be same as the basic logic.

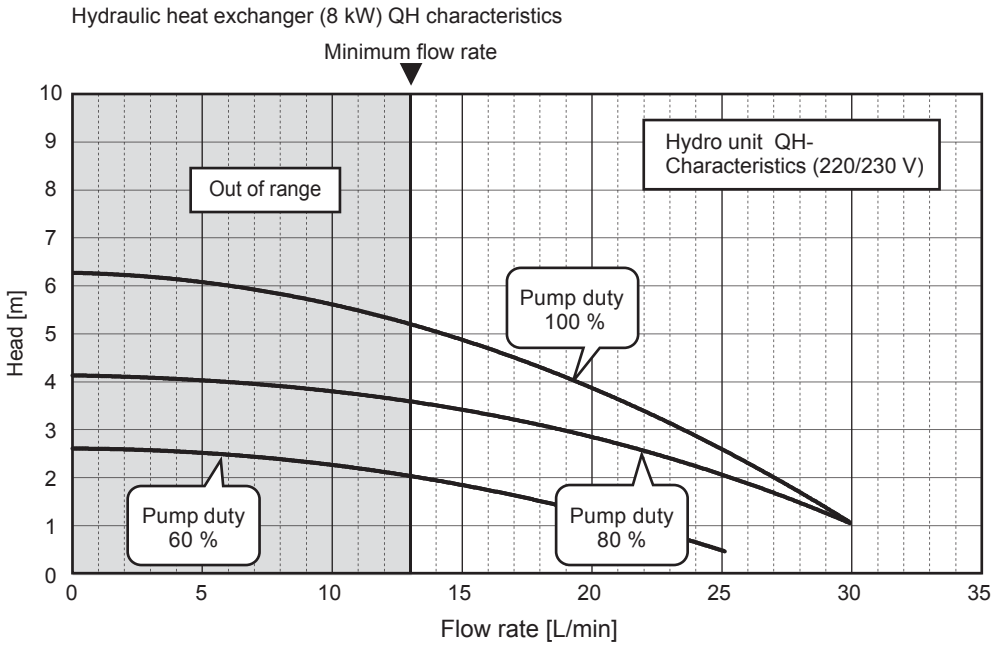
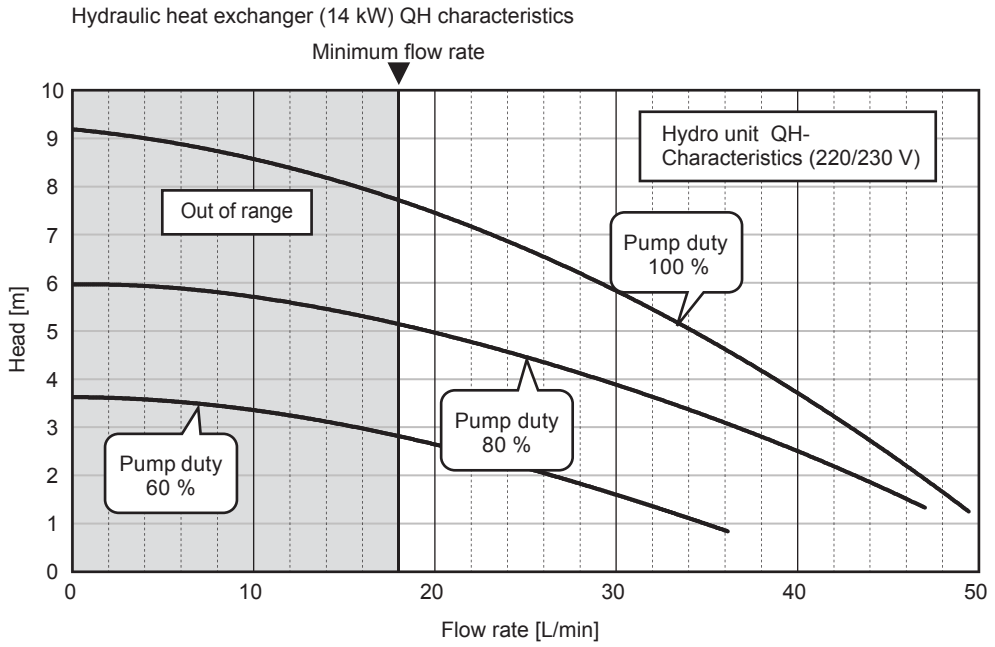
1. If customer stop operation (Heating off and hot water off) by the controller, then both heating& hot water <u>to be ON with pulse input</u>.
2. If the unit is stopped (Heating off and hot water off) by pulse input, operation pattern will be referred to the pattern before the unit OFF by pulse.

Related FC

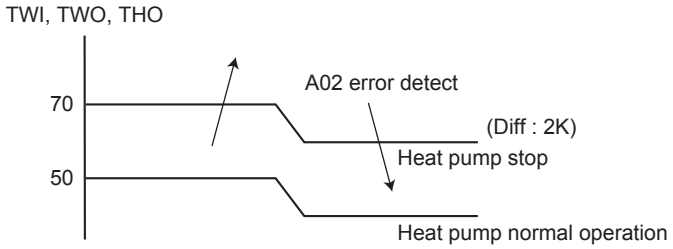
FC No.	Setting item	Default	Setting value
52	Control method	0	See page 135
61	Object to control	0	See page 135

Item	Operation flow and applicable data, etc.
8-3. Hydro Unit Control	10) Control of limit of heat pump operation 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.) • TCB-PCM03E optional board is required. Connect its connection cable to CN210 port on the PC board of the hydro unit. TCB-PCMO3E PJ17 Terminal label CN210 Red CN211 Black 10-1)Setting the control method Select an operation mode by setting FC61. • FC61=”4”:Hot water cylinder heater = OFF, backup heater = OFF (Built-in circulation pump is ON.) • FC61=”5”: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 FC61. 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 45 °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.
	11)Output signal control 1 (TCB-PCIN3E optional PC board is required. Connect its connection cable to the CN208 terminal on the PC board in the hydro unit.) • The circuit between the terminals (1) and (2) gets closed as an error detection signal is output. • The circuit between the terminals (3) and (4) gets closed as a boiler signal is output. The LED on the PC board lights up when the signals are output. 12)Output signal control 2 (TCB-PCIN3E optional PC board is required. Connect its connection cable to the CN209 terminal on the PC board in the hydro unit.) < FC67=”0”: Default > • The circuit between the terminals (1) and (2) is closed during defrosting. • The circuit between the terminal (3) and (4) is closed while the compressor is running. < FC67=”1” > • The circuit between the terminals (1) and (2) gets closed as an error is detected. • The circuit between the terminals (3) and (4) is closed during operation (when the remote controller is ON) The LED on the PC board lights up when the signals are output. TCB-PCIN3E PJ20 Terminal label CN208 Blue CN209 Green Related FC

FC No.	Setting item	Default	Setting value
67	Changing the condition of optional output (For the optional PC board connected to CN209)	0: 1-2 During defrosting 2-4 While compressor is running.	1: 1-2 As error is detected 2-4 During operation

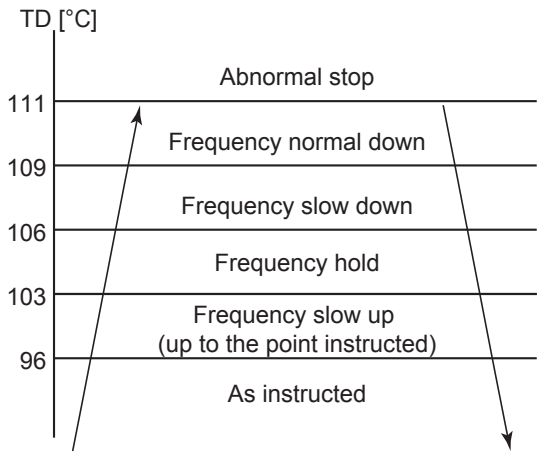
Item	Operation flow and applicable data, etc.
8-3. Hydro Unit Control	13) Q-H characteristics of hydro unit The following shows the Q-H characteristics. 13-1)HWS-805XWHM3-E, T6-E, T9-E  13-2)HWS-1405XWHM3-E, T6-E, T9-E 

Item	Operation flow and applicable data, etc.
8-3. 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 THWI < 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 55 °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) 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 seconds or longer. Or TWO ≤ 20 °C. TC+TWO<4 °C is continuously detected for 180 seconds or longer. 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, heating, hot water heat pump restarts, the start condition is not met for 10 minutes. 3) Error display • If freeze determination cancellation condition is not met, A04 error 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) Error display • If freeze determination cancellation condition is not met, A04 error is displayed.

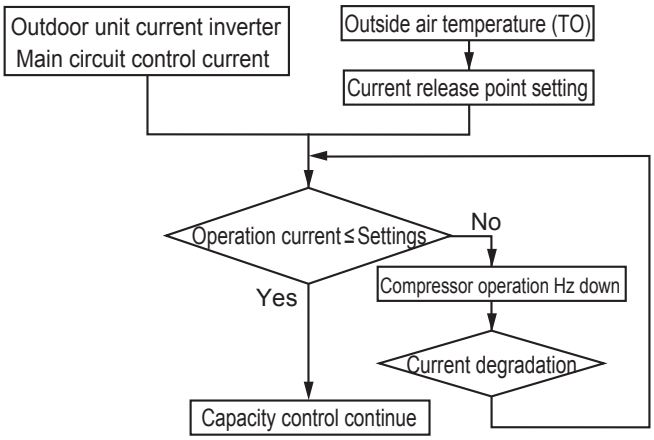
<table>
<tr><th>Item</th><th>Operation flow and applicable data, etc.</th></tr>
<tr><td rowspan="2">8-3.
Hydro Unit Control</td><td>15-4)Piping freeze prevention control 4
When the value of Ps sensor is low, freeze prevention is activated regardless of a heat pump operation mode.
1) Determination condition: Low pressure sensor detects PS < 0.2 MPa and 90 seconds passes (defrosting and cooling) (During a defrosting operation for cooling and heating, or hot water supply)
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 180 minutes.
• At the next time of defrosting, the start condition is not met. (Defrosting operation for heating or hot water supply)
3) Error display
• If freeze determination cancellation condition is not met, A08 error 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 error appeared, the built-in circulation pump will stop.

Related FC
<table>
<tr><th>FC No.</th><th>Setting item</th><th>Default</th><th>Setting available range</th></tr>
<tr><td>62</td><td>Activate/deactivate A02 error detection</td><td>0: Activate</td><td>1: Deactivate</td></tr>
</table>
This FC62 function is valid when DP_SW13-2 is ON. (See 10.1-1. Setting switch names and positions)</td></tr>
</table>

Item	Operation flow and applicable data, etc.
8-4. 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 2 to 4 K (for 805H-E) or -1 to 4 K (for 1105, 1405H-E) +1 to 4 K (1105 to 1605H8(R)-E) 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.The usual target value is 91 °C for a cooling operation, and 96 °C for a heating operation. * 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 error 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 error displayed, see the check code list. 

Item	Operation flow and applicable data, etc.
8-4. 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.



Heating, Hot water supply

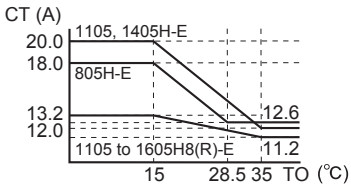
Outside temperature TO (degree °C)		Current release value (A)		
805H-E	**except for 805H-E**	**805H-E**	**1105H-E, 1405H-E**	**1105H8(R)E, 1405H8(R)E, 1605H8(R)E**
28.5 ≤ TO	35 ≤ TO	12.6	12.0	11.2
15 ≤ TO < 28.5	15 ≤ TO < 35	18.0 - (To - 15) × 0.4	20.0 - (To - 15) × 0.4	13.2 - (To - 15) × 0.1
TO < 15		18.0	20.0	13.2

Cooling

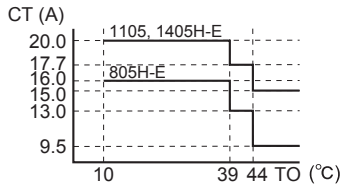
Outside temperature TO (degree °C)	Current release value (A)				
	805H-E	**1105, 1405H-E**	**1105H8(R)-E**	**1405H8(R)-E**	**1605H8(R)-E**
44 (47*) ≤ TO	9.5	15.0	7.5	7.5	7.5
39 ≤ TO < 44 (47*)	13.0	17.7	7.5	8.7	9.6
10 ≤ TO < 39	16.0	20.0	9.6	9.6	9.6

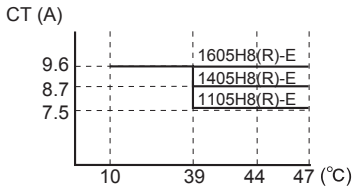
No cooling operation available for TO < 10 °C.

Heating, Hot water supply



Cooling





Item	Operation flow and applicable data, etc.
8-4. Outdoor unit control	

4) Current releases shift control

During a cooling operation, this control prevents the electronic parts, such as a compressor drive element, and compressor from failing.

- The current release control value (I) is selected from the following table according to the TO sensor value.

Current release control value (I)

Temperature range	805H-E	1105H-E	1405H-E
50 °C ≤ TO	10.5	14.1	14.1
45 °C ≤ TO < 50 °C	10.5	14.1	14.1
39 °C ≤ TO < 45 °C	14.0	14.1	16.4
TO < 39 °C	16.0	14.1	16.4
TO error	10.5	14.1	14.1

Temperature range	1105H8(R)-E	1405H8(R)-E	1605H8(R)-E
47 °C ≤ TO	7.5	7.5	7.5
39 °C ≤ TO < 47 °C	7.5	8.7	9.6
10 °C ≤ TO < 39 °C	9.6	9.6	9.6
TO error	7.5	7.5	7.5

5) 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.

* 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.

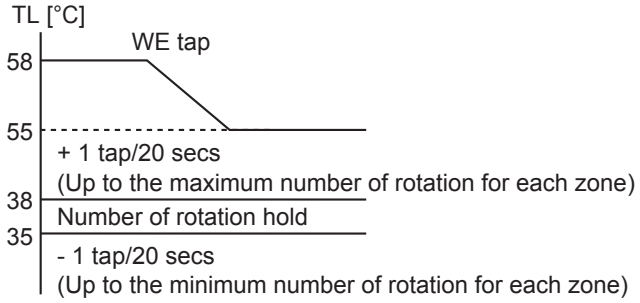
The number of fan tap rotation allocation [rpm]

		W1	W2	W3	W4	W5	W6	W7	W8
805H-E		200	230	260	300	340	380	420	460
1105, 1405H-E 1105 to 1605H8(R)-E	Upper	200	240	240	260	320	380	480	500
	Lower	0	0	200	280	360	400	500	520

		W9	WA	WB	WC	WD	WE	WF
805H-E		520	570	600	630	670	710	740
1105, 1405H-E 1105 to 1605H8(R)-E	Upper	530	610	640	660	720	780	890
	Lower	550	630	660	700	740	820	910

5-1) 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 temperature.



Item	Operation flow and applicable data, etc.
8-4. Outdoor unit control	

HWS-805H-E

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	WE	WA	WE
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
0 °C ≤ TO < 5 °C	W2	W4	W4	W6	W5	W8
-4 °C ≤ TO < 0 °C	W2	W3	W3	W5	W4	W6
TO < -4 °C	OFF	OFF	OFF	W2	OFF	W3
TO error	OFF	WC	OFF	WE	OFF	WE

HWS-1105H-E, 1405H-E

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	WC	WA	WD
29 °C ≤ TO < 38 °C	W5	WB	W7	WC (WB for 1105)	W9	WC
15 °C ≤ TO < 29 °C	W4	W8	W6	WA	W8	WC
5 °C ≤ TO < 15 °C	W3	W6	W5	W8	W7	WA
0 °C ≤ TO < 5 °C	W2	W4	W4	W6	W5	W8
-4 °C ≤ TO < 0 °C	W2	W3	W3	W5	W4	W6
TO < -4 °C	W1	W2	W1	W4	W2	W6
TO error	W1	WC	W1	WC	W2	WD

HWS-1105H8(R)-E, 1405H8(R)-E, 1605H8(R)-E

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	WD	WA	WD
29 °C ≤ TO < 38 °C	W5	WB	W7	WC (WB for 1105)	W9	WC
15 °C ≤ TO < 29 °C	W4	W8	W6	WA	W8	WC
5 °C ≤ TO < 15 °C	W3	W6	W5	W8	W7	WA
0 °C ≤ TO < 5 °C	W2	W4	W4	W6	W5	W8
-4 °C ≤ TO < 0 °C	W2	W3	W3	W5	W4	W6
TO < -4 °C	W1	W2	W1	W4	W2	W6
TO error	W1	WC	W1	WD	W2	WD

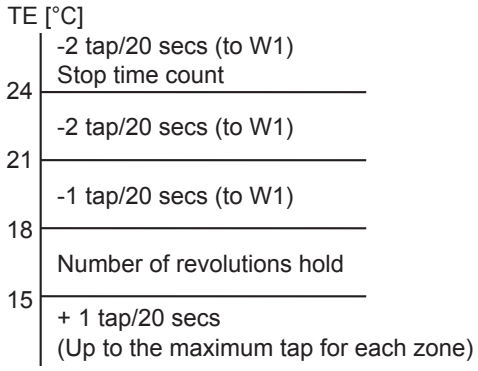
Item	Operation flow and applicable data, etc.
8-4. Outdoor unit control	

5-2) 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 °C continues for 5 minutes, the operation stops. No error 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.

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).



For 805H-E

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	W7	W8	W9
5 °C ≤ TO < 10 °C	W9	WB	WD
-3 °C ≤ TO < 5 °C	WD	WD	WE
-10 °C ≤ TO < -3 °C	WE	WE	WE
TO < -10 °C	WF	WF	WF
TO abnormal	WF	WF	WF

For 1105H-E

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	W7	W8	W9
5 °C ≤ TO < 10 °C	W9	WA	WA
-3 °C ≤ TO < 5 °C	WA	WA	WB
-10 °C ≤ TO < -3 °C	WB	WB	WB
TO < -10 °C	WD	WD	WD
TO abnormal	WD	WD	WD

For 1405H-E

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	W7	W8	W9
5 °C ≤ TO < 10 °C	W9	WA	WB
-3 °C ≤ TO < 5 °C	WB	WB	WC
-10 °C ≤ TO < -3 °C	WC	WC	WC
TO < -10 °C	WD	WD	WD
TO abnormal	WD	WD	WD

Item	Operation flow and applicable data, etc.

8-4.
Outdoor unit control

For 1105H8(R)-E

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	W7	W8	W9
5 °C ≤ TO < 10 °C	W9	WA	WA
-3 °C ≤ TO < 5 °C	WA	WA	WC
-10 °C ≤ TO < -3 °C	WC	WC	WC
TO < -10 °C	WD	WD	WD
TO abnormal	WD	WD	WD

For 1405H8(R)-E, 1605H8(R)-E

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	W7	W8	W9
5 °C ≤ TO < 10 °C	W9	WA	WB (WC)
-3 °C ≤ TO < 5 °C	WB (WC)	WB (WC)	WC
-10 °C ≤ TO < -3 °C	WC	WC	WC
TO < -10 °C	WD	WD	WD
TO abnormal	WD	WD	WD

(1605H8-E, 1605H8R-E only)

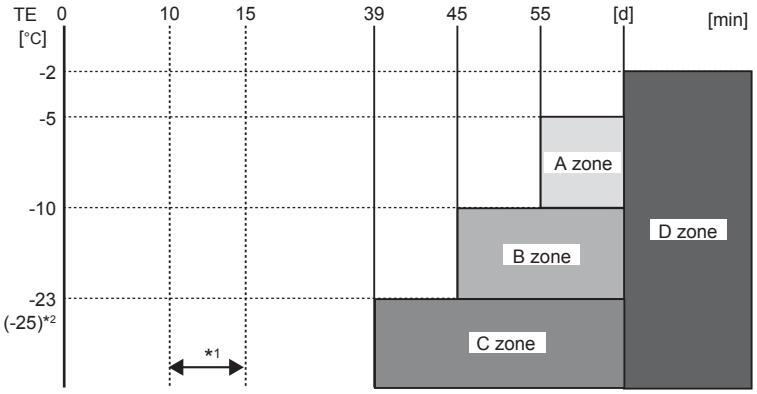
6) Defrosting control

6-1) 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.
*2 Inside brackets: For 805H-E

	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 °C" for 20 sec (except 805H-E) Maintain " TE < -25 °C" for 20 sec (805H-E)
D Zone	Accumulate compressor operation status of TE < -2 °C for 150 min

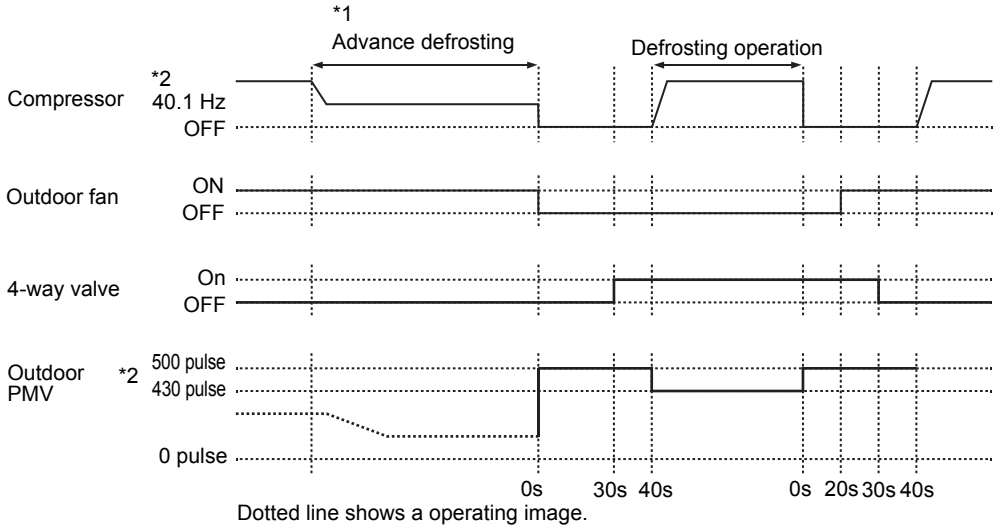
Item	Operation flow and applicable data, etc.
8-4. Outdoor unit control	Jumper switching O: Short circuit ×: Open

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

6-2) Advance defrost operation (since Dec. 2011)

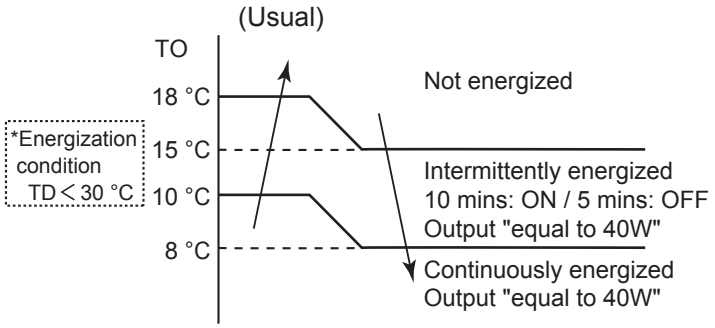
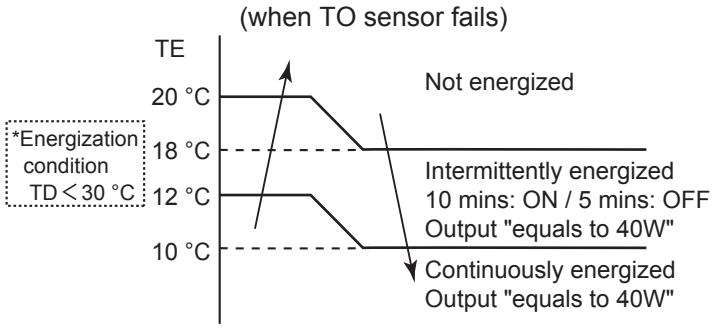
When compressor temperature is low, defrosting preliminary operation will be carried out to carry defrosting smoothly in effect.

1) Start condition of advance defrosting
   - TD < 50 ºC 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 8-4-1)
   - PMV control interval will be shorter than normal.
   - Operation frequency will be fixed.



Dotted line shows a operating image.

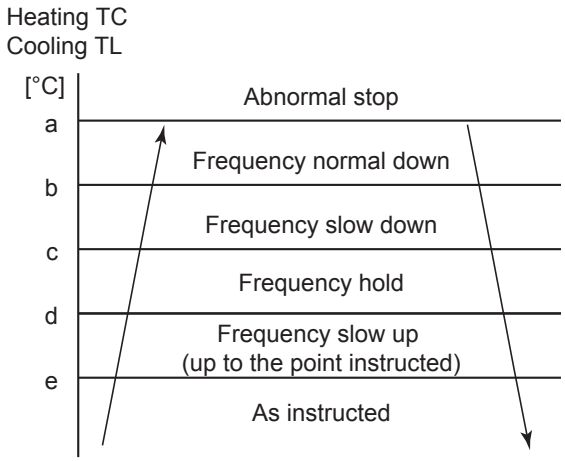
*1. When TD ≥ 50 °C, Advance defrosting will be skipped.
*2. 805H-E: 50.4 Hz, PMV = 380 pulse.
1105H(8)-E, 1405H(8)-E, 1605H8-E: 40.1 Hz, PMV = 430 pulse.

Item	Operation flow and applicable data, etc.
8-4. Outdoor unit control	7) 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. If the TO sensor fails, the TE sensor automatically takes over the operation. Determine if the TO sensor has failed check the LED's on the outdoor unit PCB. 4) If TD is 30 °C or higher, the energization stops.   Notes During winding energization, energizing noise may be heard, but this is not abnormal.
	8) 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 a operation status.) 2) If the operation stops with the remote controller, the operation does not continue.
	9) 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, error code is displayed and the compressor does not restart. (Remote controller error code display: HO1)

Item	Operation flow and applicable data, etc.
8-4. Outdoor unit control	

10) High pressure release control

1) To prevent excessive hi pressure rise, operation frequency is controlled by the TL sensor when cooling and by TWO sensor when heating.
2) If the TL sensor when cooling or the TWO sensor when heating detects an abnormal stop zone temperature, the compressor stops and the abnormality detection counter increments.
3) When the compressor stops in 2), the operation restarts when the temperature returns to the usual operation zone ("e" or below) after 150 seconds.
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, error code is displayed and the compressor does not restart.
5) For details about an check code displayed, see the check code list.



	805H-E		1105H-E, 1405H-E		1105H8(R)-E, 1405H8(R)-E, 1605H8(R)-E	
	Heating	Cooling	Heating	Cooling	Heating	Cooling
	TC (TWO+2)	TL	TC (TWO+2)	TL	TC (TWO+2)	TL
a	64 °C	63 °C	64 °C	63 °C	62 °C	63 °C
b	62 °C	62 °C	62 °C	62 °C	59 °C	62 °C
c	60 °C	60 °C	60 °C	60 °C	57 °C	60 °C
d	58 °C	58 °C	58 °C	58 °C	52 °C	58 °C
e	54 °C	54 °C	54 °C	54 °C	51 °C	54 °C

11) High pressure switch

The high pressure switch detects abnormal high pressure (higher than 4.15 Mpa) in cooling cycle and protect the compressor.

- The high pressure switch stops the compressor as the pressure in the cooling cycle becomes higher than 4.15 Mpa.
- The compressor will restart three minutes after stopping.
- If the high pressure switch functions again after restarting, the compressor stops and the “A07” error code is indicated.

12) 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” error code is indicated.

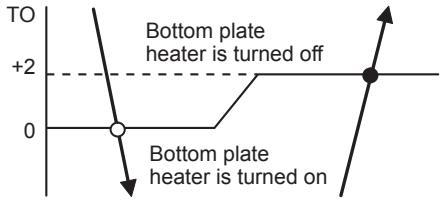
13) Bottom plate heater control

13-1)Controllable models (Models equipped with the bottom plate heater (outdoor,3 phases, 400 V) only)

- HWS-1405XWH**-E/HWS-1105H8R-E
- HWS-1405XWH**-E/HWS-1405H8R-E
- HWS-1405XWH**-E/HWS-1605H8R-E

13-2)Target to control

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



9 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
9-1	Matters to be confirmed first	9-1-1. Check the power supply voltage 9-1-2. Check for any miswiring of the connection cables between the hydro unit and the outdoor unit 9-1-3. 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.
9-2	Non-defective operation (program operation)		Non-defective program operations for the protection of the heat pump unit.
9-3	Outline of the determination diagram	9-3-1. Procedure of defect diagnosis 9-3-2. How to determine from the check code on the remote controller 9-3-3. How to cancel a check code on the remote controller 9-3-4. How to diagnose by error 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.
9-4	Diagnosis flow chart for each error code	9-4-1. Hydro unit failure detection 9-4-2. Outdoor unit failure detection 9-4-3. Temperature sensor, temperature-resistance characteristic table	
9-5	Operation check by PC board	9-5-1. 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.
9-6	Brief method for checking the key components	9-6-1. Hydro unit 9-6-2. Outdoor unit	How to determine the presence of any defect particularly in functional parts.

9-1. Matters to be confirmed first

9-1-1. Check the power supply voltage

Check that the power supply voltage is AC220-230 V± 10% (signal phase type), AC380-400 V± 10% (3 phase type). If the power supply voltage is not in this range, it may not operate normally.

9-1-2. 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.

9-1-3. 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.

9-2. Non-defective operation (program operation) … No fault 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 9-2-1 Non-defective operation

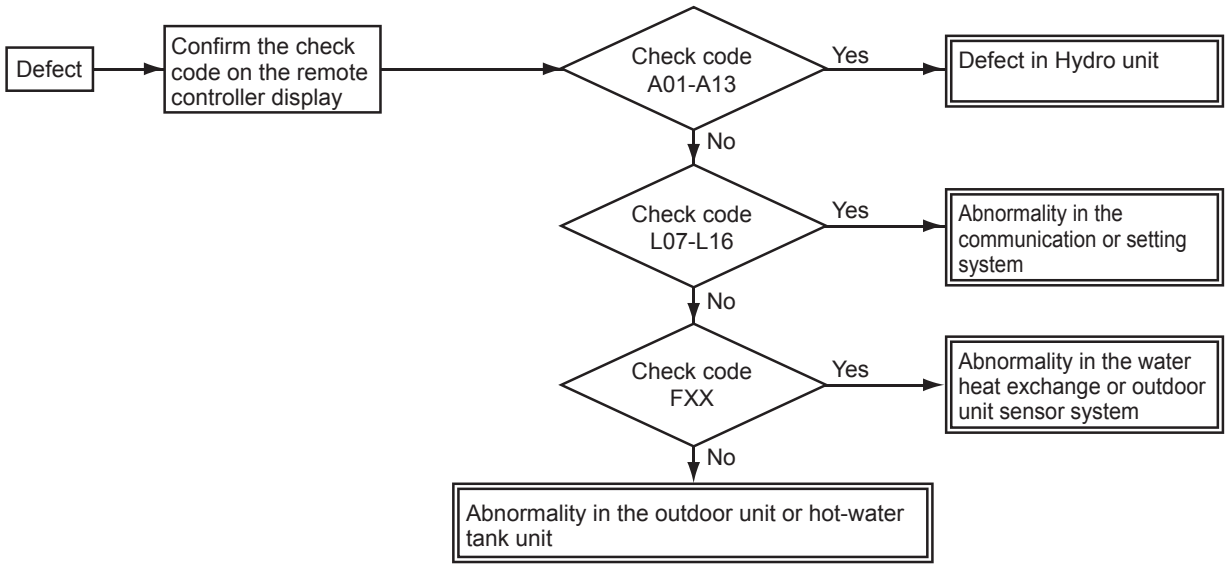
No.	Operation of the heat pump system	Explanation
1	The compressor sometimes does not operate even within the range of compressor “ON”.	The compressor does not operate during the operation of the compressor reboot timer (3 min). Even after the power activation, the compressor reboot timer continues to 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.
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 °C or lower, the heat pump will not operate in order to protect the compressor, and the heater will operate instead.
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.)

9-3. 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.

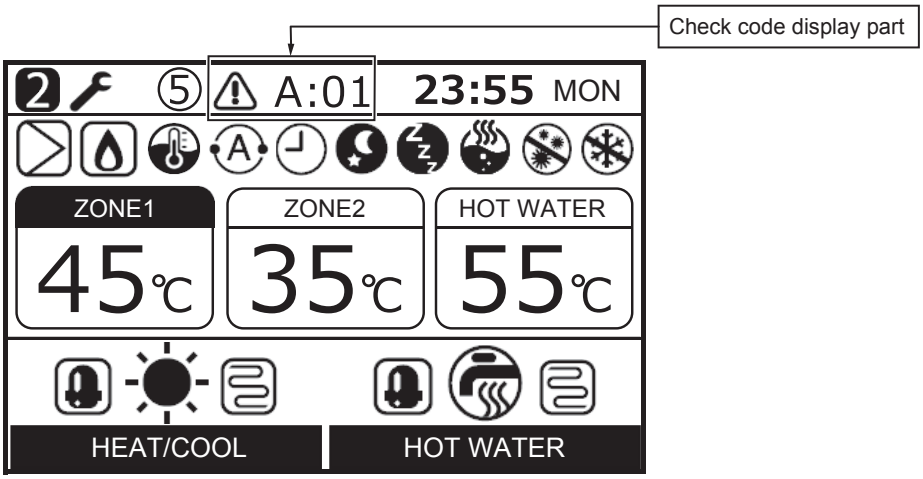
9-3-1. Procedure of defect diagnosis

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



9-3-2. 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 errors.
Since a hardware error 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.



9-3-3. 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 error will be displayed again until the hardware repair is completed.

9-3-4. How to diagnose by error 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	**Pump or flowing quantity error** 1) Detected by TC sensor TC≥63 °C is detected in the heating or hot water supply heat pump operation (except for defrosting).	Heating × Hot water O	×	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	4	94
	2) Detected by flow switch abnormality When no signal of the flow switch is showing 2 min after the built-in circulation pump operation started.				8	94
	3) Detection of chattering abnormality in the flow switch input Chattering detection: Detects input changes (OFF⇔ON) 4 times within 10 seconds during operation.				8	94
	4) Disconnection of the flow switch connector When the stopped built-in circulation pump starts its operation, the flow switch status is detecting "water flow".			1. Disconnection of the flow switch connector. 2. Defect of the flow switch.	2	94
A02	**Temperature increase error** (heating) When one of the TWI, TWO and THO sensors exceeds 70 °C.	Heating × 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	95
A03	**Temperature increase error** (hot water supply) When the TTW sensor exceeds 85 °C.	Heating O Hot water ×	O	1. Check the hot water cylinder sensor (TTW). 2. Check the hot water cylinder thermal cut-out.	1	96
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≤10 °C is detected during defrosting.	O	×	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 Switch.	Heating8 Hot water8 Cooling4	97
A05	**Piping antifreeze operation** Activating the heater under the condition of TWO<4orTWI<4orTHO<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	98

Check code	Diagnostic functional operation			Determination and action	Number of abnormalities for confirmation	Detailed item
	Operational cause	Backup operation	Automatic reset			
A07	**Pressure switch operation** The pressure switch operates for 300 sec continuously during the heat pump operation.	O	×	1. Almost no or little water flow. 2. Defect of the flow switch. 3. On-load operation under the above conditions. 4. Defect in the pressure switch.	1	99
A08	**Low pressure sensor operation error** The low pressure sensor detected 0.2 MPa or less.	O	×	1. Almost no or little water flow. 2. Defect of the flow switch. 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	100
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 × Hot water O	×	1. No water (heating without water) or no water flow. 2. Defect of the flow switch.	2	101
				3. Defect of the backup heater (poor automatic reset thermostat).	1	
A10	**Antifreeze operation (2)** When TC-TWO<-15K detected in cooling mode.	O	×	1. Almost few water flow. 2. Defect of the flow switch. 3. Low refrigerant.	10	102
A11	**Operation of the release protection** When the TWO release counts to 10.	Heating Cooling × Hot water O	×	1. Almost no water flow. 2. Defect of the flow switch. 3. Check the water outlet temperature sensor (TWO).	10	103
A12	**Heating, hot water heater** 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	104
A13	**Pump error**	Heating × Hot water O	×	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. • Once turn off the power supply to the system and turn on again and operate the system. 2. Check the Flow switch in the Hydro unit.	2	105
E03	**Regular communication error 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.	×	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 error 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	105
E08	**Duplicate address of Hydro unit, or Duplicate master Hydro unit during Group control**	×	O	1. Set the address No. of the Rotary switch "SW01" correctly for each Hydro unit.	1	—
E18	**Regular communication error between master Hydro unit and slave Hydro unit during Group control**	×	O	1. Check the Hydro unit connection. • Miswiring of the master and slave Hydro unit.	1	—
F03	**TC sensor error** 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	106
F10	**TWI sensor error** 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	108
F11	**TWO sensor error** Open or short circuit in the water outlet temperature sensor.	Heating × Hot water O	O	1. Check the resistance value and connection of the water outlet temperature sensor (TWO).	1	108

Check code	Diagnostic functional operation			Determination and action	Number of abnormalities for confirmation	Detailed item
	Operational cause	Backup operation	Automatic reset			
F14	**TTW sensor error** Open or short circuit in the hot water cylinder sensor.	Heating × Hot water O	O	1. Check the resistance value and connection of the hot water cylinder sensor (TTW).	1	109
F17	**TFI sensor error** Open or short circuit in the floor temperature sensor. (Only when zone 2 is used)	Heating × Hot water O	O	1. Check the resistance value and connection of the floor-inlet temperature sensor (TFI).	1	109
F18	**THO sensor error** Open or short circuit in the heater outlet temperature sensor.	Heating × Hot water O	O	1. Check the resistance value and connection of the heater outlet temperature sensor (THO).	1	109
F19	**Detection of THO disconnection error** When TWO–THO>15K is detected and 30 sec elapsed.	Heating × Hot water O	×	1. Check for any disconnection of the heater outlet temperature sensor (THO). 2. Defect of the flow switch.	1	110
F20	**TFI sensor error** When TWO–TFI>40K is detected and TFI<TWI–5K is detected 60 sec.	Heating × Hot water O	×	1. Check the connection of the floor-inlet temperature sensor (TFI).	1	111
F23	**Low pressure sensor error** When PS<0.07 MPa is detected for 90 sec or more. (cooling, defrosting) When PS<0.07 MPa is detected for 10 min or more. (hot water supply, heating)	O	O	1. Check the connection (body or connection wiring) of the low pressure sensor. 2. Check the resistance value of the low pressure sensor. 3. Check the refrigeration cycle (gas leak).	1	112
F29	**EEROM error** Inconsistency is detected once without verify ACK after writing to EEPROM.	×	×	1. Replace the water heat exchange control board.	1	112
F30	**Extended IC error** When the extended IC is abnormal.	×	×	1. Replace the water heat exchange control board.	1	112
L02	**Combination error** Model name of the hydro unit is different.	×	×	1. Check the model name of the hydro unit. 2. Check DP_SW13_4 is set to "OFF".	1	—
L07	**Communication error** Individual hydro units have a group line.	×	×	1. Replace the water heat exchange control board.	1	112
L09	**Communication error** The capability code for the hydro unit has not been set.	×	×	1. Check the setting of the FC01 capability specifications. HWS-805xx-E = 0012 HWS-1405xx-E = 0017	1	113
L16	**Setting error** When ZONE1 has not been set, while ZONE2 has been set.	×	×	1. Check the body DP-SW12_2,3.	1	113
P31	**Slave Hydro unit error which occurs when error occurs in master Hydro unit**	×	O	1. Check the remote controller connection. 2. Defect in the remote controller. 3. Set the address No. of the Rotary switch "SW01" correctly for each Hydro unit.	1	—

Defect mode detected by the Outdoor Unit

Check code	Diagnostic functional operation			Determination and action	Number of abnormalities for confirmation	Detailed item
	Operational cause	Backup operation	Automatic reset			
F04	**TD sensor error** Open or short circuit in the discharge temperature sensor.	O	×	1. Check the resistance value and connection of the discharge sensor (TD).	4	107 123
F06	**TE sensor error** Open or short circuit in the heat exchange temperature sensor.	O	×	1. Check the resistance value and connection of the heat exchange temperature sensor (TE).	4	107 123
F07	**TL sensor error** Open or short circuit in the heat exchange temperature sensor.	O	×	1. Check the resistance value and connection of the heat exchange temperature sensor (TL).	4	107 123
F08	**TO sensor error** Open or short circuit in the outdoor temperature sensor.	O	×	1. Check the resistance value and connection of the outdoor temperature sensor (TO).	4	108 124
F12	**TS sensor error** Open or short circuit in the suction temperature sensor.	O	×	1. Check the resistance value and connection of the suction temperature sensor (TS).	4	124
F13	**TH sensor error** Open or short circuit in the heat-sink temperature sensor.	O	×	1. Check the resistance value and connection of the heat-sink temperature sensor (TH).	8	124
F15	**TE, TS sensors error** TE, TS sensor connections are opposite.	O	×	1. Check for any wrong installation of the heat exchange temperature sensor (TE) and the suction temperature sensor (TS).	4	124
F31	**EEPROM error**	O	×		1	125
H01	**Compressor breakdown** 1 When the operation frequency lowers due to the current release 40 sec or later after the compressor activation and it stops by underrunning the minimum frequency. 2 When the operation frequency lowers due to the current limit control and it stops by underrunning the minimum frequency. 3 When an excess current is detected 0.8 sec or later after the compressor activation.	O	×	1. Check the power supply voltage (AC220-230 V±10%: single phase type). (AC380-400 V±10%: 3 phase type). 2. Over-loaded condition of the refrigeration cycle. 3. Check that the service valve is fully open.	8	114
H02	**Compressor lock** 1 When the input current is more than zero 20 sec or later after the compressor activation and the activation has not been completed.	O	×	1. Defect of compressor (lock) – Replace the compressor. 2. Defect of compressor wiring (open phase).	8	115
H03	**Defect in the current detection circuit**	O	×	1. Replace the outdoor inverter control board.	8	—

Check code	Diagnostic functional operation			Determination and action	Number of abnormalities for confirmation	Detailed item
	Operational cause	Backup operation	Automatic reset			
H04	**Operation of case thermostat** When the case thermostat exceeds 125 °C.	O	×	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	115
L10	**Unset service PC board jumper** Jumpers J800-J803 have not been cut.	O	×	1. Cut J800-J803.	1	116
L15	**Combination error** Model name of the outdoor unit is different.	×	×	1. Check the model name of the outdoor unit.	1	116
L29	**The communication between the outdoor PC board MUCs error** No communication signal between IPDU and CDB.	O	×	1. Replace the outdoor control board.	1	116
P03	**The outlet temperature error** When the discharge temperature sensor (TD) exceeds 111 °C.	O	×	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	116
P04	**The high pressure switch error**	O	×		10	117
P05	**The power supply voltage error** When the power supply voltage is extremely high or low.	O	×	1. Check the power supply voltage. (AC220-230 V±10%: single phase type). (AC380-400 V±10%: 3 phase type).	8	118
P07	**Overheating of heat-sink error** When the heat-sink exceeds 105 °C.	O	×	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. 3. Check the resistance value of the heat-sink temperature sensor (TH).	4	118
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.	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).	8	119
P19	**The 4-way valve inversion error** 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	120

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 heat exchange temperature sensor (TL) detects 63 °C during the cooling operation. When the water outlet sensor (TWO) detects 60 °C during the heating or hot water supply operation.	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 resistance value of the heat exchange temperature sensor (TL) and the water outlet temperature sensor (TWO).	10	121
P22	**Outdoor fan system error** 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. (AC220~230 V±10%: single phase type) (AC380~400 V±10%: 3 phase type)	8	122
P26	**Short circuit of the compressor driver element error** When an abnormal short circuit of IGBT is detected.	O	×	1. P26 abnormality occurs when operating with the compressor wiring disconnected … Check the control board. 2. No abnormality occurs when operating with the compressor wiring disconnected … Compressor rare short.	8	122
P29	**Compressor rotor position error** 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 inverter control board. 2. Check the wire wound resistor of the compressor. Short circuit … Replace the compressor.	8	122

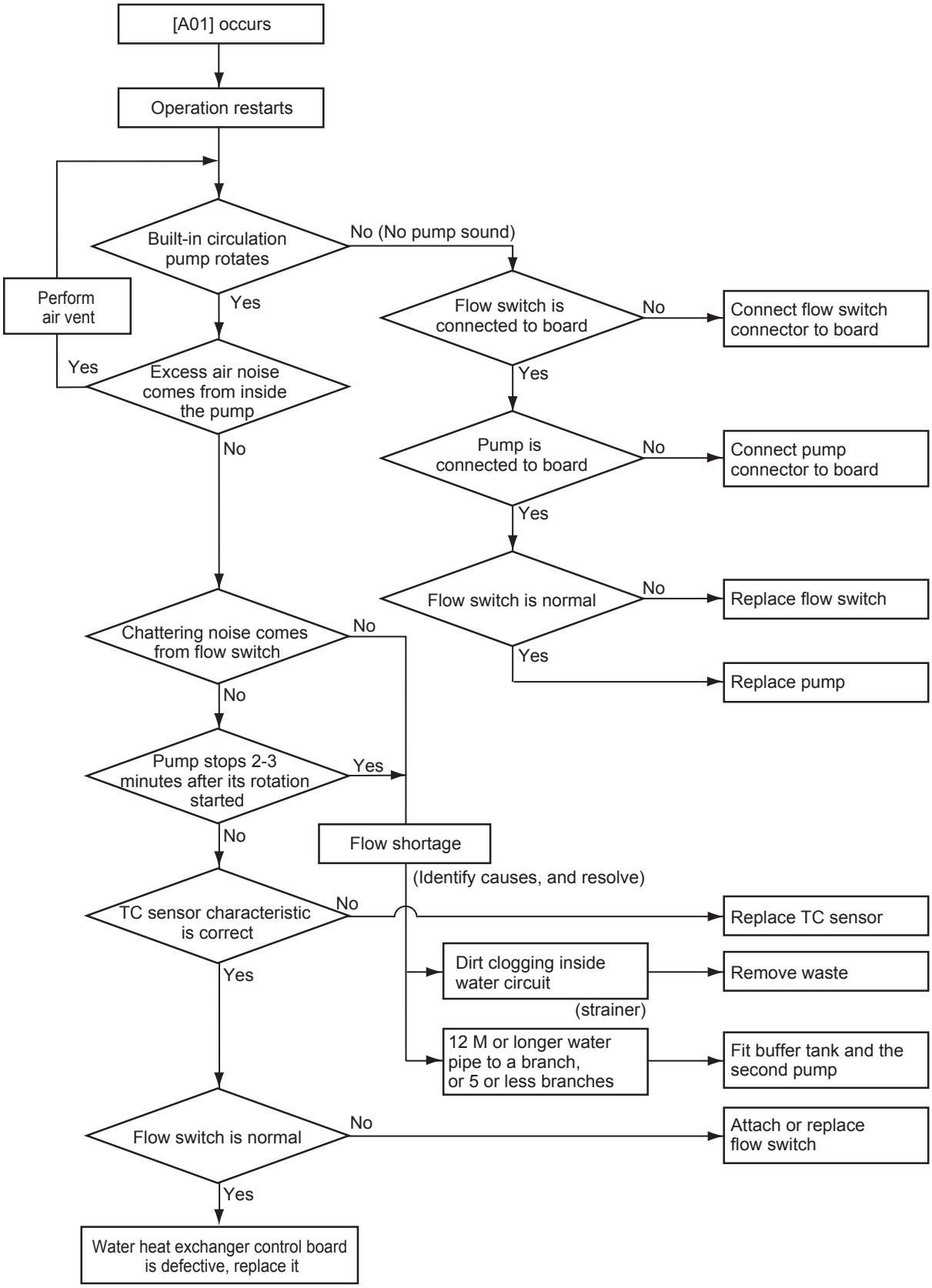
Defect mode detected by the remote controller

Check code	Diagnostic functional operation			Determination and action
	Operational cause	Status of air-conditioning	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. 2. Check the remote controller. 3. Check the hydro unit power supply wiring. 4. 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.

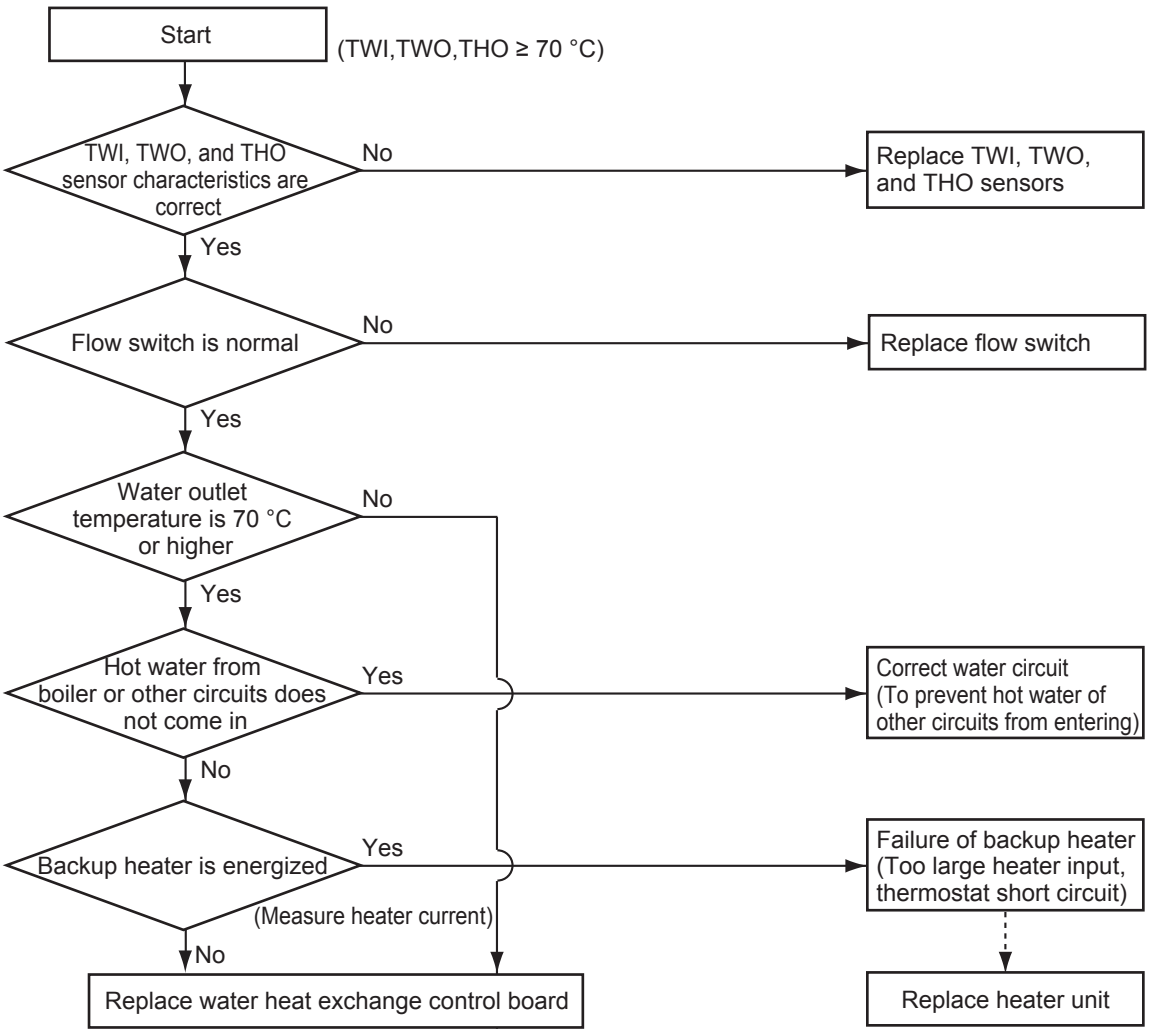
9-4. Diagnosis flow chart for each error code

9-4-1. Hydro unit failure detection

[A01] Error Pump flow determination

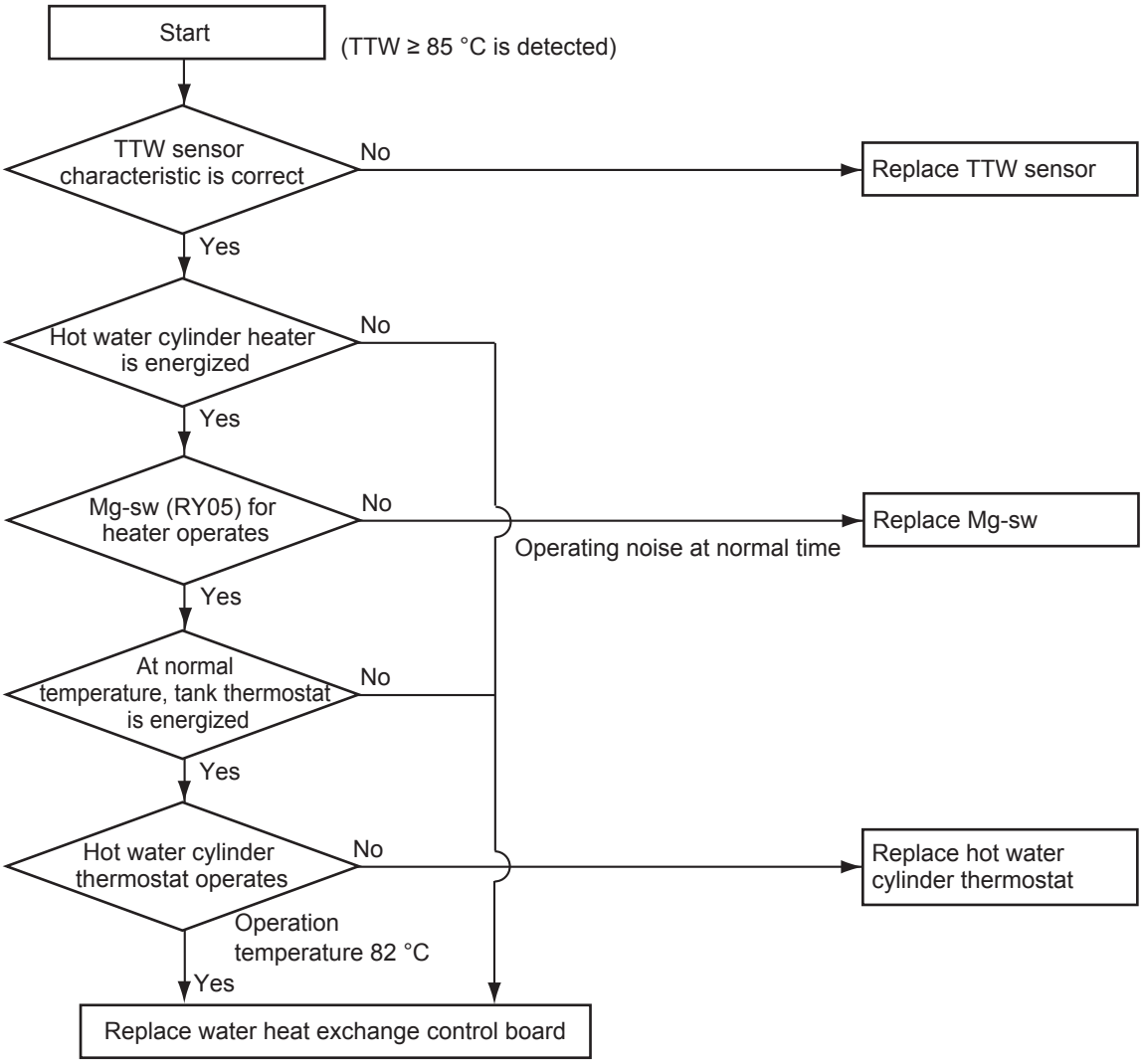


[A02] Error Temperature rise and error short circuit



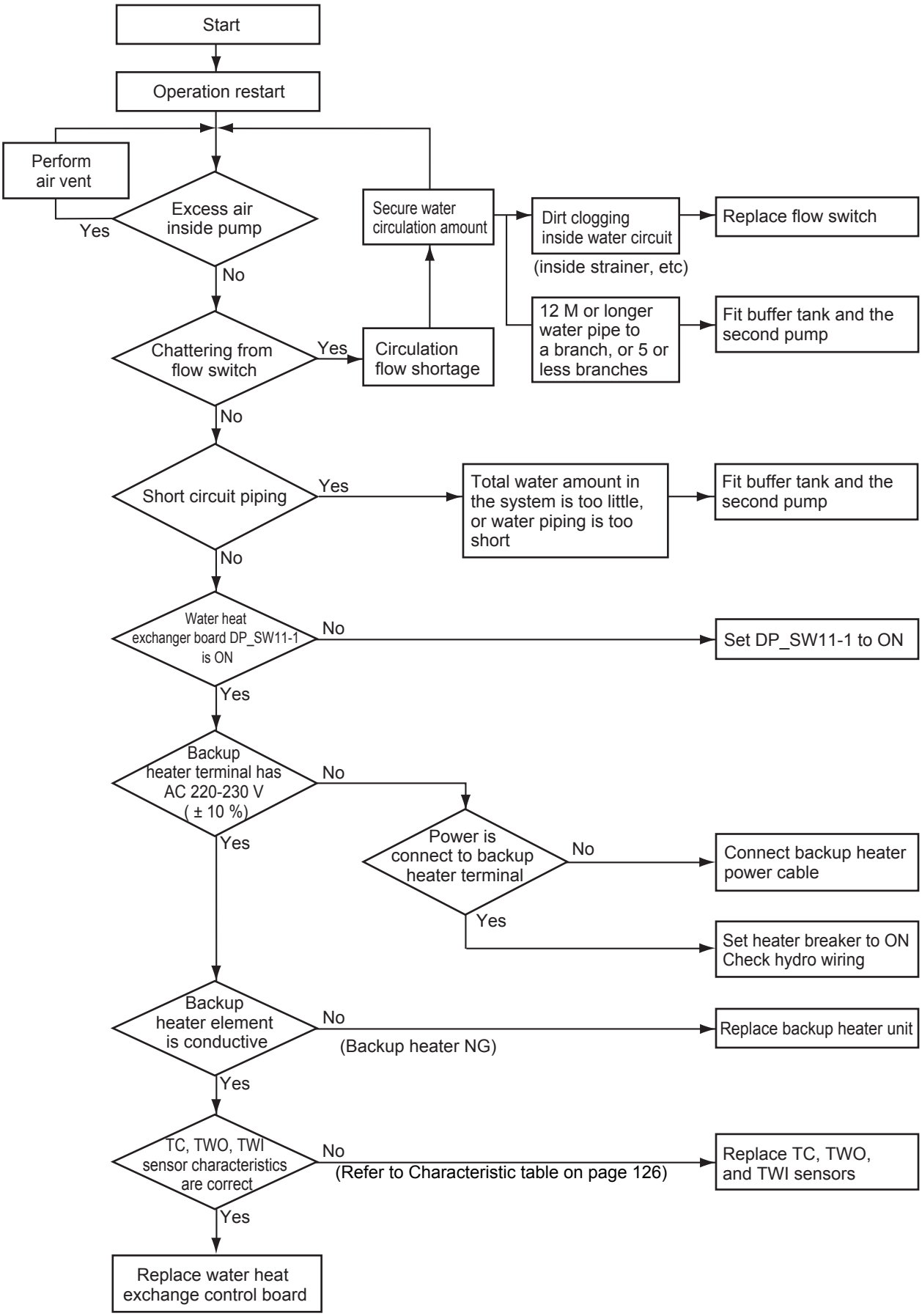
- If Boiler setting is ON (DPSW13-2 is ON) and FC62 is “1”, the A02 error is not detected.

[A03] Error Temperature rise and error short circuit

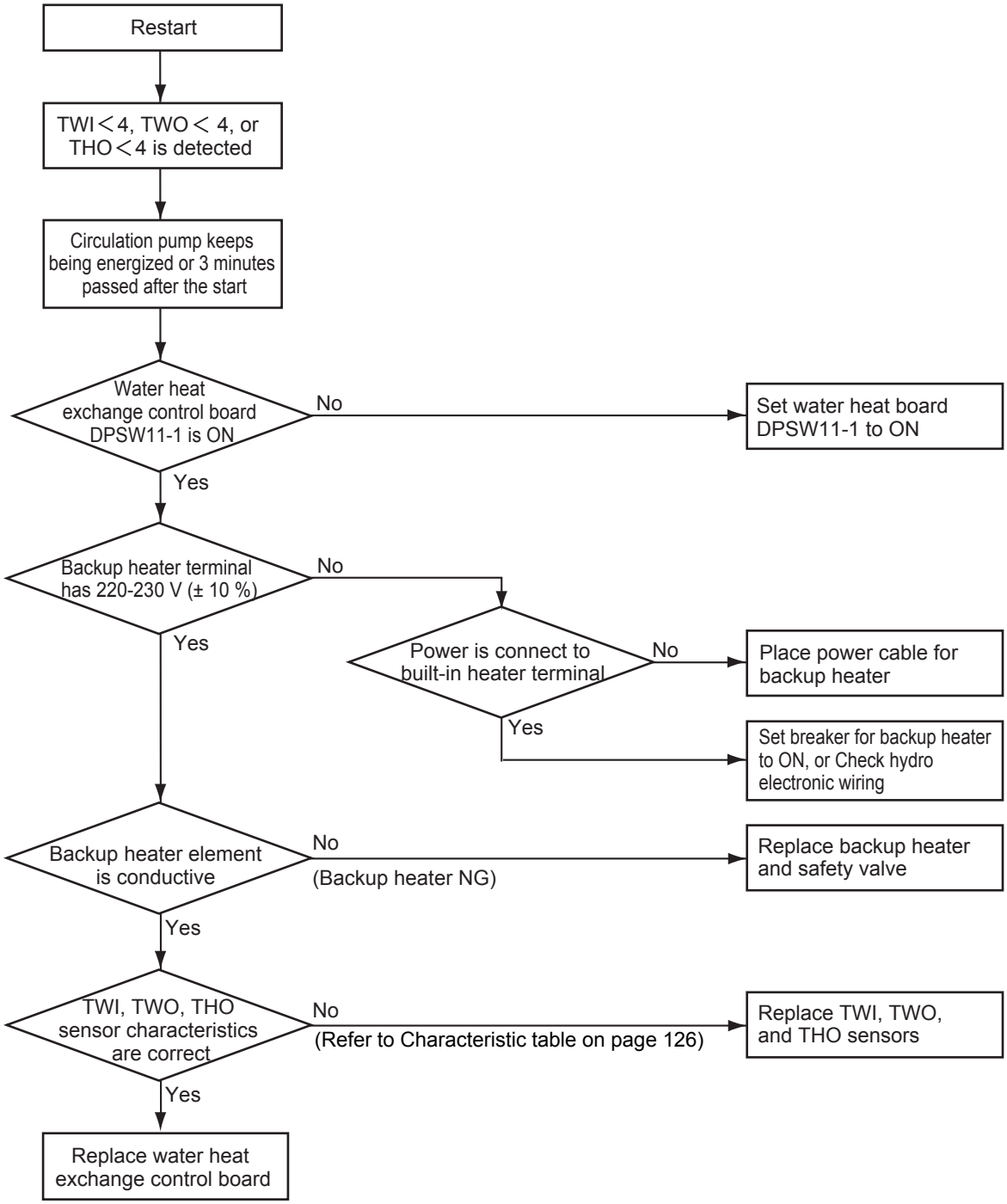


[A04] Error Freeze prevention control

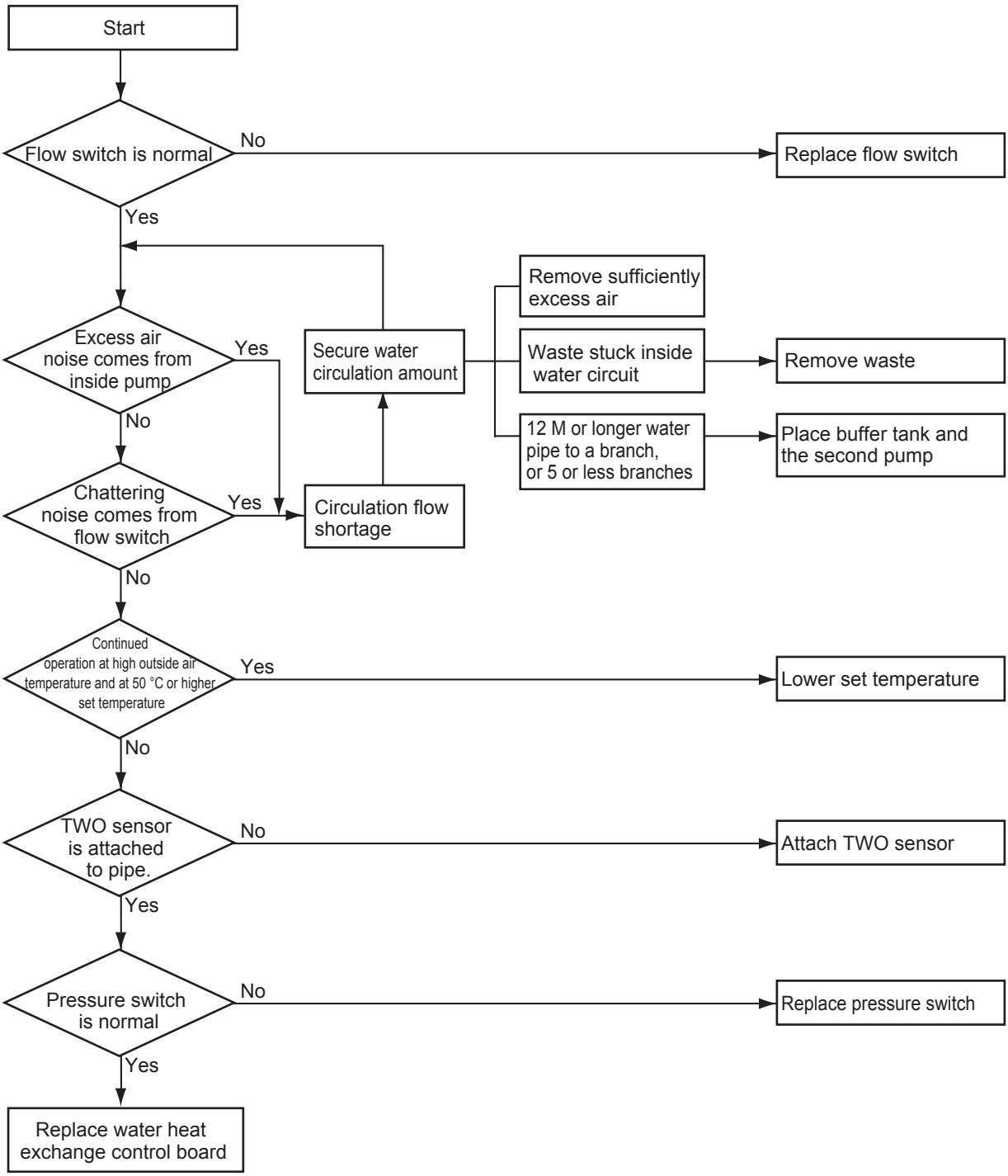
When the outside temperature and inlet water temperature is low (approx. 20 °C or lower) and the room load is large (operation frequency ≥ rating), the freeze prevention control may be activated.



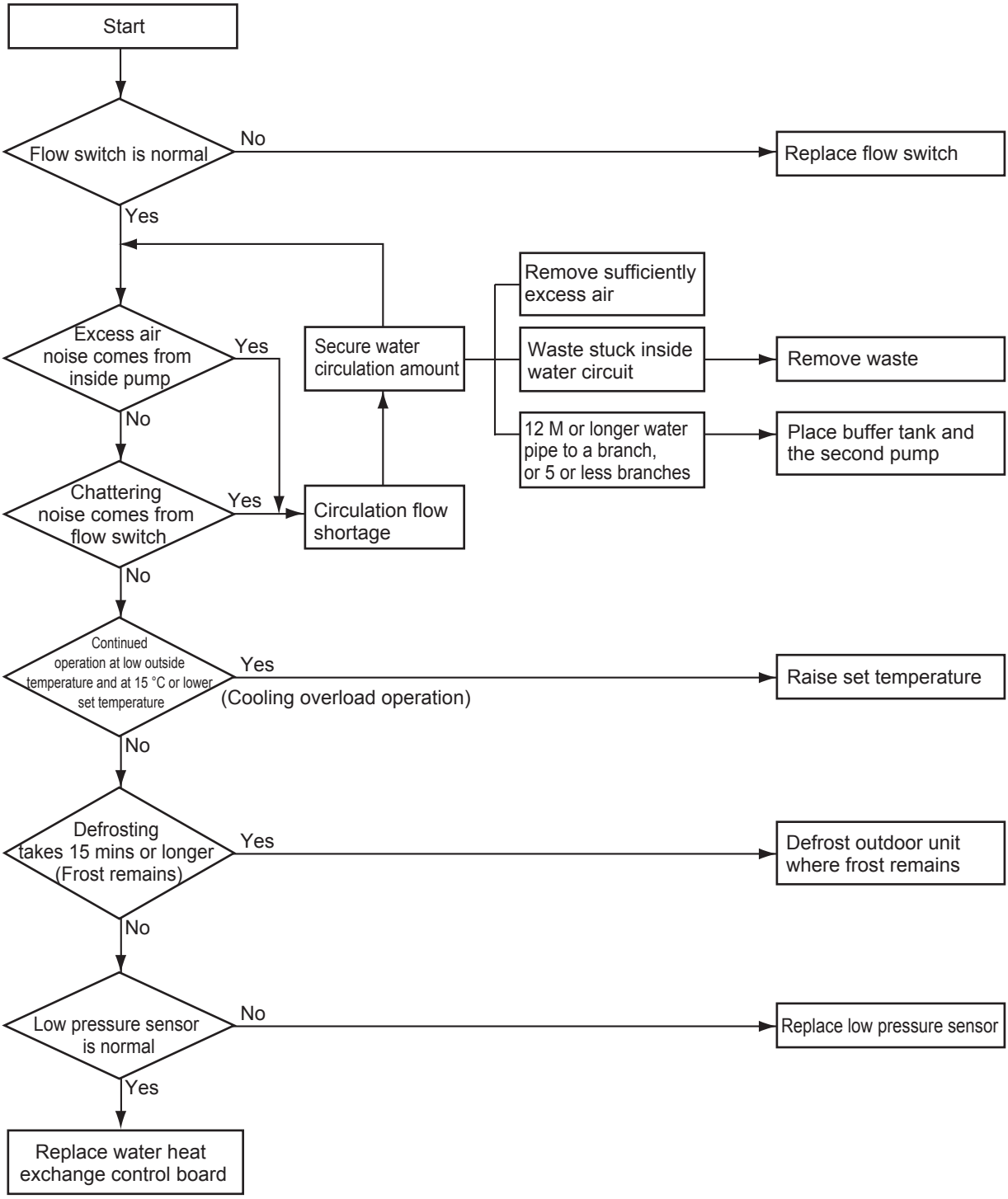
[A05] Error Piping freeze prevention control



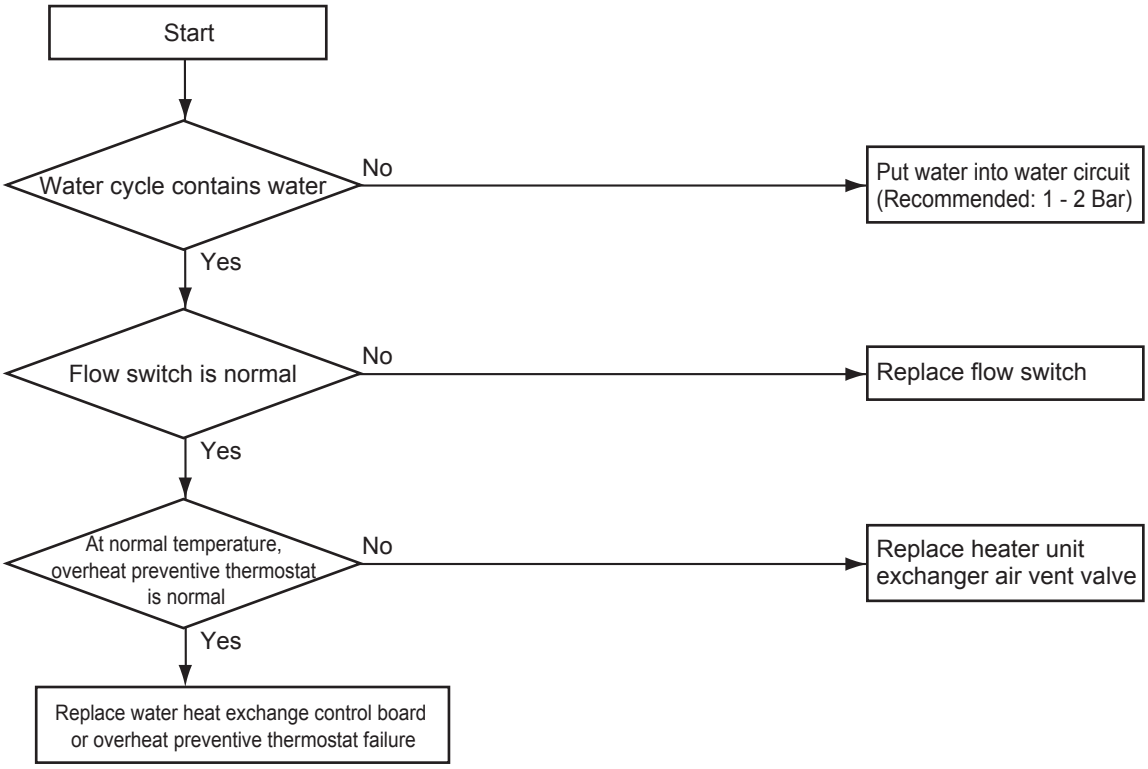
[A07] Error Pressure switch operation (Hot water supply / Heating operation)



[A08] Error Low pressure sensor lowering operation failure (Cooling / Defrosting operation)

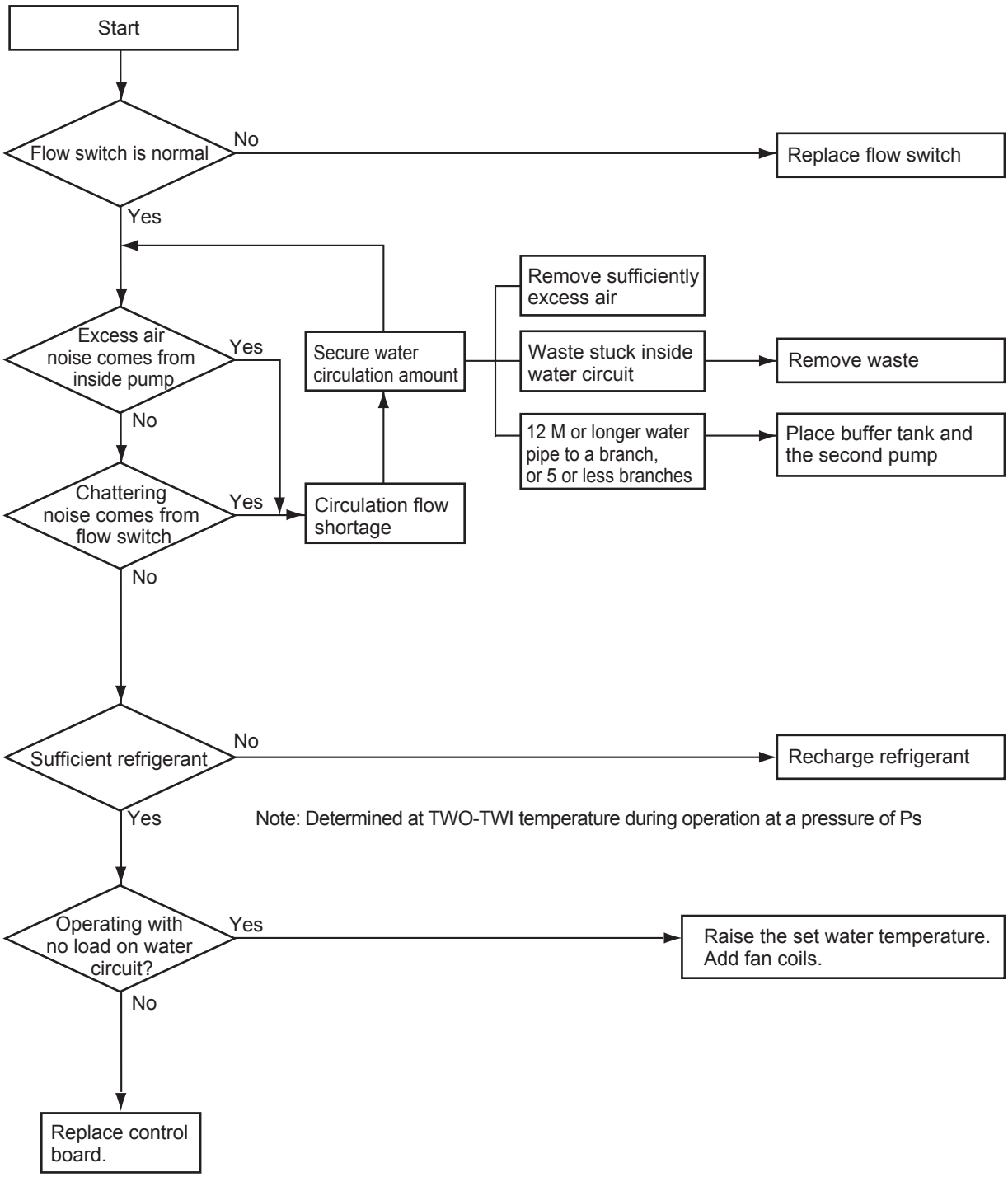


[A09] Error Overheat prevention thermostat failure (Hot water supply / Heating operation)

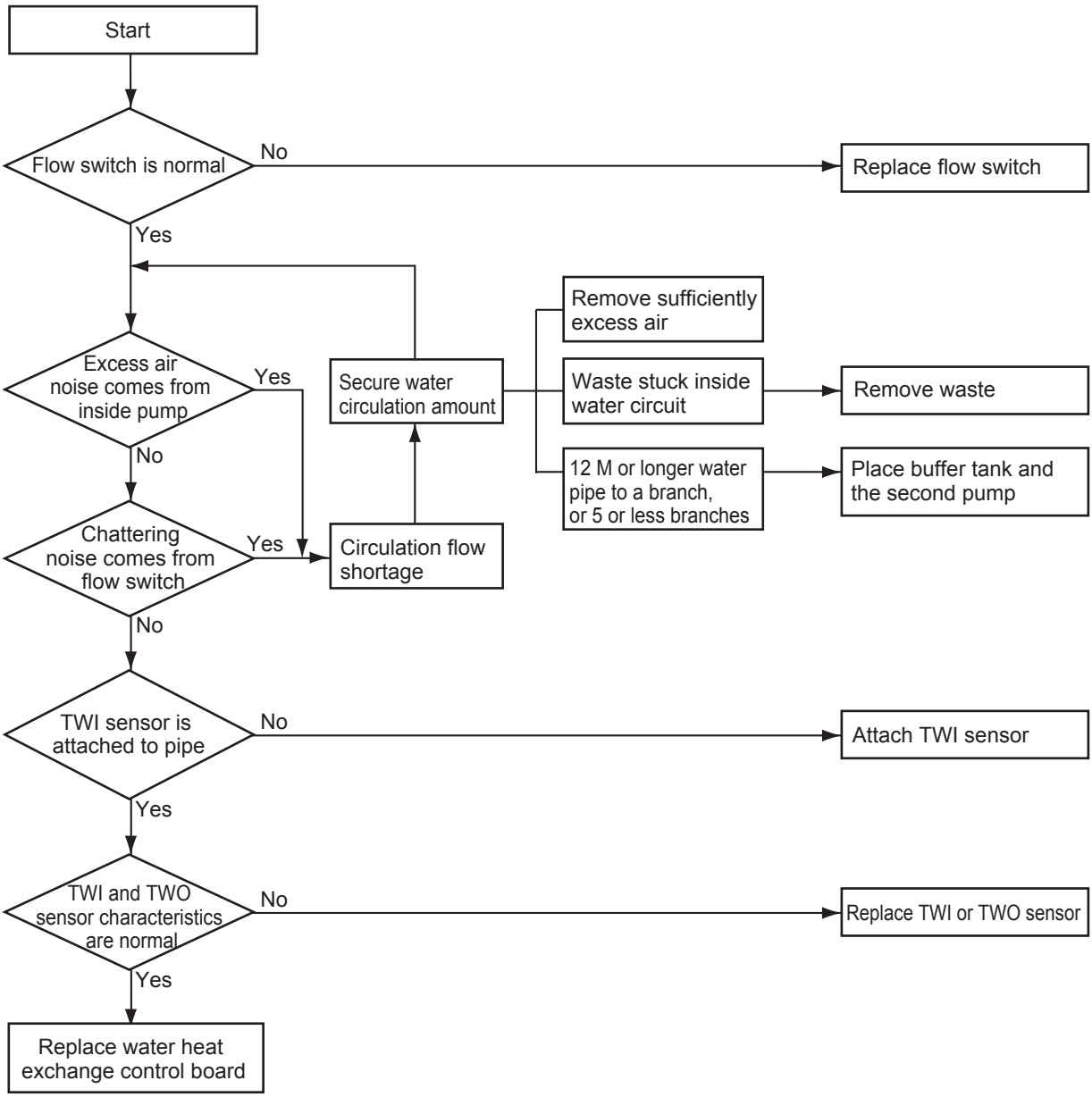


*Replace water heat exchange control board or overheat preventive thermostat failure: After the control board is replaced, if the same operation repeats, the overheat preventive thermostat is determined as defective (does not operate at 75 °C).

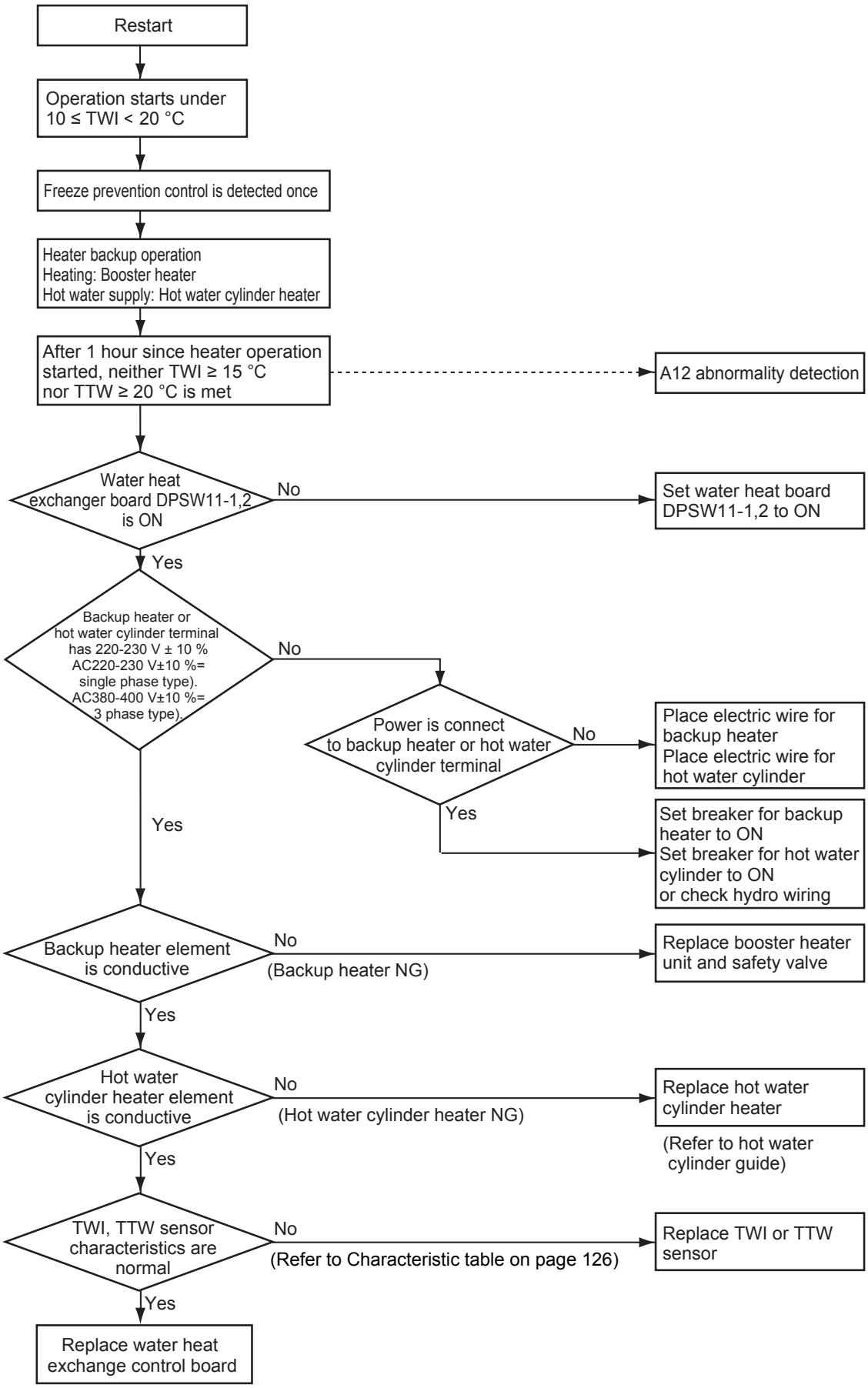
[A10] Error Freeze prevention control (2) (Cooling only)



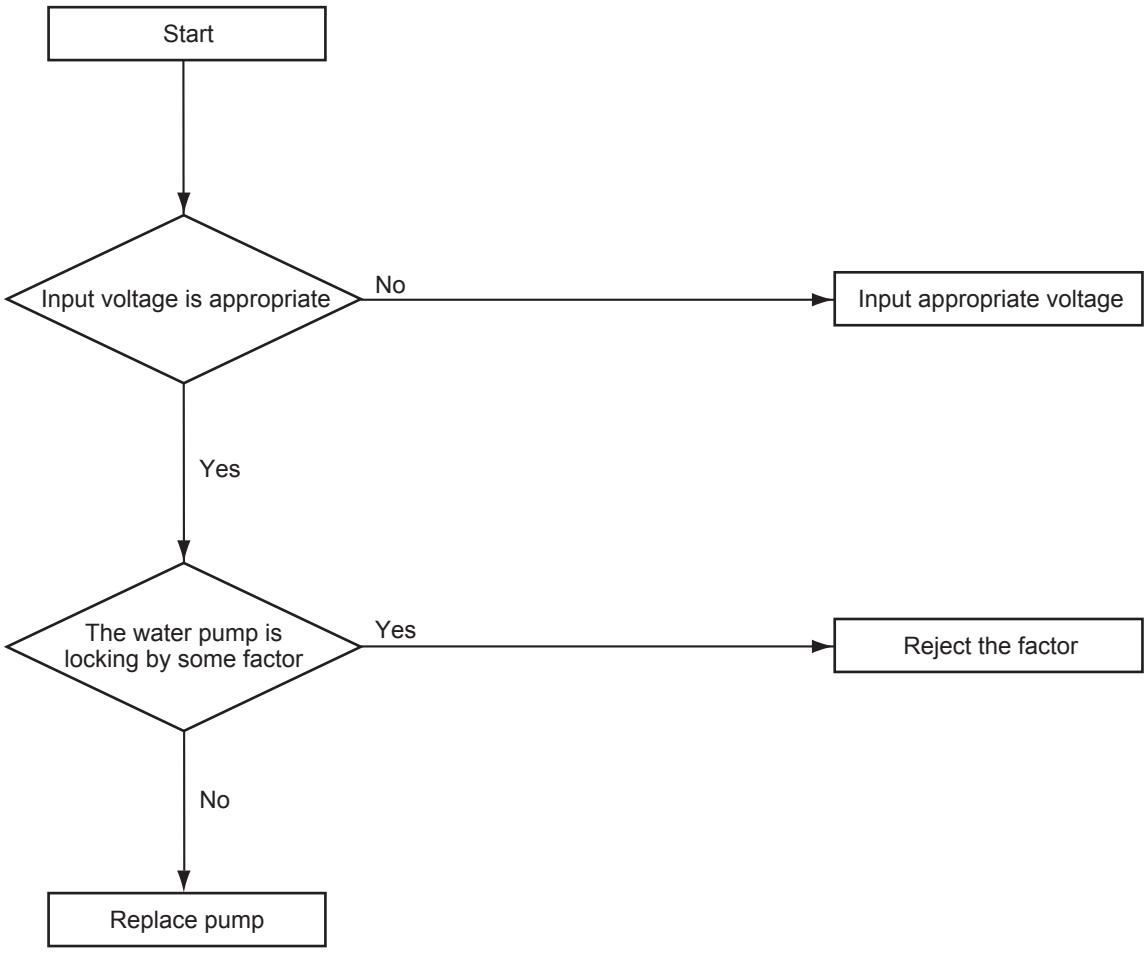
[A11] Error Release protection operation



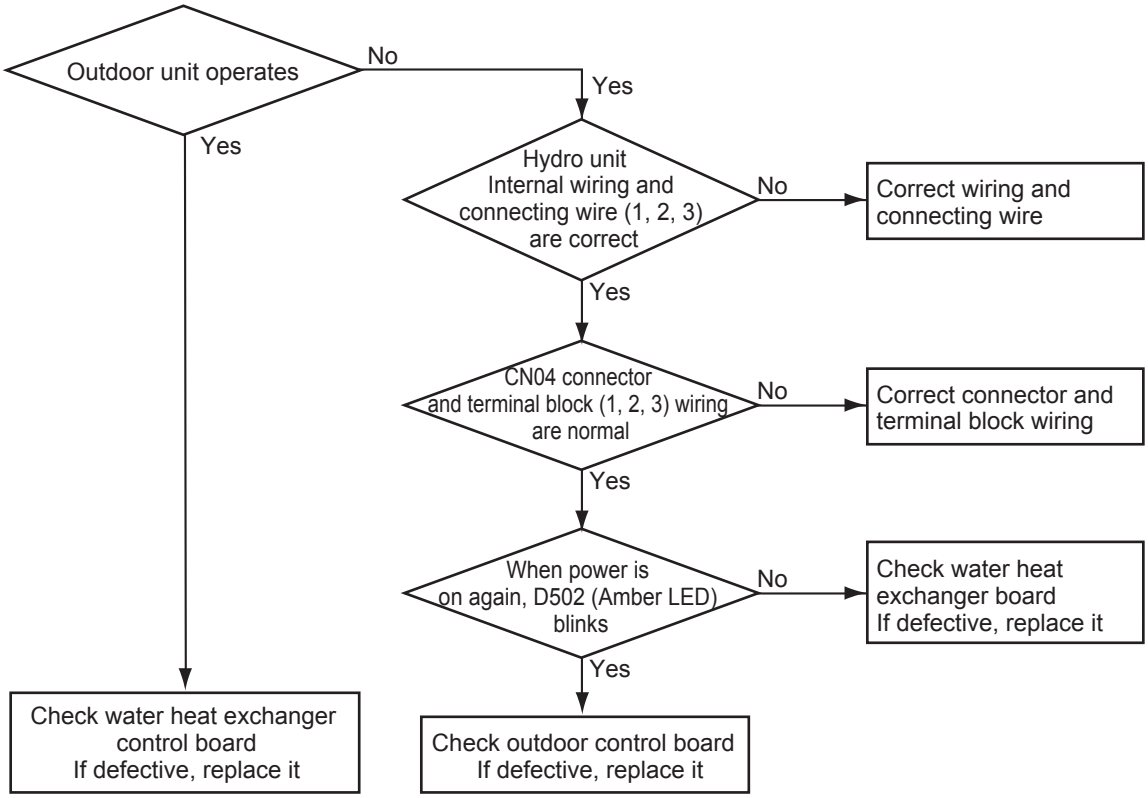
[A12] Error Heating or Hot water supply heater failure



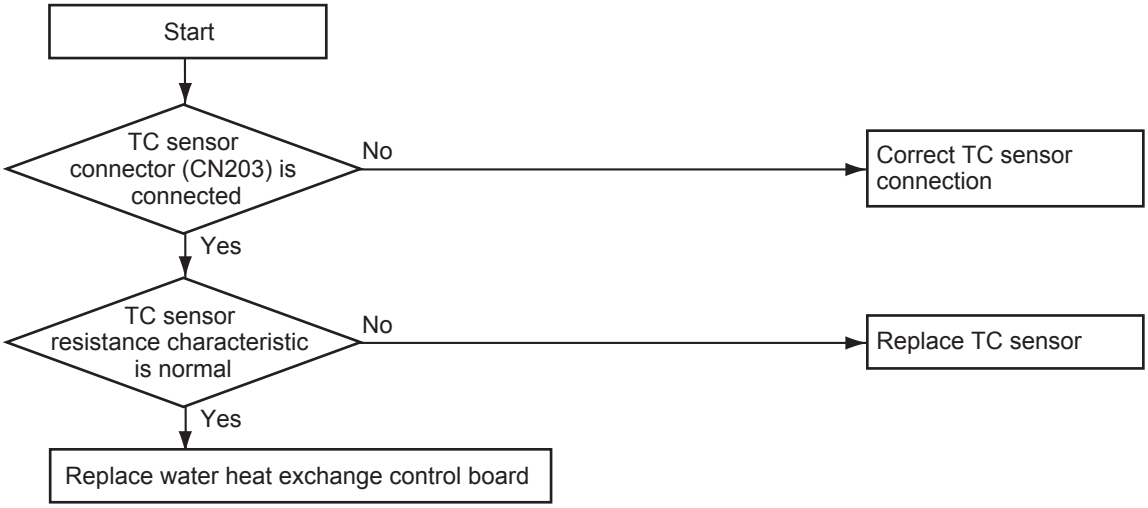
[A13] Pump error



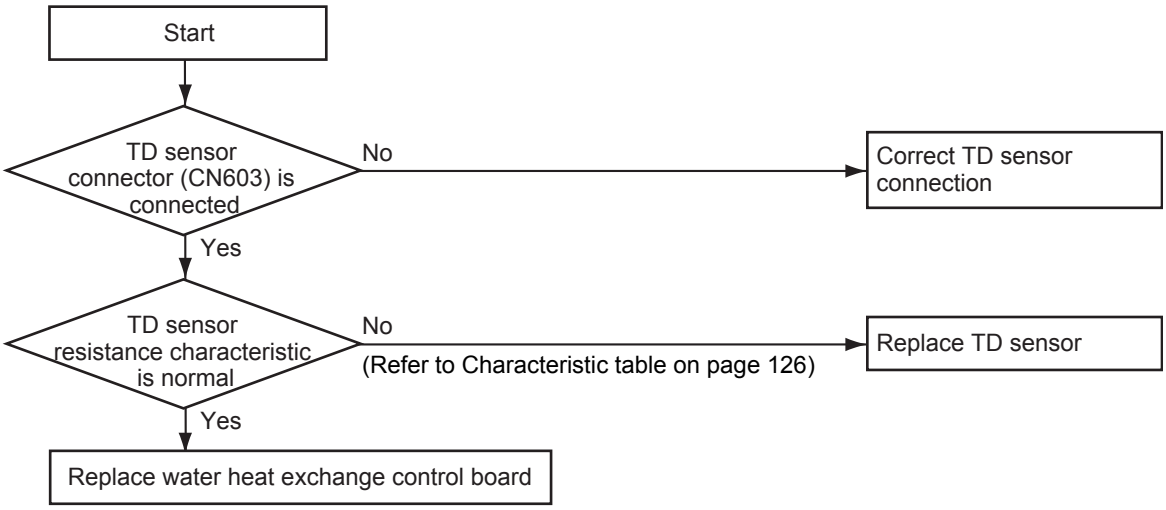
[E04] Error



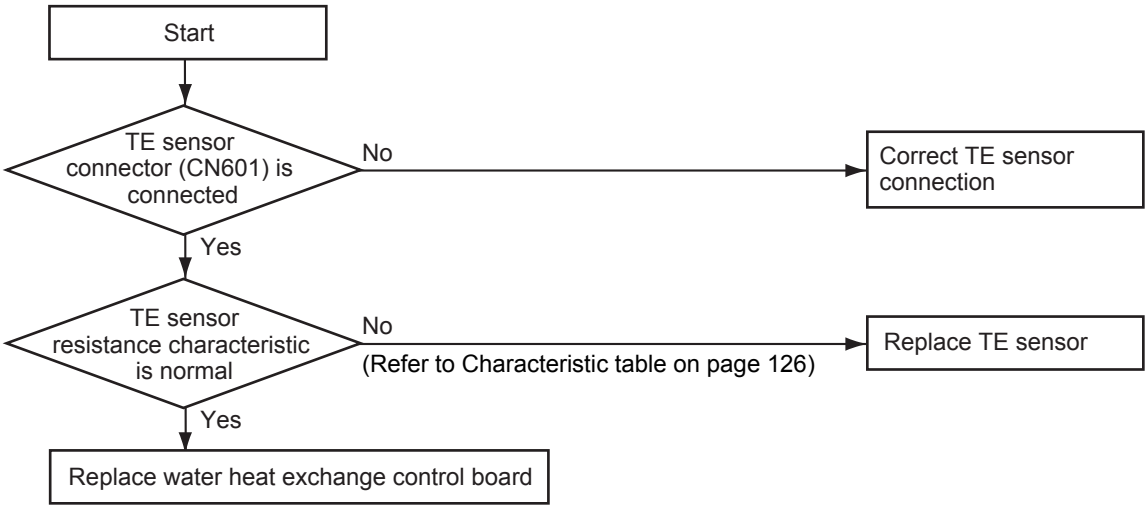
[F03] Error TC sensor failure



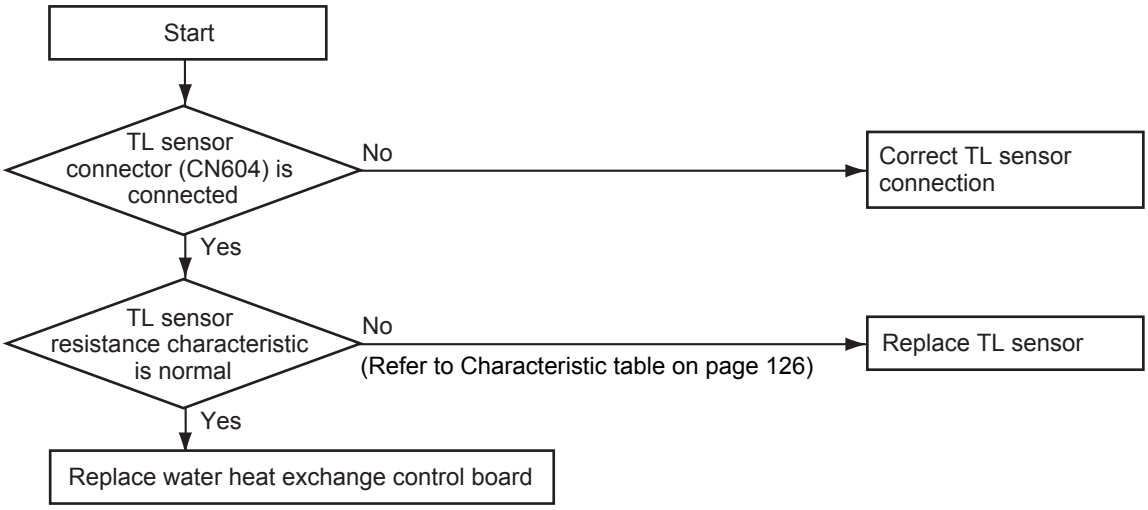
[F04] Error TD sensor failure



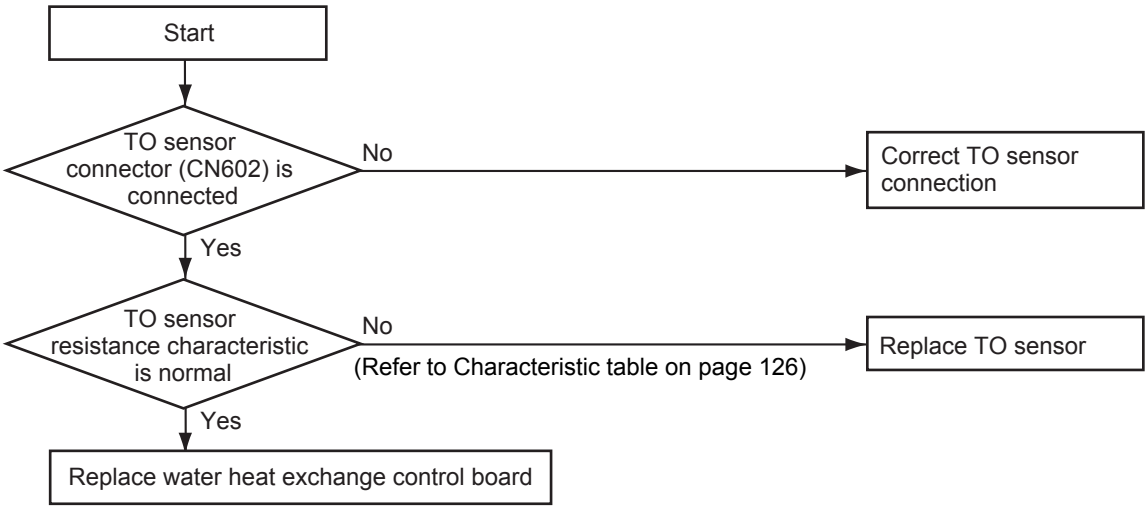
[F06] Error TE sensor failure



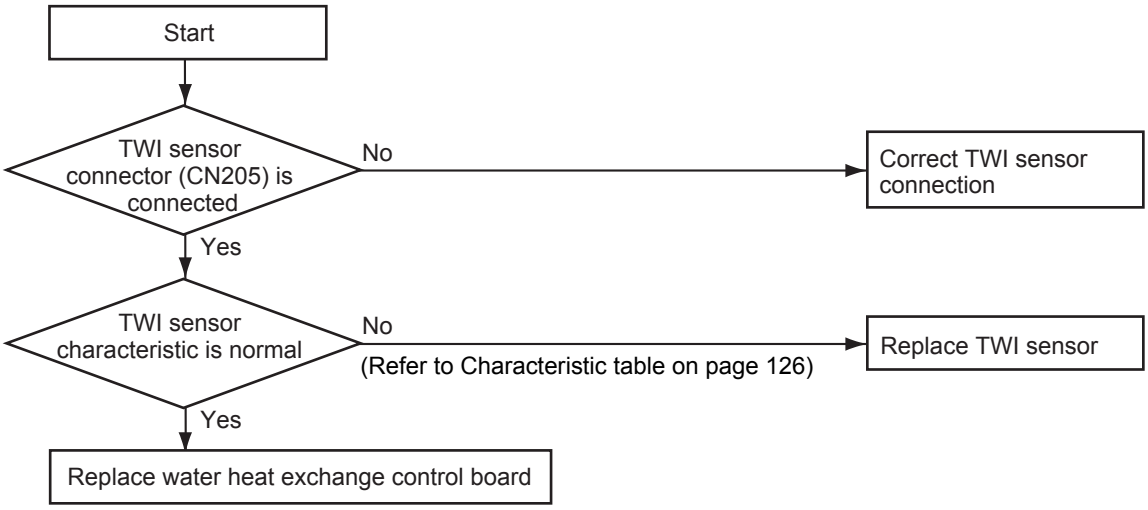
[F07] Error TL sensor failure



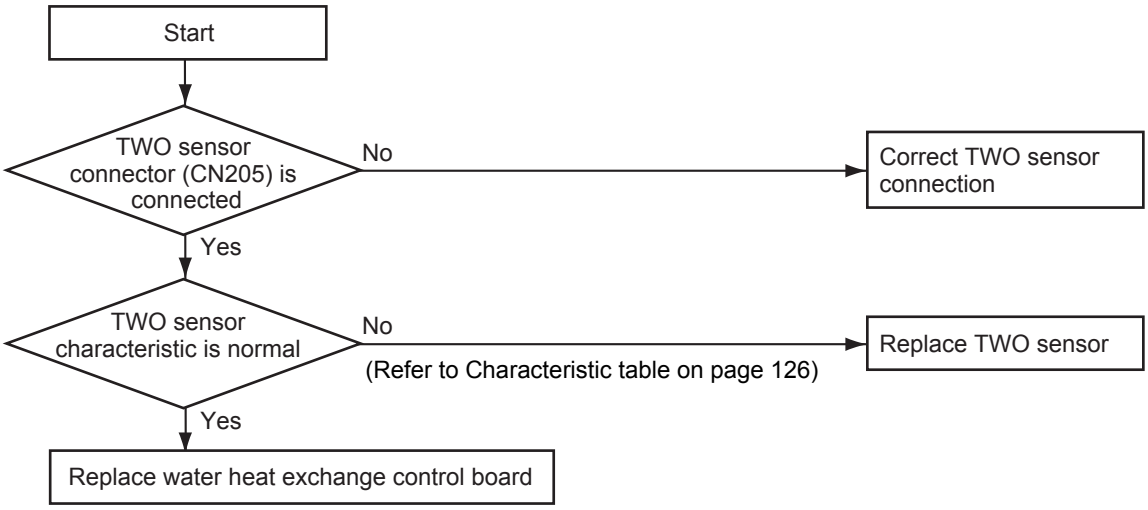
[F08] Error TO sensor failure



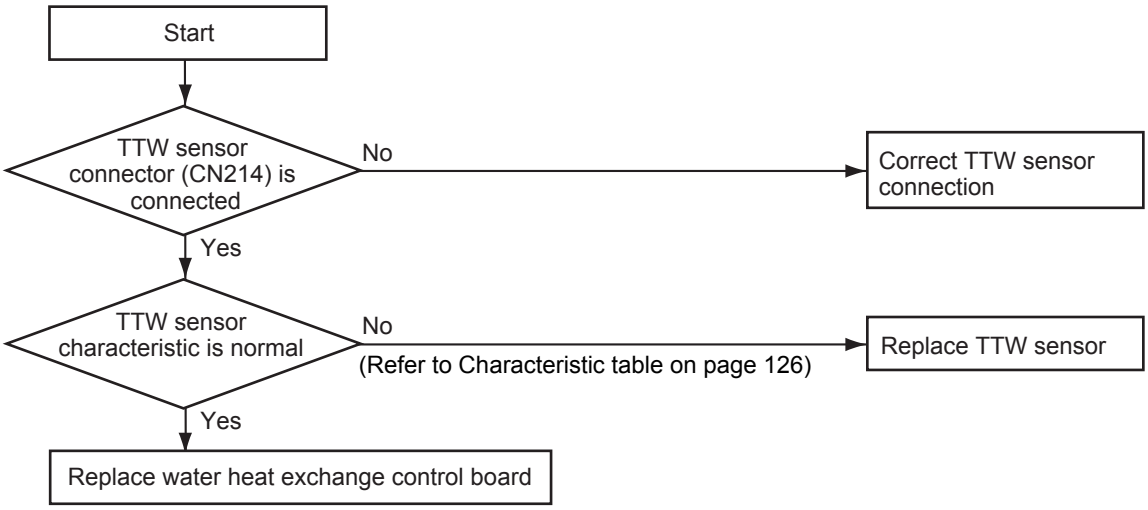
[F10] Error TWI sensor failure



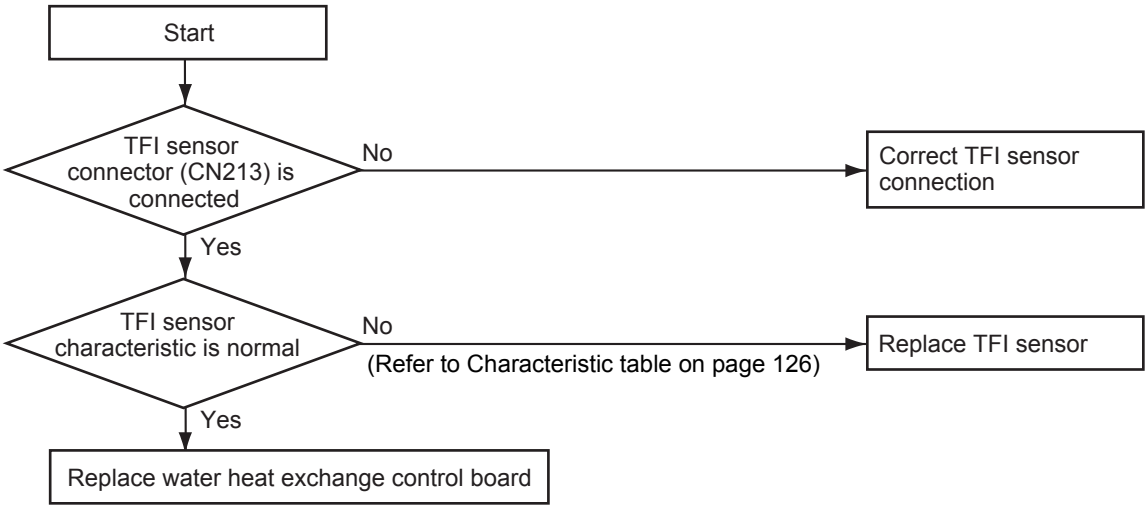
[F11] Error TWO sensor failure



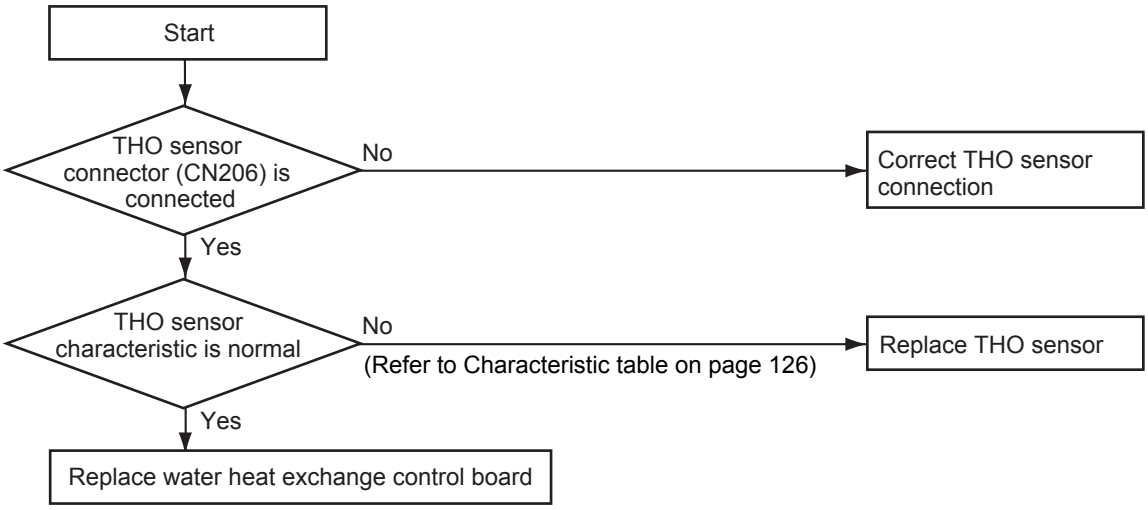
[F14] Error TTW sensor failure



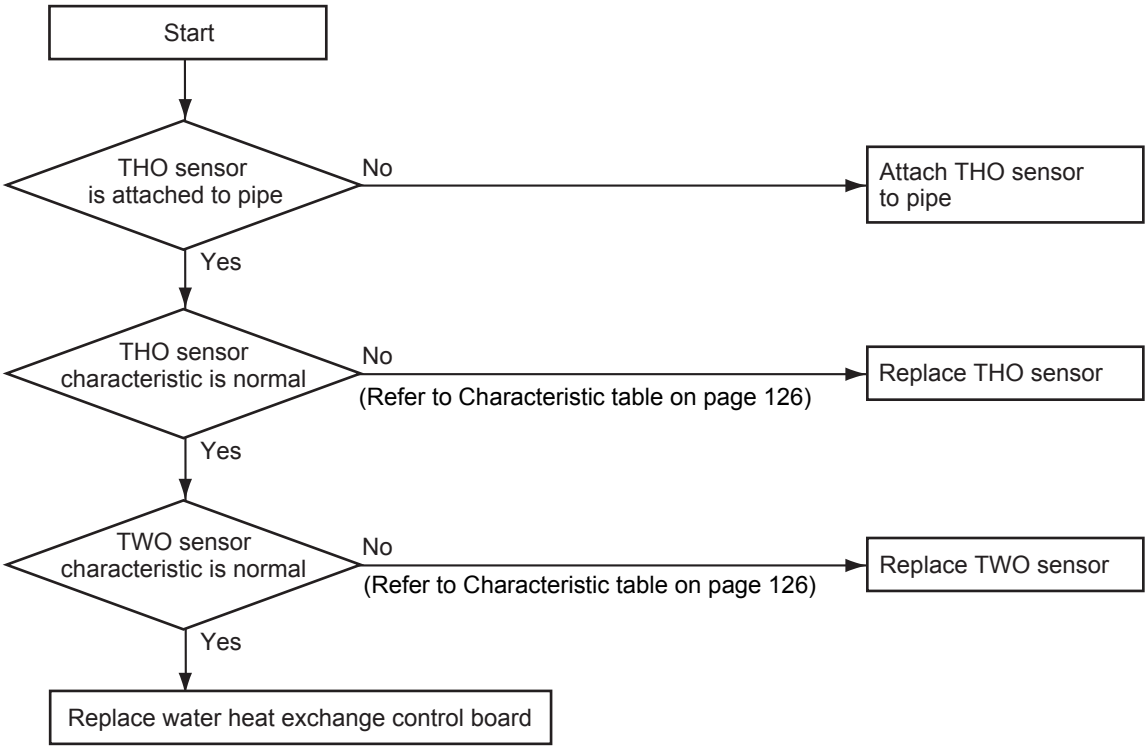
[F17] Error TFI sensor failure



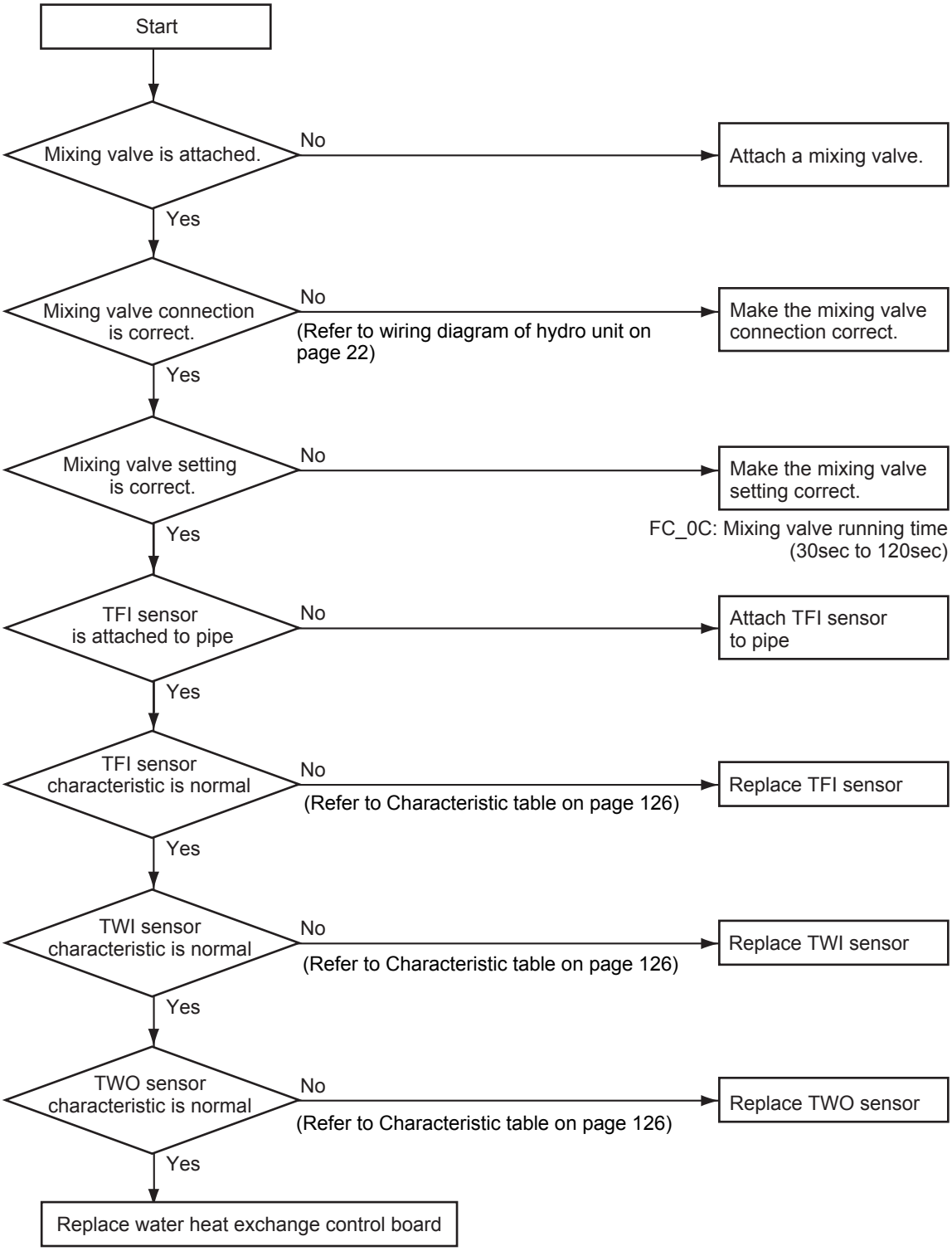
[F18] Error THO sensor failure



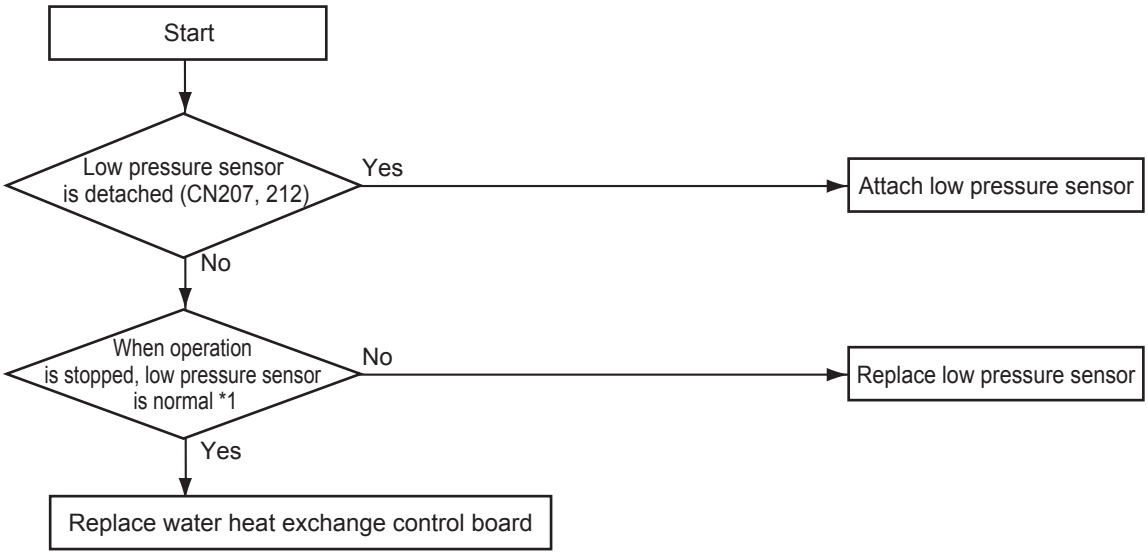
[F19] Error THO sensor detach failure



[F20] Error TFI detach failure



[F23] Error Low pressure sensor detach failure

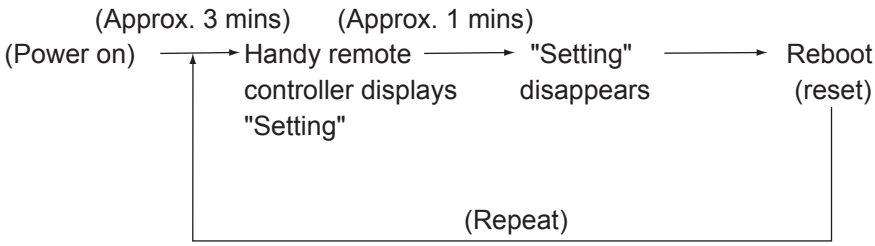


*1 How to determine: When operation is stopped

[F29] Error EEPROM failure

A failure is detected in the IC10 non-volatile memory on the water heat exchanger board during a hot water supply unit operation. Replace the service board.

* If the unit does not have EEPROM inserted when the power is turned on, or if EEPROM data read or write is unavailable, automatic address mode repeats. In this case, the intensive control unit displays [97 Abnormal].



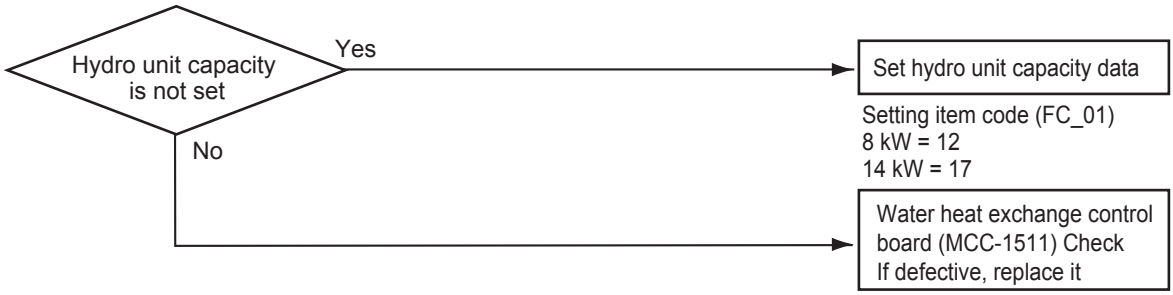
[F30] Error Enhanced IC failure

Enhanced IC on water heat exchanger control board is abnormal.
Replace the water heat exchanger control board to a service board.

[L07] Error

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] Error



[L16] Error

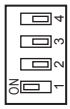
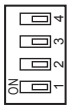
In DP_SW12-2, 3 of main unit water heat exchanger, if ZONE1 is not set and ZONE2 is set, [L16] displays abnormality.
Set correctly DP_SW12-2, 3.

9-4-2. 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 error even if it occurs only once. This may cause indication inconsistency between the remote controller and LED.

Outdoor board LED indication method

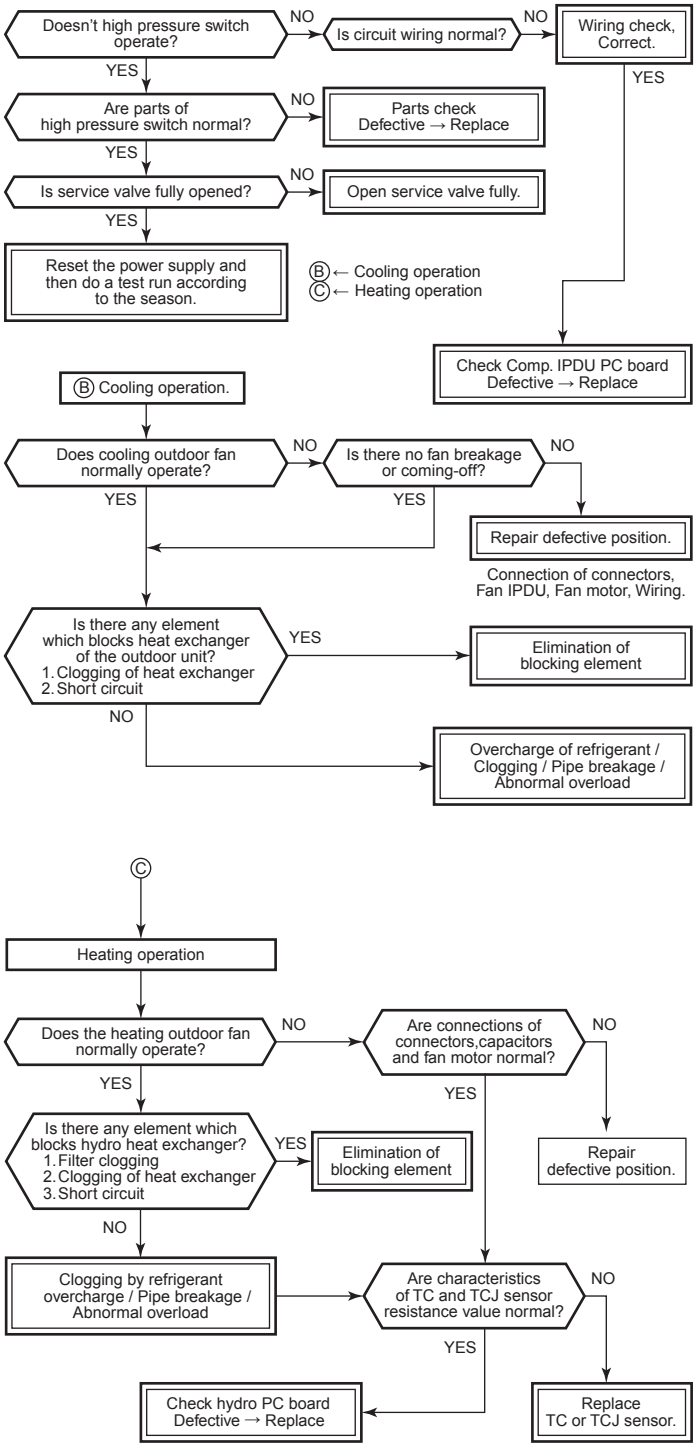
Dip switch setting • Setting 1 only of SW803 to ON indicates the latest failure. Because the error log is recorded, you can see the detail even after the power is once turned off. (Not including outside air temperature sensor (TO) failure) • After check work is done or when outside air temperature sensor (TO) failure is detected, set all the SW803 switches to OFF. (An abnormality now is indicated.)	<Latest abnormality> SW803 1 only is ON  <Abnormality now> SW803 All OFF (Initial status) 
Indication switching • One or more LEDs of D800 through D804 lit yellow indicates that a failure occurred. <Indication 1> • With the status above, pressing the SW800 button for one second causes the yellow LED to blink. <Indication 2> • Pressing again SW800 for one second or longer returns to <Indication 1>. • The combination of <Indication 1> and <Indication 2> can determine what kind of abnormality.	<Indication 1> ⇔ <Indication 2> (Normal) (Abnormality occurs) (Press SW800) D800 (yellow) ● ○ ● D801 (yellow) ● ○ ● D802 (yellow) ● ● ◎ D803 (yellow) ● ● ● D804 (yellow) ● ○ ● D805 (green) ○ ○ ○ (Example of outlet temperature sensor failure) ●…Off ○…Light ◎…Blink

Check code	Outdoor LED indication	Check and Action procedure (No specific description indicates outdoor unit parts.)
[H01]	<Indication 1> <Indication 2> ● ◎ ● ● ○ ● ● ● ○ ● ○ ○	**[Compressor fails]** Power voltage is normal. (AC220-230 V±10 %: single phase type). (AC380-400 V±10 %: 3 phase type). → No → Improve power line ↓ Yes Wiring connection is normal. Compressor lead (Board side, compressor side reactor lead, power lead) → No → Check and correct wiring connection ↓ Yes Abnormally over loaded → Yes → Deal with or remove causes ↓ No Check outdoor control board If defective, replace it PC board 805H-E (MCC-1571) 1105 to 1405H-E (MCC-1571) 1105 to 1605H8(R)-E (MCC 1596)

Check code	Outdoor LED indication	Check and Action procedure (No specific description indicates outdoor unit parts.)
[H02]	<Indication 1> <Indication 2> ● ● ● ◎ ○ ● ● ● ○ ● ○ ○	**[Compressor lock]** Power voltage is normal. (AC220-230 V±10 %: single phase type). (AC380-400 V±10 %: 3 phase type). — No → Improve power line Yes ↓ Wiring connection is normal. Compressor lead (board side, compressor side) reactor, power lead — No → Check and correct wiring connection Yes ↓ Compressor is normal. — No → Refrigerant stays inside. — No → Lock compressor and replace it. Yes → Refrigerant stays inside. — Yes ↓ Pulse motor valve operates normally. — No → TE, TS sensor pulse motor valve check If defective, replace Yes ↓ Check outdoor board If defective, replace it PC board 805H-E (MCC-1571) 1105 to 1405H-E (MCC-1571) 1105 to 1605H8(R)-E (MCC 1596)
[H04]	<Indication 1> <Indication 2> ● ● ● ● ○ ◎ ● ● ○ ● ○ ○	**[Case thermostat operation]** 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 805H-E (MCC-1571) 1105 to 1405H-E (MCC-1571) 1105 to 1605H8(R)-E (MCC 1596) 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.

Check code	Outdoor LED indication	Check and Action procedure (No specific description indicates outdoor unit parts.)
[L10]	<Indication 1> <Indication 2> ● ● ● ● ○ ◎ ● ● ○ ● ○ ○	**[Model not set] Only when service board is used** Cut jumper line by following the instruction comes with the service board package
[L15]	<Indication 1> <Indication 2> ● ◎ ○ ◎ ○ ◎ ● ◎ ○ ● ○ ○	**[Combination failure between the hydro unit]** Replace the outdoor unit with the proper model
[L29]		* Any of the following abnormality may occur. Seeing the LED on the outdoor board can determine which abnormality occurs. Communication failure between MCUs, Heat sink temperature sensor (TH) failure, EEPROM failure, Model not specified, Heat sink overheat failure, gas leakage detection, 4-way valve invert failure
	<Indication 1> <Indication 2> ● ◎ ○ ● ○ ◎ ● ◎ ○ ◎ ○ ○	**[Communication failure between MCUs]** Check outdoor control board If defective, replace it PC board 805H-E (MCC-1571) 1105 to 1405H-E (MCC-1571) 1105 to 1605H8(R)-E (MCC 1596)
[P03]	<Indication 1> <Indication 2> ○ ◎ ○ ◎ ○ ● ● ● ○ ● ○ ○	**[Abnormal outlet temperature]** 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 CN603 connector is normal. TD sensor resistance is normal — No → Correct connector Replace sensor ↓ Yes Check outdoor control board If defective, replace it PC board 805H-E (MCC-1571) 1105 to 1405H-E (MCC-1571) 1105 to 1605H8(R)-E (MCC 1596)

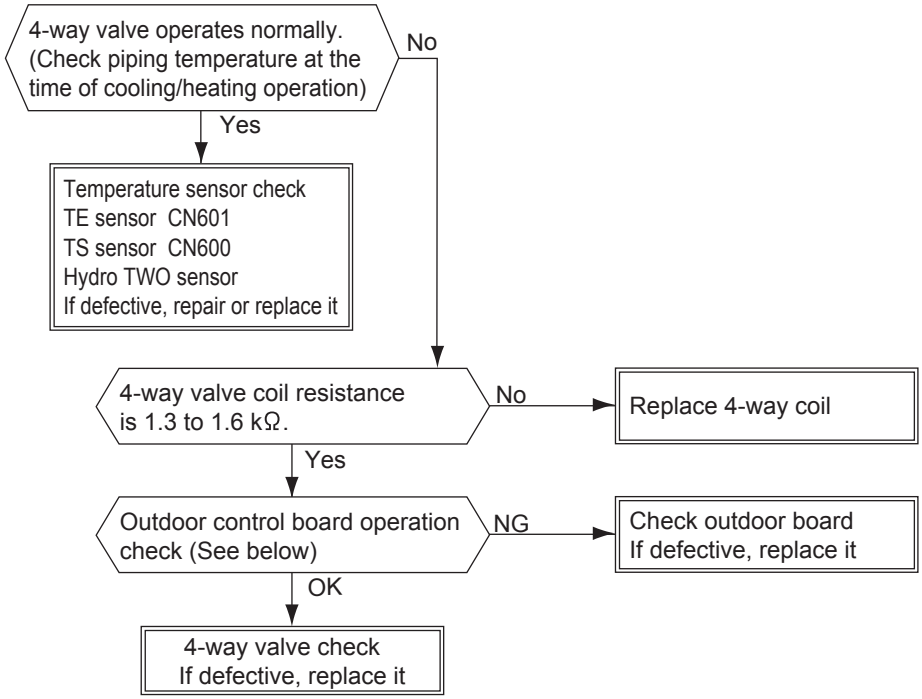
Check code	Outdoor LED indication	Check and Action procedure (No specific description indicates outdoor unit parts.)
[P04]	* Any of the following abnormality may occur. Seeing the LED on the outside board can determine which abnormality occurs. 1.High pressure sensor activated. 2.Power source failure (Vdc) 3.Hi pressure protection operation 4.Case thermostat operation	
	<Display 1> <Display 2> ○ ● ○ ● ○ ◎ ● ● ○ ● ○ ○	**[High pressure SW system error]** Power supply error (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]	<Indication 1> <Indication 2> ○ ◎ ○ ● ○ ◎ ● ● ○ ● ○ ○	**[Power source failure (voltage defective, open phase)]** Power voltage abnormal drops or rise (AC220-230 V±10 %: single phase type) (AC380-400 V±10 %: 3 phase type) → Yes → Check electric work No → Check outdoor control board If defective, replace it PC board 805H-E (MCC-1571) 1105 to 1405H-E (MCC-1571) 1105 to 1605H8(R)-E (MCC 1596)
[P07]	<Indication 1> <Indication 2> ○ ◎ ○ ◎ ○ ◎ ● ● ○ ● ○ ○	**[Heat sink overheat failure]** HWS-805H-E to 1405H-E: The screws are loose in motor drive element, Q200/300/400, of outdoor control board and rectifier, DB01/02/03. (MCC-1571) Radiation grease was not applied to backside of Q200, DB01, DB02, or DB03. → Yes → Apply radiation grease as needed Tighten screws (Be sure to place back the insulation sheet between Q300/400 and the heat sink.) HWS-1105H8(R)-E to 1605H8(R)-E: Is there no loosening of screws of motor drive element of outdoor PC board (MCC-1596) Q201? Did not forget to apply radiation grease to rear side of Q201? → Yes → Apply radiation grease as needed Tighten screws (Be sure to place back the insulation sheet between Q300/400 and the heat sink.) No → Is not the ventilation flue of the heat sink blocked? Is not the fan blocked? (Short-circuit, etc.) → No → Remove obstacles, Deal with short circuit No → Check outdoor control board If defective, replace it

Check code	Outdoor LED indication	Check and Action procedure (No specific description indicates outdoor unit parts.)
[P15]	<Indication 1> <Indication 2> ○ ◎ ○ ◎ ○ ◎ ● ◎ ○ ● ○ ○	**[Gas leakage detection]** 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 Service valve is fully opened. — No → Open fully service valve ↓ Yes Piping collapse — Yes → Repair or replace pipe ↓ No Temperature sensor check Discharge sensor CN603 Suction sensor CN600 — NG → Correct connector / Replace sensor ↓ OK Check outdoor control board / If defective, replace it PC board 805H-E (MCC-1571) 1105H to 1405H-E (MCC-1571) 1105H to 1605H8(R)-E (MCC-1596)

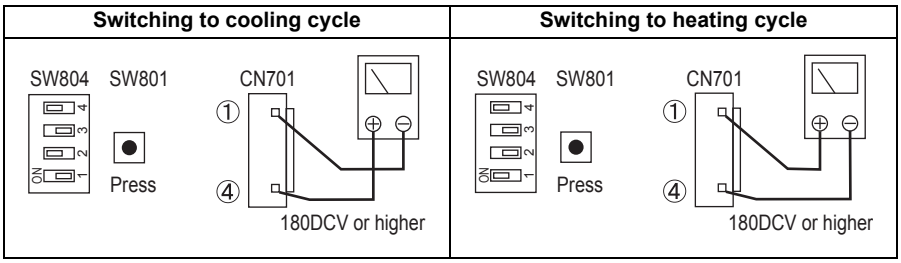
Check code	Outdoor LED indication	Check and Action procedure (No specific description indicates outdoor unit parts.)
[P19]	<Indication 1> <Indication 2> ○ ◎ ○ ◎ ○ ● ● ● ○ ◎ ○ ○	**[4-way valve invert failure]**



Outdoor control board operation check direction (Self-hold valve) = 805 to 1405H-E. (Single phase only)

1) With the dip switch SW804 set as in the table below, pressing SW801 for approx. 1 second can check the operation of switching to cooling cycle or to heating cycle.
   - The board are energized for 10 seconds.
   - Take more than a minute for the next check because the parts (coil, resistance R700) generate large heat. (This does not apply when no coil is connected.)

2) After the check, set all the SW804 dip switches to OFF.



Note: Check with a tester
With an analog tester: If a tester shows 180DCV or higher, the board is good.
With digital tester: Although values shown has some range, if its maximum value is 180DCV or higher, the board is good.

1105H8(R)-E to 1605H8(R)-E
The 4-way valve coil of 1105H8(R)-E to 1605H8(R)-E is not self-hold type.

Check code	Outdoor LED indication	Check and Action procedure (No specific description indicates outdoor unit parts.)
[P20]	<Indication 1> <Indication 2> ○ ● ○ ● ○ ◎ ● ● ○ ◎ ○ ○	**[Hi pressure protection operation]** Service valve is fully opened. — No → Open fully service valve Yes ↓ Reset the power source and perform a trail operation according to the season. Heating season / Heating operation → (skip to Something prevents heat exchange of hydro unit) Cooling season / Cooling operation ↓ Outdoor TL sensor is normal. (Measure resistance) — No → Replace sensor Yes ↓ Outdoor fan is free from crack or looseness. — No → Check outdoor fan. If defective, replace or tighten it Yes ↓ Outdoor fan operates normally. — No → Check the same item as those for [P22] abnormality Yes ↓ Something prevents outdoor unit heat exchange - Clogged heat exchanger - short circuit — Yes → Remove the disturbing element No ↓ Check for refrigerant overcharged, clogged cycle, pipe break, abnormal overload, etc. If defective, repair defective portion Something prevents heat exchange of hydro unit. - Clogged filter - Clogged heat exchanger - Short circuit — Yes → Remove the disturbing element No ↓ Check for refrigerant overcharged, clogged cycle, pipe break, abnormal overload, etc. If defective, repair defective portion

Check code	Outdoor LED indication	Check and Action procedure (No specific description indicates outdoor unit parts.)
[P22]	<Indication 1> <Indication 2> ○ ● ○ ◎ ○ ◎ ● ● ○ ◎ ○ ○	**[Blower system failure]** Power voltage is normal (AC220-230 V±10 %: single phase type) (AC380-400 V±10 %: 3 phase type) — No → Check wiring / Request power source repair ↓ Yes When not energized, the fan motor can be smoothly rotated by hand. Fan motor coil resistance is normal. Between red - white leads 12 -20Ω Between white - black leads 12 - 20Ω Between black - red leads 12 - 20Ω — No → Replace fan motor ↓ Yes Check outdoor control board / If defective, replace it PC board 805H-E (MCC-1571) 1105 to 1405H-E (MCC-1571) 1105 to 1605H8(R)-E (MCC 1596) Outdoor fan sole operation check 1) With the dip switch SW804 set as in the table below, pressing SW801 for approx. 1 second can check the outdoor fan sole operation. Perform this check to determine which of upper or lower fan has a problem. • When SW801 is pressed again for 1 second or when 2 minutes has passed, the fan stops. 2) After the check, set all the SW804 dip switches to OFF. **Outdoor fan sole operation** SW804 SW801 ON 1 2 3 4 Press
[P26]	<Indication 1> <Indication 2> ○ ● ○ ◎ ○ ● ● ◎ ○ ◎ ○ ○	**[Compressor drive element shorted out]** The connection between compressor lead and reactor is correct. (Check with wiring diagram) — No → Correct wiring ↓ Yes A operation without compressor lead does not cause the same problem. — No → Replace outdoor board ↓ Yes Compressor check (rare short circuit, etc.) If defective, replace it
[P29]	<Indication 1> <Indication 2> ○ ◎ ○ ● ○ ◎ ● ◎ ○ ◎ ○ ○	**[Position detection circuit failure]** Check outdoor control board / If defective, replace it PC board 805H-E (MCC-1571) 1105 to 1405H-E (MCC-1571) 1105 to 1605H8(R)-E (MCC 1596)

Check code	Outdoor LED indication	Check and Action procedure (No specific description indicates outdoor unit parts.)
No code	<Indication 1> <Indication 2> ● ◎ ○ ◎ ○ ◎ ● ◎ ○ ◎ ○ ○	**[Discharge abnormality]** Compressor's loss of synchronism due to rapid load change, etc. * Although the outdoor LED indicates abnormality, the compressor restarts and no abnormality is confirmed. * This may occur due to the open phase of the compressor or wiring detach.
[F04]	<Indication 1> <Indication 2> ○ ● ○ ● ● ◎ ● ● ○ ● ○ ○	**[Discharge temperature sensor (TD) failure]** TD sensor connector (CN603) is connected — No → Correct TD sensor connection Yes ↓ TD sensor resistance characteristic is normal — No → Replace TD sensor (See the characteristic table on page 107) Yes ↓ Replace outdoor control board PC board 805 to 1405H-E (MCC-1571) 1105 to 1605H8(R)-E (MCC 1599)
[F06]	<Indication 1> <Indication 2> ○ ● ○ ◎ ● ◎ ● ● ○ ● ○ ○	**[Heat exchanger temperature sensor (TE) failure]** TE sensor connector (CN601) is connected — No → Correct TE sensor connection Yes ↓ TE sensor resistance characteristic is normal — No → Replace TE sensor (See the characteristic table on page 107) Yes ↓ Replace outdoor control board PC board 805 to 1405H-E (MCC-1571) 1105 to 1605H8(R)-E (MCC 1599)
[F07]	<Indication 1> <Indication 2> ○ ◎ ○ ◎ ● ◎ ● ● ○ ● ○ ○	**[Heat exchanger temperature sensor (TL) failure]** TL sensor connector (CN604) is connected — No → Correct TL sensor connection YES ↓ TL sensor resistance characteristic is normal — No → Replace TL sensor (See the characteristic table on page 107) YES ↓ Replace outdoor control board PC board 805 to 1405H-E (MCC-1571) 1105 to 1605H8(R)-E (MCC 1599)

Check code	Outdoor LED indication	Check and Action procedure (No specific description indicates outdoor unit parts.)
[F08]	<Indication 1> <Indication 2> ○ ● ○ ● ● ● ● ◎ ○ ● ○ ○	**[Outside air temperature sensor (TO) failure]** TO sensor connector (CN602) is connected — No → Correct TO sensor connection Yes ↓ TO sensor resistance characteristic is normal — No → Replace TO sensor See the characteristic table on page 108 Yes ↓ Replace outdoor control board PC board 805 to 1405H-E (MCC-1571) 1105 to 1605H8(R)-E (MCC 1599)
[F12]	<Indication 1> <Indication 2> ○ ● ○ ● ● ◎ ● ◎ ○ ● ○ ○	**[Suction temperature sensor (TS) failure]** TS sensor connector (CN600) is connected — No → Correct TS sensor connection Yes ↓ TS sensor resistance characteristic is normal — No → Replace TS sensor Yes ↓ Replace outdoor control board PC board 805 to 1405H-E (MCC-1571) 1105 to 1605H8(R)-E (MCC 1599)
[F13]	<Indication 1> <Indication 2> ○ ◎ ○ ● ● ◎ ● ◎ ○ ● ○ ○	**[Heat sink temperature sensor (TH) failure]** Replace outdoor control board PC board 805 to 1405H-E (MCC-1571) 1105 to 1605H8(R)-E (MCC 1599)
[F15]	<Indication 1> <Indication 2> ○ ◎ ○ ◎ ● ◎ ● ◎ ○ ● ○ ○	**[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 See the characteristic table on page 107 Yes ↓ TS sensor resistance characteristic is normal — No → Replace TS sensor Yes ↓ Replace outdoor control board PC board 805 to 1405H-E (MCC-1571) 1105 to 1605H8(R)-E (MCC 1599)

Check code	Outdoor LED indication	Check and Action procedure (No specific description indicates outdoor unit parts.)
[F31]	<Indication 1> <Indication 2> ○ ◎ ○ ◎ ● ◎ ● ◎ ○ ◎ ○ ○	**[EEPROM failure]** Check outdoor control board If defective, replace it PC board 805 to 1405H-E (MCC-1571) 1105 to 1605H8(R)-E (MCC 1599)

9-4-3. Temperature sensor, temperature-resistance characteristic table

TC, TWI, TWO, TFI, TTW, TE, TS, TO sensors

Typical value

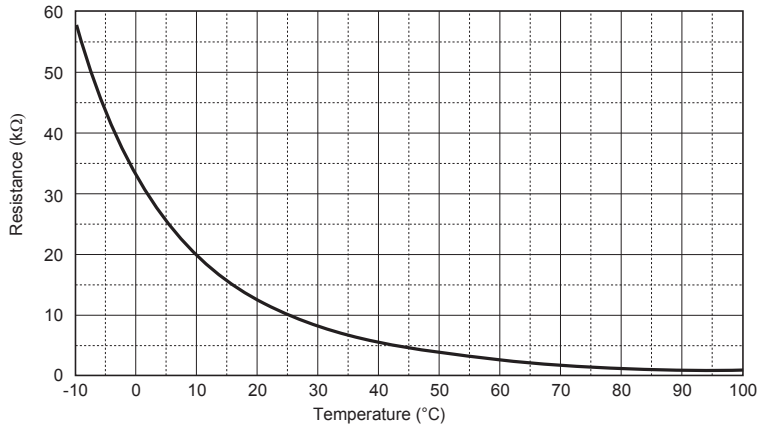
Temperature (°C)	Resistance value (kΩ)		
	(Minimum)	(Standard)	(Maximum)
-10	55.42	55.73	60.04
0	32.33	33.80	35.30
10	19.63	20.35	21.09
20	12.23	12.59	12.95
25	9.75	10.00	10.25
30	7.764	7.990	8.218
40	5.013	5.192	5.375
50	3.312	3.451	3.594
60	2.236	2.343	2.454
70	1.540	1.623	1.709
80	1.082	1.146	1.213
90	0.7740	0.8237	0.8761
100	0.5634	0.6023	0.6434

TD, TL sensors

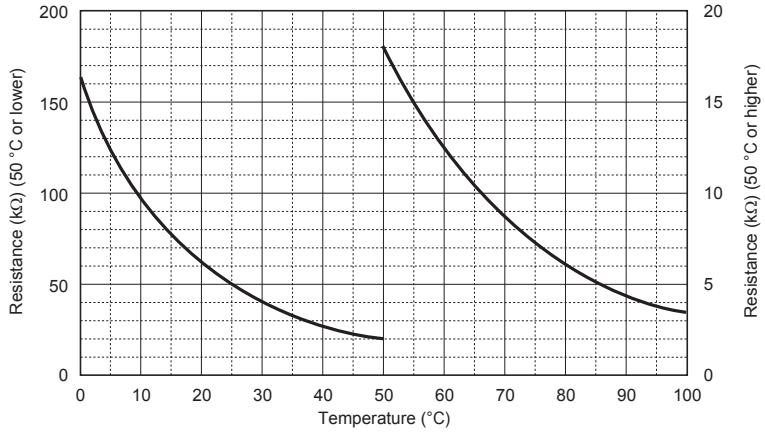
Typical value

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

TC, TWI, TWO, TFI, TTW, TE, TS, TO sensors



TD, TL sensors



* Since the TH sensor (outdoor unit heat-sink temperature sensor) is built in the outdoor control board, the resistance value cannot be measured.

9-5. Operation check by PC board switch

9-5-1. 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 SW06_2 "ON".

(2) Operation check

1) Turn on the hydro unit and the outdoor unit.
2) Rotate switch DIP SW01 to position "1" and press tactile switch SW07 for 5 sec. or longer.
3) Rotating the rotary SW01 allows to check each operation.
4) Set the DIP SW06_2 "OFF" to finish.

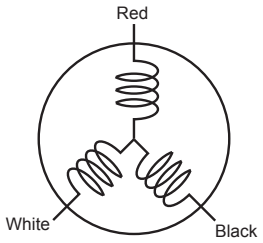
Rotary switch	Check contents		Remark
1	None		
2	2WV_W	Alive for approx. 2 sec, not alive for 3 sec	
3	3WV_W		
4	Mixing valve	Alive for 30 sec in the forward direction Alive for 30 sec in the reverse direction	
5	Built-in circulation pump	Alive / not alive for 20 sec	
6	External circulation pump 1	Alive / not alive for 20 sec	
7	(External circulation pump 2)	Alive / not alive for 20 sec	Reserved
8	Water heat exchange backup heater	Repeat heater 1, heater 2, and OFF every 20 sec	The built-in circulation pump operates.
9	Hot water cylinder heater	Alive / not alive for 10 sec	
10	Backup heater	Alive / not alive for 10 sec	The built-in circulation pump and external circulation pump operate.
11	Check the alarm output.	Output for 10 sec / no output for 10 sec	
12	Check the boiler output.	Output for 10 sec / no output for 10 sec	
13	Check the defrost output.	Output for 10 sec / no output for 10 sec	
14	Check the operation output.	Output for 10 sec / no output for 10 sec	
15	None		
16	Built-in circulation pump continuous operation	Continuously alive	Do not operate the circulation pump alive continuously without any water in hydro unit.

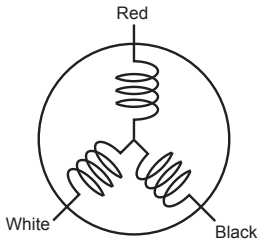
9-6. Brief method for checking the key components

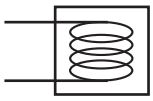
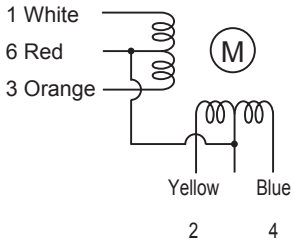
9-6-1. Hydro unit

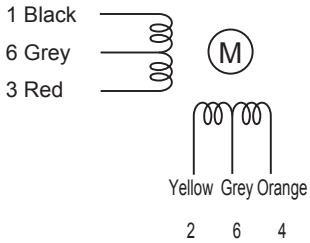
<table>
<tr><th>No.</th><th>Component name</th><th>Check procedure</th></tr>
<tr><td>1</td><td>Water heat exchange temperature (TC) sensor
Water inlet temperature (TWI) sensor
Water outlet temperature (TWO) sensor
Hot water cylinder temperature (TTW) sensor
Floor inlet temperature (TFI) sensor</td><td>Remove the connector and measure the resistance value with a tester. (Normal temperature)
<table>
<tr><th>Sensor \ Temperature</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="5">33.8 kΩ</td><td rowspan="5">20.35 kΩ</td><td rowspan="5">12.59 kΩ</td><td rowspan="5">7.99 kΩ</td></tr>
<tr><td>Water inlet temperature (TWI) sensor</td></tr>
<tr><td>Water outlet (TWO) sensor</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>

9-6-2. Outdoor unit

<table>
<tr><th>No.</th><th>Component name</th><th>Check procedure</th></tr>
<tr><td>1</td><td>Compressor
Type
DA220A2F-22L
(805H-E)
DA422A3F-26M
(1105,1405H-E)
DA422A3F-27M
(1105, 1405, 1605H8(R)-E)</td><td>Measure the resistance value of each winding with a tester.
 

805 to 1405H-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
1105 to 1605H8(R)-E
<table>
<tr><th>Location</th><th>Resistance value</th></tr>
<tr><td>Red ─ White</td><td>0.75-0.83 Ω</td></tr>
<tr><td>White ─ Black</td><td>0.75-0.83 Ω</td></tr>
<tr><td>Black ─ Red</td><td>0.75-0.83 Ω</td></tr>
</table>
At 20 °C</td></tr>
<tr><td>2</td><td>Outdoor fan motor
Type
ICF-280-A60-1
(805H-E)
ICF-280-A100-1
(1105,1405H-E)
(1105 to 1605H8(R)-E)</td><td>Measure the resistance value of each winding with a tester.
 

<table>
<tr><th></th><th>Location</th><th>Resistance value</th></tr>
<tr><td rowspan="3">805H-E</td><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>
<tr><td rowspan="3">1105,1405H-E
1105 to 1605H8(R)-E</td><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
STF-H01AP1874A1
STF-H01AJ1736A1</td><td>Measure the resistance value.
805 to 1405H-E
1617 Ω ± 113 Ω
1105 to 1605H8(R)-E
1725 Ω ± 172.5 Ω
  </td></tr>
<tr><td rowspan="2">4</td><td>Pulse motor valve coil
Type
CAM-MD12TF-15
(805H-E)</td><td>Measure the resistance value.
 

<table>
<tr><th>Location</th><th>Resistance value</th></tr>
<tr><td>Red ─ White, Orange</td><td>42-50 Ω</td></tr>
<tr><td>Red ─ Yellow, Blue</td><td>42-50 Ω</td></tr>
</table>
Condition 20 °C</td></tr>
<tr><td>Type
UKV-A038
(1105,1405H-E)
(1105 to 1605H8(R)-E)</td><td> 

<table>
<tr><th>Location</th><th>Resistance value</th></tr>
<tr><td>Grey ─ Black, Red</td><td>43-49 Ω</td></tr>
<tr><td>Grey ─ Yellow, Orange</td><td>43-49 Ω</td></tr>
</table>
Condition 20 °C</td></tr>
</table>

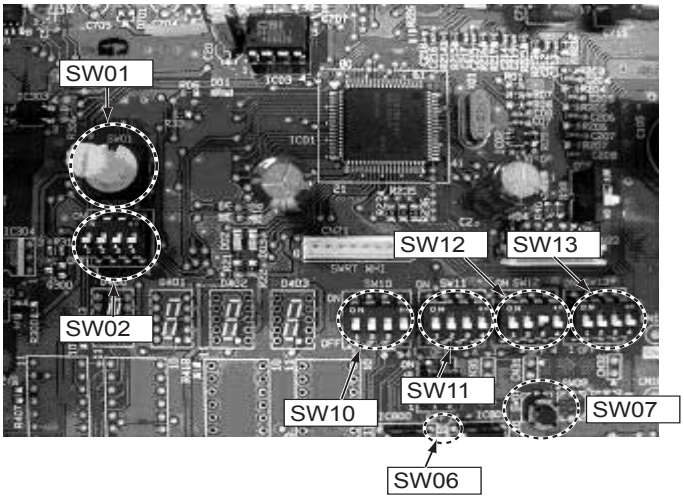
<table>
<tr><th>No.</th><th>Component name</th><th>Check procedure</th></tr>
<tr><td>5</td><td>Suction temperature (TS) sensor
Heat exchange temperature (TE) sensor
Outdoor temperature (TO) sensor</td><td>Remove the connector and measure the resistance value with a tester.
10-20 kΩ (Normal temperature)
<table>
<tr><th>Temperature / Sensor (kΩ)</th><th>0 °C</th><th>10 °C</th><th>20 °C</th><th>30 °C</th></tr>
<tr><td>Outdoor heat exchange temperature sensor (TE)</td><td rowspan="2">33.8</td><td rowspan="2">20.4</td><td rowspan="2">12.6</td><td rowspan="2">8.0</td></tr>
<tr><td>Suction temperature sensor (TS)</td></tr>
</table></td></tr>
<tr><td>6</td><td>Discharge temperature (TD) sensor</td><td>Remove the connector and measure the resistance value with a tester.
<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>Discharge temperature sensor (TD)</td><td>161.3</td><td>99.0</td><td>62.4</td><td>40.2</td></tr>
</table></td></tr>
</table>

10 Hydro unit and outdoor unit settings

Hydro unit

1. Hydro unit Setting

1-1. Setting switch names and positions



1-2. SW02 (System switching 1)

SW02	Switching details	Factory default		Remarks
02_1	Boiler install position After 3WV heating side / Before 3WV	After 3WV, heating	OFF	Before 3 WV
02_2	–	–	OFF	
02_3	External cylinder thermostat connected.	No	OFF	
02_4	External room thermostat connected.	No	OFF	

1-3. SW10 (Pump switching)

SW10	Switching details	Factory default		Remarks
10_1	Pump P1 operation during hot water mode OFF = P1 ON during heat pump activate ON = P1 Continuous run	Heat-pump activate	OFF	
10_2	Pump P1 operation during room heating. P1 pump stop or not using outside air temperature. OFF = Continuous run ON = Pump P1 stop when TO>20 ^{o}C (Available to change the temperature setting by FC 9E)	Continuous run	OFF	
10_3	Synchronization of Pump P1 and P2.	Non-synchronous	OFF	
10_4	Pump P1 ON/OFF cycling (During long periods of system OFF)	No	OFF	

1-4. SW11 (Heater Yes/No switching)

SW11	Switching details	Factory default		Remarks
11_1	Hydro unit backup heater Energized Yes/No	Energized	OFF	
11_2	Hot water cylinder heater Energized Yes/No	Energized	OFF	
11_3	External booster heater output Enabled Yes/No	Enabled	OFF	
11_4	–	–	OFF	

1-5. SW12 (System switching 2)

SW12	Switching details	Factory default		Remarks
12_1	Hot water supply is using	Yes	OFF	
12_2	ZONE1 operation is using	Yes	OFF	
12_3	ZONE2 operation is using	No	OFF	
12_4	–	–	OFF	

1-6. SW13 (System switching 3)

SW13	Switching details	Factory default		Remarks
13_1	3WV SPST/SPSD Specification switching	SPST	OFF	
13_2	Boiler output enabled	No	OFF	
13_3	Auto Restart of power outage after system power failure.	Yes	OFF	
13_4	–	–	OFF	

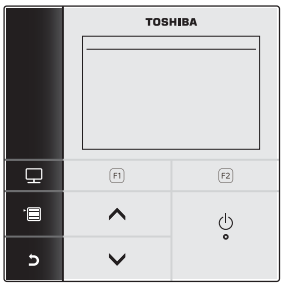
2. Function Code Setting

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

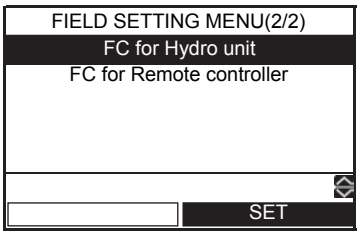
2-1. How to set hydro unit function code

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

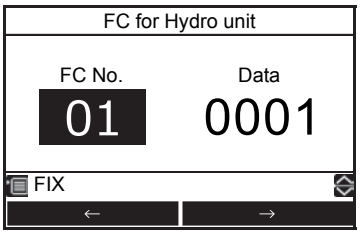
1 **Press the [ ] button and the [ ] button at same time for 4 seconds or longer on the top screen to display the "FIELD SETTING MENU".**



2 **Press the [ ] / [ ] button to select "FC for Hydro unit" on the FIELD SETTING screen, then press the [F2] button.**



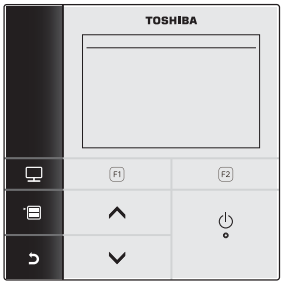
3 **Press the [F1] / [F2] button to select FC number or Data, then press the [ ] / [ ] button to set the value.**



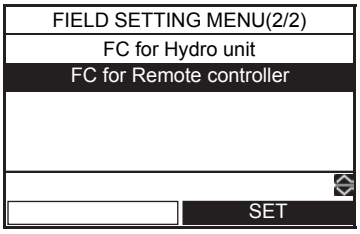
4 **Press the [ ] button. The set value is registered.**

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

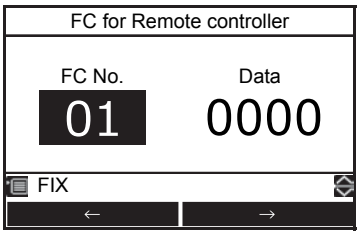
1 **Press the [ ] button and the [ ] button at same time for 4 seconds or longer on the top screen to display the "FIELD SETTING MENU".**



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



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



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

Function code table

FC	Item	Details			Factory default
01	Water heat exchanger capacity *1	0012: 805XWH**-E		0017: 1405XWH**-E	Depends on type
02	Cooling/Non-cooling switching	0000: Cooling		0001: Not cooling	0000: Cooling
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	-	0060: 60 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
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	-	0018: 20 °C	0007: 7 °C
1A	Upper limit of heating (ZONE1) set temperature	0037: 37 °C	-	0055: 55 °C	0055: 55 °C
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	0055: 55 °C
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	-	0050: 50 °C	0045: 45 °C
22	Priority mode Hot water supply/Heating switching temperature	-0020: -20 °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
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	0040: 40 °C
2D	Set temperature B with outside air temperature of T1	0020: 20 °C	-	0055: 55 °C	0035: 35 °C
2E	Set temperature C with outside air temperature of 0 °C	0020: 20 °C	-	0055: 55 °C	0030: 30 °C
2F	Set temperature D with outside air temperature of T3	0020: 20 °C	-	0055: 55 °C	0025: 25 °C
30	Set temperature E with outside air temperature of 20 °C	0020: 20 °C	-	0055: 55 °C	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
34	Hydro unit backup heater up time	0000: 10 min 0002: 30 min		0001: 20 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: 10 °C	-	0020: 20 °C	0015: 15 °C
3C	2-way valve operation (logical reverse) control	0000: Energized during cooling 0001: Not energised 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

*1 FC_01 is needed for PCB replacement or function code reset procedure has been completed.
*2 System restart with remote controller.
*3 Restart in the mode when stopping.
*4 In addition, it is enable only when switch 2-3 is set to “OFF” and FC61 is set to “3”.

FC	Item	Details	Factory default
52	External input contact logic (must be used in with FC61)	0000: CLOSE to stop system *2 0001: OPEN to stop system *2 0002: OPEN to stop system, CLOSE to restart system (Statics input) 0003: CLOSE to stop system, CLOSE again to restart system (plus input)	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	0001: 1 minute - 0030: 30 minutes	0004: 4 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	Changing the target of stopping/starting by external signal or changing the TEMPO setting	0000: Hot water supply and heating 0001: Keeping initial status *3 0002: Hot water supply only 0003: Heating only 0004: TEMPO1 (Not activate the heaters) 0005: TEMPO2 (Not activate the heaters, inlet pump, heat pump)	0000: Hot water supply and heating
62	Activate/deactivate A02 error 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
67	Changing the condition of optional output (For the optional PC board connected to CN209)	0000: 1-3 During defrosting 2-3 While compressor is running. 0001: 1-3 As error is detected 2-3 During operation	0000: 1-3 During defrosting 2-3 While compressor is 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	0000: 30 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	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	-0030: -30 °C - -0020: -20 °C	-0020: -20 °C
A2	Zone2 temperature setting method	0000: Percentage (FC31) 0001: Fixed value (FCA3~ A5)	0000: Percentage
A3	Set temperature A' with outside temperature of T0	0020: 20 °C - 0055: 55 °C	0040: 40 °C
A4	Set temperature B' with outside temperature of T1	0020: 20 °C - 0055: 55 °C	0035: 35 °C
A5	Set temperature E' with outside temperature of 20 °C	0020: 20 °C - 0055: 55 °C	0020: 20 °C

*1 FC_01 is needed for PCB replacement or function code reset procedure has been completed.
*2 System restart with remote controller.
*3 Restart in the mode when stopping.
*4 In addition, it is enable only when switch 2-3 is set to "OFF" and FC61 is set to "3".

FC	Item	Details	Factory default
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 FC9D 0001: The calculated temperature by Auto curve	0000: The fixed
B6	Changing the target of stopping / starting by external signal (CN210 - terminal 2 and 3)	0000: none (Local hot water tank thermostat) 0001: Hot water supply control *4	0000: 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

*1 FC_01 is needed for PCB replacement or function code reset procedure has been completed.
*2 System restart with remote controller.
*3 Restart in the mode when stopping.
*4 In addition, it is enable only when switch 2-3 is set to “OFF” and FC61 is set to “3”.

Remote controller function code table

FC	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 - 30 (1 day - 30 days)	00: No setting

*14~1A: for floor drying function

2-3. How to reset hydro function code

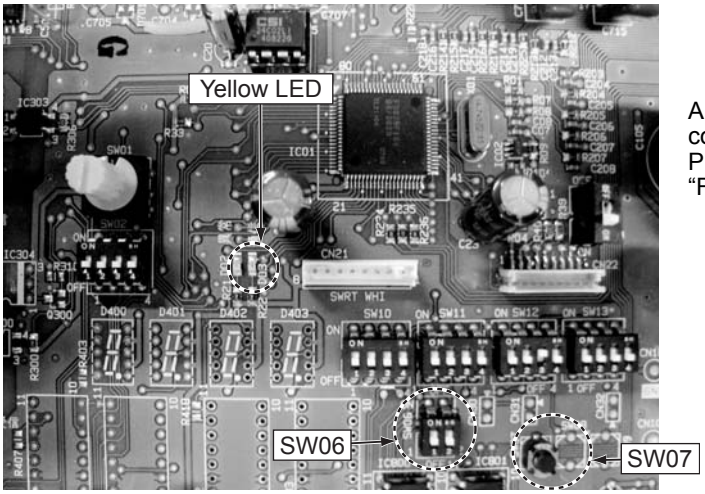
If the hydro unit PCB has been replaced, it is necessary to change the FC 01 (capacity setting)

(1) Preparation

1) Turn all off the Hot water supply operation and Heating/Cooling operation.
2) Turn off the power supply of the hydro unit and the outdoor unit.
3) Remove the front panel of the hydro unit and cover to the hydro unit electrical box.
4) Set SW06_1 and _2 "ON".

(2) Procedure

1) Turn on the power supply of the hydro unit and the outdoor unit.
   - The small yellow LED located near the MCU should be flashing slowly.
2) Press tactile switch SW07 until the yellow LED turns off.
   - When the tactile switch SW07 has been press for 5 sec, flashing becomes quickly. And when the switch will be pressed further 5 sec, the yellow LED will turn off.
     When the SW07 is released, the yellow LED start to flash quickly again.
3) Turn off the power supply of the hydro unit and the outdoor unit.
4) Set SW06_1 and _2 to "OFF".
5) Replace the electrical box cover and front panel on the hydro unit.



And you can reset hydro function code on remote controller.
Press the [∧] [∨] [↩] long time in "FC for Hydro unit" display, and select "YES".

2-4. How to reset remote controller function code

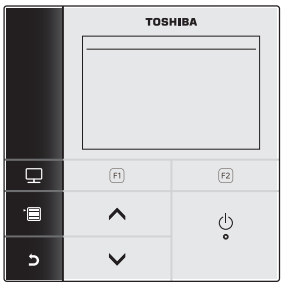
You can reset remote controller function code on remote controller.
Press the [∧] [∨] [↩] long time in "FC for remote controller" display, and select "YES".

3. Test run

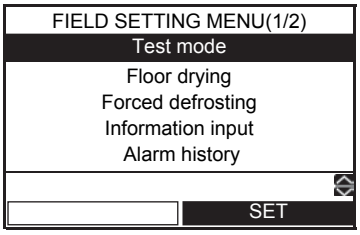
- Even if the outside air temperature or water temperature is outside the setting value range, Heating, Cooling and Hot water supply operation become possible.
- Since the protection setting is disabled in the TEST mode, do not continue a test run longer than 10 minutes.

<Procedure>

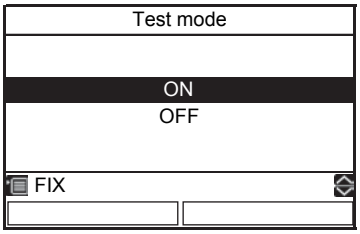
1 **Press the [ ] button and the [ ] button at same time for 4 seconds or longer on the top screen to display the "FIELD SETTING MENU".**



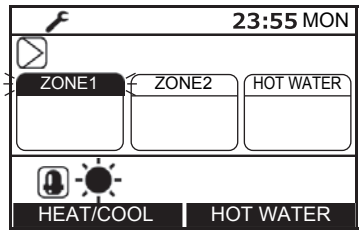
2 **Press the [ ] / [ ] button to select "Test mode" on the FIELD SETTING MENU screen, then press the [F2] button.**



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.**



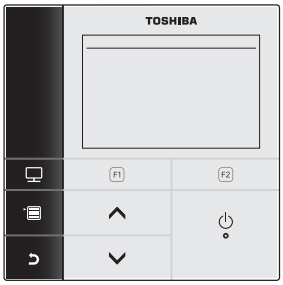
- The pump is activated in 30 seconds. If air is not released completely, the flow rate switch is activated to stop operation. Release air again according to the piping procedure. Little air entrainment is discharged from the purge valve.
- Check that the hydraulic pressure has become the predetermined 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

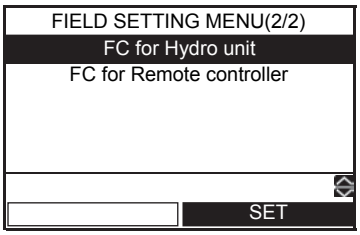
- This function is available only for the header remote controller.
- Set function codes for various operation modes with the remote controller.

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

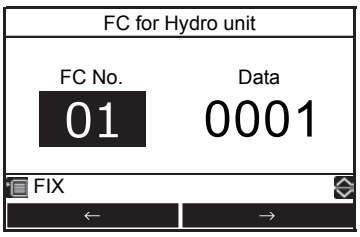
1 **Press the [ ] button and the [ ] button at same time for 4 seconds or longer on the top screen to display the "FIELD SETTING MENU".**



2 **Press the [ ] / [ ] button to select "FC for Hydro unit" on the FIELD SETTING screen, then press the [F2] button.**



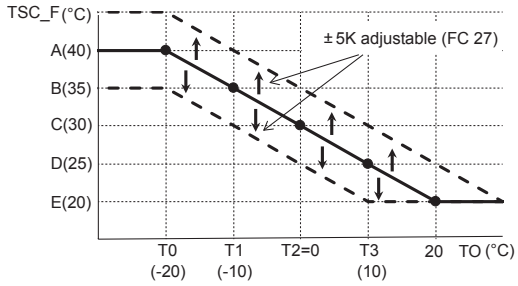
3 **Press the [F1] / [F2] button to select FC number or Data, then press the [ ] / [ ] button to set the value.**



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 FC

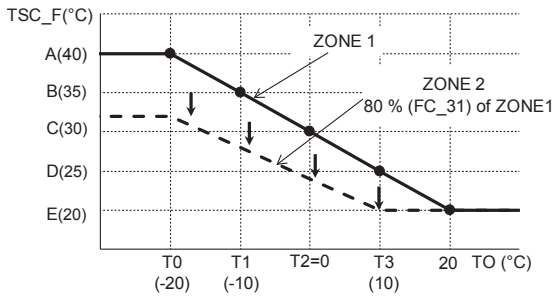
FC No.	Setting item	Default	range
2C	Setting temperature A at T0	40	20~55 °C
2D	Setting temperature B at T1	35	20~55 °C
2E	Setting temperature C at T2(= 0 °C)	30	20~55 °C
2F	Setting temperature D at T3	25	20~55 °C
30	Setting temperature E at 20 °C	20	20~55 °C
A1	Outside temperature T0	-20	-30~-20 °C
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

<ZONE2>

- Set temperature of the ZONE2 can be selected from two methods (FC_A2). One is a percentage of ZONE1, the other is a fixed value.

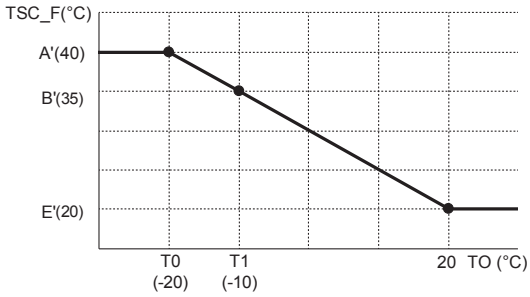
FC_A2 = "0" : Percentage method that is set by FC_31.
FC_A2 = "1" : Fixed value method that is set by FC_A3, A4 and A5.
However, it is automatically controlled the set temperature of ZONE1 to be the ZONE2 or more.

FC_A2=0 Percentage method



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

FC_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.

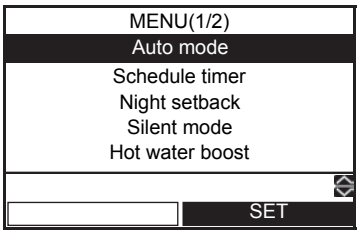
Related FC

FC No.	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 °C
A4	Setting temperature B' at T1	35	20~55 °C
A5	Setting temperature E' at 20 °C	20	20~55 °C
31	Auto-Curve ratio of ZONE2	80	0~100%

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.

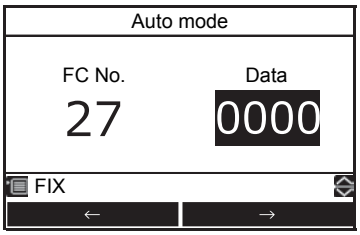
1 **Press the [∧] / [∨] button to select "Auto mode" on the MENU screen.**



2 **Press the [F1] button for 4 seconds or longer to enter the setting mode. The function code setting screen appears.**
FC No. 27: Shifted temperature (Range: -5 ~ +5, Default: 0)

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

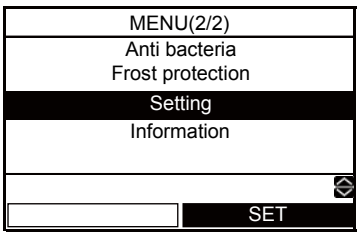
4 **Press the [▤] button. The set temperature is registered.**



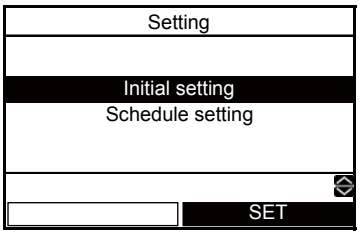
5. Clock Setting

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

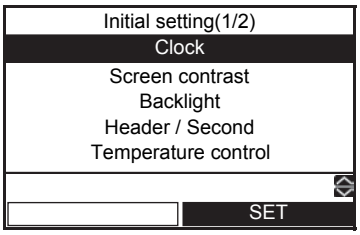
1 **Press the [∧] / [∨] button to select “Setting” on the MENU screen, then press the [F2] button.**



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



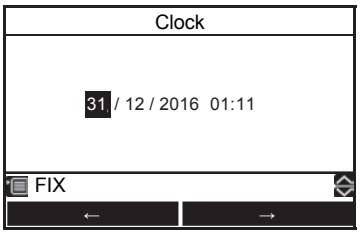
3 **Press the [∧] / [∨] button to select “Clock” on the Initial setting screen, then press the [F2] button.**



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

5 **Press the [∧] / [∨] 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

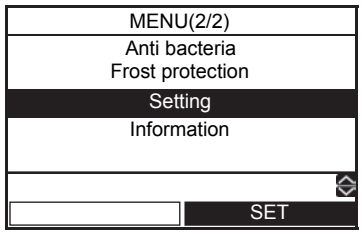
6-1. How to set scheduled operation

- 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.

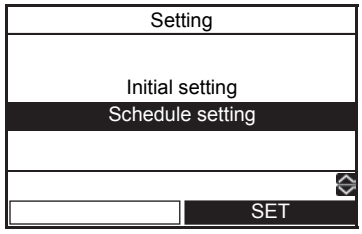
<Preparation>

Set the remote controller time at first.

1 **Press the [∧] / [∨] button to select "Setting" on the MENU screen, then press the [F2] button.**



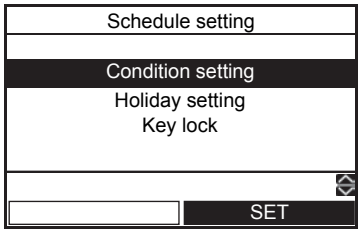
2 **Press the [∧] / [∨] button to select "Schedule setting" on the setting screen, then press the [F2] button.**



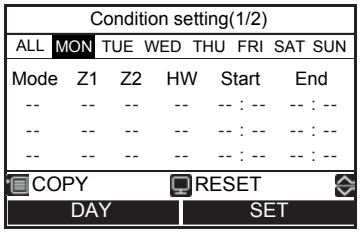
Condition setting

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

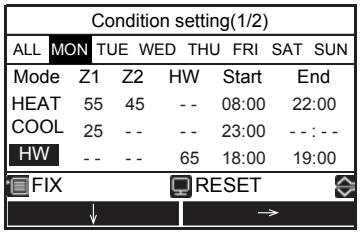
1 **Press the [∧] / [∨] button to select "Condition setting" on the Schedule setting screen, then press the [F2] button.**



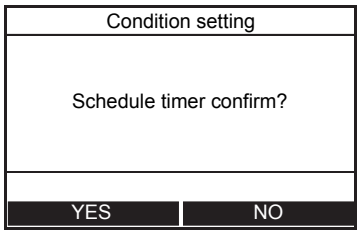
2 **Press the [F1] button to select the day, then press the [F2] button to input running pattern.**



3 **Press [F1] / [F2] button to select the change item, then press the [∧] / [∨] 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 error is displayed.

To set up ranging over a day

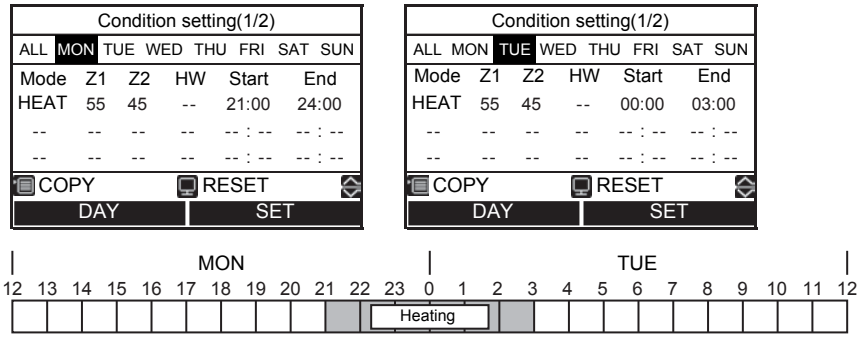
There are two methods.

①If “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”.

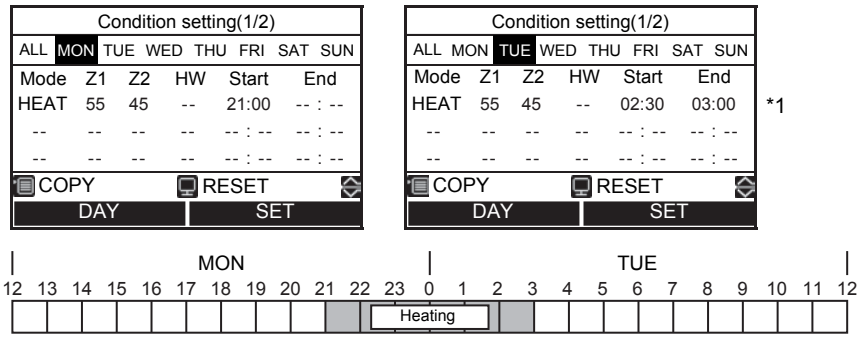
②If “--” is set to “END”, the previous operation status will be continued next day. And set the time you want to stop to “END”. Any “START” time is sufficient if it is earlier than “END” time.

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

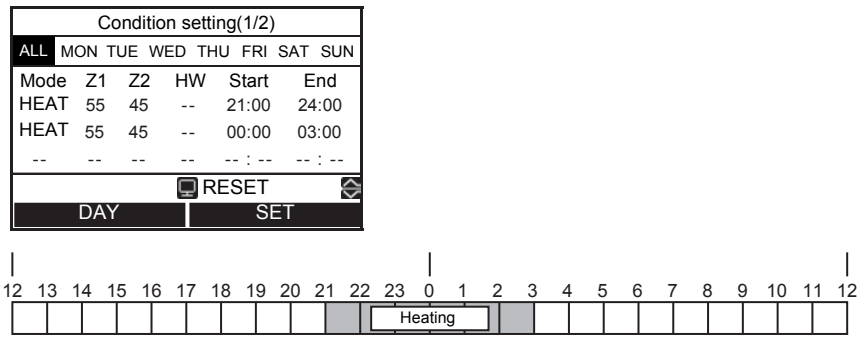
Example of set up (1)



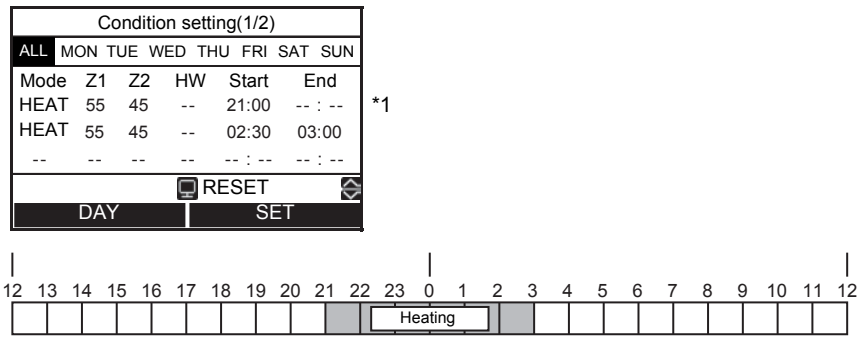
Example of set up (2)



Example of set up (3) (ALL DAY)



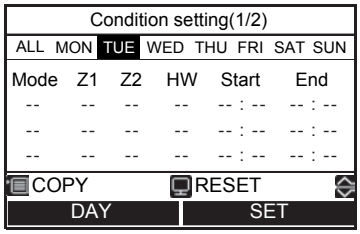
Example of set up (4) (ALL DAY)



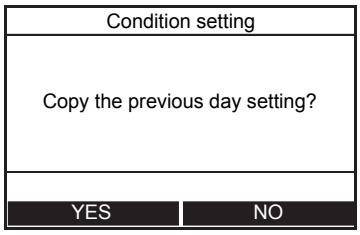
*1: “START” time is permissible 00:00 ~ 02:59 in this example.

To copy the settings of the previous day

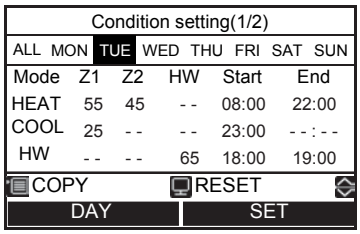
1 **Press the [F1] button to select the day, then press the [▤] button to copy the settings of the previous day.**



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



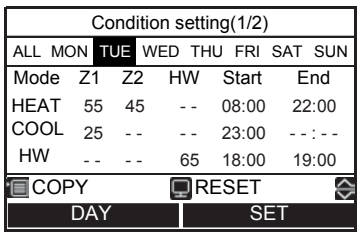
↓



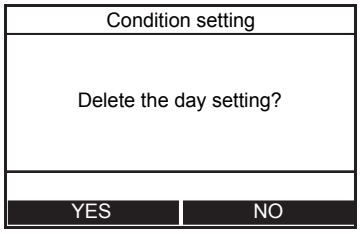
- If the [▤] button is pressed in the state where “MON” is selected, the contents of the setting of “SUN” is copied.

To reset the settings for each day.

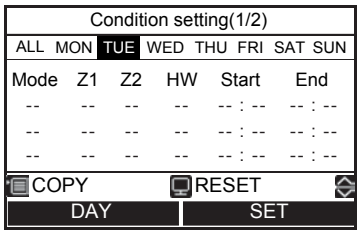
1 **Press the [F1] button to select the day, then press the [▭] button to reset the settings of the day.**



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



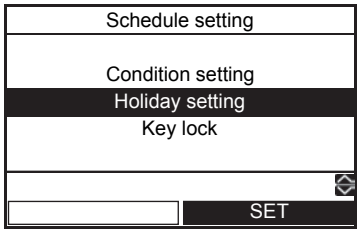
↓



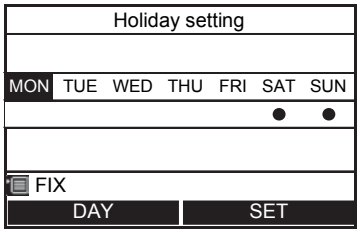
Holiday setting

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

1 **Press the [∧] / [∨] 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.



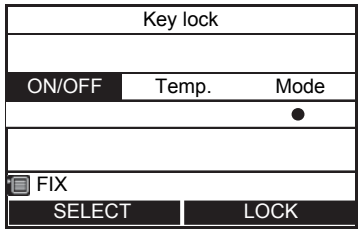
3 **Press the [▤] button to Fix.**

Key lock

- Select whether to LOCK / UNLOCK [ON/OFF], [Temperature], [mode] during schedule timer.

1 **Press the [∧] / [∨] 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

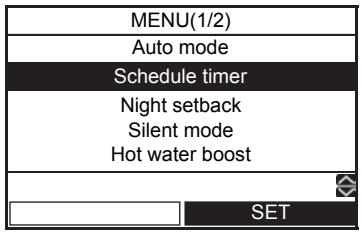


3 **Press the [▤] button to Fix.**

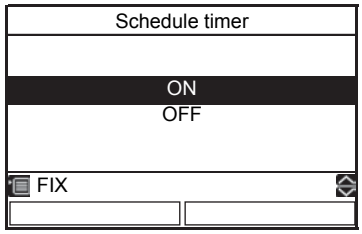
- When "LOCK" is selected, the key cannot be used during Key lock and schedule timer.
- The factory default is "UNLOCK".

To enable the Schedule timer function

1 **Press the [∧] / [∨] button to select "Schedule timer" on the MENU screen, then press the [F2] button.**



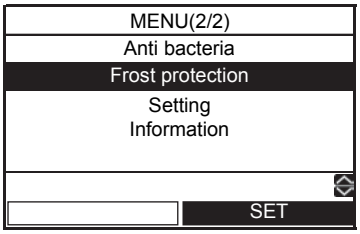
2 **Press the [∧] button to select "ON" on the Schedule timer screen, then press the [▤] button. The ◷ mark appears on the top screen.**



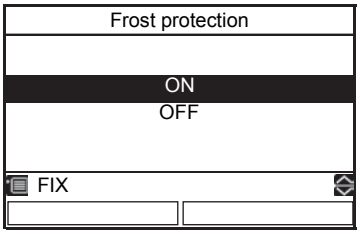
7. Frost protection Setting

- 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 [∧] / [∨] button to select “Frost protection” on the MENU screen, then press the [F2] button.

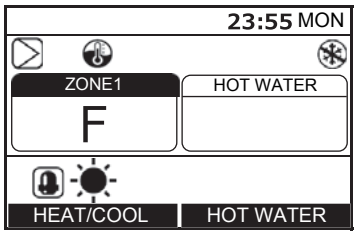


2 Press the [∧] button to select “ON” on the Frost protection screen, then press the [▤] button.



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

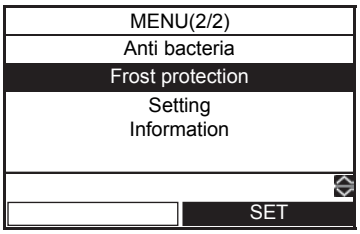
- When the set period has passed, the Frost protection operation ends automatically.



<How to set Frost protection operation end time>

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

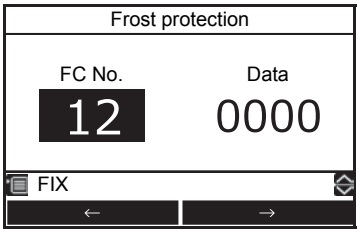
1 **Press the [∧] / [∨] button to select "Frost protection" on the MENU screen.**



2 **Press the [F1] button for 4 seconds or longer to enter the setting mode. The function code setting screen appears.**
FC No. 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 FC number or Data, then press the [∧] / [∨] button to set the value.**

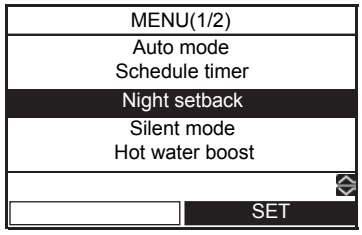
4 **Press the [▤] button. The set value is registered.**



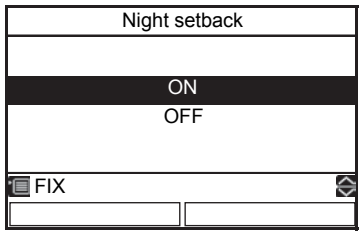
8. NIGHT Operation Setting

- 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 [∧] / [∨] 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.**

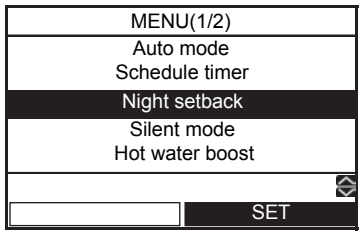


3 **Start the heating or cooling operation, then the mark appears on the top screen.**

<How to set NIGHT operation start and end time>

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

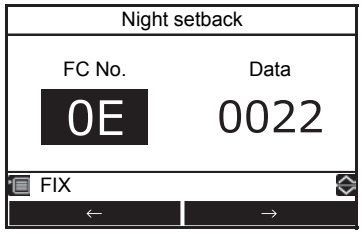
1 **Press the [∧] / [∨] button to select an "Night setback" on the MENU screen.**



2 **Press the [F1] button for 4 seconds or longer to enter the setting mode. The function code setting screen appears.**
FC No. 0E: Start time (Range: 0~23, Default: 22)
0F: End time (Range: 0~23, Default: 06)

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

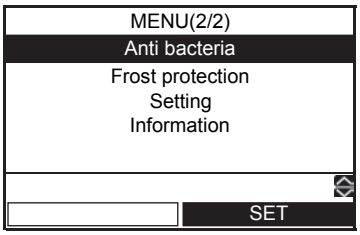
4 **Press the [▤] button. The set time is registered.**



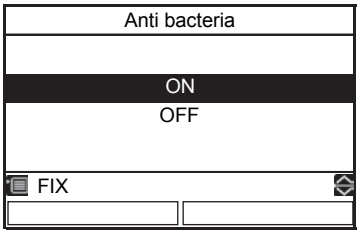
9. Anti bacteria Setting

- 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.**

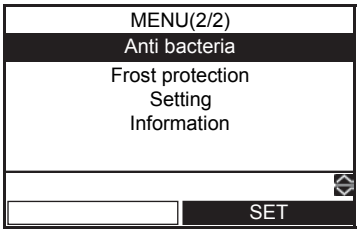
<How to set Anti bacteria temperature and holding time>

In FC_0A or 0B, the set temperature and holding time can be changed.
FC_0A: Set temperature change range 70 to 80 °C (75 °C: default)
FC_0B: Holding time change range 0 to 60 minutes (30 minutes: default)

<How to set Anti bacteria start time and cycle>

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

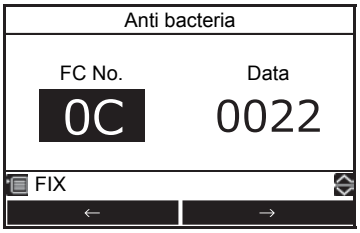
1 **Press the [∧] / [∨] button to select "Anti bacteria" on the MENU screen.**



2 **Press the [F1] button for 4 seconds or longer to enter the setting mode. The function code setting screen appears.**
FC No. 0C: Start time (Range: 0~23, Default: 22)
0D: cycle (Range: 0~10, Default: 07)

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

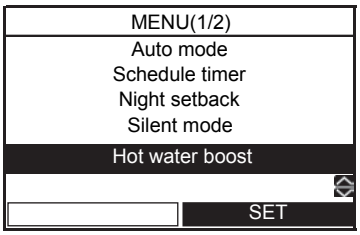
4 **Press the [▤] button. The set value is registered.**



10. Hot water boost Setting

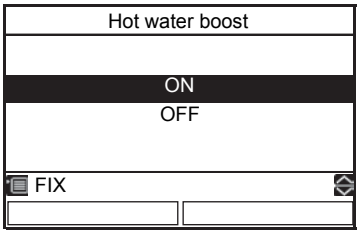
- This function is used when temporarily giving priority to the hot water supply operation. The hot water supply operation is performed in preference to other operations with a target of the preset time (60 minutes) or the preset temperature (75°C). Use this function when hot water is not used for a 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 [∧] / [∨] 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.

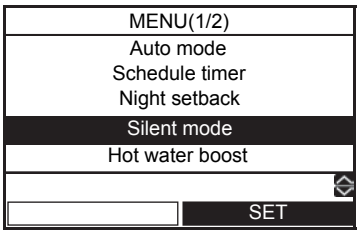
<How to set Hot water boost operation time and temperature>

In FC_08 or 09, the operation time and set temperature can be changed.
FC_08: Operation time change range 30 to 120 minutes (60 minutes: default)
FC_09: Set temperature change range 40 to 80 °C (75 °C: default)

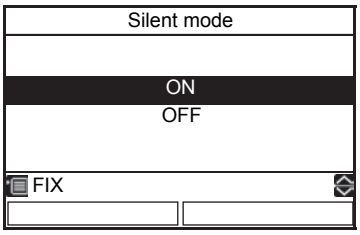
11. Night time Low-noise Setting

- 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 neighbours. Night time low-noise 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.**

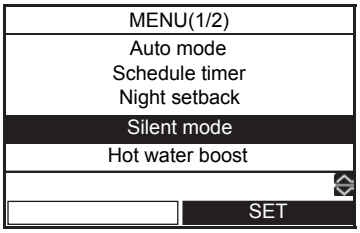


3 **Start the heating, cooling or hot water operation. The ⏲ mark appears on the top screen during the set-up time zone.**

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

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

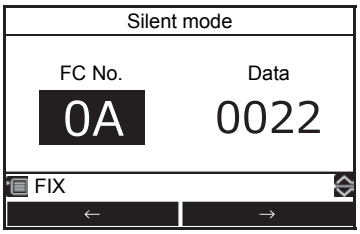
1 **Press the [∧] / [∨] button to select "Silent mode" on the MENU screen.**



2 **Press the [F1] button for 4 seconds or longer to enter the setting mode. The function code setting screen appears.**
FC No. 0A: Start time (Range: 0~23, Default: 22)
0B: End time (Range: 0~23, Default: 06)

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

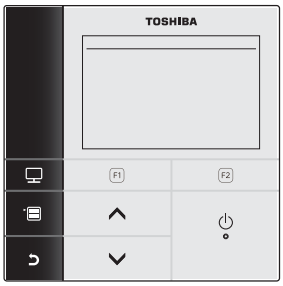
4 **Press the [▤] button. The set time is registered.**



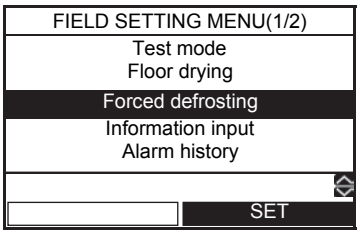
12. Forced Defrosting Setting

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

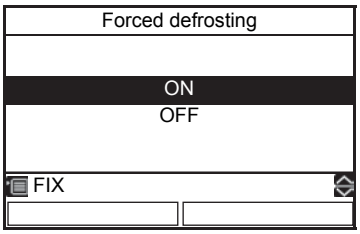
1 **Press the [ ] button and the [ ] button at same time for 4 seconds or longer on the top screen to display the "FIELD SETTING MENU".**



2 **Press the [ ] / [ ] button to select "Forced defrosting" on the FIELD SETTING 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.)

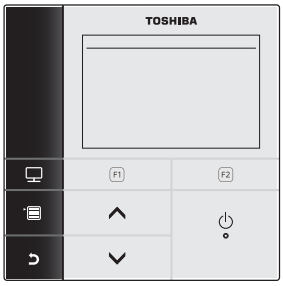
13. Display Function of Set Temperature and Other Settings

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

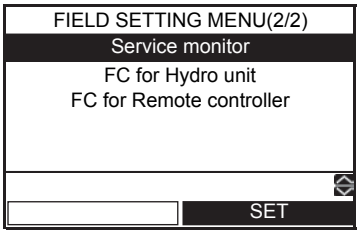
■ Sensor temperature display calling

<Procedure>

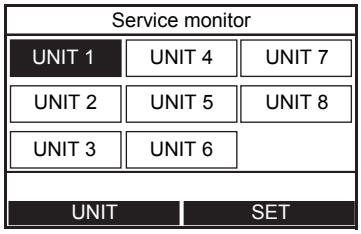
1 **Press the [▤] button and the [∨] button at same time for 4 seconds or longer on the top screen to display the "FIELD SETTING MENU".**

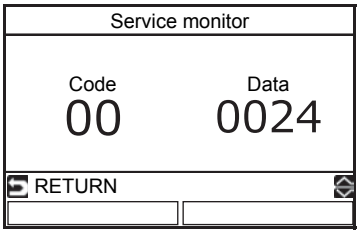


2 **Press the [∧] / [∨] button to select "Service monitor" on the FIELD SETTING MENU screen, then press the [F2] button.**



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	Control temperature (Hot water cylinder)	°C
	01	Control temperature (Zone1)	°C
	02	Control temperature (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
	0	Low pressure (Ps) × 1/10	kPa
	0F	Hydro soft Ver.	–

	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

	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

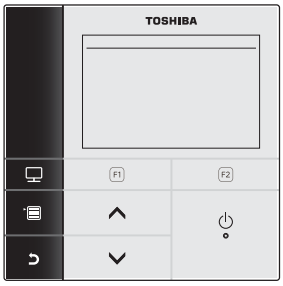
- Some sensors (temperature / pressure) or fan are not displayed, because not connected.

14. Failure History Calling Function

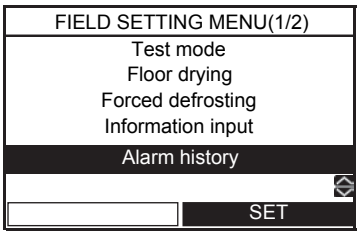
- List of latest 10 alarm data: error information of error code, date and time is displayed.

<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".**

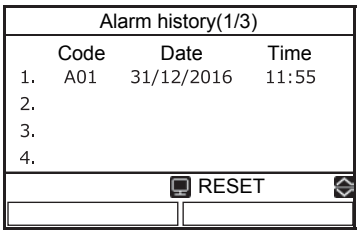


2 **Press the [ ] / [ ] button to select "Alarm history" on the FIELD SETTING MENU screen, then press the [F2] button.**

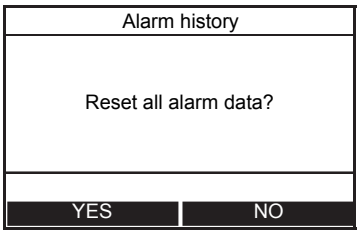


To reset the alarm history

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



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



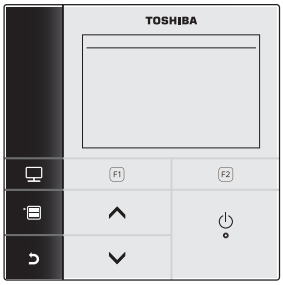
NOTE

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

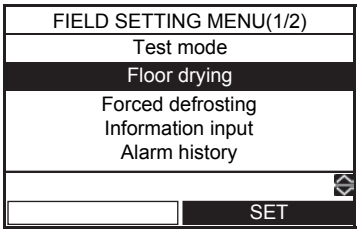
15. Floor drying

- 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 function code.
- Operation is not started unless All the related function 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.

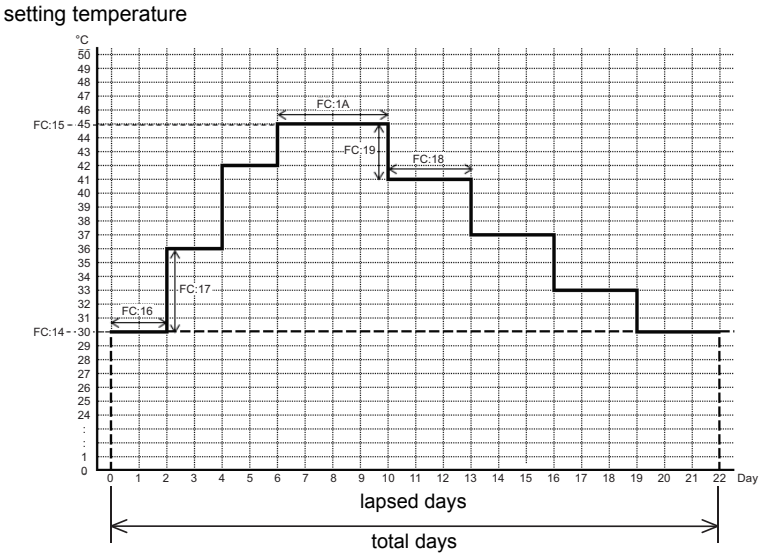
1 **Press the [ ] button and the [ ] button at same time for 4 seconds or longer on the top screen to display the "FIELD SETTING MENU".**



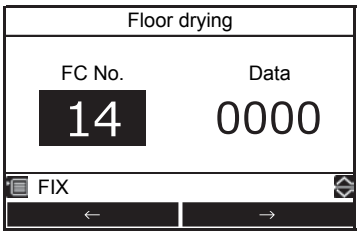
2 **Press the [ ] / [ ] button to select "Floor drying" on the FIELD SETTING MENU, then press the [F1] button for 4 seconds or longer.**



FC:14 setting start and End temperature [20-55°C]
FC:15 setting Max temperature [20-55°C]
FC:16 continuation days for every step up to Max temperature [1-7 days]
FC:17 temperature difference for every step up to Max temperature [1-10 K]
FC:18 continuation days for every step down to End temperature [1-7 days]
FC:19 temperature difference for every step down to End temperature [1-10 K]
FC:1A Continuation days in Max temperature [1-30 days]



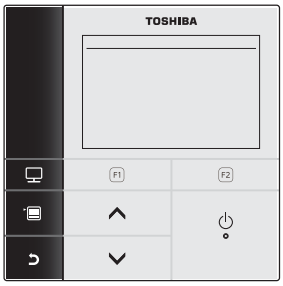
3 **Press the [F1] / [F2] button to select FC number or Data, then press the [ ] / [ ] button to set the value.**



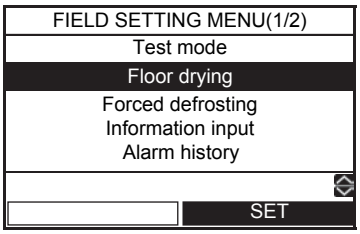
4 **Press the [ ] button. The set value is registered.**

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".**

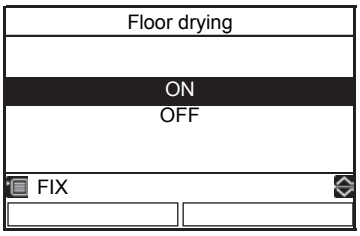


2 **Press the [ ] / [ ] button to select "Floor drying" on the FIELD SETTING MENU, then press the [F2] button.**



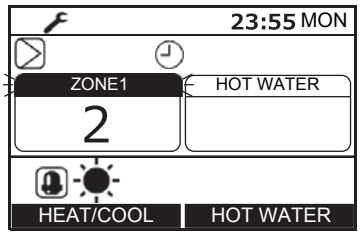
3 **Press the [ ] button to select the ON, then press the [ ] button.**

- 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.

Outdoor unit

16. Outdoor Unit Setting

16-1. 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

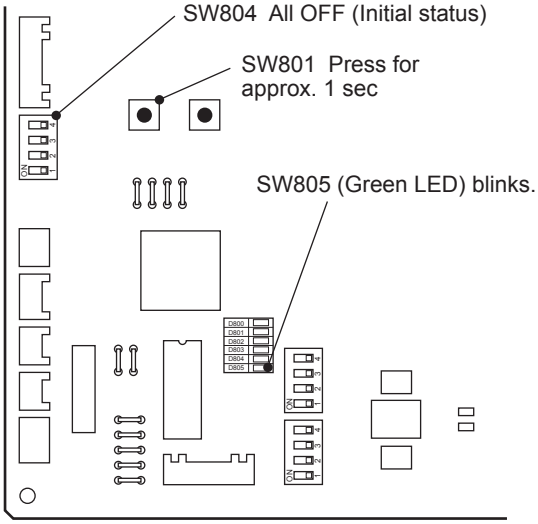
2 **Set all the SW804 dip switches to OFF (initial status), and press the push-button switch SW801 for approx. 1 second.**
A cooling operation starts. (During the operation, D805 (green LED) blinks.
Note that this operation lasts for 10 minutes.

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

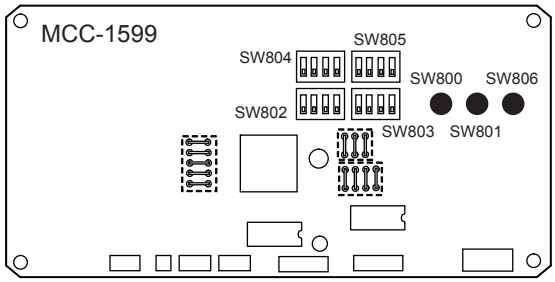
4 **After the refrigerant recovery is completed, close the gas-side valve.**

5 **Press again the push-button switch SW801 for approx. 1 second. The outdoor unit stops operation (cooling).**

<HWS-805H-E, 1105H-E, 1405H-E>



<HWS-1105H8(R)-E, 1405H8(R)-E, 1605H8(R)-E>



*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 SW06-2 “ON”.
3.Turn on the power. (hydro and outdoor unit)
4.Rotate switch SW01 to position “1” and press tactile switch SW07 for 5 sec, or longer.
5.Rotating the rotary SW01 to position “16”.
6.If you finish refrigerant recovery operation, set SW06-2 “OFF” and set SW01 “1”.

16-2. Outdoor unit settings (Existing piping, Power save, etc.)

The following settings are available with dip switch setting and jumper wire setting.

<table>
<tr><th>Function</th><th>Where to set</th><th>Control details</th></tr>
<tr><td>Existing piping setting</td><td rowspan="3">SW802
ON 1 2 3 4
--- OFF
--- Existing piping setting
--- Power save setting
--- Snow prevention fan control
* All OFF position at factory default</td><td>When using a Ø19.1 pipe for the existing piping, set the switch to ON. This case may decrease heating capacity depending on the outside air temperature when heating or on a room temperature.</td></tr>
<tr><td>Power save setting</td><td>When using the power save function, set the switch to ON. This setting controls the compressor frequency lowering (about 10%) according to the heat exchange temperature of the hydro unit during a heating or hot water supply operation.</td></tr>
<tr><td>Snow prevention fan control</td><td>This control enables the function that prevents snow from entering the draft air duct through the fan guard or a heat exchanger gap and causing motor lock. If the outside air temperature is 0 °C below, this control operates the outdoor fan in W5 even if the compressor is not in operation.</td></tr>
<tr><td>Defrosting time change</td><td>J805, J806</td><td>If the defrosting interval is shorter than the standard, the jumper wire is cut. For the control details or how to cut the jumper wire, see defrosting control.</td></tr>
<tr><td>Maximum frequency change</td><td>J807</td><td>If the maximum value of compressor frequency need to be lowered, cut the jumper wire shown on the left.
This control lowers the maximum frequency when hot water supply, heating, or cooling is in operation. (HWS-805H-E only)
In this case, the maximum capacity decreases.
Maximum frequency of compressor
<table>
<tr><th rowspan="2">Model</th><th colspan="2">HWS-805H-E</th><th colspan="2">HWS-1105H-E</th><th colspan="2">HWS-1405H-E</th></tr>
<tr><th>Cooling</th><th>Heating</th><th>Cooling</th><th>Heating</th><th>Cooling</th><th>Heating</th></tr>
<tr><td>Standard</td><td>70.2</td><td>70.2</td><td>53.4</td><td>60.0</td><td>70.2</td><td>70.2</td></tr>
<tr><td>J807 cut</td><td>55.8</td><td>55.8</td><td>48.0</td><td>54.0</td><td>48.6</td><td>55.8</td></tr>
</table>
<table>
<tr><th rowspan="2">Model</th><th colspan="2">HWS-1105H8(R)-E</th><th colspan="2">HWS-1405H8(R)-E</th><th colspan="2">HWS-1605H8(R)-E</th></tr>
<tr><th>Cooling</th><th>Heating</th><th>Cooling</th><th>Heating</th><th>Cooling</th><th>Heating</th></tr>
<tr><td>Standard</td><td>53.4</td><td>60.0</td><td>64.2</td><td>66.0</td><td>70.2</td><td>70.2</td></tr>
<tr><td>J807 cut</td><td>48.0</td><td>42.0</td><td>48.0</td><td>49.2</td><td>55.8</td><td>55.8</td></tr>
</table></td></tr>
</table>

16-3. Service support functions (LED indication, Switch operation method)

The following settings are available with dip switches.

(1) Overview

Using 3 dip switches (SW802, SW803, SW804) and 2 push-button switches (SW800, SW801) can make settings available and confirm operations.

For operation

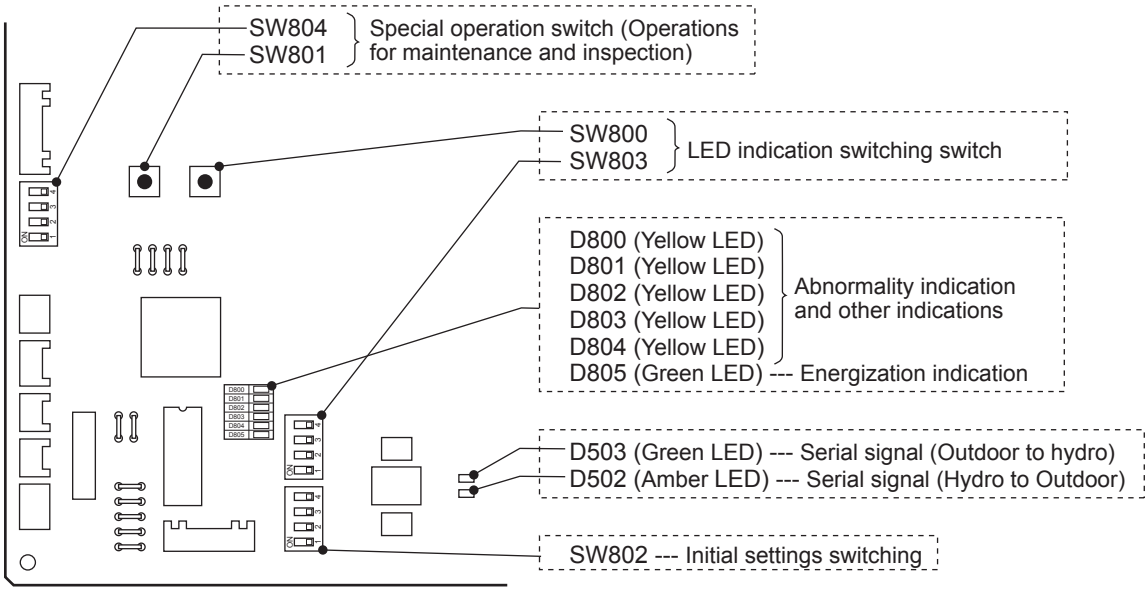
Part number	Specification	Operation details
SW800	Press button switch	This switch switches the indications of LED (D800 to D804) on the outdoor control board.
SW803	Dip switch	
SW801	Press button switch	This switch enables users to perform a special operation for maintenance and inspection.
SW804	Dip switch	
SW802	Dip switch	This switch performs initial settings. (See 10-16-2)

For display

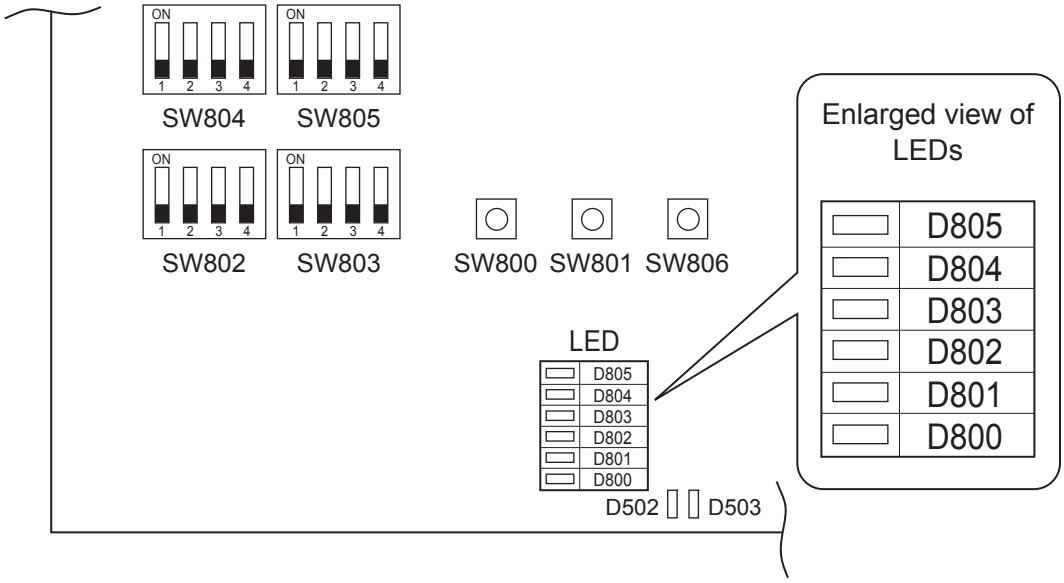
Part number	Specification	Operation details
D502	Amber LED	Signal display (signals from the hydro unit) of communication between hydro unit and outdoor unit (serial communication)
D503	Green LED	Signal display (signals from the outdoor unit) of communication between hydro unit and outdoor unit (serial communication)
D800 to D804	Yellow LED	**Abnormality indication** All OFF of SW803 or the lit status of any of D800 to D804 indicates that the outdoor control unit detects an abnormality. Setting SW803 to other than OFF shows details with LED indication.
D805	Green LED	**Energization indication** This LED lights when the outdoor unit is energized. During a special operation with the SW801 or SW804 operation, this LED blinks.

Note: All the LEDs have no colour when off.

<HWS-805H-E, 1105H-E, 1405H-E>



<HWS-1105H8(R)-E, 1405H8(R)-E, 1605H8(R)-E>



(2) LED indication switching (SW800, SW803 operation)

(2) -1. Indication switching list

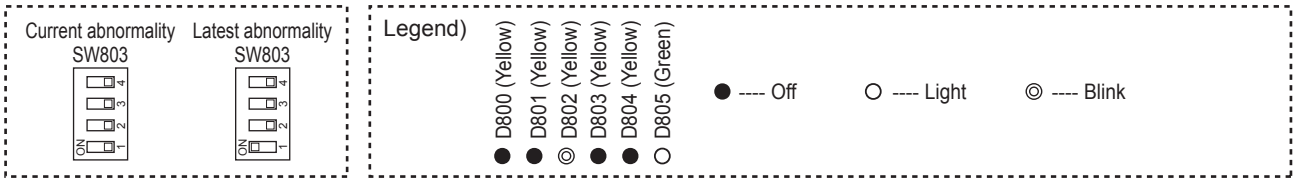
Operating SW803 can switch the indications of LED D800 to D804 on the outdoor control board.

Switch	Function and details
SW803	**Abnormality indication (Current abnormality)** This switch indicates the current abnormality. Without an abnormality, the lights are off. (See (2)-2)
SW803	**Abnormal indication (Latest abnormality: Latest abnormality including the current one)** After the abnormality status is released, this setting enables users to see the previous abnormalities. (Previous abnormality can be checked even if the power is once turned off.) * If there is an abnormality now, the abnormality details of the current one is displayed. * This setting does not display a TO sensor failure. (Check for the failure with the setting for current abnormality.) (See (2)-2)
TD SW803 TE SW803 TS SW803 TO SW803 TL SW803 TH SW803 TWI SW803 TC* SW803	**Temperature sensor indication** These switches indicate the temperature sensor detecting value. * TC=TWO+2 (heating, hot water supply) TC=TWO (cooling) (See (2)-3)
SW803	**Current indication** This switch indicates the current value in the outdoor unit. (See (2)-3)
SW803	**Compressor operation frequency indication** This switch indicates the compressor operation frequency. (See (2)-3)
SW803	**PMV position indication** This switch indicates PMV (Pulse motor valve) position. (See (2)-3)

(2) -2. Abnormality indication

The current abnormality and the latest abnormality (including the current one) can be identified by the LED D800 to D804 on the outdoor control board.

1) Setting all the SW803 dip switches to OFF indicates the current abnormality status.
2) Setting SW803 dip switch <1> only to ON indicates the previous abnormality (including the current one).
3) An abnormality lights any of the LEDs from D800 to D804.(Indication 1)
4) Pressing the push-button switch SW800 for approx. 1 second switches indication.(Indication 2)
5) When SW800 is again pressed or 2 minutes has passed, the indication 1 status returns.



Indication 1 (Initial indication)	Indication 2 (SW800 operation)	Abnormality details	Remote controller Abnormality code
●●●●●○	●●●●●○	Normal	---
○○●●○○	●●◎●●○	Discharge temperature sensor (TD) failure	F04
	●◎◎●●○	Heat exchanger temperature sensor (TE) failure	F06
	◎◎◎●●○	Heat exchanger temperature sensor (TL) failure	F07, F06
	●●●◎●○	Outside air temperature sensor (TO) failure	F08
	●●◎◎●○	Suction temperature sensor (TS) failure	F12, F06
	◎●◎◎●○	Heat sink temperature sensor (TH) failure	F13, L29
	◎◎◎◎●○	Heat exchanger, suction sensor (TE, TS) wrong wiring	F15, F06
	◎◎◎◎◎○	EEPROM failure	F31, L29
●●○●○○	◎●●●●○	Compressor break down	H01
	●◎●●●○	Compressor lock	H02
	◎◎●●●○	Current detection circuit failure	H03
	●●◎●●○	Faulty compressor case thermostat	H04, P04
●○○●○○	●◎●◎●○	Not set up the capacity	L10, L29
	◎◎◎◎●○	Combination failure between the hydro unit	L15
	◎●◎◎◎○	Communication failure between MCUs	L29
	◎◎◎◎◎○	Other abnormality (e.g. Compressor's loss of synchronism)	No abnormality confirmation
○○○●○○	◎◎●●●○	Abnormal discharge temperature	P03
	●●◎●●○	High pressure SW system error	P04
	◎●◎●●○	Power failure	P05, H03, P04
	◎◎◎●●○	Heat sink overheat failure	P07, L29
	◎◎◎◎●○	Gas leakage detection	P15, L29
	◎◎●●◎○	4-way valve reverse failure	P19, L29
	●●◎●◎○	Hi pressure protection operation	P20, P04
	●◎◎●◎○	Fan drive system failure	P22
	●◎●◎◎○	Compressor drive	P26
	◎●◎◎◎○	Compressor rotor position failure	P29

(2)-3. Sensor, Current, Compressor operation frequency, PMV position indication

The values detected by controller, such as temperature sensor or current values, can be easily checked.

Legend)

D800 (Yellow)	D801 (Yellow)	D802 (Yellow)	D803 (Yellow)	D804 (Yellow)	D805 (Green)
●	●	●	●	●	○

● ---- Off ○ ---- Light

Item setting / LED indication	Temperature sensor (℃) TD SW803, TE SW803, TS SW803, TO SW803, TL SW803, TH SW803, TA SW803, TC* SW803 *Refer to page 164	Current (A) SW803	Compressor operation frequency (r.p.s.) SW803	PMV position (pulse) SW803
●●●●●○	less than –25	0-0.9	0-4	0-19
○●●●●○	–25 – –21	1-1.9	5-9	20-39
●○●●●○	–20 – –16	2-2.9	10-14	40-59
○○●●●○	–15 – –11	3-3.9	15-19	60-79
●●○●●○	–10 – –6	4-4.9	20-24	80-99
○●○●●○	–5 – –1	5-5.9	25-29	100-119
●○○●●○	0 – 4	6-6.9	30-34	120-139
○○○●●○	5-9	7-7.9	35-39	140-159
●●●○●○	10-14	8-8.9	40-44	160-179
○●●○●○	15-19	9-9.9	45-49	180-199
●○●○●○	20-24	10-10.9	50-54	200-219
○○●○●○	25-29	11-11.9	55-59	220-239
●●○○●○	30-34	12-12.9	60-64	240-259
○●○○●○	35-39	13-13.9	65-69	260-279
●○○○●○	40-44	14-14.9	70-74	280-299
○○○○●○	45-49	15-15.9	75-79	300-319
●●●●○○	50-54	16-16.9	80-84	320-339
○●●●○○	55-59	17-17.9	85-89	340-359
●○●●○○	60-64	18-18.9	90-94	360-379
○○●●○○	65-69	19-19.9	95-99	380-399
●●○●○○	70-74	20-20.9	100-104	400-419
○●○●○○	75-79	21-21.9	105-109	420-439
●○○●○○	80-84	22-22.9	110-114	440-459
○○○●○○	85-89	23-23.9	115-119	460-479
●●●○○○	90-94	24-24.9	120-124	480-499
○●●○○○	95-99	25-25.9	125-129	500
●○●○○○	100-104	26-26.9	130-134	–
○○●○○○	105-109	27-27.9	135-139	–
●●○○○○	110-114	28-28.9	140-144	–
○●○○○○	115-119	29-29.9	145-149	–
●○○○○○	120 or higher	30-30.9	150-154	–
○○○○○○	sensor failure, not connected	31 or higher	155 or higher	–

* TD, TL, and TH show errors below the ordinary temperature because they are sensors for high temperature.

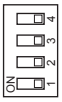
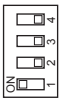
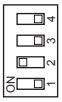
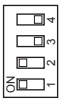
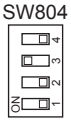
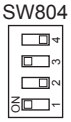
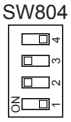
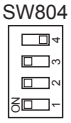
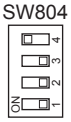
* Current value for the outdoor unit only is shown.

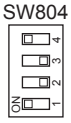
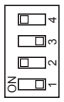
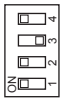
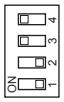
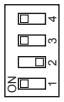
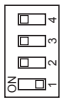
(3) Special operation for maintenance and inspection (SW801, SW804)

SW801 and SW804 can perform the following special operations for maintenance and inspection.

1) Switches the dip switch SW804. (See the table below)
2) Presses the push-button switch SW801 for approx. 1 second.
3) Starts the functions shown below. During the start processing of each function, LED D805 (Green) blinks.
4) When the push-button switch SW801 is pressed for approx. 1 second, or the dip switch SW804 is switched, or the defined time for each function has passed, the each function stops and LED D805 (Green) returns to continuous lit.

<Special operation>

SW804	Operation when press button switch SW801 is pressed		
SW804 	**Refrigerant recovery operation** The outdoor unit operates cooling. The hydro unit may freeze with this operation alone. **Remove beforehand the water in the hydro unit. (See 10-16-1)**		
SW804 	**Hydro unit cooling request** Performs a trial cooling operation. (See Note1)		
SW804 	**Hydro unit heating request** Performs a trial heating operation.(See Note1)		
SW804 	**Fan motor forcible operation** Forcibly performs a fan motor operation. When SW801 is pressed again or after 2 minutes, the operation returns to the normal control.		**Caution:** Although these controls are available during an operation, basically perform them when no operation is in progress. Performing these controls during an operation may cause dangerously rapid pressure change.
SW804 	(No operation particularly)		
SW804 	**PMV full open operation** Fully opens PMV (Pulse motor valve). When SW801 is pressed again or after 2 minutes, the operation returns to the normal control.		
SW804 	**PMV full close operation** Fully closes PMV (Pulse motor valve). When SW801 is pressed again or after 2 minutes, the operation returns to the normal control.		
SW804 	**PMV half open operation** Half opens (250 pulses) PMV (Pulse motor valve). When SW801 is pressed again or after 2 minutes, the operation returns to the normal control.		
SW804 	**4-way valve relay operation (RY700, CN700 for check)** Sets 4-way valve energization relay (RY700) to ON. When SW801 is pressed again or after 2 minutes, the operation returns to the normal control. **Caution:** Do not connect the coil into the body when perform this operation.		

SW804	Operation when press button switch SW801 is pressed		
SW804 	**Self-holding valve vacuum operation (Switch to heating cycle)** (RY700, RY701, RY705, CN701 for check) Sets relay RY700, RY701, and RY705 to ON. (CN701 Between 1 to 4 Voltage = Approx. 325V) This function operates for 10 seconds. After that it becomes OFF.	**HWS-805H-E** **HWS-1105H-E** **HWS-1405H-E only**	**Caution:** Although these controls are available during an operation, basically perform them when no operation is in progress. Performing these controls during an operation may cause dangerously rapid pressure change.
SW804 	**Self-holding valve release operation (Switch to cooling cycle)** Sets relay RY700 to ON. (CN701 Between 1 to 4 Voltage = Approx. 325V) This function operates for 10 seconds. After that it becomes OFF.		
SW804 	**SV valve relay operation (RY702, CN702 for check)** Sets SV valve relay (RY702) to ON. When SW801 is pressed again or after 2 minutes, the operation returns to the normal control. * HWS-1105 and 1405H-E do not have the parts mounted, so this operation is unavailable.		
SW804 	**Heater output relay operation (RY703, CN703 for check)** Sets relay for optional heater (RY703) to ON. When SW801 is pressed again or after 2 minutes, the operation returns to the normal control.		
SW804 	**External output relay operation (RY704, CN704 for check)** Sets relay for external output (RY704) to ON. When SW801 is pressed again or after 2 minutes, the operation returns to the normal control.		
SW804 	(No operation particularly)		
SW804	**External output relay operation change** **Note:** Do not use this setting.		

(Note 1) The forced test run with this setting cannot be cancelled by the remote controller in the hydro unit. Be sure to cancel the operation from the outdoor unit. (Press again SW801 for 1 second)

11 Replacement of the service PC board

■ Setting the jumper wires and DIP switches

Outdoor unit	Service Parts (CDB)
HWS-805H-E	4316V562 (MCC-1571)
HWS-1105H-E,1405H-E	3026V053 (MCC-1571)
HWS-1105H8(R)-E, 1405H8(R)-E, 1605H8(R)-E	3026V055 (MCC-1599)

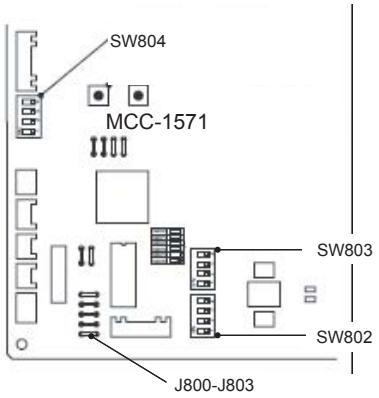
Parts name		Function	Setting
Jumper wire	J800~J803	Model switching	Cut these jumper wires according to the following table.
	J804~J811	Settings	Set these jumper wires to the settings of the PC board before replacement.
DIP switch	SW802	Settings	Set SW802 to the setting of the PC board before replacement.
	SW803	LED indication switching	Set SW803 to all OFF.
	SW804	Special operations for service	Set SW804 to all OFF.
	SW805 (Only H8series)	Special operations for service	Set SW805 to all OFF

Model switching (J800 to J803)

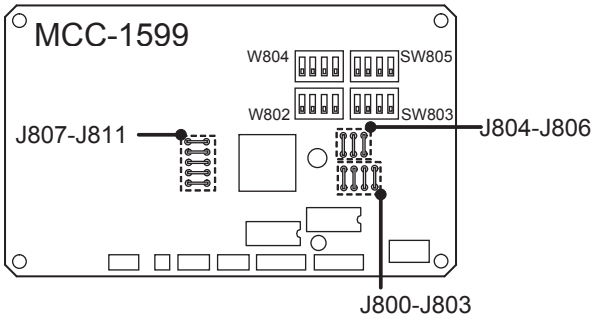
Since this service PC board is available for several models, cut the jumper wires according to the following table. If they are not cut correctly, an error code “L10” or “L29” appears on the remote controller and the operation is disabled.

Model name	J 800	J 801	J 802	J 803
Factory default	○	○	○	○
HWS-805H-E	○	×	×	○
HWS-1105H-E	×	×	×	○
HWS-1405H-E	○	○	○	×
HWS-1105H8*-E	○	×	×	○
HWS-1405H8*-E	×	×	×	○
HWS-1605H8*-E	○	○	○	×
* : Characters that indicate the following: No character -- Standard models R ----- For with cord heater	○:Connected, ×:Cut			

<HWS-805H-E,1105H-E,1405H-E>



<HWS-1105H8*-E,1405H8*-E,1605H8*-E>



12 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.

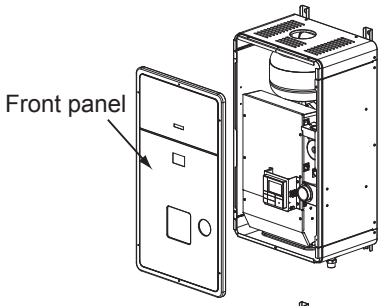
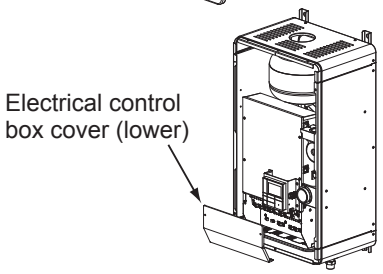
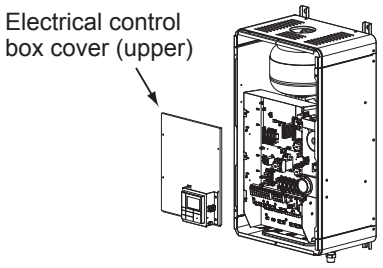
<Check>
Ensure that no water pressure is present when replacing the water circuit (circulation pump, heater unit, flow switch, etc). After a repair is complete, perform a test run (after attaching the front panel, upper and lower cabinets, and side cabinet) and check that no abnormality including smoke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

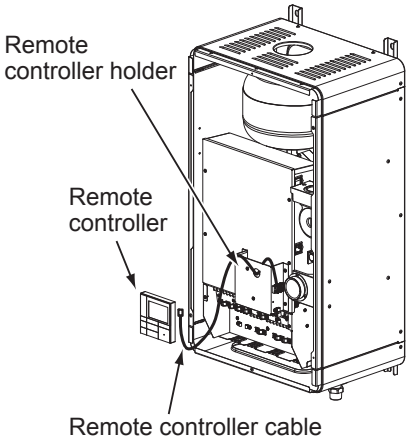
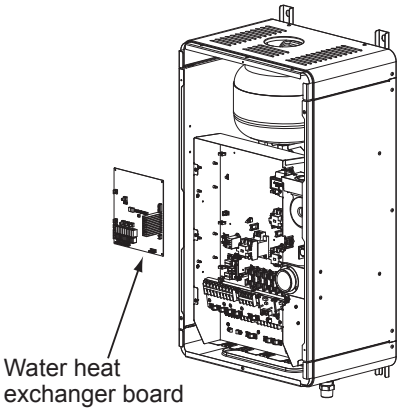
<Watch out for fire>
Observe the following instructions when repairing the refrigerant cycle.
(1) Watch out for surrounding fire. Always put out the fire of stove burner or other devices before starting the repair.
Should the fire fail to be put out, the oil mixed with refrigerant gas could catch fire.
(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.

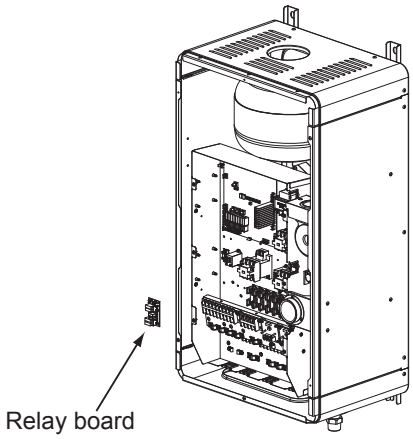
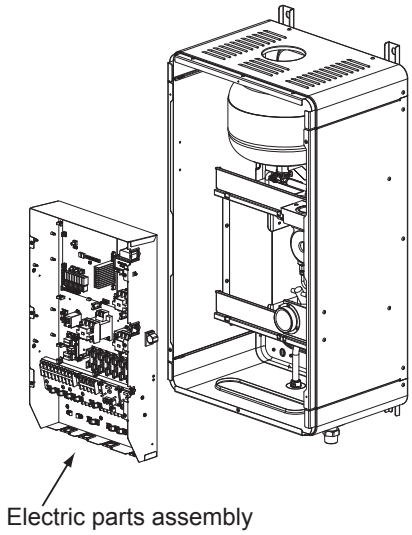
⚠ CAUTION

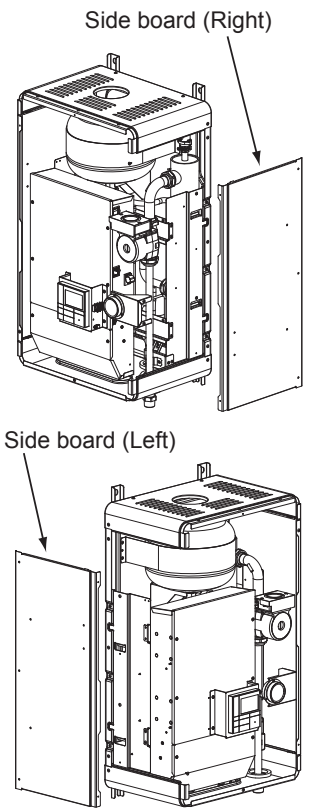
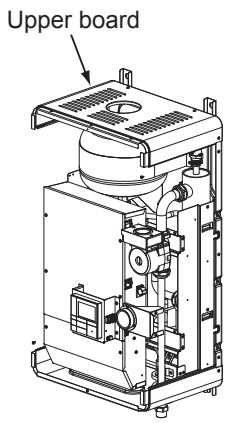
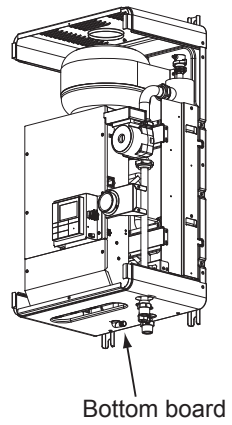
<Wear gloves>
Wear gloves (∗) when performing repair.
Failure to do so may cause an injury when accidentally contacting the parts.
∗: Thick gloves such as cotton work gloves

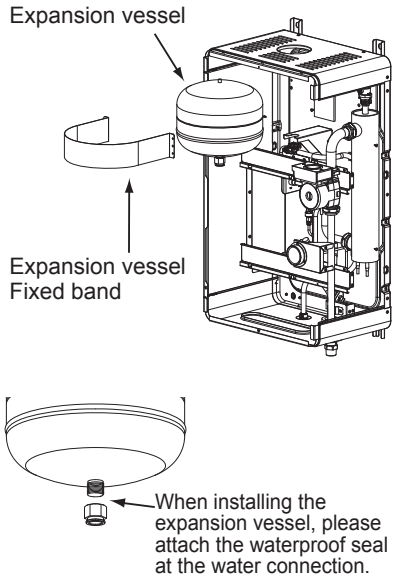
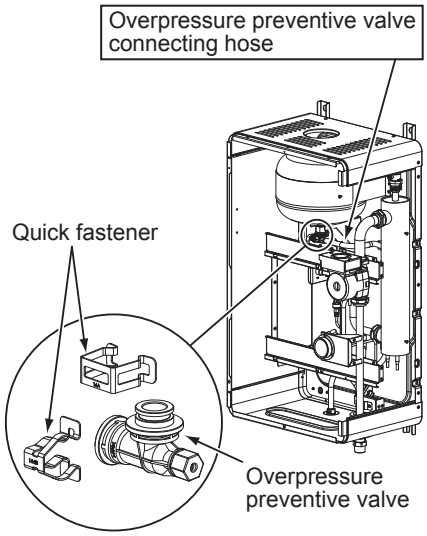
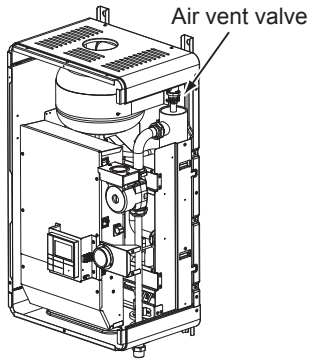
1. Hydro Unit

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. (ST1T Ø4 × 10, 6 screws) 3) After unscrew the screws, remove the front panel by pulling it toward you.	
	Electrical control box cover (lower)	4) Remove the electrical control box cover (lower). (ST2T Ø4 × 8, 2 screws) 5) Disconnect the power source cable and outdoor unit connecting cable from the terminal block.	
	Electrical control box cover (upper)	6) Remove the electrical control box cover (upper). (ST2T Ø4 × 8, 4 screws) 7) Disconnect the remote controller connecting cable from the CN41 connector of the water heat exchange board.	
		2. How to attach 1) Connect the remote controller connecting cable to the water heat exchange board. 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.	

No.	Exchange parts name	Work procedure	Remarks
2	Remote controller	1.How to remove 1) Perform the step 1-1. 2) Remove the remote controller from the holder using a flat-blade 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.	
3	Water heat exchanger board MCC-1511	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. 1. Connector CN100: TB 01 3P Connector (5P: White) CN101: Trans (3P: White) CN102: Trans (6P: White) CN200: Flow switch (3P: Red) CN201: Pressure switch (2P: White) CN202: Bimetal thermostat (3P: Yellow) CN203: TC sensor (2P: Yellow) CN204: TWI sensor (3P: Brown) CN205: TWO sensor (2P: Red) CN206: THO sensor (3P: White) CN207: Low pressure sensor (2P: Blue) CN212: Low pressure sensor (4P: White) CN213: TB 06 4P Terminal block (3P: White) CN214: TB 06 4P Terminal block (2P: White) CN305: TB 01 3P Terminal block (3P: Green) CN500: PWM control line (6P: Blue) CN501: Relay board (6P: Yellow) CN601: Relay 05 (3P: Red) CN602: TB 04 6P Terminal block (7P: White) CN603: Pump (3P: Yellow) CN604: Relay 06, TB 04 4P Terminal block (7P: Blue) CN605: Relay 01, Relay 02 (3P: Yellow) CN606: Relay 03, Relay 04 (3P: Blue) 2. Round-shape terminal 100: Ground (ST2T Ø4 × 8, 1 wire) **NOTE** When removing the connector, release the safety lock of the housing. 3) Release the 6 stoppers of the water heat exchanger board to remove the board.	

No.	Exchange parts name	Work procedure	Remarks
4	Relay board MCC-1431	1. How to remove 1) Perform the step 1-1. 2) Disconnect the connectors and lead cables connected to other parts from the relay board. 1. Connector CN01: TB 01 3P Terminal block (3P: White) CN02: Water heat exchanger board (5P: White) CN10: TB 05 9P Terminal block (9P: White) **NOTE** When removing the connector, release the safety lock of the housing. 3) Release the 3 stoppers of the relay board to remove the board.	
5	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. 1. Connector CN200: Flow switch (3P: Red) CN201: Pressure switch (2P: White) CN202: Bimetal thermostat (3P: Yellow) CN203: TC sensor (2P: Yellow) CN204: TWI sensor (3P: Brown) CN205: TWO sensor (2P: Red) CN206 THO sensor (3P: White) CN207: Low pressure sensor (2P: Blue) CN212: Low pressure sensor (4P: White) CN603: Pump (3P: Yellow) Disconnect the heater power source cable (For backup heater and hot water cylinder heater) from the MgSW. **NOTE** When removing the connector, release the safety lock of the housing. 3) Remove the fixed screws. (ST2T Ø4 × 8, 2 screws) 4) Remove the electric parts assembly by pulling it toward you while pulling it upward because the assembly back side has a hook holding structure.	

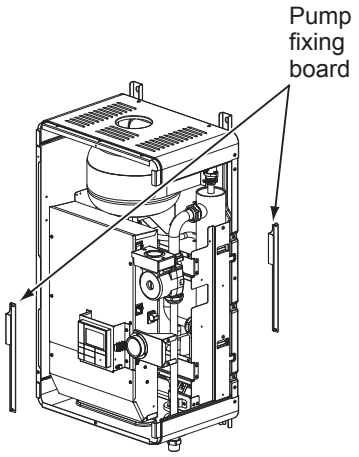
No.	Exchange parts name	Work procedure	Remarks
6	Side board	1. Side board (Right) 1) Perform the step 1-1-1), 2), 3). 2) Remove the fixed screws of the side board (Right). (ST1T Ø4 × 10, 5 screws) 3) Remove the fixed screws of the side board (Right) and the manometer fixing board. (ST1T Ø4 × 10, 2 screws) 2. Side board (Left) 1) Remove the fixed screws of the side board (Left). (ST1T Ø4 × 10, 5 screws)	
7	Upper board	1) Perform the step 1-1-1), 2), 3) and step 6. 2) Remove the fixed screws of the upper board. (ST1T Ø4 × 10, 4 screws)	
8	Bottom board	1) Perform the step 1-1-1), 2), 3) and step 6. 2) Remove the fixed screws of the bottom board. (ST1T Ø4 × 10, 4 screws) Removal is required if water and refrigerant piping are connected.	

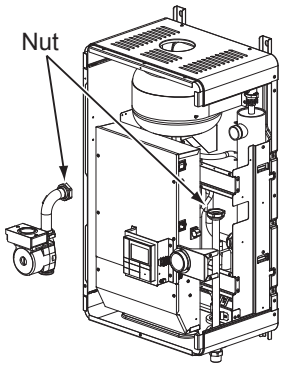
No.	Exchange parts name	Work procedure	Remarks
9	Expansion vessel	To replace a water circuit part, first close the water supply source valve and the valve of water pipe connected to the hydro unit. 1) Perform the step 1-1, step 5, step 6-1 2) Remove the fixed band of the expansion vessel. (ST1T Ø4 × 8, 4 screws) 3) Remove the expansion vessel connection. When installing the expansion vessel, please attach the waterproof seal at the water connection. After the expansion vessel replacement repair, open the water supply source valve and water piping valve to pass water through the hydro unit, and check that the expansion vessel connection has no water leakage.	
10	Overpressure preventive valve	To replace a water circuit part, first close the water supply source valve and the valve of water pipe connected to the hydro unit. 1) Perform the step 1-1, step 5, step 6-1 2) Remove the quick fastener. 3) 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. After the Overpressure preventive valve replacement repair, open the water supply source valve and water piping valve to pass water through the hydro unit, and check that the Overpressure preventive valve connection has no water leakage.	
11	Air vent valve	To replace a water circuit part, first close the water supply source valve and the valve of water pipe connected to the hydro unit. 1) Perform the step 1-1-1), 2), 3), step 6-1. 2) 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 air vent valve replacement repair, open the water supply source valve and water piping valve to pass water through the hydro unit, and check that the air vent valve connection has no water leakage.	

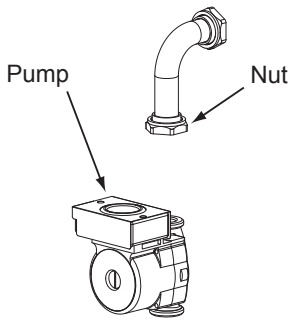
<table>
<tr><th>No.</th><th>Exchange parts name</th><th>Work procedure</th><th>Remarks</th></tr>
<tr>
<td>12</td>
<td>Pump</td>
<td>
To replace a water circuit part, first close the water supply source valve and the valve of water pipe connected to the hydro unit.

1. How to remove
1) Perform the step 1-1-1), 2), 3), step 6-1.
2) Remove the 2 nuts of the heater connection and the lower side of the pump. (Water pipe wrench is necessary.)
3) Remove the pump fixing board.
(ST2T Ø4 × 8, 4 screws)
4) Remove the nut of the upper part of the pump.

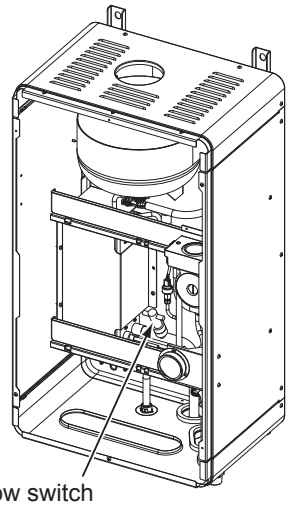
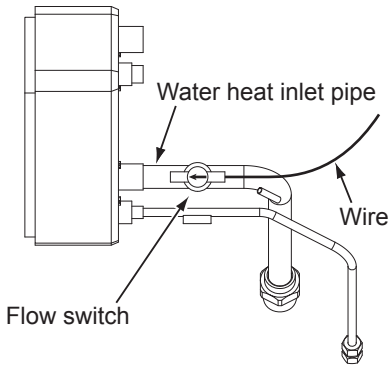
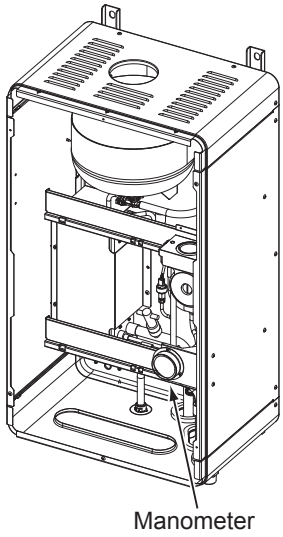
2. How to attach
The pump connection uses a liquid packing for water seal. When replacing the pump, use a packing which was slathered with the liquid gasket.
<table>
<tr><th>Part code</th><th>Service parts</th></tr>
<tr><td>37595721</td><td>Packing</td></tr>
</table>
1) Attach a new pump in the reverse order of the removal.

After the pump replacement repair, open the water supply source valve and water piping valve to pass water through the hydro unit, and check that the pump connection has no water leakage.
</td>
<td>






</td>
</tr>
</table>

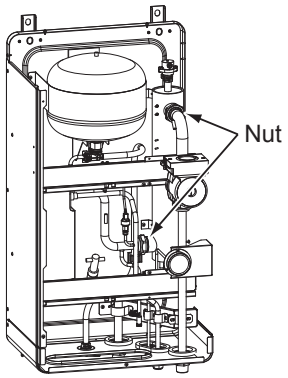
No.	Exchange parts name	Work procedure	Remarks
13	Flow switch	To replace a water circuit part, first close the water supply source valve and the valve of water pipe connected to the hydro unit. 1. How to remove 1) Perform the step 1-1 and step 5. 2) Remove the flow switch. The flow switch connection 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 switch in the reverse order of the removal. **NOTE** As shown on the right, place a flow sensor parallel to the water heat exchanger inlet pipe so that the wire is place on the right side from the front view. After the flow switch replacement repair, open the water supply source valve and water piping valve to pass water through the hydro unit, and check that the flow switch connection has no water leakage.	 
14	Manometer	To replace a water circuit part, first close the water supply source valve and the valve of water pipe connected to the hydro unit. 1. How to remove 1) Perform the step 1-1 and step 5 and 6. 2) Remove the manometer. After the manometer replacement repair, open the water supply source valve and water piping valve to pass water through the hydro unit, and check that the manometer connection has no water leakage.	

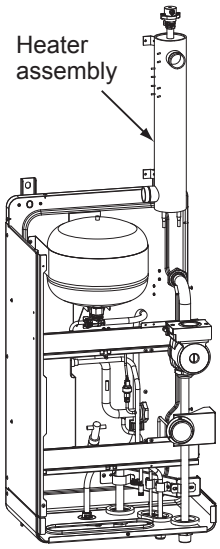
<table>
<tr><th>No.</th><th>Exchange parts name</th><th>Work procedure</th><th>Remarks</th></tr>
<tr><td>15</td><td>Heater assembly</td><td>
To replace a water circuit part, first close the water supply source valve and the valve of water pipe connected to the hydro unit.

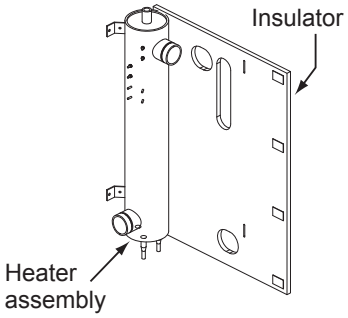
1. How to remove
1) Perform the step 1-1, step 5, 6, 7, and 11.
2) Remove the nut of the heater connection.
3) Remove the 2 fixed screws of the heater.
4) Pull the heater out upward.
5) Remove the insulator from the heater.

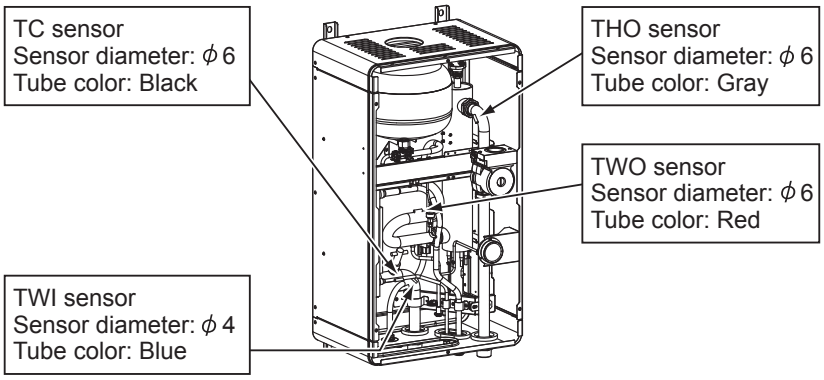
2. How to attach

The heater connection uses a liquid packing for water seal. When replacing the heater, use a packing which was slathered with the liquid gasket.
<table><tr><th>Part code</th><th>Service parts</th></tr><tr><td>37595721</td><td>Packing</td></tr></table>
1) Attach a new heater in the reverse order of the removal.

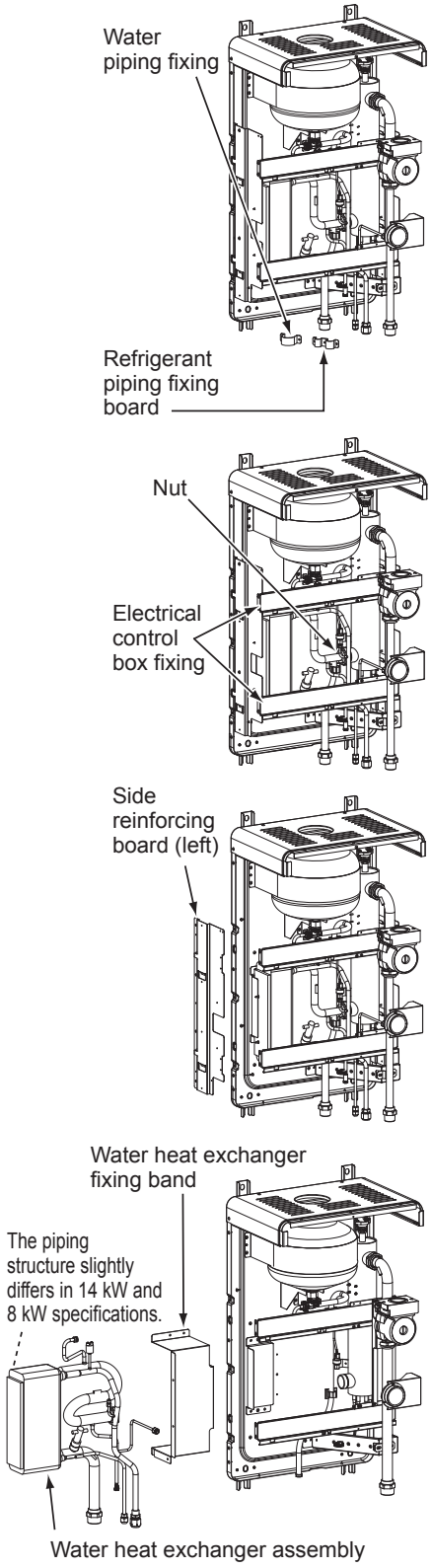
After the heater assembly replacement repair, open the water supply source valve and water piping valve to pass water through the hydro unit, and check that the heater connection has no water leakage.
</td><td>






</td></tr>
<tr><td>16</td><td>TC sensor
TWI sensor
TWO sensor
THO sensor</td><td colspan="2">
1. How to remove
1) Perform the step 1-1 and step 5.
2) Take the sensor out.


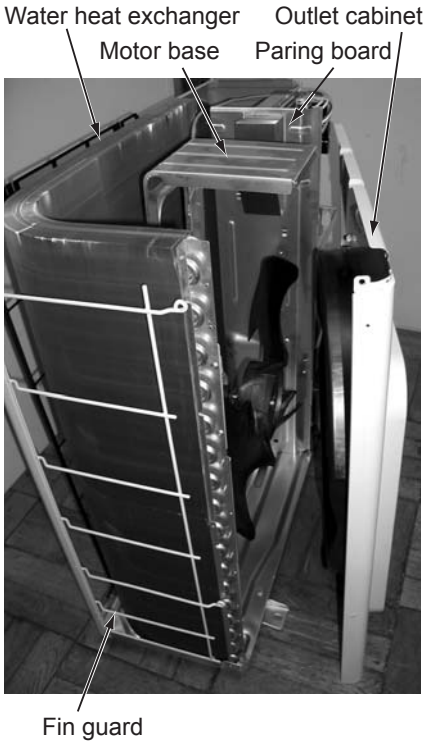
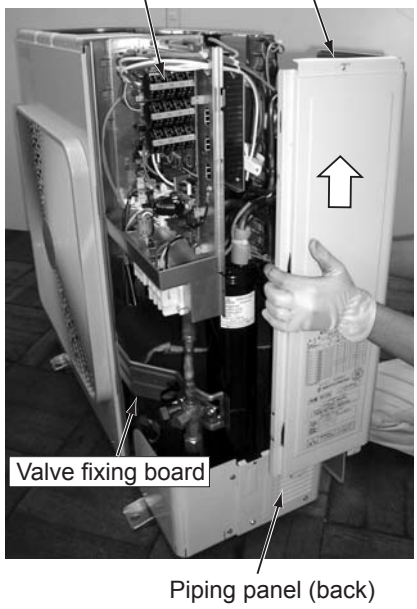
</td></tr>
</table>

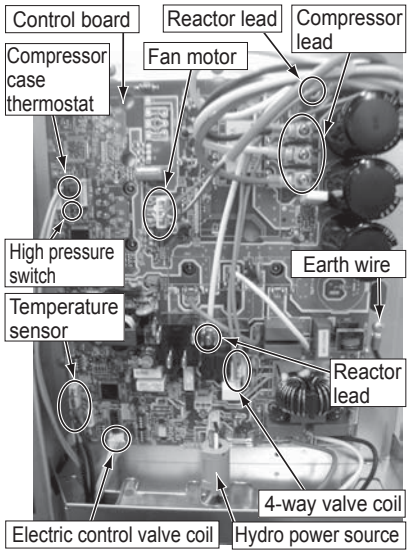
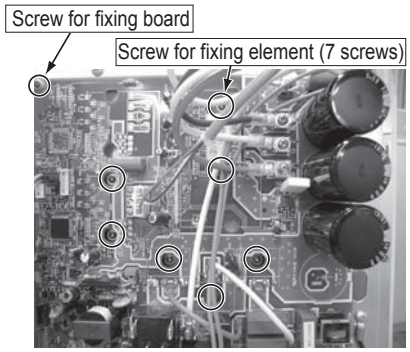
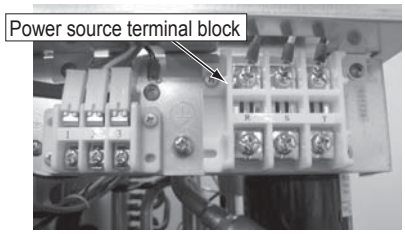
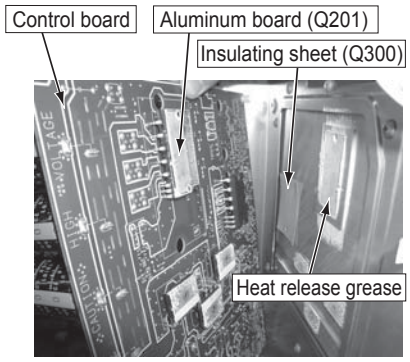
No.	Exchange parts name	Work procedure	Remarks
17	Water heat exchanger assembly	• Close the water piping source valve and the valve of water pipe connected to the hydro unit, and then remove the refrigerant and water piping. • Perform refrigerant recovery with the outdoor unit. • Disconnect all the power source cable, outdoor unit connection cable, and cylinder connection cable. 1. How to remove 1) Perform the step 1-1, step 5, 6, and 8. 2) Remove the water pipe fixing board. (ST2T Ø4 × 8, 2 screws) 3) Remove the refrigerant piping fixing board. (ST2T Ø4 × 8, 3 screws) 4) Remove the nut of the heater connection. 5) Remove the fixed screws of the electrical control box fixing board. (ST2T Ø4 × 8, 4 screws) 6) Remove the side reinforcing board (left). (ST2T Ø4 × 8, 6 screws) 3 for inside, 3 for outside 7) Remove the water heat exchanger fixing band. (ST2T Ø4 × 8, 6 screws) 8) Remove the water heat exchanger assembly. 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. • After the water heat exchanger assembly replacement repair, open the water supply source valve and water piping source valve to pass water through the hydro unit, and check that the connection has no water leakage. • After connecting the refrigerant pipe, check that the connection has no refrigerant leakage.	

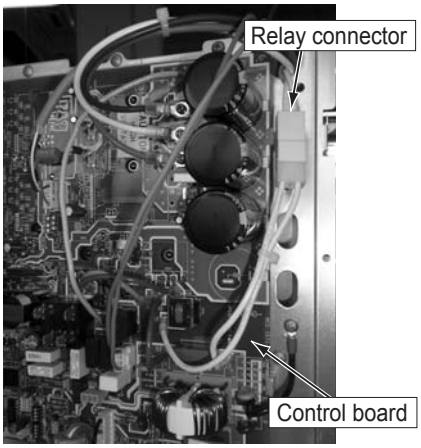
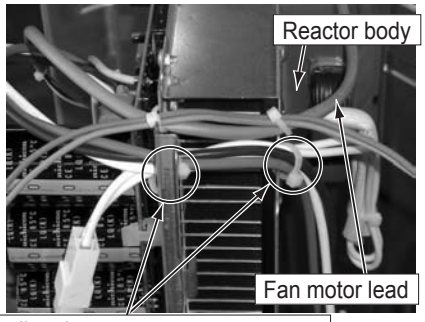
2. Outdoor Unit

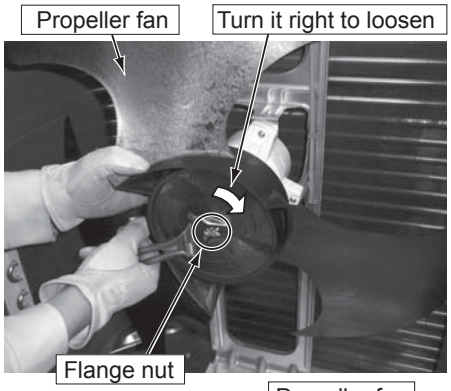
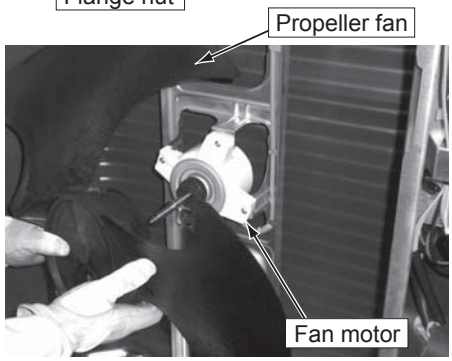
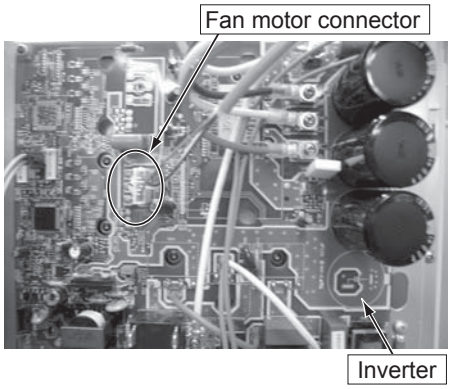
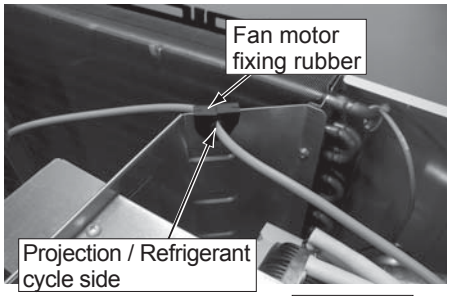
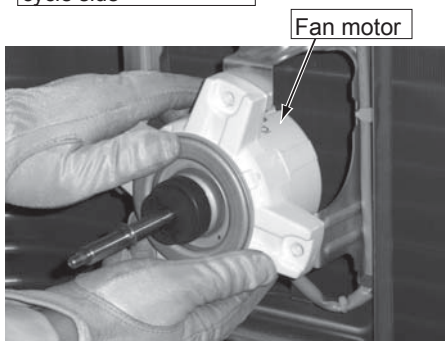
2-1. HWS-805H-E

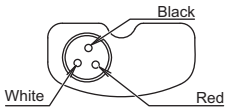
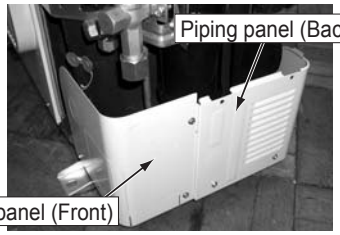
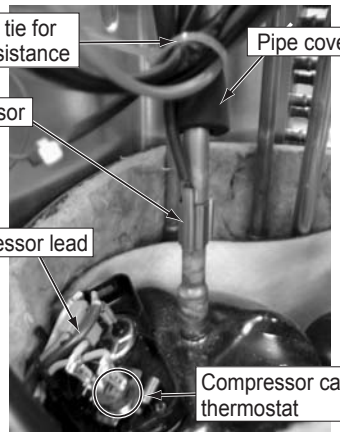
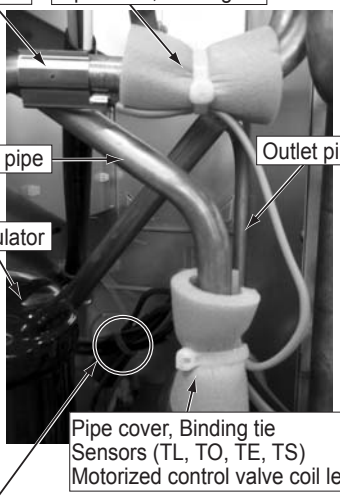
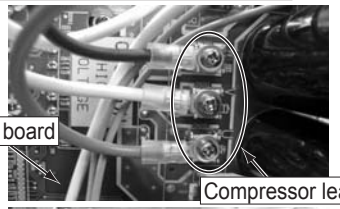
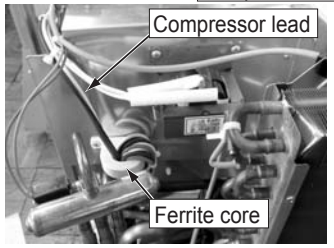
No.	Exchange parts name	Work procedure	Remarks
1	Common procedure	**NOTE** Wear gloves when performing the work. Failure to do so may cause an injury when accidentally contacting the parts. 1. How to remove 1) Stop the operation by remote controller and turn off the breaker. 2) Remove the front panel. (Hex Ø4 × 10, 2 screws) • After unscrewing the screws, remove the front panel while pulling it downward. 3) Disconnect the power source cable and connecting cables between hydro and outdoor from the cord plank and terminals. 4) Remove the top board. (Hex Ø4 × 10, 5 screws) 2. How to attach 1) Attach the top board. (Hex Ø4 × 10, 5 screws) At this time, insert the back side fin guard between the top board and the water heat exchanger (back side). 2) Connect the power source cable and connecting cables between hydro and outdoor to the terminal, and fix them with the cord clamp. **NOTE** The power source cable and connecting cable between hydro and outdoor units must be fixed along the connecting piping by using a cable tie so that the cables do not contact the compressor, gas side valve, gas side piping and outlet pipe. 3) Attach the front panel. (Hex Ø4 × 10, 2 screws)	Front panel Top board Insert the back side fin guard between the top board and the heat exchanger (back side).

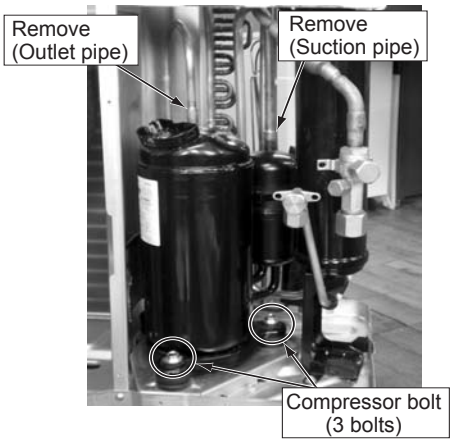
No.	Exchange parts name	Work procedure	Remarks
2	Outlet cabinet	How to remove 1) Perform the step 1-1. 2) Remove the screws of the outlet cabinet and parting board. (ST1T Ø4 × 8, 3 screws) 3) Remove the screws of the outlet cabinet and bottom board. (Hex Ø4 × 10, 2 screws) 4) Remove the screws of the outlet cabinet and motor base. (ST1T Ø4 × 8, 2 screws) 5) Remove the screws of the outlet cabinet and water heat exchanger. (ST1T Ø4 × 8, 1 screw) 6) Remove the screws of the outlet cabinet and fin guard. (Hex Ø4 × 10, 2 screws)	
3	Side cabinet	1) Perform the step 1-1. 2) Remove the screws that fixes the inverter assembly and the side cabinet. (ST1T Ø4 × 8, 2 screws) 3) Remove the screws of the side cabinet and valve fixing board. (ST1T Ø4 × 8, 2 screws) 4) Remove the screws of the side cabinet and piping panel (back). (Hex Ø4 × 10, 2 screws) 5) Remove the screws of the side cabinet and bottom board. (Hex Ø4 × 10, 1 screw) 6) Remove the screws of the side cabinet and water heat exchanger. (Hex Ø4 × 10, 3 screws) 7) Remove the side cabinet while shifting it upward. (Inverter hook)	

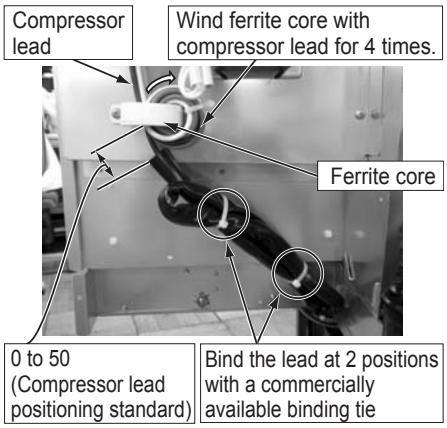
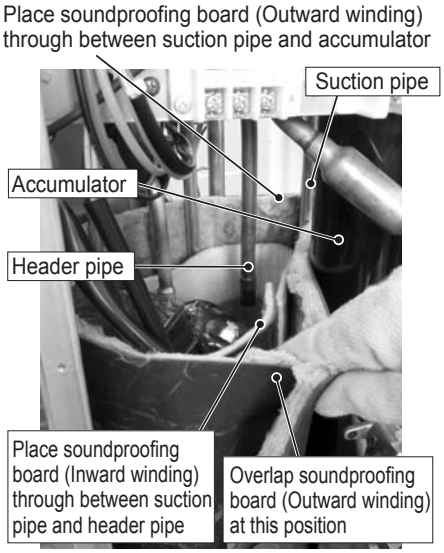
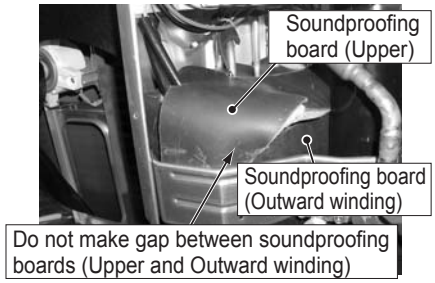
No.	Exchange parts name	Work procedure	Remarks
4	Electric parts replacement	1. Control board 1) Perform the step 1-1. **⚠ WARNING** **For 1 minute after the power is turned off, do not disassemble the inverter to prevent an electric shock.** 2) Remove the connector connected to the control board. (Hydro power source, temperature sensor, electric control valve coil, 4-way valve coil, compressor case thermostat, fan motor, high pressure switch) * Remove the connector by releasing the lock in the housing. 3) Remove the lead cable connected to the control board. (Torque at tightening is 1.47 ±0.1N•m) Compressor lead U: CN200 Red V: CN201 White W: CN202 Black Remove the power source cable from the power source terminal block. (Torque at tightening is 2.5 ±0.1N•m) 4) Remove the earth wire of the control board. (Truss B tight screw Ø4 × 6, 1 screw) 5) Remove the fixed screws of the control board. (Collar screw for fixing element Ø3 × 16, 7 screws, Pan S-tight screw for fixing the board Ø3 × 20, 1 screw) 6) Remove the control board. (Supporter 5 positions) **NOTE** Removing the control board may be difficult due to the heat release grease for the heat sink. 7) Attach a new control board. **NOTE** • Be careful for not taking the compressor lead V: CN201 White for the reactor lead CN05 or 06 White. (The compressor lead has a transparent sleeve at its ring terminal. The reactor lead ring terminal does not have sleeve.) • Be sure to attach the aluminium board (Q201) and the insulating sheet (Q300). (Applying beforehand a bit of heat release grease to the back side of the insulating sheet can easily paste the sheet to the heat sink.)	   

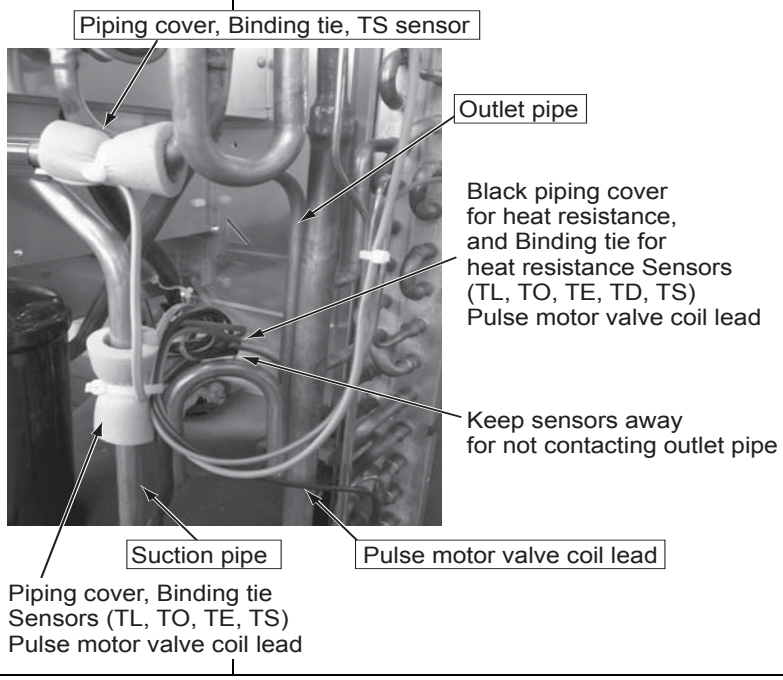
No.	Exchange parts name	Work procedure	Remarks
4	Electric parts replacement	2. Reactor 1) Perform the step 1-1. 2) Remove the relay connector connected to the control board. 3) Cut the binding tie that binds the compressor leads and relay connectors. 4) Remove the reactor. (Truss B tight screw Ø4 × 6, 2 screws) 5) Attach a new reactor. **NOTE** Be sure to bind the removed binding tie by using the commercially available binding tie. Make sure that the fan motor lead and the reactor body do not contact each other.	  Binding tie (Compressor lead, Relay connector)

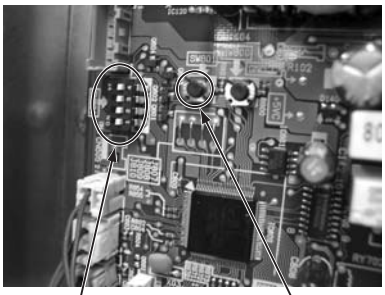
No.	Exchange parts name	Work procedure	Remarks
5	Fan motor	1) Perform the step 1-1 and step 2. 2) Remove the fan motor and the flange nut that fixes the propeller fan. • To loosen the flange nut, turn it clockwise. (Turn it counter clockwise for tightening.) 3) Remove the propeller fan. 4) Remove the connector for fan motor from the inverter. (control board) 5) Remove the fan motor lead from the fan motor lead fixing rubber on the through hole of the parting board. 6) Remove the fixed screws (4 for each) while holding the fan motor so that it does not drop. * Notes in assembling fan motor • Tighten the flange nut in 4.95 N•m (50 kgf•cm) • To prevent the fan motor lead from contacting the propeller fan, adjust the length of fan motor lead fixing rubber so that it does not slack. Attach the fan motor lead fixing rubber to the parting board so that the projection part is placed on the refrigerant cycle side. • Make sure that the reactor body and the fan motor lead do not contact each other. • Be sure to bind the removed binding tie by using the commercially available binding tie. **NOTE** Fix the fan motor lead to the motor base using a metal tie so that the fan motor lead does not contact the propeller fan.	    

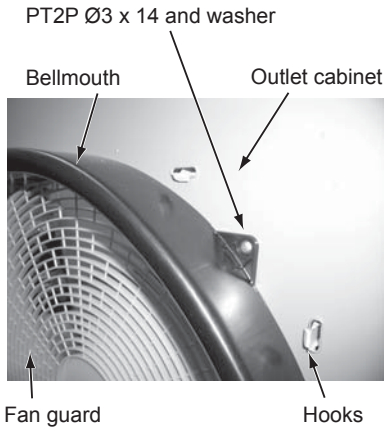
No.	Exchange parts name	Work procedure	Remarks
6	Compressor Compressor lead	1. Remove defective compressor 1) Perform refrigerant gas recovery. 2) Perform the step 1-1 and step 2 and 3. 3) Remove the piping panel (Front). Remove screws of the piping panel (Front) and bottom board. (Hex Ø4 × 10, 2 screws) Remove screws of the piping panel (Front and Back). (Hex Ø4 × 10, 1 screw) 4) Remove the piping panel (Back). Remove screws of the piping panel (Back) and bottom board. (Hex Ø4 × 10, 2 screws) 5) Remove the valve fixing board. Remove the bolt of the valve. (Hex head bolt Ø6 × 15, 4 bolts) Remove the screws of the valve fixing board and parting board. (ST1T Ø4 × 8, 1 screw) Remove the screws of the valve fixing board and accumulator. (ST1T Ø4 × 8, 1 screw) Cut the binding tie of the discharge pipe and suction pipe to remove each sensor and the pulse motor valve coil lead. 6) Remove the soundproofing board. (Upper, Inward winding, Outward winding) 7) Remove the compressor terminal cover, and then remove the compressor lead and compressor case thermostat.  8) Remove the TD sensor fixed to the discharge pipe. 9) Remove the compressor lead. (Leave the ferrite core attached to the electrical control box.) Control board U: CN200 Red V: CN201 White W: CN202 Black (Torque at tightening is 1.47 ±0.1N•m)	    

No.	Exchange parts name	Work procedure	Remarks
6	Compressor Compressor lead	10) Remove the discharge and suction pipes connected to the compressor by using a burner. **⚠ WARNING** When removing the piping by burning the solder, take enough care for a fire going off at the moment the wax melts if oil remains inside the piping. **NOTE** Do not make fire flame contact with the 4-way valve and pulse motor valve. (This may cause an operation failure.) 11) Pull out the discharge and suction pipes of the refrigerant cycle upward. 12) Remove the compressor bolts that fix the compressor to the bottom board. (3 bolts) 13) Pull the compressor out toward you. **NOTE** The compressor weighs 15 kg or more. Two people should be required to handle it.	

No.	Exchange parts name	Work procedure	Remarks
6	Compressor Compressor lead	2. Attach the compressor 1) Attach the compressor in the reverse order of the removal. **NOTE** • Be sure to replace the compressor lead after the compressor replacement. (Compressor lead spare parts code: 43160591) At this time, wind the ferrite core with the compressor lead for 4 times. Bind the compressor lead that is long with a commercially available binding tie. When doing this, be careful for the compressor lead not to contact the discharge pipe. • Fix the removed sensors and pulse motor valve coil lead to the outlet and suction pipes through the piping cover by using a binding tie. At this time, be careful for the sensors and pulse motor valve coil lead not to contact the discharge pipe. (To fix the sensors and leads, use the black piping cover for heat resistance and a commercially available binding tie for heat resistance.) • Attach the soundproofing board (Inward winding, Outward winding), as shown in the right figure, through between the compressor and between the piping and parting board. • Place the compressor lead and the compressor case thermostat so that they fall into between the inward winding and outward winding of the soundproofing board.	  

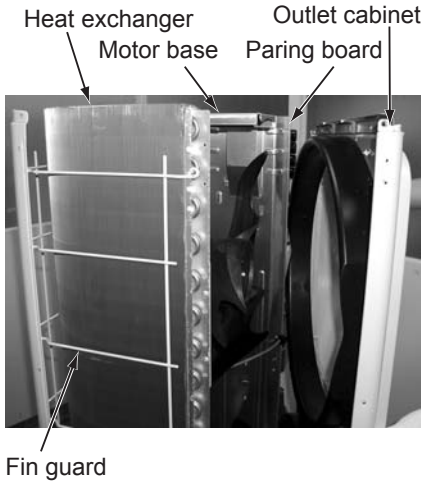


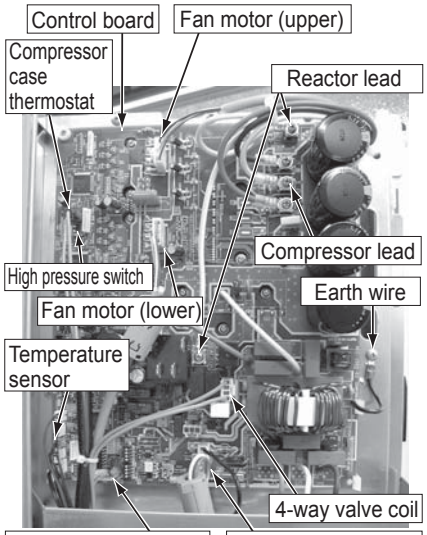
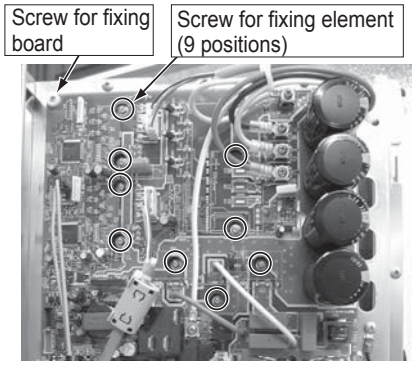
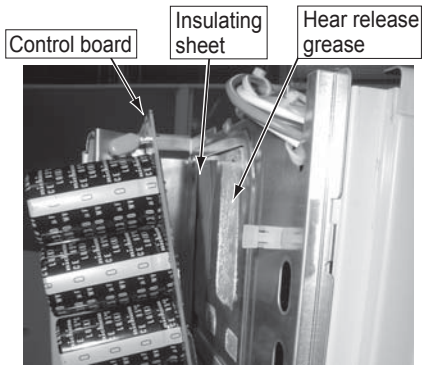
No.	Exchange parts name	Work procedure	Remarks
6	Compressor Compressor lead	3. Vacuuming 1) Connect the vacuum pump to the charge port of the gas piping valve to operate the vacuum pump. 2) Perform vacuuming until the vacuum low pressure gauge shows 1(mmHg). **NOTE** Open fully the pulse motor valve before vacuuming. With the valve closed, vacuuming between the outdoor unit liquid valve and the pulse motor valve may fail. How to make pulse motor valve forcible full open • Turn on the electric leakage breaker. • Set the SW804 dip switch 1 and 3 on the outdoor unit control board to ON. • Press SW801 on the outdoor unit control board for 1 second or longer. • After pressing SW801 for 1 second or longer, turn off the electric leakage beaker within 2 minutes. 4. Charge refrigerant 1) Add refrigerant whose amount is defined according to the piping length from the valve charge port. (HWS-805H-E : 1.8 kg)	 SW804 SW801
7	Pulse motor valve coil	1. How to remove 1) Perform the step 1-1 and step 3. 2) Remove the coil from the pulse motor valve body while pulling the coil upward to release the spring holding the copper pipe. 2. How to attach 1) Fix the spring to the copper pipe.	Pulse motor valve coil Spring Pulse motor valve body

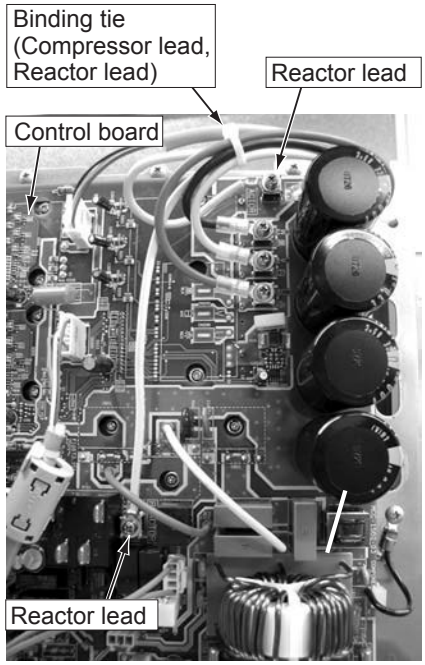
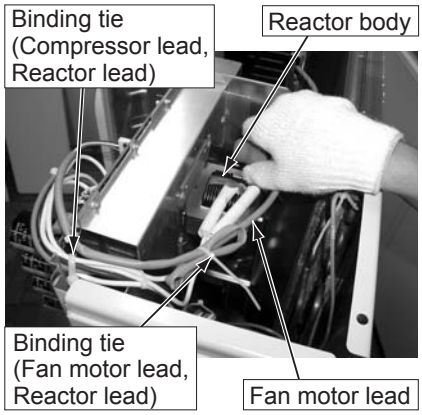
No.	Exchange parts name	Work procedure	Remarks
8	Fan guard	1. How to remove 1) Perform the step 1-1 and step 2. **NOTE** Perform a replacement work on cardboard or cloth to prevent the product from being damaged. 2) Remove the outlet cabinet and put with the fan guard side down. 3) Remove the screw for the bell mouth and fan guard. (PT2P Ø3 x 14 and washer, 4 pcs.) 4) Release the hooks (8 positions) of the fan guard. 2. How to attach 1) Press the hooks (8 positions) with hands from the front side to fix them. 2) Attach the bell mouth fixed with screws and washers. (PT2P Ø3 x 14 and washer, 4 pcs.) **NOTE** Check that all the hooks are fixed to the given positions.	

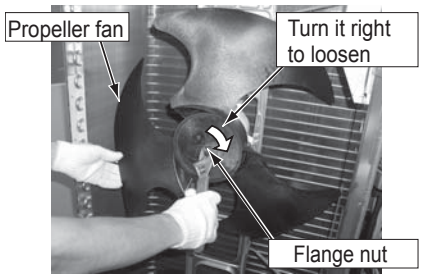
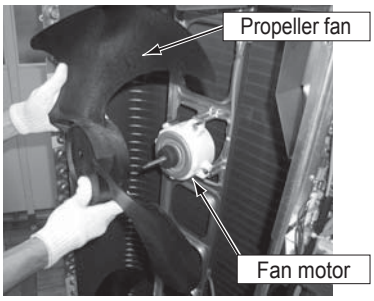
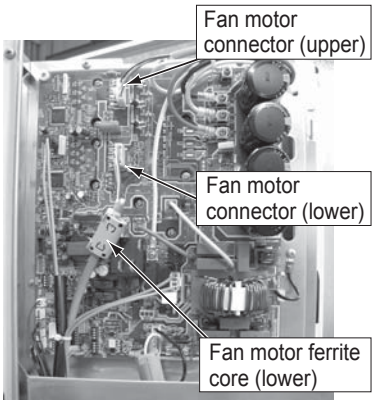
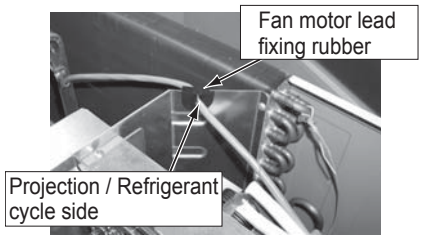
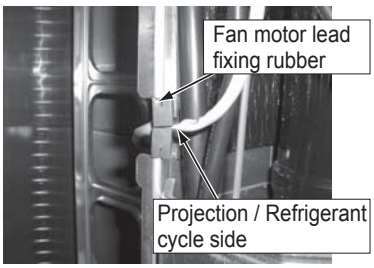
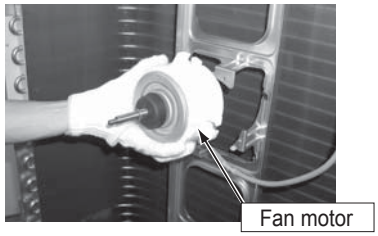
2-2. HWS-1105H-E, 1405H-E

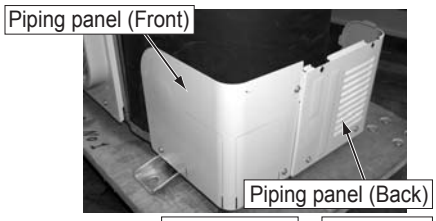
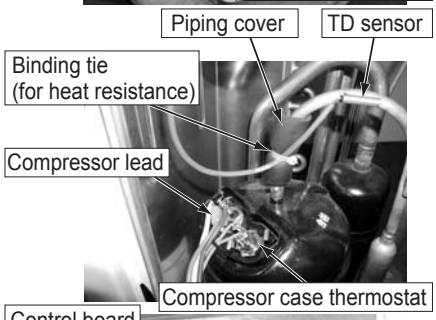
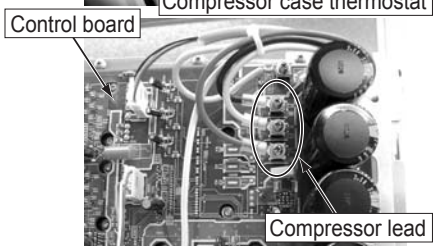
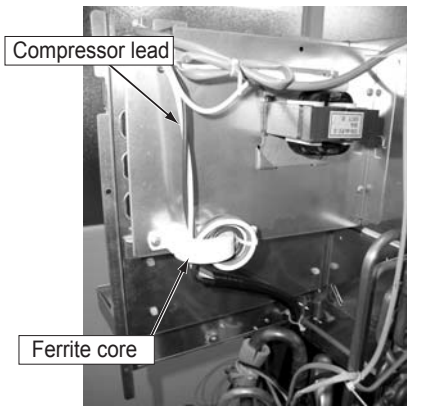
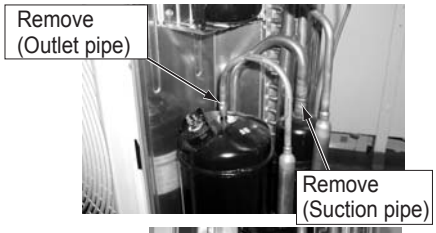
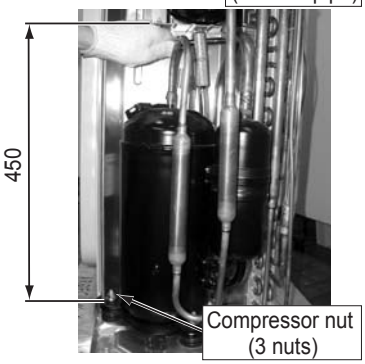
No.	Exchange parts name	Work procedure	Remarks
1	Common procedure	**NOTE** Wear gloves when performing the work. Failure to do so may cause an injury when accidentally contacting the parts. 1. How to remove 1) Stop the operation by remote controller and turn off the breaker. 2) Remove the front panel. (Hex Ø4 × 10, 2 screws) • After unscrewing the screws, remove the front panel while pulling it downward. 3) Disconnect the power source cable and connecting cables between hydro and outdoor from the cord clamp and terminals. 4) Remove the top board. (Hex Ø4 × 10, 5 screws) 2. How to attach 1) Attach the top board. (Hex Ø4 × 10, 5 screws) 2) Connect the power source cable and connecting cables between hydro and outdoor to the terminal, and fix them with the cord clamp. **NOTE** The power source cable and connecting cable between hydro and outdoor units must be fixed along the connecting piping by using a cable tie so that the cables do not contact the compressor, gas side valve, gas side piping and outlet pipe. 3) Attach the front panel. (Hex Ø4 × 10, 2 screws)	Front panel Top board

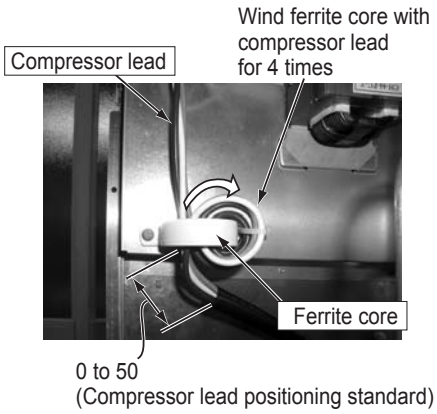
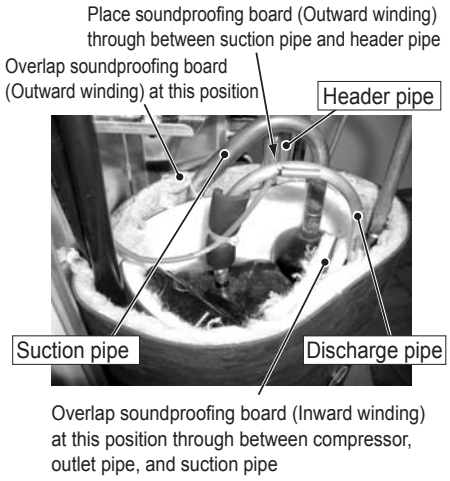
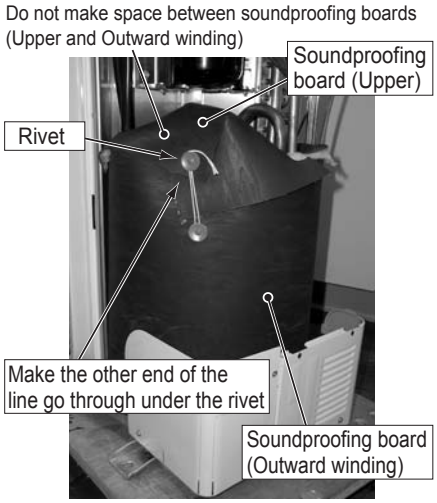
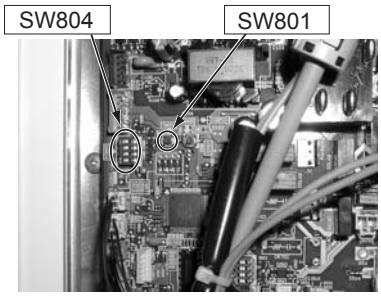
No.	Exchange parts name	Work procedure	Remarks
2	Outlet cabinet	How to remove 1) Perform the step 1-1. 2) Remove the screws of the outlet cabinet and parting board. (ST1T Ø4 × 8, 4 screws) 3) Remove the screws of the outlet cabinet and bottom board. (Hex Ø4 × 10, 2 screws) 4) Remove the screws of the outlet cabinet and motor base. (ST1T Ø4 × 8, 2 screws) 5) Remove the screws of the outlet cabinet and heat exchanger. (ST1T Ø4 × 8, 1 screws) 6) Remove the screws of the outlet cabinet and fin guard. (Hex Ø4 × 10, 2 screws)	
3	Side cabinet	1) Perform the step 1-1. 2) Remove the screws that fixes the inverter assembly and the side cabinet. (ST1T Ø4 × 8, 2 screws) 3) Remove the screws of the side cabinet and valve fixing board. (ST1T Ø4 × 8, 2 screws) 4) Remove the screws of the side cabinet and piping panel (back). (Hex Ø4 × 10, 2 screws) 5) Remove the screws of the side cabinet and bottom board. (Hex Ø4 × 10, 1 screws) 6) Remove the screws of the side cabinet and fin guard (heat exchanger). (Hex Ø4 × 10, 5 screws) 7) Remove the side cabinet while shifting it upward (inverter hook).	

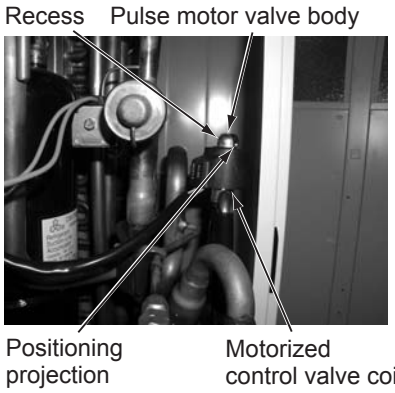
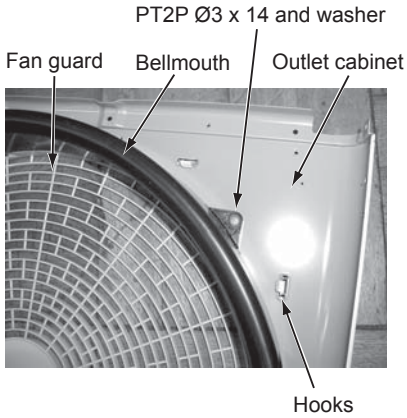
No.	Exchange parts name	Work procedure	Remarks
4	Electric parts replacement	1. Control board 1) Perform the step 1-1. **⚠ WARNING** For 1 minute after the power is turned off, do not disassemble the inverter to prevent an electric shock. 2) Remove the connector connected to the control (Hydro power source, temperature sensor, electric control valve coil, 4-way valve coil, compressor case thermostat, fan motor, high pressure switch) * Remove the connector by releasing the lock in the housing. 3) Remove the lead cable connected to the control board. Compressor lead U: CN200 Red V: CN201 White W: CN202 Black Reactor lead CN05 White CN06 White Relay connector 4) Remove the earth wire of the control board. (Truss B tight screw Ø4 × 6, 1 screw) 5) Remove the fixed screws of the control board. (Collar screw for fixing element Ø3 × 16, 9 screws, Pan S-tight screw for fixing the board Ø3 × 20, 1 screw) 6) Remove the control board. (Supporter 5 positions) Note) Removing the control board may be difficult due to the heat release grease for the heat sink. 7) Attach a new control board. **NOTE** • Be careful for not taking the compressor lead V: CN201 White for the reactor lead CN05 or 06 White. (The compressor lead has a transparent sleeve at its ring terminal. The reactor lead ring terminal does not have sleeve.) • Be sure to attach the insulating sheet. (Applying beforehand a bit of heat release grease to the back side of the insulating sheet can easily paste the sheet to the heat sink.)	  

No.	Exchange parts name	Work procedure	Remarks
4	Electric parts replacement	2. Reactor 1) Perform the step 1-1. 2) Remove the reactor lead connected to the control board. CN05 White, CN06 White 3) Cut the binding tie that binds the compressor leads and fan motor leads. 4) Remove the reactor. (Truss B tight screw Ø4 × 6, 2 screw) 5) Attach a new reactor. **NOTE** Be sure to bind the removed binding tie by using the commercially available binding tie. Make sure that the fan motor lead and the reactor body do not contact each other.	 

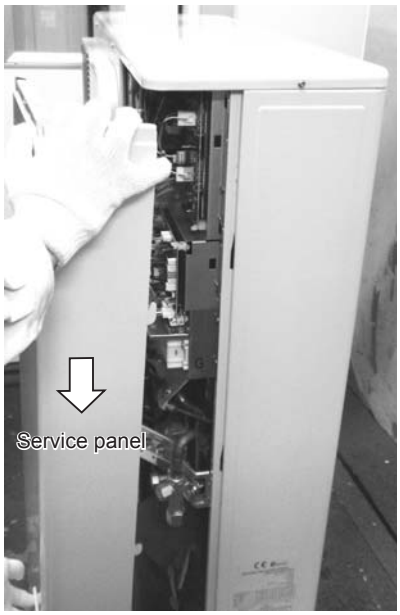
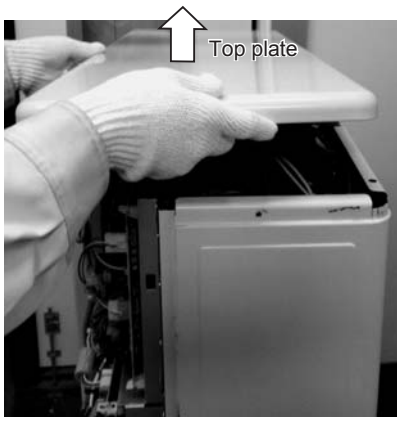
No.	Exchange parts name	Work procedure	Remarks
5	Fan motor	1) Perform the step 1-1 and step 2. 2) Remove the fan motor and the flange nut that fixes the propeller fan. • To loosen the flange nut, turn it clockwise. (Turn it counter clockwise for tightening.) 3) Remove the propeller fan. 4) Remove the connector for fan motor from the inverter. (control board) (Remove the ferrite core of the lower fan motor to use it again for a new fan motor.) 5) Remove the fan motor lead from the fan motor lead fixing rubber on the through hole of the parting board. 6) Remove the fixed screws (4 for each) while holding the fan motor so that it does not drop. * Notes in assembling fan motor • Tighten the flange nut in 4.95 N•m (50 kgf•cm). • To prevent the fan motor lead from contacting the propeller fan, adjust the length of fan motor lead fixing rubber so that it does not slack. Attach the fan motor lead fixing rubber to the parting board so that the projection part is placed on the refrigerant cycle side. • Make sure that the reactor body and the fan motor lead do not contact each other. • Be sure to bind the removed binding tie by using the commercially available binding tie. • Be sure to re-attach the ferrite core of the lower fan motor. (Fix this with a commercially available binding tie.) **NOTE** Fix the fan motor lead to the motor base using a metal tie so that the fan motor lead does not contact the propeller fan.	     

No.	Exchange parts name	Work procedure	Remarks
6	Compressor Compressor lead	1. Remove defective compressor 1) Perform refrigerant gas recovery. 2) Perform the step 1-1 and step 3. 3) Remove the piping panel (Front). Remove screws of the piping panel (Front) and bottom board. (Hex Ø4 × 10, 2 screws) Remove screws of the piping panel (Front and Back). (Hex Ø4 × 10, 1 screws) 4) Remove the piping panel (Back). Remove screws of the piping panel (Back) and bottom board. (Hex Ø4 × 10, 2 screws) 5) Remove the soundproofing board. (Upper, Inward winding, Outward winding) 6) Remove the compressor terminal cover, and then remove the compressor lead and compressor case thermostat. 7) Remove the TD sensor fixed to the discharge piping. 8) Remove the compressor lead. (Leave the ferrite core attached to the electrical control box.) Control board U: CN200 Red V: CN201 White W: CN202 Black 9) Remove the outlet and suction pipes connected to the compressor by using a burner. **⚠ WARNING** When removing the piping by burning the solder, take enough care for a fire going off at the moment the wax melts if oil remains inside the piping. **NOTE** Do not make fire flame contact with the 4-way valve and pulse motor valve. (This may cause an operation failure.) 10) Pull out the discharge and suction pipes of the refrigerant cycle upward. 11) Remove the compressor nuts that fix the compressor to the bottom board. (3 nuts) 12) Pull the compressor out toward you. **NOTE** The compressor weighs 20 kg or more. Two people should be required to handle it.	     

No.	Exchange parts name	Work procedure	Remarks
6	Compressor Compressor lead	2. Attach the compressor 1) Attach the compressor in the reverse order of the removal. **NOTE** • Be sure to replace the compressor lead after the compressor replacement. (Compressor lead spare parts code: 43160591) At this time, wind the ferrite core with the compressor lead for 4 times. • Attach the soundproofing board (Inward winding, Outward winding), as shown in the right figure, through between the compressor and between the piping and parting board. • Fix the TD sensor with a commercially available heat resistant binding tie through the piping cover so that the sensor do not contact the discharge pipe. 3) Vacuuming 1) Connect the vacuum pump to the charge port and check joint of the gas piping valve to operate the vacuum pump. 2) Perform vacuuming until the vacuum low pressure gauge shows 1(mmHg). **NOTE** Open fully the pulse motor valve before vacuuming. With the valve closed, vacuuming between the outdoor unit liquid valve and the pulse motor valve may fail. How to make pulse motor valve forcible full open • Turn on the electric leakage breaker. • Set the SW804 dip switch 1 and 3 on the outdoor unit control board to ON. • Press SW801 on the outdoor unit control board for 1 second or longer. • After pressing SW801 for 1 second or longer, turn off the electric leakage breaker within 2 minutes. 4. Charge refrigerant 1) Add refrigerant whose amount is defined according to the piping length from the valve charge port. (HWS-1105H-E, 1405H-E : 2.7 kg)	   

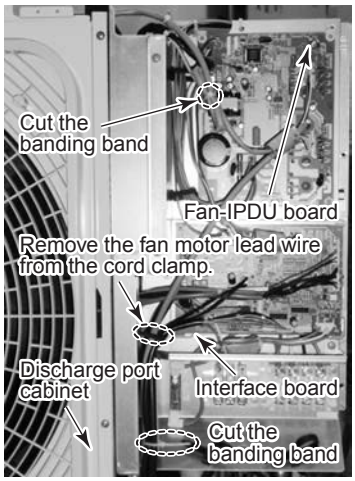
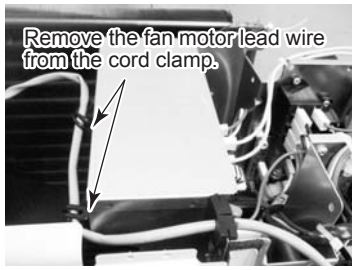
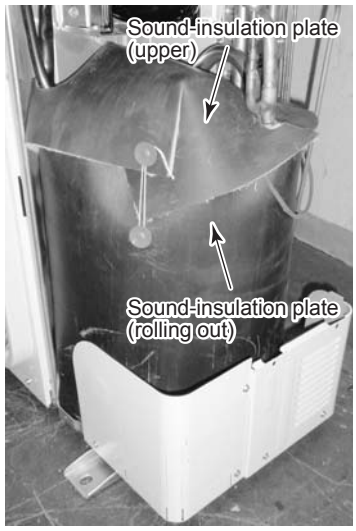
No.	Exchange parts name	Work procedure	Remarks
7	Pulse motor valve coil	1. How to remove 1) Perform the step 1-1. 2) Remove the coil from the pulse motor valve body by pulling upward while rotating the coil. 2. How to attach 1) Fix the coil by exactly adjusting the coil positioning projection to the recess of the pulse motor valve body.	
8	Fan guard	1. How to remove 1) Perform the step 1-1 and step 2. **NOTE** Perform a replacement work on cardboard or cloth to prevent the product from being damaged. 2) Remove the outlet cabinet and put with the fan guard side down. 3) Remove the screw for the bell mouth and fan guard. (PT2P Ø3 x 14 and washer, 4 pcs.) 4) Release the hooks (8 positions) of the fan guard. 2. How to attach 1) Press the hooks (8 positions) with hands from the front side to fix them. 2) Attach the bell mouth fixed with screws and washers. (PT2P Ø3 x 14 and washer, 4 pcs.) **NOTE** Check that all the hooks are fixed to the given positions.	

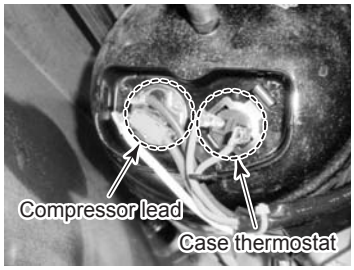
2-3. HWS-1105H8(R)-E, 1405H8(R)-E, 1605H8(R)-E

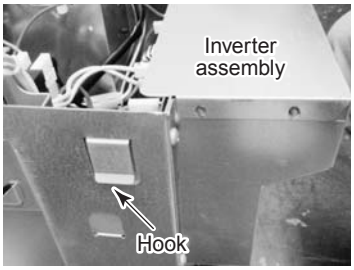
No.	Part name	Procedure	Remarks
1	Common procedure	**⚠ WARNING** Stop operation of the air to water and turn off breaker switch. **⚠ CAUTION** Ensure wearing of gloves when performing any work in order to avoid injury from parts, etc. 1. Detachment 1) Remove the service panel. (Hexagonal screws Ø4 × 10, 2 pcs.) • Remove the screws and then pull service panel downward to remove. 2) Remove the power supply cable and the system interconnection wire from the cord clamp and the terminal. 3) Remove the top plate. (Hexagonal screws Ø4 × 10, 5 pcs.) 2. Attachment 1) Attach the top plate. (Hexagonal screws Ø4 × 10, 5 pcs.) 2) Connect the power supply cable and the system interconnection wire to the terminal and then fix with the cord clamp. **⚠ CAUTION** The power supply cable and the system interconnection wire must be affixed along the crossover pipe using a commercially available bundling band so that they do not make contact with the compressor, gas valve, gas pipe and discharge pipe. 3) Attach the front panel. (Hexagonal screws Ø4 ×10, 2 pcs.)	 

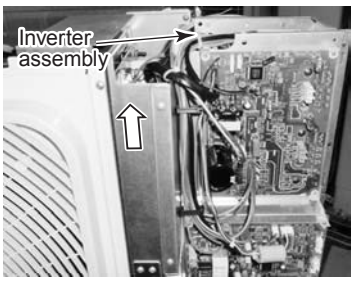
No.	Part name	Procedure	Remarks
2	Discharge port cabinet	1. Detachment 1) Carry out the operation in 1. of 1) above. 2) Remove the screws fixing the inverter assembly, the discharge port cabinet and the partition board. (ST1T Ø4 × 8, 4 pcs.) 3) Remove the screws for the discharge port cabinet and the bottom plate. (Hexagonal screw Ø4 × 10, 2 pcs.) 4) Remove screw for the discharge port cabinet and heat exchanger. (ST1T Ø4 × 8, 1 pc.) 5) Remove screw for the discharge port cabinet and the motor base. (ST1T Ø4 × 8, 2 pcs.) 6) Remove screws for the discharge port cabinet and the fin guard. (Hexagonal screw Ø4 × 10, 2 pcs.) 2. Attachment 1) Attach the discharge port cabinet and end board of heat exchanger and fix with a screw. (ST1T Ø4 × 8, 1 pc.) 2) Mount other removed screws into original positions.	

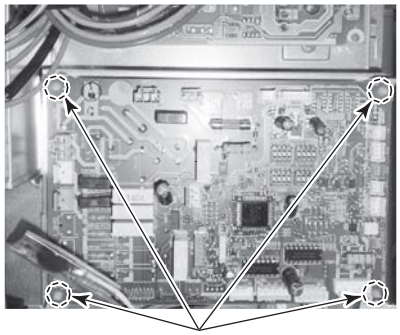
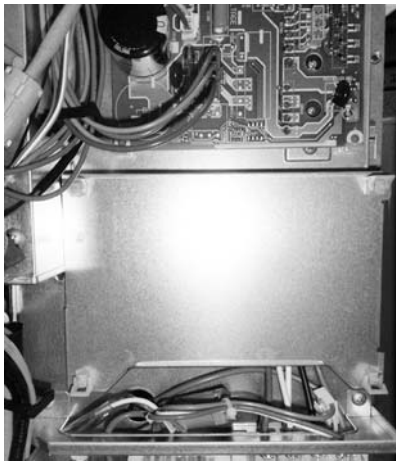
No.	Part name	Procedure	Remarks
3	Side cabinet	1. Detachment 1) Carry out the operation in 1. of 1) above. 2) Remove the screws fixing the inverter assembly and the side cabinet. (ST1T Ø4 × 10, 3 pcs.) 3) Remove the screws for the side cabinet and the valve fixing plate. (ST1T Ø4 × 10, 2 pcs.) 4) Remove screw for the side cabinet and piping panel (rear). (Hexagonal screw Ø4 × 10, 2 pcs.) 5) Remove screw for the side cabinet and the bottom plate. (Hexagonal screw Ø4 × 10, 1 pc.) 6) Remove screws for the side cabinet, heat exchanger and the fin guard. (Hexagonal screw Ø4 × 10, 5 pcs.) 2. Attachment 1) Temporarily suspend the side cabinet on the inverter assembly using the hook. 2) Mount the removed screws in the opposite procedure to that during detachment.	

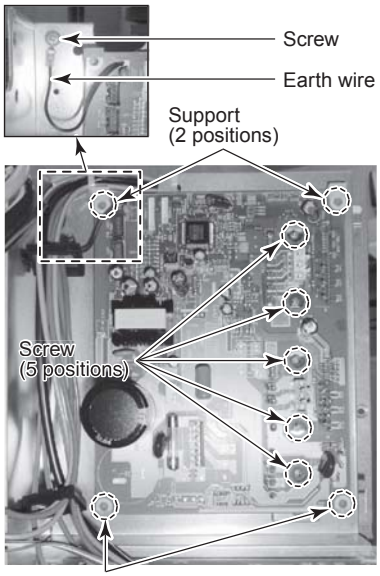
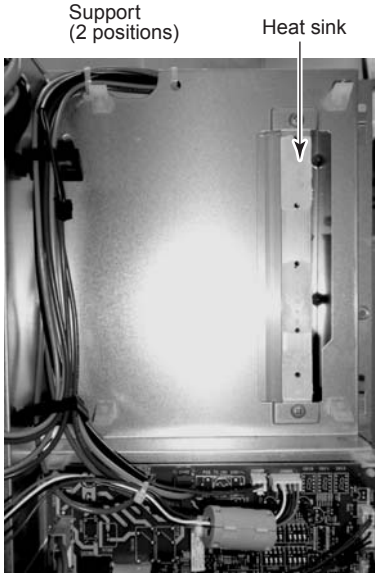
No.	Part name	Procedure	Remarks
4	Inverter assembly	1. Detachment 1) Carry out the operation in 1. of 1), 1. of 3) above. 2) Remove the connectors connected to the Fan IPDU board, the connector connected to other components from the control board (Interface board). CN600 : TS sensor (3P: White, tube: Gray) CN601 : TE sensor (2P: White, tube: Blue) CN602 : TO sensor (2P: Yellow, tube: Black) CN603 : TD sensor (3P: White, tube: Red) CN604 : TL sensor (2P: White, tube: White) CN609 : Case thermo. (2P: Blue) CN690 : High pressure switch (3P: Green) CN700 : 4-way coil (3P: Yellow) CN710 : PMV coil (6P: White) • Fan IPDU board CN700 : Outdoors lower fan motor (3P: Blue) CN750 : Outdoors upper fan motor (3P: White) Cut the banding band and remove connector connected from fan motor to fan motor relay board. * Remove connectors after unlocking housing section. 3) Remove the screw (1 position) fixing the discharge port cabinet. 4) Cut bundling band fixing various lead lines to inverter assembly. 5) Remove sound-insulation plate (upper). 6) Remove terminal cover of compressor and remove compressor lead. 7) Pull up the inverter assembly at upper side to remove hook of partition plate (rear left part). 2. Attachment 1) Mount the inverter assembly on the partition plate. ⚠ **CAUTION** When mounting the inverter assembly on the partitioning plate, ensure proper mounting of the hook (rear left part) with partitioning plate. 2) Mount the individual components in the opposite procedure to that during detachment.	  

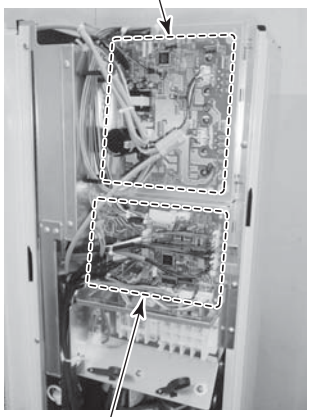
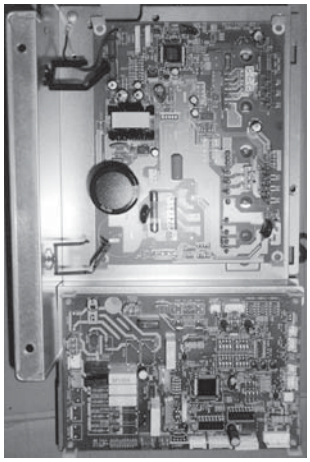
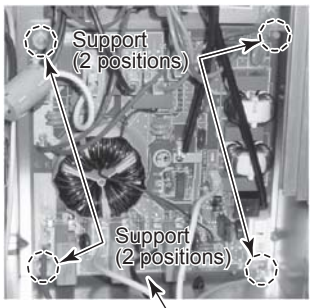
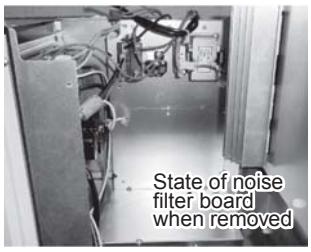
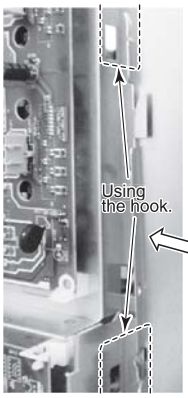
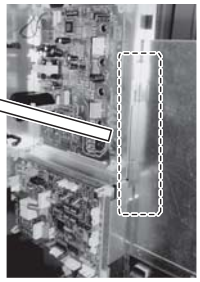


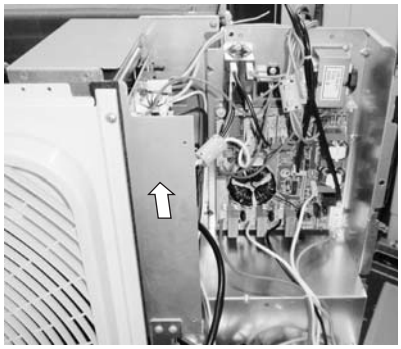
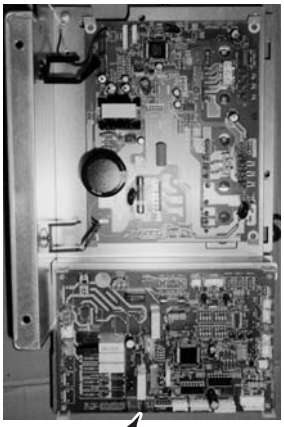
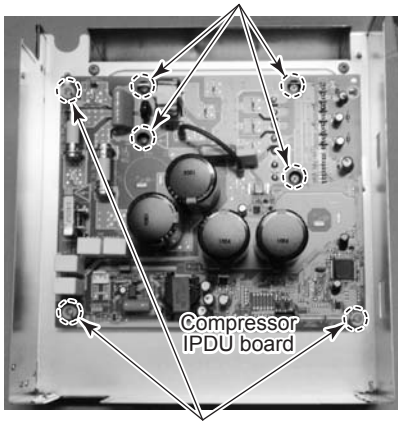
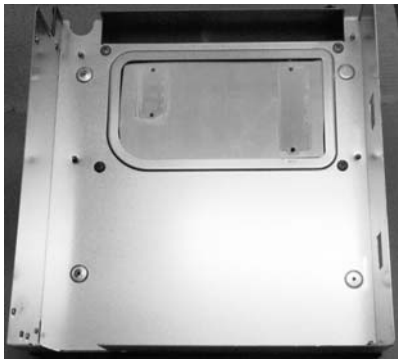


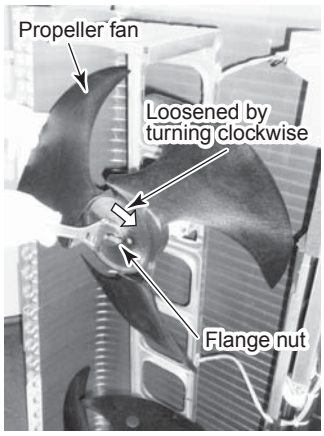
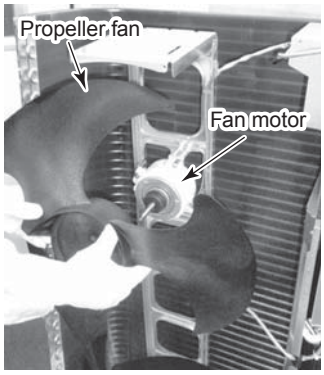
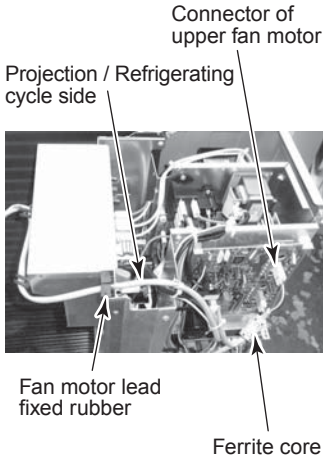
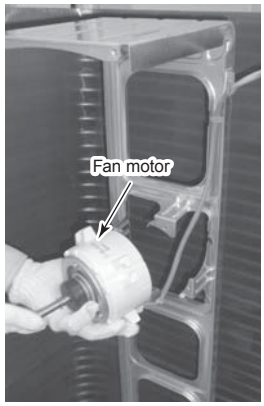
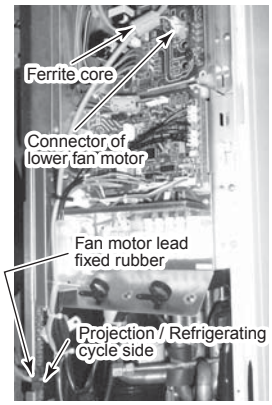


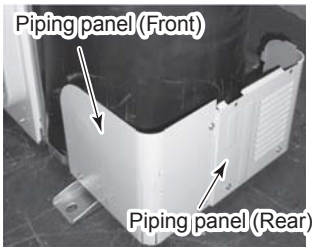
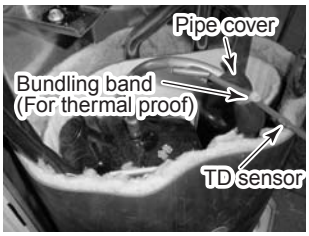
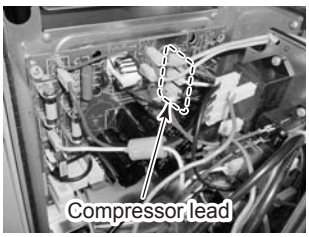
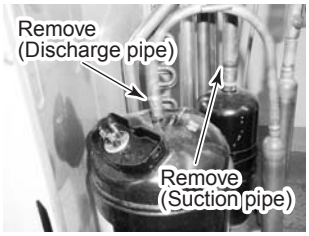
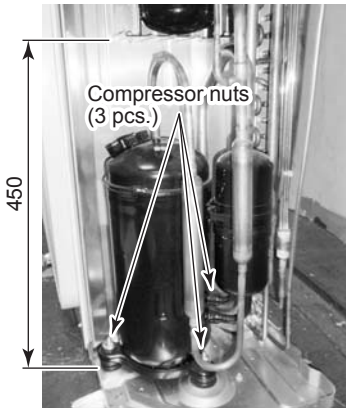
No.	Part name	Procedure	Remarks
5	Interface board (Control board) MCC-1599	1. Detachment 1) Carry out the operation in 1. of 1), 1. of 3) above. 2) Remove lead wires and connectors to other components from the interface board (control board). CN01 : Hydro/Outdoor connection terminal (5P: White) CN02 : Power relay (3P: Red) CN600 : TS sensor (3P: White, tube: Gray) CN601 : TE sensor (2P: Green, tube: Blue) CN602 : TO sensor (2P: Yellow, tube: Black) CN603 : TD sensor (3P: White, tube: Red) CN604 : TL sensor (2P: White, tube: White) CN608 : Connection with noise filter board (2P: White) CN609: Case thermo. (2P :Blue) CN690 : High pressure switch (3P: Green) CN700 : 4-way coil (3P: Yellow) CN708 : Magnet switch (3P: Blue) CN710 : PMV coil (6P: White) CN802 : Connection with Fan IPDU board (5P: white) * Remove connectors after unlocking housing section 3) Remove the claws of the supports (4 positions) fixing the board and remove the interface board (Control board). 2. Attachment 1) Mount the interface board (Control board). 2) Mount the individual components in the opposite procedure to that during detachment.	 Interface board (Control board)  Support (4 positions)  Statue of control board when removed

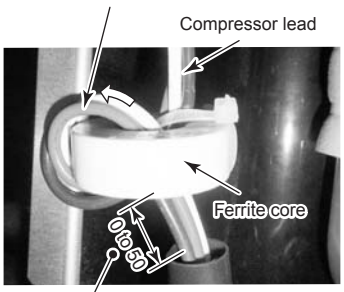
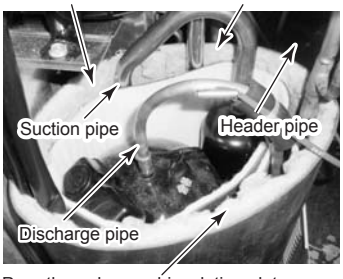
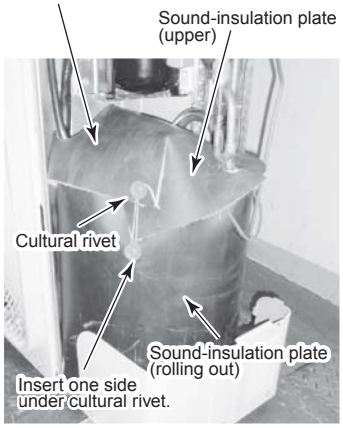
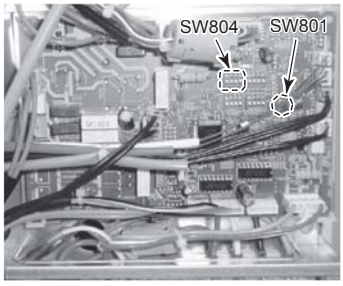
No.	Part name	Procedure	Remarks
6	Fan-IPDU board MCC-1597	1. Detachment 1) Carry out the operation in 1. of 1), 1. of 3) above. 2) Remove lead wires and connectors to other components from the Fan-IPDU board. CN500 : Connection between reactor and noise filter board (7P, Red) CN502 : Compressor IPDU board (3P, White) CN504 : Interface board (5P, Blue) CN505 : Compressor IPDU board (5P, Red) CN602 : Noise filter board (2P, Black) CN700 : Outdoors lower fan motor (3P, Blue) CN750 : Outdoors upper fan motor (3P, White) * Connectors should be removed after unlocking the housing section. 3) Remove screw fixing the earth wire. 4) Remove the claw of the support (4 positions) fixing the board and the screw (5 positions) fixing the heat sink and then remove the Fan-IPDU board. 2. Attachment 1) Mount Fan-IPDU board 2) Mount components in the opposite method to that when removing.	   State of Fan-IPDU board when removed

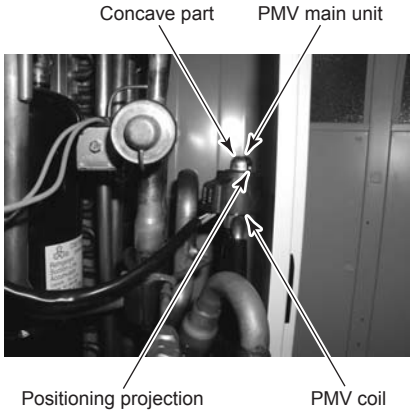
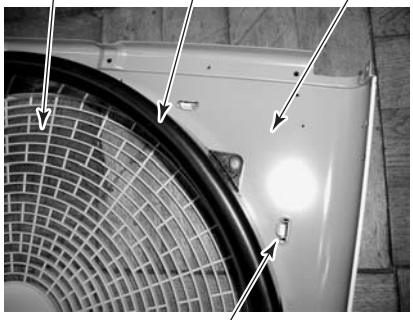
No.	Part name	Procedure	Remarks
7	Noise filter board MCC-1600	1. Detachment 1) Perform the operation in 1. of 1),1. of 4), 1.-2 of 5) and 1.-2 of 6). 2) Remove the screws (3 positions) fixing the inverter assembly (front). Then slide the inverter assembly (front) upwardly and remove. 3) Remove the lead wires connector to other components from the noise filter board. CN05: Power supply terminal block (red) CN06: Power supply terminal block (White) CN07: Power supply terminal block (Black) CN08: Power supply terminal block (Gray) CN09: Connection to earth (Brown) CN10: Posister (Red) CN16: Relay (Red) CN17: Compressor IPDU board (White) CN18: Relay (Black) CN19: Relay (Gray) CN20: Power supply terminal block (White) CN23: Fan-IPDU board (5P, Red) CN50: Interface board (2P, White) CN51: Fan-IPDU board (2P, Back) * Connectors should be removed after unlocking the housing section. 4) Remove the claw of the support (2 positions) and the screw (2 positions) fixing the base and then remove the noise filter base. 2. Attachment 1) Mount noise filter board. 2) Mount components in the opposite method to that when removing.	Fan-IPDU board  Interface board  Inverter assembly (front)  Noise filter board 
		 Using the hook, it is possible to temporarily suspend the inverter assembly (front).  	

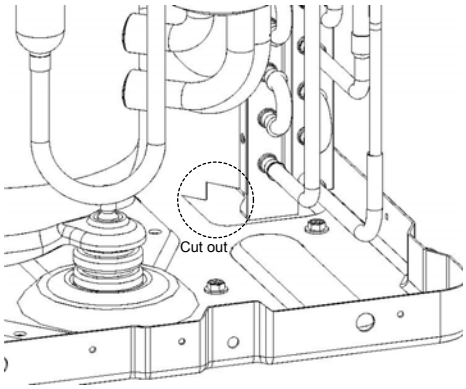
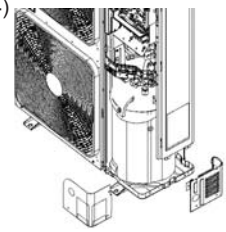
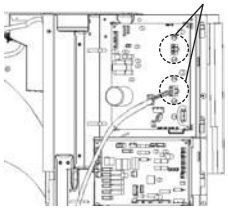
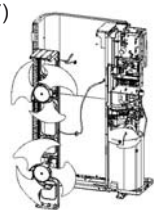
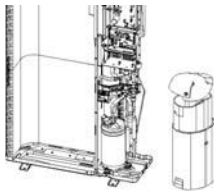
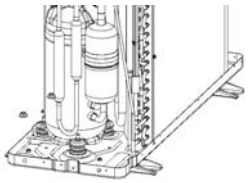
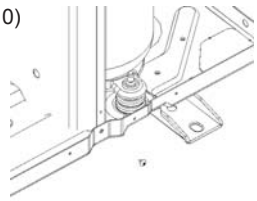
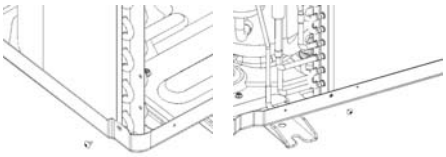
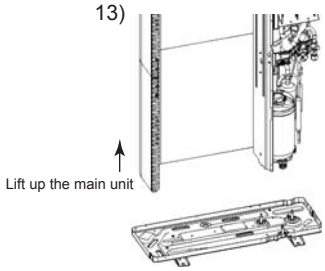
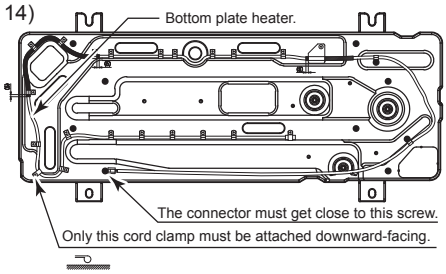
No.	Part name	Procedure	Remarks
8	Compressor IPDU board MCC-1596	1. Detachment 1) Carry out the operation in 1. of 1), 1. of 4), 1. of 5), 1. of 6) and 1. of 7). 2) Remove the screw (4 positions) fixing the inverter assembly (IPDU). 3) Remove the lead wire and connector to other components from the compressor IPDU board. CN04 : Posister (Red) CN09 : Power supply terminal block (Yellow) CN10 : Power supply terminal block (Yellow) CN11 : Relay (Red) CN12 : Noise filter board (White) CN13 : Relay (Black) CN101 : FAN-IPDU board (3P, White) CN211 : Compressor (Red) CN212 : Compressor (White) CN213 : Compressor (Black) CN851 : FAN-IPDU board (5P, Red) * Connectors should be removed after unlocking the housing section. 4) Slide and remove the inverter assembly (IPDU). 5) Remove the screws (4 positions) fixing the heat sink and the screws (3 positions) fixing the compressor IPDU board and then remove the compressor IPDU board. 2. Attachment 1) Mount compressor IPDU board. 2) Mount components in the opposite method to that when removing.	  Inverter assembly (front) Screws (4 positions)  Screws (3 positions)  State of compressor IPDU board when removed

No.	Part name	Procedure	Remarks
9	Fan motor	1. Detachment 1) Carry out works of item 1 of 1) and work of 2). 2) Remove the flange nut fixing the fan motor and the propeller fan. • The flange nut is loosened by turning it clockwise. (When tightening it, turn it counterclockwise.) 3) Remove the propeller fan. 4) Remove the connector for the fan motor from the inverter. (Remove the ferrite core of the lower fan motor because it is used.) 5) Remove the fan motor lead from the fan motor lead fixed rubber of the penetrated part of the partition board. 6) Remove the fixing screws (4 pieces each) while supporting the fan motor so that it does not fall down. * Cautions for assembling of fan motor • Tighten the flange nut with 4.95N•m (50 kgf•cm). • Adjust length of the fan motor lead wire at the fan motor lead fixed rubber so that the fan motor lead is not slackened; otherwise the fan motor lead may come to contact with the propeller fan. Attach the fan motor lead fixed rubber to the partition board so that the projection is set at the refrigerating cycle side. • Be sure so that the rector body does not contact with the fan motor lead. • Be sure to bundle the removed bundling band with the bundling band on the market. • Necessarily attach the ferrite core of the lower fan motor again. (Fix it with bundling band on the market.) **REQUIREMENT** Be sure to fix the fan motor lead to the motor base using the metal band of the motor base so that the fan motor lead does not come to contact with the propeller fan.	    

No.	Part name	Procedure	Remarks
10	Compressor Compressor lead	1. Removal of defective compressor 1) Recover the refrigerant gas. 2) Carry out work of item 1 of 1), 1 of 3) and 1 of 7). 3) Remove the piping panel (Front). Remove the piping panel (Front) and screws of the bottom plate. (Hexagonal screw Ø4 × 10, 2 pcs.) Remove screw of the piping panel (Front) and the piping panel (Rear). (Hexagonal screw Ø4 × 10, 1 pc.) 4) Remove the piping panel (Rear). Remove the piping panel (Rear) and screws of the bottom plate. (Hexagonal screw Ø4 × 10, 2 pcs.) 5) Remove the sound-insulation plate. (Upper, rolling in, rolling out) 6) Remove the terminal cover of the compressor and then remove the compressor lead and the compressor case thermo. 7) Remove TD sensor which is fixed to the discharge pipe. 8) Remove the compressor lead. Control PC board U: CN211 Red V: CN212 White W: CN213 Black 9) Remove ferrite core from compressor lead. 10) Using a burner, remove the discharge pipe and the suction pipe which are connected to the compressor. **⚠ WARNING** In case of removing the piping by broiling the welded part with a burner, if there is oil in the pipe, it may burst into flames at the moment that wax melted, so take sufficient care. **⚠ CAUTION** Note so that the flame does not catch the 4-way valve and PMV. (A malfunction may be caused.) 11) Pull off the discharge pipe and the suction pipe of the refrigerating cycle upward. 12) Remove the compressor nuts which fix the compressor to the bottom plate. (3 pcs.) 13) Pull out the compressor toward you. **⚠ CAUTION** As weight of the compressor is 20 kg or more, handle it by 2 workers.	    

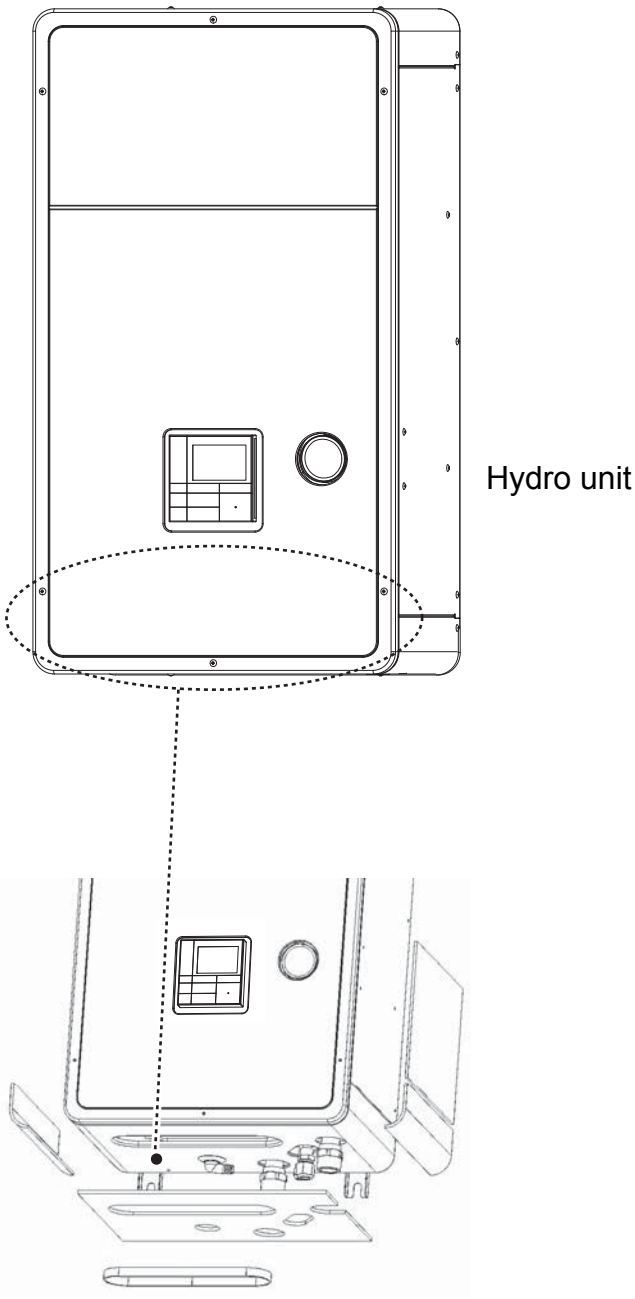
No.	Part name	Procedure	Remarks
10	Compressor Compressor lead (Continued)	2. Mounting of compressor 1) Mount the compressor in the reverse procedure for removal. **NOTE** • After replacement of the compressor, be sure to replace the compressor lead. (Repair part code of compressor lead: 43160612) In this time, wrap the ferrite core with the compressor lead wire by 1 time. • As shown in the right figure, mount the sound-insulation plate (rolling in, rolling out) by passing through it between the compressor and the piping, and between the piping and the partition board. • Fix TD sensor by the bundling band for heat proof on the market via the pipe cover so that TD sensor does not directly come to contact with the discharge pipe. 3. Vacuuming 1) Connect the vacuum pump to the charge port and the check joint of the gas pipe valve and then drive the vacuum pump. 2) Carry out vacuuming until the vacuum low pressure gauge indicates 1 (mmHg). **NOTE** Before vacuuming, open PMV fully. If PMV is closed, vacuum may be impossible between liquid pipe valve and PMV of the outdoor unit. Forced full-opening method of PMV • Turn on the leakage breaker. • Turn on 1 and 3 of Dip switch SW804 on the control PC board of the outdoor unit. • Keep pushing SW801 on the control PC board of the outdoor unit for 1 second or more. • After pushing SW801 for 1 second or more, turn off the leakage breaker within 2 minutes. 4. Refrigerant charge 1) Add the refrigerant amount determined by the pipe length from the charge port of the valve.	Wrap the ferrite core with the compressor lead wire for 1 time.  0 to 50 (Compressor lead positioning standard) Put the end of sound-insulation plate (rolling out) on the other end at this position. Pass through sound-insulation plate (rolling out) between suction pipe and header pipe.  Pass through sound-insulation plate (rolling in) between compressor and discharge pipe, suction pipe and then put the end of sound-insulation plate on the other end at this position. There should be no clearance between sound-insulation plate (upper) and sound-insulation plate (rolling out).  

No.	Part name	Procedure	Remarks
11	PMV coil	1. Detachment 1) Carry out work of item 1 of 1). 2) Turn the coil while pulling upward and then remove the coil from the PMV main unit. 2. Attachment 1) Surely match the positioning projection of the coil with the concave part of PMV main unit and then fix it.	
12	Fan guard	1. Detachment 1) Carry out works of item 1 of 1) and 1 of 2). **REQUIREMENT** To prevent scratch on the product, carry out the work on cardboard, cloth, etc. 2) Remove the discharge port cabinet and then put on it so that the fan guard side directs downward. 3) Remove the hooking claws (8 positions) of the fan guard. 2. Attachment 1) Push the hooking claws (8 positions) with hands from the front side to fix the claws. **REQUIREMENT** Check that all the hooking claws are fixed at the specified positions.	

No.	Part name	Procedure	Remarks
13	Bottom plate heater	1. Detachment 1) Recover the refrigerant. (See 16-1. Refrigerant recovery control) Drain the water in the hydro unit before refrigerant recovery. 2) Execute steps 1-1, 2, and 3. 3) Detach the two fin guards. (9 pcs. hex screws Ø4 × 10) 4) Detach the two piping panels. (5 pcs. hex screws Ø4 × 10) 5) Disconnect the 3” and 5” refrigerant pipes. 6) Disconnect the fan motor connectors from the PC board (one for the upper fan and one for the lower fan. Cut the tie-lap bands (6) location) 7) Detach the fan motor base. (2 pcs. hex screws Ø5 × 10) 8) Remove the insulation mats (One above the compressor and two around it). 9) Remove the three nuts fixing the compressor. 10) Remove the screw fixing the partition plate and bottom plate. (1 pcs. ST1T Ø4 × 8) 11) Remove the screws fixing the heat exchanger and bottom plate. (2 pcs. ST1T Ø4 × 8) 12) Disconnect the connector of the bottom plate heater from the CDB PC board. 13) Lift the main unit up and detach the bottom plate. 14) Replace the heater. (21 pcs. ST2T Ø4 × 8 and 2 pcs. hex screw Ø5 × 10) 2. Attachment Execute the opposite of steps 1)-13) in reverse order. **Note for step 10** The partition plate has a cutout for the heater. Connect the heater cord through the cutout when reassembling the unit.  	3) 4)  Fan motor connection 6)  7)  8)  9)  10)  11)  13)  14) 

13 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.

14 Periodic inspection items

For a long-term safe operation of this equipment, perform periodic inspection and parts replacement.

<Inspection items>

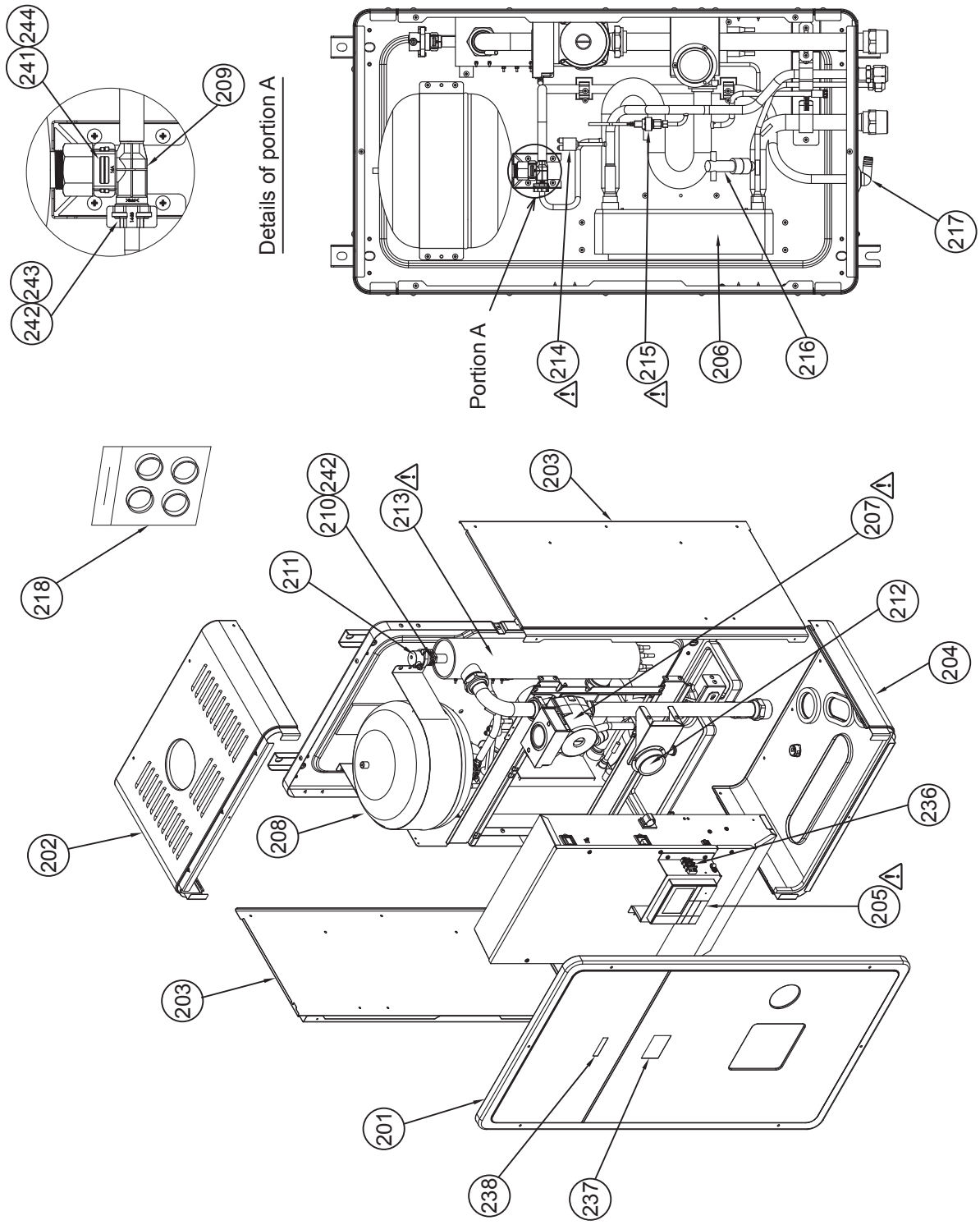
Hydro unit (HWS-805**-E, 1405**-E)	Frequency	Periodic inspection details
1. Insulation measurement (Power source circuit / Heater circuit)	Annually	Insulation measurement with a mega tester
2. Power source measurement (No-load voltage)	Annually	Electronic voltage measurement: 220-230 V ±10%
3. Operation 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 switch	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

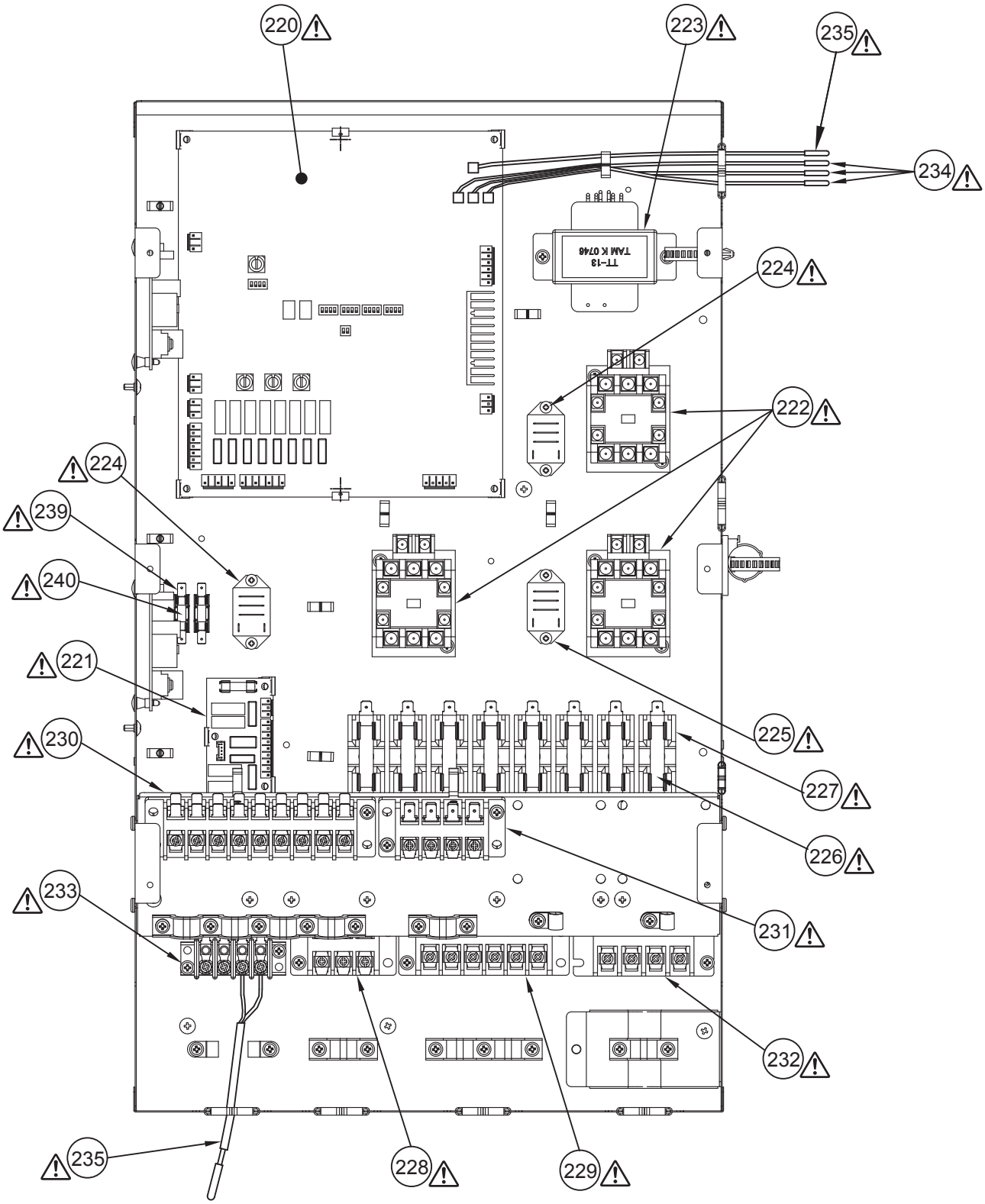
Outdoor unit (HWS-805H-E, 1105H-E, 1405H-E) (HWS-1105H8(R)-E, 1405H8(R)-E, 1605H8(R)-E)	Frequency	Periodic inspection details
1. Insulation measurement (Power source circuit / Compressor)	Annually	Insulation measurement with a mega tester
2. Power source measurement (No-load voltage / Rated operation)	Annually	Electronic voltage measurement: 220-230 V ±10% (Single phase type) 380-400 V ±10% (3 phase type)
3. Operation frequency (Outdoor unit operation check)	Annually	Frequency check by rated operation (See 10-13)
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: 220-230 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

15 Part exploded view, part list

Hydro Unit




220
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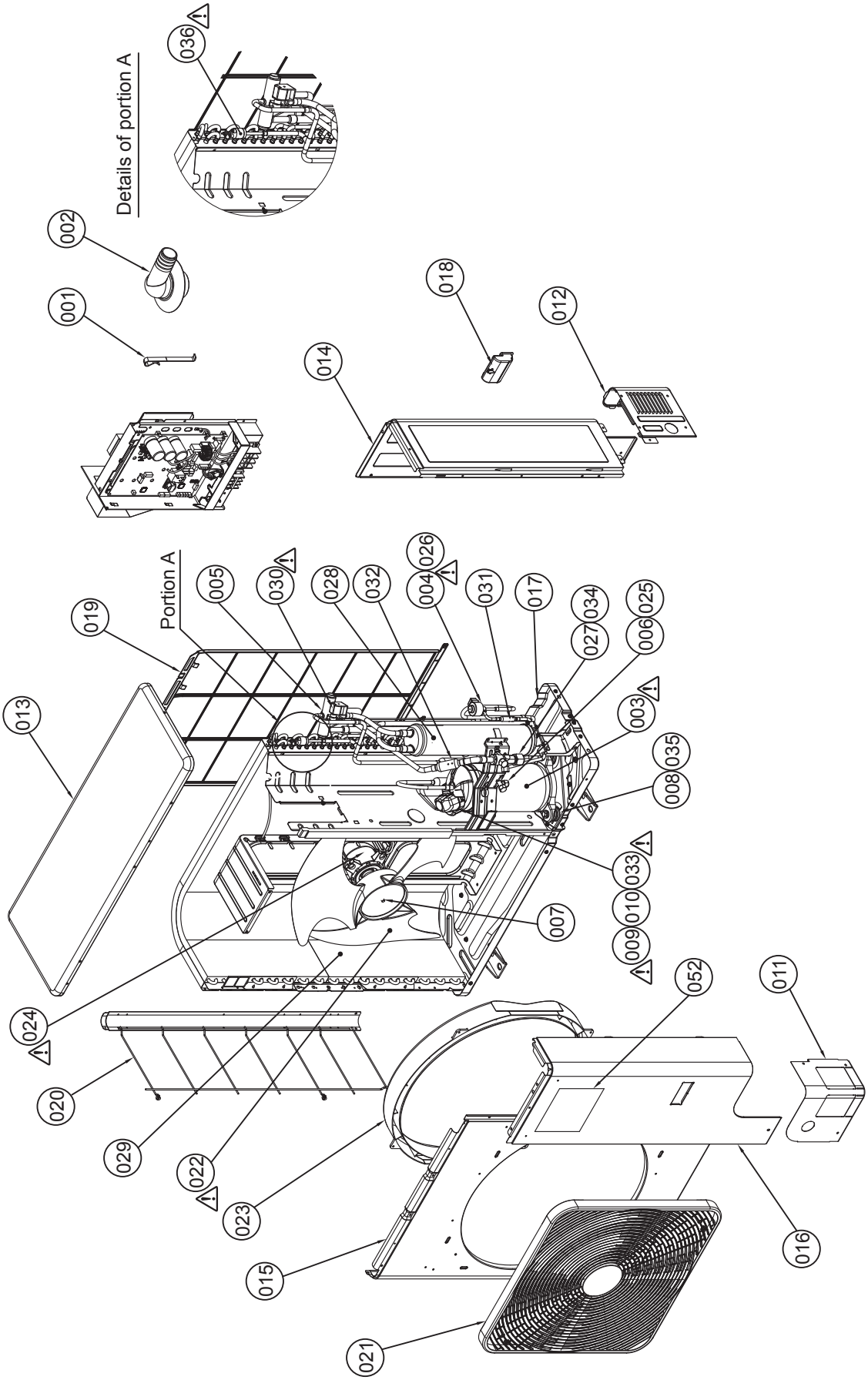
TT-13
TAM K 0746

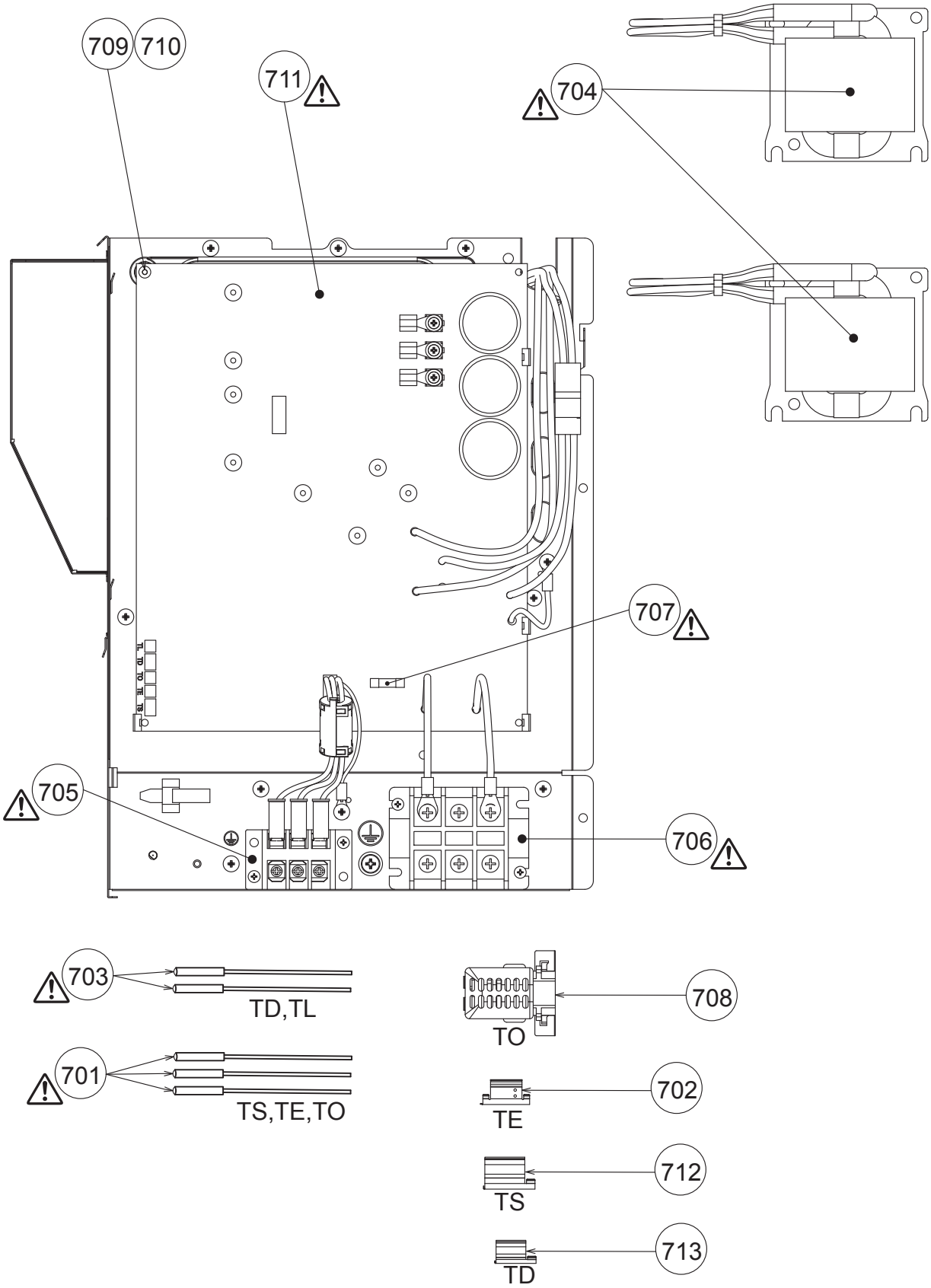
Safety ⚠	Location No.	Part No.	Description	Number of pieces per unit					
				HWS-805XWHM3-E	HWS-805XWHT6-E	HWS-805XWHT9-E	HWS-1405XWHM3-E	HWS-1405XWHT6-E	HWS-1405XWHT9-E
	201	37500840	CABINET, FRONT	1	1	1	1	1	1
	202	37500800	PLATE, UP	1	1	1	1	1	1
	203	37500801	PLATE, SIDE	2	2	2	2	2	2
	204	37500835	PLATE, DN, ASSY	1	1	1	1	1	1
⚠	205	37566711	REMOTE CONTROLLER	1	1	1	1	1	1
	206	37546885	PIPE ASSY, WATER HEAT EXCHANGER	1	1	1			
	206	37546886	PIPE ASSY, WATER HEAT EXCHANGER				1	1	1
⚠	207	37541739	PUMP, WATER, ASSY	1	1	1			
⚠	207	37541740	PUMP, WATER, ASSY				1	1	1
	208	37542710	VESSEL, EXPANTION	1	1	1	1	1	1
	209	37547773	VALVE ASSY, OVERPRESSURE PREVENTIVE	1	1	1	1	1	1
	210	37519776	FASTENER, QUICK	1	1	1	1	1	1
	211	37547769	VALVE, AIR VENT	1	1	1	1	1	1
	212	37543706	METER, PRESSURE	1	1	1	1	1	1
⚠	213	37545713	HEATER ASSY	1			1		
⚠	213	37545714	HEATER ASSY		1			1	
⚠	213	37545715	HEATER ASSY			1			1
⚠	214	43151322	SWITCH ASSY, PRESSURE ACB-4UB83W	1	1	1	1	1	1
⚠	215	37551736	SENSOR, LOW PRESSURE	1	1	1	1	1	1
	216	37551735	SWITCH, FLOW				1	1	1
	216	37551737	SWITCH, FLOW	1	1	1			
	217	43F32441	NIPPLE, DRAIN	1	1	1	1	1	1
	218	37595721	PACKING, ASSY	1	1	1	1	1	1
⚠	220	3026V072	PC BOARD ASSY	1	1	1	1	1	1
⚠	221	4316V338	PC BOARD ASSY	1	1	1	1	1	1
⚠	222	43152401	CONTACTOR, MAGNETIC	2	3	3	2	3	3
⚠	223	43158187	TRANSFORMER	1	1	1	1	1	1
⚠	224	43154156	RELAY, LY1F	1	2	2	1	2	2
⚠	225	43054107	RELAY, LY1F	1	1	1	1	1	1
⚠	226	43160297	FUSE	4	6	8	4	6	8
⚠	227	43060059	FUSE, HOLDER	4	6	8	4	6	8
⚠	228	43160565	TERMINAL BLOCK, 3P, 20A	1	1	1	1	1	1
⚠	229	43160566	TERMINAL BLOCK, 6P, 20A	1	1	1	1	1	1
⚠	230	4306A130	TERMINAL BLOCK, 9P, 20A	1	1	1	1	1	1
⚠	231	43160576	TERMINAL BLOCK, 4P, 20A	1	1	1	1	1	1
⚠	232	43160579	TERMINAL	1	1	1	1	1	1
⚠	233	43160561	TERMINAL, 4P	1	1	1	1	1	1
⚠	234	43050425	SENSOR ASSY, SERVICE	3	3	3	3	3	3
⚠	235	43150320	SENSOR ASSY, SERVICE	2	2	2	2	2	2
⚠	236	43160568	TERMINAL, 2P	1	1	1	1	1	1
	237	37517875	MARK, ESTIA	1	1	1	1	1	1
	238	37517876	MARK, TOSHIBA FOR ESTIA	1	1	1	1	1	1
⚠	239	43160571	FUSE, HOLDER, 15A, 250V	2	2	2	2	2	2
⚠	240	43F6A156	FUSE(ET), 3.15A, AC250V	2	2	2	2	2	2
	241	3025Q006	RING, O	1	1	1	1	1	1
	242	3025Q013	RING, O	2	2	2	2	2	2
	243	3025S012	FASTENER,QUICK	1	1	1	1	1	1
	244	3025S013	FASTENER,QUICK	1	1	1	1	1	1

Outdoor Unit (HWS-805H-E)



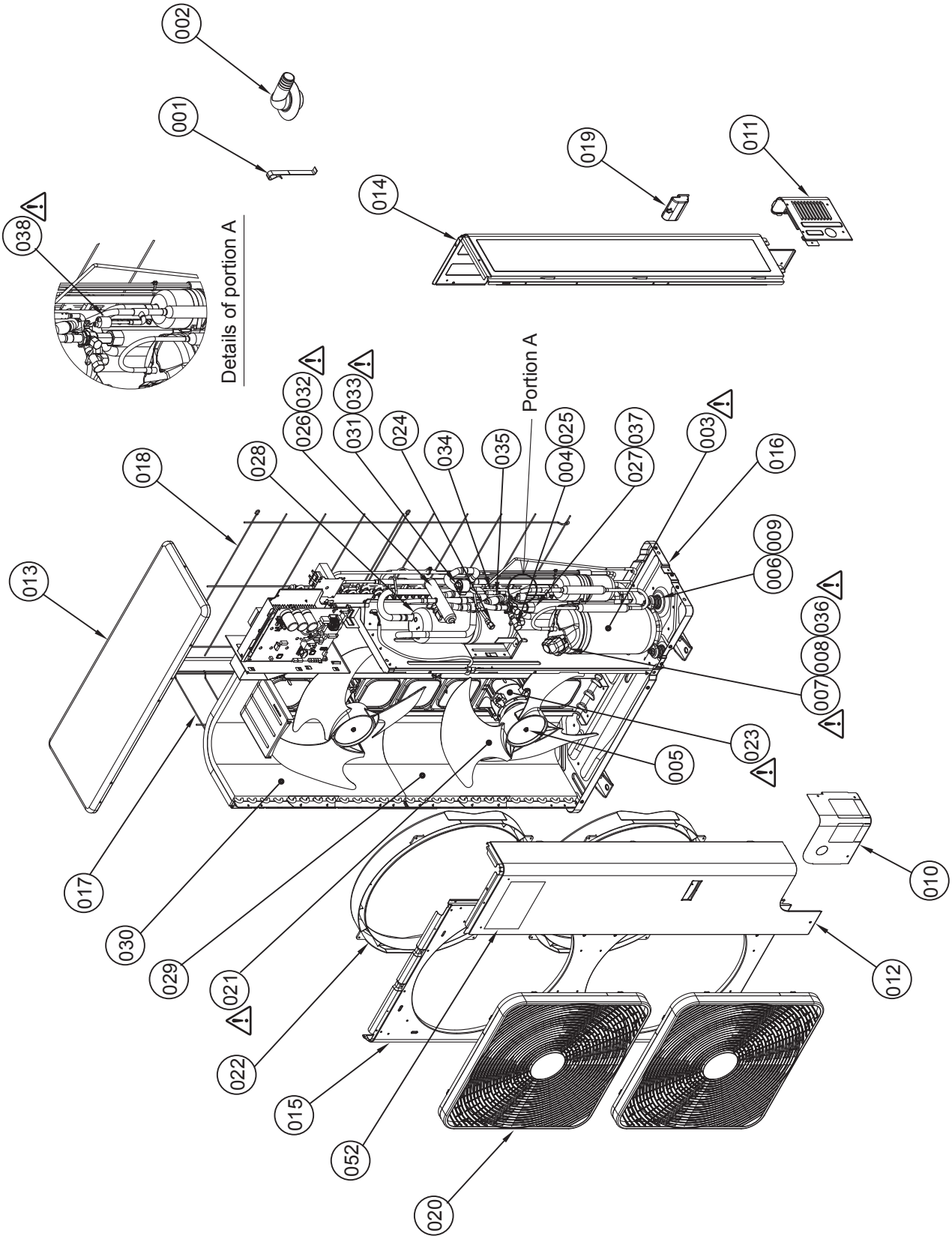
Safety ⚠	Location No.	Part No.	Description	Number of pieces per unit
				HWS-805H-E
	001	43F19904	HOLDER, SENSOR (TS)	1
	002	43F32441	NIPPLE, DRAIN	1
⚠	003	43041798	COMPRESSOR, DA220A2F-22L	1
⚠	004	43F46493	COIL, PMV	1
	005	43F46500	VALVE, 4WAY, STF-H0218	1
	006	43F47246	BONNET, 3/8 IN	1
	007	43F47669	NUT, FLANGE	1
	008	43049739	CUSHION, RUBBER	3
⚠	009	43F50407	THERMOSTAT,BIMETAL	1
	010	43F63317	HOLDER,THERMOSTAT	1
	011	43100437	PANEL, FRONT, PIPING	1
	012	43100438	PANEL, BACK, PIPING	1
	013	43100440	PLATE, ROOF	1
	014	43100452	PANEL, SIDE	1
	015	43100453	PANEL, AIR OUTLET	1
	016	43100454	PANEL, FRONT	1
	017	43100455	BASE ASSY	1
	018	43107276	HANGER	2
	019	43107277	GUARD, FIN, BACK	1
	020	43107278	GUARD, FIN, SIDE	1
	021	43119540	GUARD, FAN ASSY	1
⚠	022	43120244	FAN, PROPELLER, PB521	1
	023	43122113	BELL MOUTH	1
⚠	024	4312C042	MOTOR, FAN, ICF-280-A60-1	1
	025	4314N092	VALVE, PACKED, 9.52	1
	026	43146695	VALVE, PULSE, MODULATING	1
	027	43146724	VALVE, BALL, SBV-JA5GTC-1, R0HS	1
	028	43148232	ACCUMULATOR, ASSY	1
	029	4314G278	CONDENSER ASSY	1
⚠	030	37547768	COIL, VLVE, 4WAY, STF-H01AP1880A1	1
	031	4314Q031	STRAINER	1
	032	4314Q056	STRAINER	1
⚠	033	43160591	LEAD ASSY, COMPRESSOR	1
	034	43194029	BONNET, 5/8 IN	1
	035	43197183	BOLT, COMPRESSOR	3
⚠	036	43151322	SWITCH ASSY, PRESSURE ACB-4UB83W	1
	052	37517891	MARK, TOSHIBA FOR ESTIA	1

Inverter Assembly (HWS-805H-E)



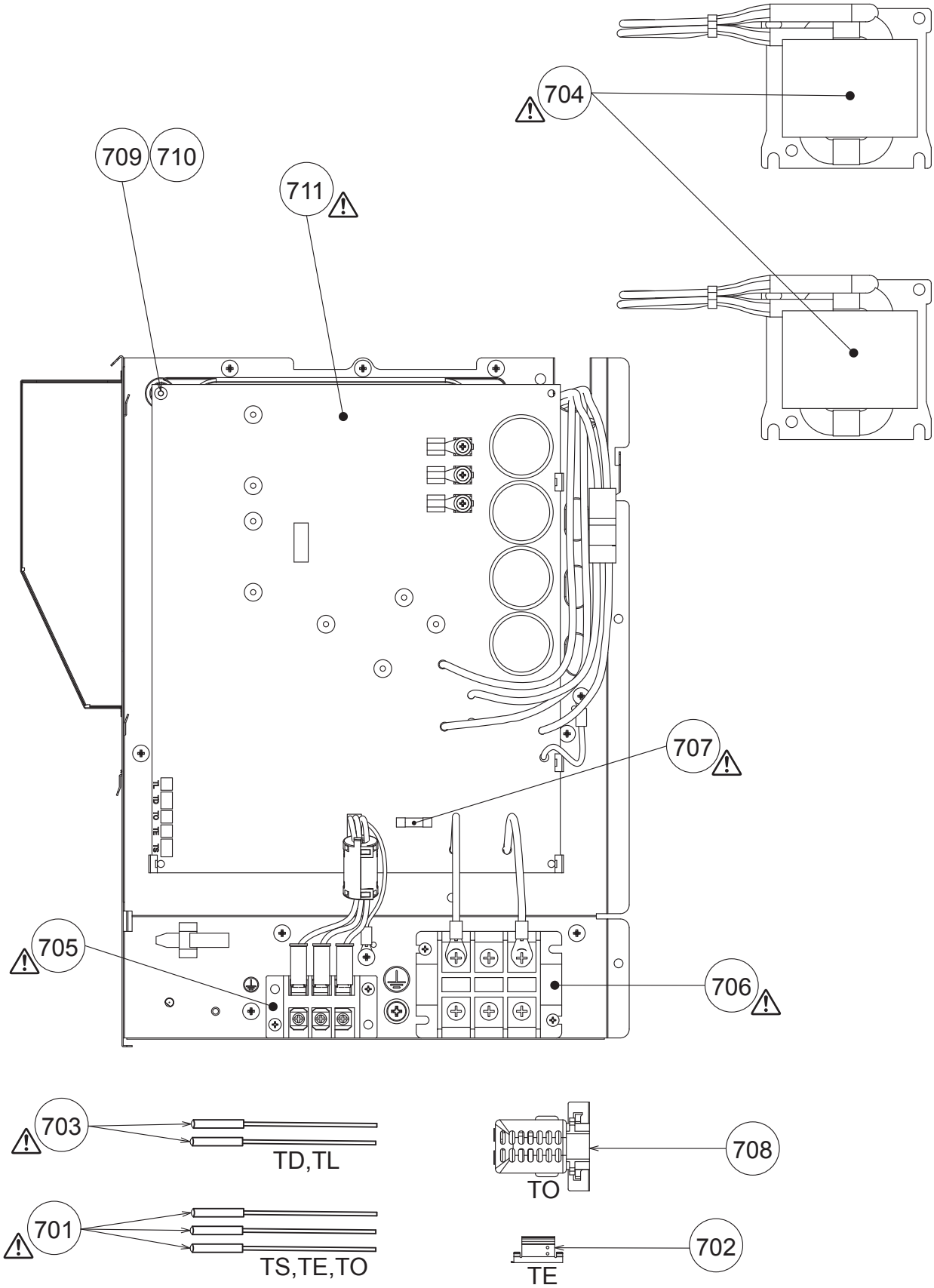
Safety ⚠	Location No.	Part No.	Description	Number of pieces per unit
				HWS-805H-E
⚠	701	43050425	SENSOR ASSY, SERVICE	3
	702	43F63325	HOLDER, SENSOR (TE)	1
⚠	703	43150319	SENSOR ASSY, SERVICE	2
⚠	704	43155188	REACTOR, CH-56-2Z-T	2
⚠	705	43160565	TERMINAL BLOCK, 3P, 20A	1
⚠	706	43160581	TERMINAL	1
⚠	707	43160589	FUSE	1
	708	43163055	HOLDER, SENSOR	1
	709	43163059	SPACER, BUSH	1
	710	43163060	SPACER, COLLAR	1
⚠	711	3026V073	PC BOARD ASSY, MCC-1571	1
	712	43F63322	HOLDER, SENSOR (TS)	1
	713	43F63321	HOLDER, SENSOR (TD)	1

Outdoor Unit (HWS-1105H-E, 1405H-E)



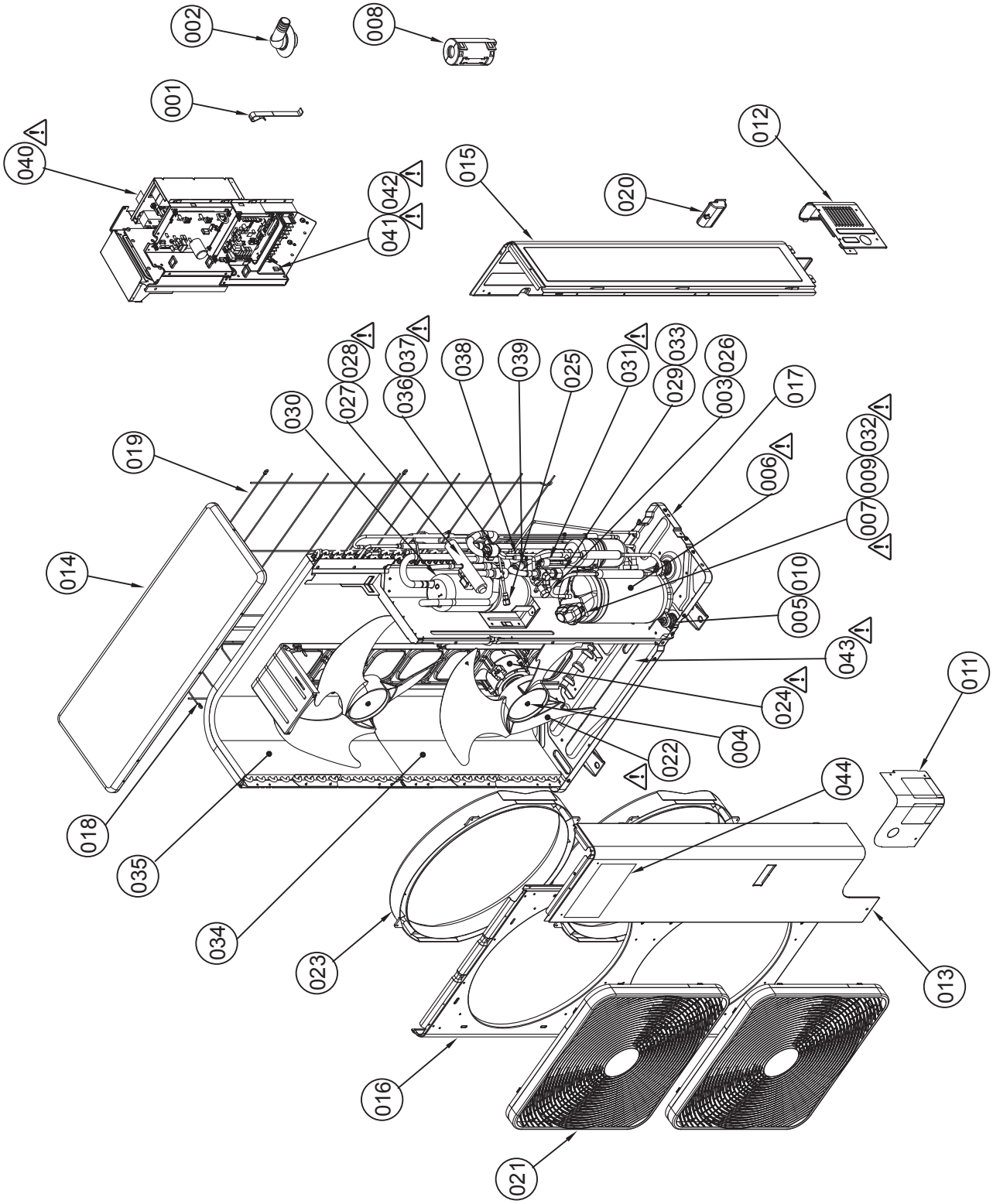
Safety ⚠	Location No.	Part No.	Description	Number of pieces per unit	
				HWS-1105H-E	HWS-1405H-E
	001	43F19904	HOLDER, SENSOR (TS)	3	3
	002	43F32441	NIPPLE, DRAIN	1	1
⚠	003	43041794	COMPRESSOR, DA422A3F-25M	1	1
	004	43F47246	BONNET, 3/8 IN	1	1
	005	43F47669	NUT, FLANGE	2	2
	006	43049739	CUSHION, RUBBER	3	3
⚠	007	43F50407	THERMOSTAT,BIMETAL	1	1
	008	43F63317	HOLDER,THERMOSTAT	1	1
	009	43F97212	NUT	3	3
	010	43100437	PANEL, FRONT, PIPING	1	1
	011	43100438	PANEL, BACK, PIPING	1	1
	012	43100439	PANEL, FRONT	1	1
	013	43100440	PLATE, ROOF	1	1
	014	43100441	PANEL, SIDE	1	1
	015	43100442	PANEL, AIR OUTLET	1	1
	016	43100443	BASE ASSY	1	1
	017	43107274	GUARD, FIN, SIDE	1	1
	018	43107275	GUARD, FIN, BACK	1	1
	019	43107276	HANGER	3	3
	020	43119540	GUARD, FAN ASSY	2	2
⚠	021	43120244	FAN, PROPELLER, PB521	2	2
	022	43122113	BELL MOUTH	2	2
⚠	023	4312C100	MOTOR, FAN, ICF-280-A100-1(A)	2	2
	024	43146676	J0INT,CHECK	1	1
	025	4314N092	VALVE, PACKED, 9.52	1	1
	026	37546878	VALVE, 4-WAY, STF-H0404	1	1
	027	43146724	VALVE, BALL, SBV-JA5GTC-1, R0HS	1	1
	028	43148170	ACCUMULATOR ASS'Y	1	1
	029	4314G266	CONDENSER ASSY, DOWN	1	1
	030	4314G269	CONDENSER ASSY, UP	1	1
	031	4314N023	VALVE, PLUS, MODULAING, UKV-25D100	1	1
⚠	032	37547768	COIL, VLVE, 4WAY, STF-H01AP1880A1	1	1
⚠	033	4314N025	COIL, PMV, UKV-A038	1	1
	034	4314Q031	STRAINER	1	1
	035	4314Q032	STRAINER	1	1
⚠	036	43160591	LEAD ASSY, COMPRESSOR	1	1
	037	43194029	BONNET, 5/8 IN	1	1
⚠	038	43151322	SWITCH ASSY, PRESSURE ACB-4UB83W	1	1
	052	37517891	MARK, TOSHIBA FOR ESTIA	1	1

Inverter Assembly (HWS-1105H-E, 1405H-E)



Safety ⚠	Location No.	Part No.	Description	Number of pieces per unit	
				HWS-1105H-E	HWS-1405H-E
⚠	701	43050425	SENSOR ASSY, SERVICE	3	3
	702	43F63325	HOLDER, SENSOR (TE)	1	1
⚠	703	43150319	SENSOR ASSY, SERVICE	2	2
⚠	704	43158190	REACTOR	2	2
⚠	705	43160565	TERMINAL BLOCK, 3P, 20A	1	1
⚠	706	43160581	TERMINAL	1	1
⚠	707	43160589	FUSE	1	1
	708	43163055	HOLDER, SENSOR	1	1
	709	43163059	SPACER, BUSH	1	1
	710	43163060	SPACER, COLLAR	1	1
⚠	711	3026V074	PC BOARD ASSY, MCC-1571	1	1

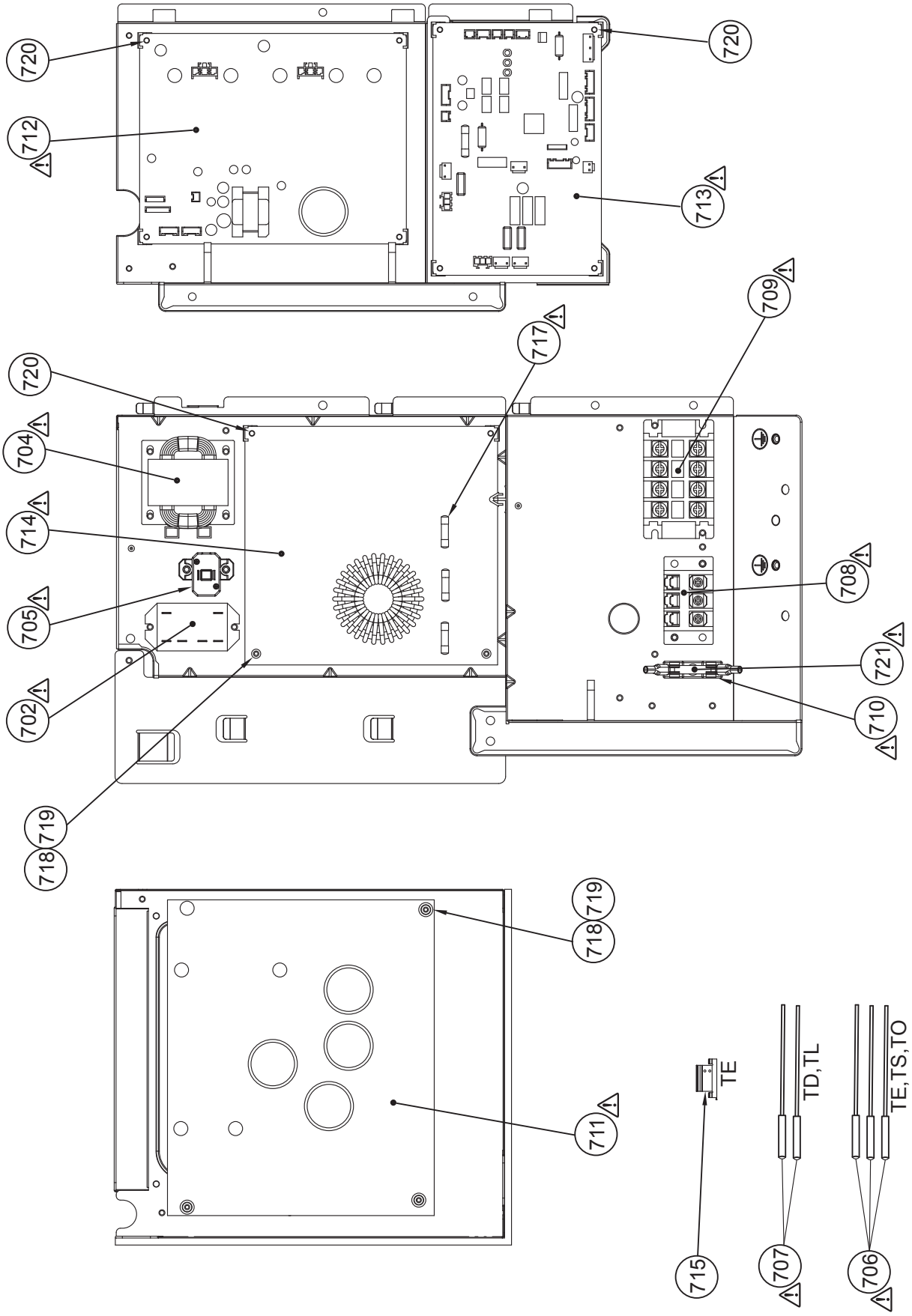
Outdoor Unit (HWS-1105H8(R)-E, 1405H8(R)-E, 1605H8(R)-E)



Safety ⚠	Location No.	Part No.	Description	Model name HWS		
				HWS-1105H8(R)-E	HWS-1405H8(R)-E	HWS-1605H8(R)-E
	001	43F19904	HOLDER, SENSOR (TS)	3	3	3
	002	43F32441	NIPPLE, DRAIN	1	1	1
	003	43F47246	BONNET, 3/8 IN	1	1	1
	004	43F47669	NUT, FLANGE	2	2	2
	005	43049739	CUSHION, RUBBER	3	3	3
⚠	006	4304C703	COMPRESSOR, DA422A3F-27M	1	1	1
⚠	007	43F50407	THERMOSTAT,BIMETAL	1	1	1
	008	43F60029	FILTER,N0ISE	1	1	1
	009	43F63317	HOLDER,THERMOSTAT	1	1	1
	010	43F97212	NUT	3	3	3
	011	43100437	PANEL, FRONT, PIPING	1	1	1
	012	43100438	PANEL, BACK, PIPING	1	1	1
	013	43100439	PANEL, FRONT	1	1	1
	014	43100440	PLATE, ROOF	1	1	1
	015	43100470	PANEL, SIDE	1	1	1
	016	43100442	PANEL, AIR OUTLET	1	1	1
	017	43100443	BASE ASSY	1 (*1)	1 (*1)	1 (*1)
	017	37500804	BASE ASSY	1 (*2)	1 (*2)	1 (*2)
	018	43107274	GUARD, FIN, SIDE	1	1	1
	019	43107275	GUARD, FIN, BACK	1	1	1
	020	43107276	HANGER	3	3	3
	021	43119540	GUARD, FAN ASSY	2	2	2
⚠	022	43120244	FAN, PROPELLER, PB521	2	2	2
	023	43122113	BELL MOUTH	2	2	2
⚠	024	4312C100	MOTOR, FAN, ICF-280-A100-1(A)	2	2	4
	025	43146676	J0INT,CHECK	1	1	1
	026	4314N092	VALVE, PACKED, 9.52	1	1	1
	027	37546878	VALVE, 4-WAY, STF-H0404	1	1	1
⚠	028	4314N080	COIL, SOLENOID, STF-H01AJ1736A1	1	1	1
	029	43146724	VALVE, BALL, SBV-JA5GTC-1, R0HS	1	1	1
	030	43148170	ACCUMULATOR ASS'Y	1	1	1
⚠	031	43151322	SWITCH ASSY, PRESSURE ACB-4UB83W	1	1	1
⚠	032	43160612	LEAD ASSY, COMPRESSOR	1	1	1
	033	43194029	BONNET, 5/8 IN	1	1	1
	034	4314G266	CONDENSER ASSY, DOWN	1	1	1
	035	4314G269	CONDENSER ASSY, UP	1	1	1
	036	4314N023	VALVE, PLUS, MODULAING, UKV-25D100	1	1	1
⚠	037	4314N025	COIL, PMV, UKV-A038	1	1	1
	038	4314Q031	STRAINER	1	1	1
	039	4314Q032	STRAINER	1	1	1
⚠	040	43158227	REACTOR	1	1	1
⚠	041	43160571	FUSE, HOLDER, 15A, 250V	2 (*2)	2 (*2)	2 (*2)
⚠	042	43F6A156	FUSE(ET), 3.15A, AC250V	2 (*2)	2 (*2)	2 (*2)
⚠	043	37545716	HEATER ASSY	1 (*2)	1 (*2)	1 (*2)
	044	37517891	MARK, TOSHIBA FOR ESTIA	1	1	1

(*1) H8-E series only
(*2) H8R-E series only

Inverter Assembly (HWS-1105H8(R)-E, 1405H8(R)-E, 1605H8(R)-E)



Safety ⚠	Location No.	Part No.	Description	Model name HWS		
				HWS-1105H8(R)-E	HWS-1405H8(R)-E	HWS-1605H8(R)-E
⚠	702	43154177	RELAY	1	1	1
⚠	704	43158207	REACTOR	1	1	1
⚠	705	43153006	PTC-THERMISTOR	1	1	1
⚠	706	43050425	SENSOR ASSY, SERVICE	3	3	3
⚠	707	43150319	SENSOR ASSY, SERVICE	2	2	2
⚠	708	43160565	TERMINAL BLOCK, 3P, 20A	1	1	1
⚠	709	43160579	TERMINAL	1	1	1
⚠	710	43F60859	FUSE BLOCK, 30A, 250V	1	1	1
⚠	711	4316V416	PC BOARD ASSY, MCC-1596, COMP-IPDU	1	1	1
⚠	712	4316V391	PC BOARD ASSY, MCC-1597, FAN-IPDU	1	1	1
⚠	713	3026V015	PC BOARD ASSY, MCC-1559, CDB	1	1	1
⚠	714	4316V398	PC BOARD ASSY, MCC-1600, N/F	1	1	1
	715	43F63325	HOLDER, SENSOR (TE)	1	1	1
⚠	717	43160590	FUSE	3	3	3
	718	43282001	BUSHING	5	5	5
	719	43183020	COLLAR	5	5	5
	720	43F63248	SUPPORTER, ASSY	2	2	2
⚠	721	43060700	FUSE, 10A, 250V	1	1	1

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