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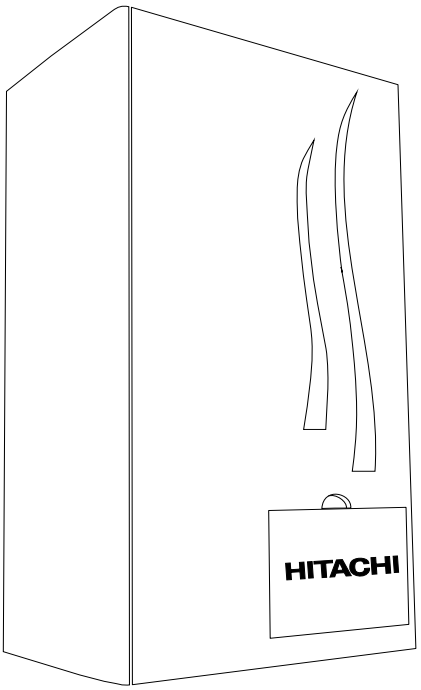
YUTAKI S SERIES



Service Manual

RWM-FSN3E Indoor units
RAS-H(V)RNME-AF Outdoor units
RAS-HVRN2 Outdoor unit

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1. General information

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1.1 General information

1.1.1 General notes

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No type of modification must be made to the equipment without prior, written authorisation from the manufacturer.

1.1.2 Introduction

The HITACHI's YUTAKI S system is a heating and cooling solution for the home with high energy efficiency. The system consists of an outdoor unit (Inverter heat pump) and an indoor unit hydraulic module. The heat pump absorbs/sends heat from/to the outside, and transfers it to the water circuit through the indoor unit hydraulic module.

YUTAKI S can be used both in winter time and in summer time, integrating heating and cooling systems, creating an air-conditioned system and using just one energy source, the electricity.

◆ For winter time

With the aim of reducing energy expenditure, there is a clear trend in the market to use medium and low temperature heating systems. Technological advances and improvements in insulation in the home enable to use of low temperature water to heat homes. This results in more comfort and greater energy efficiency.

YUTAKI S meets the necessary conditions to provide this type of application, fulfilling user's needs.

The heat pump extracts the heat present in the air, increases its refrigerant temperature and transmits it to the water circuit by means of indoor unit plate heat exchanger, where the heat is taken to radiators/(fan-coils), underfloor heating components or both (2nd temperature area).

As well as increased efficiency and reduced CO_2 emissions due to the extraction of free heat from the outside air, the system also boasts proven reliability and minimum maintenance. YUTAKI S provides a comfortable atmosphere all year long, even in the coldest climates by means of the following system configuration possibilities:

- Mono-valent system: This is the most popular configuration. The air to water heat pump is sized to provide 80% of the heating requirements on the coldest day of the year. An auxiliary electric heater (inside the unit) is used to provide the additional heating required on cold days. This option usually results in an ideal balance between installation costs and future energy consumption, as proven by its popularity in colder climates than ours, such as Sweden and Norway.
- Mono-energy system: The air to water heat pump is sized to provide 100% of the heating requirements on the coldest day the year.
- Alternating Bi-valent system: For installations with an existing heating system by boiler and when is needed to heat the supplied water temperature to the circuit up to high temperatures (80ºC), the boiler can be configured to alternate with the air to water heat pump.

◆ For summer time

YUTAKI S system can be also used as cooling system for combination with fan-coils, refreshing floor or both (2nd temperature area).

For fan-coils: It is possible to cool the water up to 5ºC.

For refreshing floor: It is possible to cool the water up to temperatures between 16 and 22ºC.

◆ Domestic Hot Water (DHW) production

YUTAKI S also gives the option of sanitary hot water production, allowing the user to benefit from the heat pump's high efficiency and achieve hot water up to 70ºC. This is made possible by a Domestic Hot Water Tank accessory supplied by HITACHI, which is heated in the heat pump at temperatures below 60ºC, using water pre-heated. An electric heater integrated at the top of the stainless steel tank, increases the temperature in accordance with the user's needs.

◆ Additional combinations

YUTAKI S system can be used for the following additional combinations:

Solar combination for DHW

YUTAKI S system can be combined with solar panel.

The solar combination will enable to heat up the DHW by means of the sun. The solar combination is designed to transfer the heat from the solar panels (sun radiation) to the heat exchanger of DHW tank.

Swimming pool operation

For summer sesion period, YUTAKI S can be used to heat up the swimming pool water temperature up to a value between 24 and 33ºC.

1.1.3 Environtment-friendly units

The new HITACHI's YUTAKI S series uses environmentally-friendly R410A gas refrigerant, and the RoHS and Green Dot regulations are applied throughout the manufacturing and installation process to reflect HITACHI's awareness of environmental respect and commitment.

R410A is totally environmentally-friendly since it does not contain any substances that damage the ozone layer: ODP (ozone depleting product) =0.

HITACHI's YUTAKI S series are very efficient and allow significant energy savings compared with conventional systems. This energy efficiency means less production of CO_2, which causes the greenhouse effect.

1.2 Applied symbols

During normal air conditioning system design work or unit installation, greater attention must be paid in certain situations requiring particular care in order to avoid damage to the unit, the installation or the building or property.

Situations that jeopardise the safety of those in the surrounding area or that put the unit itself at risk will be clearly indicated in this manual.

To indicate these situations, a series of special symbols will be used to clearly identify these situations.

Pay close attention to these symbols and to the messages following them, as your safety and that of others depends on it.

DANGER

- ***The text following this symbol contains information and instructions relating directly to your safety and physical wellbeing.***
- ***Not taking these instructions into account could lead to serious, very serious or even fatal injuries to you and others in the proximities of the unit.***

In the texts following the danger symbol you can also find information on safe procedures during unit installation.

CAUTION

- ***The text following this symbol contains information and instructions relating directly to your safety and physical wellbeing.***
- ***Not taking these instructions into account could lead to minor injuries to you and others in the proximities of the unit.***
- ***Not taking these instructions into account could lead to unit damage.***

In the texts following the caution symbol you can also find information on safe procedures during unit installation.

NOTE

- ***The text following this symbol contains information or instructions that may be of use or that require a more thorough explanation.***
- ***Instructions regarding inspections to be made on unit parts or systems may also be included.***

1.3 Product guide

1.3.1 Classification of indoor unit models

Unit type (indoor unit water module)							
	Position-separating hyphen (fixed)						
		Compressor power (HP): 2.0, 3.0, 4.0, 5.0, 6.0, 8.0, 10.0.					
			System Free				
				R410A refrigerant			
					Series		
						E: Made in Europe	
RWM	-	X.X	FS	N	3	E	

1.3.2 Classification of outdoor unit models

◆ RAS-HVRN2

Unit type (outdoor unit)									
	Position-separating hyphen (fixed)								
		Compressor power (HP): 2.							
			Heat pump						
				V: Single phase unit (1~ 230V 50Hz)					
				-: Three phase unit (3N~ 400V 50Hz)					
					Inverter system				
						R410A refrigerant			
							Series		
								-: Made in Japan	
RAS	-	X	H	X	R	N	2	X	

◆ RAS-H(V)RNME-AF

Unit type (outdoor unit)										
	Position-separating hyphen (fixed)									
		Compressor power (HP): 3, 4, 5, 6, 8, 10.								
			Heat pump							
				V: Single phase unit (1~ 230V 50Hz)						
				-: Three phase unit (3N~ 400V 50Hz)						
					Inverter system					
						R410A refrigerant				
							IVX series			
								E: Made in Europe		
									YUTAKI S	
RAS	-	X	H	X	R	N	M	E	-AF	

1.3.3 Classification of Domestic Hot Water Tank accessory

Unit type: Domestic Hot Water Tank	Capacity (L) 200-300 Litres	Tank type: E=Enamelled S=Stainless	Position-separating hyphen (fixed)	2.5 kW Electrical Heater	Series	E = Made in Europe
DHWT	XXX	X	-	H	1	E

1.3.4 Product guide: indoor unit

RWM-FSN3E indoor units			
1~		3N~	
Unit	Code	Unit	Code
RWM-2.0FSN3E	7E474103	-	-
RWM-3.0FSN3E	7E474105	-	-
RWM-4.0FSN3E	7E474107	RWM-4.0FSN3E	7E474107
RWM-5.0FSN3E	7E474108	RWM-5.0FSN3E	7E474108
RWM-6.0FSN3E	7E474109	RWM-6.0FSN3E	7E474109
-	-	RWM-8.0FSN3E	7E474110
-	-	RWM-10.0FSN3E	7E474111

1.3.5 Product guide: outdoor unit

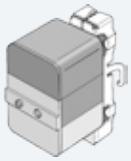
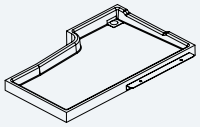
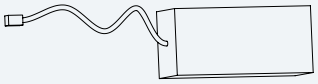
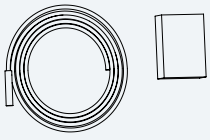
RAS-H(V)RNME-AF outdoor units			
RAS-HVRNME-AF units ☀ ❄ 1~		RAS-HRNME-AF units ☀ ❄ 3N~	
Unit	Code	Unit	Code
RAS-2HVRN2	60288093	-	-
RAS-3HVRNME-AF	7E300018	-	-
RAS-4HVRNME-AF	7E300020	RAS-4HRNME-AF	7E300120
RAS-5HVRNME-AF	7E300021	RAS-5HRNME-AF	7E300121
RAS-6HVRNME-AF	7E300022	RAS-6HRNME-AF	7E300122
-	-	RAS-8HRNME-AF	7E317110
-	-	RAS-10HRNME-AF	7E317111

1.3.6 Accessory code list

◆ Room Thermostats

Accessory	Name	Code	Figure
ATW-RTU-01	ON/OFF Thermostat (Receiver + Room Thermostat)	7E543000	
ATW-RTU-02	“Intelligent” Thermostat (Receiver + Room Thermostat)	7E549900	
ATW-RTU-03	2nd temperature Thermostat (Only Room Thermostat) *Only for “Intelligent” Thermostat application	7E549901	

◆ Other accessories

Accessory	Name	Code	Figure
ATW-HSK-01 (BDHM1)	Hydraulic separator	7E549905 (BDHM1)	
ATW-3WV-01 (VID3V1)	3-way valve	7E549906 (VID3V1)	
ATW-AQT-01 (ASMSH1)	Aquastat	7E549907 (ASMSH1)	
ATW-2KT-01 (CDH2Z1)	2nd temperature kit	7E549904 (CDH2Z1)	
ATW-MVM-01 NEW	Mixing valve motor	7E549912	
ATW-DPK-01	Drain pan kit (For RWM-(2.0-6.0)FSN3E)	7E549902	
ATW-DPK-02 NEW	Drain pan kit (For RWM-(8.0/10.0)FSN3E)	7E549903	
ATW-AOS-01	Auxilliary output signal box (Relay board for additional output signals)	7E549910	
ATW-2OS-01	Ambient temperature sensor (2nd outdoor temperature sensor)	7E549909	
ATW-WTS-02	Water temperature sensor (2nd temperature control, boiler combination)	7E549911	
ATW-SPS-01	Swimming pool sensor	7E549908	

Accessory	Name	Code	Figure
ATW-WTS-02Y	Water temperature sensor (for Domestic Hot Water Tank)	9E500004	
DHWT200E-2.5H1E	Domestic Hot Water Tank Enamelled (200 L.)	70544000	
DHWT300E-2.5H1E	Domestic Hot Water Tank Enamelled (300 L.)	70544001	
DHWT200S-2.5H1E	Domestic Hot Water Tank Stainless (200 L.)	70544100	
DHWT300S-2.5H1E	Domestic Hot Water Tank Stainless (300 L.)	70544101	
DHWT-CP-01	Permanent cathode protection for enamelled tank (200 L.)	70544900	
DHWT-CP-03	Permanent cathode protection for enamelled tank (300 L.)	70544903	
DHWT-CP-02	Permanent cathode protection for stainless tank (200 L.)	70544901	
DHWT-CP-04	Permanent cathode protection for stainless tank (300 L.)	70544904	
DHWT-SWG-01	Security valve	70544902	

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2. Unit installation

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2.1 Outdoor unit installation

2.1.1 Initial check

CAUTION

- ***Install the outdoor unit with sufficient clearance around it for operation and maintenance as shown in the next pages.***
- ***Install the outdoor unit where good ventilation is available.***
- ***Do not install the outdoor unit where exists a high level of oil mist, salty air or sulphurous atmosphere.***
- ***Install the outdoor unit as far as practical (being at least 3 meters) from electromagnetic wave radiator, such as medical equipment.***
- ***Keep clearance between units of more than 50 mm, and avoid obstacles that could hamper air intake, when installing more than one unit together.***
- ***Install the outdoor unit in the shade or not exposed to direct sunshine or direct radiation from high temperature heat source.***
- ***Do not install the outdoor unit in a place where a seasonal wind directly blows into the outdoor fan.***
- ***For cleaning, use non-inflammable and nontoxic cleaning liquid. Use of inflammable agent may cause explosion or fire.***
- ***Work with sufficient ventilation, for working in an enclosed space could cause oxygen deficiency. Toxic gas may be produced when cleaning agent is heated to high temperature by, e.g., being exposed to fire.***
- ***Cleaning liquid shall be collected after cleaning.***
- ***Pay attention not to clamp cables when attaching the service cover to avoid electric shock or fire.***
- ***Check the foundation to be flat, leveled and strongly enough.***
- ***Install the unit in a restricted area not accessible by the general public.***
- ***Aluminium fins have very sharp edges. Pay attention to the fins in order to avoid injury.***
- ***Do not install the indoor units in a flammable environment to avoid a fire or an explosion.***
- ***Do not install the indoor units, outdoor unit, within approximately 3 meters from strong electromagnetic wave radiators, such as medical equipment.***
- ***Do not install the indoor units in a machinery shop or kitchen, where vapor from oil or mist flows to the indoor units. In the worst case, the oil damages the plastic parts of the indoor unit.***
- ***This appliances are not intended for use by people (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision and instruction concerning the use of the appliance by a person responsible for their safety.***
- ***Turn OFF all power switches before maintenance is performed.***
- ***Do not start the cleaning procedures before 5 minutes of the stop of the unit.***

2.1.2 Transportation of outdoor unit

DANGER

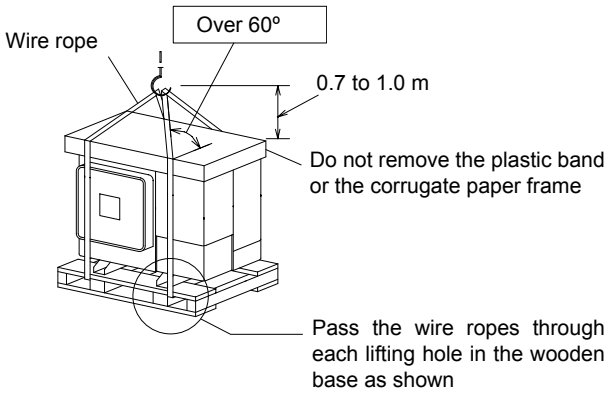
Do not put any foreign material into the outdoor unit and check to ensure that none exists in the outdoor unit before the installation and test run. Otherwise, a fire or failure will occur.

◆ Hanging method

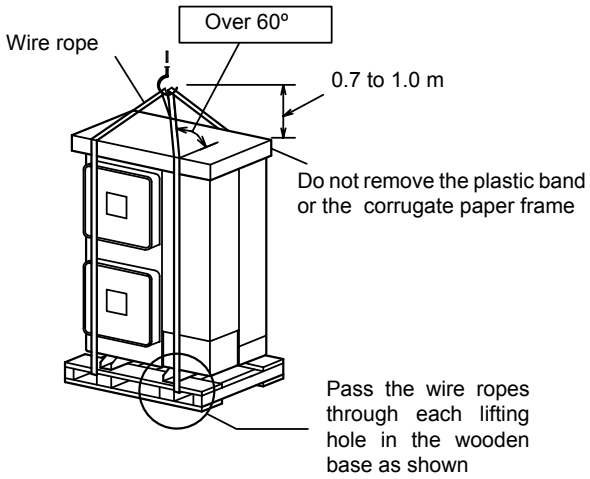
When hanging the unit, ensure the balance of the unit, check safety and lift it up smoothly. Do not remove any packing materials and hang the unit under packing condition with two ropes, as shown in the figure.

RAS-2HVRN2

RAS-3HVRNME-AF



RAS-(4-10)H(V)RNME-AF



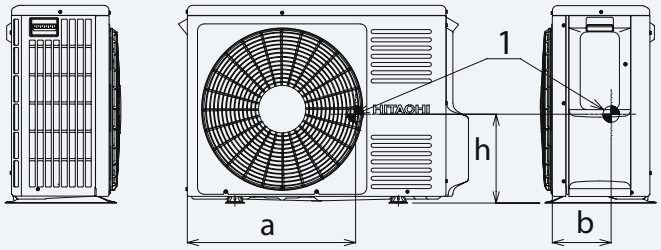
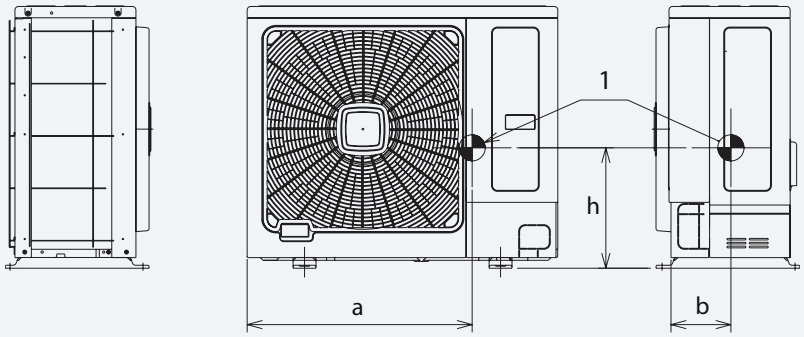
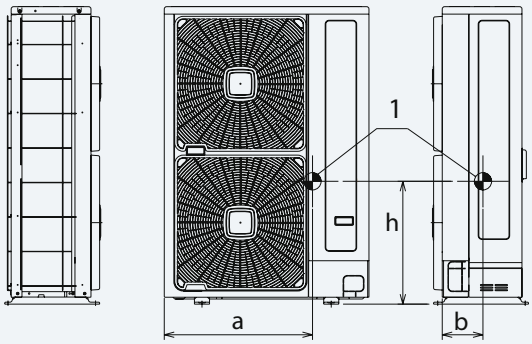
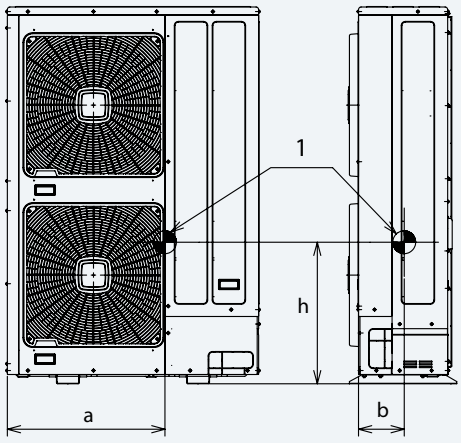
CAUTION

- ***Lift the outdoor unit in its factory packaging with 2 wire ropes.***
- ***For safety reasons ensure that the outdoor unit is lifted smoothly and does not lean.***
- ***Do not attach lifting equipment to the plastic band or the corrugated paper frame, because of the ropes will slip or break the materials.***
- ***Ensure that the exterior of the unit is adequately protected with cloth or paper.***

2.1.3 Center of gravity

◆ Hanging method

When hanging the unit ensure the balance of the unit check safety and lift it up smoothly. Do not remove any packing materials and hang the unit under packing condition with two ropes as shown below. At leat two persons are needed to move the unit.

RAS-2HVRN2	a. 515 mm b. 180 mm h. 275 mm	
RAS-3HVRNME-AF	a. 590 mm b. 185 mm h. 370 mm	
RAS-(4-6)H(V)RNME-AF	a. 615 mm b. 190 mm h. 570 mm	
RAS-(8-10)HRNME-AF	a. 690 mm b. 200 mm h. 620 mm	

1 Center of gravity

2.1.4 Factory-supplied accessories for RAS-(8-10)HRNME-AF

Make sure that the following accessories are packed with the unit.

NOTE

If any of these accessories are not packed with the unit please contact your dealer.

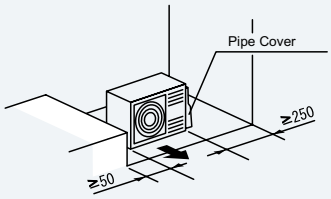
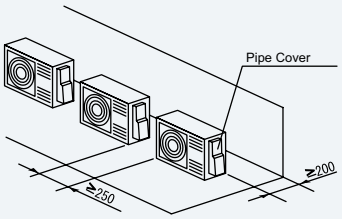
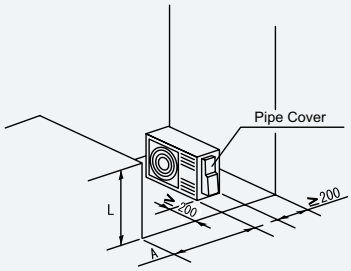
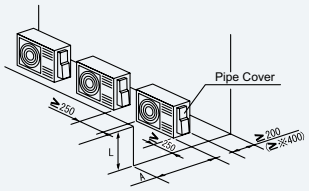
Accessory	Appearance	Quantity
Gasket		1
Pipe flange for refrigerant gas piping		1
Ring core		1
Cable tie		1
Compressed sheet		1

2.1.5 Installation space

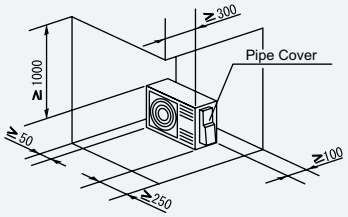
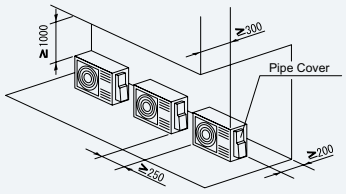
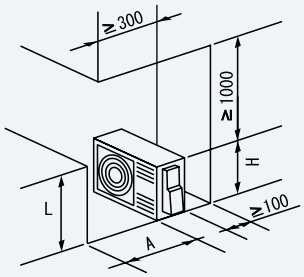
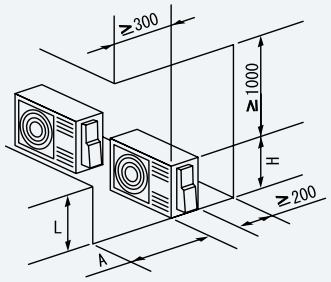
- **RAS-2HVRN2**

Blocked in Inlet Side

Upper Side Open

Single Installation	Multiple Installation (Two units or more)
	
Ensure 250 mm or more of the side space on the pipe cover side.	Allow 250 mm of space between units. Leave open both right and left sides.
	
Be sure to use the fan direction guide. Leave open both right and left sides. Ensure 250 mm or more of the side space on the pipe cover side.	Be sure to use the fan direction guide. Allow 250 mm of service space between units. Leave open both right and left sides. When subject to direct sunlight on the back wall ensure the length marked with ※ be 400 or greater. Ensure 250 mm or more of the side space on the pipe cover side.

Upper Side Blocked

Single Installation	Multiple Installation (Two units or more)
	
Fifteen mm of space is acceptable for one of the lateral sides. Ensure 250 mm or more of the side space on the pipe cover side.	Allow 250 mm of service space between units. Leave open both right and left sides. Ensure 250 mm or more of the side space on the pipe cover side.
	
Be sure to use the fan direction guide. Leave open both right and left sides. Ensure 250 mm or more of the side space on the pipe cover side.	Be sure to use the fan direction guide. Allow 250 mm of service space between units. Leave open both right and left sides. Serial installation allowed up to two units. Ensure 250 mm or more of the side space on the pipe cover side.

Blocked in Inlet Side

The length A is as show in the following table:

L	A
0<L=1/2H	500 or greater
1/2H<L≤H	1000 or greater

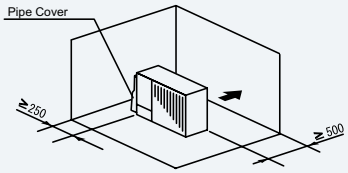
When L > H use a base for outdoor unit to make L ≤ H.

Close the base not to allow the outlet air bypassed.

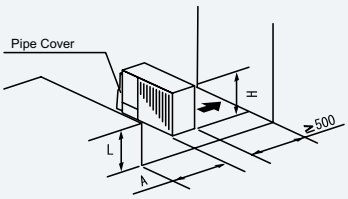
Outlet Side Blocked

Upper Side Open

Single Installation



Ensure 250 mm or more of the side space on the pipe cover side.



Be sure to use the fan direction guide. Leave open both right and left sides.

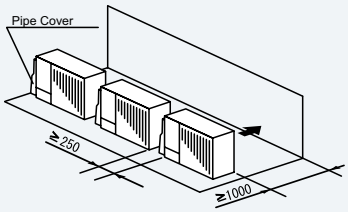
The length A is as show in the following table:

L	A
0<L=1/2H	100 or greater
1/2H<L≤H	200 or greater

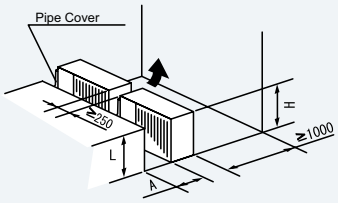
When L > H use a base for outdoor unit to make L ≤ H.

Close the base not to allow the outlet air bypassed.

Multiple Installation (Two units or more)



Allow 250 mm of service space between units. Both right and left sides shall be open.



Be sure to use the fan direction guide. Allow 250 mm of service space between units. Serial installation allowed up to two units.

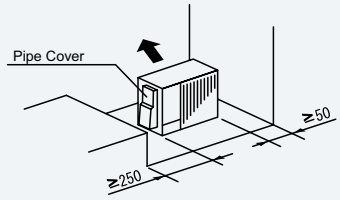
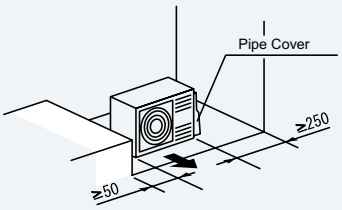
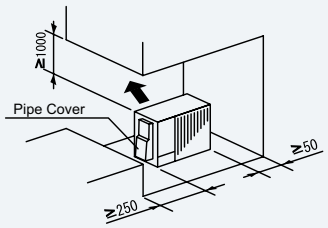
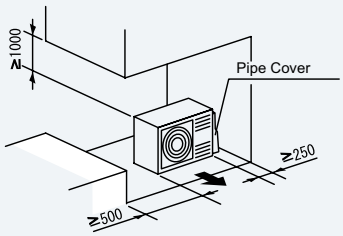
Leave open both right and left sides.

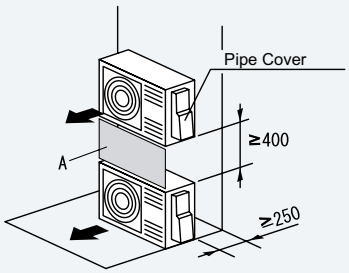
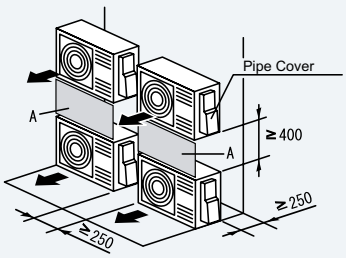
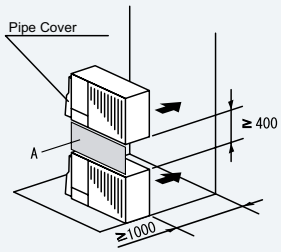
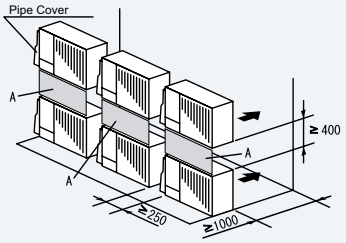
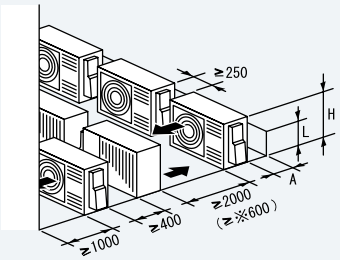
The length A is as show in the following table:

L	A
0<L=1/2H	150 or greater
1/2H<L≤H	250 or greater

When L > H use a base for outdoor unit to make L ≤ H.

Close the base not to allow the outlet air bypassed.

Lateral Side Blocked	
Upper Side Open	
Single Installation	
	
Ensure 250 mm or more of the side space on the pipe cover side.	Ensure 250 mm or more of the side space on the pipe cover side.
Upper Side Blocked	
	
Ensure 250 mm or more of the side space on the pipe cover side.	Ensure 250 mm or more of the side space on the pipe cover side.

Single Installation	Multiple Installation
Blocked in Inlet Side	
	
Close the part A not to allow the outlet air bypassed. Install to avoid the drain water from upper unit falling on the lower unit. Ensure 250 mm or more of the side space on the pipe cover side. Allow 400 mm of service space above the top board.	Allow 250 mm of service space between units. Serial sideways installation allowed up to two units. Leave open both right and left sides. Close the part A not to allow the outlet air bypassed. Install to avoid the drain water from upper unit falling on the lower unit. Ensure 250 mm or more of the side space on the pipe cover side. Allow 400 mm of service space above the top board.
Outlet Side Blocked	
	
Be sure to use the fan direction guide. Close the part A not to allow the outlet air bypassed. Install to avoid the drain water from upper unit falling on the lower unit. Ensure 250 mm or more of the side space on the pipe cover side. Allow 400 mm of service space above the top board.	Be sure to use the fan direction guide. Allow 250 mm of service space between units. Serial side way installation allowed but leave open both right and left sides. Close the part A not to allow the outlet air bypassed. Install to avoid the drain water from upper unit falling on the lower unit. Ensure 250 mm or more of the side space on the pipe cover side. Allow 400 mm of service space above the top board.
Multiple Installation in Multiple Rows	
	Ensure 250 mm or more of the side space on the pipe cover side. Allow 400 mm of service space above the top board. The length A is as show in the following table: L: 0<L=1/2H → A: 150 or greater L: 1/2H<L≤H → A: 250 or greater
When L > H use a base for outdoor unit to make L ≤ H. Close the base not to allow the outlet air bypassed. Be sure to use the fan direction guide in order to ensure the length marked with ※.	

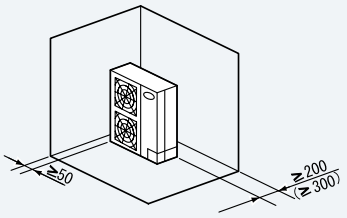
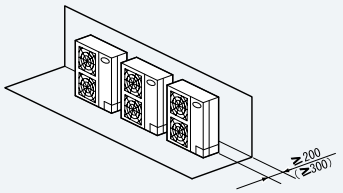
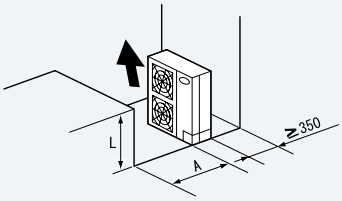
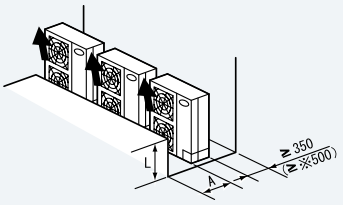
NOTE

- ***All units are in (mm).***
- ***Do not stack more than two units in height.***
- ***Close gap (*) to avoid recirculating discharge air flow.***

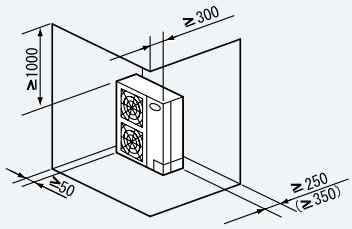
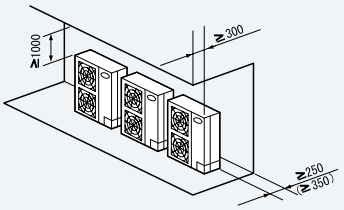
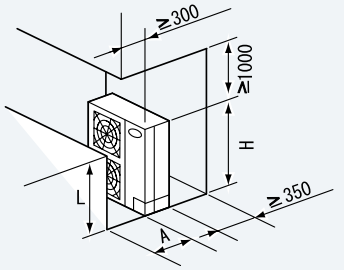
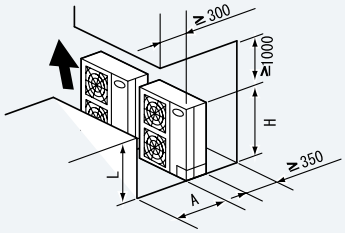
- **RAS-(3-6)H(V)RNME-AF**

Blocked in Inlet Side

Upper Side Open

Single Installation	Multiple Installation (Two units or more)
	
100 mm or more of the side space is acceptable on the service cover side. Dimensions in ( ) shows numbers especially for IVX 4-10 HP. 150 or more (200 or more) of the back space is acceptable when the right and left sides are open.	Allow 100 mm of space between units. Leave open both right and left sides. Dimensions in ( ) shows numbers especially for IVX 4-10 HP.
	
Be sure to use the fan direction guide. Leave open both right and left sides.	Be sure to use the fan direction guide. Allow 100 mm of space between units. Leave open both right and left sides. When subject to direct sunlight on the back wall ensure the length marked with ※ be 500 or greater.

Upper Side Blocked

Single Installation	Multiple Installation (Two units or more)
	
100 mm or more of the side space is acceptable on the service cover side. Dimensions in ( ) shows numbers especially for IVX 4-10 HP.	Allow 100 mm of space between units. Leave open both right and left sides. Dimensions in ( ) shows numbers especially for IVX 4-10 HP.
	
Be sure to use the fan direction guide. Leave open both right and left sides.	Be sure to use the fan direction guide. Allow 100 mm of space between units. Leave open both right and left sides. Serial installation allowed up to two units.

Blocked in Inlet Side

The length A is as shown in the following table:

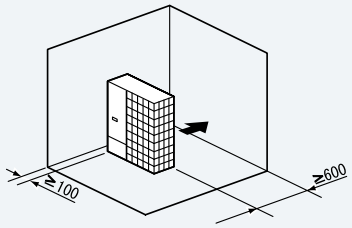
L	A
0 < L ≤ 1/2H	600 or greater
1/2H < L≤ H	1200 or greater

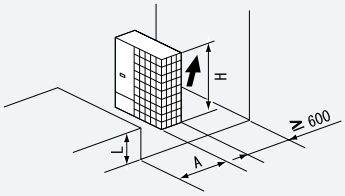
Be sure to use the fan direction guide. Allow 100 mm of space between units. Leave open both right and left sides. Serial installation allowed up to two units.

Outlet Side Blocked

Upper Side Open

Single Installation





Be sure to use the fan direction guide. Leave open both right and left sides.

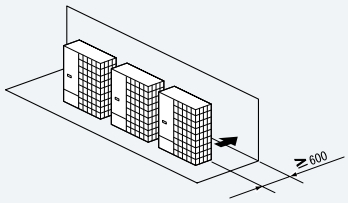
The length A is as shown in the following table:

L	A
0 < L ≤ 1/2H	≤ 200
1/2H < L≤ H	≤ 300

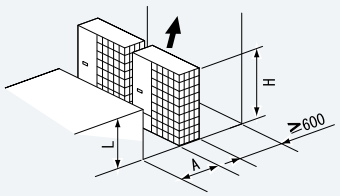
When L > H use a base for outdoor unit to make L ≤ H.

Close the base not to allow the outlet air bypassed.

Multiple Installation (Two units or more)



Allow 100 mm of space between units. Both right and left sides shall be open.



Be sure to use the fan direction guide. Allow 100 mm of space between units. Serial installation allowed up to two units. Leave open both right and left sides.

The length A is as shown in the following table:

L	A
0 < L ≤ 1/2H	≤ 250
1/2H < L≤ H	≤ 350

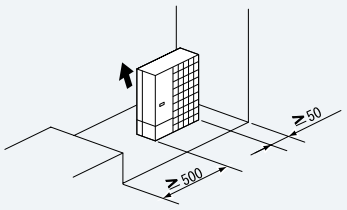
When L > H use a base for outdoor unit to make L ≤ H.

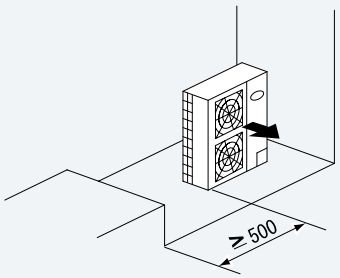
Close the base not to allow the outlet air bypassed.

Lateral Side Blocked

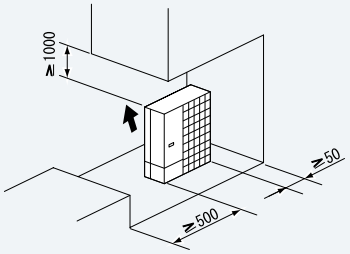
Upper Side Open

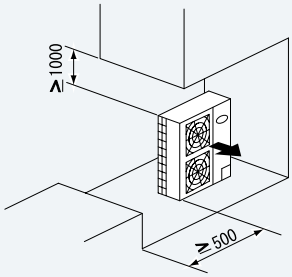
Single Installation





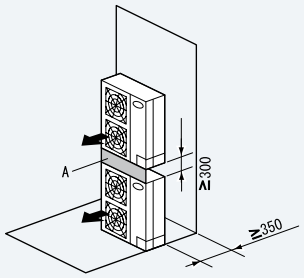
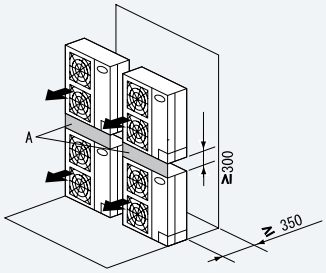
Upper Side Blocked



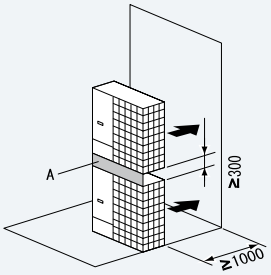
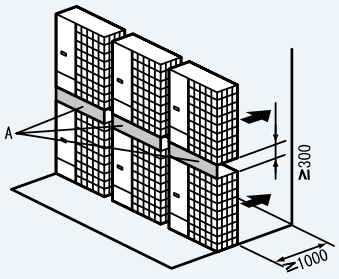


Stack installation (allowed up to 2 Units)

Upper Side Open

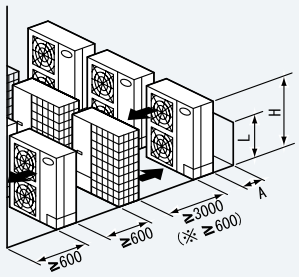
Single Installation	Multiple Installation
	
Close the part A not to allow the outlet air bypassed. Install to avoid the drain water from upper unit falling on the lower unit.	Allow 100 mm of space between units. Serial sideways installation allowed up to two units. Leave open both right and left sides. Close the part A not to allow the outlet air bypassed. Install to avoid the drain water from upper unit falling on the lower unit.

Upper Side Blocked

Single Installation	Multiple Installation
	
Be sure to use the fan direction guide. Close the part A not to allow the outlet air bypassed. Install to avoid the drain water from upper unit falling on the lower unit.	Be sure to use the fan direction guide. Allow 100 mm of space between units. Serial side way installation allowed. but leave open both right and left sides. Close the part A not to allow the outlet air bypassed. Install to avoid the drain water from upper unit falling on the lower unit.

Multiple Installation in Multiple Rows

Serial Installation in Multiple Rows (E.g. Rooftop)



Allow approx. 100 mm of space from the side unit. Leave open both right and left sides.

The length A is as shown in the following table:

L	A
0 < L ≤ 1/2H	≤ 200
1/2H < L≤ H	≤ 300

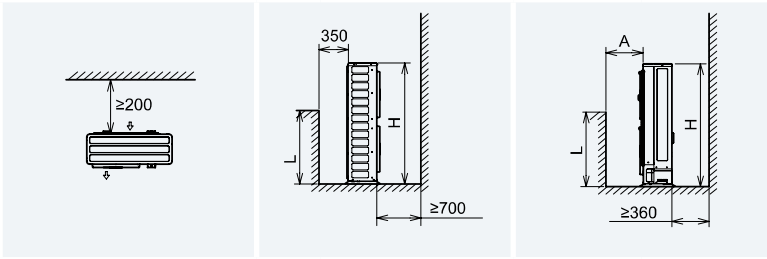
NOTE

When L > H use a base for outdoor unit to make L = H. Close the base not to allow the outlet air bypassed. Be sure to use the fan direction guide in order to ensure the length marked with ※.

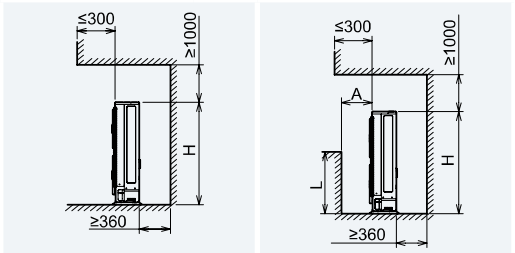
- **RAS-(8-10)HRNME-AF**

Single installation

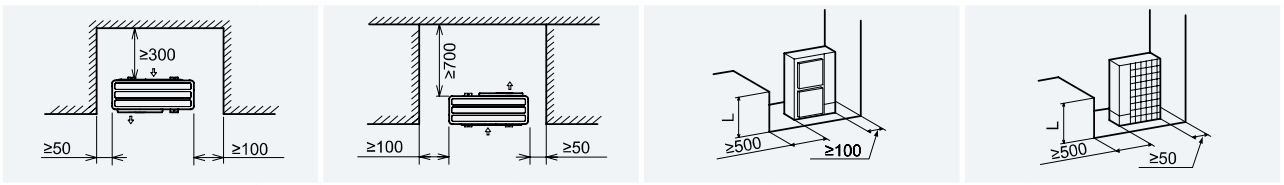
Around side are open



Around sides are open with obstacles above



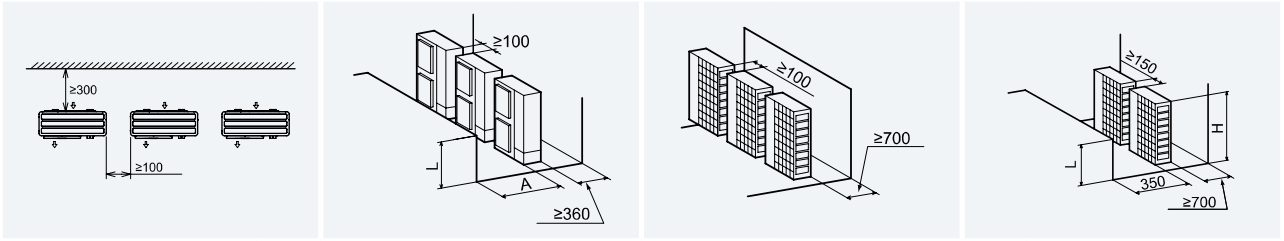
Around sides are closed



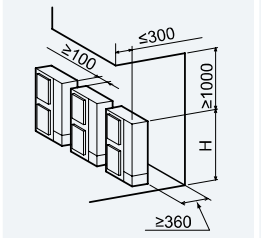
Around sides are open with obstacles above

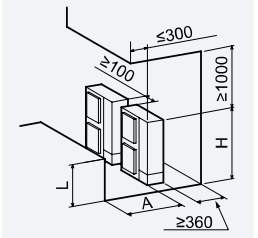
Multiple installation

Around sides are open

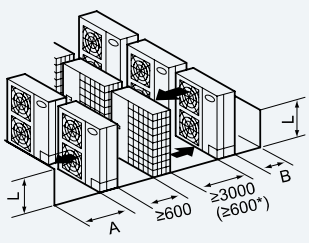


Around sides are open with obstacles above





Multi-Row



NOTE

- ***All units are in mm.***
- ***Do not stack more than two units in the height.***
- ***If L is larger than H mount the units on a base so that H is equal or greater than L.***
  - ***H: Unit height (1650 mm) + base concret height.***

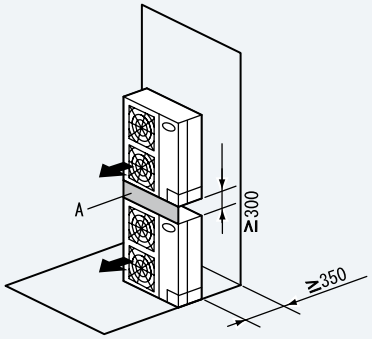
L	A	B
0 < L ≤ 1/2 H	600 or more	300 or more
1/2H < L ≤ H	—	—

- ***In this situation ensure that the base is closed and does not allow the airflow to short circuit.***
- ***In each case install the outdoor unit so that the discharge flow is not short-circuited.***
- ***When the installation dimension results the one marked with an (*) mount the air flow guide***

Stack installation (allowed up to 2 Units)

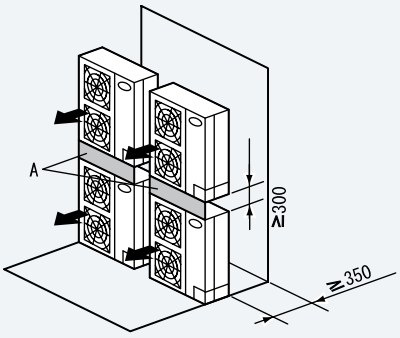
Blocked in Inlet Side

Single Installation



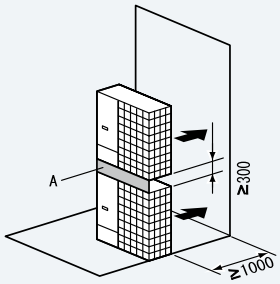
Close the part A not to allow the outlet air bypassed. Install to avoid the drain water from upper unit falling on the lower unit.

Multiple Installation

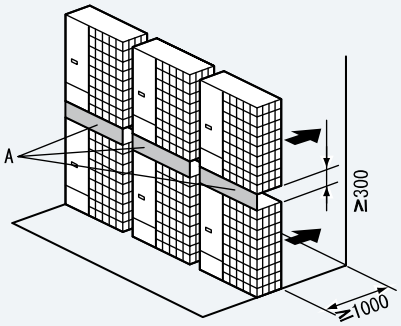


Allow 100 mm of space between units. Serial sideways installation allowed up to two units. Leave open both right and left sides. Close the part A not to allow the outlet air bypassed. Install to avoid the drain water from upper unit falling on the lower unit

Outlet Side Blocked



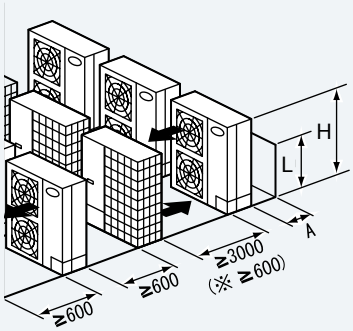
Be sure to use the fan direction guide. Close the part A not to allow the outlet air bypassed. Install to avoid the drain water from upper unit falling on the lower unit.



Be sure to use the fan direction guide. Allow 100mm of space between units. Serial sideway installation allowed. but leave open both right and left sides. Close the part A not to allow the outlet air bypassed. Install to avoid the drain water from upper unit falling on the lower unit.

Multiple Installation in Multiple Rows

Serial Installation in Multiple Rows (E.g. Rooftop)



Allow approx. 100 mm of space from the side unit.
Leave open both right and left sides.

The length A is as shown in the following table:

L	A
0<L≤1/2H	≤200
1/2H<L≤H	≤300

NOTE

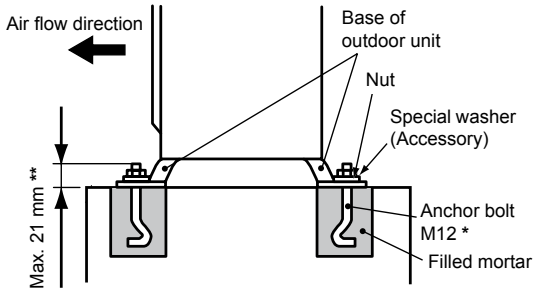
When L > H, use a base for outdoor unit to make L ≤ H. Close the base not to allow the outlet air bypassed. Be sure to use the fan direction guide in order to ensure the length marked with ※.

- Do not stack more than two units in height.

2.1.8 Installation place provision

◆ Concrete foundation

1 When installing the outdoor unit, fix the unit by anchor bolts.



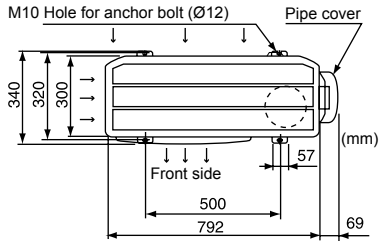
* M10 (RAS-2HVRN2, RAS-(3-6)H(V)RNME-AF)
M12 (RAS-(8/10)HRNME-AF)

** ≤ 17 mm (RAS-2HVRN2)
≤ 21 mm (RAS-(3-10)H(V)RNME-AF)

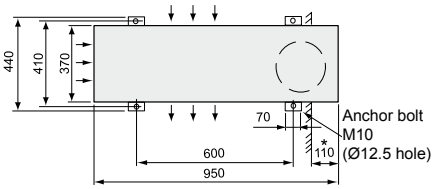
Fix the outdoor unit to the anchor bolts by special washer.

Please, refer to the following figure regarding the location of fixing holes:

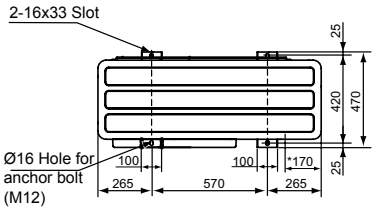
RAS-2HVRN2



RAS-(3-6)H(V)RNME-AF



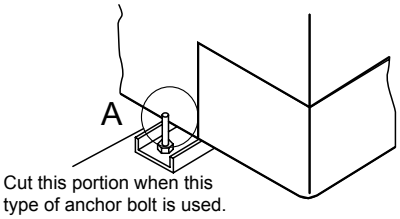
RAS-(8/10)HRNME-AF

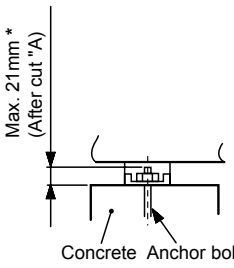


NOTE

: Space for downward piping.

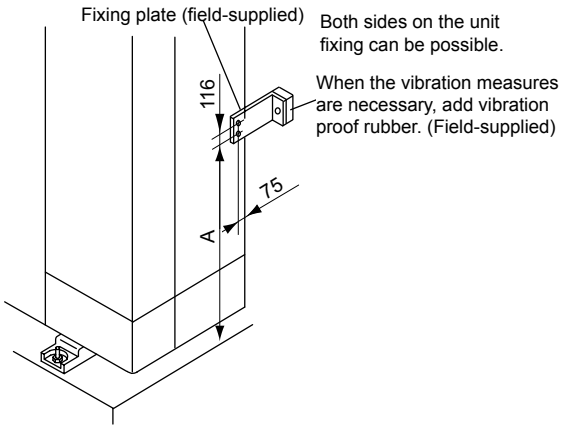
Example of fixing outdoor unit by anchor bolts.





* ≤ 17 mm (RAS-2HVRN2)
≤ 21 mm (RAS-(3-10)H(V)RNME-AF)

2 Fix the outdoor unit firmly so that declining, making noise, and falling down by strong wind or earthquake is avoided.



Model	A	B
RAS-2HVRN2 RAS-3HVRNME-AF	529	116
RAS-(4-6)H(V)RNME-AF	1109	
RAS-(8/10)HRNME-AF	1173	110

3 During the heating or defrosting operations, drain water is discharged from the unit.

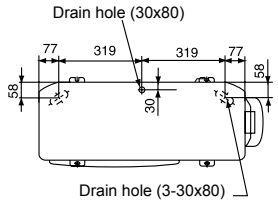
When installing the unit, the location with good drainage should be selected, or establish the drainage.

It is recommended not to install the unit at high place such as on a roof or a veranda, because the water may drip from the unit.

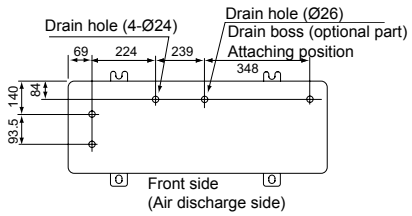
If the unit installation at high place is not avoidable, the drain water should be treated surely by installing additional drain pan. (Especially in water, the drain water may be frozen and cause of injury by slipping.)

4 In case of the drain piping is necessary for the outdoor unit, use the drain-kit (DBS-26 or DBS-26L: Optional Parts).

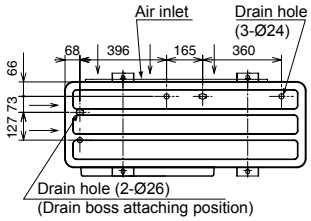
RAS-2HVRN2



RAS-(3-6)H(V)RNME-AF



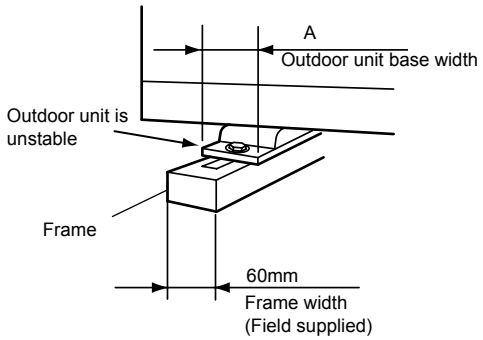
RAS-(8/10)HRNME-AF



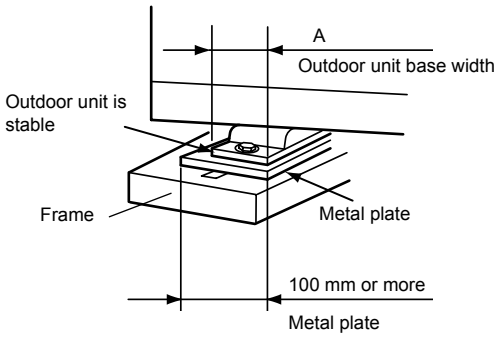
5 The whole base of the outdoor unit should be installed on a foundation or frame. When using vibration-proof material, it should also be positioned in the same place.

When installing the outdoor unit on a field supplied frame, use metal plates to adjust the frame width for stable installation as shown in the figure below.

INCORRECT



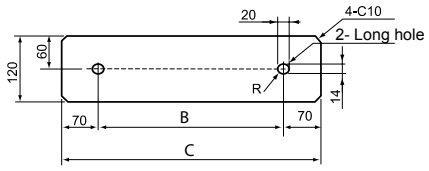
CORRECT



Model	A
RAS-2HVRN2	57
RAS-(3-6)H(V)RNME-AF	70
RAS-(8/10)HRNME-AF	100

Recommended metal plate size (Field supplied)

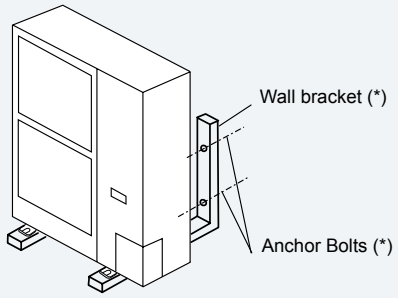
- Material: Hot-rolled mild steel plate (SPHC)
- Plate thickness: 4.5 T



Model	B	C
RAS-2HVRN2	320	(460)
RAS-(3-6)H(V)RNME-AF	410	(550)
RAS-(8/10)HRNME-AF	420	(560)

◆ Suspended unit

1 Suspend the unit as the drawing indicates.
2 Ensure that wall can resist the Outdoor unit weight indicated in specification label plate.
3 It is recommended to select each foot support to bear the full weight of the unit (in order to consider stress fatigue applied when unit is working too).



(*) Field supplied

⚠ CAUTION

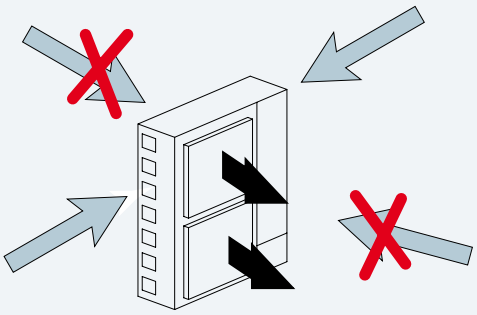
Pay attention to the following for installation:

- ***Installation shall ensure that outdoor unit will not incline, vibrate, make noise or fall down by a blast of wind or in an earthquake. Calculate quake-resistance strength to ensure that installation is strong enough against falling. Fix the unit with wires (field supplied) when installing in a location without walls or windbreak and likely exposed to a blast of wind.***
- ***To use a vibration-proof mat, fix four places to the front and back.***

◆ Installing location where the unit will be exposed to strong wind.

Follow the instructions below to install on the rooftop or a location without surrounding buildings, where strong wind is expected against the product.

1 Choose a location where the outlet or inlet side of the product will not be exposed to strong wind.
2 When the outlet is exposed to strong wind: Direct strong wind may cause lack of air flow and adversely affect to the operation.



⚠ CAUTION

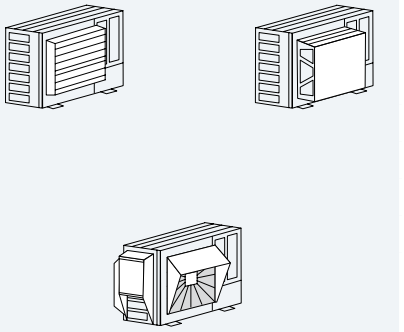
Excessive strong wind against the outdoor unit outlet may cause inverse rotation and damage the fan and motor.

2.1.9 Optional parts and installation

◆ RAS-2HVRN2

Air flow guide, wind guard and snow protection hood

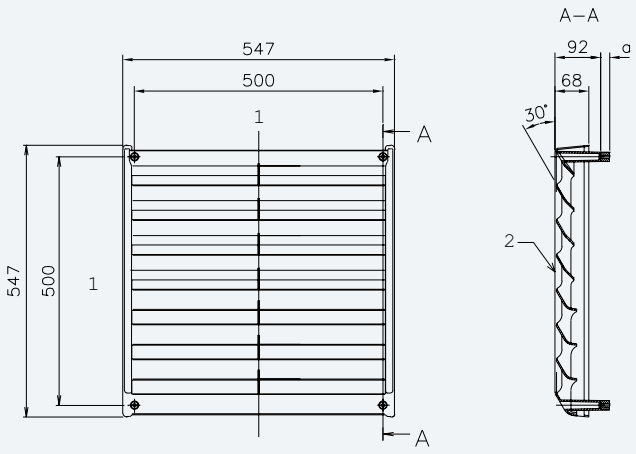
Optional parts			Model
Air flow guide			AG-264
Wind guard			WSP-264
Snow protection hood	Zinc Plate	Air outlet	ASG-NP80F
		Air inlet of rear side	ASG-NP56B
		Air inlet of side face	ASG-NP56L
	Stainless plate (NSSC180)	Air outlet	ASG-NP80FS2
		Air inlet of rear side	ASG-NP63B52
		Air inlet of side face	ASG-NP63LS2



1 Air flow guide
2 Wind guard
3 Snow protection hood

◆ Air flow guide

Model	AG-264
Quantity	1 per unit
Air discharge direction	Upward (downward) left & right
Material	Weather proof polypropylene resin
Color	Gray
Weight	1.4 kg
Accessories	Fixing screw 4x [M5 (SUS) x 12]+4x [M5 (SUS) x 30] Installation manual Self-screw 2x [M4 x 13]
Installation restriction	"Wind Guard" or "Snow protection hood" is not available to install with air flow guide. ("Guard net" is available to be installed together.)



1 Mounting dimension
2 Air flow guide

Attaching example of air flow guide

- Attach the air flow guide to the air discharge grille with four (4) screws (supplied).
- The fixing holes are located at 4 positions on the grille. (Screw tightening torque 2.4 3.1 N.m)
- Do not remove the air discharge grille for air flow guide installation.

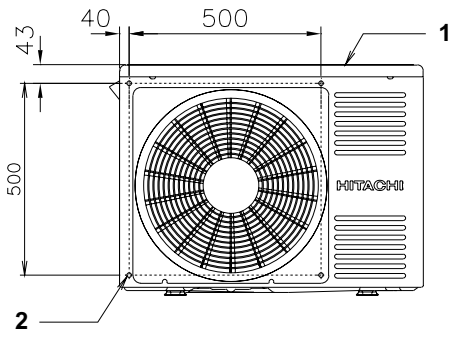
CAUTION

If the air guide is installed without discharge grille it may cause injury due to rotating fan.

Locations of fixing holes

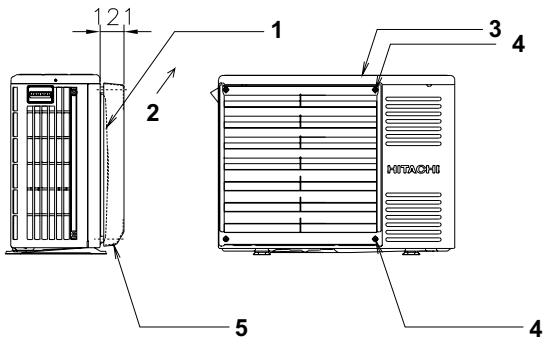
The holes Location shall be made by using self-screws (M4x13) and later shall be used SUS screw (M5x12) for fixing air flow guide.

1 Outdoor Unit
2 Hole (4 locations)



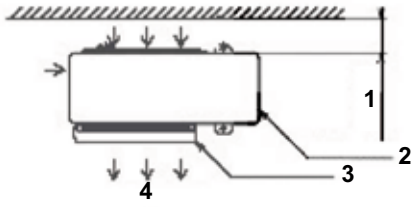
One flow guide installation

1 Air discharge grille
2 Air flow
3 Outdoor unit
4 M5 fixing screw x4 (Accessories)
5 Air flow guide



Service space (In case of upward air discharge)

- In case of right and left sides air discharge enough space for air discharge is required.
- The downward air discharge is also available. In such case install the base under the unit to secure enough space for air discharge.
- In case of serial units installation air discharge should be upward.

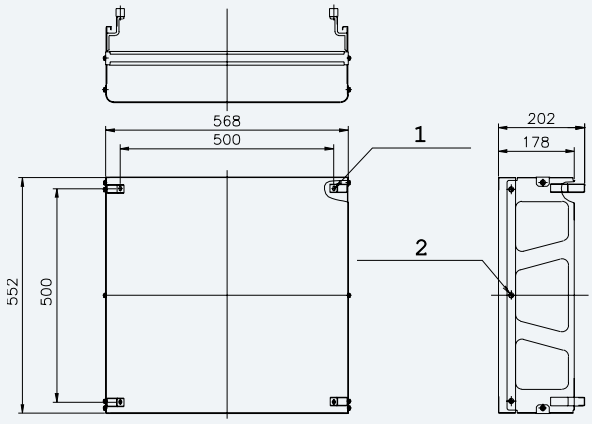


1 Min.150 mm
2 Outdoor unit
3 Air flow guide
4 Passage side

◆ Wind guard

Specifications

Model	WSP-264
Quantity	1 per unit
Material	Galvanized sheet metal + baked painting
Color	UTOPIA Beige
Weight	4.0 kg
Accessories	Fixing screw x 4 [M5 (SUS) x 30]- Unit Fixing Screw x 10 [M5 (SUS) x 12]- Wind Ward Installation manual
Installation restriction	"Guard net" "Air flow guide" or "Snow protection hood" is not available to install with Wind guard



1 4-6x10 Long Hole
2 5 (Both Sides) - M5 Screw (attachement)

Attaching example of air wind guard

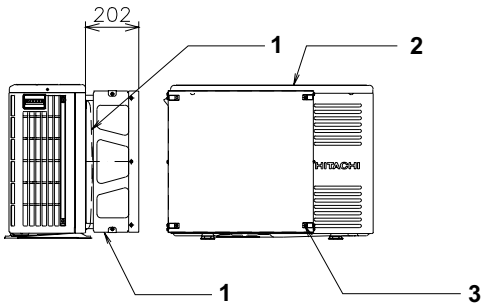
- Attach the air flow guide to the air discharge grille with four (4) screws (supplied).
- The fixing holes are located at 4 positions on the grille. (Screw tightening torque 2.4 3.1 N.m)
- Do not remove the air discharge grille for air flow guide installation.

CAUTION

If the air guide is installed without discharge grille it may cause injury due to rotating fan.

Two windguard covers installation

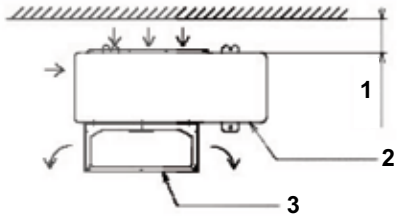
1 Air discharge grille
2 Outdoor unit
3 M5 fixing screw x4 (Accessories)



Service space

- Both sides of the outdoor unit should be open.
- No obstacles should be placed in the air discharge side.

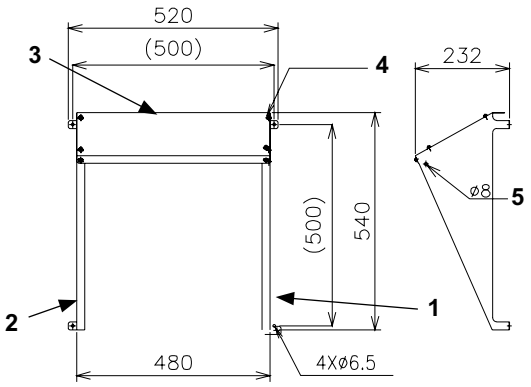
1 Min.150 mm
2 Outdoor unit
3 Wind guard



◆ Snow protection hood

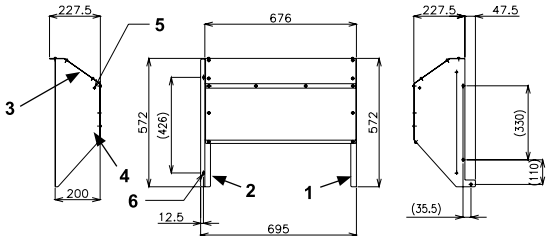
Air discharge hood

Nº	Part name	Quantity
1	Right side plate	1
2	Left side plate	1
3	Front panel	1
4	Fixing screw (Accessories)	
5	Hole for safety wire rope to prevent overturning	



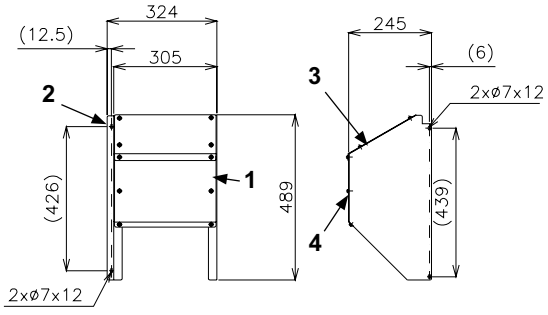
Rear suction hood

Nº	Part name	Quantity
1	Right side plate	1
2	Left side plate	1
3	Upper front panel (Upside)	1
4	Upper front panel (Downside).	1
5	Hole for safety wire rope to prevent overturning	
6	Fixing screw (Accessories)	

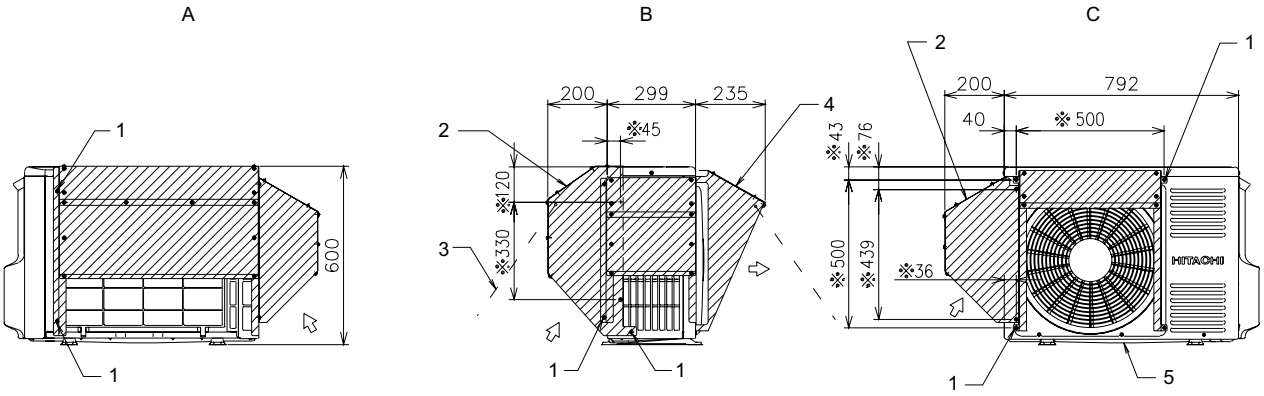


Left suction hood

Nº	Part name	Quantity
1	Right side plate	1
2	Left side plate	1
3	Upper front panel (Upside)	1
4	Upper front panel (Downside).	1



Attaching example of snow protection hood



1. Fixing screw (accessories)
2. Air inlet hood
3. Wire rope (optional for over turning protection)
4. Air discharge hood
5. Outdoor unit

A. Rear side

B. Left side

C Front side

NOTE

The holes locations marked with a mark shall be made by using sel screw (M4X13) and later shall be used SUS Screw for fixing protection hood.

Specifications of snow protection hood

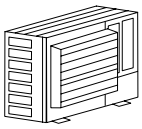
Product name		Air discharge hood		Rear suction hood		Left suction hood	
Model		ASG-NP80F	ASG-NP80FS2	ASG-NP56B	ASG-NP63BS2	ASG-NP56L	ASG-NP63LS2
Quantity		1 per unit					
Material		Bonderized steel sheet Iron	Stainless (NSSC180)	Bonderized steel sheet Iron	Stainless (NSSC180)	Bonderized steel sheet Iron	Stainless (NSSC180)
Color		Gray (1.0Y8.5/0.5 or approximation)	—	Gray (1.0Y8.5/0.5 or approximation)	—	Gray (1.0Y8.5/0.5 or approximation)	—
Weight		3 kg		6 kg		3 kg	
Assembling		Knockingdown parts (assembled at field)					
Components	Hood	For air discharge part x 1		For rear side air intake x 1		For left side air intake x 1	
	Unit fixing screw	4 (M5x12 tapping screw)		5 (M5x12 tapping screw)		4 (M5x12 tapping screw)	
	Hood fixing screw (SUS)	6 (M5x12 tapping screw)	6 (M5x14)	14 (M5x12 tapping screw)	14 (M5x14)	10 (M5x12 tapping screw)	10 (M5x14)
	Self-screw	2 (M4x13)		2 (M4x13)		2 (M4x13)	
		Installation manual					
Installation restriction		Installation with “Guard net” “Wind guard” or is not available		Installation with “Guard net” is not available			
Safety wire rope for overturning prevention (optional parts)		ASG-SW20A					

◆ RAS-3HVRNME-AF

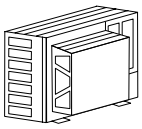
Air flow guide, wind guard and snow protection hood

Optional parts			Model
Air flow guide			AG-335A
Wind guard			WSP-335A
Snow protection hood	Zinc plate	Air outlet	ASG-NP335F
		Air inlet of rear side	ASG-NP80B
		Air inlet of side face	ASG-NP80L
	Stainless plate (SUS304)	Air outlet	ASG-NP335FS2
		Air inlet of rear side	ASG-NP160BS2
		Air inlet of side face	ASG-NP160LS2

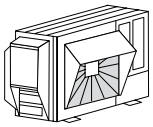
Air flow guide



Wind Guard



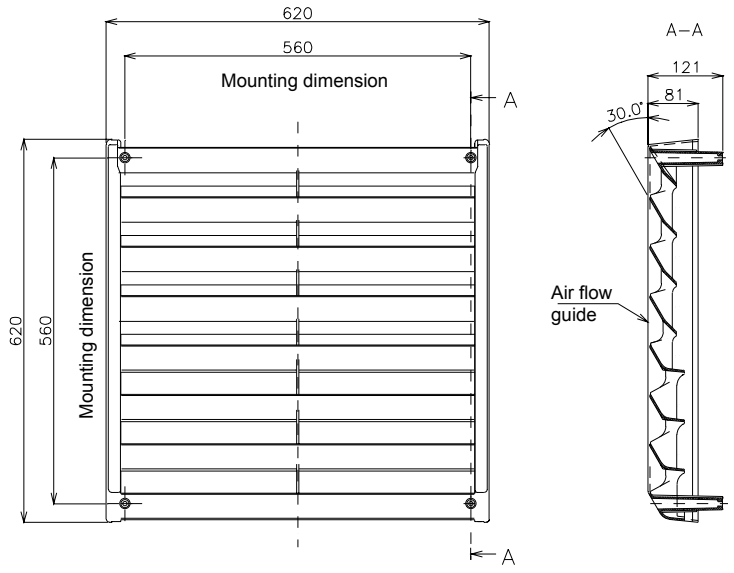
Snow protection hood



- Air flow guide
  - Specifications

Model	AG-335A
Quantity	1 per unit
Air discharge direction	Upward (downward), left & right
Material	Weather proof polypropylene resin
Color	Gray
Weight	1.9 kg
Accessories	Fixing screw x 4 [M5 (SUS) x 20] Installation manual
Installation restriction	“Wind Guard” or “Snow protection hood” is not available to install with air flow guide. (“Guard net” is available to be installed together.)

(mm)

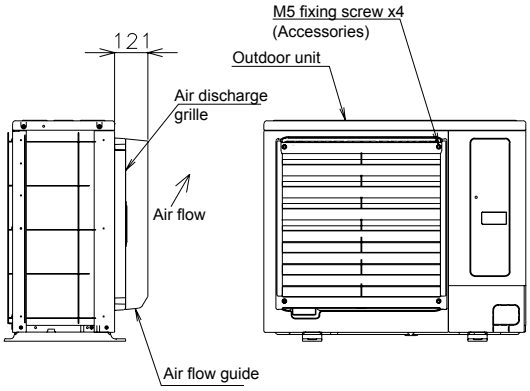


  - Attaching example of air flow guide
    - Attach the air flow guide to the air discharge grille with four (4) screws (supplied).
    - The fixing holes are located at 4 positions on the grille. (Screw tightening torque 2.4~3.1Nm).
    - Do not remove the air discharge grille for air flow guide installation.

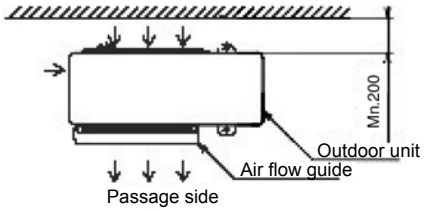
⚠ CAUTION

If the air guide is installed without discharge grille, it may cause injury due to rotating fan.

- One flow guide installation



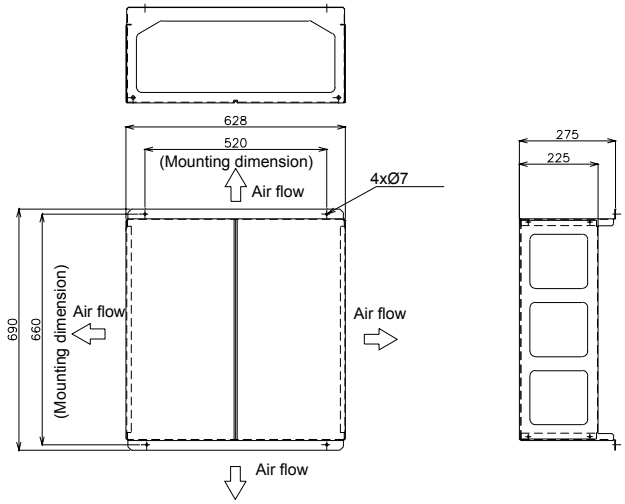
- Service space (In case of upward air discharge)
  - In case of right and left sides air discharge, enough space for air discharge is required.
  - The downward air discharge is also available. In such case, install the base under the unit to secure enough space for air discharge.
  - In case of serial units installation, air discharge should be upward.



- Wind guard

  - Specifications

Model	WSP-335A
Quantity	1 per unit
Material	Galvanized sheet metal + baked painting
Color	Gray (1.0Y8.5/0.5)
Weight	5.5 kg
Accessories	Fixing screw x 4 [M5 (SUS) x 12] Installation manual
Installation restriction	“Guard net”, “Air flow guide” or “Snow protection hood” is not available to install with Wind guard

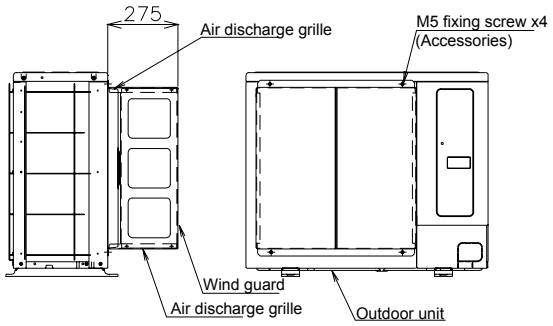


  - Attaching example of air wind guard
    - Attach the wind ward to the air discharge grille with four (4) screws (supplied).
    - The fixing holes are located at 4 positions on the grille. (Screw tightening torque 2.4~3.1Nm)
    - Do not remove the air discharge grille for air flow guide installation.

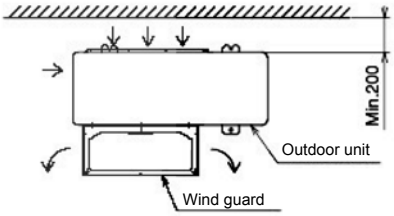
CAUTION

If the air guide is installed without discharge grille, it may cause injury due to rotating fan.

- One windguard cover installation

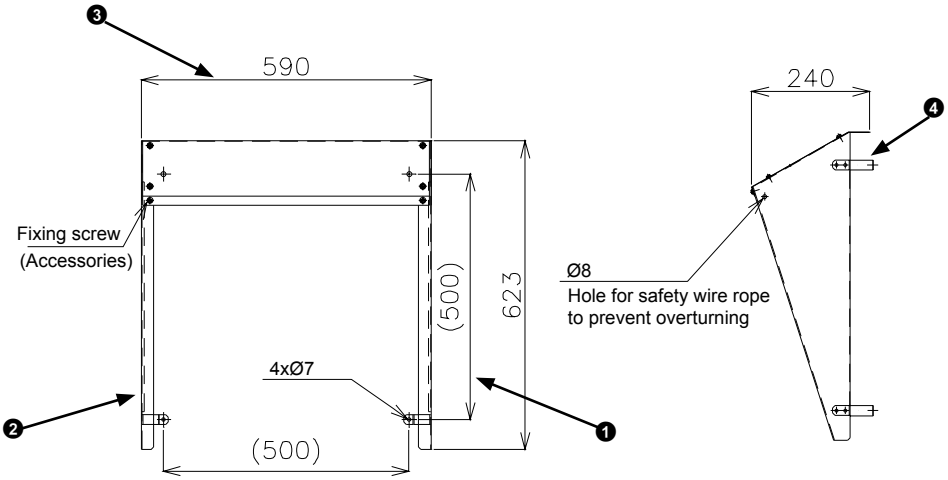


- Service space
  - Both sides of the outdoor unit should be open.
  - No obstacles should be placed in the air discharge side.



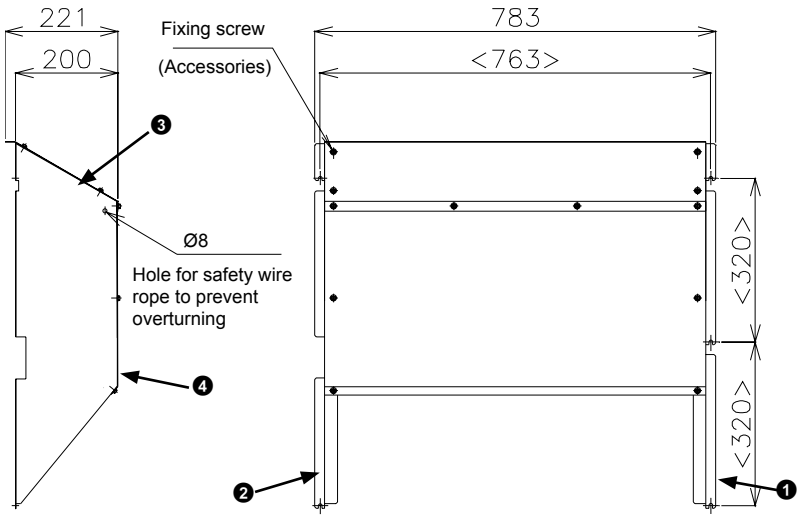
- Snow protection hood
  - Air discharge hood

No.	Part name	Qty.
❶	Right side plate	1
❷	Left side plate	1
❸	Front panel	1
❹	Stay	4



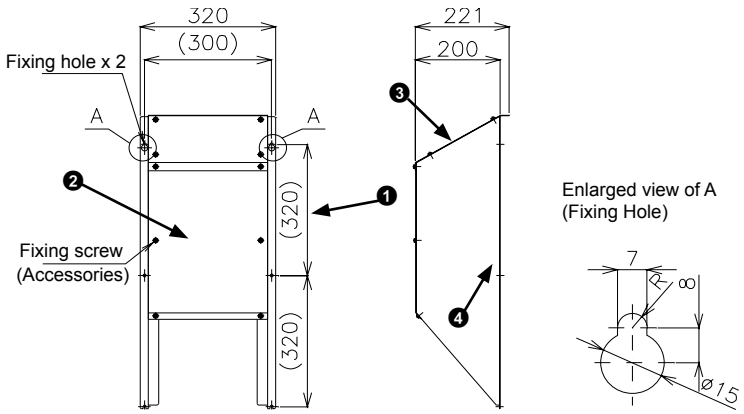
- Rear suction hood

No.	Part name	Qty.
❶	Right side plate	1
❷	Left side plate	1
❸	Upper front panel (Upside)	1
❹	Upper front panel (Downside)	1

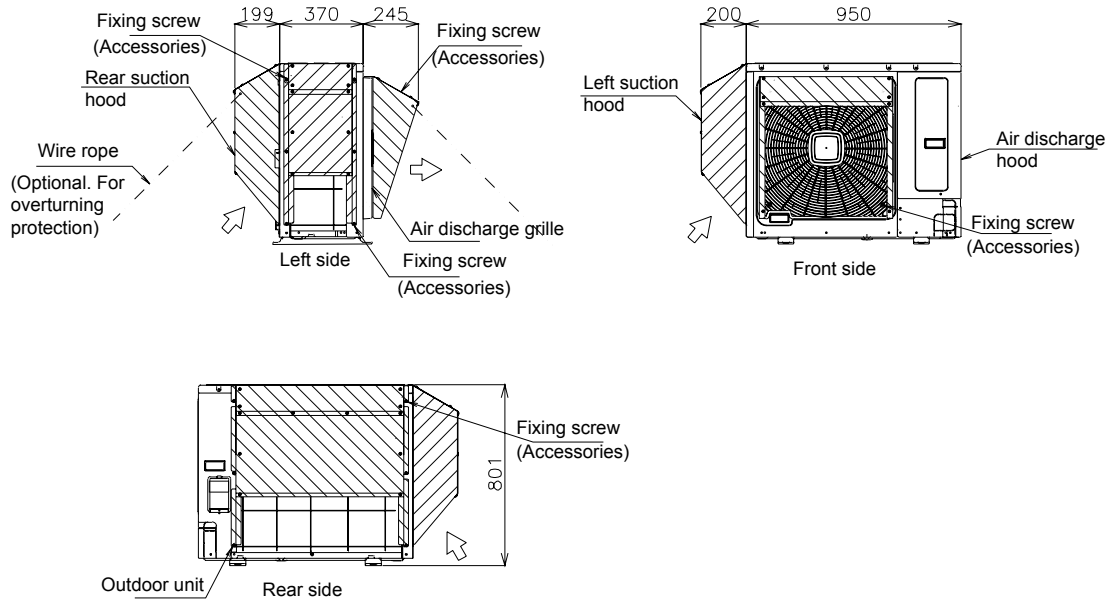


- Left suction hood

No.	Part name	Qty.
❶	Right side plate	1
❷	Left side plate	1
❸	Front panel (Upside)	1
❹	Front panel (Downside)	1



- Attaching example of snow protection hood



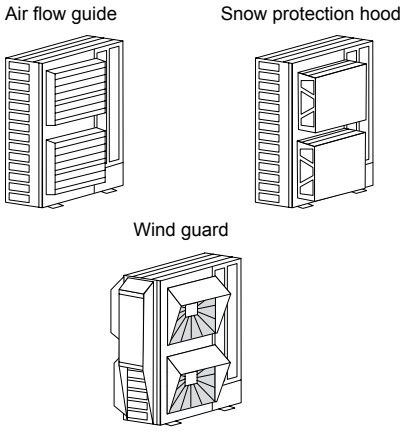
- Specifications of snow protection hood

Product name		Air discharge hood		Rear suction hood		Left suction hood	
Model		ASG-NP335F	ASG-NP335FS2	ASG-NP80B	ASG-NP160BS2	ASG-NP80L	ASG-NP160LS2
Quantity		2 per unit		1 per unit			
Material		Bonderized steel sheet Iron	Stainless (NSSC 180)	Bonderized steel sheet Iron	Stainless (NSSC 180)	Bonderized steel sheet Iron	Stainless (NSSC 180)
Color		Gray (1.0Y8.5/0.5 or approximation)	-	Gray (1.0Y8.5/0.5 or approximation)		Gray (1.0Y8.5/0.5 or approximation)	-
Weight		3 kg		14 kg		8 kg	
Assembling		Knockingdown parts (assembled at field)					
Components	Hood	For air discharge part x 1		For rear side air intake x 1 (Upper side x 1, lowe side x 1)		For left side air intake x 1	
	Unit Fixing screw	4 (M5x12 tapping screw)		5 (M5x14 tapping screw)		6 (M5x12 tapping screw)	
	Unit Fixing screw (SUS)	6 (M5x12 tapping screw)	6 (M5x14)	12 (M5x12 tapping screw)	12 (M5x14)	10 (M5x12 tapping screw)	10 (M5x14)
		Installation manual					
Installation restriction		Installation with “Guard net” or “Wind guard” is not available		Installation with “Guard net” is not available			
Safety wire rope for overturning prevention (optional parts)		ASG-SW20A					

◆ RAS-(4-6)H(V)RNME-AF

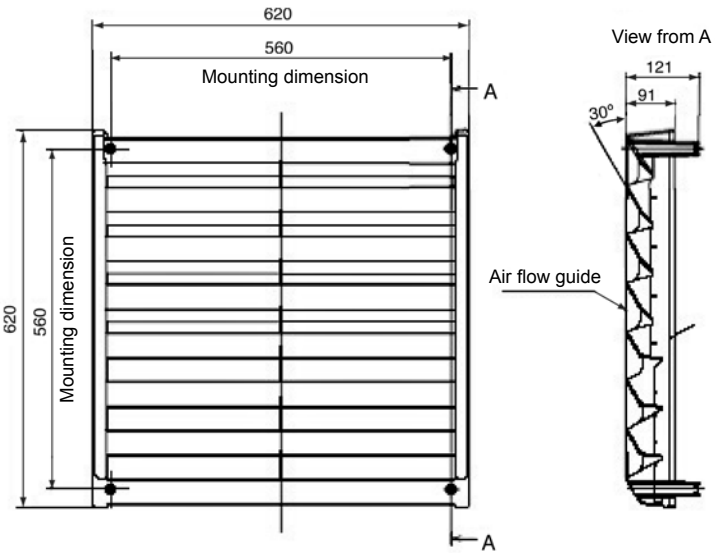
Air flow guide, wind guard and snow protection hood

Optional parts			Model
Air flow guide			AG-335A x 2
Wind guard			WSP-335A x 2
Snow protection hood	Zinc plate	Air outlet	ASG-NP335F x 2
		Air inlet of rear side	ASG-NP280B
		Air inlet of side face	ASG-NP280L
	Stainless plate (NSSC 180)	Air outlet	ASG-NP335FS2 x 2
		Air inlet of rear side	ASG-NP280BS2
		Air inlet of side face	ASG-NP280LS2



- Air flow guide
  - Specifications

Model	AG-335A
Quantity	2 per unit
Air discharge direction	Upward (downward), left & right
Material	Weather proof polypropylene resin
Color	Gray
Weight	1.9 kg
Accessories	Fixing screw x 4 [M5 (SUS) x 20] Installation manual
Installation restriction	"Wind Guard" or "Snow protection hood" is not available to install with air flow guide. ("Guard net" is available to be installed together.)

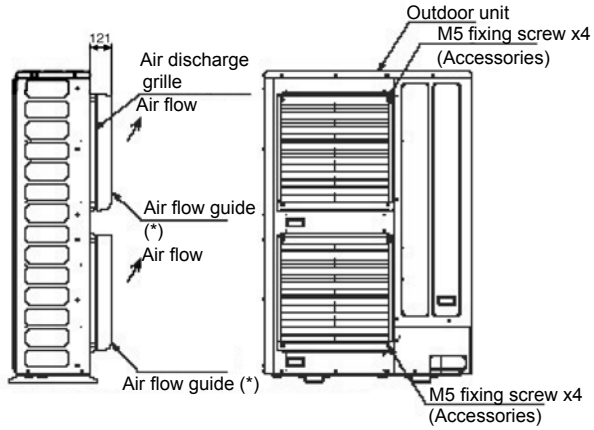


- Attaching example of air flow guide
  - Attach the air flow guide to the air discharge grille with four (4) screws (supplied).
  - The fixing holes are located at 4 positions on the grille. (Screw tightening torque 2.4~3.1N.m)
  - Do not remove the air discharge grille for air flow guide installation.

CAUTION

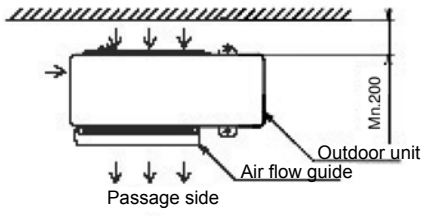
If the air guide is installed without discharge grille, it may cause injury due to rotating fan.

- Two windbreak covers installation



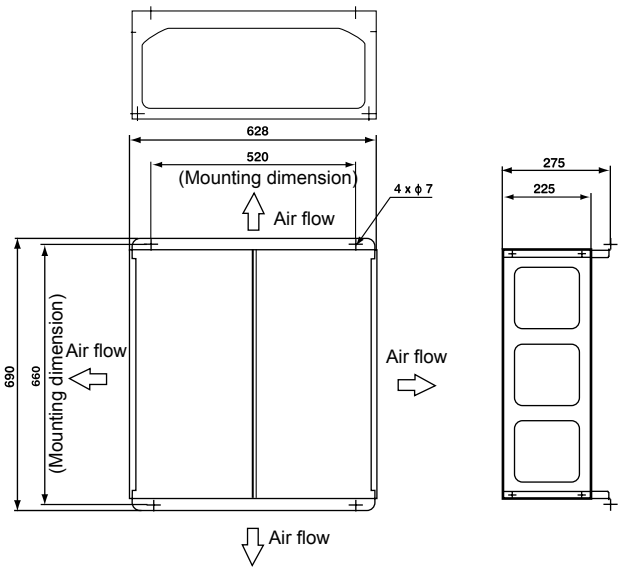
(*) Air flow direction of both air flow guides should be the same

- Service space (In case of upward air discharge)
  - In case of right and left sides air discharge, enough space for air discharge is required.
  - The downward air discharge is also available. In such case, install the base under the unit to secure enough space for air discharge.
  - In case of serial units installation, air discharge should be upward.



- Wind guard
  - Specifications

Model	WSP-335A
Quantity	2 per unit
Material	Galvanized sheet metal + baked painting
Color	Gray (1.oY8.5/0.5)
Weight	5.5 kg
Accessories	Fixing screw x 4 [M5 (SUS) x 12] Installation manual
Installation restriction	"Guard net", "Air flow guide" or "Snow protection hood" is not available to install with Wind guard

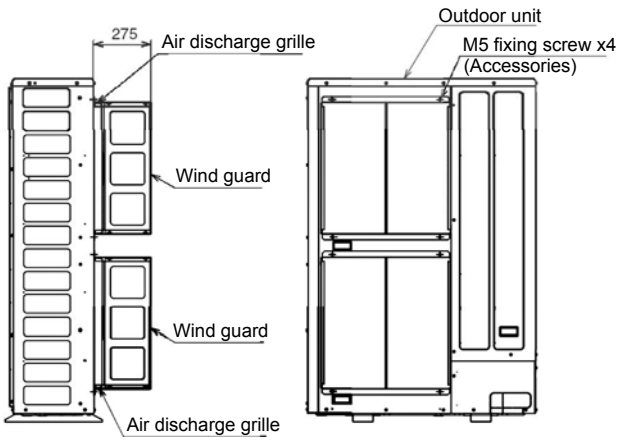


- Attaching example of air wind guard
  - Attach the air flow guide to the air discharge grille with four (4) screws (supplied).
  - The fixing holes are located at 4 positions on the grille (Screw tightening torque 2.4~3.1N.m).
  - Do not remove the air discharge grille for air flow guide installation.

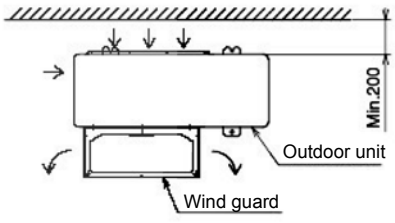
CAUTION

If the air guide is installed without discharge grille, it may cause injury due to rotating fan.

- Two windguard covers installation

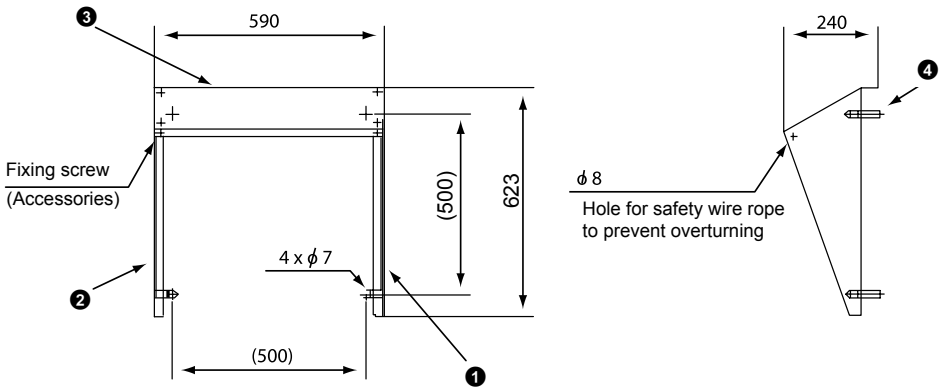


- Service space
  - Both sides of the outdoor unit should be open.
  - No obstacles should be placed in the air discharge side.



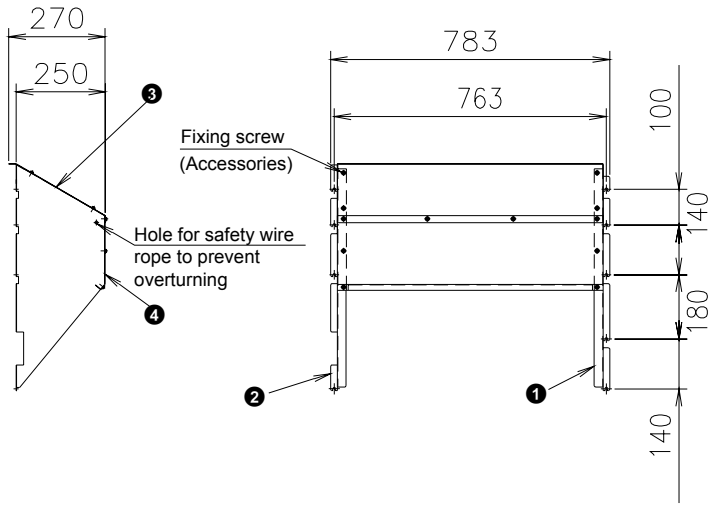
- Snow protection hood
  - Air discharge hood

No.	Part name	Qty.
❶	Right side plate	1
❷	Left side plate	1
❸	Front panel	1
❹	Stay	4



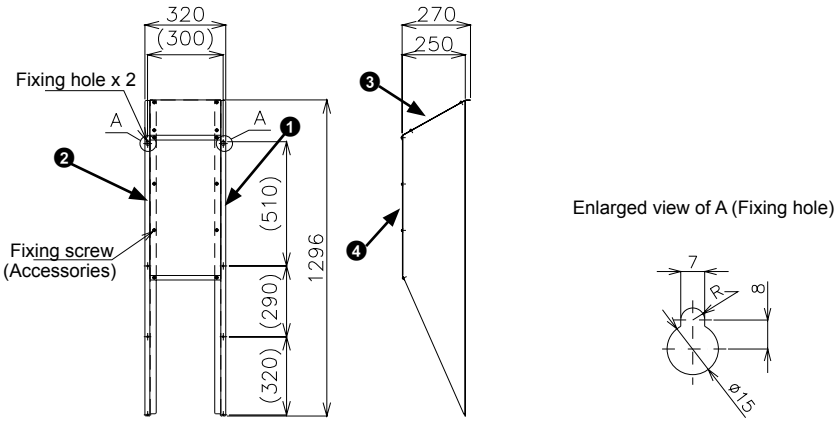
  - Rear suction hood

No.	Part name	Qty.
❶	Right side plate	1
❷	Left side plate	1
❸	Upper front panel (Upside)	1
❹	Upper front panel (Downside)	1

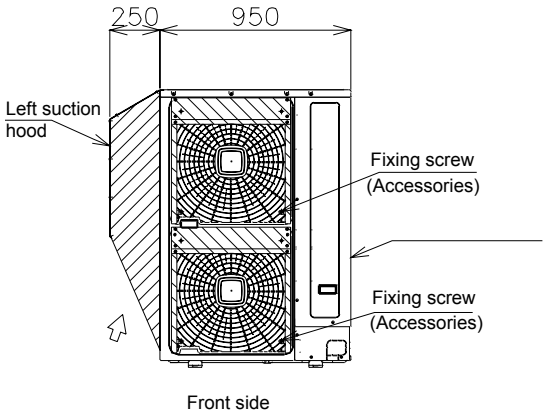


  - Left suction hood

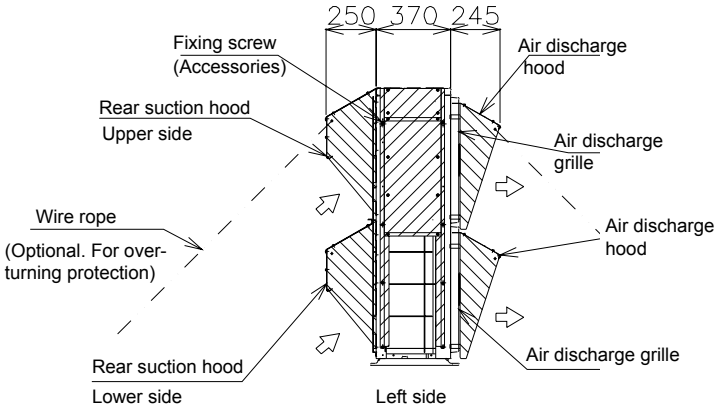
No.	Part name	Qty.
❶	Right side plate	1
❷	Left side plate	1
❸	Front panel (Upside)	1
❹	Front panel (Downside)	1



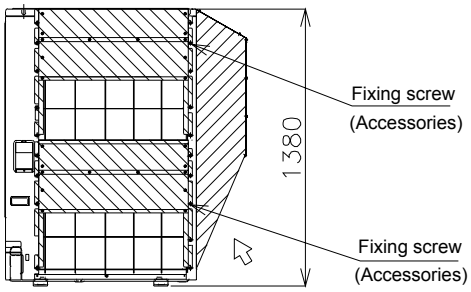
- Attaching example of snow protection hood



Front side



Left side



Rear side

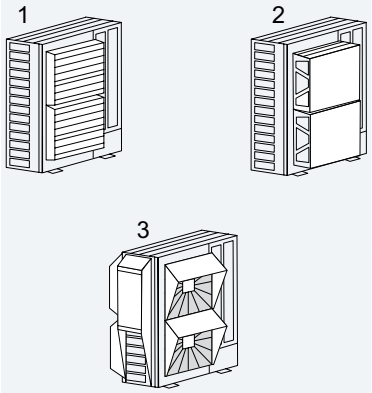
- Specifications of snow protection hood

Product name		Air discharge hood		Rear suction hood		Left suction hood	
Model		ASG-NP335F	ASG-NP335FS2	ASG-NP280B	ASG-NP280BS2	ASG-NP280L	ASG-NP280LS2
Quantity		2 per unit		1 per unit			
Material		Bonderized steel sheet Iron	Stainless (NSSC 180)	Bonderized steel sheet Iron	Stainless (NSSC 180)	Bonderized steel sheet Iron	Stainless (NSSC 180)
Color		Gray (1.0Y8.5/0.5 or approximation)	-	Gray (1.0Y8.5/0.5 or approximation)		Gray (1.0Y8.5/0.5 or approximation)	-
Weight		3 kg		14 kg		8 kg	
Assembling		Knockingdown parts (assembled at field)					
Components	Hood	For air discharge part x 1		For rear side air intake x 1 (Upper side x 1, lowe side x 1)		For left side air intake x 1	
	Fixing screw	4 (M5x12 tapping screw)		11 (M5x14 tapping screw)		8 (M5x12 tapping screw)	
	Fixing screw (SUS)	6 (M5x14 tapping screw)	6 (M5x14)	24 (M5x14 tapping screw)	24 (M5x14)	12 (M5x12 tapping screw)	12 (M5x14)
		Installation manual					
Installation restriction		Installation with “Guard net”, “Wind guard” or “Air flow guide” is not available		Installation with “Guard net” is not available			
Safety wire rope for overturning prevention (optional parts)		ASG-SW20A					

◆ RAS-(8/10)HRNME-AF

Air flow guide wind guard and snow protection hood

Optional parts			Model
Air flow guide			AG-335A x 2
Wind guard			WSP-335A x 2
Snow protection hood	Zinc plate	Air outlet	ASG-NP335F x 2
		Air inlet of rear side	ASG-NP335B
		Air inlet of side face	ASG-NP335L
	Strainless plate (SUS304)	Air outlet	ASG-NP335FS2 x 2
		Air inlet of rear side	ASG-NP335BS2
		Air inlet of side face	ASG-NP335LS2

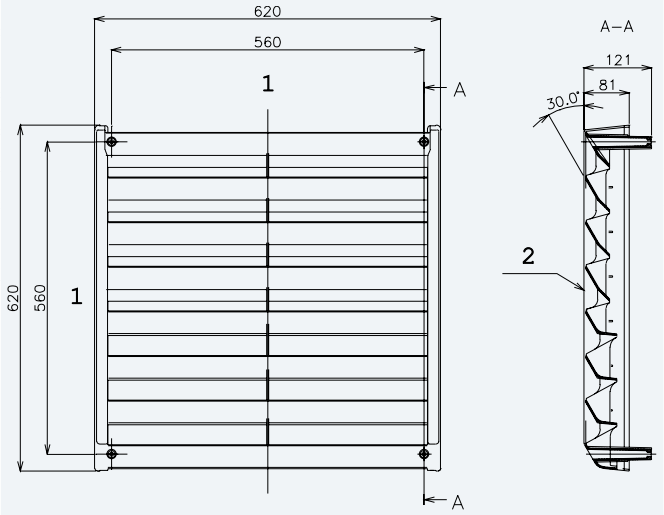


1 Air flow guide
2 Wind guard
3 Snow protection hood

Air flow guide

- Specifications

Model	AG-335A
Quantity	2 per unit
Air discharge direction	Upward (downward) left & right
Material	Weather proof polypropylene resin
Color	Gray
Weight	1.9 kg
Accessories	Fixing screw x 4 [M5 (SUS) x 20] Installation manual
Installation restriction	"Wind guard" or "Snow protection hood" is not available to install with air flow guide. ("Guard net" is available to be installed together.)



1 Mounting dimension
2 Air flow guide

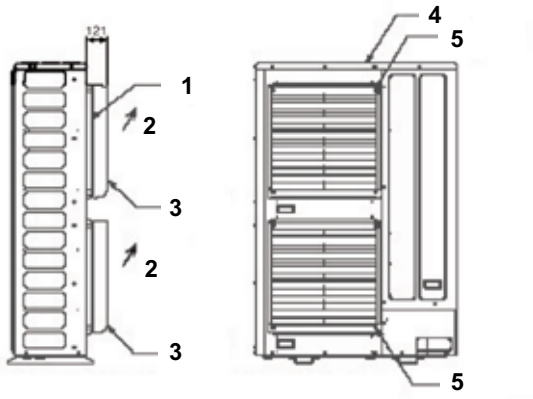
- Attaching example of air flow guide
  - Attach the air flow guide to the air discharge grille with four (4) screws (supplied).
  - The fixing holes are located at 4 positions on the grille. (Screw tightening torque 2.4 3.1 N.m)
  - Do not remove the air discharge grille for air flow guide installation.

⚠CAUTION

- ***If the air guide is installed without discharge grille it may cause injury due to rotating fan.***

- Two flow guides installation

1 Air discharge grille
2 Air flow
3 Air flow guide (see the note)
4 Outdoor Unit
5 M5 fixing screw x4 (Accessories)

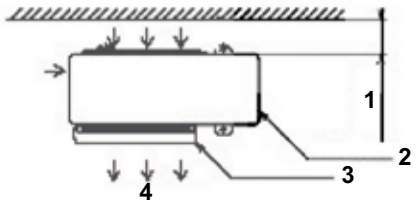


NOTE

Air flow direction of both air flow guides should be the same.

- Service space (In case of upward air discharge)

  - In case of right and left sides air discharge enough space for air discharge is required.
  - The downward air discharge is also available. In such case install the base under the unit to secure enough space for air discharge.
  - In case of serial units installation air discharge should be upward.

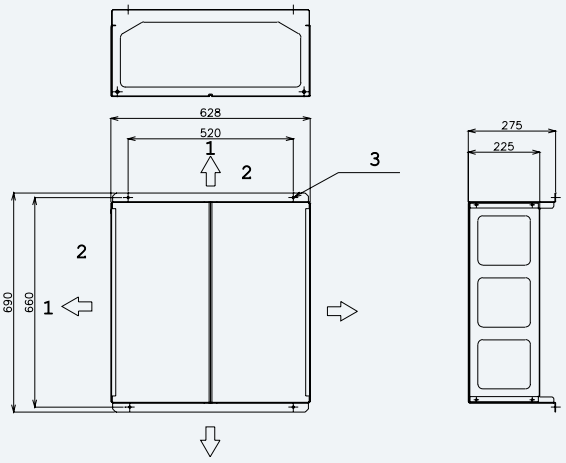


1 Min. 200 mm
2 Outdoor unit
3 Air flow guide
4 Passage side

Wind guard

- Specifications

Model	WSP-335A
Quantity	2 per unit
Material	Galvanized sheet metal + baked painting
Color	Gray (1.0Y8.5/0.5)
Weight	5.5 kg
Accessories	Fixing screw x 4 [M5 (SUS) x 12] Installation manual
Installation restriction	“Guard net” “Air flow guide” or “Snow protection hood” is not available to install with Wind guard



1 Mounting dimension
2 Air flow

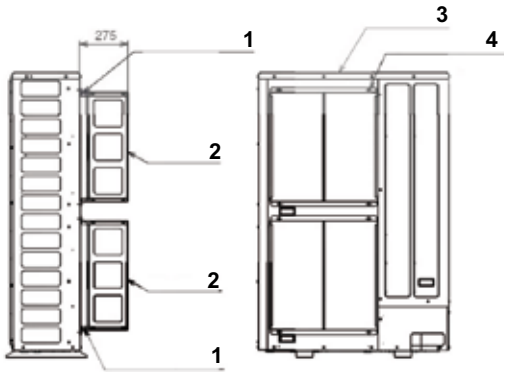
- Attaching example of air wind guard
  - Attach the air flow guide to the air discharge grille with four (4) screws (supplied).
  - The fixing holes are located at 4 positions on the grille. (Screw tightening torque 2.4 3.1 N.m)
  - Do not remove the air discharge grille for air flow guide installation.

CAUTION

If the air guide is installed without discharge grille it may cause injury due to rotating fan.

- Two windguard covers installation

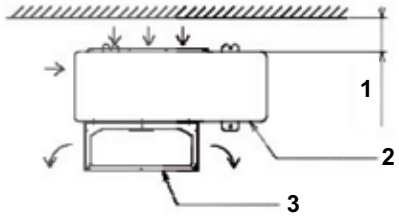
1 Air discharge grille
2 Wind guard
3 Outdoor unit
4 M5 fixing screw x4 (Accessories)



- Service space

  - Both sides of the outdoor unit should be open.
  - No obstacles should be placed in the air discharge side.

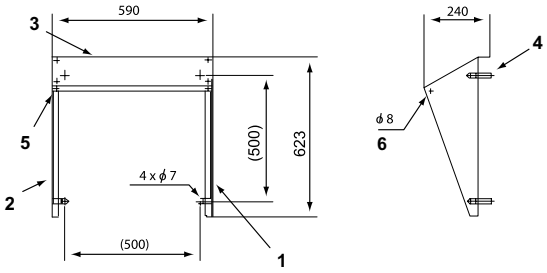
1 Min. 200 mm
2 Outdoor unit
3 Wind guard



Snow protection hood

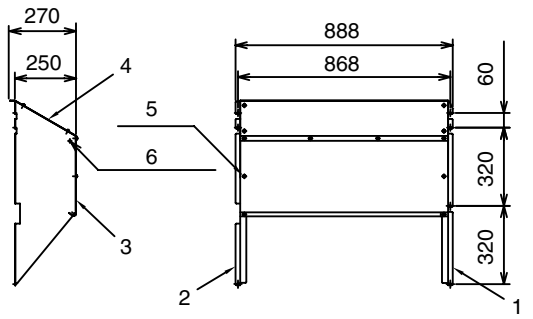
- Air discharge hood

Nº	Part name	Quantity
1	Right side plate	1
2	Left side plate	1
3	Front panel	1
4	Stay	4
5	Fixing screw (Accessories)	
6	Hole for safety wire rope to prevent overturning	



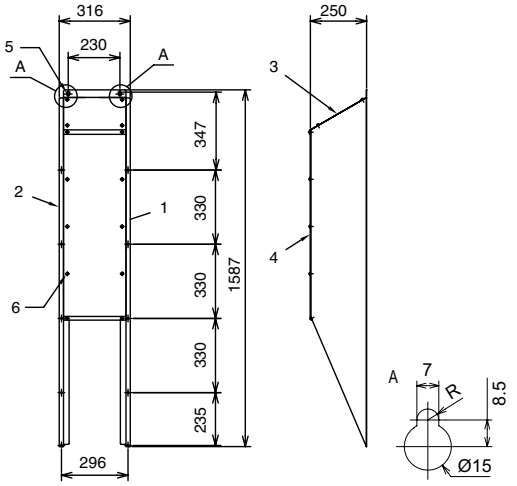
- Rear suction hood

Nº	Part name	Quantity
1	Right side plate	1
2	Left side plate	1
3	Upper front panel (Downside)	1
4	Upper front panel (Upside)	1
5	Fixing screw (Accessories)	
6	Hole for safety wire rope to prevent overturning	

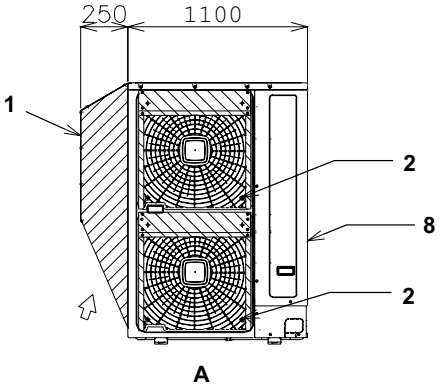


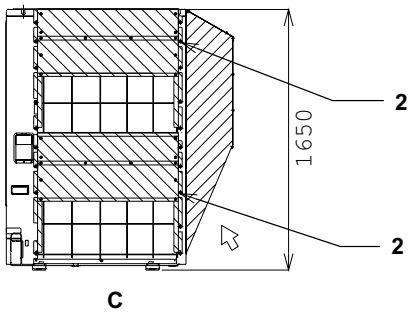
- Left suction hood

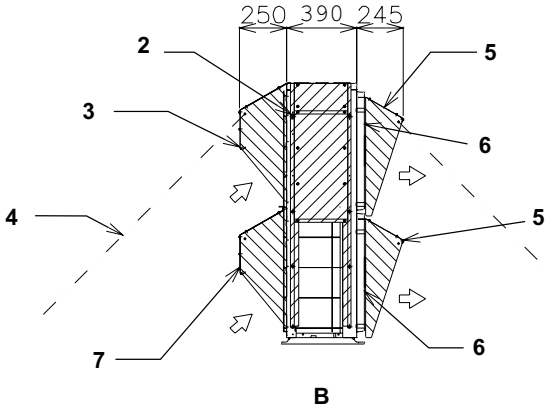
Nº	Part name	Quantity
1	Right side plate	1
2	Left side plate	1
3	Front panel (upside)	1
4	Front side (downside)	1
5	Fixing hole x 2	
6	Fixing screw (Accessories)	



- Attaching example of snow protection hood







1. Left suction hood
2. Fixing screw (Accessories)
3. Rear suction hood Upper side
4. Wire rope (Optional. For overturning protection)
5. Air discharge hood
6. Air discharge grille
7. Rear suction hood Lower side
8. Outdoor unit

A. Front side
B. Left side
C. Rear side

- Specifications of snow protection hood

Product name		Air discharge hood		Rear suction hood		Left suction hood	
Model		ASG-NP335F	ASG-NP335FS2	ASG-NP335B	ASG-NP335BS2	ASG-NP335L	ASG-NP335LS2
Quantity		2 per unit		1 per unit			
Material		Bonderized steel sheet Iron	Stainless (NSSC180)	Bonderized steel sheet Iron	Stainless (NSSC180)	Bonderized steel sheet Iron	Stainless (NSSC180)
Color		Gray (1.0Y8.5/0.5 or approximation)	—	Gray (1.0Y8.5/0.5 or approximation)	—	Gray (1.0Y8.5/0.5 or approximation)	—
Weight		3 kg		14 kg		8 kg	
Assembling		Knockingdown parts (assembled at field)					
Components	Hood	For air discherge part x 1		For rear side air intake x 1 (Upper side x 1 lowe side x 1)		For left side air intake x 1	
	Fixing screw	4x(M5x12 l tapping screw)		10x (M5x14 l tapping screw)		8x (M5x12 l tapping screw)	
	Fixing screw (SUS)	6x (M5x12 l tapping screw)	6x (M5x14 l)	24x (M5x14 l tapping screw)	24x (M5x14l)	14x (M5x12 tapping screw)	14x (M5x14)
		Installation manual					
Installation restriction		Installation with “Guard net” “Wind guard” or “Air flow guide” is not available		Installation with “Guard net” is not available			
Safety wire rope for overturning prevention (optional parts)		ASG-SW20A					

2.2 Indoor unit installation

2.2.1 Selection of the installation location

The indoor unit of the split-type air to water must be installed following these basic requirements:

- Install the unit in a no-frost enviroment.
- The unit is prepared to be wall mounted (wall bracket is factory supplied), so make sure that selected wall is flat and is made of a non-combustible surface, strong enough for supporting the indoor unit weight.
- Be sure to maintain the recommended servicing space for future unit servicing and guarantee enough air circulation around the unit.
- Keep water draining provisions. The safety valve and the air purge are provided with a drain pipe which are located at the bottom side of the unit.
- If the event of a cooling installation, a drain pan (supplied as an accessory) will be installed. The installer is responsible for proper installation and draining.

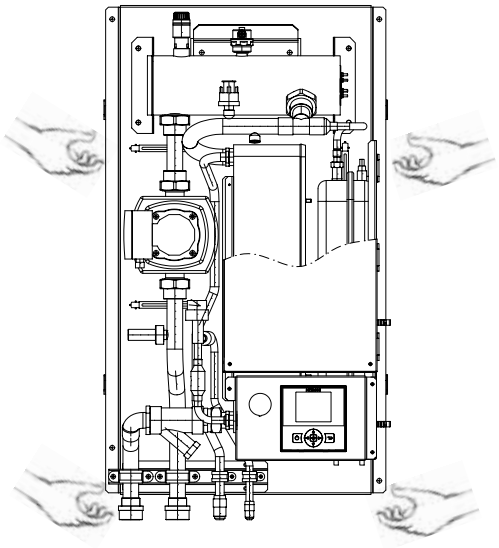
⚠ CAUTION

- ***Do not install the indoor units where electromagnetic waves are directly radiated to the electrical box.***
- ***Install the indoor units and components as far as possible (at least 3 meters) from all sources of electromagnetic wave radiation.***
- ***Install noise filter when the power supply emits harmful noises.***
- ***To avoid fire or explosion, do not install the indoor unit in a flammable environment.***
- ***The air to water heat pump must be installed by a service technician. The installation must comply with local and European regulations.***

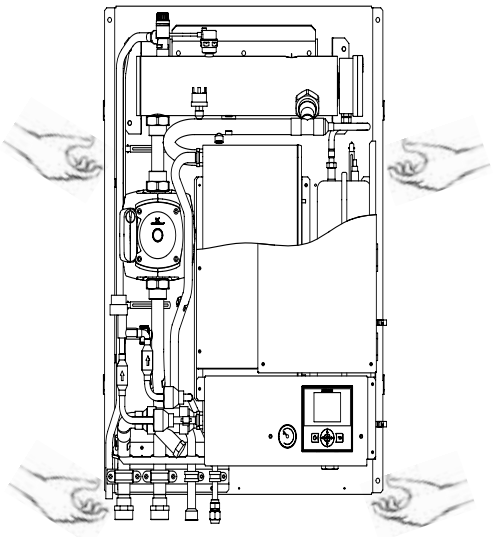
Handling of the indoor unit

- Place the packaged unit as close as possible to its final installation location in order to prevent any damage during transportation.
- The indoor unit is supplied in a cardboard box fixed to the wood base by straps. Cut the straps and remove the cardboard box in an upward motion.
- The indoor unit is fixed to the wood base by bolts. Before accessing those bolts, the front cover of the unit must be removed. Open the user's interface cover, unscrew two fixing screws (check the figure below) and remove the front cover of the unit following the instructions.

RWM-(2.0-6.0)FSN3E



RWM-(8.0/10.0)FSN3E

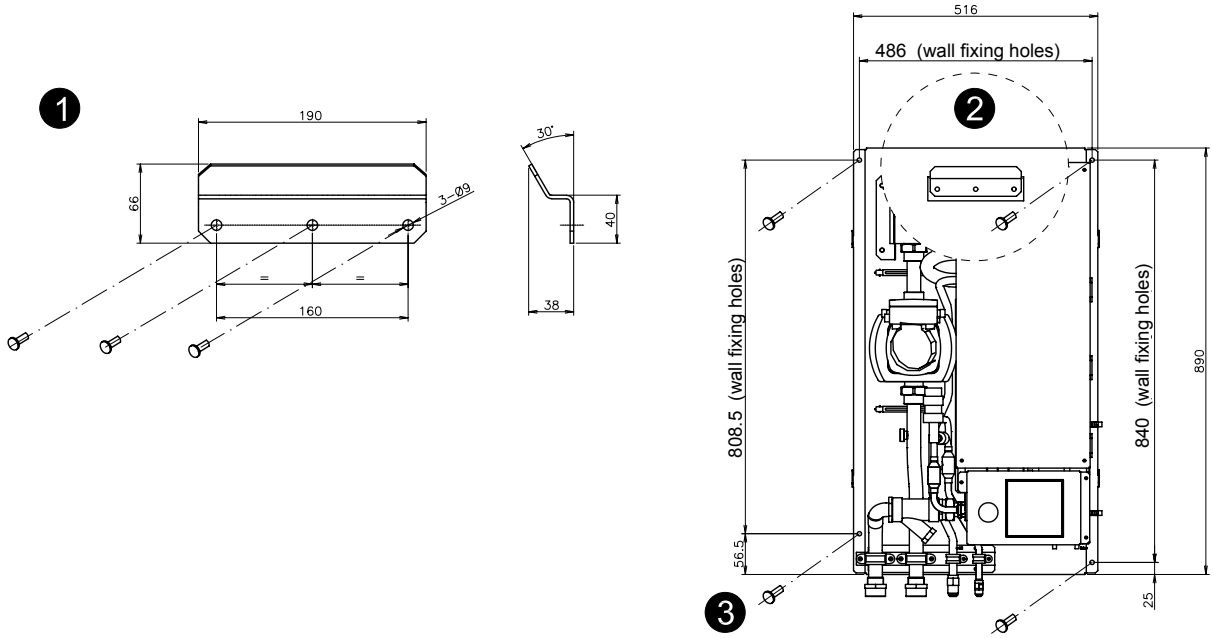


- Two persons are required to carry and mount the unit to its final location. Check the figure above for proper handling when lifting the unit to the wall.

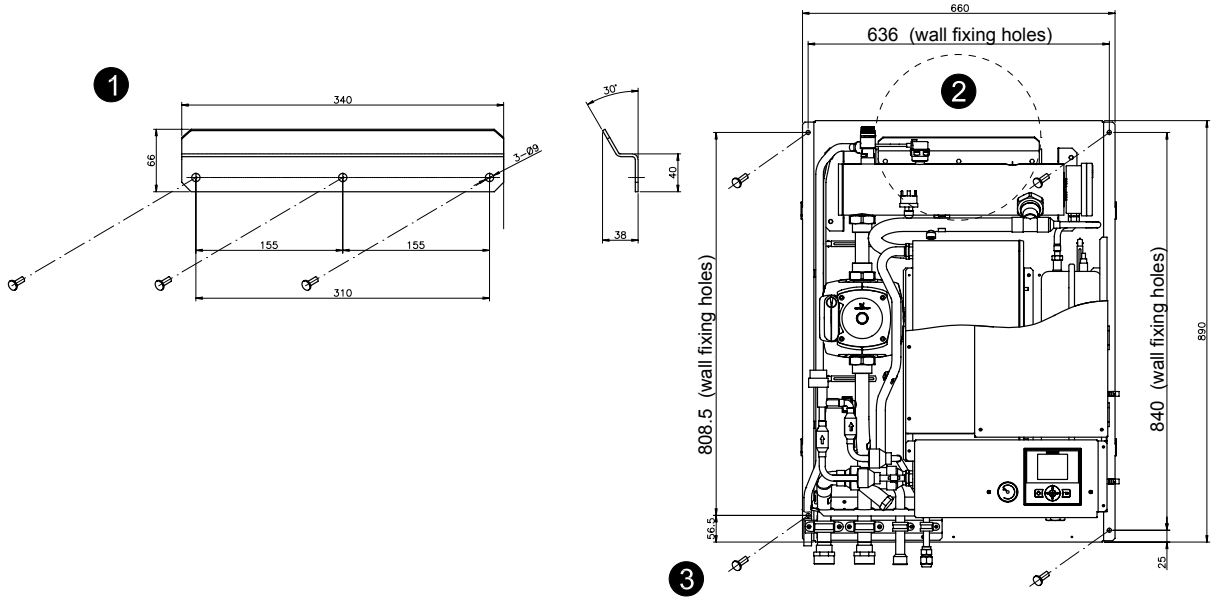
2.2.2 Wall mounting procedure

- Step ❶: Fix the wall support to the wall using appropriate plugs and screws. Make sure that the wall support is completely levelled.
- Step ❷: Hang the indoor unit on the wall support (two persons are required in order to lift the unit. The unit's weight is approximately 60 kg (RWM-(2.0-6.0)FSN3E) and 85 kg (RWM-(8.0/10.0)FSN3E))
- Step ❸: Fix the indoor unit at the bottom side using appropriate plugs and screws. To do so, the unit is equipped with two holes at the bottom outer edges of the back plate frame (there are two additional holes on the upper outer edges of the back plate frame for in which the Wall Support cannot be installed).

RWM-(2.0-6.0)FSN3E



RWM-(8.0/10.0)FSN3E

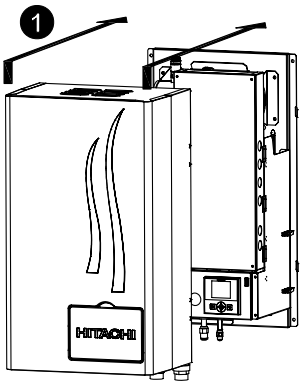


2.2.3 Cover assembly

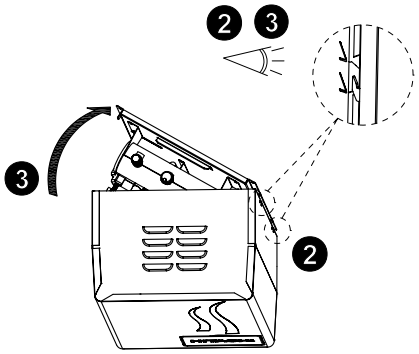
NOTE

This operation should be performed upon completion of the unit's pipe work.

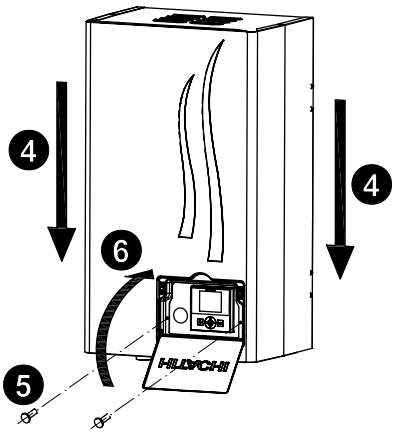
- Step ❶: Place the Unit's Cover at same level of the wall mounted unit by taking it from the bottom side (one person can perform this operation, during this operation it is possible to rest the Cover on the Electrical Box).

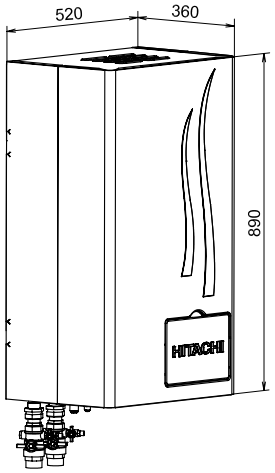


- Step ❷: Place the Right side Cover Holes over the Back Plate Hooks (x2 locations) with the help of the external marks indicated by ">").
- Step ❸: When the Right side is centred, repeat the operation on the Left side. Put the Left side Cover Holes into the Back Plate frame Hooks (x2 locations) with the help of the external marks indicated by ">").



- Step ❹: Once the 4 hooks are placed into their corresponding cover hooks, lower the cover to the end of the hooks.
- Step ❺: For the final placement of the cover, open the LCD service cover and screw the two screws with the nylon washers between the screw and the cover.
- Step ❻: Finally, close the user's interface service cover.





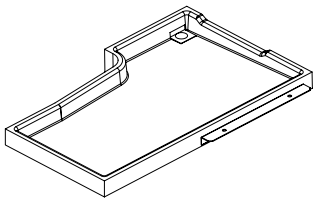
2.2.4 Drain pan assembly

NOTE

If there is a cooling installation a drain pan must be installed. Hitachi's drain pan accessory is supplied by request:

Name	Code	For models
ATW-DPK-01	7E549902	RWM-(2.0-6.0)FSN3E
ATW-DPK-02	7E549903	RWM-(8.0/10.0)FSN3E

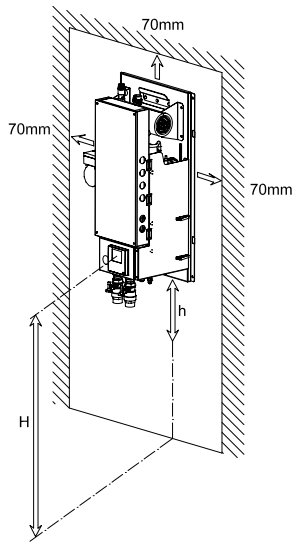
Drain pipe assembly is recommended only after completion of the pipe work, following assembly instructions included with the accessory.



Make sure to avoid dew outside the drain pan when installing it on the pipes, and maintain level in order to prevent drain pan overflow.

2.2.5 Service space

- Install the indoor unit with sufficient clearance around it to provide good conditions for electrical cables, Water and refrigerant piping connections installation and maintenance.
- Minimum recommended space:



NOTE

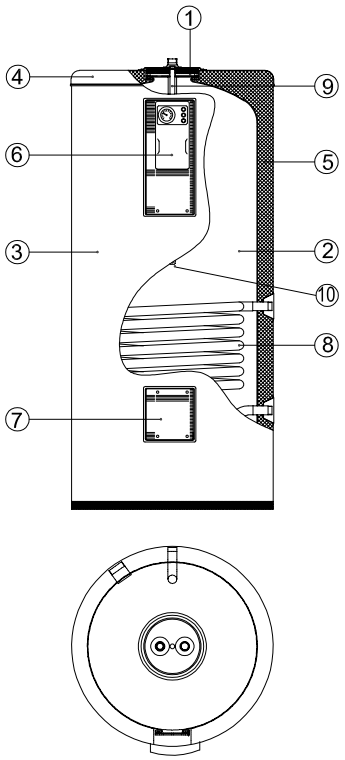
H= 1200mm ~ 1500mm. Recommended unit height for proper access to the control panel (LCD user's interface).

h= 350mm: Minimum unit height for installing the shutdown valves and the first bending pipe line.

2.3 DHWT - Domestic Hot Water Tank

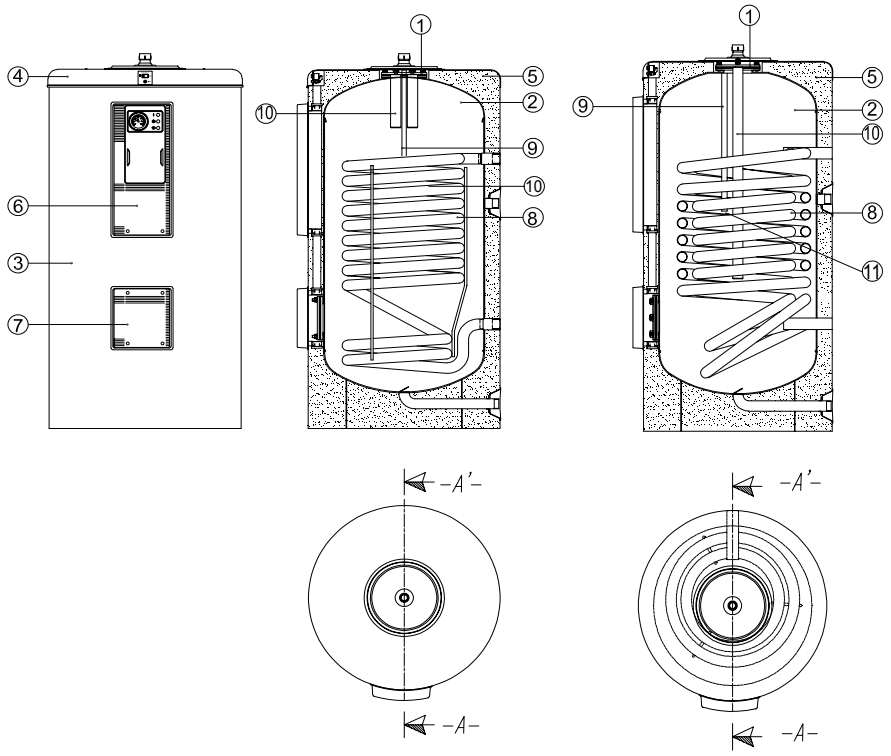
2.3.1 Name of parts

◆ **DHWT(200/300)S-2.5H1E**



Ref.	Qty.	Name
①	1	Inspection aperture
②	1	HSW storage tank
③	1	External covering
④	1	Top cover
⑤	1	Thermal insulation
⑥	1	Control panel
⑦	1	Electrical Heater
⑧	1	Heating coil
⑨	1	Sensor probe
⑩	1	DHWT sensor

◆ **DHWT(200/300)E-2.5H1E**



Ref.	Qty.	Name
①	1	Inspection aperture
②	1	HSW storage tank
③	1	External covering
④	1	Top cover
⑤	1	Thermal insulation
⑥	1	Control panel
⑦	1	Electrical Heater
⑧	1	Heating coil
⑨	1	Sensor probe
⑩	1	Cathodic protection (anode)
⑪	1	DHWT sensor

2.3.2 Unit installation

Transport the products as close as possible to the installation location before unpacking. Check the contents of the package:

- DHWT Model
- Installation and Operation Manual & Documents

2.3.3 Selection procedure for DHWT units

NOTE

- ***DHWT appliance is intended to be installed in an indoor place.***
- ***DHWT installation must be done by professional installers.***
- ***Install the DHWT with sufficient clearance around it for operation and maintenance as shown in the following figures.***
- ***Install the DHWT where good ventilation is available. Do not install the DHWT where there is a high level of oil mist, salty air or sulphurous atmosphere.***
- ***When installing some device next to DHWT, keep clearance between DHWT and any other obstacle of more than 500 mm.***

CAUTION

- ***Insufficient ventilation can cause oxygen deficiency.***
- ***Working with no sufficient ventilation, in an enclosed space, should cause can produce toxic gas, especially when cleaning agent is heated to high temperature by, e.g., being exposed to fire.***
- ***Do not install DHWT near any flammable substance.***

2.3.4 Working space

- Check that DHWT are installed vertically.
- For cleaning, use no flammable and no toxic cleaning liquid. The use of flammable agents should cause explosion or fire.
- Cleaning liquid shall be collected after cleaning.
- Pay attention do not trap cables when closing the electrical box cover. It could cause a electric shock.

3. Piping work and refrigerant charge

Index

3.1 Refrigerant and water pipe work

3.1.1 General notes before performing pipe work

1 Prepare locally-supplied copper pipes.
2 Select the piping size with the correct thickness and correct material able to withstand sufficient pressure.
3 Select clean copper pipes. Make sure that there is no dust or moisture inside the pipes. Blow the inside of the pipes with oxygen free nitrogen to remove any dust and foreign materials before connecting them.

NOTE

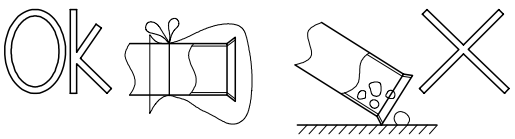
A system with no moisture or oil contamination will give maximum performance and lifecycle compared to that of a poorly prepared system. Take particular care to ensure that all copper piping is clean and dry internally.

There is no refrigerant in the cycle of the indoor unit.

CAUTION

Cap the end of the pipe when pipe is to be inserted through a wall hole.

Do not put pipes on the ground directly without a cap or vinyl tape at the end of the pipe.



If piping installation is not completed until next day or over a longer period of time, braze off the ends of the piping and charge with oxygen free nitrogen through a Schrader valve type access fitting to prevent moisture and particle contamination.

Do not use insulation material that contains NH3, as it can damage copper pipe material and become a source of future leakage.

Completely insulate both refrigerant gas piping and liquid piping between the indoor unit and the outdoor unit.

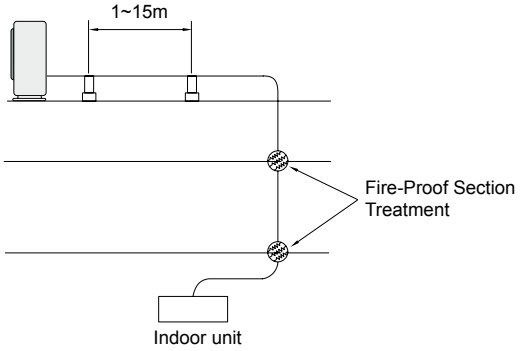
If not insulated, in cooling mode and high ambient humidity conditions, dew will appear on the piping surface.

Refrigerant circuit and Water circuit must be performed and inspected by a licensed technician and must comply with all relevant European and national regulations.

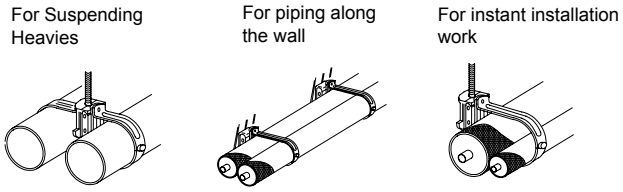
3.1.2 Suspension of refrigerant and water pipes

Suspend the refrigerant and water piping at certain points and prevent the refrigerant and water piping from being in direct contact with the building: walls, ceilings, etc…

If there is direct contact between pipes, abnormal sound may occur due to the vibration of the piping. Pay special attention in cases of short piping lengths.



Do not fix the refrigerant and water pipes directly with the metal fittings (refrigerant piping may expand and contract). Some examples for suspension method are shown below.



3.1.3 Pipe work and connection

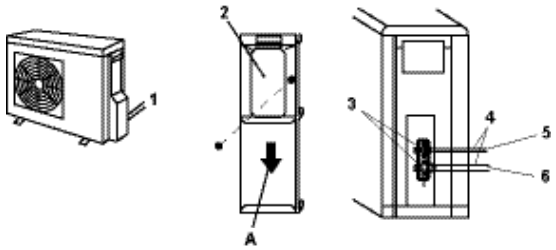
◆ Outdoor unit

Piping connection

1 The pipes can be connected from any of the following four directions: front, rear, bottom or right side, when facing the outdoor unit.

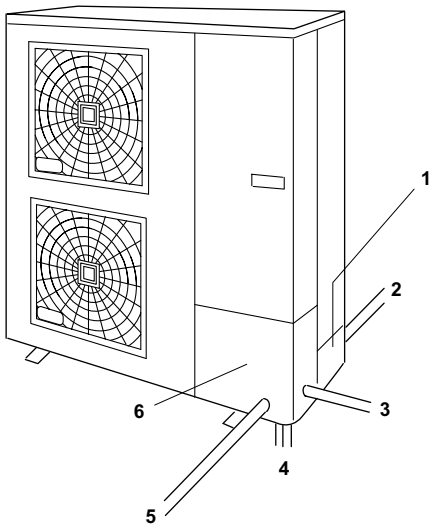
- RAS-2HVRN2

No.	Description
1	Rear side piping
2	Pipe cover
3	Stop valve
4	Connecting piping
5	Liquid
6	Gas
A	Direction to remove pipe cover

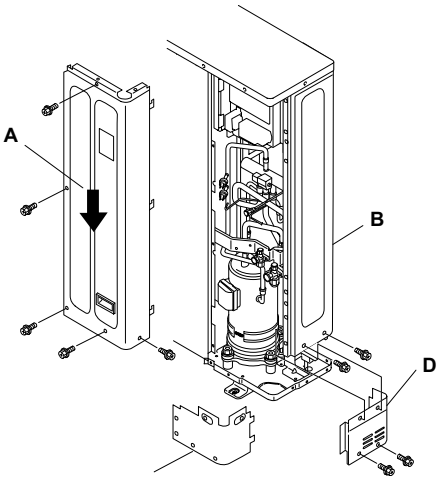


- RAS-(3-10)H(V)RNME-AF

No.	Part
1	Rear side piping cover
2	Rear side piping work (Knock-out hole)
3	Right side piping work (Knock-out hole)
4	Bottom side piping work (Piping cover)
5	Front side piping work (Knock-out hole)
6	Front side piping cover



No.	Part
A	Push down the cover slowly
B	Rear cover
C	Front side piping cover
D	Rear side piping cover



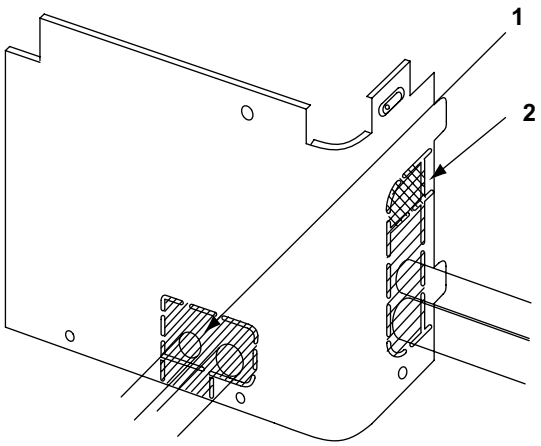
Make holes in the piping cover or cabinet for taking the pipes out. Take the piping cover away from the unit, and make holes by cutting along the guideline at the rear of the cover or punching it with a driver. Remove the burr with a cutter.

NOTE

Hold the cover with a hand at the same time while removing the screws as the cover may fall down.

- **For the front and side piping**

No.	Part
1	Front piping hole
2	Side piping hole



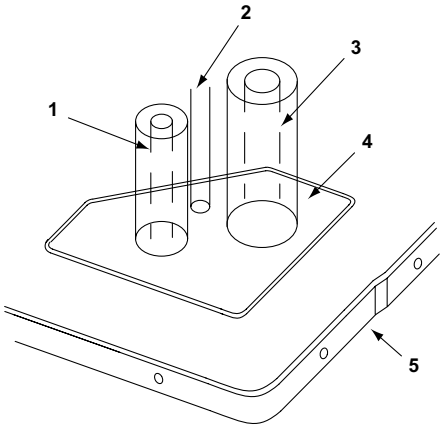
To use racking or conduit tubes, check the size and remove the stiped parts, following the slit.

NOTE

Place insulation (field supplied) to protect cables and pipes from being damaged by plate edges.

For the downward piping

No.	Part
1	Liquid piping
2	Wiring
3	Gas piping
4	Knock-out hole
5	Bottom base

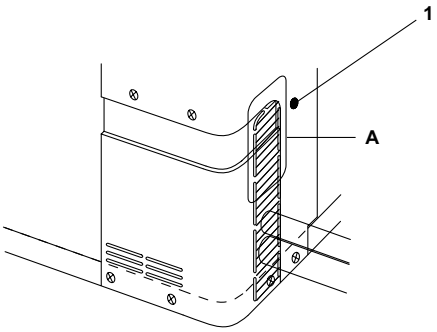


NOTE

The wiring must not be in contact directly with the pipes.

For the rear side piping

No.	Part
1	Rear cover



NOTE

Remove the rear pipe cover under the rear cover and remove the stipped part following the slit.

2 Mount the piping cover in order to avoid water entering into the unit. Seal the holes where pipes and wires are inserted, by using an insulation (field-supplied).

3 If the field-supplied piping is connected with stop valves directly, it is recommended to use a tube bender.

4 Check that the stop valves are closed completely before connecting pipes.

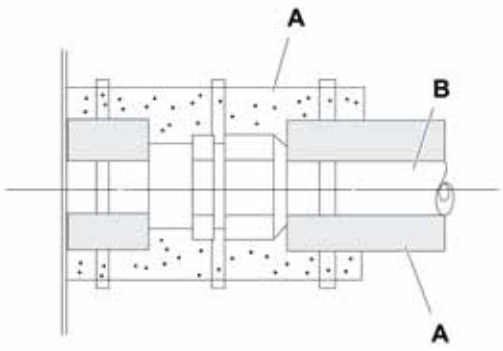
5 Connect the field supplied refrigerant pipes to the indoor unit and outdoor unit. Apply the oil thinly at the seat flare nut and pipe before tightening.

The required tightening torque is as follows:

Pipe Size	Tightening Torque (Nm)
Ø 6.35 mm	20
Ø 9.53 mm	40
Ø 12.7 mm	60
Ø 15.88 mm	80
Ø 25.4 mm	100

6 After connecting the refrigerant piping, seal the open space between knockout hole and refrigerant pipes by using the insulation material.

No.	Part
A	Insulation material.
B	Field supplied

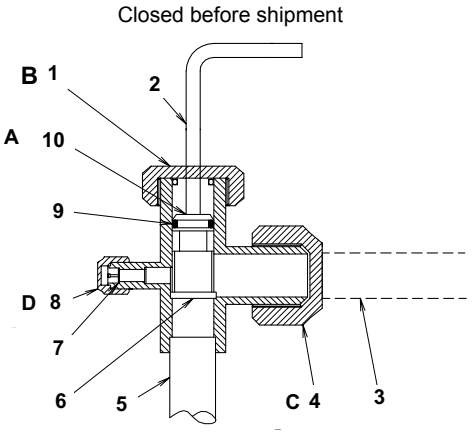


NOTE

Remove the rear pipe cover under the rear cover and remove the stipped part following the slit.

7 Operation of stop valve should be performed according to the figure.

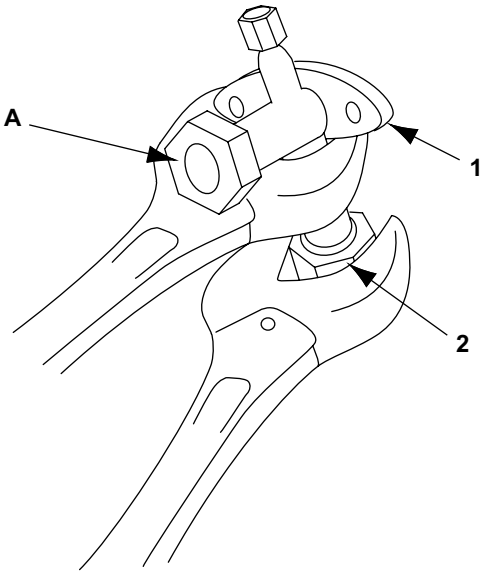
No.	Description	Remarks
1	Cap	—
2	Allen wrench	Hex 4/5/10 mm
3	Refrigerant Piping	Field supplied
4	Cap	—
5	Refrigerant Pressure	To outdoor unit
6	Seat Surface	Fully closed position
7	Check Joint	Only the charging those can be connected
8	Cap	—
9	O-Ring	Rubber
10	Spindle valve	Open – Counterclockwise
		Close – Clockwise



Tighten torque (Nm)					
Valve type / Model		A	B	C	D
Liquid valve	2-6HP	7-9	34-42	34-42	14-18
Gas valve	2-6HP	9-11	34-42	68-82	14-18
Liquid valve	8HP	7-9	37	40	16
	10-12HP	7-9	37	60	16
Gas valve	8-12HP	9-11	49	53-75	9.8

- **Outdoor unit stop valve**

No.	Part
1	Stop valve
2	Flare nut
A	Do not apply two spanners at this position. If applied, leakage will occur



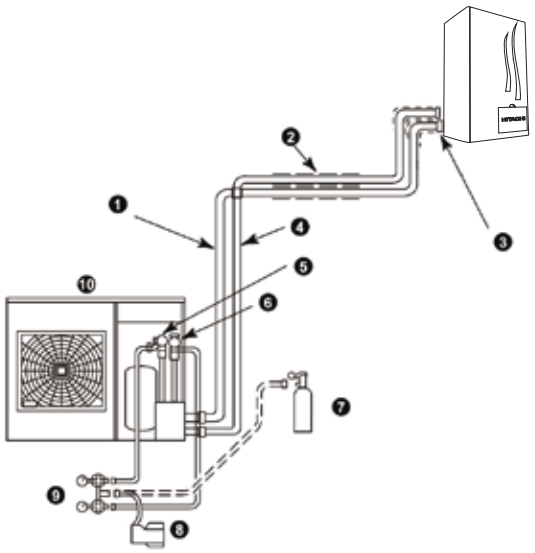
CAUTION

- ***At the test run, fully open the spindle. If not fully opened, the devices will be damaged.***
- ***Do not attempt to turn service valve rod beyond its stop.***
- ***Do not loosen the stop ring. If the stop ring is loosened, it is dangerous since the spindle will hop out.***
- ***Do not apply force to the spindle valve at the end of opening (5 Nm or smaller). The back seat construction.***

Evacuation and refrigerant charge

- Connect the gauge manifold using charging hoses with a vacuum pump or a nitrogen cylinder to the check joints of the liquid line and the gas line stop valve.
- Check for any gas leakage at the flare nut connection, by using nitrogen gas to increase the pressure at 4.15 MPa for outdoor units inside of the field-supplied piping.
- Operate the vacuum pump for 1 to 2 hours until the pressure decreases lower than a pressure of 756 mmHg in vacuum.
- For charging refrigerant, connect the gauge manifold using charging hoses with a refrigerant charging cylinder to the check joint of the liquid line stop valve.
- Charge the proper quantity of refrigerant according to the piping length (Calculate the quantity of the refrigerant charge).
- Fully open the gas line stop valve, and slightly open the liquid line stop valve.
- Charge refrigerant by opening the gauge manifold valve.
- Charge the required refrigerant within the difference range of ±0.5 kg by operating the system in cooling.
- Fully open the liquid line stop valve after completing refrigerant charge.
- Continue cooling operation for more than 10 minutes to circulate the refrigerant.
- See the example below.

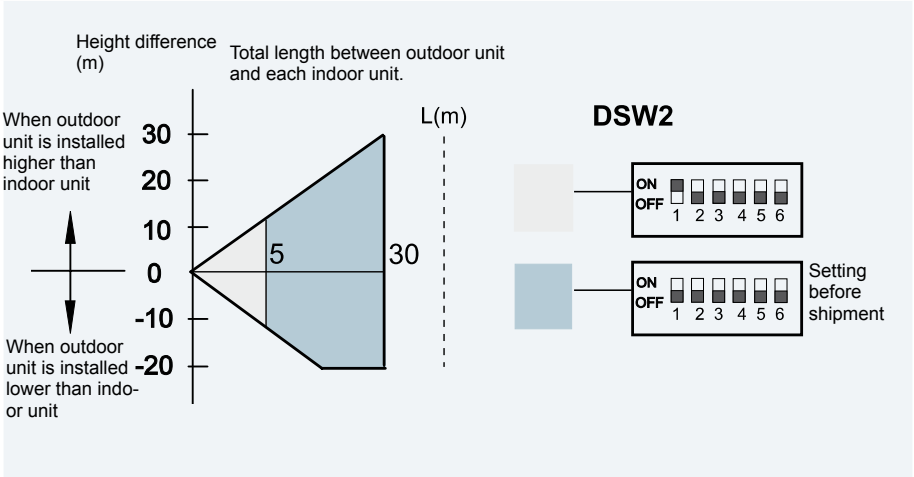
No.	Description
1	Gas line
2	Thermal insulation
3	Cover the flare nut and union of the piping connection with thermal insulation
4	Liquid line
5	Liquid stop valve
6	Gas stop valve
7	Nitrogen tank. For air thight test & nitrogen blow during brazing
8	Vacuum cylinder
9	Manifold gauge
10	Outdoor unit

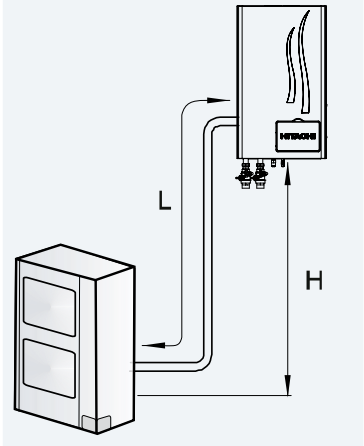


Refrigerant piping length

The refrigerant piping between the indoor unit and the outdoor unit should be designed using the following chart.

Keep the design point within the area of the chart, which is showing the applicable height difference according to piping length.





Item		(2-10)HP
Maximum piping length (L)	Actual piping length	30
	Equivalent piping length	40
Maximum height difference between indoor and outdoor unit (H)	Outdoor unit higher than indoor unit	30
	Indoor unit higher than outdoor unit	20

Refrigerant piping size

Piping connection size of outdoor unit & indoor unit

Outdoor unit	Pipe size		Indoor Unit	Pipe size	
	Gas pipe	Liquid pipe		Gas pipe	Liquid pipe
RAS-2HVRN2	Ø 12.7 (1/2")(1*)	Ø 6.35 (1/4")	RWM-2.0FSN3E	Ø 15.88 (5/8")(1*)	Ø 6.35 (1/4")
RAS-3HVRNME-AF	Ø 15.88 (5/8")	Ø 9.53 (3/8")	RWM-3.0FSN3E	Ø 15.88 (5/8")	Ø 9.53 (3/8")
RAS-4H(V)RNME-AF	Ø 15.88 (5/8")	Ø 9.53 (3/8")	RWM-4.0FSN3E	Ø 15.88 (5/8")	Ø 9.53 (3/8")
RAS-5H(V)RNME-AF	Ø 15.88 (5/8")	Ø 9.53 (3/8")	RWM-5.0FSN3E	Ø 15.88 (5/8")	Ø 9.53 (3/8")
RAS-6H(V)RNME-AF	Ø 15.88 (5/8")	Ø 9.53 (3/8")	RWM-6.0FSN3E	Ø 15.88 (5/8")	Ø 9.53 (3/8")
RAS-8HRNME-AF	Ø 25.4 (1")	Ø 9.53 (3/8")	RWM-8.0FSN3E	Ø 25.4 (1")	Ø 9.53 (3/8")
RAS-10HRNME-AF	Ø 25.4 (1")	Ø 12.7 (1/2")	RWM-10.0FSN3E	Ø 25.4 (1")	Ø 12.7 (1/2")

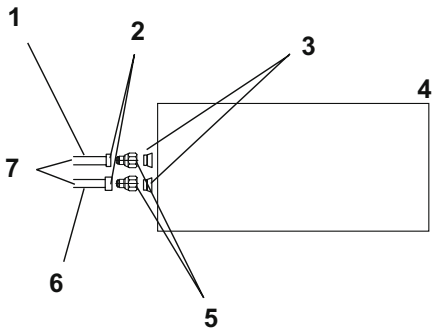
NOTE

(1*): 2HP system only (RAS-2HVRN2 + RWM-2.0FSN3E). If using different piping size for outdoor unit and indoor unit, a pipe adapter will be required: (Ø12.7 → Ø15.88).

The pipe adapter is factory supplied with the outdoor unit.

Connecting flare adapter (only for RAS-2HVRN2)

No.	Description
1	Liquid line
2	Flare nut (Accessories)
3	Pipe (Accessories)
4	Indoor unit
5	Flare adapter (Accessories)
6	Gas line
7	Pipe (Field supplied)



The piping sizes for indoor unit and outdoor unit are different. Attach the flare adapter (accessories) at the indoor piping union part.

Use the adequate flare adapter as follows:

Indoor unit	Flare adapter	
	Gas pipe	Liquid pipe
2.0 HP	Big size (Ø15.88→Ø12.70)	—

Drain discharging boss

When the base of the outdoor unit is temporarily used as a drain receiver and the drain water in it is discharged, this drain boss is used to connect the drain piping.

Model	Applicable Model
DBS-12L	RAS-2HVRN2
DBS-26	RAS-(3-10)H(V)RNME-AF

- Connection procedure

1 Insert the rubber cap into the drain boss up to the extruded portions.
2 Insert the boss into the unit base and turn approximately 40 degree counterclockwise.
3 The outer diameter section of the drain boss is 32 mm.
4 A drain pipe should be field-supplied.

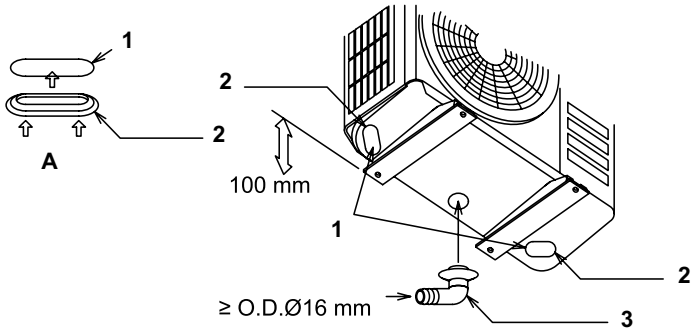
NOTE

- ***Do not use this drain boss set in a cold area, because the drain water may freeze.***
- ***This drain boss may not be sufficient to collect drain water. If collecting a big amount of drain water should be necessary, provide a drain-pan bigger than the unit base supplied one, and install it under the unit with drainage.***

- RAS-2HVRN2

Bottom base view

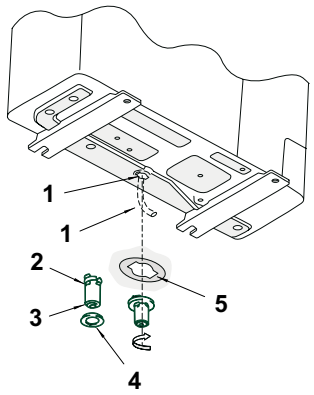
No.	Description
1	Drain hole
2	Plastic cap
3	Drain pipe
A	Push



- RAS-(3-10)H(V)RNME-AF

Bottom base view

No.	Description
1	Drain pipe
2	Extruded portion
3	Drain boss
4	Rubber cap
5	Drain hole of base



◆ Indoor unit

Before performing the pipe work and pipe connections, the unit cover must be removed (follow chapter *Indoor Unit Installation* in reverse).

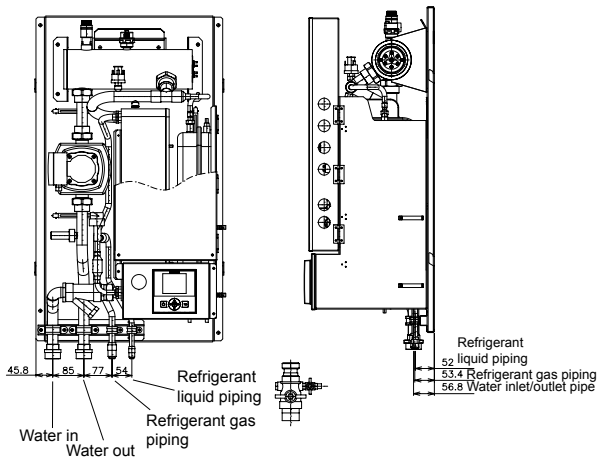
Piping location

Refere to the figure below detailing the location of the refrigerant pipes, dimensions and connection sizes.

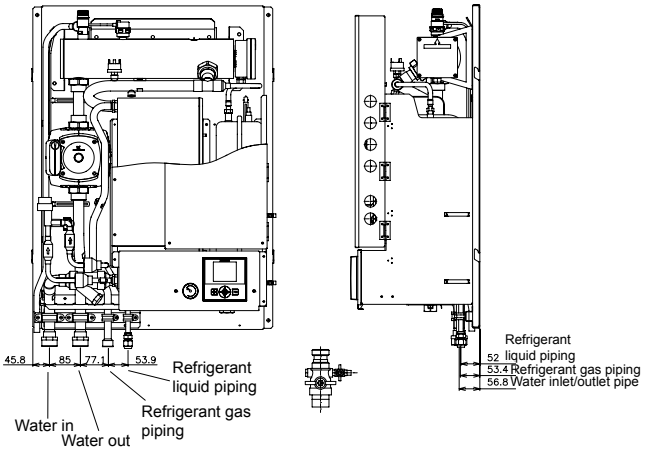
NOTE

There is a label behind the pipes indicating its circuit connection.

RWM-(2.0-6.0)FSN3E



RWM-(8.0/10.0)FSN3E



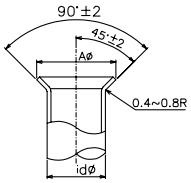
Refrigerant Pipe Connections

- The indoor unit is set up to be connected the liquid pipe by Flare Nut (factory supplied). Perform the indicated pipe work by maintaining the dimensions indicated in the following tables.

- Dimensions of the flared pipe

Units: mm (inch)

Nominal diameter	External diameter	$A_{Ø\ +0/-0.4}$
(1/4)	6.35	9.1
(3/8)	9.53	13.2
(1/2)	12.7	16.6
(5/8)	15.88	19.7



- Thickness of the copper pipes

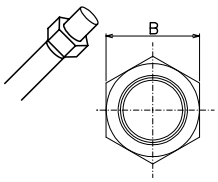
Units: mm (inch)

Nominal diameter	External diameter	Thickness
(1/4)	6.35	0.80
(3/8)	9.53	0.80
(1/2)	12.7	0.80
(5/8)	15.88	1.00

- Dimensions of the flare nut

Units: mm (inch)

Nominal diameter	External diameter	B
(1/4)	6.35	17
(3/8)	9.53	22
(1/2)	12.7	26
(5/8)	15.88	29



- Flare nuts tightening torque

Always use two wrenches or fix spanners when tightening the Flare Nuts on the refrigerent pipes.

If any failure occurs during this process the result could be pipe damage or refrigerant leak.

Unit: N.m

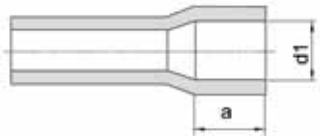
Pipe size	Tightening torque
Ø 6.35 mm	20
Ø 9.53 mm	40
Ø 12.7 mm	60
Ø 15.88 mm	80

Brazing work

⚠ CAUTION

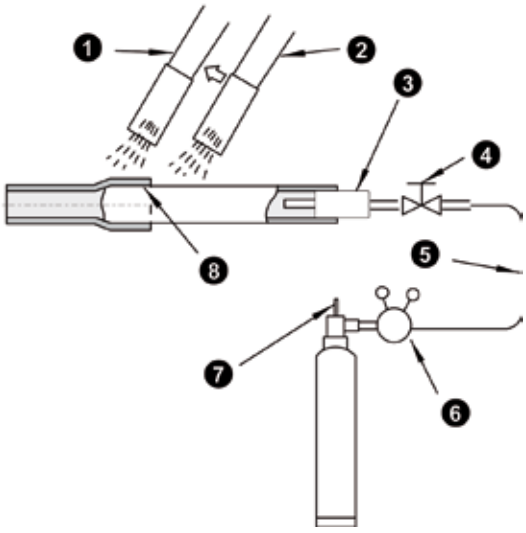
- ***Use nitrogen gas for blowing during pipe brazing. If oxygen, acetylene or fluorocarbon gas is used, it will cause an explosion or poisonous gas.***
- ***A rust coating will appear inside of tubes if no nitrogen gas blowing is performed during brazing work. This film will be flecked off after operation and will circulate in the circuit, resulting in clogged expansion valves, etc, and the compressor will be affected.***
- ***Use a reducer valve when nitrogen gas blowing is performed during brazing. The gas pressure should be maintained within 0.03 to 0.05 MPa. If excessively high pressure is applied to a pipe, it will cause an explosion.***

Copper pipe size		Ød1		Gap	a
Ø6.35	+0.08	Ø6.5	+0.1	0.33	6
	-0.08		0	0.07	
Ø9.53	+0.08	Ø9.7	+0.1	0.35	8
	-0.08		0	0.09	
Ø12.7	+0.08	Ø12.9	+0.1	0.38	8
	-0.08		0	0.19	
Ø15.88	+0.09	Ø16.1	+0.1	0.41	8
	-0.09		0	0.13	
Ø19.05	+0.09	Ø19.3	+0.1	0.44	10
	-0.09		0	0.16	
Ø22.22	+0.09	Ø22.42	+0.1	0.39	10
	-0.09		0	0.11	
Ø25.4	+0.12	Ø25.6	+0.1	0.42	12
	-0.12		0	0.08	



A basic brazing method is shown below.

No.	Description
1	Pre-heat the outer tube for better flowing of the filler metal
2	Heat inner side tube evenly
3	Rubber plug
4	Packless valve
5	High pressure hose
6	0.03 to 0.05 MPa (0.3 to 0.5 Kg/cm² G)
7	Reducer valve: open this valve only when the gas is needed
8	Nitrogen gas flow 0.05 m³/h or smaller



3.2 Water pipe work and connection

3.2.1 General notes

- Install the factory supplied Shutdown Valves for connecting the Water Inlet / Outlet pipes as close as possible to the Indoor Unit, in order to minimise flow resistance and, if necessary, for water flow regulation.
- It is advisable to use flexible joints after the Shutdown Valve for the water Inlet / Outlet piping to prevent the transmission of vibrations.
- Proper Water pipe inspection should be performed after piping work to assure there is no water leakage in the circuit. Fill in the water circuit (refer to *Circuit Water Filling-in* chapter) and open inlet and outlet Shutdown Valves.
- The Indoor Unit is equipped with an air purger (factory supplied) at the highest location of the Indoor Unit (Electric Heater top). If this location is not the highest of the water installation, air might be trapped inside the water pipes, which could cause system malfunction. In that case additional air purgers are provided (field supplied) to ensure no air enters the water circuit.
- It is advisable to insulate the water pipes, joints and connection in order to avoid heat loss.
- When the unit is stopped during shutdown periods and the ambient temperature is very low, the water in the pipes and the circulating pump may freeze, thus damaging the pipes and the water pump. In order to prevent this, the unit has a self-protection mechanism which should be activated (refer to *Available optional functions* chapter).

CAUTION

When connecting the water piping to the indoor unit, it is necessary to install 500mm of flexible water piping from the indoor unit, in order to avoid metal expansion problems due to temperature. After these 500mm install copper Piping.

NOTE

The maximum piping length depends on the maximum pressure availability in the water outlet pipe. Please check the pump curves.

3.2.2 Water piping connection

◆ Piping location and connection size

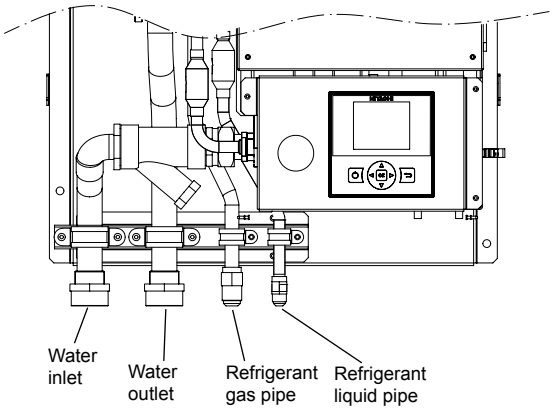
The unit is factory supplied with two shutdown valves to be connected to the water inlet / outlet pipe. By using these shut-down valves it is very practical to connect the indoor unit to the heating system by using flexible joints just bellow the valves (G 1-1/4" connection).

Refer to the figure bellow detailing the location of the Water Pipes location, dimensions and Connection sizes.

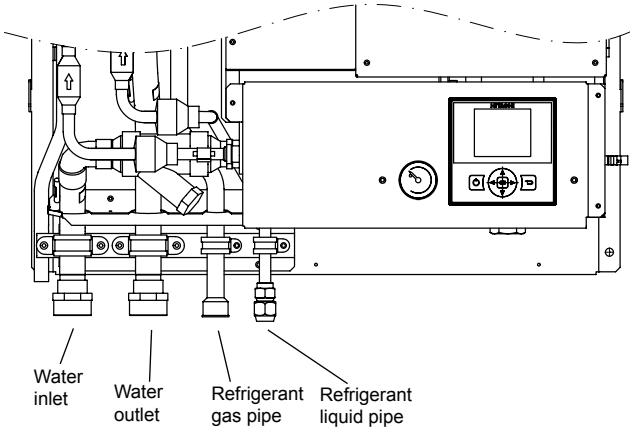
NOTE

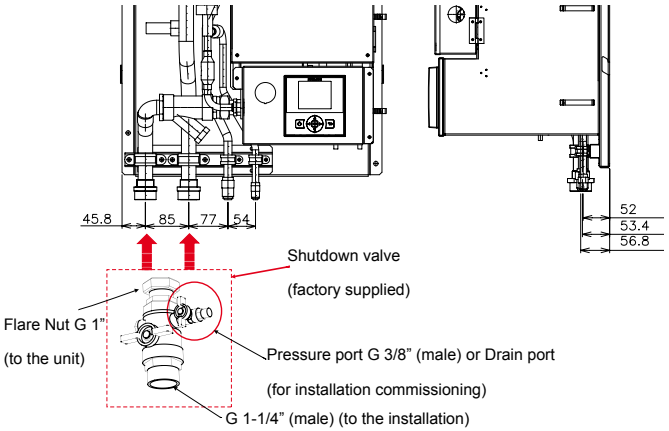
There is a label behind the pipes indicating its circuit connection.

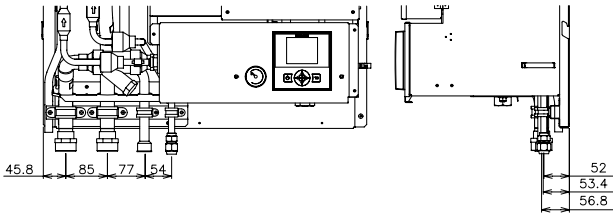
RWM-(2.0-6.0)FSN3E



RWM-(8.0/10.0)FSN3E







3.2.3 Draining pipe work

Connect the drain pipe coming from the safety valve (located with the water IN/OUT pipes) to the general draining system.

NOTE

The safety valve will be activated when water pressure reaches 3 bars.

- Two draining ports are provided with the factory supplied shutdown valves, and a draining cap on the expansion vessel to drain the water from the indoor unit in case of servicing. In that situation, connect the appropriate drain pipe in order to avoid any water coming into contact with electrical parts.
- If there is a cooling intallation, a drain pipe must be installed (refer to *Unit Installation* chapter). The drain pipe on the drain pan must be connected to the general Draining System (following assembly instruction included with accessory). The Drain Pipe size is ø25mm (outer dimension).

CAUTION

Drain taps must be provided at all low points of the installation to permit complete drainage of the circuit during servicing.

Do not drain the water circuit when the system is operating. There will be a blast of water which will cause damage.

3.2.4 Circuit water filling-in

- The Installation will be filled in through a shutdown valve (field supplied) which must be connected to the water circuit between the indoor unit and the heating circuit.
- It is necessary to install a Check Valve (non-return valve) at the water filling in point. The Check Valve acts as a safety device to protect the installation against back pressure, back flow and back syphonage of non-potable water into drinking water supply net. The Check Valve should be field supplied.
- Charge the water circuit until reaching a water pressure of 1.7~2.0 bar (1.8 bar recommended).
- Fill in the circuit with water (from the drinking water supply net). The heating installation water must comply with EN directive 98/83 EC. Non-sanitary controlled water is not recommended (for example, water from wells, rivers, lakes, etc.).

CAUTION

The maximum water pressure is 3 bar (Safety Valve nominal opening pressure).

Make sure that all field supplied components installed in the piping circuit can withstand the water pressure.

The unit is only to be used in a closed water circuit.

An automatic air vent is provided inside the indoor unit. Additional air vents will be provided at all high points of the circuit. The air vents should be located at points which are easily accessible for servicing. Check that the air vent is not tightened too much so that automatic release of air in the water circuit remains possible.

The internal Air Pressure of the Expansion Vessel tank will be addapted to the water Volume of the final installation (factory supplied with 1 bar. of internal Air Pressure). Refer to the Technical Catalogue data for Expansion Vessel tank Air Pressure compensation.

3.2.5 Water flow adjustment

In every installation the Circuit's water flow must be adjusted according to its particular internal Pressure Lost. In addition to this, the circuit should be set according to Heating circuit (Heating Floor, Radiators, Fan Coils) and its corresponding water outlet temperature. The procedure for adjusting the water flow is described below:

- 1st., measurement of Pressure Lost
- 2nd., check the Pump Performance Curves
- 3rd., selection of the Pump Speed
- 4th., adjustment of the water flow

◆ Pressure Lost calculation

The indoor unit is factory supplied with two Shutdown Valves which are provided with a Pressure Port. The object of these Pressure Ports, is to offer the installer a quick connection to read the Lost Pressure in the circuit when commissioning.

Plug in a differential Manometer to the Pressure Ports and open the inlet / outlet ports (1*).

The Pressure Lost is calculated from the pressure difference between the value of the inlet and the outlet water pressure.

NOTE

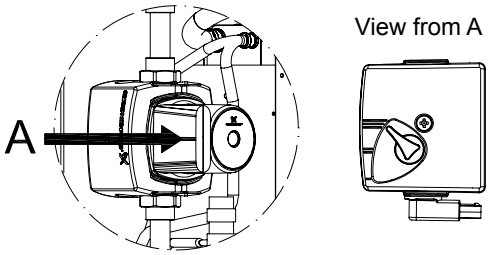
(1*) If there is no having a Differential Manometer, it is possible to do this operation with just one std. Manometer (it is advisable to use the same Manometer in order to avoid reading mistakes from different devices because of different tolerances or adjustment).

◆ Check the Pump Performance Curves

Refer to the Pump Performance Curves to calculate the circuit's Water Flow depending on the actual Pressure Drop and the Heating Circuit type (Heating Floor, Radiators, Fan Coils).

◆ Selection of the Pump Speed

The indoor unit pump should be adjusted according to Pressure Lost of the circuits and the calculated Water Flow. The pump speed selector switch is located on the pump's Terminal Box.



Pump speed selector

Speed indications:

Speed 1 (Low)

Speed 2 (Medium)

Speed 3 (High)

NOTE

The Pumps are factory supplied on speed 3 (High)

◆ Water flow adjustment

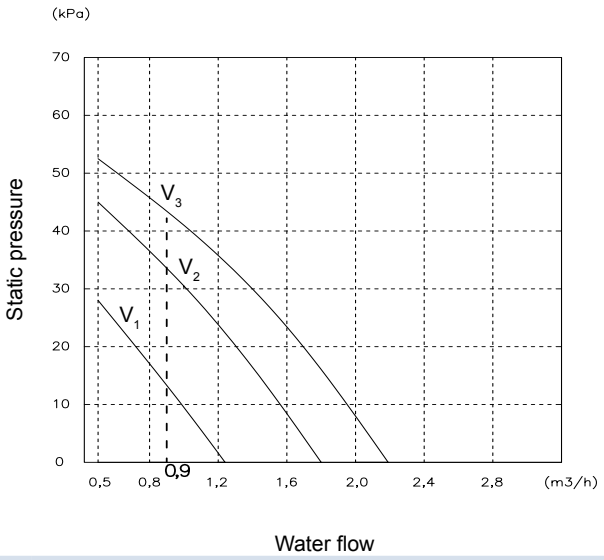
The Water Flow should be adjusted by closing one of the main Shutdown Valves until the pressure matches the Pump Performance Curves.

Finally, the differential Manometer should be removed once the Pressure Port Valves are closed.

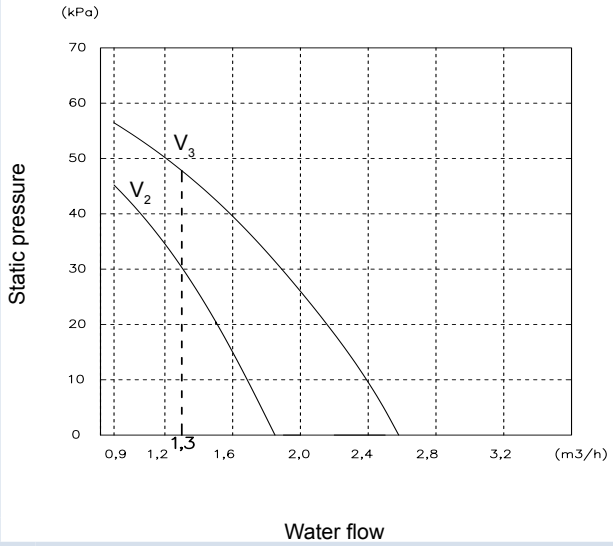
3.3 Pressure charts

◆ RWM-(2.0-10.0)FSN3E

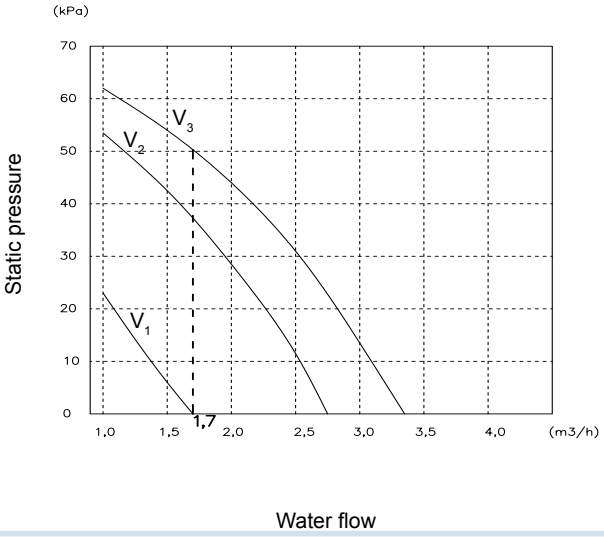
RWM-2.0FSN3E



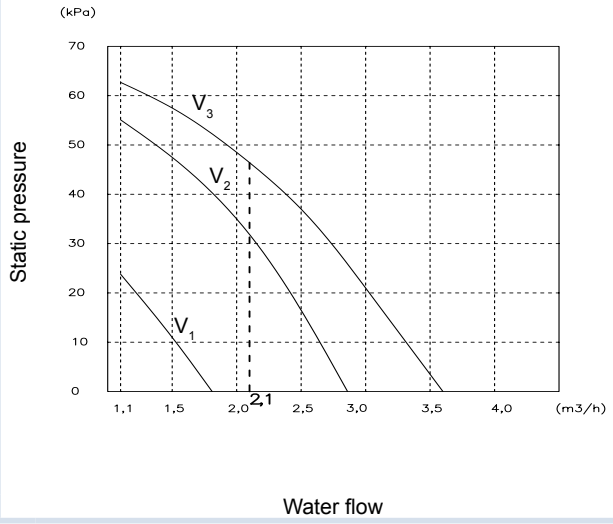
RWM-3.0FSN3E



RWM-4.0FSN3E



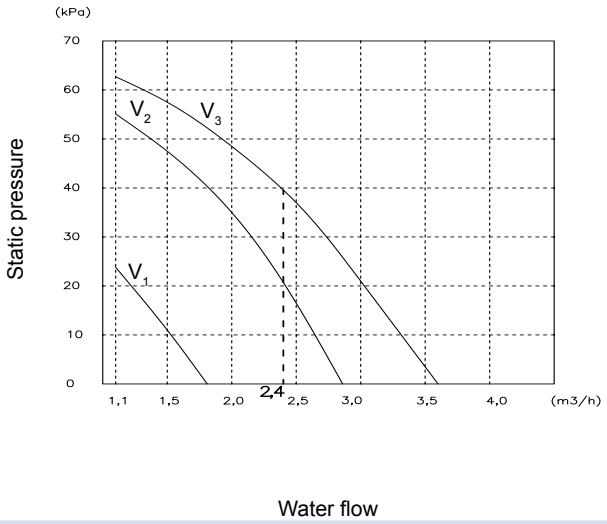
RWM-5.0FSN3E



NOTE

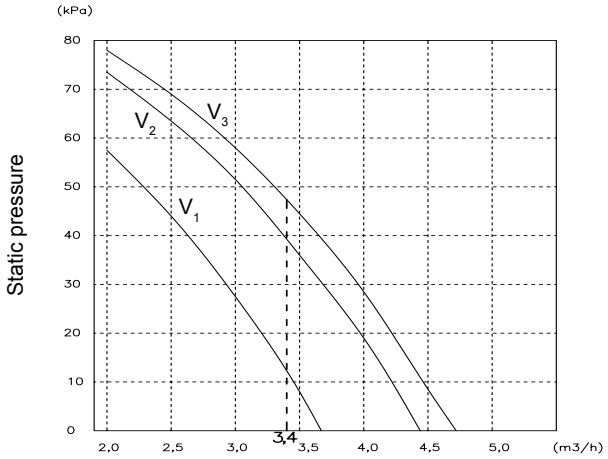
V: Pump motor speed (V_1: Low, V_2: Medium, V_3: High)

RWM-6.0FSN3E



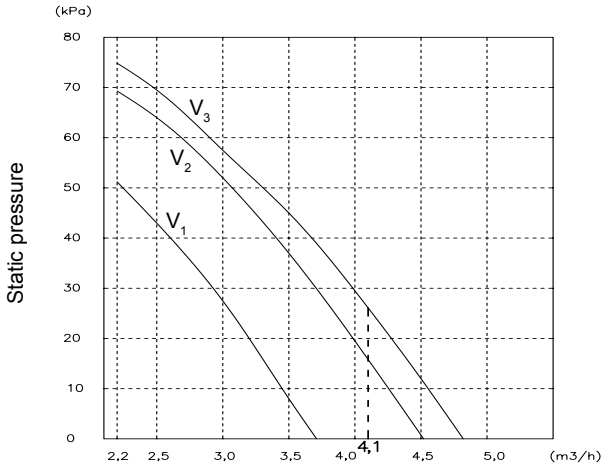
Water flow

RWM-8.0FSN3E



Water flow

RWM-10.0FSN3E



Water flow

NOTE

V: Pump motor speed (V_1: Low, V_2: Medium, V_3: High)

3.4 DHWT - Domestic Hot Water Tank

3.4.1 Hydraulic circuit

When Piping connections are performed:

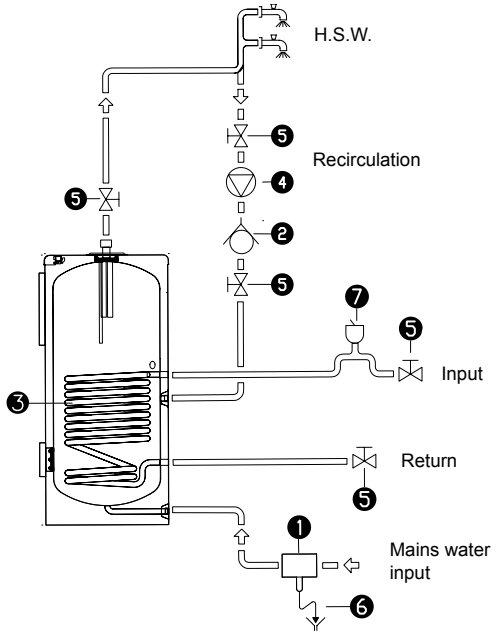
1 Connect all pipes as close as possible to the unit, so that disconnection can be easily performed when required.
2 It is recommended to use flexible joints for the piping of water inlet and outlet, so vibration will not be transmitted.
3 Whenever possible, sluice valves should be installed for water piping, in order to minimise flow resistance and to maintain sufficient water flow.
4 It is recommended to apply ball valves in both water pipe connections to make easier any maintenance work.
5 Proper inspection should be performed to check for leaking parts inside and outside the system, by completely opening the hot water inlet and outlet valves to the water condenser.
6 This DHWT must be fully air purged to avoid heating elements radiating the tank case without water.
7 Apply thermal insulation on the hydraulic system pipes in order to avoid accidental injure due to excessive heat on piping surfaces and also to avoid heat losses.
8 When the unit is stopped during shutdown periods and the ambient temperature is very low, it is possible that the water in the pipes and in the circulating pump freeze, thus damaging the pipes and the water pump. In order to prevent this, during shutdown periods it is useful to empty the water from the installation.

NOTE

Check periodically:

- ***Water flow and pressure***
- ***Water leakage's***
- ***Fixing points tightening***
- ***Inlet and outlet connection pipes must be 1G"***

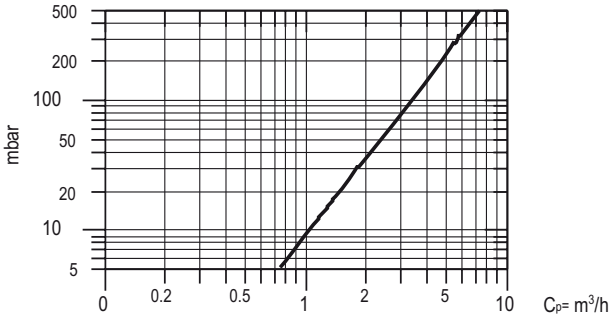
DHWT(200/300)(E/S)-2.5H1E



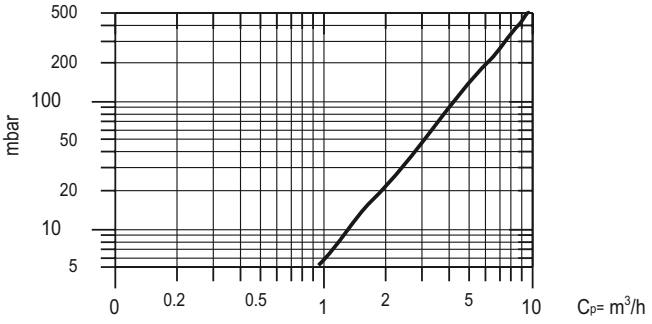
Ref.	Name
1	Sanitary safety valve unit
2	Non-return valve
3	Heating coil
4	Recirculation pump
5	Shutoff cock
6	Drain
7	Drain valve

3.4.2 Pressure drop

DHWT(200/300)E-2.5H1E

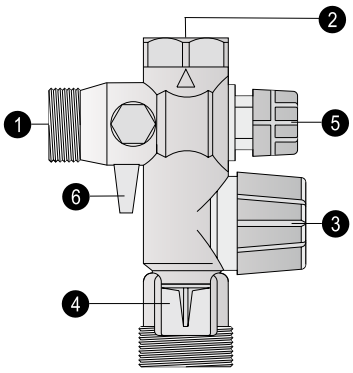


DHWT(200/300)S-2.5H1E



◆ General standard for hydraulic installation

- The safety valve unit will fitted at the sanitary water installation.
- A pressure reducer must be placed in the DHWT installation. The nominal pressure of the safety unit will be 8 bar.
- When the main pressure is more than 6 bar a pressure reducer should be installed.
- The water discharge during heating (expansion) is normal. The volume of this discharge can be up to 3% of the storage tank's capacity.
- The pressure regulator device must be working regularly , depending on the quality of water, in order to remove the lime's deposits and verify that it is not blockade.
- A water leakage in the pressure protection device can exist. The discharge pipe should be always open to the atmosphere, free of frost and in continuous slope to the down side.
- Dielectric bushes must be fitted at the input and output sanitary water and at the tank circuit connections.
- Emptying the DHWT: Close the main inlet water valve and open the relief valve of the security water group.



Ref	Name
1	Main inlet water
2	DHWT inlet connection
3	Security valve and manual empty
4	Emptying connection
5	Check valve
6	Close valve

4. Electrical wiring

Index

4.1 Unit electrical wiring and connection

4.1.1 General check

1 Ensure that the field-supplied electrical components (mains power switches, circuit breakers, wires, connectors and wire terminals) have been properly selected according to the electrical data indicated. Make sure that they comply with national and regional electrical codes.

2 Following the Council Directive 2004/108/EC(89/336/EEC), relating to electromagnetic compatibility, next table indicates:
Maximum permissible system impedance Zmax at the interface point of the user's supply, in accordance with EN61000-3-11.

Outdoor unit	Z_{max} (Ω)
RAS-2HVRN2	-
RAS-3HVRNME-AF	-
RAS-4HVRNME-AF	0.41
RAS-5HVRNME-AF	0.29
RAS-6HVRNME-AF	0.29
RAS-4HRNME-AF	-
RAS-5HRNME-AF	-
RAS-6HRNME-AF	-
RAS-8HRNME-AF	-
RAS-10HRNME-AF	-

Indoor unit	Z_{max} (Ω)
RWM-2.0FSN3E(1~)	-
RWM-3.0FSN3E(1~)	-
RWM-4.0FSN3E(1~)(*)	0.24
RWM-5.0FSN3E(1~)(*)	0.24
RWM-6.0FSN3E(1~)(*)	0.24
RWM-8.0FSN3E(3N~)	-
RWM-10.0FSN3E(3N~)	-

NOTE

(*) In case of indoor unit three phases connection, Z_{max} is not considered.

3 Harmonics situation of each model regarding IEC 61000-3-2 and IEC 61000-3-12 is as follows:

Models situation regarding IEC 61000-3-2 and IEC 61000-3-12 Ssc "xx"	Models	Ssc "xx" (KVA)
Equipment complying with IEC 61000-3-2 (professional use (*))	RAS-2HVRN2 (*) RAS-3HVRNME-AF RAS-4HRNME-AF (*) RAS-5HRNME-AF (*) RAS-6HRNME-AF (*) RAS-8HRNME-AF (*)	-
Equipment complying with IEC 61000-3-12	RAS-4HVRNME-AF RAS-5HVRNME-AF RAS-6HVRNME-AF	-
Installation restrictions may be applied by supply authorities in relation to harmonics	RAS-10HRNME-AF	-

4 Check to ensure that the power supply voltage is within +/-10% of the rated voltage.

5 Check to ensure that power supply has an impedance low enough to warranty not reduce the starting voltage more than 85% of the rated voltage.

6 Check to ensure that the ground wire is connected.

7 Connect a fuse of specified capacity.

DANGER

- ***Check to ensure that screws for terminal block are tightly tightened.***
- ***Do not connect of adjust any wiring or connections unless the main power switch is OFF.***
- ***Check that the earth wire is securely connected, tagged and locked in accordance with national and local codes.***

CAUTION

- ***Check to ensure that the indoor pump and the outdoor fan have stopped before electrical wiring work or periodical check is performed.***
- ***Protect the wires, drain pipe, electrical parts, from rats or other small animals. If not protected, rats may damage unprotected parts, and at the worst, a fire will occur.***
- ***Wrap the accessory packing around the wires, and plug the wiring connection hole with the seal material to protect the product from any condensed water and insects.***
- ***Tightly secure the wires with the cord clamp inside the indoor unit.***
- ***Lead the wires through the knockout hole in the side cover when using conduit.***
- ***Electrical wiring must comply with national and local codes. Contact your local authority in regards to standards, rules, regulations, etc.***
- ***Check that the ground wire is securely connected.***

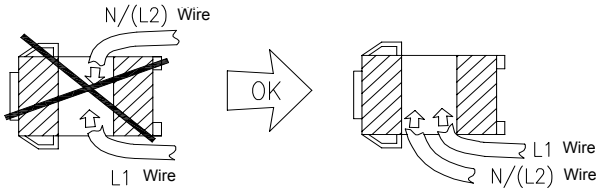
NOTE

- ***Check and test to ensure that if there is more than one source of power supply, that all are turned OFF.***
- ***Be sure to use a dedicated power supply. Never use a power supply shared by another appliance.***

4.1.2 Electrical connection of outdoor unit

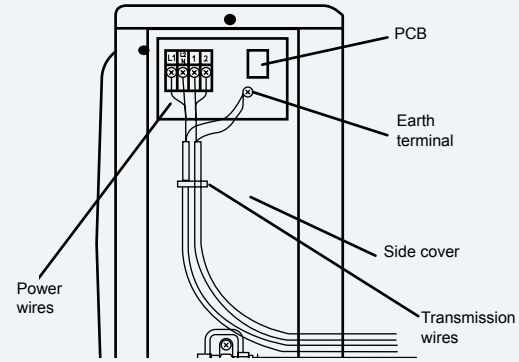
The correct electrical wiring connection for the outdoor unit is shown below:

1 Using the appropriate cable, connect the power circuit to the appropiate terminals as shown on the wiring label and the illustration below. In case of RAS-(8/10)HRNME-AF, insert the power source cables L1, L2, L3, and N (for 380-415V 50Hz), and the earth cable into a ring core (two turns), and fix the cables by using the band (accessory). Do not insert the cables from a different sides into the ring core.

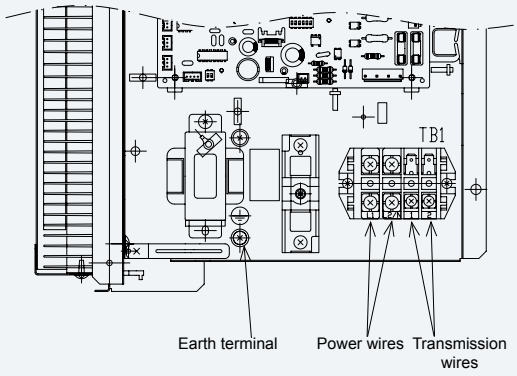


2 Connect the power source cables L1 and N (for 230V 50Hz) or L1, L2, L3 to the terminal board, and N (for 400V 50Hz) and the earth conductor to the earthing screw in the electrical box base plate.

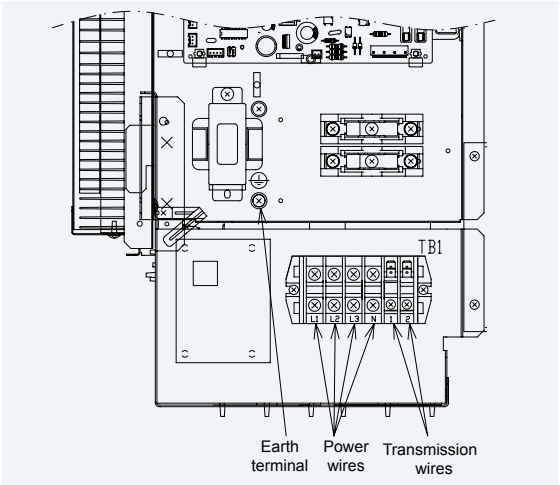
RAS-2HVRN2



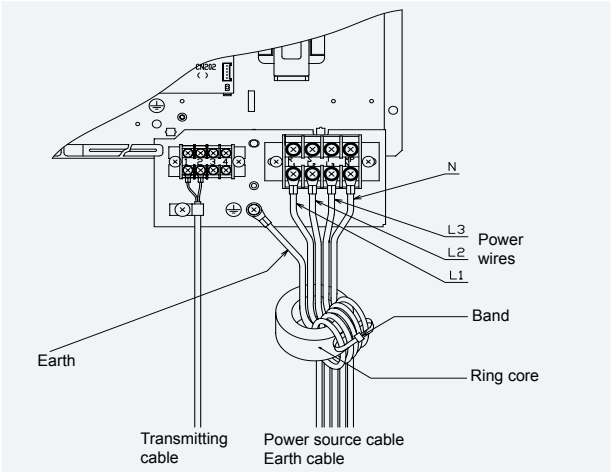
RAS-(3-6)HVRNME-AF



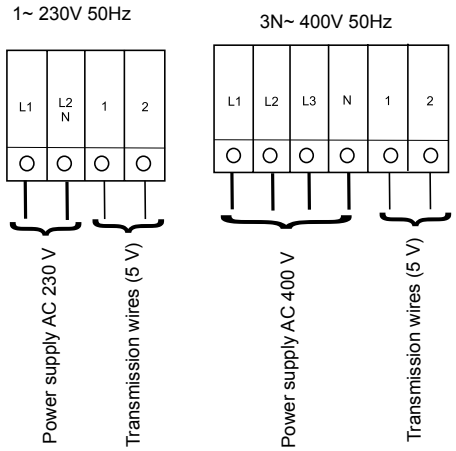
RAS-(4-6)HRNME-AF



RAS-(8/10)HRNME-AF

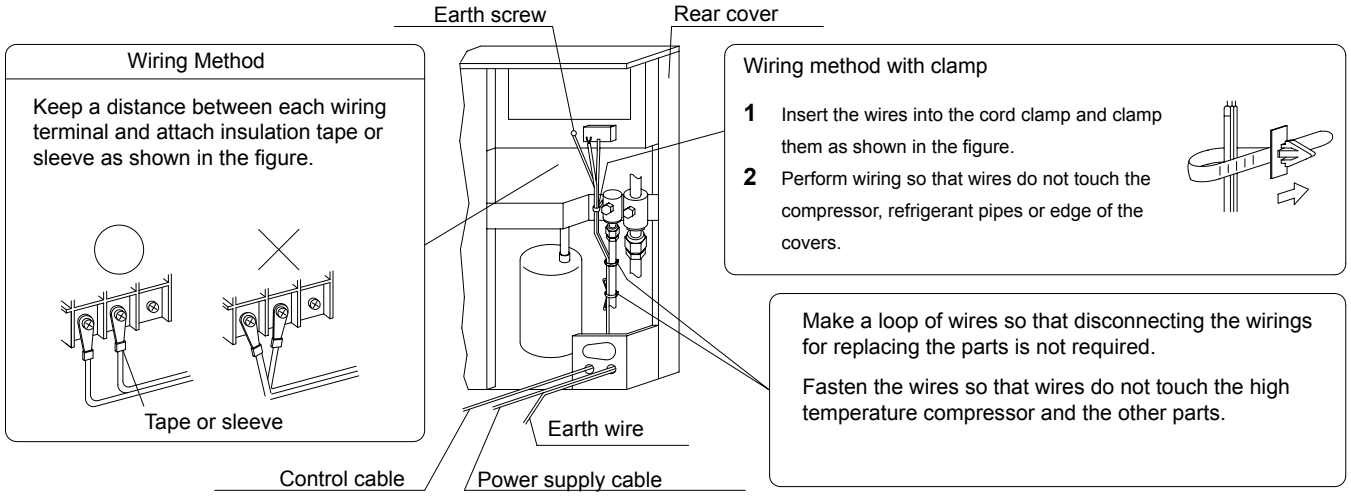


3 Connect the transmission wires between the outdoor unit and the indoor unit to the terminals 1 and 2 on the terminal board.



4 Fix the cable with the clamp supplied in the Electrical Box to ensure strain relief.

5 When routing out cable, make sure that it does not obstruct mounting of the outdoor service cover.



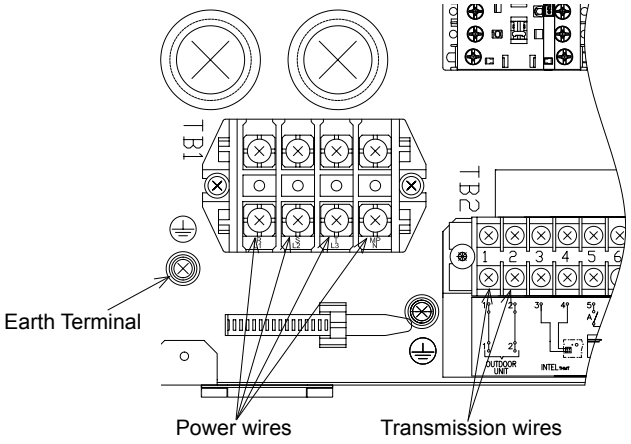
.

4.1.3 Electrical connection of indoor unit

◆ Wiring connection

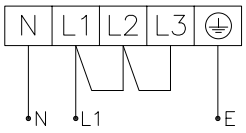
The correct electrical wiring connection for the outdoor unit is shown below:

1 Using the appropriate cable, connect the power circuit to the appropiatre terminals as shown on the wiring label and the illustration bellow.

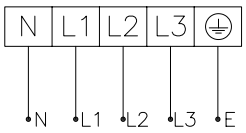


Power terminals

Power supply: 1~ 230V 50Hz



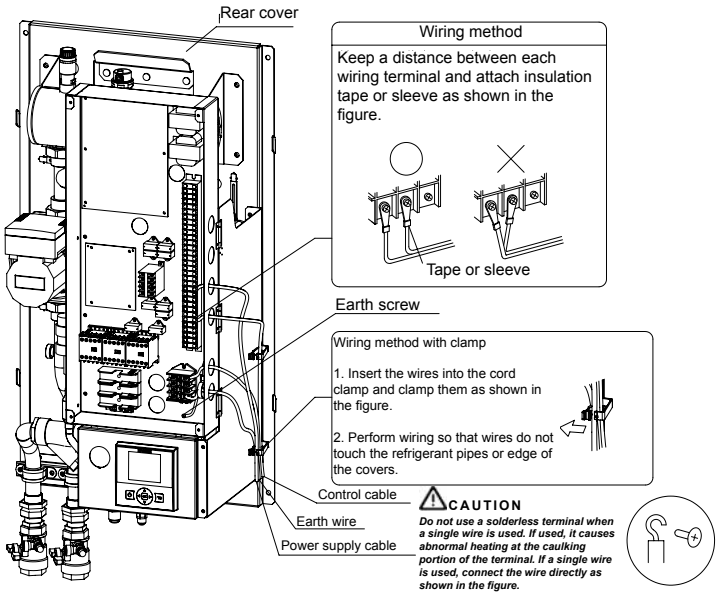
Power supply: 3N~ 400V 50Hz



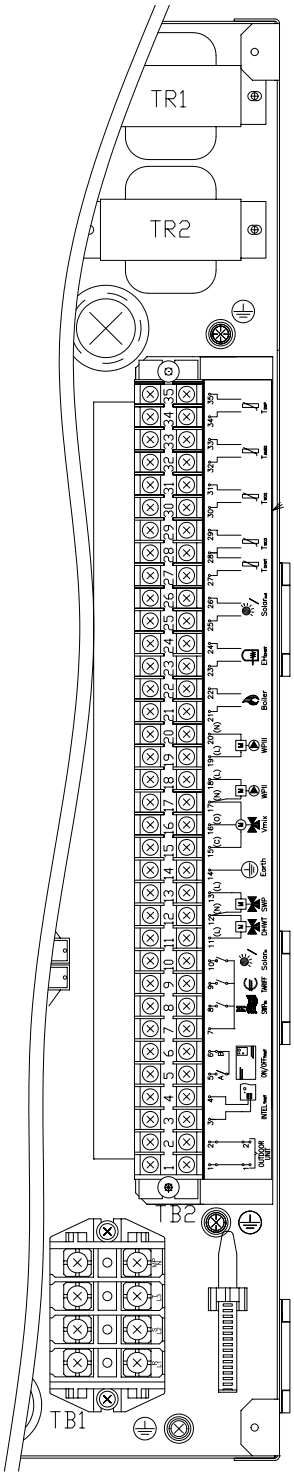
⚠ CAUTION

Be sure to use a dedicated power circuit for the indoor unit. Never use a power circuit shared by another appliance (Outdoor unit).

2 Using the appropiate cables, connect the power source cables L1 and N (for 230V 50Hz) or L1, L2, L3 and N (for 400V 50Hz) and the ground cable to the earthing screw in the electrical box base plate.
3 Connect the transmission wires between the outdoor unit and the indoor unit to the terminals 1 and 2 on the terminal board 2 (TB2).
4 Fix the cable with the clamp supplied in the Electrical Box to ensure strain relief.
5 When routing out cable, make sure that it does not obstruct mounting of the outdoor service cover.



◆ Terminal board connections



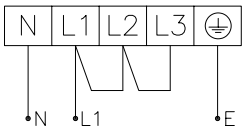
Mark	Part name		Description
TERMINAL BOARD 1 (TB1)			
N	AC 230V	AC 400V	The mains power supply connection (230/400VAC) is wired to terminals T,L1,L2,L3, N.
L1			
L2	-		
L3			
TERMINAL BOARD 2 (TB2)			
1	Indoor/Outdoor commutation cables		The H-LINK transmission between outdoor unit and indoor unit is wired to terminals 1-2.
2			
3	Opentherm communication cables		Only for Intelligent Room thermostat accessory: The receiver is connected to the polarity-free terminals A/B.
4			
5	Optional ON/OFF Room thermostat		The air to water heat pump system has been designed to allow the connection of a remote thermostat to effectively control your home's temperature. Depending on the room temperature, the thermostat will turn the air to water heat pump system ON and OFF. You will also be able to program the on and off times and achieve intelligent consumption levels.
6			
7	L Common		Terminal Line common for swimming pool, tariff switch or solar input accessory.
8	Swimming pool input		Only for swimming pool installations: It is necessary to connect an external input to the air to water heat pump to provide signal when Water pump of Swimming pool is ON.
9	Tariff switch input		If a tariff–switching device is provided by the electricity utility, it can be used to prevent the heat pump switching ON.
10	Solar input		Available input for Solar combination with Domestic Hot Water Tank.
11	Domestic Hot Water valve		The air to water heat pump can be used to heat DHW. This output will be on when DHW is activated.
12	N common		Neutral terminal common for accessory devices.
13	Swimming pool valve		The air to water heat pump can be use to heat Swimming pool. This output will be on when Swimming pool is activated.
14	Earth Connection		Terminal earth connection for accessories.
15	Mixing valve close		When a mixing system is required for a second temperature control, these two outputs are necessary to control de mixing valve.
16	Mixing valve open		
17	N Common		
18	Water Pump 2 (WP2)		When there is a second temperature application, a secondary pump is the circulating pump for the secondary heating loop.
19	Water Pump 3 (WP3)		When there is a hydraulic separator or buffer tank, additional Water pump (WP3) is needed.
20			
21	Boiler output		The boiler can be used when the heat pump cannot achieve the required temperature itself.
22			
23	Electrical Heater DHW Output		If DHW Storage tank contains an electric heater, the air to water heat pump can enable it if the heat pump cannot achieve the required DHW temperature itself.
24			
25	Solar output		Output for solar combination with Domestic Hot Water Tank.
26			
27	DHW thermistor		The DHW sensor is used to control the domestic hot water storage tank.
28	Common thermistor		Common terminal for thermistor.
29	Water outlet boiler (THMwo3)		Water sensor for boiler combination.
30	Water outlet C2 thermistor (THMwo2)		The sensor is used for the second temperature control and should be positioned after the mixing valve and the circulation pump.
31			
32(+)	Second ambient thermistor		The sensor is used for the second ambient temperature control and should be positioned outside.
33(-)			
34(+)	Swimming pool thermistor		The sensor is used for the swiming pool temperature control and should be positioned inside plate HEX of swimming pool.
35(-)			

◆ Terminal board detailed connection

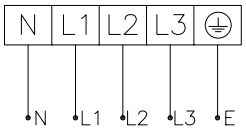
Main power supply (TB1)

The mains power connection is wired to Terminal Board 1 (TB1) as follows:

Power supply: 1~ 230V 50Hz



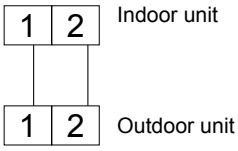
Power supply: 3N~ 400V 50Hz



Indoor/Outdoor commutation cables (TB2)

The transmission is wired to terminals 1-2.

The H-LINK II wiring system requires only two transmission cables that connect to the indoor unit and the outdoor unit.



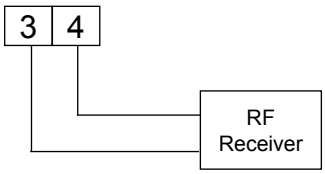
Room thermostat configuration

There are two different room thermostat types as accessory.

- **Optional intelligent room thermostat (TB2) (ATW-RTU-02)**

Only for Intelligent Room thermostat accessory: The receiver is connected to the polarity-free terminals 3/4.

The Room Unit and RF Receiver are already configured to communicate with each other. If the Room Unit or RF Receiver is replaced or added additional second temperature circuit thermostat, it is necessary to use the RF binding procedure (See binding procedure chapter)

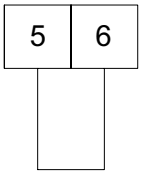


- **Optional ON/OFF room thermostat (TB2) (ATW-RTU-01)**

The heat pump system has been designed to allow the connection of a remote ON/OFF thermostat to effectively control your home's temperature. Depending on the room temperature, the thermostat will turn the unit system ON or OFF.

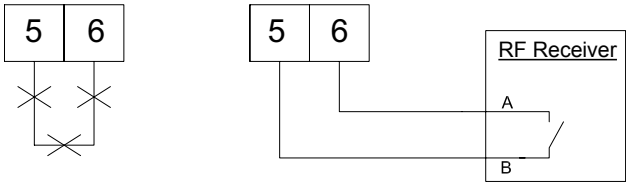
- If no thermostat is installed

Terminals 4 and 5 of the Board terminal are jumped. If no remote thermostat is installed, the operating condition for the unit (Thermo ON/OFF) will be controlled by the "water calculation" control system.



- **Installation of the AF-RTU-01 Thermostat (Hitachi part)**

Remove jumper between terminals 5 and 6 of the Terminal Board 2 and connect the thermostat receiver as shown in the following image:



Thermostat requirements:

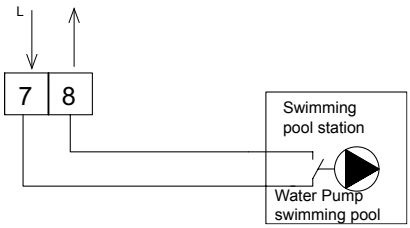
- Power supply: 230V AC.
- Contact voltage: 230V.

NOTE

- ***If intelligent room thermostat is selected, optional ON/OFF thermostat has no effect.***
- ***Set the configuration in the user control. See*** *LCD User interface configuration* ***for more information.***

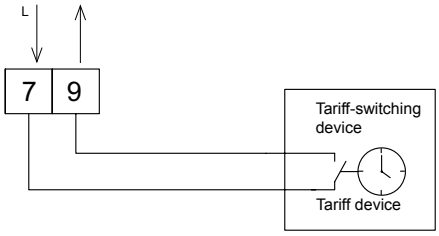
Swimming pool Input (TB2)

It is necessary to connect an external input to the Heat pump to provide a signal with Swimming pool's Water pump is ON.



Tariff switch input (TB2)

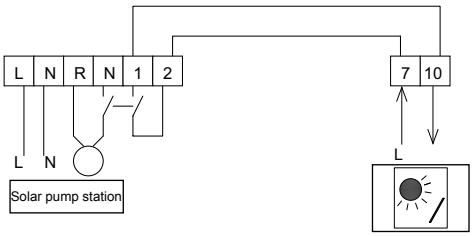
If a tariff-switching device (load shedding management) is provided by the electricity utility, it can be used to prevent the heat pump switching ON.



Solar input (TB2)

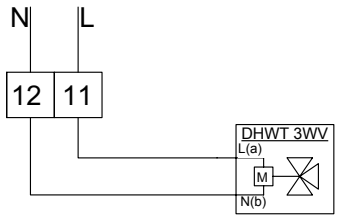
The solar pump station will have an auxiliary contact that closes when the solar pump station's pump contact is operated.

This contact will provide 230 V to the input of the indoor unit, and prevent domestic water heating by the heat pump and/or booster heater during solar heating.



Domestic hot water valve (TB2)

The unit can be used to heat DHW. The signal is used for the 3-way motorized diverting valve and provide position control of supply water flow (flow for space heating when no signal, and flow for DHW when signal is ON).



Using the appropriate cable, connect valve cable as shown in previous diagram.

Valve requirements:

- Power supply: 230V AC 50Hz.
- Maximum running current: 100mA

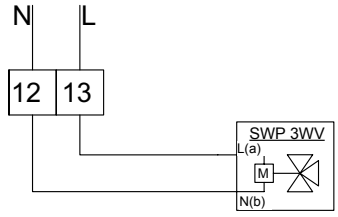
CAUTION

Only 3-way type valve can be connected:

- ***Spring return 2-wire type 3-way valve: The 3-way valve should be fitted when normally working (not power into the valve).***
- ***If using SPST 3-wire valve, HITACHI is not responsible for its operation.***

Swimming pool valve (TB2)

The unit can be used to heat Swimming pool. The signal is used for the 3-way motorized diverting valve and to provide position control of supply water flow (flow for space heating when no signal, and flow for swimming pool when signal is ON).



Using the appropriate cable, connect valve cable as shown in previous diagram.

Valve requirements:

- Power supply: 230V AC 50Hz.
- Maximum running current: 100mA

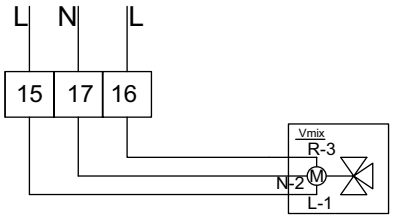
CAUTION

Only 3-way type valve can be connected:

- ***Spring return 2-wire type 3-way valve: the 3-way valve should be fitted when normally working (not power into the valve).***
- ***If using SPST 3-wire valve, HITACHI is not responsible for its operation.***

Mixing valve for 2nd circuit control (TB2)

In a mixing system (for second temperature level), the mixing valve is controlled to maintain the required supply temperature.



Item	Name	Description
15	Left	Close
17	Neutral	Neutral
16	Right	Open

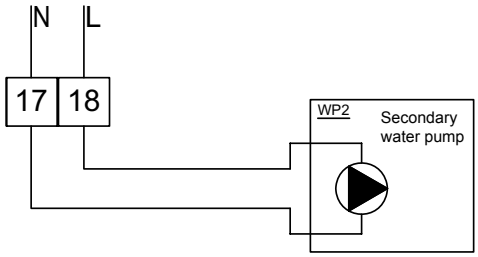
Using the appropriate cable, connect valve cable as shown in previous diagram.

Valve requirements:

- Power supply: 230V AC 50Hz.
- Maximum running current: 100mA

Water pump 2 for 2nd circuit control (TB2)

In case of second circuit installation (second temperature level), the secondary pump is the circulating pump for the second heating circuit.



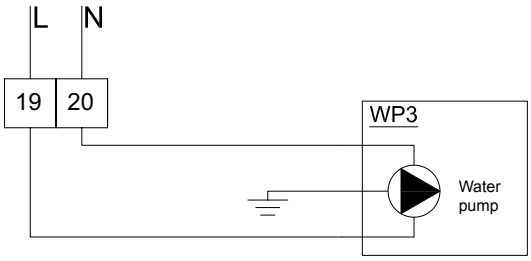
Using the appropriate cable, connect pump cable as shown in previous diagram.

Pump requirements:

- Power supply 230V AC 50Hz.
- Maximum running current: 500mA (In case of high water pump consumption, install an auxiliary relay).

Water pump 3 for hydraulic separator system (TB2)

When the boiler is configured with the heat pump or needs an additional pump for the system, a hydraulic separator or buffer tank must be used to ensure proper hydraulic balancing. Additional Water pump (WP3) is needed.



Using the appropriate cable, connect pump cable as shown in previous diagram.

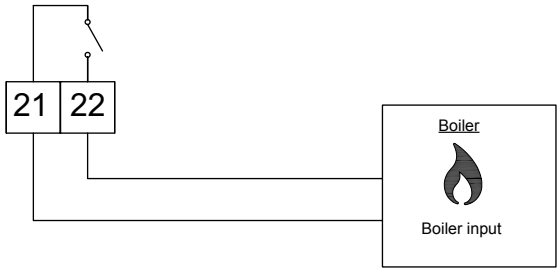
Pump requirements:

- Power supply. 230Vac 50Hz.
- Maximum running current: 500mA (In case of high water pump consumption, install an auxiliary relay).

Boiler output (TB2)

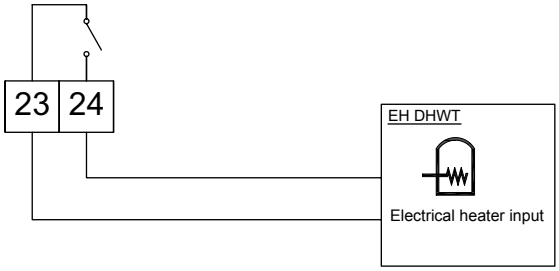
The boiler can be used when the heat pump cannot achieve the required temperature itself.

This output is activated when Boiler demands it.



Electrical heater DHWT output (TB2)

If DHW Storage tank contains an electric heater, the Air to water heat pump can enable it if the heat pump cannot achieve the required DHW temperature itself.

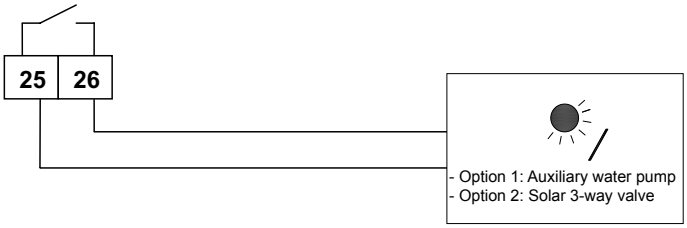


NOTE

For the HITACHI Domestic Hot Water Tank (DHW200/300(E/S)-2.5H1E) the Terminal connections will be terminals 3 and 4.

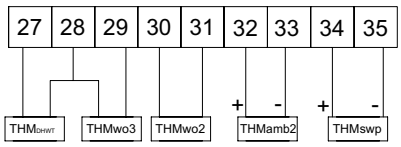
Solar output (TB2)

When solar mode is enabled by the heat pump and the temperature in the solar panel rises above the water temperature in the domestic hot water tank, Heat pump outputs will be switched ON.



Thermistors

- The DHW sensor (THM_{DHW}) is used to control the domestic hot water storage tank.
- Water sensor (THM_{WO3}) for hydraulic separator or buffer tank and boiler combination.
- The mixed supply sensor (THM_{WO2}) is used in systems with a mixing valve and should be positioned after the mixing valve and the circulation pump on the second circuit.
- 2nd ambient sensor (THM_{AMB2}) is used when the heatpump is located in a position not suitable for this measurament
- Swimming pool sensor (THM_{SWP}) is used for the swimming pool-temperature control and should be positioned inside plate HEX of swimming pool.



NOTE

2nd Ambient sensor and swimming pool temperature uses a sensor with 4-20mA transceiver, The 4-20mA signal is polarity-sensitive. You must connect the wires as shown.

4.2 Setting of DIP switches and RSW switches

4.2.1 Outdoor unit

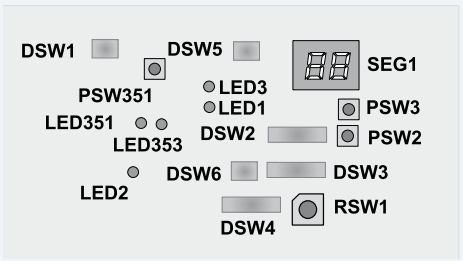
◆ Location of DIP switches and RSW switches

The PCB (see the electrical wiring diagram - plane a) in the outdoor unit is operated with different dip switches, rotary switches and push switches.

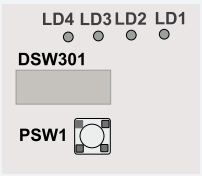
Position switches at the PCB:

RAS-2HVRN2

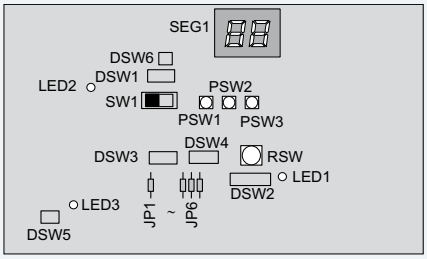
PCB1



PCB2



RAS-(3-10)H(V)RNME-AF



NOTE

- ***The mark "■" indicates the position of dips switches.***
- ***No mark "■" indicates pin position is not affecting.***
- ***The figures show the settings before shipment or after selection.***

CAUTION

Before setting dips switches, first turn the power source off and then set the position of the dips switches. In case of setting the switches without turning the power source off, the contents of the setting are invalid.

◆ Function of the of DIP switches and RSW switches

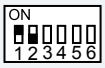
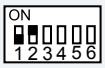
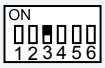
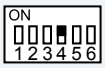
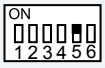
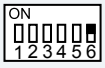
DSW1: Test Run

Function	Setting position
Setting before shipment	
Test run for cooling	
Test run for heating	
Forced stop of compressor (1) *The compressor is OFF during this operation.*	

NOTE

- ***It is possible to select the cancellation of the outdoor hot start control by pushing both PSW1 & PSW3 simultaneously during 3 seconds.***
- ***This operation is reset once the compressor is in Thermo-ON mode.***
- ***During the test run operation the units will operate continuously during 2 hours without Thermo-OFF and the 3-minute guard for compressor protection will be effective.***

DSW2: Piping length/selection function

Function		Setting position
Setting before shipment		
Piping length	5 m < Lt	
	Lt > 30 m	
	5 m < Lt < 30 m	
Cancellation of outdoor hot start control. (Not recommended, only available for special testing cases)		
Cancellation of outdoor air temperature control. (No change)		
Optional function selection setting (set by PSW)		
External input/output selection signals (set by PSW)		

CAUTION

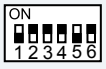
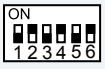
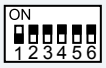
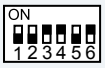
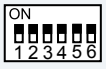
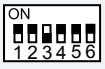
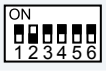
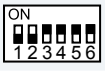
The cancellation of the outdoor hot start control configuration could damage the compressor if it is usually used. In that case the unit warranty will be void.

NOTE

Only for RAS-2HVRN2 units:

In case of using DHWT and Heat in summer operation, DSW2 pin 4 needs to be on.

DSW3: Capacity setting

Unit	Setting position	Unit	Setting position
RAS-2HVRN2		RAS-4HRNME-AF	
RAS-3HVRNME -AF		RAS-5HRNME -AF	
RAS-4HVRNME -AF		RAS-6HRNME -AF	
RAS-5HVRNME -AF		RAS-8HRNME -AF	
RAS-6HVRNME-AF		RAS-10HRNME-AF	

DSW4/RSW1: Refrigerant cycle setting (No change)

Setting position (DSW4)		Setting position (RSW1)	
Setting for tens (second digit)		Setting for units (first digit)	

Rotary switches' positions (RSW1) are set by inserting a screw driver into the groove.

DSW5: Transmission setting of end terminal resistance

Before shipment, No. 1 pin of DSW5 is set at ON.

Function	Setting position
Setting before shipment	

DSW6: Power source setting/individual operation

Function	Setting position			
	2HP	3HP	(4/5/6)HP	(8/10)HP
230V (setting before shipment)				-
400V (setting before shipment)	-	-		

◆ Jumpers

Jumper lead setting (JP1~6)

Setting before shipment:

JP1	JP2	JP3	JP4	JP5	JP6
1	0	0	1	1	1

0 = Open; 1 = Short circuit

The function selection using the jumper lead setting is shown in the table below.

Setting	Function	Details
JP1 (*)	Not used	-
JP2	Not used	-
JP3	Not used	-
JP4	Not used	-
JP5	Not used	-
JP6	Not used	-

(*) Only for RAS-(8/10)HRNME-AF

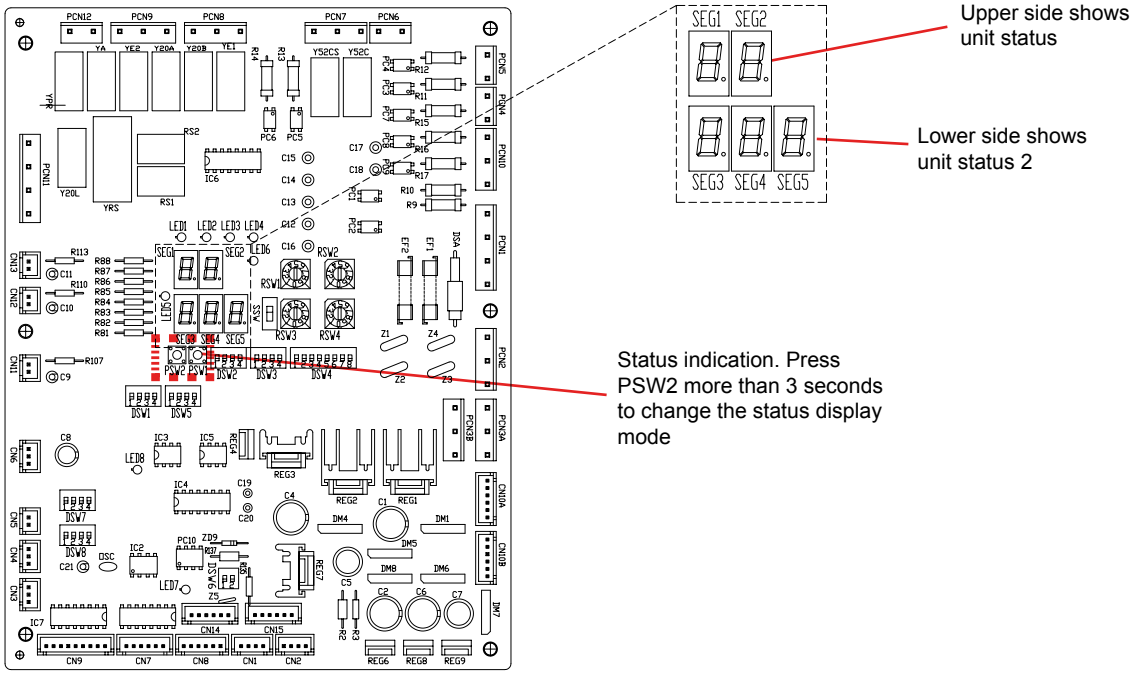
◆ LED's indication

LED Indication		
LED1	Red	This LED indicates the transmission status between the indoor unit and the RCS
LED2	Yellow	This LED indicates the transmission status between the indoor unit and the outdoor unit
LED3	Green	Power source for the PCB

4.2.2 Indoor unit

◆ Location of DIP switches and RSW switches

Below are the dip switch positions:



NOTE

- ***The mark "■" indicates the dip switches positions.***
- ***No mark "■" indicates pin position is not affected.***
- ***The figures show the settings before shipment or after selection.***
- ***"Not used" means that the pin must not be changed. A malfunction might occur if changed.***

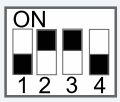
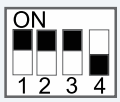
CAUTION

Before setting dip switches, first turn the power supply OFF and then set the position of dip switches. If the switches are set without turning the power supply OFF, the contents of the setting are invalid.

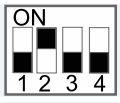
◆ Functions of dip switches and rotary switches

DSW1: Not used

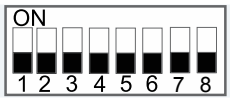
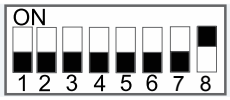
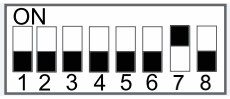
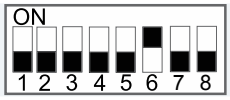
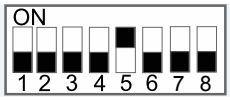
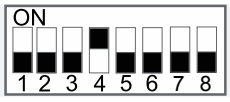
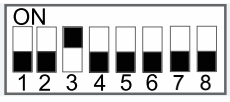
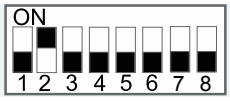
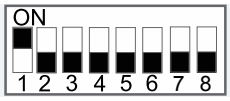
DSW2: Unit capacity setting

RWM-2.0FSN3E	
RWM-3.0FSN3E	
RWM-4.0FSN3E	
RWM-5.0FSN3E	
RWM-6.0FSN3E	
RWM-8.0FSN3E	
RWM-10.0FSN3E	

DSW3: Additional settings

Setting before shipment	
N.A (not used)	
N.A (not used)	
1-step heater for 3-phase unit	
N.A. (Not used)	

DSW4: Additional setting

Setting before shipment	
Optional functions enabled	
Heater Forced OFF	
N.A. (Not used)	
Standard / ECO water pump operation	
Emergency operation heater	
Cooling operation	
Outdoor sensor accessory	
N.A (not used)	

NOTE

Never activate Heater Forced OFF and Emergency operation heater at the same time.

CAUTION

Never turn all DSW4 dip switch pins ON. If this happens, the software of the unit will be removed.

DSW5: Internal configuration

Not used

DSW6: Internal configuration

Not used

DSW7: Internal configuration

Not used

DSW8: Internal configuration

Not used

DSW9: Internal configuration

Not used

RSW1 & RSW2: Refrigerant cycle setting

Refrigerant cycle setting: RSW1: Ten digits RSW2: Unit digits	

RSW3 & RSW4: Indoor unit address setting

Refrigerant cycle setting: RSW3: Ten digits RSW4: Unit digits	

◆ Led indications

LED1: Pump operation

Status	LED1
Pump operation ON	ON
Power supply OFF	OFF

LED2: System heater operation

Status	LED2
System Heater or Boiler operation	ON
System Heater or Boiler operation	OFF

LED3: HSW Heater operation

Status	LED3
HSW Heater operation ON	ON
HSW Heater operation OFF	OFF

LED4: Operation status indication

Status	LED4
Thermo OFF	OFF
Thermo ON	ON

LED5: Power supply indication

Status	LED5
Supply ON	ON
Supply OFF	OFF

LED6: Alarm indication

Status	LED5
Alarm ON	ON (flick)
Alarm OFF	OFF

LED7: Not used

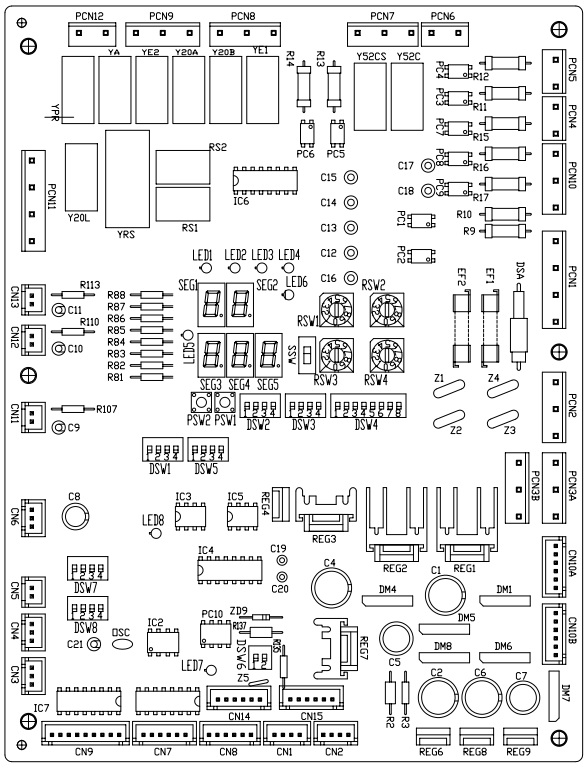
LED8: H-Link transmission indication

◆ **Operation display (seven-segments PCB)**

Operation display at normal operation

- Segment display:

	Segment Display	
	Upper (2 char)	Lower (3 char)
Unit OFF	oF	
Cooling – Demand OFF	Co	St
Cooling – Thermo OFF		oF
Cooling – Thermo ON		on
Heating – Demand OFF	hE	St
Heating – Thermo OFF		oF
Heating – Thermo ON		on
Heating – Boiler ON		bo
Hot Sanitary Water – Thermo OFF	hS	oF
Hot Sanitary Water – Thermo ON		on
Swimming Pool – Thermo OFF	SP	oF
Swimming Pool – Thermo ON		on
Alarm	AL	Alarm code
Test Run Heating/Cooling	t(h/c)	--
Tariff function enabled	HE/Co	tAr

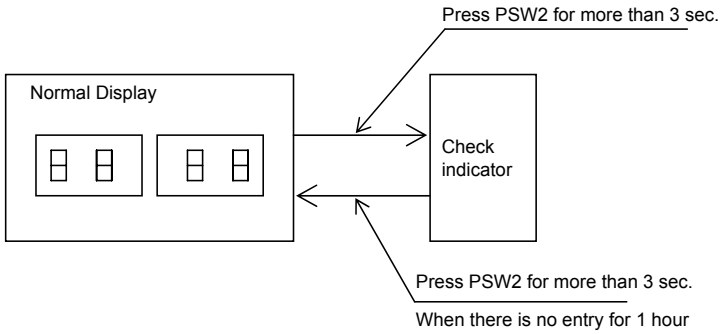


Check indicator

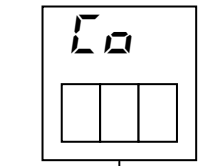
- Combination of checking switches (▲: PSW2▼: PSW1) displays the three indications shown below:

▲: PSW2	▼: PSW1	Function name	Detail of display
○		Check indicator	Water temps, cycle temps, etc

○: Press for more than 3 sec



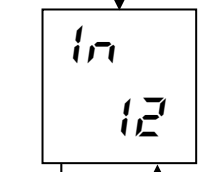
- Check indicator mode
  Switches to this mode to display the temperature that the microcomputer detects, etc. when PSW2 is pressed more than three seconds.
  Operation and display Details:
  Check indication



This section shows an example of “check indication”

Temperature is displayed with the number rounded up to the nearest whole number. Fix the minus sign to the box on the left.

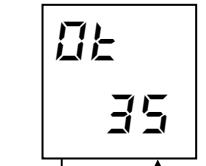
Press PSW2 for more than 3 sec.



Cold water inlet temperature

<Example of 12ºC

PSW2 PSW1



Cold water outlet temperature

<Example of 12ºC

PSW2 PSW1

...

...

- Summary table of “Check indication”

Code Display	Data display	Description
tH	888	Heat water Temperature Setting (ºC)
tC	888	Cold Water Temperature Setting (ºC)
in	888	Water Inlet Temperature (THM_{WI}) (ºC)
ot	888	Water outlet Temperature (THM_{WO}) (ºC)
o1	888	Water outlet Temperature HP (THM_{WOHP}) (ºC)
o2	888	Water outlet Temperature Circuit 2 (THM_{WO2}) (ºC)
ob	888	Water outlet Temperature Boiler (THM_{WO3})
oh	888	Water outlet Temperature DHW (THM_{DHW}) (ºC)
o5	888	Swimming pool Temperature (THM_{SWP}) (ºC)
tA	888	Outdoor Unit Ambient Temperature (THM7) (ºC)
tA.	888	Second ambient Temperature (THM_{AMB2}) (ºC)
t1	888	Outdoor Unit Average Ambient Temperature (ºC)
tG	888	Gas Temperature (THM_{G}) (ºC)
tL	888	Liquid Temperature (THM_{L}) (ºC)
td	888	Compressor top Temperature (THM9) (ºC)
t5	888	Evaporation gas Temperature (THM8) (ºC)
dF	888	Defrosting
d1	888	Cause of stoppage
h1	888	Inverter Operation frequency (Hz)
E1	888	Indoor Expansion valve opening (%)
Eo	888	Outdoor Expansion valve opening
P1	888	Compressor running current (A)
d1	888	Digital inputs
do	888	Digital outputs
ou	888	Refrigerant Cycle Address
iu	888	Indoor Unit Address
no	888	ROM Nº
Cd	888	Capacity Code (Hp x 8)
Co	888	Outdoor capacity Cope (Hp x 8)

Indoor & Outdoor Unit Capacity Code

Capacity	Code
2HP	14
3HP	22
4HP	32
5HP	40
6HP	48
8HP	64
10HP	80

4.3 Common wiring

CAUTION

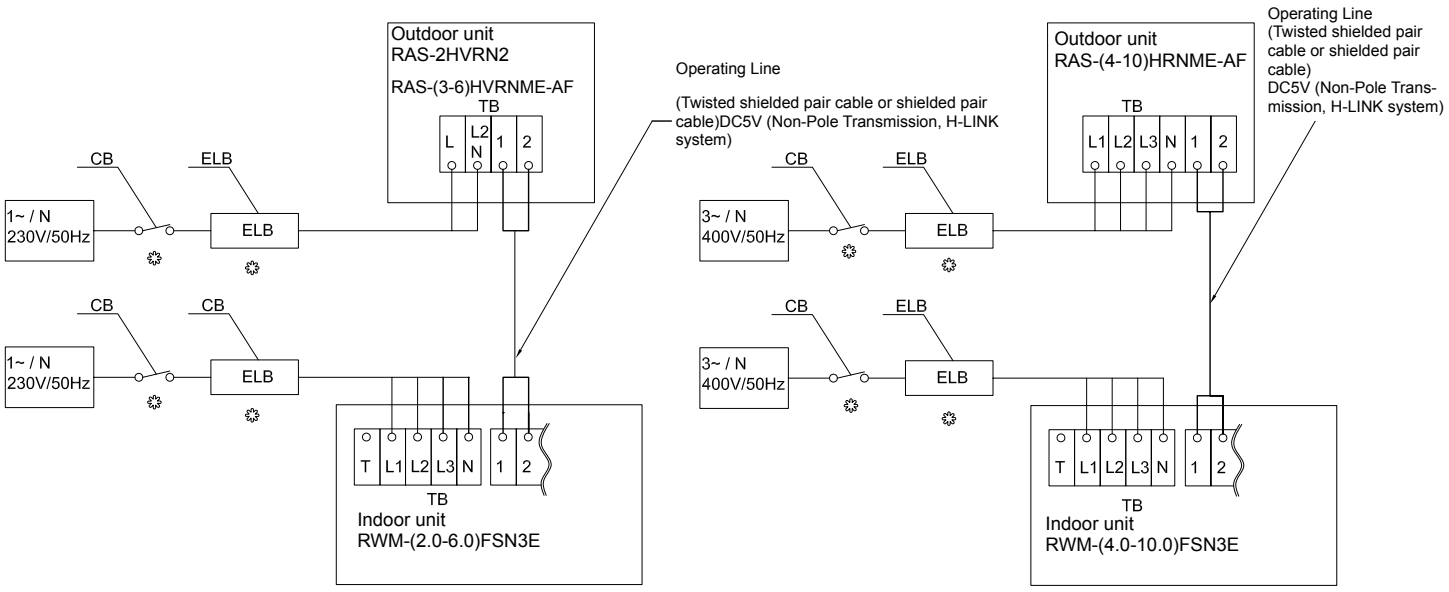
All the field wiring and electrical components must comply with local codes.

4.3.1 Electrical wiring between outdoor and indoor unit

- Connect the electrical wires between the indoor unit and the outdoor unit, as shown in the next diagram.
- Follow the local codes and regulations when performing the electrical wiring.
- Use twist pair wires (more than 0.75 mm²) for operation wiring between outdoor unit and indoor unit.
- Use 2-core wires for the operating line (Do not use wire with more than 3 cores).
- Use shielded wires for intermediate wiring to protect the units from noise obstacle and sizing in compliance with local codes.
- In the event that a conduit tube for field-wiring is not used, fix rubber bushes to the panel with adhesive.
- All the field wiring and equipment must comply with local and international codes.

CAUTION

Pay attention to the connection of the operating line. Incorrect connection may cause PCB failure.



TB : Terminal Board
CB : Circuit Breaker
ELB : Earth Leakage Breaker
– – – : Internal Wiring
——— : Field Wiring
☼ : Field-Supplied
1,2 : Outdoor-Indoor connection

NOTE

The power supply must be connected to the outdoor unit and indoor unit separately.

4.3.2 Wire sizes

- Recommended minimum sizes for field provided wires

Model	Power supply	Max. Current (A)	Power supply cable size	Required number of wires	Transmitting Cable Size	Required number of wires	Actuator cable size	Required number of wires
			EN60335-1		EN60335-1		EN60335-1	
RWM-2.0FSN3E	1~ 230V 50Hz	16	4.0 mm²	2 + GND	0.75 mm²	2 + (*Shielded cable)	0.75 mm²	2 + GND
RWM-3.0FSN3E		16	4.0 mm²					
RWM-4.0FSN3E	1~ 230V 50Hz 3N~ 400V 50Hz	32/11	6.0/2.5 mm²	2 + GND / 4 + GND				
RWM-5.0FSN3E		32/11	6.0/2.5 mm²					
RWM-6.0FSN3E		32/11	6.0/2.5 mm²					
RWM-8.0FSN3E	3N~ 400V 50Hz	17	4.0 mm²	4 + GND				
RWM-10.0FSN3E		17	4.0 mm²					
RAS-2HVRN2	1~ 230V 50Hz	11	2.5 mm²	2 + GND				
RAS-3HVRNME-AF		14	4.0 mm²					
RAS-4HVRNME-AF		18	4.0 mm²					
RAS-5HVRNME-AF		26	6.0 mm²					
RAS-6HVRNME-AF		26	6.0 mm²					
RAS-4HRNME-AF	3N~400V 50 Hz	7	2.5 mm²	4 + GND				
RAS-5HRNME-AF		11	4.0 mm²					
RAS-6HRNME-AF		13	4.0 mm²					
RAS-8HRNME-AF		13	4.0 mm²					
RAS-10HRNME-AF		17	4.0 mm²					

NOTE

GND: Ground wire

- Types of switches

Select the main switches in accordance with the following table:

Model	Power supply	Max. Current (A)	CB (A)	ELB (no. of poles/A/mA)
RWM-2.0FSN3E	1~230V 50Hz	16	20	2/40/30
RWM-3.0FSN3E		16	20	
RWM-4.0FSN3E	1~230V 50Hz 3N~400V 50Hz	32/11	32/15	2/40/30 - 4/40/30
RWM-5.0FSN3E		32/11	32/15	
RWM-6.0FSN3E		32/11	32/15	
RWM-8.0FSN3E	3N~400V 50Hz	17	20	4/40/30
RWM-10.0FSN3E		17	20	
RAS-2HVRN2	1~230V 50Hz	11	16	2/40/30
RAS-3HVRNME-AF		14	25	
RAS-4HVRNME-AF		18	25	
RAS-5HVRNME-AF		26	32	
RAS-6HVRNME-AF		26	32	
RAS-4HRNME-AF	3N~400V 50 Hz	7	15	4/40/30
RAS-5HRNME-AF		11	20	
RAS-6HRNME-AF		13	20	
RAS-8HRNME-AF		13,2	20	
RAS-10HRNME-AF		17,1	25	

NOTE

CB: Circuit Breaker

ELB: Earth Leakage Breaker

4.4 DHWT - Domestic Hot Water Tank

General check

1 Ensure that the field-supplied electrical components (mains power switches, circuit breakers, wires, connectors and wire terminals) have been properly selected according to the electrical data indicated. Make sure that they comply with national and regional electrical codes.
2 Electrical connection must be done by professional installer.
3 Check to ensure that the power supply voltage is within +/-10% of the rated voltage.
4 Make ensure that power supply has an impedance low enough to warranty not reduce the starting voltage more than 85% of the rated voltage.
5 Check that the earth wire is securely connected, tagged and locked in accordance with national and local codes.
6 Connect a fuse of specified capacity.
7 Check periodically the electrical connection tightening.

DANGER

Electrical hazard. Can cause serious injuries or death.

- ***Do not connect or adjust any wiring or connections unless the main power switch is OFF.***
- ***Make sure that all the power sources are switched OFF.***
- ***Check that the earth wire is securely connected, tagged and locked in accordance with national and local codes.***
- ***Check and test to ensure that if there is more than one source of power supply, that all are turned OFF.***
- ***Check to ensure that the screws of the terminal block are tightly tightened.***

Crash hazard. Can cause serious injuries or death.

- ***Check to ensure that Yutaki fans are stopped before electrical wiring work or periodical check is performed.***

CAUTION

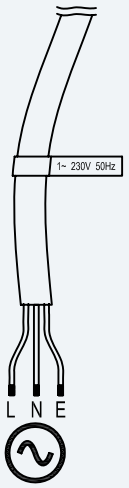
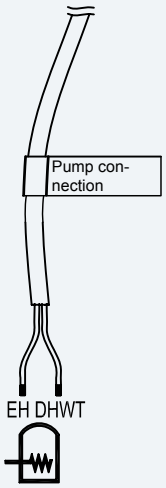
Damage to wires. Risk of fire.

- ***Protect the wires, drain pipe and electrical parts from water, rats or other small animals. If not protected, rats may damage unprotected parts.***
- ***Wrap the accessory packing around the wires, and plug the wiring connection hole with the seal material to protect the product from any condensed water and insects.***
- ***Tightly secure the wires with the cord clamp inside the unit.***
- ***Electrical wiring must comply with national and local codes. Contact your local authority in regards to standards, rules, regulations, etc.***
- ***Check that the ground wire is securely connected.***

◆ Electrical wiring connection

The electrical wiring connection between DHWT and Yutaki system is as follows:

Customer connection:

Power supply: 1~ 230V 50Hz	Electric heater DHWT	Sensor DHWT
		

◆ Wire size

- Recommended minimum size for field provided wires:

Model	Power supply	Maximum current (A)	Power supply cable size	EH control cable size	Sensor cable size
			EN60335-1	EN60335-1	EN60335-1
DHWT	1~ 230V 50Hz	15	2.5 mm²	1.0 mm²	0.75 mm²

- Type of switches:

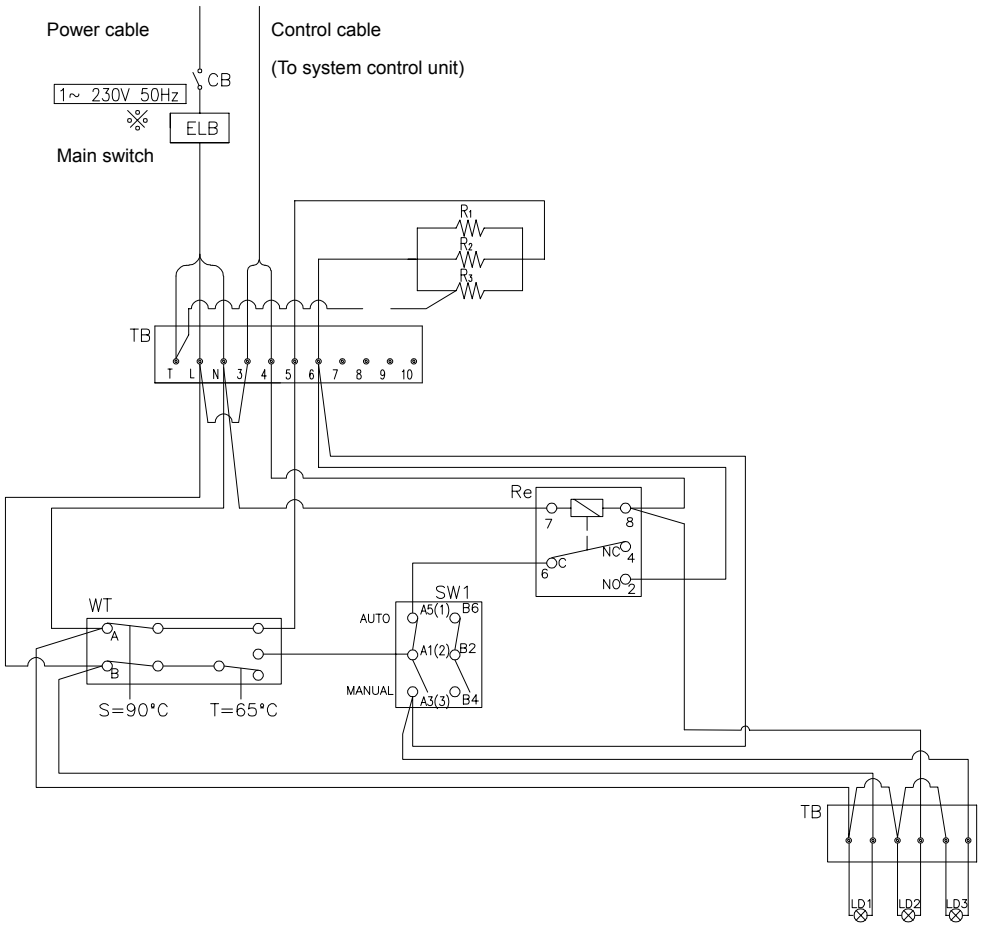
Select the main switches in accordance with the following table:

Model	Power supply	Maximum current (A)	CB (A)	ELB (nº of poles/A/mA)
DHWT	1~ 230V 50Hz	15	20	2/40/30

NOTE

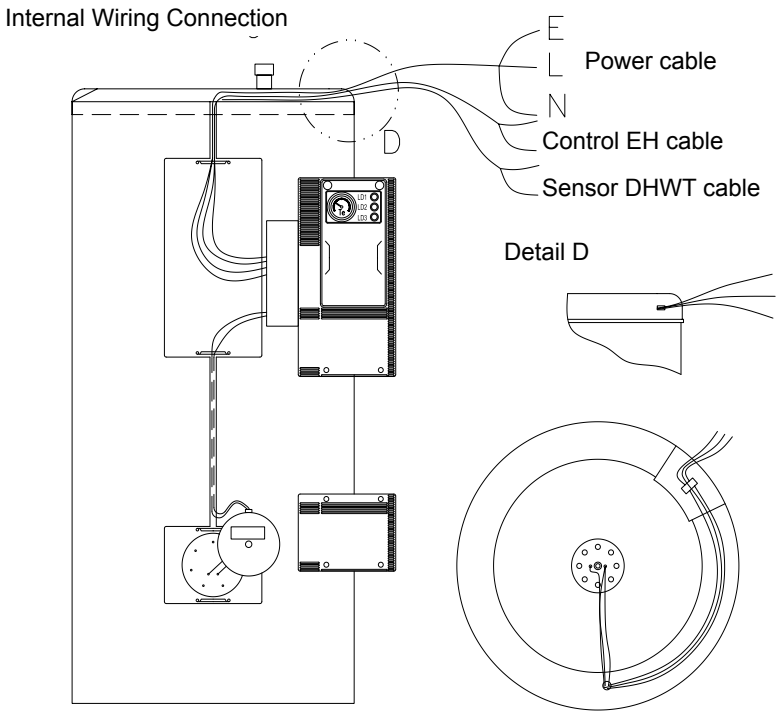
- ***CB: Circuit Breaker***
- ***ELB: Earth Leakage Breaker***
- ***Follow local codes and regulations when selecting field wires, Circuit Breakers and Earth Leakage Breakers***
- ***Use the wires which are not lighter than de ordinary polychloroprene sheated flexible cord (code designation H05RN-F).Electrical wiring connection diagram***

Electrical wiring connection diagram

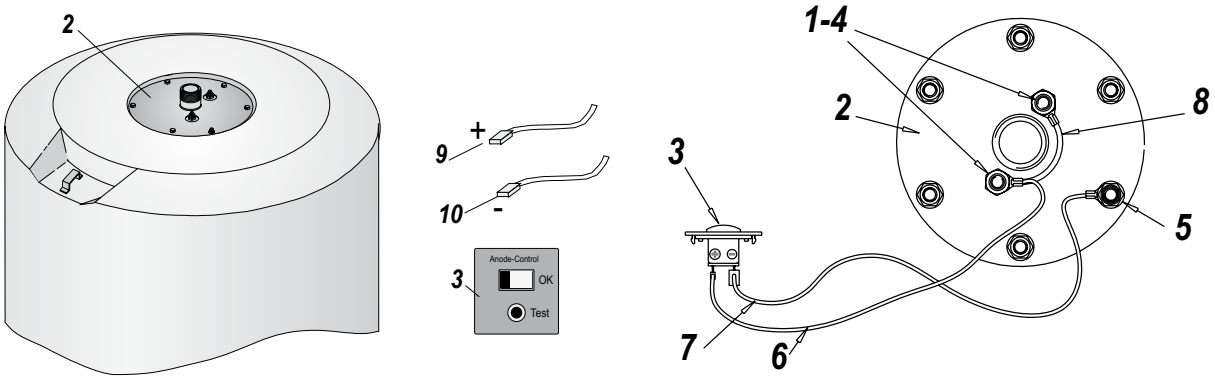


Ref.	Name
WT	Regulating and Safety thermostat
Re	Auxiliary Relay
SW1	Operating Mode switch
R 123	Electrical Heater
LD1	LED1: POWER ON
LD2	LED2: AUTO MODE ON
LD3	LED3: Electrical Heater Manual
TB	Terminal Board
L/N/T	Power supply
3/4	Control Heater Input
5/6	Electrical Heater Connection

Internal wiring



Cathodic protection



In order to protect the inside of the vessel from corrosion all the enamelled DHWT can be equipped whit a cathodic protection unit, comprising magnesium sacrifice anodes, charge gauges and wiring of connection.

It basically comprises a magnesium anode (1) mounted on the storage tank's connection plate (2), connected to the external anode load measured (3) which allow to know the anode consumption rate without having to dismantle it.

The electrical connection of the load measured (3) to the anode (1), is made through the wiring of connection (6):

- To the anode: U shaped terminal M10 (4)
- To the load measured: female Faston terminal 2.8 (10)

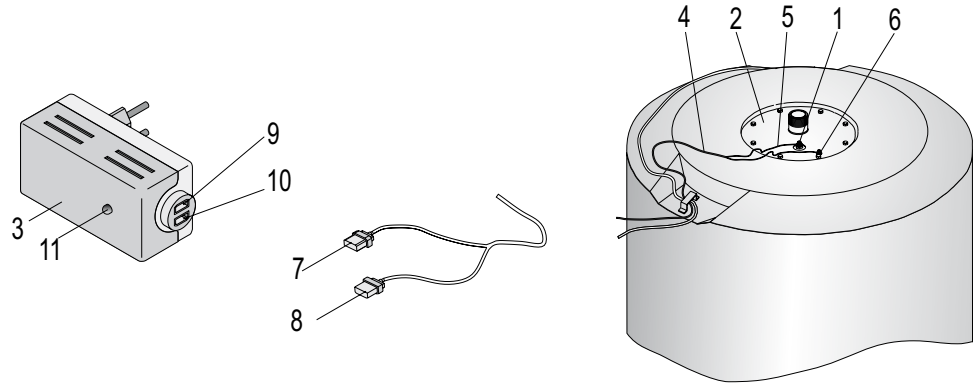
The electrical connection of the load measured (3) to the earth, is made through the wiring of connection (7):

- To earth: U shaped terminal M10 (5)
- To the load measured: female Faston terminal 6.3 (10)

CAUTION

- ***Check the magnesium anode load periodically by pushing the button. If the gauge is in the red zone, the magnesium anode must be replaced.***
- ***Do not install the permanent cathode protection and the cathodic protection together.***

◆ Titanium protection accessory



All the Hitachi DHWT can be equipped with the permanent cathode protection system which is totally automatic and maintenance free.

It basically comprises a titanium anode (1) mounted on the storage tank's connection plate (2) and connected to a potentiostat (3) which automatically regulates the input current to the anode, constantly measuring the potential of the storage tank), through the leads (4).Wiring the anode to the potentiostat by means of leads (4) is carried out in the following way:

- To the anode: connection (5), female Faston terminal.
- To earth: connection (6), U shaped terminal.
- To the potentiostat: connections at (9) and (10), pins (7) and (8) respectively.

NOTE

- ***Use original wires only. To avoid any risk of corrosion due to reverse polarity do not lengthen nor shorten the wires.***
- ***Use a socket base near to the storage heater for this purpose.The protective anode starts comes into operation when the storage heater is full of water. When there is no water the control pilot light (11) lights up red and blinks on and off.***
- ***If the pilot light (11) is green, this shows that the storage heater is receiving a protective current. If the pilot light is not on or lights up red and blinks, check the connections, contacts and mains supply. If this anomaly continues, contact the fitter or our Customer Technical Service Department.***
- ***In the case of vertically installed storage heaters from which water is not going to be extracted for periods of more than 3 months, we recommend fitting an automatic purger at the DHW outlet.***
- ***If the storage heater is installed horizontally, we recommend the extraction of water at least once every 3 months.***
- ***The potentiostat (3) and connecting wires (4) must not be disconnected, except when the storage heater is emptied.***
- ***Do not disconnect the protection system during periods of absense (holidays, etc.).***
- ***Occasionally check that the pilot light is working correctly (11).***

◆ Electric heater

The electric heater is made of Incoloy alloy 825 and complies with the European Low Voltage Directive 2006/95/EC.

It comprises a flange that holds three U-Shaped heating elements for 2.5kw power resistances.

Replace electric heater

The steps to be followed are:

1. Totally disconnect the unit from the main power supply.
2. With the help of a tool remove the heater to be replaced. Be careful not to damage the enamel surface in case of enamelled tanks.
3. Insert the new heater in the same position as the old one.
4. Connect again and plug into the main power supply.

Safety measures

Before any intervention, totally disconnect the DHWT from the main power supply. All the connections circuits must be disconnected.

Installation, configuration, start up and maintenance of heating elements must be carried out by an authorised electrical fitter. All standards and regulations must be observed.

The user is responsible of ensuring that the essential requirements of the European Low Voltage Directive are respected.

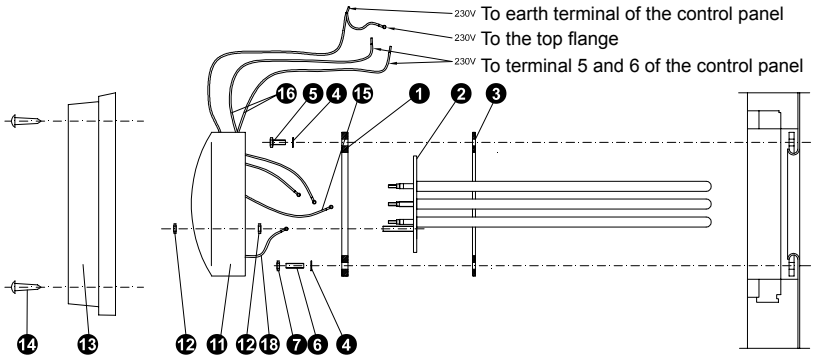
Electric heating elements generates high temperatures. Precautions should be taken to protect goods and persons from accidental burns during the operation and after the equipment has been disconnected or installed.

Note minimum cable section: Resistances of 2.5kW recommended cable: H05SJ-K accordance with UNE 21027, and will have at least 2.5mm² section.

The tanks must be with a DHWT temperature control thermostat and an all-pole limiter thermostat (the setting of these two components must be compatible with the design parameters of storage tanks). The sensors must always be located at a higher level than the electric heater element.

We recommend installing appropriate safety devices (temperature safety device, safety level for heating liquids by natural convection, flow safety device for liquids in circulation, etc.).

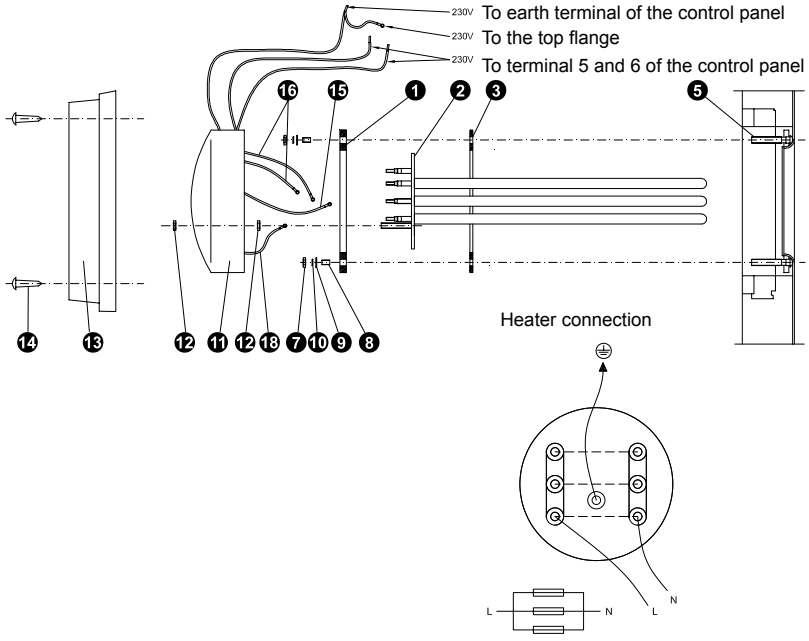
DHWT(200/300)S-2.5H1E



Ref.	Name
1	Flange
2	Heater
3	Seal
4	Washers
5	Screws
6	Studs
7	Nuts
11	Metal protective casing
12	Screws M6
13	Panel
14	Screws M4
16	Wires
18	Earth Wire

4

DHWT(200/300)E-2.5H1E



Ref.	Name
1	Flange
2	Heater
3	Seal
7	Nuts
8	Nylon bushing
9	Nylon washers
10	Metalic washers
11	Metal protective casing
12	Screws M6
13	Panel
14	Screws M4
16	Wires
18	Earth Wire

HITACHI
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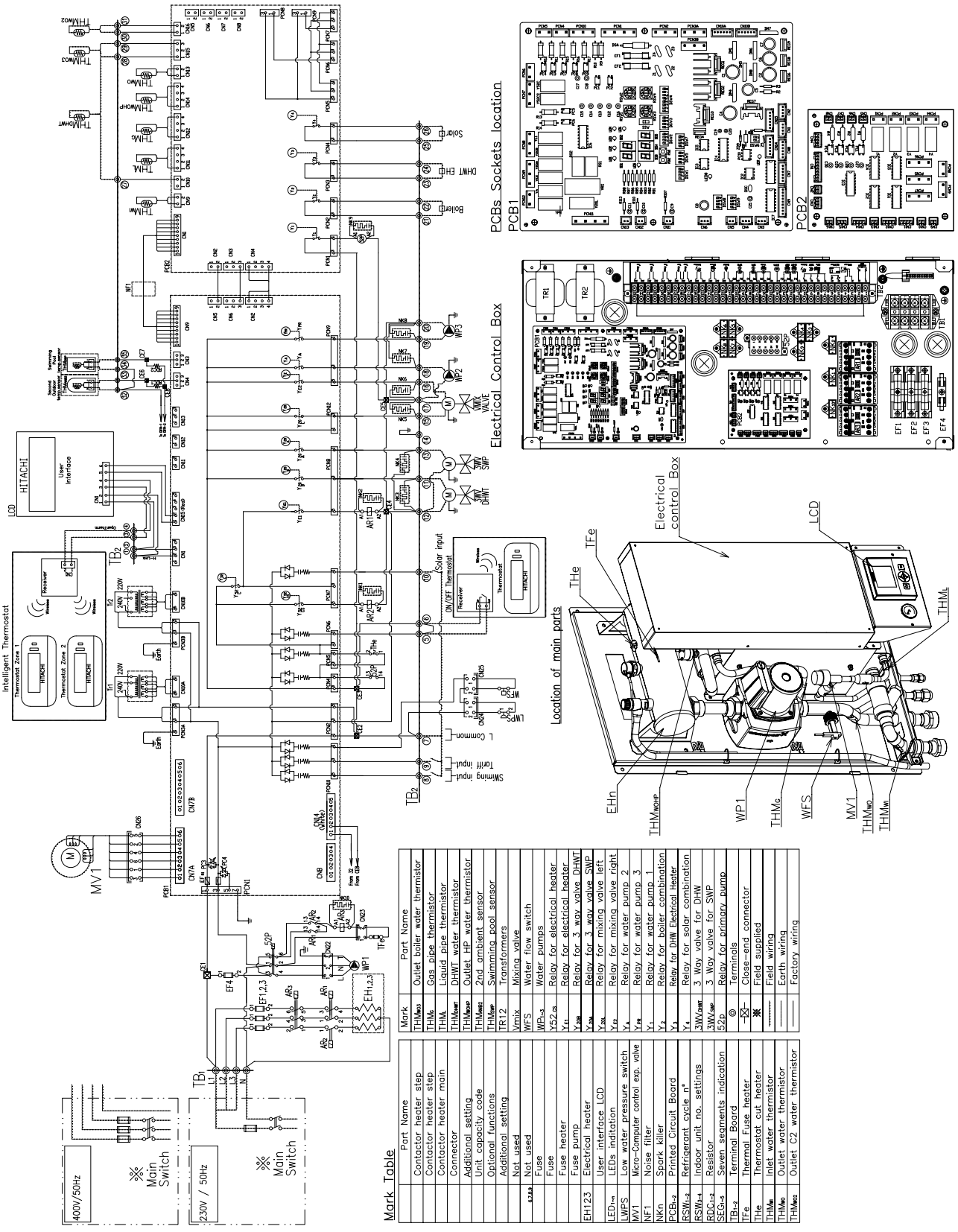
4.5 Electrical Wiring Diagrams

4.5.1 Electrical wiring diagram for indoor unit

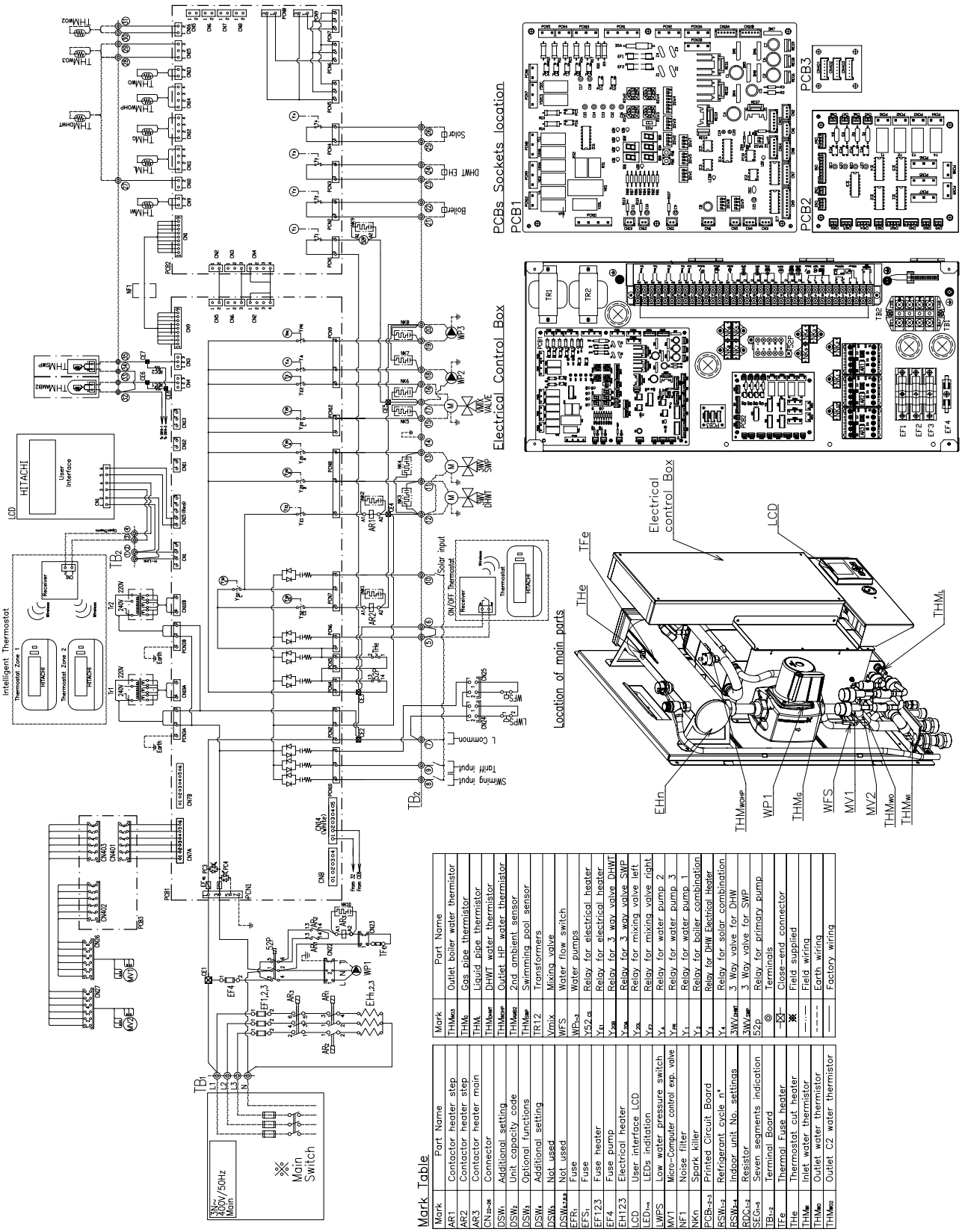
◆ **RWM-(2.0-6.0)FSN3E**



Mark Table

Part Name	Mark	Part Name
Contactor heater step	THMwo	Outlet boiler water thermistor
Contactor heater step	THMg	Gas pipe thermistor
Contactor heater main	THML	Liquid pipe thermistor
Connector	THMdwhr	DHWT water thermistor
Additional setting	THMchp	Outlet HP water thermistor
Unit capacity code	THMamb	2nd ambient sensor
Optional functions	THMsw	Swimming pool sensor
Additional setting	TR12	Transformers
Not used	Vmix	Mixing valve
Not used	WFS	Water flow switch
Fuse	WP1~3	Water pumps
Fuse	Y52.os	Relay for electrical heater
Fuse heater	Y1	Relay for electrical heater
Fuse pump	Ydw	Relay for 3 way valve DHWT
Electrical heater	Y2w	Relay for 3 way valve SWP
User interface LCD	Y2v	Relay for mixing valve left
LEDs indication	Y3v	Relay for mixing valve right
Low water pressure switch	Y4	Relay for water pump 2
Micro-Computer control exp. valve	Ym	Relay for water pump 3
Noise filter	Y1	Relay for water pump 1
Spark killer	Y3	Relay for boiler combination
Printed Circuit Board	Y5	Relay for DHW Electrical Heater
Refrigerant cycle n°	Y4	Relay for solar combination
Indoor unit no. settings	3WVdwhr	3 Way valve for DHW
Resistor	3WVsw	3 Way valve for SWP
Seven segments indication	52p	Relay for primary pump
Terminal Board	⊗	Terminals
Thermal Fuse heater	⊠	Close-end connector
Thermostat cut heater	※	Field supplied
Inlet water thermistor	------	Field wiring
Outlet water thermistor	———	Earth wiring
Outlet C2 water thermistor	———	Factory wiring

◆ RWM-(8.0/10)FSN3E



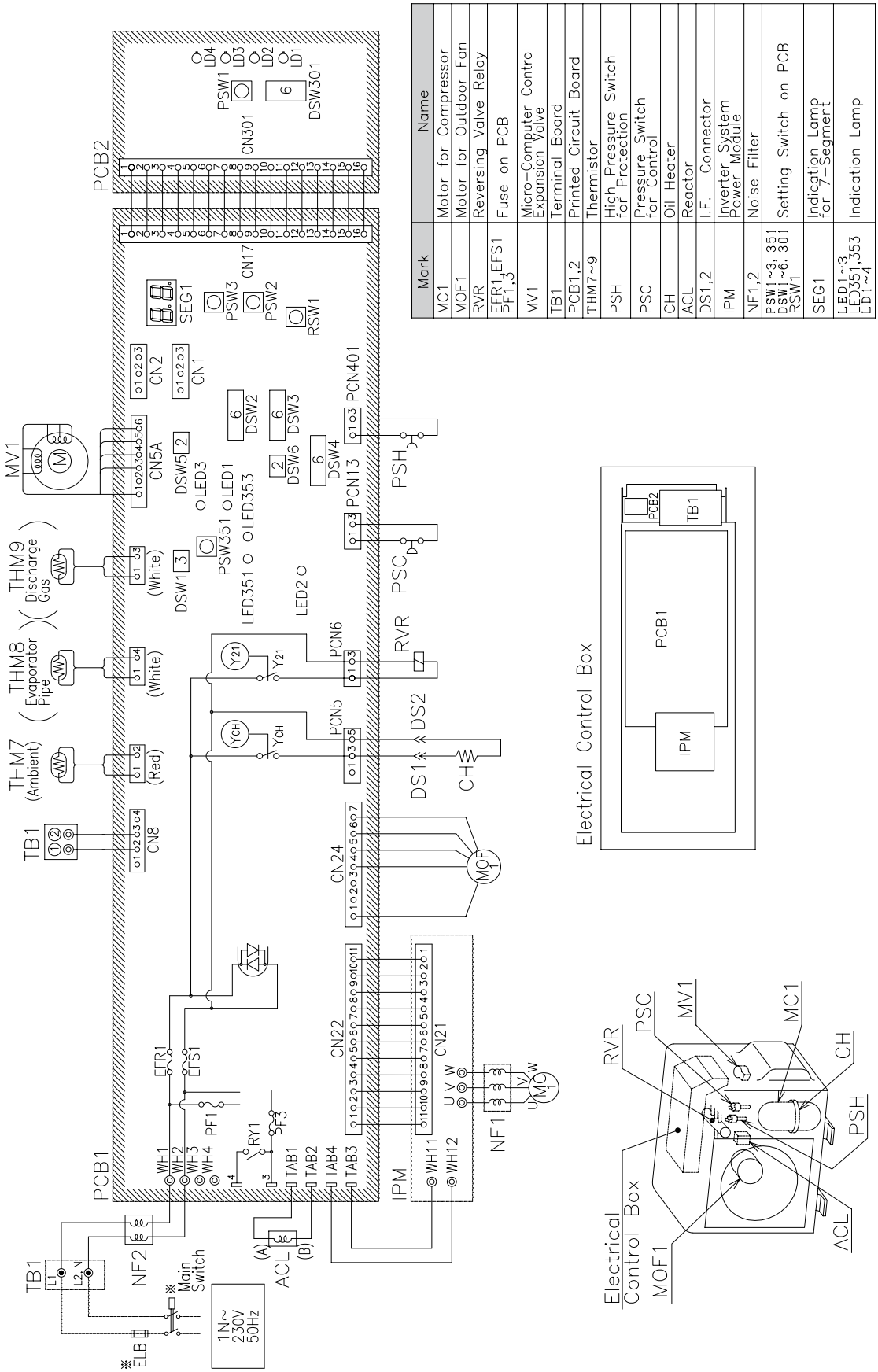
Mark Table

Mark	Part Name
AR1	Contactor heater step
AR2	Contactor heater step
AR3	Contactor heater main
CN□-□	Connector
DSW1	Additional setting
DSW2	Unit capacity code
DSW3	Optional functions
DSW4	Additional setting
DSW5	Not used
DSW6,7,8	Not used
EFR	Fuse
EFS1	Fuse
EF123	Fuse heater
EF4	Fuse pump
EH123	Electrical heater
LCD	User interface LCD
LED1~4	LEDs indication
LWPS	Low water pressure switch
MV1	Micro-Computer control exp. valve
NF1	Noise filter
NKn	Spark killer
PCB1~3	Printed Circuit Board
RSW1~3	Refrigerant cycle n°
RSW1~4	Indoor unit No. settings
RDC1~3	Resistor
SEG1~3	Seven segments indication
TB1~3	Terminal Board
TFe	Thermal Fuse heater
THe	Thermostat cut heater
THM∟	Inlet water thermistor
THMwo	Outlet water thermistor
THMwo2	Outlet C2 water thermistor

Mark	Part Name
THMwo3	Outlet boiler water thermistor
THMg	Gas pipe thermistor
THML	Liquid pipe thermistor
THMwsp	DHWT water thermistor
THMwsp2	Outlet HP water thermistor
THMwo2	2nd ambient sensor
THMsw	Swimming pool sensor
TR1,2	Transformers
Vmix	Mixing valve
WFS	Water flow switch
WPn~3	Water pumps
Y52	Relay for electrical heater
Yn	Relay for electrical heater
Ysw	Relay for 3 way valve DHWT
Ysw	Relay for 3 way valve SWP
Ym	Relay for mixing valve left
Ym	Relay for mixing valve right
Y1	Relay for water pump 2
Y2	Relay for water pump 3
Y3	Relay for water pump 1
Y5	Relay for boiler combination
Y6	Relay for DHW Electrical Heater
Y7	Relay for solar combination
3WVsw	3 Way valve for DHW
3WVsw	3 Way valve for SWP
52P	Relay for primary pump
◎	Terminals
—⊠—	Close-end connector
※	Field supplied
—:—:—	Field wiring
-----	Earth wiring
———	Factory wiring

4.5.2 Electrical wiring diagram for outdoor unit

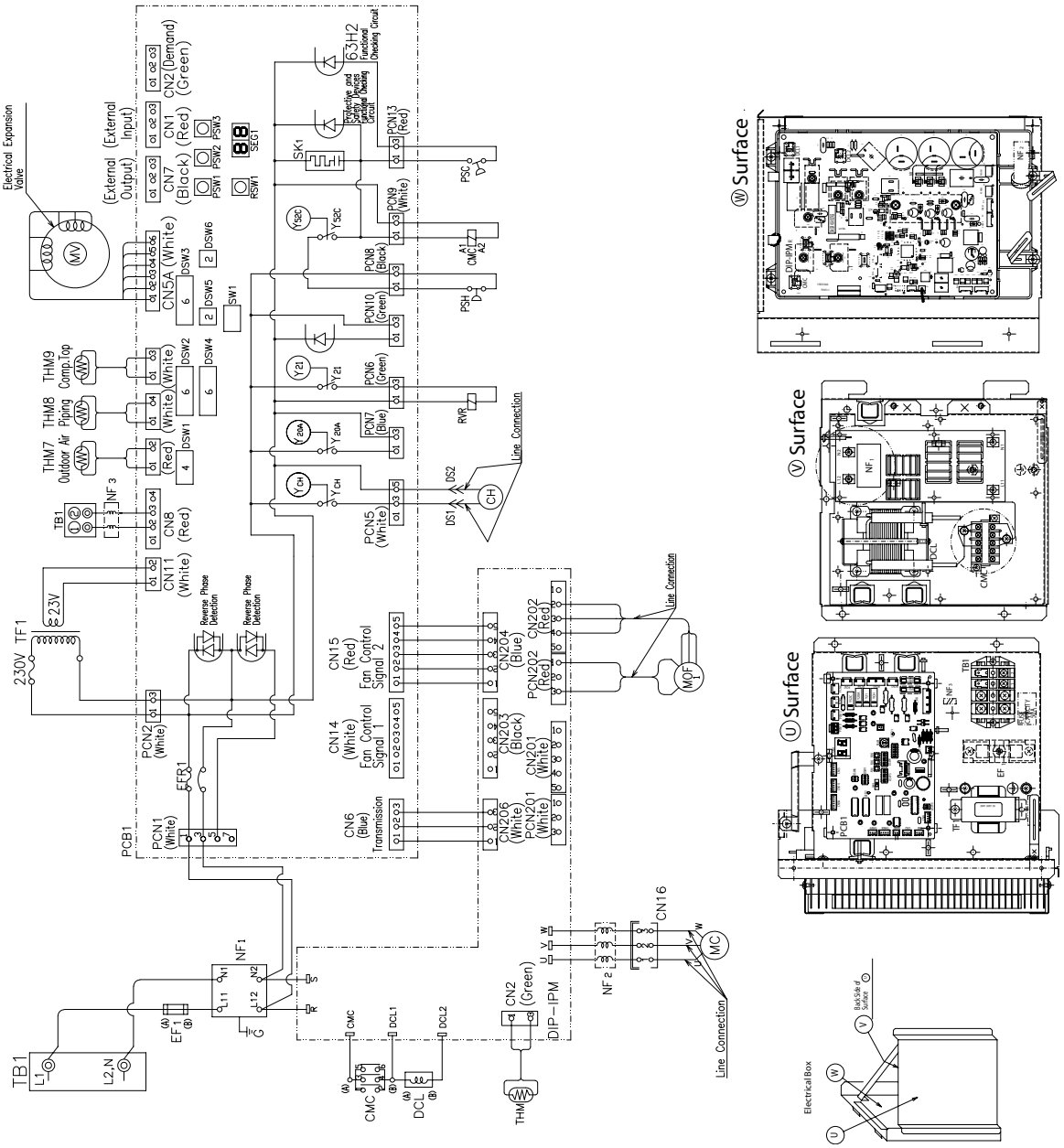
◆ **RAS-2HVRN2**



Mark	Name
MC1	Motor for Compressor
MOF1	Motor for Outdoor Fan
RVR	Reversing Valve Relay
EFR1,EFS1 PF1,3	Fuse on PCB
MV1	Micro-Computer Control Expansion Valve
TB1	Terminal Board
PCB1,2	Printed Circuit Board
THM7~9	Thermistor
PSH	High Pressure Switch for Protection
PSC	Pressure Switch for Control
CH	Oil Heater
ACL	Reactor
DS1,2	I.F. Connector
IPM	Inverter System Power Module
NF1,2	Noise Filter
PSW1~3, 351 DSW1~6, 301 RSW1	Setting Switch on PCB
SEG1	Indication Lamp for 7-Segment
LED1~3 LED351,353 LD1~4	Indication Lamp

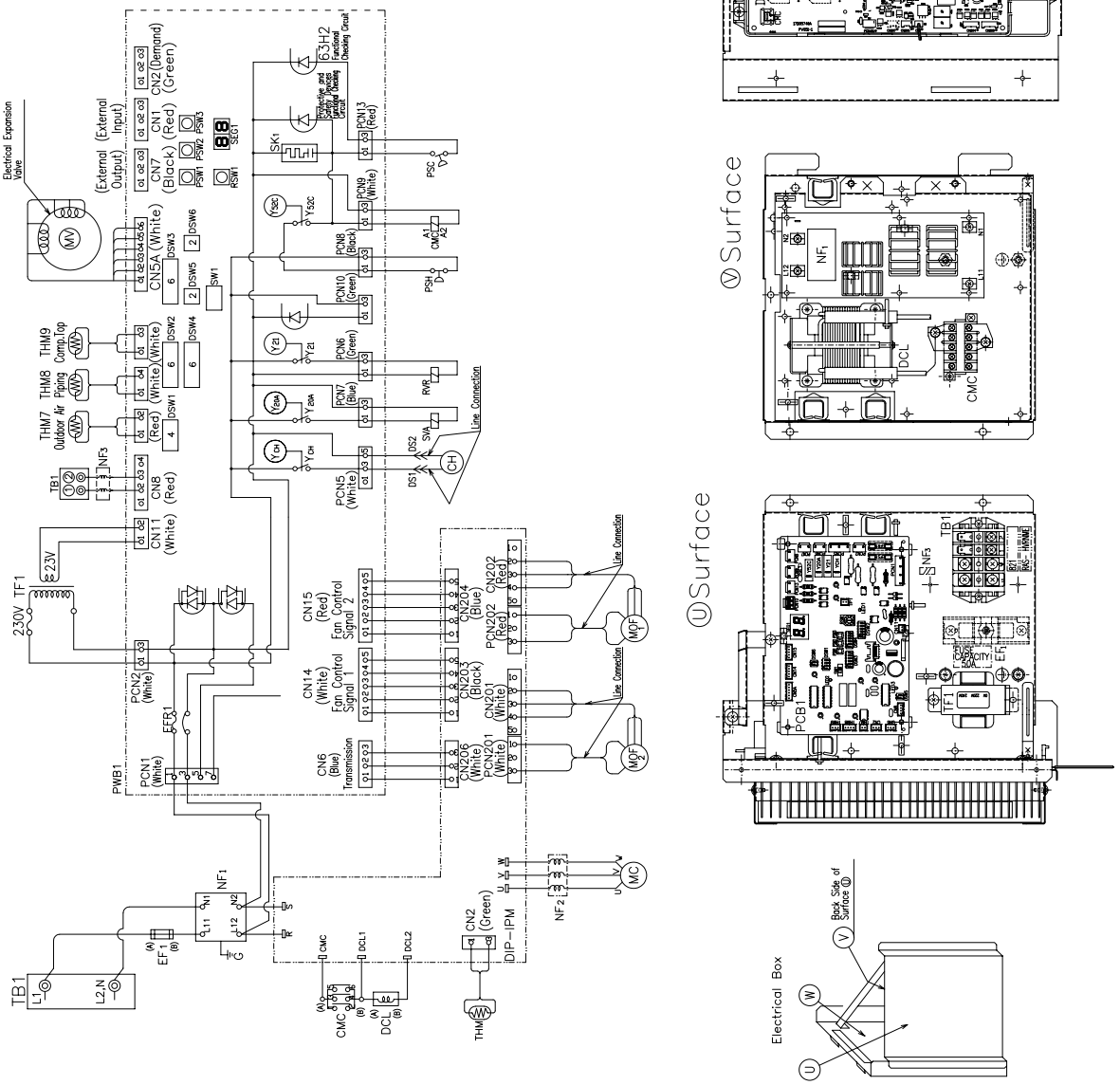
◆ RAS-3HVRNME-AF

Mark	Name of Parts	Remarks
MC	Motor (for Compressor)	
MOF1	Motor (for Fan)	
EF1	Power Fuse	
CMC	Magnetic Contactor (for Compressor)	
RVR	Magnetic 4 Way Valve	
MV	Electrical Expansion Valve	
TB1,2	Terminal Board	
TF1	Transformer	
PCB1	Printed Circuit Board	
EFR1	Fuse	
Y 52C	Aux.Relay (For Compressor Magnetic Contactor)	DC Coil
Y 21	Aux.Relay (For Magnetic 4 Way Valve)	DC Coil
Y 20A	Aux.Relay (For Magnetic Valve)	DC Coil
Y CH	Aux.Relay (For C Heater)	DC Coil
THM7	Thermistor (for Outdoor Air)	
THM8	Thermistor (for Piping)	
THM9	Thermistor (for Comp.Top)	
PSH	High Pressure Switch (for Protection)	
PSC	High Pressure Switch (for Control)	
DCL	Reactor	
DIP-IPM	Inverter Module	
NF1~3	Noise Filter	
PSW1	Switch (Forced Defrosting)	On PWB
PSW2	Switch (Checking)	On PWB
PSW3	Switch (Checking)	On PWB
DSW1	Switch (Test Run)	On PWB
DSW2	Switch (Auxiliary Option Setting)	On PWB
DSW3	Switch (Outdoor Capacity Setting)	On PWB
DSW4	Switch (Refrigerant Cycle Setting)	On PWB
DSW5	Switch	On PWB
DSW6	Switch (Power Source Setting)	On PWB
SW1	Switch (Transmission Changeover)	On PWB
CH	Crankcase Heater	
DS 1,2	Inserting Type Connector	
G	Ground	



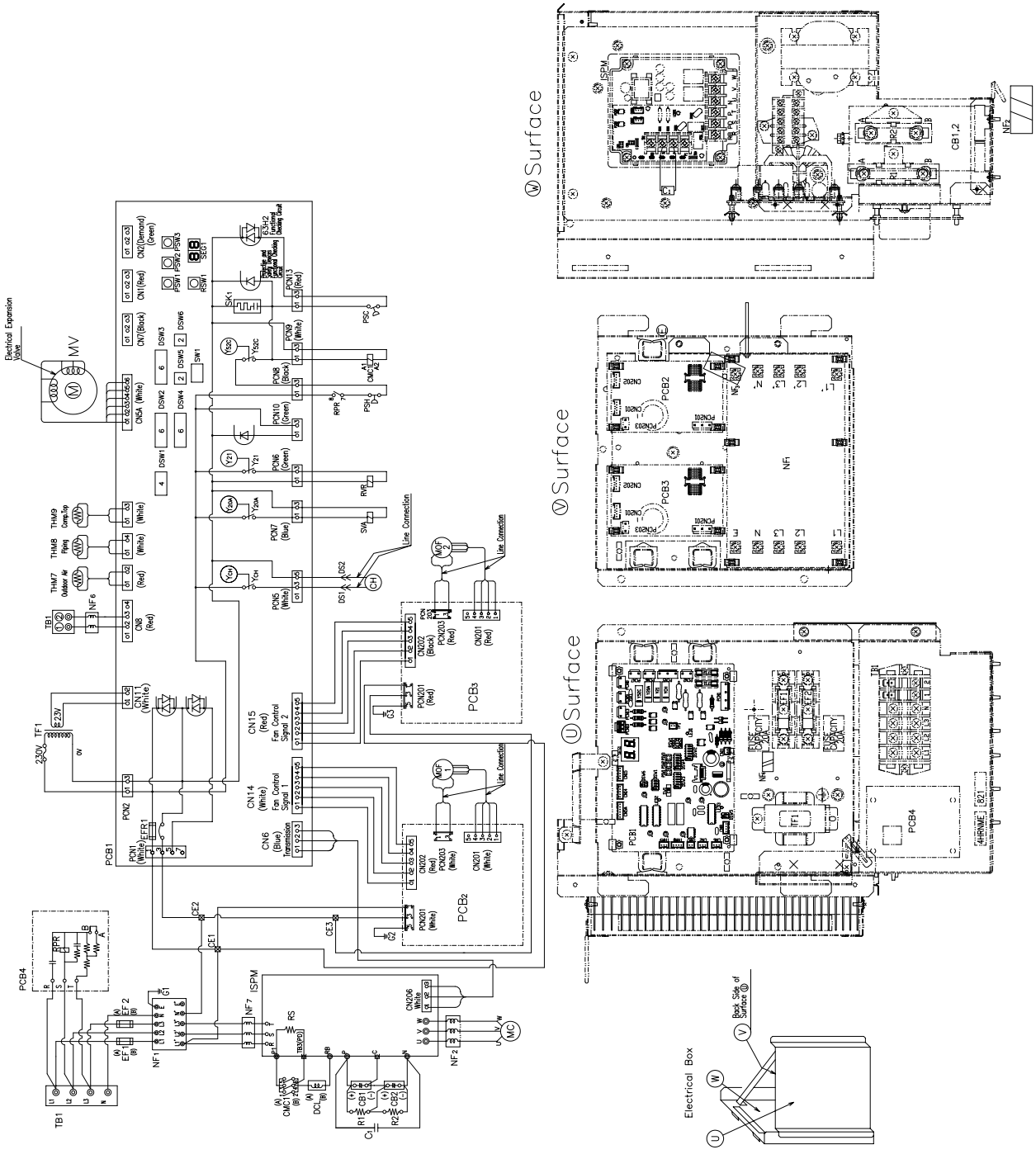
◆ RAS-(4-6)HVRNME-AF

Mark	Name of Parts	Remarks
MC	Motor (for Compressor)	
MOF1,2	Motor (for Fan)	
EF1	Power Fuse	
CMC	Magnetic Contactor (for Compressor)	
RVR	Magnetic 4 Way Valve	
SVA	Solenoid Valve	
MV	Electrical Expansion Valve	
TB1	Terminal Board	
TF1	Transformer	
PCB1	Printed Circuit Board	
EFR1	Fuse	
Y_{52C}	Aux.Relay (For Compressor Magnetic Contactor)	DC Coil
Y_{21}	Aux.Relay(For Magnetic 4 Way Valve)	DC Coil
Y_{20A}	Aux.Relay(For Magnetic Valve)	DC Coil
Y_{CH}	Aux.Relay(For C Heater)	DC Coil
THM7	Thermistor (for Outdoor Air)	
THM8	Thermistor (for Piping)	
THM9	Thermistor (for Comp. Top)	
PSH	High Pressure Switch(for Protection)	
PSC	High Pressure Switch(for Control)	
DCL	Reactor	
DIP-IPM	Inverter Module	
NF1~3	Noise Filter	
PSW1	Switch(Forced Defrosting)	On PWB
PSW2	Switch(Checking)	On PWB
PSW3	Switch(Checking)	On PWB
DSW1	Switch(Test Run)	On PWB
DSW2	Switch(Auxiliary Option Setting)	On PWB
DSW3	Switch(Outdoor Capacity Setting)	On PWB
DSW4	Switch(Refrigerant Cycle Setting)	On PWB
DSW5	Switch	On PWB
DSW6	Switch (Power Source Setting)	On PWB
SW1	Switch(Transmission Changeover)	On PWB
DS1,2	Insertting Type Connector	
G	Ground	
CH	Crankcase Heater	



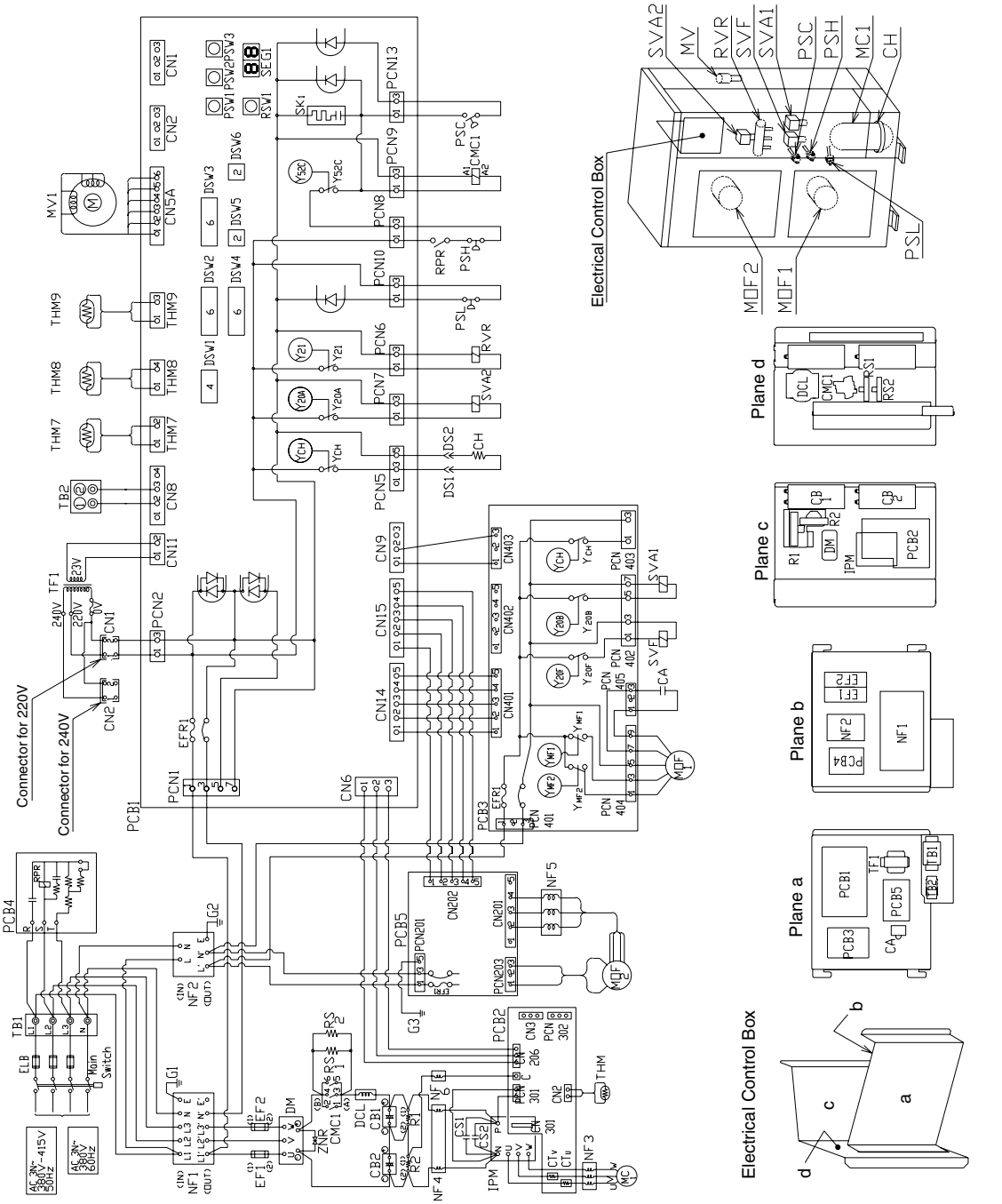
◆ RAS-(4-6)HRNME-AF

Mark	Name of Parts	Remarks
MC	Motor (for Compressor)	
MOF1,2	Motor (for Fan)	
EF1,2	Power Fuse	
CMC1	Magnetic Contactor (for Compressor)	
RVR	Magnetic 4 Way Valve	
SVA	Solenoid Valve	
MV	Electrical Expansion Valve	
TB1	Terminal Board	
TF1	Transformer	
PCB1	Printed Circuit Board	
PCB2,3	Printed Circuit Board	
PCB4	Printed Circuit Board	
EFR1	Fuse	
Ysc	Aux.Relay(for Compressor Magnetic Contactor)	DC Coil
Y_{21}	Aux.Relay(for Magnetic 4 Way Valve)	DC Coil
Y_{20A}	Aux.Relay(For Magnetic Valve)	DC Coil
Y_{CH}	Aux.Relay(For C Heater)	DC Coil
THM7	Thermistor (for Outdoor Air)	
THM8	Thermistor (for Piping)	
THM9	Thermistor (for Comp. Top)	
PSH	High Pressure Switch(for Protection)	
PSC	High Pressure Switch(for Control)	
DCL	Reactor	
CB1,2	Capacitor	
ISPM	Inverter Module	
NF1,2,6,7	Noise Filter	
PSW1	Switch(Forced Defrosting)	On PWB
PSW2	Switch(Checking)	On PWB
PSW3	Switch(Checking)	On PWB
DSW1	Switch(Test Run)	On PWB
DSW2	Switch(Auxiliary Option Setting)	On PWB
DSW3	Switch(Outdoor Capacity Setting)	On PWB
DSW4	Switch(Refrigerant Cycle Setting)	On PWB
DSW5	Switch	On PWB
DSW6	Switch (Power Source Setting)	On PWB
SW1	Switch(Transmission Changeover)	On PWB
C1	Capacitor	
R1,2	Resistance (For Starting)	
RPR	Reverse Protection Relay	
CH	Crankcase Heater	



◆ RAS-(8/10)HRNME-AF

Mark	Part Name
CA CS1.2	Capacitor
CB1.2	Capacitor
CH	Crankcase heater
CMC1	Contactor for compressor motor
DCL	Reactor
DS 1.2	I. F Connector
DM	Diode module
DSW1~6	Dip switch on PCB1
EF1.2	Fuse
IPM	Inverter system power module
MC1	Motor for compressor
MOF1.2	Motor for outdoor fan
MV1	Micro-computer control expansion valve
NF1~6	Noise filter
PCB1~5	Printed circuit board
PSC.PSL	Pressure switch for control
PSH	High pressure switch for protection
PSW1~3	Push switch on PCB1
RS1.2	Resistor for starting
R1.2	Resistor
RVR	Reversing valve relay
SVA1.A2 SVF	Solenoid valve for hot gas bypass
TB1.2	Terminal board
TF1	Transformer
THM	Thermistor for fin temperature
THM7~9	Thermistor
ZNR	Surge absorber

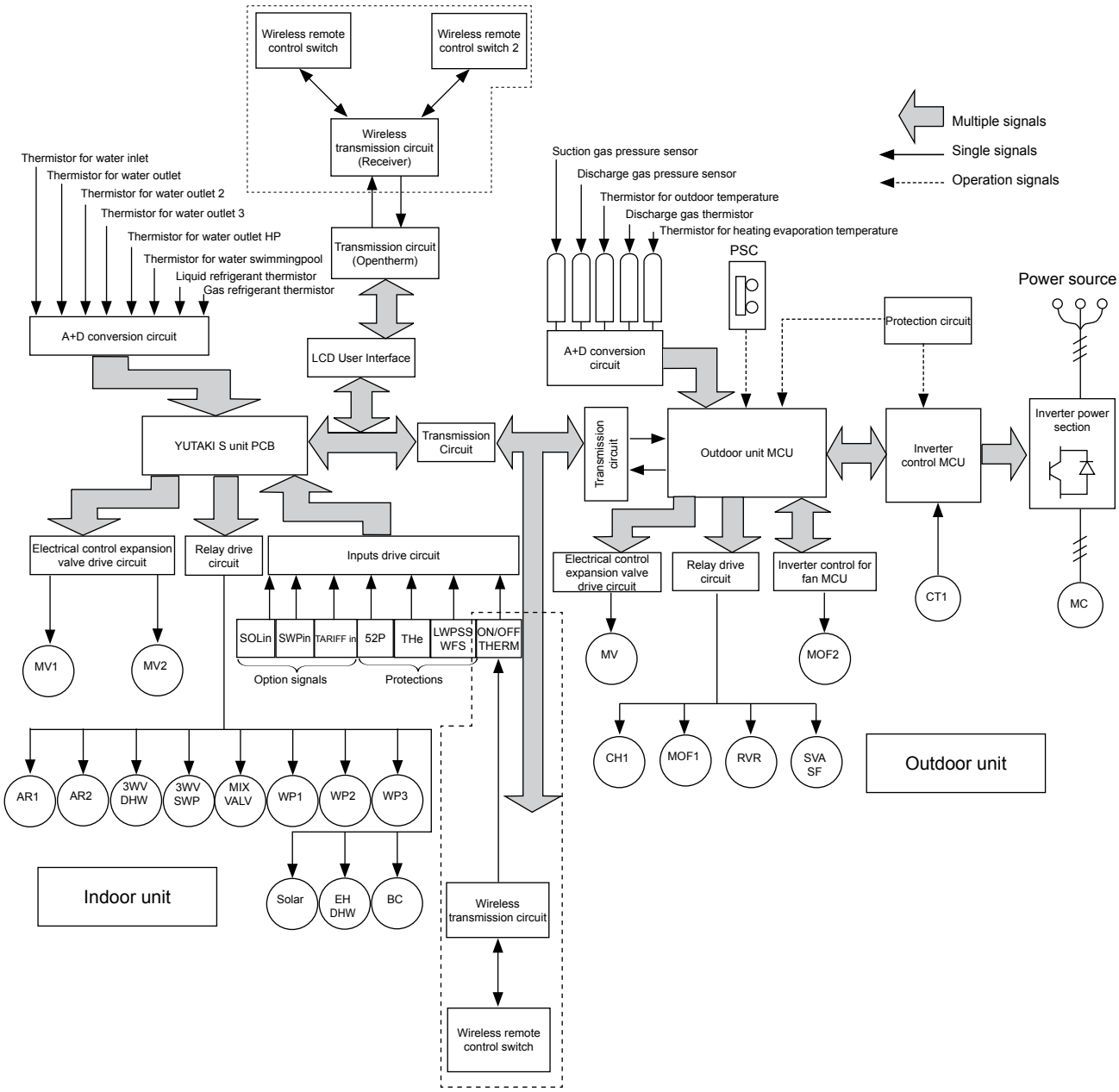


5. Control system

Index

5.1 Device control system

The figure below shows the outline of the control system.



Symbol	Name
AR1,2	Heater steps control
3WV DHW	3-way valve for Domestic Hot Water Tank output
3WV SWP	3-way valve for swimming pool output
MIX VALV	Mixing valve for second temperature control
WP1,2,3	Water pumps (primary, secondary, buffer tank)
Solar	Solar output (accessory)
EH DHW	Electrical heater Domestic Hot Water tank output
BC	Boiler combination output
SOLin	Solar input (accessory)
SWPin	Swimming pool input
TARIFFin	Electrical tariff input
52P	Water pump auxiliary contactor
THe	Electrical heater thermostat protection

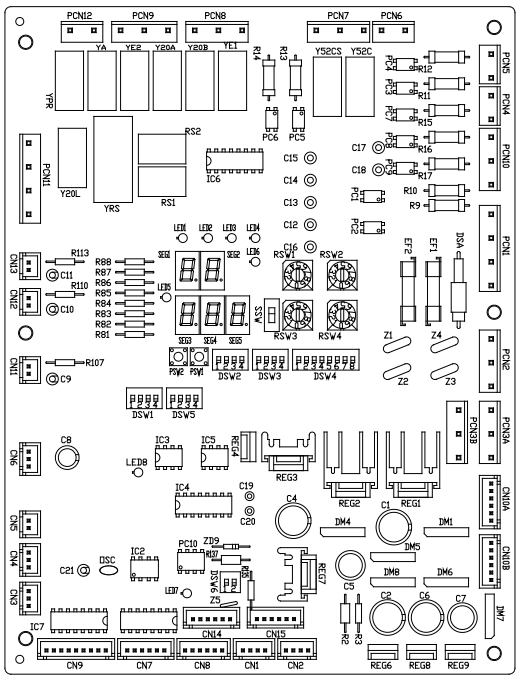
Symbol	Name
LWPS	Low water pressure switch
WFS	Water flow switch
ON/OFF THERM	ON / OFF Room thermostat input (accessory)
MV1,2	Electronic expansion valves
CH1	Crankcase heater
MOF1,2	Motor (for outdoor fan)
RVR	4-way valve
SVA SF	Solenoid valve
CT1	Current transformer
MC	Compressor magnetic contactor
PSC	Pressure switch for control

5.2 Printed circuit board

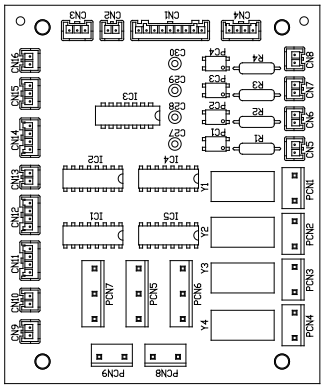
5.2.1 Indoor unit

- PCB Drawing

PCB1



PCB2



PCB1	Switch indication	
	Name	Connector No.
Operation / Display	Not used	DSW1
	Capacity Setting	DSW2
	Additional setting	DSW3
	Additional setting	DSW4
	Not used	DSW5
	H-link (transmission)	DSW6
	Additional setting	DSW7
	Refrigerant unit address	RSW1
		RSW2
	Indoor unit address	RSW3
		RSW4
	Checking Mode (Forward)	PSW1
	Checking Mode (Back)	PSW2

PCB1	LED indication	
	Name	Connector No.
LEDS	7-segment	SEG1,2,3,4,5
	Water Pump operation	LED1
	Heater or Boiler operation	LED2
	DHW Heater operation	LED3
	Thermo ON/OFF operation	LED4
	Power supply in the unit	LED5
	Alarm (Flickering with 1 sec interval)	LED6
	Not used	LED7
	H-Link transmission	LED8

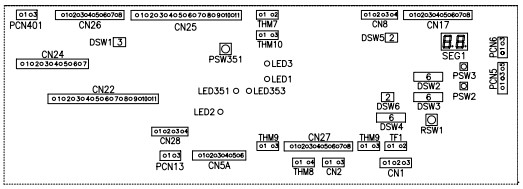
PCB1	Connector Indications	
	Name	Connector Nº
Power	Power supply	PCN1
	Power supply 2	PCN2
	Transformer power supply (230v)	PCN3A,B
	Transformer power supply (24v)	CN10A,B
	LCD Power supply	CN15
Pro-tection Device	Low Water Pressure & Water Flow control	PCN10
	Pump feedback	PCN4
	Heater protection (Thermostat cut-out)	PCN5
Trans-mission	H-Link communication	CN1
	PCB1-PCB2 communication	CN2,5,6,9
A/D Input	Swimming pool water thermistor or 2nd ambient temperature	CN4
External Input / Output	Heater step 1	PCN7
	Heater step 2	PCN8
	Room thermostat (ON/OFF)	PCN6
	Swimming pool input	PCN10
	Electrical Tariff input	PCN10
	Solar input	PCN7
	3-way valve swimming pool output	PCN8
	3-way valve DHW output	PCN8
	Mixing valve second temperature	PCN 9 / 12
	Secondary pump output (WP2)	PCN9
	Secondary pump output (WP3)	PCN9
PCB2		
Actuator	Pump Actuator	PCN1
	Boiler signal	PCN2
	Electrical heater DHW signal	PCN3
	Solar signal	PCN4
A/D Input	Gas Thermistor (THMg)	CN12
	Liquid Thermistor (THMl)	CN11
	Water outlet Thermistor (THMwo)	CN13
	Water inlet Thermistor (THMwi)	CN9
	Water sanitary tank thermistor (THMDHW)	CN10
	Water Boiler control thermistor (THMwo3)	CN15
	Water 2nd temperature thermistor (THMwo2)	CN16

5.2.2 Outdoor unit

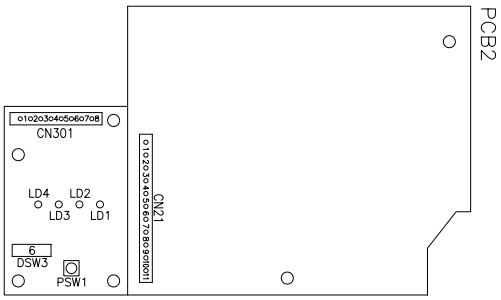
◆ RAS-2HVRN2

PCB1 LED indication		
LED1	Red	Power source for the PCB
LED2	Green	This LED indicates the inverter transmission status
LED3	Yellow	This LED indicates the transmission status between the indoor unit and the outdoor unit
LED351	Red	For inspection
LED353	Red	For inspection

PCB1



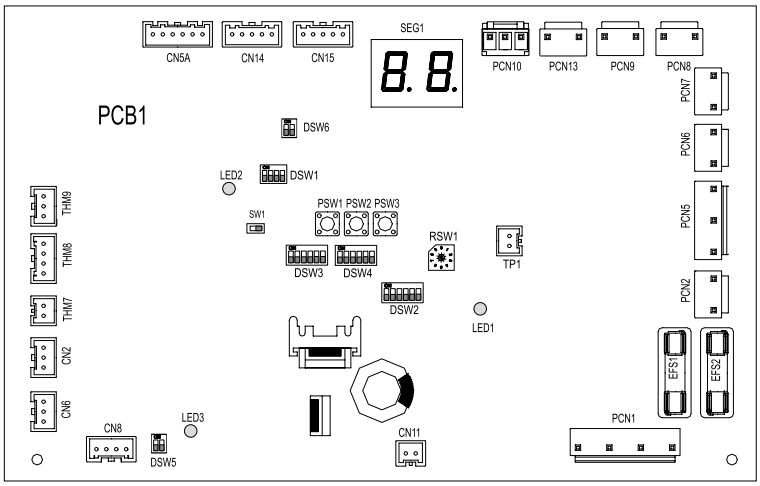
PCB2 LED indication		
LED1	Red	These LEDS indicate the cause of unit stoppages
LED2	Red	
LED3	Red	
LED4	Red	



Connector indication		
PCN5	CH	Crankcase heater of compressor (oil)
PCN6	RVR	Reversing valve relay
PCN13	PSC	Pressure switch control
PCN401	PSH	High pressure switch protection
THM7	AIR	Outdoor air temperature thermistor
THM8	PIPE	Pipe temperature thermistor
THM9	COMP	Compressor temperature thermistor
THM10	—	—
CN1	—	Input function
CN2	—	Demand input
CN5A	MV	Micro electronic expansion valve
CN7	—	Output function
CN8	H-LINK	Transmission from outdoor unit to indoor unit
CN17	—	Transmission to PCB2
CN21	—	Transmission to PCB1
CN22	—	Transmission to IPM
CN24	MOF	Motor for outdoor fan
CN25	—	For inspection
CN26	—	For inspection
CN27	—	For inspection
CN28	—	For inspection
CN301	—	Transmission to PCB1

Switch indication	
DSW1	Test run
DSW2	Piping length
DSW3	Capacity
DSW4	Ref. cycle number
DSW5	End terminal resistance
DSW6	Optional function
RSW1	Ref. cycle number
PSW1	Manual defrost operation switch. The defrost option is manually available under the forced defrost area
PSW2	Available optional function. Setting can be selected using the 7-segment display
PSW3	
PSW351	The inverter micro-computer checking

◆ RAS-(3-10)H(V)RNME-AF



Connector indication	
PCN1	Fuse
PCN2	PCB1 connection from outdoor to indoor unit
PCN5	Crankcase heater of compressor (oil)
PCN6	Output optional function
PCN7	Output optional function
PCN8	Pressure switch protection
PCN9	Compressor contactor
PCN13	Pressure switch control
THM7	Outdoor air temperature thermistor
THM8	Pipe temperature thermistor
THM9	Compressor temperature thermistor
CN2	Current transformer
CN5A	Micro electronic expansion valve
CN8	Transmission from outdoor to indoor unit
CN14	Transmission between PCB1 and ISPM
EFS1, 2	Power protection

Switch indication	
DSW1 (PCB1)	Test run
DSW2	Piping length and selection function
DSW3	Capacity code
DSW4/ RSW1	Refrigerant cycle number
DSW5	End terminal resistor
DSW6	Power source setting

LED indication		
LED1	Red	This LED indicates the transmission status between the indoor unit and the RCS
LED2	Yellow	This LED indicates the transmission status between the indoor unit and the outdoor unit
LED3	Green	Power source for the PCB

5

NOTE

- ***The mark "■" indicates position of dips switches. Figures show setting before shipment or after selection.***
- ***Not mark "■" indicates pin position is not affecting.***

CAUTION

- ***Before setting dips switches, firstly turn off power source and set the position of the dips switches. If the switches are set without turning off the power source, the contents of the setting are invalid.***

5.3 Safety protection and control device

5.3.1 Indoor unit

MODEL			RWM-(2.0/3.0)FSN3E	RWM-(4.0-6.0)FSN3E	RWM-(8.0/10.0)FSN3E
For Electric Heater					
	Surface Thermostat		Manual reset, Non-adjustable (one per unit)		
			75ºC±5%		
	Thermal fuse		Non-reset (needs to be replaced), Non-adjustable (one per unit)		
			110ºC +0 -5%		
	Fuse capacity		6A	12A	16A
For Water circulation					
	Low water pressure switch		Automatic reset		
		Open	1 bar		
		Close	1.5 bar		
	High water pressure		3 bar		
	Low water flow switch		Automatic reset		
		Open	12 l/min ±15 % contact opens with decreasing flow		
	Pump feedback		Input ON when relay ON		
For water temperature					
	High temperature protection		+5ºC of Maximum water temperature (Heating mode)		
	Freeze temperature protection		-3ºC of minimum water temperature (Cooling mode)		
For refrigerant temperature					
	Freeze temperature protection		Tl<-20ºC (for 30 seconds)		
For the control circuit					
	Fuse capacity		5A (Inside PCB)		
For the water pump					
	Fuse capacity		3.15A		

5.3.2 Outdoor unit

MODEL				RAS-2HVRN2	RAS-3HVRNME-AF	RAS-4H(V)RNME-AF	RAS-(5/6)H(V)RNME-AF	RAS-(8/10)RNME-AF
For compressor	High pressure switch			Automatic reset, non-adjustable				
		Cut-out	MPa	$4.15^{-0.05}_{-0.15}$				
		Cut-out		3.20±0.15				
For control	Fuse	1~ 230V 50Hz	A	25	40	40	50	-
		3N~ 400V 50Hz		-	-	2x20	2x20	40
	CCP timer setting time		min	Non adjustable				
				3				
For condenser fan motor Internal thermostat				Automatic reset, non-adjustable (each one for each motor)				
	DC	Cut-out	ºC	-	-	-	-	120±5
	AC	Cut-out		-	-	-	-	150±5
		Cut-in		-	-	-	-	96±15
For control circuit Fuse capacity on PCB			A	3	5			5 (PCB1 and PCB5) 10 (PCB3)

5.4 Standard control functions

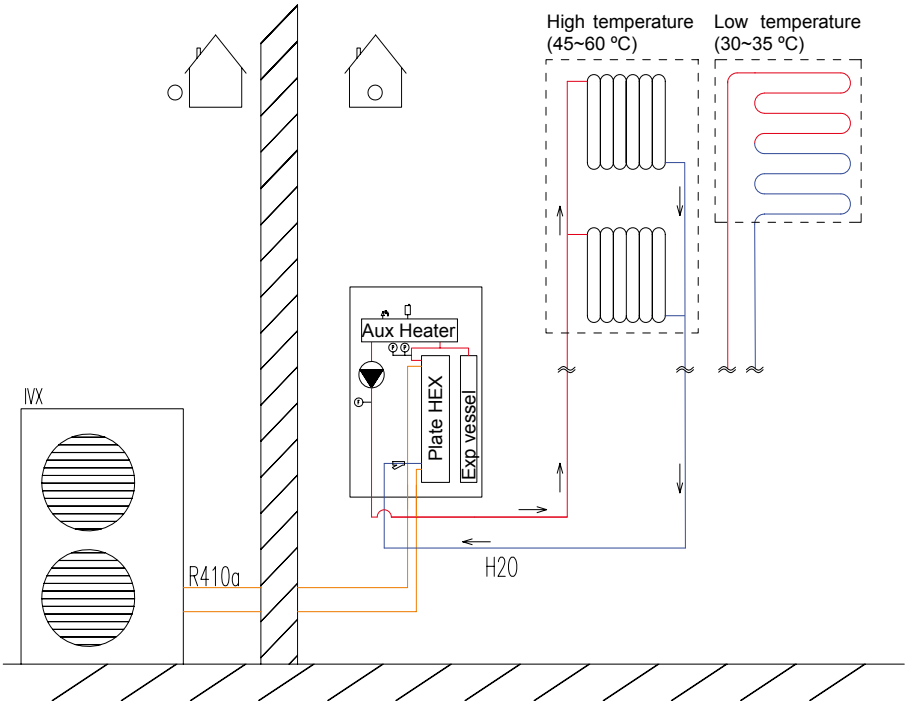
5.4.1 Indoor Unit

◆ Space heating

Main heating configuration

Available system configuration is as follows:

Configuration 1: Direct Circuit



The unit is connectable to only one circuit demand, either high temperature (i.e., radiator or fan coils) or low temperature (radiant floor).

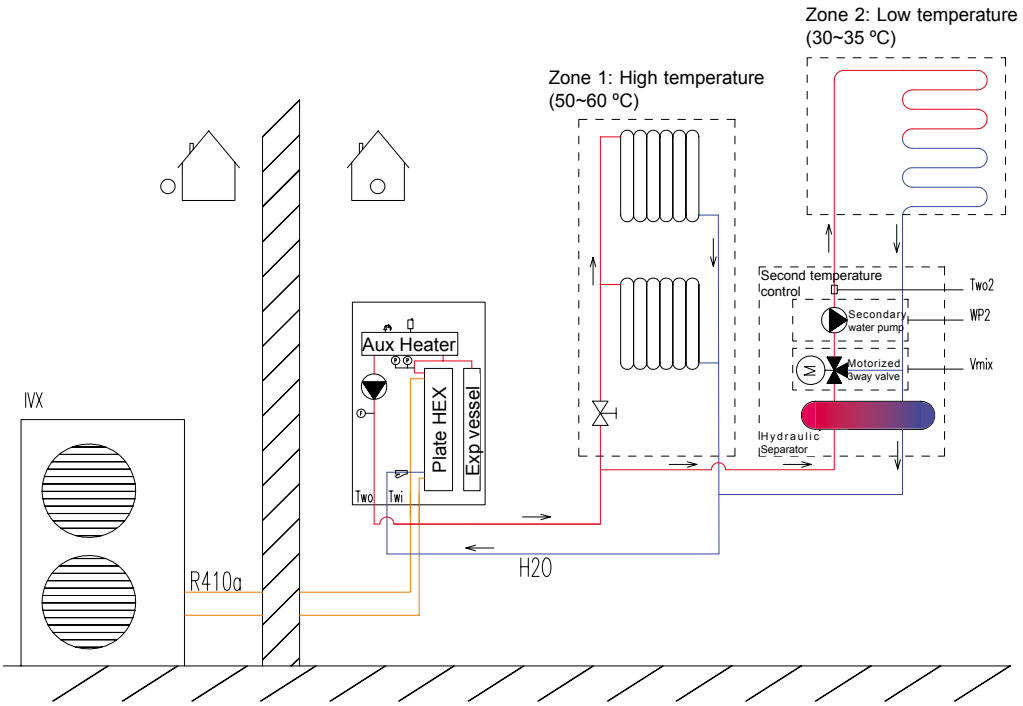
In addition, the unit can be combined with Sanitary tank (with solar kit extension) and with swimming pool.

NOTE

For more information refer to respective chapters.

Water temperature target depends on actual water outlet temperature and calculations by the selected setting mode.

Configuration 2: Direct and mixing circuit (two levels of water outlet temperature)



When the YUTAKI S is connected to two different heating circuits, circuit 1 will be direct (high temperature for radiator operation) and circuit 2 will be a mixing circuit in order to have a second temperature control using mixing valve (low temperature for floor heating operation). Additionally, a motorized valve can be added in order to close direct circuit when not in use (see *Optional functions* chapter). The floor heating loops (circuit 2) require a lower temperature than with fan coils (circuit 1). To get these two water temperature levels, a mixing station is required (see *Available accessories*). This mixing station is controlled using the indoor unit by means of a mixing valve and additional water sensor.

The unit can always be combined with Sanitary tank (with solar kit extension) and with swimming pool.

Water temperature target depends on the maximum heating supply set-points (Target area 1, target area 2).

- Selecting space heating configuration

Available system configuration will be set using water type for space heating operation:

CODE	REF	Description	Default Value
CIRCUIT 1 (Direct circuit)			
3-004	WTh1	Water Calculation Heating C1 (None; OTCpoints; OTCgradient; Fix)	OTCgradient
CIRCUIT 2 (Mixed circuit)			
3-104	WTh2	Water Calculation Heating C2 (None; OTCpoints; OTCgradient; Fix)	None

For information on how to create settings, refer to *User interface* chapter.

Space heating activation conditions

- Space heating mode is activated by any of following events:
  - Space Heating mode selected by user (User interface RUN/STOP button) and
  - Space Heating mode activated by external thermostat signal (ATW-RTU-01) (Installation Option 1) or Space Heating mode activated by intelligent thermostat (ATW-RTU-02) (Installation Option 2).
- Space heating mode is disabled if:
  - Domestic Hot Water operation mode is in load condition.
  - No-load condition is active (all of the activation events are inactive).

Water temperature set-point

Each of the 2 water circuits will have an independent water set-point.

Water circuit set-point configuration can be set as follows:

CODE	REF	Description	Default Value
		CIRCUIT 1 (Direct circuit)	
3-004	WTh1	Water Calculation Heating C1 (None; OTCpoints; OTCgradient; Fix)	OTCgradient
		CIRCUIT 2 (Mixed circuit)	
3-104	WTh2	Water Calculation Heating C2 (None; OTCpoints; OTCgradient; Fix)	None

For information about how to create settings, refer to *User interface* chapter.

Where:

- None
  - Heating circuit is disabled
- OTC Points
  - Water target is selected by an Outside Temperature Compensated (OTC) control that is defined by 4 different points (Minimum and maximum water outlet temperatures vs. Minimum and maximum outdoor ambient temperatures).
- OTC Gradient
  - Water target is selected by an Outside Temperature compensated (OTC) control that is defined by a different gradient of the curve. The initial point of the curve is always 20ºC-20ºC (Water outlet target 20ºC at outdoor ambient temperature of 20ºC).
- Fix
  - Water target value is defined by a fixed temperature set by the user.

Ambient temperature calculation for water temperature compensation calculation

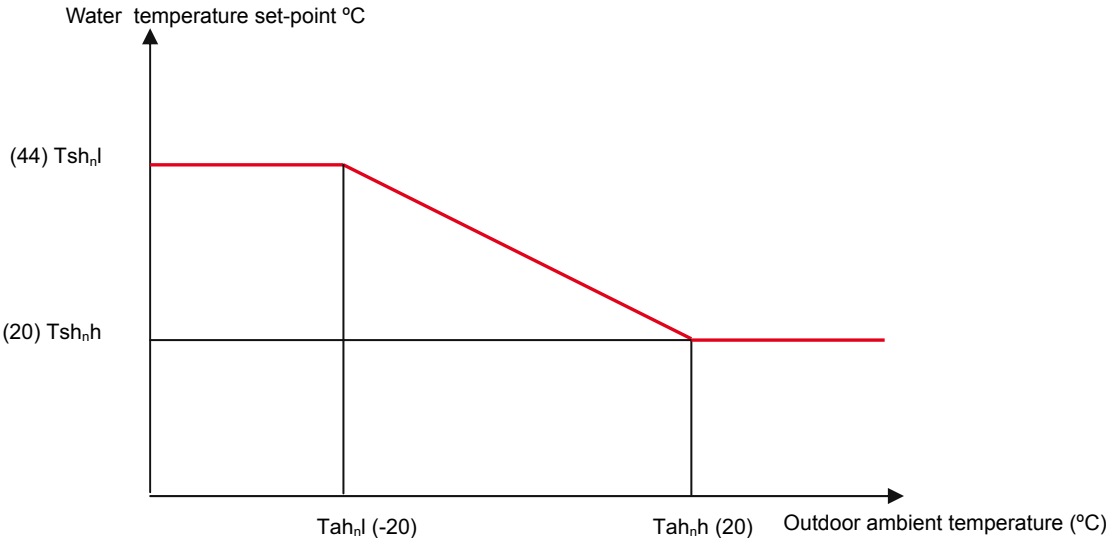
In order to avoid problems with sudden temperature changes an average ambient temperature will be used for ambient temperature instead of direct value.

The average time will be 2 hours.

OTC Points: Outside temperature compensated (OTC) control by points

OTC Points system will use average outdoor ambient temperature in order to get the water temperature set-point.

Water set-point will be determined using the following rule:



Where:

Tsh$_n$L: Temperature setting at low ambient temperature

Tsh$_n$H: Temperature setting at high ambient temperature

Tah$_n$L: Low ambient temperature

Tah$_n$H: High ambient temperature

n: water circuit number (n= 1 or 2)

CODE	REF	Description	Default Value	Range	Steps	Units
CIRCUIT 1 (Direct circuit)						
3-005	Tah$_1$l	Low ambient Tº C1	-20	-20~6	1	ºC
3-006	Tah$_1$h	High ambient Tº C1	20	7~25	1	ºC
3-007	Tsh$_1$l	Set-point at low ambient Tº C1	44	(3-012)~(3-011)	1	ºC
3-008	Tsh$_1$h	Set-point at high ambient Tº C1	20	(3-012)~(3-011)	1	ºC
CIRCUIT 2 (Mixed circuit)						
3-105	Tah$_2$l	Low ambient Tº C2	-20	-20~6	1	ºC
3-106	Tah$_2$h	High ambient Tº C2	20	7~25	1	ºC
3-107	Tsh$_2$l	Set-point at low ambient Tº C2	44	(3-112)~(3-111)	1	ºC
3-108	Tsh$_2$h	Set-point at high ambient Tº C2	20	(3-112)~(3-111)	1	ºC

NOTES

- ***Default values are the same for both circuits in order to prevent high temperature in the Heating floor circuit,***
- ***Default value corresponds to Water Rule = 0.6 (Radiant Floor).***
- ***Parameters (3-0(1)12)~(3-0(1)11) are defined by Maximum and minimum water outlet temperatures selected by installer.***

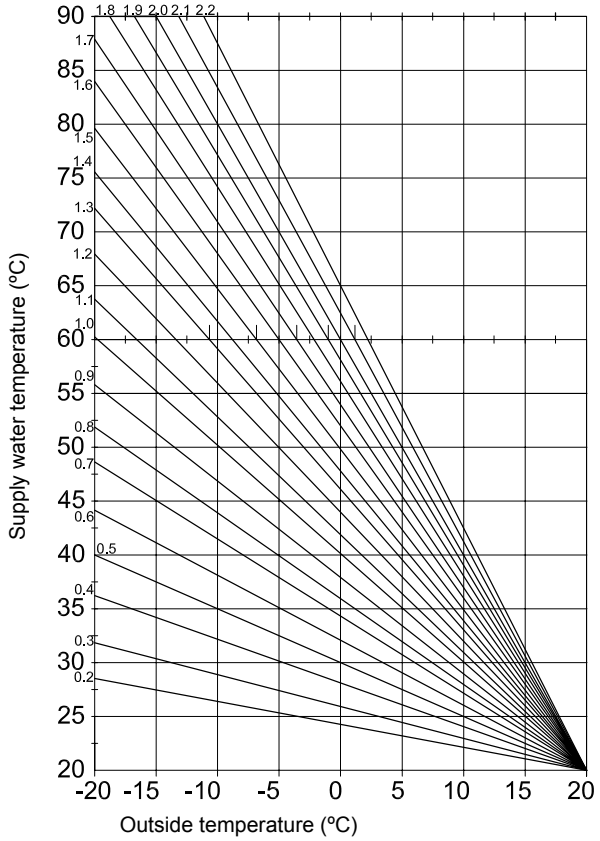
CAUTION

- ***It is the installer's responsibility to make sure no unwanted situation occurs (for example: water temperature setting too high into floor heating)***
- ***Be aware that the water set-point for circuit 2 will always be lower than water calculation for circuit 1.***
- ***When only circuit 1 is heating, circuit 2 will be fed with water at temperature equal to circuit 1's target water.***

OTC Gradient: Outside temperature compensated (OTC) control by gradient

Water target is selected by an Outside Temperature compensated (OTC) control that is defined by a different gradient of the curve. The initial point of the curve is always 20ºC-20ºC (Water outlet target 20ºC at outdoor ambient temperature of 20ºC).

The gradient of the heating curve describes the relation between the change in the supply temperature and the change in outside temperature.



Gradient	Water Outlet Target
0.2	-0,2 x Text + 24
0.3	-0,3 x Text + 26
0.4	-0,4 x Text + 28
0.5	-0,5 x Text + 30
0.6	-0,6 x Text + 32
0.7	-0,7 x Text + 34
0.8	-0,8 x Text + 36
0.9	-0,9 x Text + 38
1.0	-1,0 x Text + 40
1.1	-1,1 x Text + 42
1.2	-1,2 x Text + 44
1.3	-1,3 x Text + 46
1.4	-1,4 x Text + 48
1.5	-1,5 x Text + 50
1.6	-1,6 x Text + 52
1.7	-1,7 x Text + 54
1.8	-1,8 x Text + 56
1.9	-1,9 x Text + 58
2.0	-2,0 x Text + 60
2.1	-2.1x Text + 62
2.2	-2.2x Text + 64

CODE	REF	Description	Default Value	Range	Steps	Units
CIRCUIT 1 (Direct circuit)						
3-009	OTCh1	Gradient C1	0.6	0.2~2.2	0.1	-
CIRCUIT 2 (Mixed circuit)						
3-109	OTCh2	Gradient C2	0.6	0.2~2.2	0.1	-

NOTES

- ***Default values are the same for both circuits in order to prevent high temperature in the Heating floor circuit,***
- ***Default value corresponds to Water Rule = 0.6 (Radiant Floor).***

CAUTION

- ***It is the installer's responsibility to make sure no unwanted situation occurs (for example: water temperature setting too high into floor heating)***
- ***Be aware that the water set-point for circuit 2 will always be lower than water calculation for circuit 1.***
- ***When only circuit 1 is heating, circuit 2 will be fed with water at temperature equal to circuit 1's target water.***

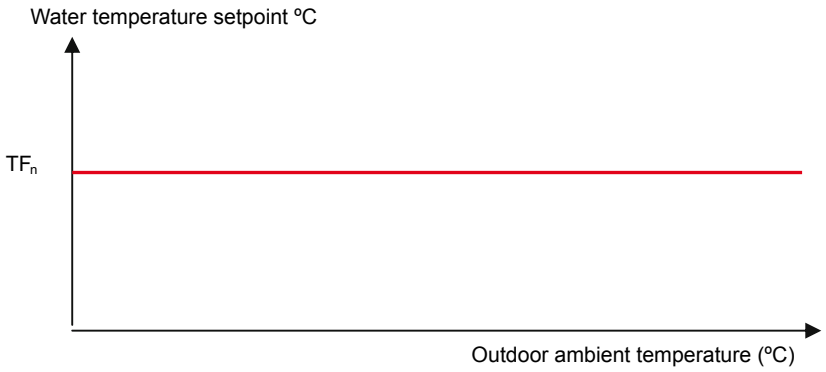
Example:

3-009 (OTC1) = ***1.1***

Text (Outdoor temperature) = 0ºC → *water outlet target = -1.1x 0 +42* = **42ºC**

Fixed water temperature set-point

Outdoor ambient temperature has no effect on this setting. The user will select a fixed water outlet temperature setpoint.



Where:

TF_n: Fixed temperature setting

n: heating circuit number (n= 1 or 2)

CODE	REF	Description	Default Value	Range	Steps	Units
CIRCUIT 1 (Direct circuit)						
3-010	TF1	Fixed Tº C1	40	(3-012)~(3-011)	1	ºC
CIRCUIT 2 (Mixed circuit)						
3-110	TF2	Fixed Tº C2	40	(3-112)~(3-111)	1	ºC

NOTES

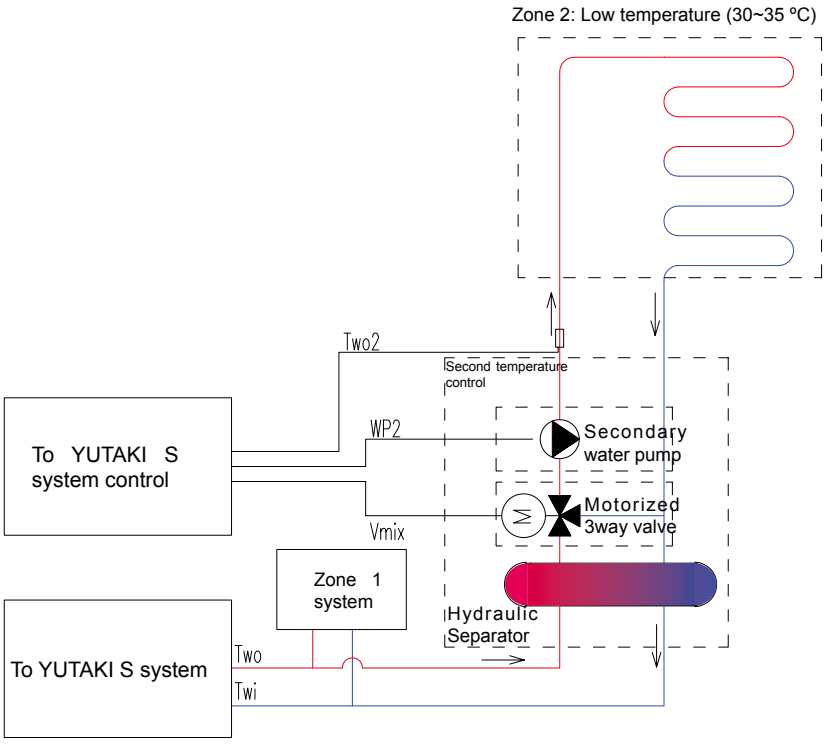
- ***Default values are same for both circuits in order to prevent high temperature in the Heating floor circuit.***
- ***Parameters (3-0(1)12)~(3-0(1)11) are defined by Maximum and Minimum water outlet temperatures selected by installer.***
- ***Water outlet temperature will depend on unit's operational range.***

CAUTION

- ***It is the installer's responsibility to make sure no unwanted situation occurs (for example: water temperature setting too high into floor heating).***
- ***Be aware that the water set-point for circuit 2 will always be lower than water calculation for circuit 1.***
- ***When only circuit 1 is heating, circuit 2 will be fed with water at temperature equal to circuit 1's target water.***

Second water temperature control

The mixing valve is controlled to maintain the second heating supply temperature at the second heating temperature set-point. The mixing valve position is calculated with a proportional integral action (P+I) control algorithm based on the difference between the heating supply set-point and the heating supply temperature.



The system control then decides how much to open or close the mixing valve to achieve the desired position for the valve.

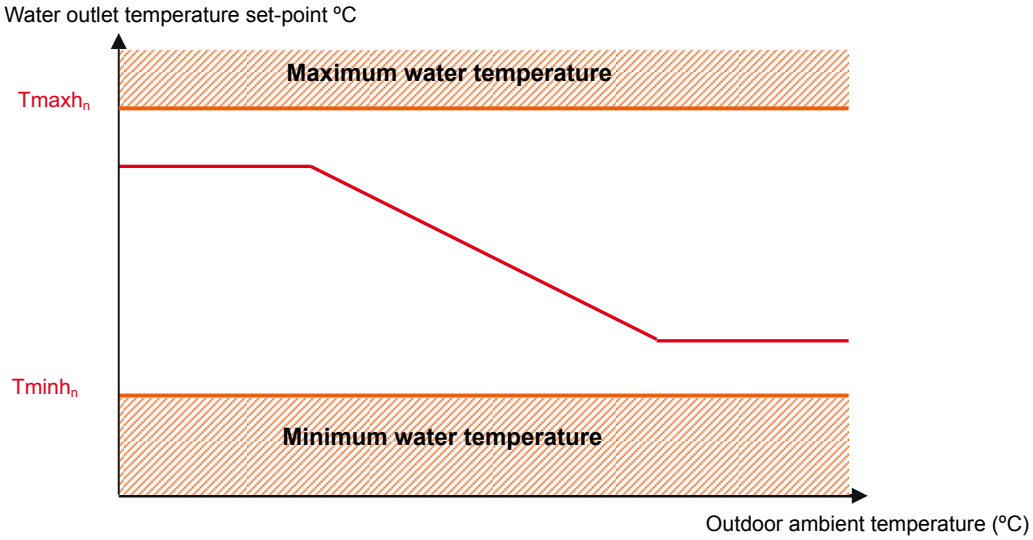
CODE	REF	Description	Default Value	Range	Steps	Units
3-133	PB	Proportional band of mixing valve	6.0K	-0.2~20	0.2	ºC
3-134	IRF	Integral reset factor of mixing valve	2.5	0.0~20	0.1	%
3-135	RTV	Running time factor of mixing valve	140	10~500	10	sec

NOTE

Heating and cooling operation have same values.

Selection of heating circuit minimum/maximum temperature limits by Installer

The installer will limit the Space Heating Temperature Set-point in order to prevent excessively high or low temperatures in the space heating.



Temperature Limit values:

CODE	REF	Description	Default Value	Range	Steps	Units
CIRCUIT 1 (Direct circuit)						
3-011	Tmaxh$_1$	Maximum supply Tº	60	35~60 (*)(**)	1	ºC
3-012	Tminh$_1$	Minimum supply Tº	20	20~34	1	ºC
CIRCUIT 2 (Mixed circuit)						
3-111	Tmaxh$_2$	Maximum supply Tº	60	35~60 (*)(**)	1	ºC
3-112	Tminh$_2$	Minimum supply Tº	20	20~34	1	ºC

NOTE

(*) 55ºC for RWM-2.0FNS3E

(**) 80ºC when boiler combination

CAUTION

Temperature limits have priority over all other temperature set-point modifications (Room Thermostat, User Selection, etc.), and maximum water temp is limited by unit's operational range.

Note that water temperature can reach up to 5ºC higher than maximum water temperature by installer before Thermo OFF condition.

Try to set a minimum of 2 degrees difference between setting temperature (3-(0/1)04) and maximum supply temperature by installer.

◆ Space cooling

Water circuit configuration

NOTE

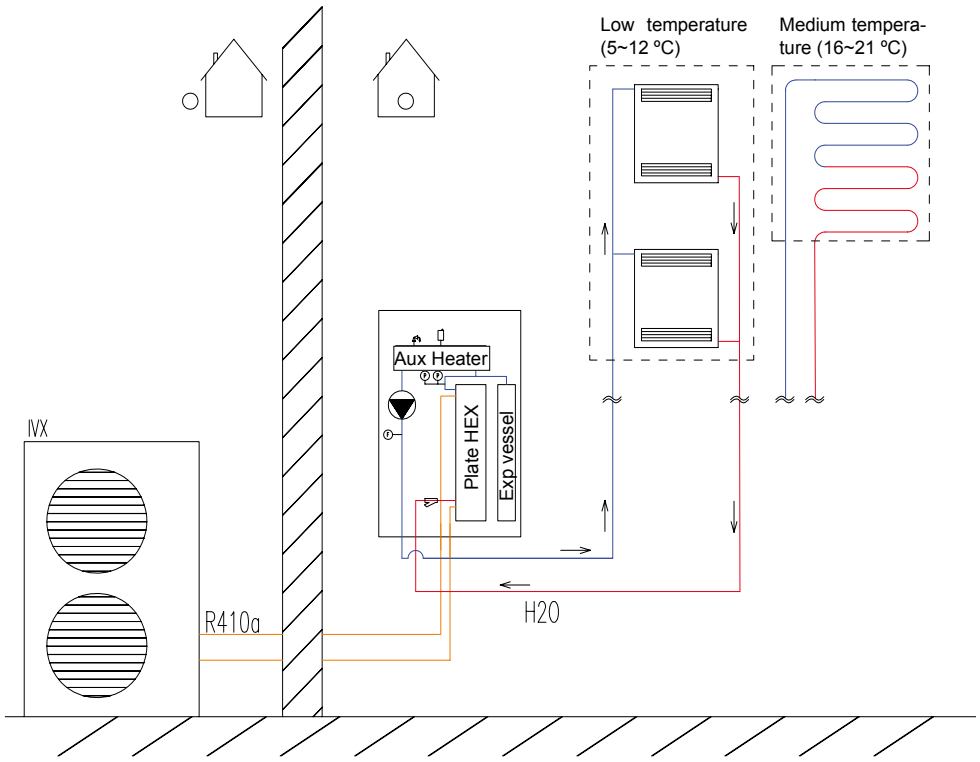
The air to water heat pump is pre-configurated to work only in heating mode. In order to allow the cooling mode, it is necessary to perform a dip-switch setting and install the drain pan accessory. In the case, all the cooling mode uses for the unit will be permitted and the LCD user's interface cooling configuration will appear.

In case of heating istallation working also in cooling operation, the responsability of correct system functioning will be of the installer.

The configuration examples given below are only for illustration purposes.

- **Main cooling configuration**

Configuration 1: Direct Circuit

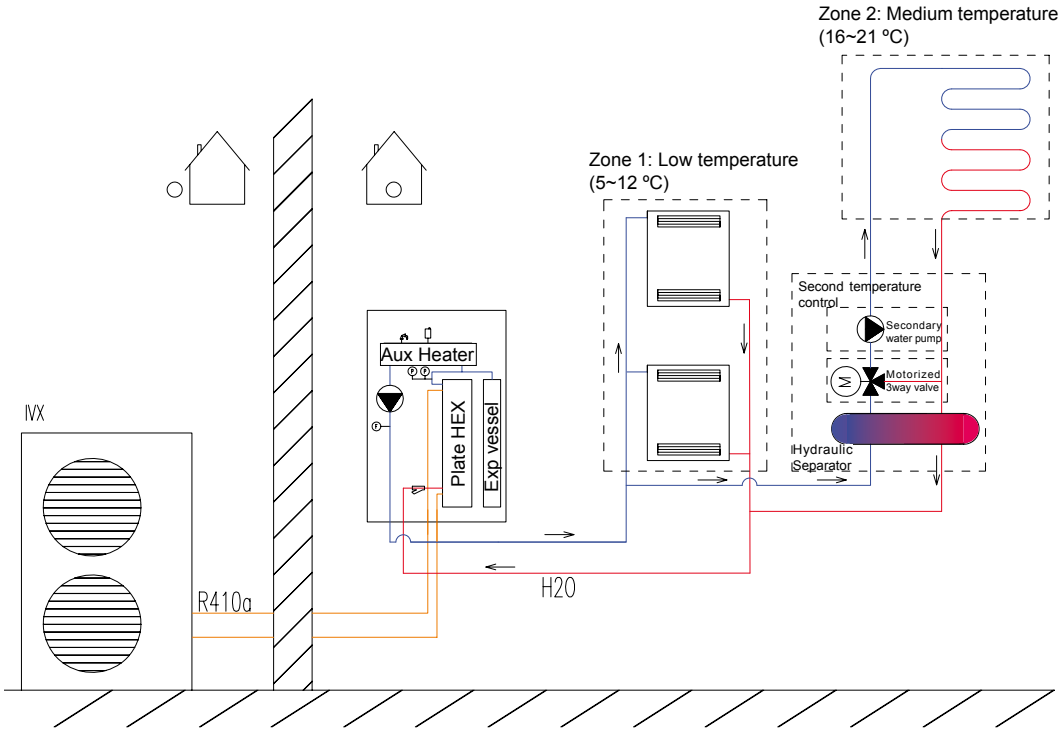


The unit is connectable to only one circuit demand, either low temperature (i.e., fan coils) or medium temperature (refreshing floor).

In addition, the unit can be combined with Sanitary tank (with solar kit extension) and with swimming pool.

Water temperature target depends on actual water outlet temperature and calculations by outside temperature compensation (for refreshing floor application) or a fixed water temperature setting (fan coils cooling).

Configuration 2: Direct and mixing circuit (two levels of water outlet temperature)



When the YUTAKI S is connected to two different cooling circuits, circuit 1 will be direct (low temperature for fanoils operation (12~5ºC)) and circuit 2 will be a mixing circuit in order to have a second temperature control using mixing valve (medium temperature for floor refreshing operation (16~22ºC)). Additionally, a motorized valve can be added in order to close direct circuit when not in use (see *Optional functions* chapter).

The unit can always be combined with Sanitary tank (with solar kit extension) and with swimming pool.

Water temperature target depends on the maximum cooling supply set-points (Target area 1, target area 2).

NOTE

In case of Radiator and Refreshing floor installation, Radiators valve will be closed and disabled by user and the system only works for refreshing floor. (See Optional functions chapter).

- Selecting space cooling configuration

  Available system configuration will be set using water type for space cooling operation:

CODE	REF	Description	Default Value
CIRCUIT 1 (Direct circuit)			
3-004	WTc1	Water Calculation Cooling C1 (None; OTCpoints; Fix)	Fix
CIRCUIT 2 (Mixed circuit)			
3-104	WTh2	Water Calculation Cooling C2 (None; OTCpoints; Fix)	None

NOTE

By default, YUTAKI S will be configured for only one circuit (Direct circuit) and fixed water temperature setting.

Space cooling general control conditions

If “Water Type heating” reads “None” (disabled), then all space control cooling is disabled.

Space Cooling mode is activated by any of the following events:

- Space Cooling mode selected by user (YUTAKI S LCD controller) and
- Space Cooling mode activated by external thermostat signal (ATW-RTU-01) (Installation Option 1) or
- Space Cooling mode activated by intelligent thermostat (ATW-RTU-02) (Installation Option 2)

Space Cooling mode is disabled if:

- DHW operation mode is in DHW priority AND DHW is in load condition
- No-load condition is active (all of the activation events are inactive).

Water temperature set-point

Each of the 2 water circuits will have an independent water set-point.

Water circuit set-point configuration can be set as follows:

CODE	REF	Description	Default Value
CIRCUIT 1 (Direct circuit)			
3-004	WTc1	Water Calculation Cooling C1 (Note; OTCpoints; Fix)	Fix
CIRCUIT 2 (Mixed circuit)			
3-104	WTh2	Water Calculation Cooling C2 (Note; OTCpoints; Fix)	None

Where:

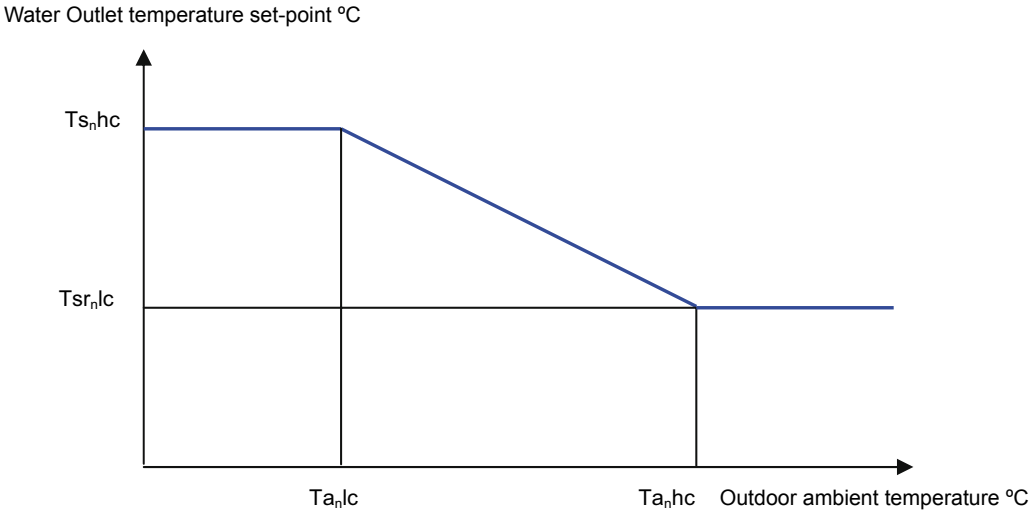
None: Cooling circuit is disabled.

OTC Points: Water target is selected by an Outside Temperature Compensated (OTC) control that is defined by 4 different points (Minimum and maximum water outlet temperatures vs. Minimum and maximum outdoor ambient temperatures).

Fix: Water target value is defined by a fixed temperature set by the user.

Outside temperature compensated (OTC) control for refreshing floor

The weather-dependent set-point field settings define the parameters for weather-dependent operation of the unit. When weather-dependent operation is active the water temperature is determined automatically depending on the outdoor temperature: higher outdoor temperatures will result in colder water and vice versa.



Where:

Ts$_n$hc: Temperature setting for max water temperature at low ambient temperature cooling

Ts$_n$lc: Temperature setting for min water temperature at high ambient temperature cooling

Ta$_n$lc: Low ambient temperature setting for max water temperature cooling

Ta$_n$hc: High ambient temperature setting for min water temperature cooling

n: water circuit number (n= 1 or 2)

CODE	REF	Description	Default Value	Range	Steps	Units
CIRCUIT 1 (Direct circuit)						
3-014	Ta1lc	Low ambient Tº C1	23	17~30	1	ºC
3-015	Ta1hc	High ambient Tº C1	32	31~45	1	ºC
3-016	Ts1lc	Set-point at low ambient Tº C1	22	(3-020)~(3019)	1	ºC
3-017	Ts1hc	Set-point at high ambient Tº C1	16	(3-020)~(3019)	1	ºC
CIRCUIT 2 (Mixed circuit)						
3-114	Ta2lc	Low ambient Tº C2	23	17~30	1	ºC
3-115	Ta2hc	High ambient Tº C1	32	31~45	1	ºC
3-116	Ts2lc	Set-point at low ambient Tº C2	22	(3-120)~(3119)	1	ºC
3-117	Ts2hc	Set-point at high ambient Tº C2	16	(3-120)~(3119)	1	ºC

NOTES

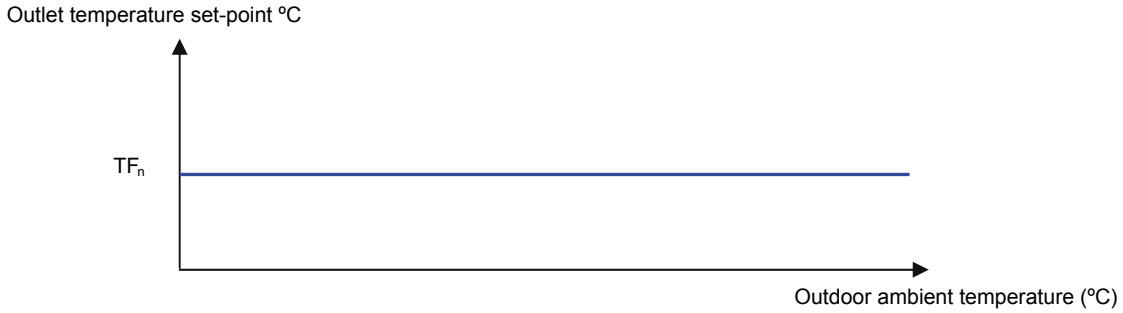
- ***Default values are the same for both circuits in order to prevent low temperatures in the Refreshing floor circuit.***
- ***Parameters (3-0(1)20)~(30(1)19) are defined by Maximum and minimum water outlet temperatures selected by installer.***

CAUTION

- ***It is the installer's responsibility to make sure no unwanted situation occurs (for example: water temperature setting too low into floor refreshing).***
- ***Be aware that the water set-point for circuit 2 will always be higher than water calculation for circuit 1.***

Fixed water temperature setting

OTC has no effect on this setting. The user will select a fixed water outlet temperature between 5ºC and 21ºC using the user interface (LCD Controller).



Where:

TF_n: Fixed water temperature setting.

n: heating circuit number (n= 1 or 2).

CODE	REF	Description	Default Value	Range	Steps	Units
CIRCUIT 1 (Direct circuit)						
3-018	TF1	Fixed Tº C1	19	(3-020)~ (3019)	1	ºC
CIRCUIT 2 (Mixed circuit)						
3-118	TF2	Fixed Tº C2	19	(3-120)~ (3119)	1	ºC

NOTES

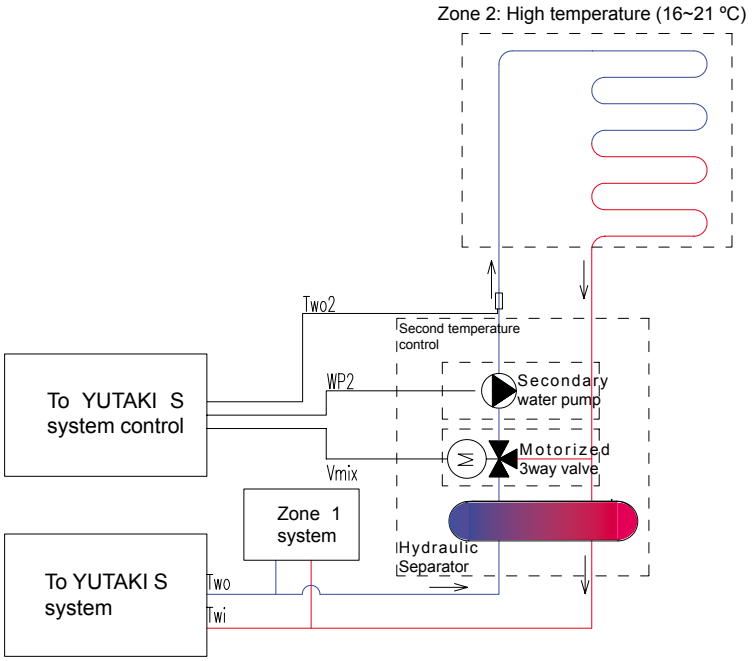
- ***Default values are same for both circuits in order to prevent low temperature in the Refreshing floor circuit.***
- ***Parameters (3-0(1)20)~(30(1)19) are defined by Maximum and minimum water outlet temperature selected by installer (See bellow).***

CAUTION

- ***It is the installer's responsibility to make sure no unwanted situation occurs (for example: water temperature setting too low into floor refreshing).***
- ***Be aware that the water set-point for circuit 2 will always be higher than water calculation for circuit 1.***

Second water temperature control

The mixing valve is controlled to maintain the second cooling supply temperature at the second cooling temperature set-point. The mixing valve position is calculated with a proportional integral action (P+I) control algorithm based on the difference between the cooling supply set-point and the cooling supply temperature.



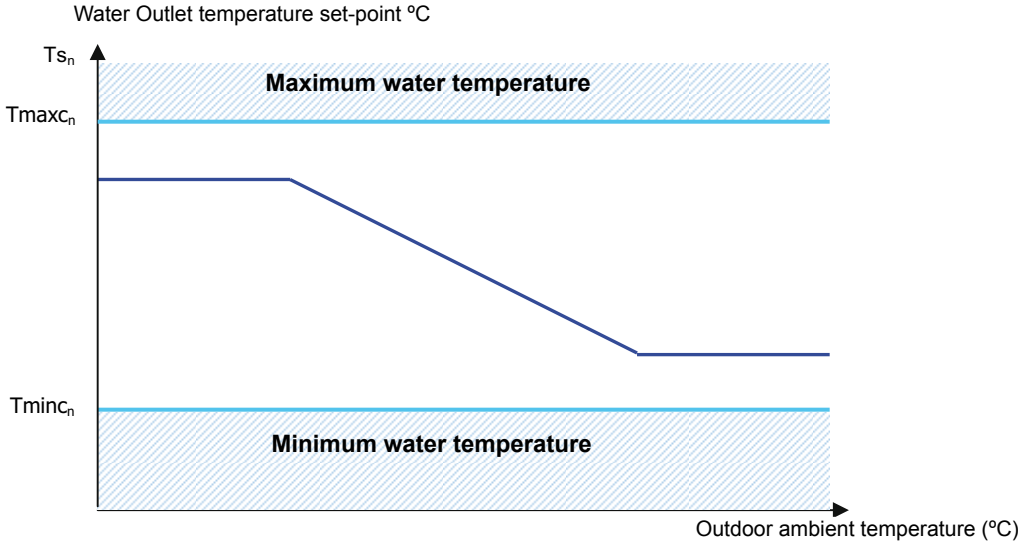
CODE	REF	Description	Default Value	Range	Steps	Units
3-133	PB	Proportional band of mixing valve	6.0K	-0.2~20	0.2	ºC
3-134	IRF	Integral reset factor of mixing valve	2.5	0.0~20	0.1	%
3-135	RTV	Running time factor of mixing valve	140	10~500	10	sec

NOTE

Heating and cooling have same values.

Selection of cooling circuit minimum/maximum temperature limits by Installer

The maximum temperature limit can be used, for example, to prevent low temperatures from reaching floor-refreshing systems. The minimum temperature limit can be used when a minimum level of cooling in the cooling circuit is desired.



CODE	REF	Description	Default Value	Range	Steps	Units
CIRCUIT 1 (Direct circuit)						
3-019	Tmaxc$_1$	Maximum supply Tº C1	22	19~22	1	ºC
3-020	Tminc$_1$	Minimum supply Tº C1	16	5~18	1	ºC
CIRCUIT 2 (Mixed circuit)						
3-119	Tmaxc$_2$	Maximum supply Tº C2	22	19~22	1	ºC
3-120	Tminc$_2$	Minimum supply Tº C2	16	5~18	1	ºC

CAUTION

Temperature limits have priority over all other temperature set-point modifications (Room Thermostat, User Selection, etc.), and minimum water temp is limited by YUTAKI S operational range.

Note that water temperature can reach up to 3ºC lower than minimum water temperature by installer before Thermo OFF condition.

Try to set a minimum of 2 degrees difference between setting temperature (3-(0/1)04) and minimum supply temperature by installer.

◆ Room Thermostat control

YUTAKI S unit can be used with two different Room Thermostats available as accessories:

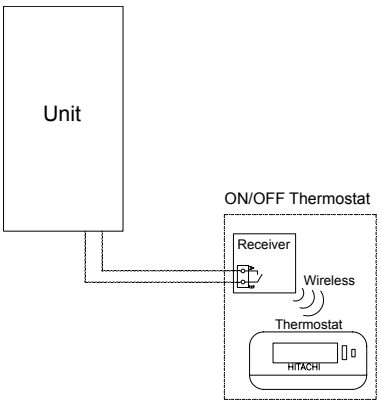
- ON/OFF Thermostat (ATW-RTU-01)
- Intelligent Room Thermostat (with Opentherm communication) (ATW-RTU-02) with extension room thermostat for second circuit (ATW-RTU-03)

Thermostat Type is selected using the parameter list on user interface:

CODE	REF	Description	Default Value
Room thermostat type			
3-002	RTT	RTT (ON/OFF, Intelligent)	ON/OFF

ON/OFF Thermostat (accessory ATW-RTU-01)

When the ON/OFF Room Thermostat temperature setting is higher than room ambient temperature, Room Thermostat communicates with RF Receiver in order to close relay signal and Thermo ON Condition must be applied.



Thermostat	Receiver	Unit status	Pump status (ECO)
Demand	Closed relay signal between terminals 5-6	Thermo ON unit	Pump runs
No demand	Open relay signal between terminals 5-6	Thermo OFF unit	Pump stops after overrun time *

NOTE

For more information on how to work water pumps, see chapter on Water pump control.

- Minimum on time and ON/OFF time cycle

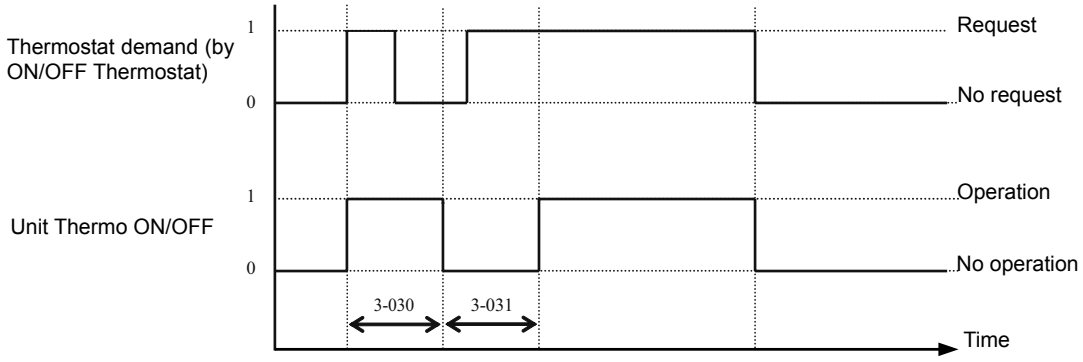
In order to reduce Thermo ON/OFF Cycles per hour, there are two additional functions for ON/OFF Thermostat.

These two functions are:

a. Minimum ON Time: When Thermostat is demanded, a minimum ON time will be applied (including when demand is OFF)

b. Minimum OFF Time: When Thermostat is demanded, a minimum OFF time will be applied.

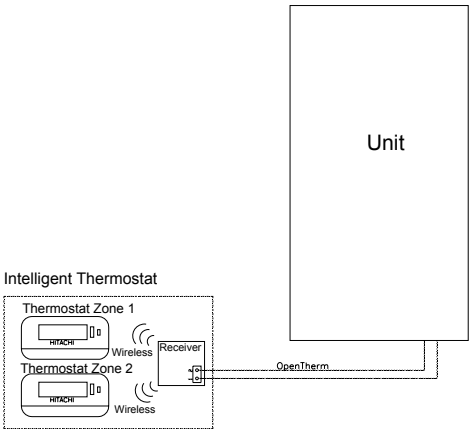
CODE	REF	Description	Default Value	Range	Steps	Units
3-030	Ron	Minimum ON Time	6	0~15	1	min
3-031	Roff	Minimum OFF Time	6	0~15	1	min



Intelligent room thermostat (accessory ATW-RTU-02/03)

When an intelligent room thermostat is installed (as accessory), the unit and Room Thermostat communicate by means of the receiver and Opentherm communication.

Room thermostat sends the actual room temperature and room temperature setting to the unit.



- Room set-point effect (Only heating operation)

The room temperature will modify the water set-point of the Outside Temperature Compensated (OTC) control (both OTC Points and OTC Gradient) system.

At different times of the day, according to the time programme in the Room Unit, the room temperature set-point will cause a shift of the heating curve down to reflect the change in desired room temperature. The change in supply set-point due to the room set-point is dependent on the value of the outside temperature and the selected heating calculation.

Resulting Water Temperature Set-Point will be:

$$\textbf{\textit{Ttwo}} = \textit{Ttwo OTC} + 2 \times \Delta \textit{Troom}$$

Where:

Ttwo: Resulting Water Set-Point

Ttwo OTCn: Water Set-Point as calculated by OTCn.

ΔTroom: Room Temperature Offset = RS – RD.

RS = Room set-point; RD = Room default temperature condition (20ºC)

Example:

Default OTC: ***Ttwo OTC*** = *-1.3 x Ta + 43.2*

Text (outside temperature) = ***0ºC***

Ttwo OTC = *-1.3x 0 +43.2* = ***43.2ºC***

RS = ***18ºC***

RD: Better condition 20ºC.

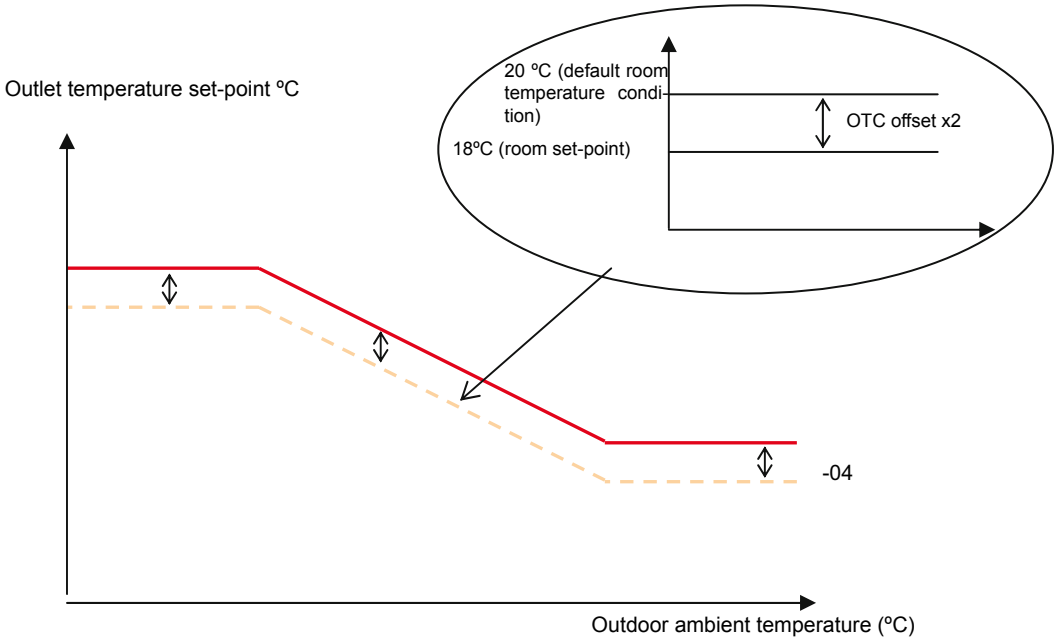
Ttwo = function (OTC + (Room temperature set-point offset) x2)

Ttwo = function (OTC + (Room set-point - default room temperature condition (20ºC) x2)

Ttwo = function (OTC + ((18- 20) x2)

Ttwo = *43.2 + (-4ºC)* → Ttwo = ***39.2ºC***

In this case, for a 2K change in room set-point, the supply is changed by 4K.



NOTE

Room set-point factor has no effect on setting fixed temperature operation.

- Room temperature compensation (Only heating operation)

If room compensation is enabled, the calculated supply set-point is adjusted based on the difference between room temperature and room set-point in order to reduce room error. The amount of room effect can be adjusted using the room temperature compensation factor setting. To increase or decrease the amount of room compensation, adjust the room compensation factor. A higher value will give more priority to the room temperature error, and a lower value will mean the controller follows the selected heating curve more closely.

If a Room Unit is not bound (RF binding) to heating circuit 1 or 2, the room temperature compensation function is disabled.

CODE	REF	Description	Default Value	Range	Steps	Units
		CIRCUIT 1				
3-003	$Rfact_1$	Compensation factor C1	2	0~5	1	-
		CIRCUIT 2				
3-103	$Rfact_2$	Compensation factor C2	2	0~5	1	-

NOTE:

No disable room compensation function, set 3-0(1)03 to 0.

New water temperature set-point is calculated as follows:

Ttwo = *Ttwo OTC + $Rfact_n$ x (RS - RT)*

Where:

Ttwo: Resulting Water Set-Point

Ttwo OTC_n: Water Set-Point as calculated by OTCn.

$Rfact_n$: Room compensation factor (Default 2)

RS: Room set point

RT: Room temperature

Example:

Ttwo OTC = *-1.3 x Ta + 43.2*

Text (outside temperature) = ***0ºC***

Ttwo OTC = *-1.3x 0 +43.2* = ***43.2ºC***

RS = 20ºC

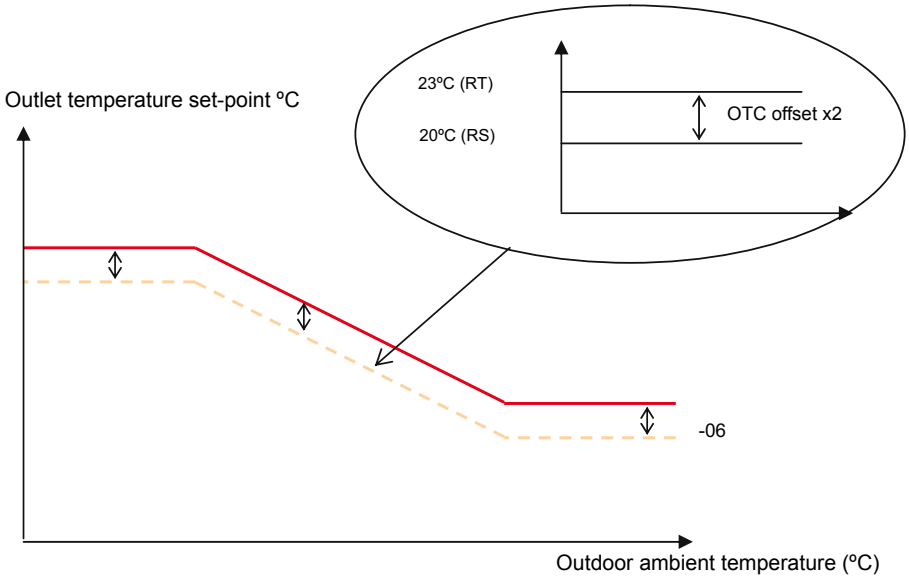
RT = 23ºC

$RFact_n$= 2 (Default value)

Ttwo = *function (OTC + $RFact_n$ x (Room set-point – Room temperature)*

Ttwo = *function (OTC + 2x (20 – 23)*

Ttwo = *43.2 + (-6ºC)* → Ttwo = ***37.2ºC***



NOTE

Room set-point factor has no effect on setting fixed temperature operation.

- Thermo OFF condition by room thermostat

If Room Temperature Roff is higher (heating operation) or lower (cooling operation) than Room Temperature set-point, it must also be set to THERMO OFF (Compressor OFF, Heater OFF,…) and water pump must be turned OFF after over-run time (if ECO Pump is selected).

- Heating application:

  If *Room Temperature > Room Set-point temperature + Roff* → Thermo OFF by Indoor temperature

  If *Room Temperature < Room Set-point temperature* → Thermo ON by Indoor temperature

NOTE

In case of multiple Room Thermostats: Thermo OFF occurs when all Thermostats are fulfilled.

- Cooling application

  If *Room Temperature < Room Set-point temperature - Roff* → Thermo OFF by Indoor temperature

  If *Room Temperature > Room Set-point temperature* → Thermo ON by Indoor temperature

NOTE

In case of multiple Room Thermostats: Thermo OFF occurs when all Thermostats are fulfilled.

CODE	REF	Description	Default Value	Range	Steps	Units
3-032	Roff	Room Thermo OFF	3	0~5	1	ºC

- Unit OFF status by room thermostat (Heating and cooling application)

If Room Temperature setting is 5ºC or 10ºC. (by pressing OFF button (5ºC) or Holidays button (10ºC) on User Thermostat), the heating or cooling space selected will be turned OFF. When both User Thermostats are in question, the entire heating or cooling space will be in the Unit OFF position.

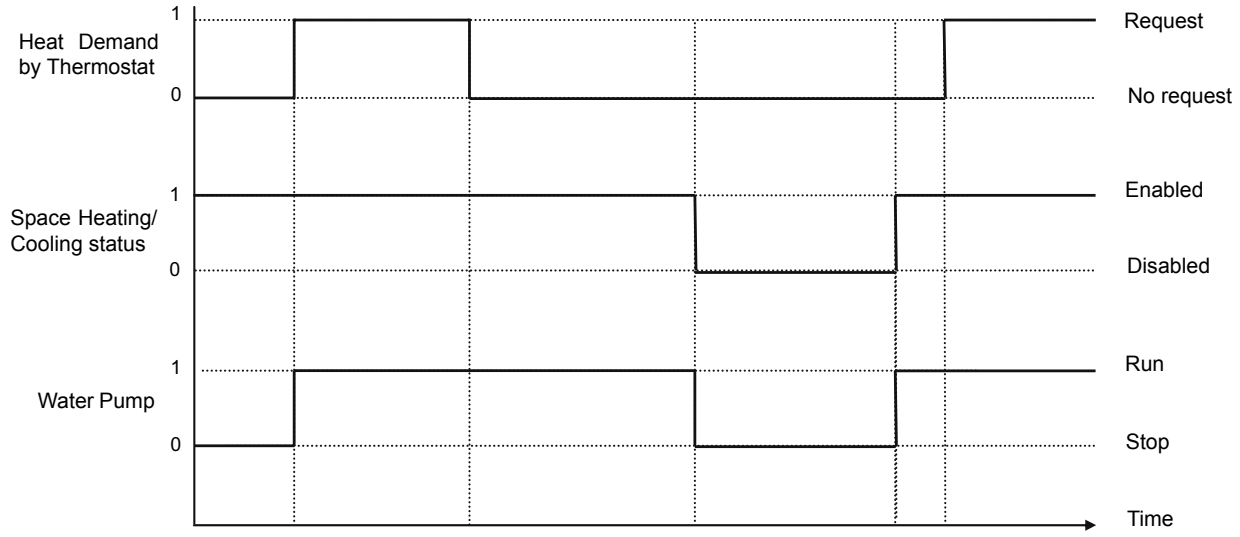
◆ Circuit water pumps

Main water pump for heating or cooling circuit application

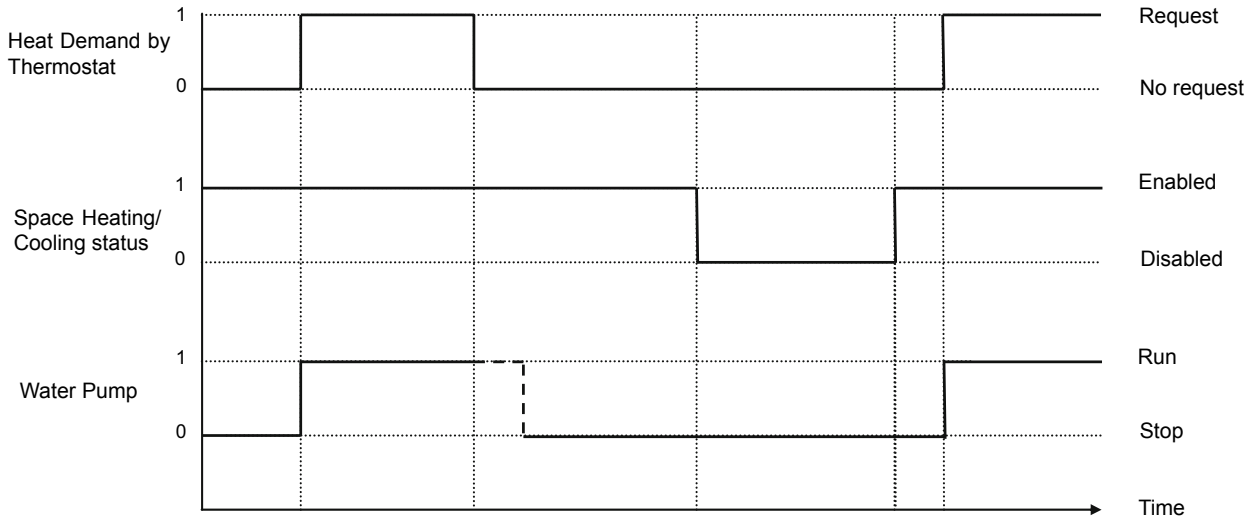
- Pump configuration (Standard & Economy function)

Pump control can be set to standard or Economy mode. This configuration is set using DSW4 pin 5.

When pin is OFF, pump will be in standard operation and pump always be in operation when space heating or cooling is enabled, but when space heating or cooling is disabled using the LCD user interface or Thermostat OFF (intelligent thermostat only), pump must be switched OFF and only switched ON by Domestic Hot water request.

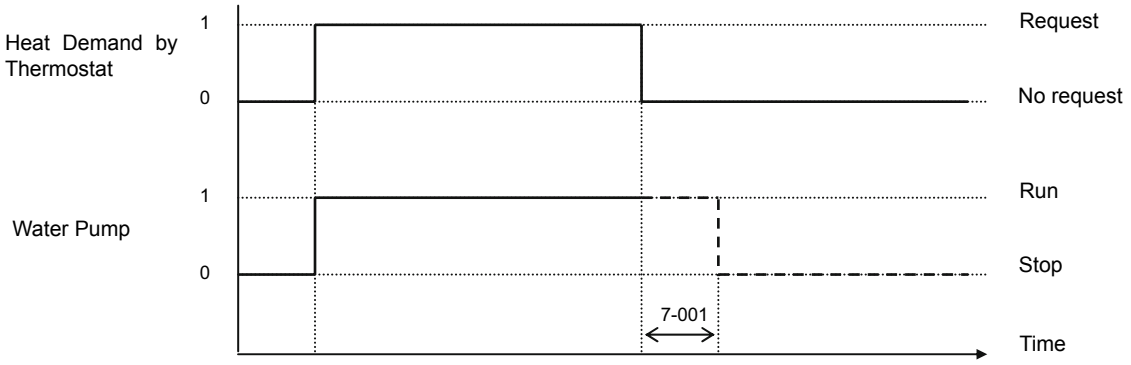


When pin is ON, pump will be in ECONOMY operation. Economy operation allows pump to stop when system is stopped by demand OFF in room thermostat.



- Overrun pump delay

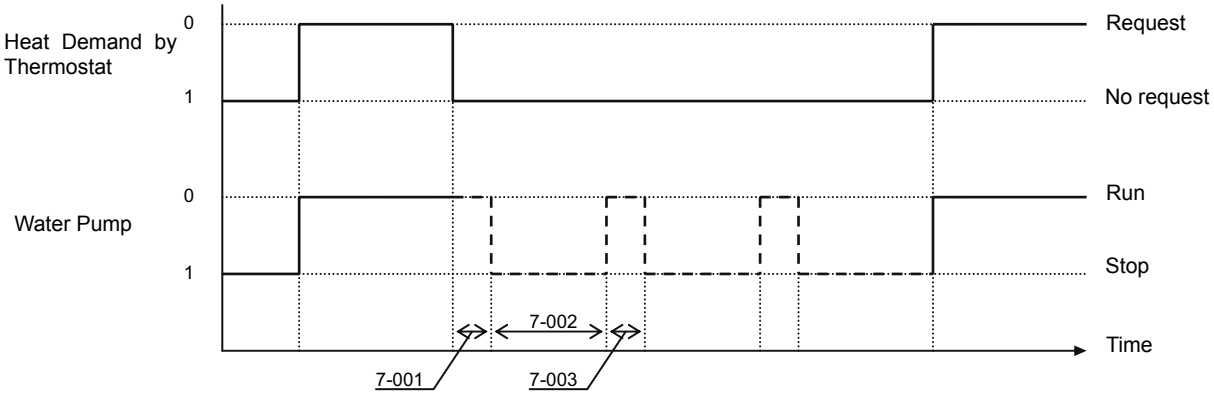
All pumps are no longer required; operation must continue at least until pump overrun time has passed since end of requirement.



CODE	REF	Description	Default Value	Range	Steps	Units
7-001	POVRT	Pump 1 overrun time	10	10~120	5	min

- Recirculation option (Only for economy mode)

When recirculation option is enabled, pumps will operate regularly when they are stopped by Room thermostat Demand OFF condition.



CODE	REF	Description	Default Value	Range	Steps	Units
7-002	PRCOFF	Pump recirculation time OFF	45	10~120	5	min
7-003	PRCON	Pump recirculation time ON	10	10~120	5	min

NOTE

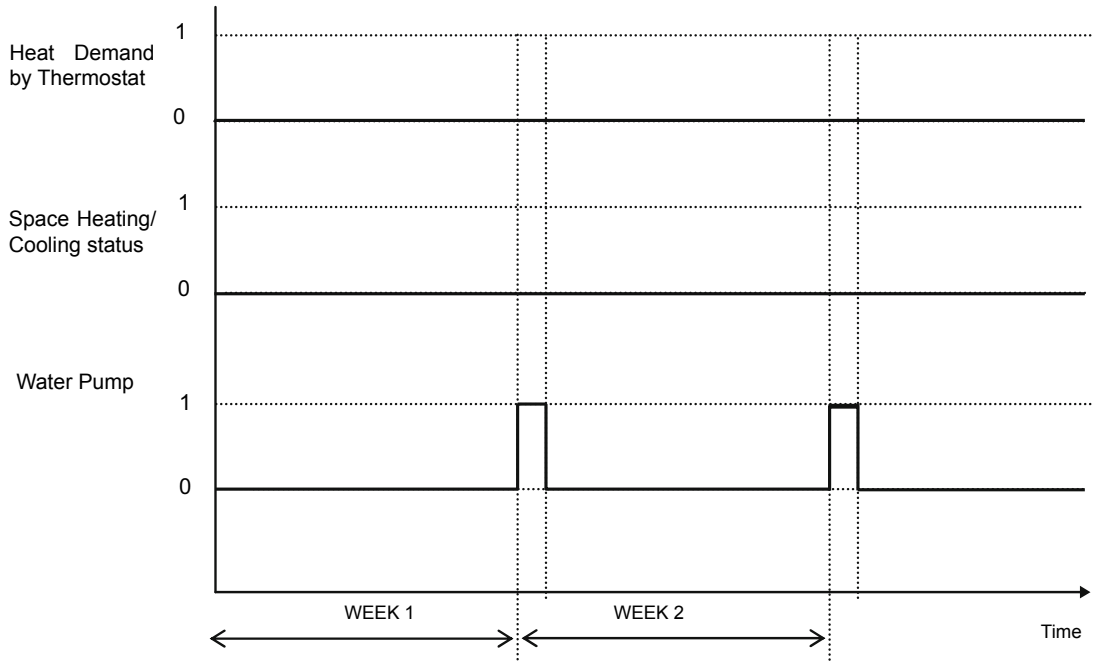
If 7-002 & 7-003 is 0, the Re-circulation Option has no effect.

Pump seizure protection

The pump seizure protection function helps to prevent these components from sticking during long periods of inactivity.

Every week the components will be run for a short period.

Pumps are switched on for 1 minute.



CODE	REF	Description	Default Value	Range	Steps	Units
8-002	SeizPr	Seizure Protection Status	Disabled	Disabled Enabled	-	-
8-010	OpInt	Operation Day	Mon	Mon~Sun	-	Day
8-011	StTim	Start Time (00~24)	01:00	(00~24)	-	Time

These Installer parameters control the optional seizure function. They are used to enable seizure protection and set its activation time. When this happens, follow these instructions:

- Make sure mixing valves are fully opened and then fullyclosed (time depends on runtime parameter).
- Diverting valves are switched on for 1 minute.
- Pumps are switched on for 1 minute.

◆ Auxiliary electric heater for space heating

All units are delivered with an integrated electric heater for additional heating capacity during cold outdoor temperatures. The electrical heater also can be used for emergency operation in case of outdoor unit malfunction. The electrical heater is available for a heating capacity of 3,6 and 9 kW, depending on unit capacity selected.

Electric Heater will only operate if unit is in Space Heating mode. It will always be disabled in any other mode (Hot Sanitary Water, Swimming Pool and Cooling mode).

Electric Heater will only operate when Heating Accessory is set to Heater or Heater + Boiler. In the case of Heater + Boiler it will never operate with both at the same time. The decision as to how to operate will be made considering ambient temperature.

Model	Heater Capacity	Heater steps	Electrical Heater nominal voltage
RWM-2.0FSN3E	3kW	3 steps (1/2/3kW)	1x230V
RWM-3.0FSN3E	3kW	3 steps (1/2/3kW)	1x230V
RWM-4.0FSN3E	6kW	3 steps (2/4/6kW)	1x230V or 3x400V
RWM-5.0FSN3E	6kW	3 steps (2/4/6kW)	1x230V or 3x400V
RWM-6.0FSN3E	6kW	3 steps (2/4/6kW)	1x230V or 3x400V
RWM-8.0FSN3E	9kW	3 steps (3/6/9kW)	3x400V
RWM-10.0FSN3E	9kW	3 steps (3/6/9kW)	3x400V

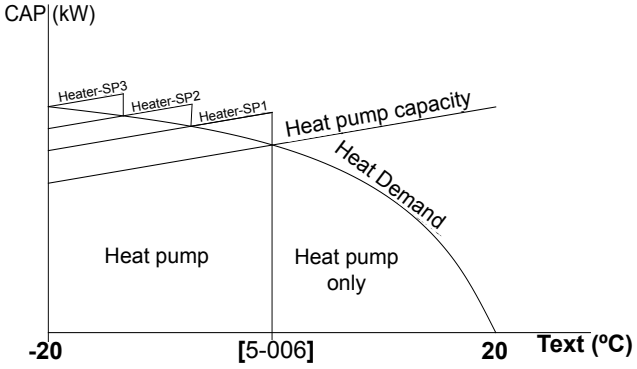
User Variables:

CODE	REF	Description	Default Value
5-000	HS	Complementary Heating = (Only HP; Heater; Boiler; Heater + Boiler)	Only HP

- Heater bivalent point

  Heater will only be enabled when:

  Outdoor Ambient Temperature > Electrical heater Bivalent Point (5-006).



User Variable:

CODE	REF	Description	Default Value	Range	Steps	Units
5-006	EHb	Electrical Heater Bivalent Point	0	-20~20	1	ºC

- Heater step control

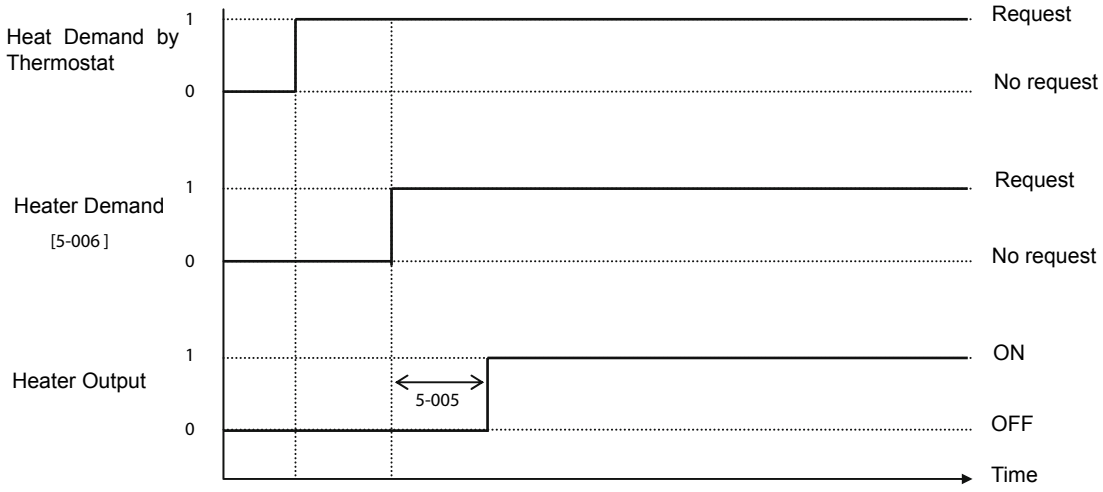
Load Factor determines the desired heating supplied by heater. Load factor is calculated by a P+I function ranging from 0 to 100%. Actual heater output will be translated from percentage to a 3-step output using hysteresis system.

Steps	Power		
	(2/3) HP	(4-6) HP	(8/10) HP
1	1kW	2kW	3kW
2	2kW	4kW	6kW
3	3kW	6kW	9kW

- Heater wait time

If Water set-point (Ttwo) ≤ Maximum Heat Pump Operation, Electric Heater will be only allowed to operate when more than electrical heater waiting time (5-005) Wait Time has passed since Heat Pump was started.

When Water set-point (Ttwo) > Maximum Heat Pump Operation or when heater needs to operate in emergency mode, Electric Heater may be operated regardless of Wait time.



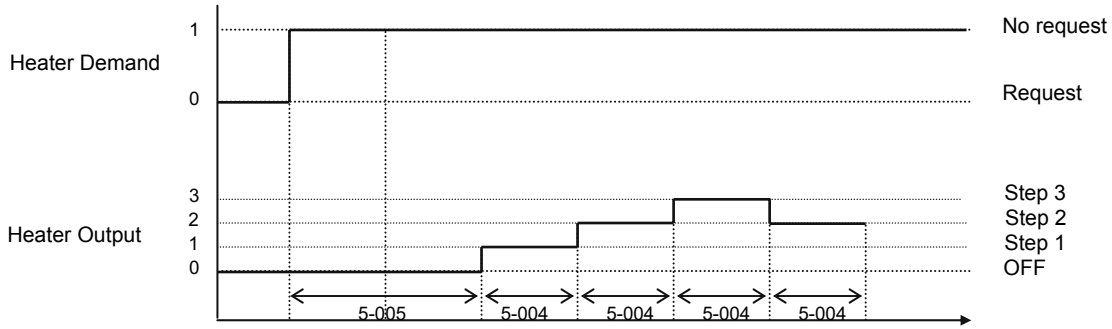
User Variable:

CODE	REF	Description	Default Value	Range	Steps	Units
5-005	WTEH	Wait time for electric Heater	30	0~90	1	min

Heater inter-stage steps control

After each step increase, further step increases are prohibited during ISWT to avoid hunting. Step decrease does not have this limitation. Since sampling time is 1 minute, at least 1 minute needs to pass between any step changes.

In any of the following conditions step will be forced to 0. This change will occur regardless of maximum 1-step change and user defined delay:



User variables:

CODE	REF	Description	Default Value	Range	Steps	Units
5-004	ISWT	Inter-Stage Wait time	5	0~10	1	min

Heater for emergency mode

When user allows emergency mode (DSW4-4 ON), heater may operate in said mode. This configuration

allows also Hot Sanitary Water emergency operation.

NOTE

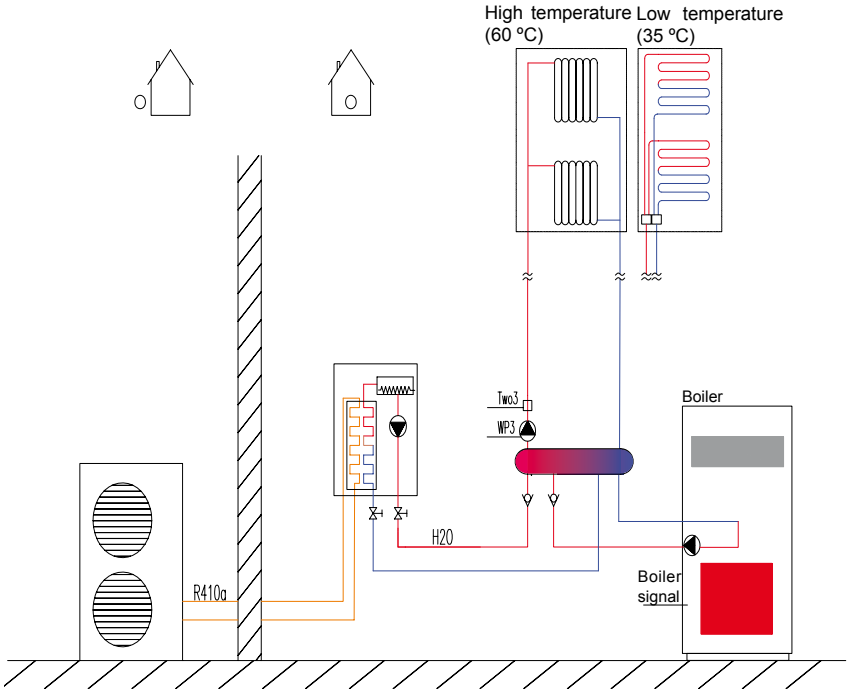
For more information refer to chapter *Optional functions.*

◆ Boiler combination for space heating

Boiler operation

Boiler will only operate if unit is in Space Heating or Hot Sanitary Water modes. It will always be disabled in any other mode (Swimming Pool and Cooling mode).

Unless otherwise stated, all procedures in this chapter will only affect operation when performing Space Heating. Boiler operation during Hot Sanitary Water operation will be explained in its own sub-heading below.



Boiler will only operate when Heating Accessory is set to Boiler or Heater + Boiler. Boiler and Heater can never work at the same time. The decision as to how to operate is based on ambient temperature and is explained in “Use Boiler + Heater” below.

System protection will always have priority over boiler operation wherever it applies.

User Variables:

CODE	REF	Description	Default Value
5-000	HS	Complementary Heating = (Only HP, Heater, Boiler, Heater + Boiler)	Only HP

CAUTION

The boiler is configured as alternating with the heat pump. A hydraulic separator or buffer tank must be used to ensure proper hydraulic balancing. Additional Water pump (WP3) and water sensor (Two3) are necessary for boiler combination control.

User variables:

CODE	REF	Description	Default Value
6-000	hsb	Hydraulic Separator = (Disabled, Enabled)	Automately enabled when boiler complementary heating selected

CAUTION

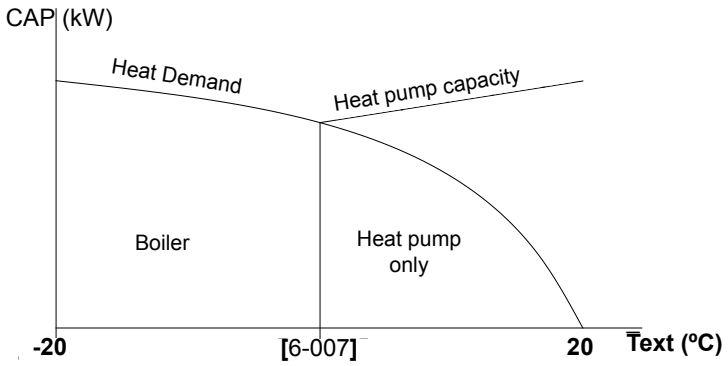
- ***Be sure that the boiler and the integration of the boiler with the YUTAKI S system is in accordance with relevant European and national regulations.***
- ***HITACHI can not be held responsible for incorrect or unsafe situations in the boiler system.***
- ***Make sure that return water to the YUTAKI S heat exchanger never exceeds more than 57ºC.***
- ***Make sure that the non-return valves (field supplied) are correctly installed in the system as shown in the illustration above.***

- Boiler bivalent point

Unit should be sized to operate mainly in heat pump mode. Given that capacity is reduced with temperature, it may be desirable for the unit to use boiler accessory only when ambient temperature is low.

Boiler will only be enabled when:

Outdoor Ambient Temperature > Bivalent outdoor temperature for boiler (6-007)



User Variable:

CODE	REF	Description	Default Value	Range	Steps	Units
6-007	BB	Bivalent outdoor temperature for Boiler	-5	-20~20	1	ºC

Target temperature

- Space heating

Being a parallel system (either Heat Pump or Boiler), water setting will be the same as the water set-point for Heat pump without outdoor unit temperature restrictions but with restrictions of Maximum water temperature by installer.

- DHW heating

Water set-point for DHW is defined to 80 ºC.

- Conditions for enabling and disabling boiler.
  - Conditions for Enabling

Unit will enable boiler operation if all the following conditions are met.

1 Heating operation selected (Space Heating or DHW)
2 Boiler or Boiler+ Heater complementary heating selected
3 Ambient temperature < Boiler Bivalent point (6-007) (-5ºC Default) more than (Waiting time for boiler) (6-006)
4 Water temperature (Two3) ≤ Water Temperature target (Ttwo) - Supply set point control offset (4ºC default) (6-001)

- Conditions for Disabling

Unit will not enable boiler operation in any of the following conditions are met:

1 Demand OFF by Room Thermostat
2 Ambient temperature > Boiler Bivalent point (6-007) more than 10 minutes.

User variables:

CODE	REF	Description	Default Value	Range	Steps	Units
6-001	kscob	Supply set-point control offset	4.0ºC	0 ~10	1	ºC
6-006	WTBO	Waiting time for boiler	30 min	1 ~90	1	min

- Conditions for THERMO ON/OFF Boiler:
  - Conditions for Thermo ON Enabling:

1 Water temperature (Two3) < Water temperature setting (Ttwo) - Supply set point offset (4ºC Default)
2 Room thermostat in demand ON.

- Conditions for Thermo OFF:

When any of Conditions a, b, or c are fulfilled.

a. Measured outlet temp value (Two3) ≥ Water temperature target + 5ºC.
b. Outlet water temp (Two3) = Max water range temp by installer (1&2 (3-(0)(1)11)) + 2ºC.
c. Thermo OFF by Room Thermostat.

NOTE

Complementary disabling functions for the boiler itself:

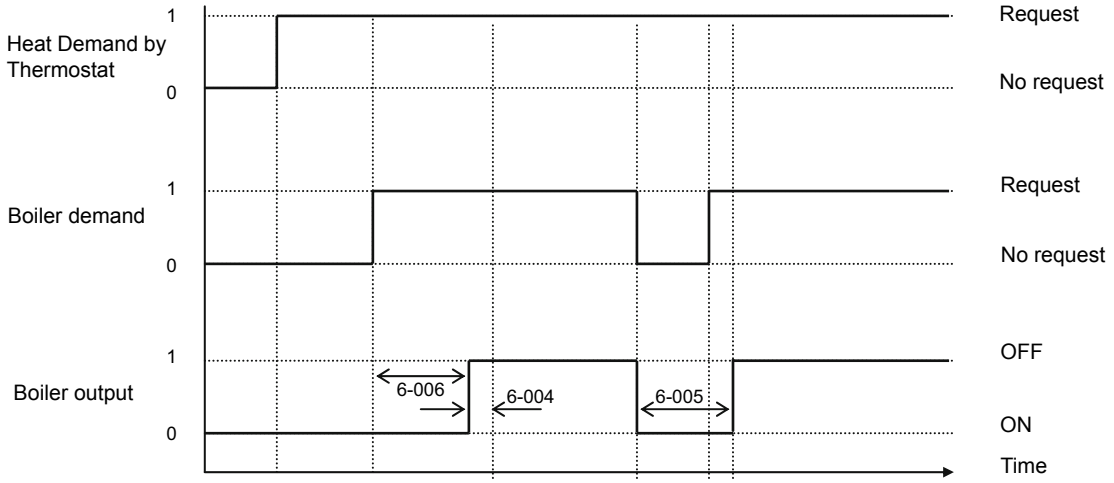
In any of the following conditions step will be forced to 0 (boiler off):

- ***Boiler is disabled by user or thermo OFF by itselfs***
- ***There is an alarm related to boiler***

Boiler minimum and maximum times

Boiler can only be stopped after minimum ON time has passed (6-004).

Boiler can only be started after minimum OFF time has passed (6-005).



User Variables:

CODE	REF	Description	Default Value	Range	Steps	Units
6-004	Bon	Boiler minimum ON time	2 min	1 ~ 30	1	min
6-005	Boff	Boiler minimum OFF time	5 min	1 ~ 30	1	min

NOTE

Maximum water temperature of the installer have priority against Boiler minimum ON Time.

Emergency mode

When user allows emergency mode (DSW4-4 ON), boiler may operate in said mode.

In the case of Heater + Boiler combination, Boiler has priority.

NOTE

For more information refer to Optional functions chapter.

◆ Use of boiler + electric heater

When using Boiler + Heater, unit normally operates in heat pump, and the heater supplies the extra heating necessary.

Heater till certain extreme outdoor temperature and Boiler will only operate when temperature is too low for Heat Pump and Heater.

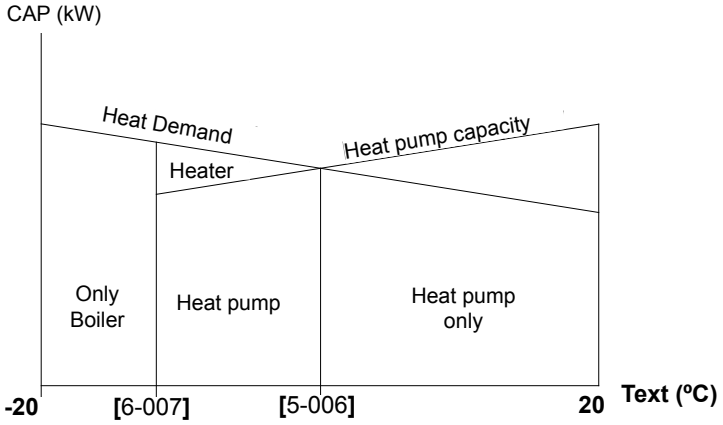
- Heater and boiler bivalent point

Heat Pump and Heater enabled if:

- Ambient Temperature (Bivalent outdoor temperature for Heater) (5-006)

Heat Pump and Heater disabled and Boiler enabled if:

- Ambient Temperature (Bivalent outdoor temperature for Boiler) (6-007)



NOTE

- ***Boiler operation is only for bivalent system (alternating operation, parallel connected).***
- ***In the Heating + Boiler configuration, system control sets Boiler outdoor bivalent point at 5ºC below Heater outdoor bivalent point. It will auto-increase (5-006) in order to maintain the 5ºC difference.***

◆ Domestic Hot Water (DHW)

An optional domestic hot water tank can be connected to the YUTAKI S Indoor unit. The domestic hot water tank is available in four models: 200 or 300 liters, enamelled or stainless, with integrated electrical Heater (See available accessories).

Refer to the domestic hot water tank installation manual for more details.

Sanitary water will only operate if it is enabled from LCD user interface:

CODE	REF	Description	Default Value
3-121	DHWs	DHW status (Disabled; Enabled)	Disabled

If there is any sanitary water operation being performed and DHW status is changed from Enabled to Disabled, the current sanitary water operation will be stopped.

Priority

Sanitary Operation has priority over all other operation modes unless otherwise noted.

The following constraints apply:

- When Sanitary Water requires Heat Pump operation, no other modes can require heat pump operation.
- If Sanitary Water does not require Heat Pump operation, it is stopped or works with heater only; there is no restriction on the other operation modes.

Sanitary water modes (Standard / High demand)

DHW loading has two different modes, STANDARD Mode and HIGH DEMAND Mode.

- **STANDARD Mode:** The domestic hot water tank will start heating when water temperature in tank is low enough for Heat Pump to be started.
- **HIGH DEMAND Mode:** The domestic hot water tank will start heating when differential is higher than T_{DHWON}. Only the water tank heater will start unless water temperature in tank goes below Heat Pump starting temperature. (Not available for boiler combination)

DHW Modes will be selected using LCD User interface:

CODE	REF	Description	Default Value
3-021	DHWm	DHW Mode (Standard Usage; High Demand)	Standard usage

Domestic hot water temperature setting (T_{DHWS})

Sanitary Water operation (both Heater and Heat Pump) will be stopped when:

- $T_{DHW} > T_{DHWS}$

  Where:

  Tdhw: Domestic Hot water temperature

  Tdhws: Domestic Hot water setting temperature

CODE	REF	Description	Default Value	Range	Steps	Units
3-022	T_{DHWS}	DHW Tº set-point	45	35~(3-122)	1	ºC

Maximum set-point selected by Installer

In order to avoid excessively hot water in the tank, there is an additional function that allows the installer to set a maximum temperature.

CODE	REF	Description	Default Value	Range	Steps	Units
3-122	T_{DHWMAX}	DHW maximum set-point Tº	55	40~70	1	ºC

NOTE

Antilegionella function has no effect.

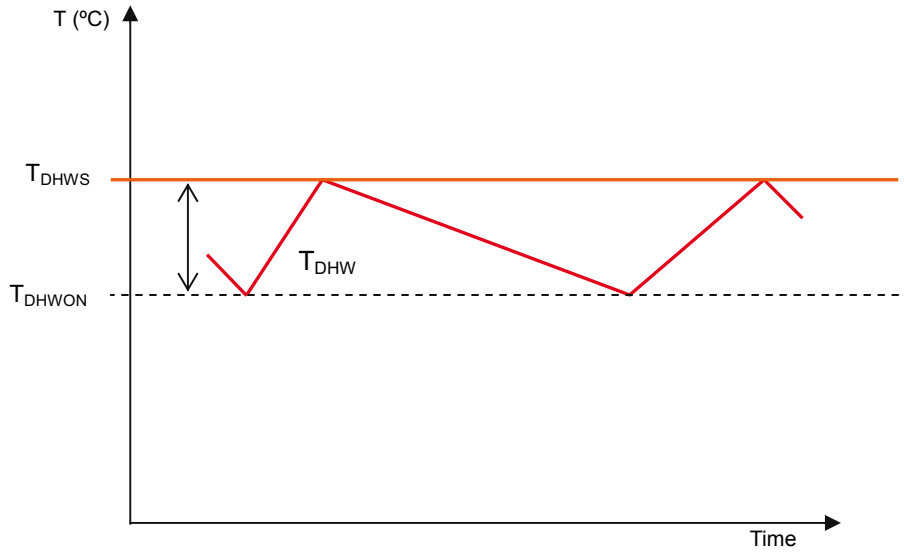
High demand mode differential (T_{DHWON})

Sanitary Water Heater will start when following conditions are met:

- System is set to HIGH DEMAND Mode

Other functions may cause Sanitary Water Heater to start regardless of this control. For example, Sanitary Water Heater may be started by Electric Heater Wait time.

CODE	REF	Description	Default Value	Range	Steps	Units
3-023	T_{DHWON}	DHW differential	6	2~15	1	ºC



T_{DHW}: Water temperature in DHW (ºC) (by THM_{DHW} sensor)

T_{DHWS}: Water temperature setting in DHW (ºC)

T_{DHWON}: Domestic hot water differential (temperature drop that starts DHW)

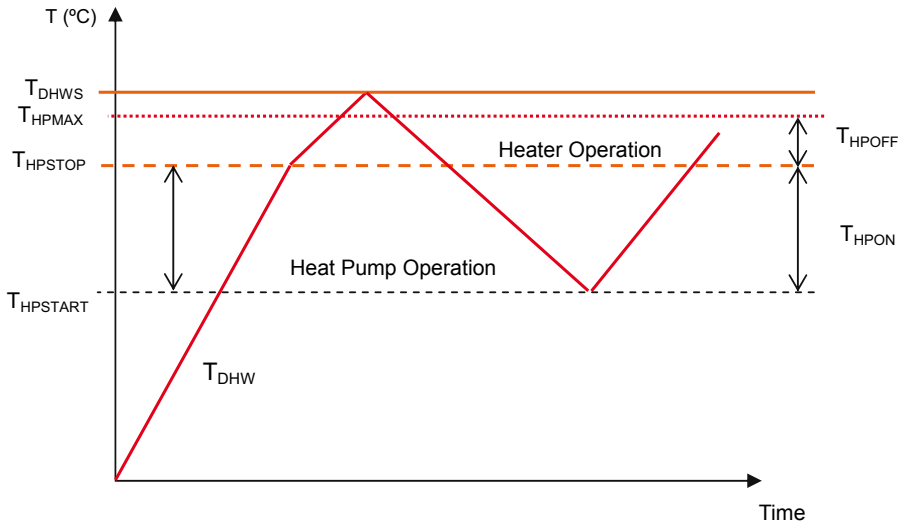
Heat pump operation for DHW (T_{HPON} & T_{HPOFF})

During Heat Pump operation for DHW, sanitary water tank is heated using heating water circuit.

Since there is no sensor inside the heating circuit for sanitary water tank, water outlet temperature is used to control sanitary tank heating.

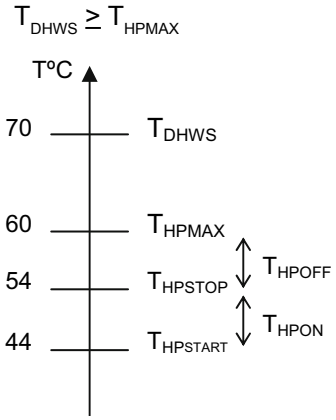
Heat pump operation for sanitary water starts when T_{DHW} is lower than $T_{HPSTART}$.

Heat pump operation for sanitary water stops when T_{DHW} is greater than T_{HPSTOP}. After this stoppage, unit should continue heating sanitary water tank by means of sanitary tank electric heater until stoppage conditions are met.

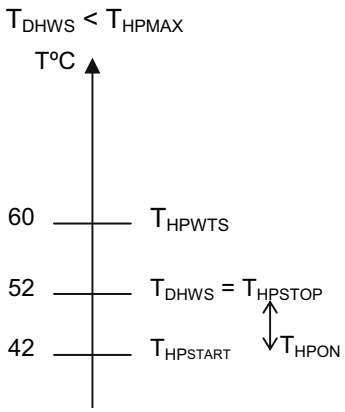


Example of temperature settings:

Case 1



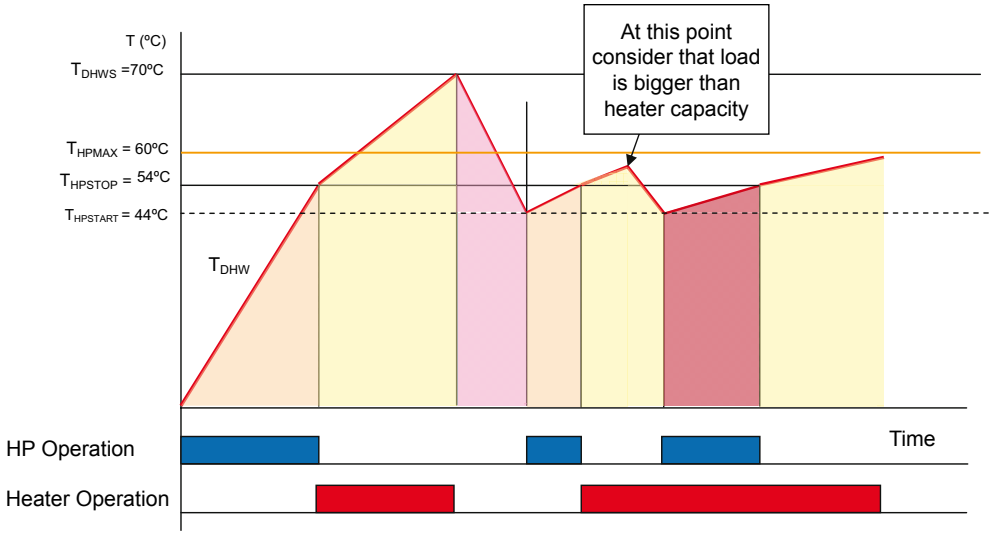
Case 2



CODE	REF	Description	Default Value	Range	Steps	Units
3-024	T_{HPOFF}	HP OFF Tº differential	6	2~10	1	ºC
3-025	T_{HPON}	HP ON Tº differential	10	2~16	1	ºC

THPMAX: Maximum water outlet by Heat Pump.

Working example using STANDARD DEMAND mode and default values except T_{DHWS} set Case 1.



NOTE

This example does not consider the possible constraints due to timing between changes.

Maximum / Minimum DHW loading time (T_{DHWMAX} / T_{DHWMIN})

This function controls the minimum and maximum times that Sanitary Water can operate using Heat Pump mode. Heater operation is not affected by it.

Heat Pump will not stop if:

- Heat Pump Operation Time < T_{DHWMIN}

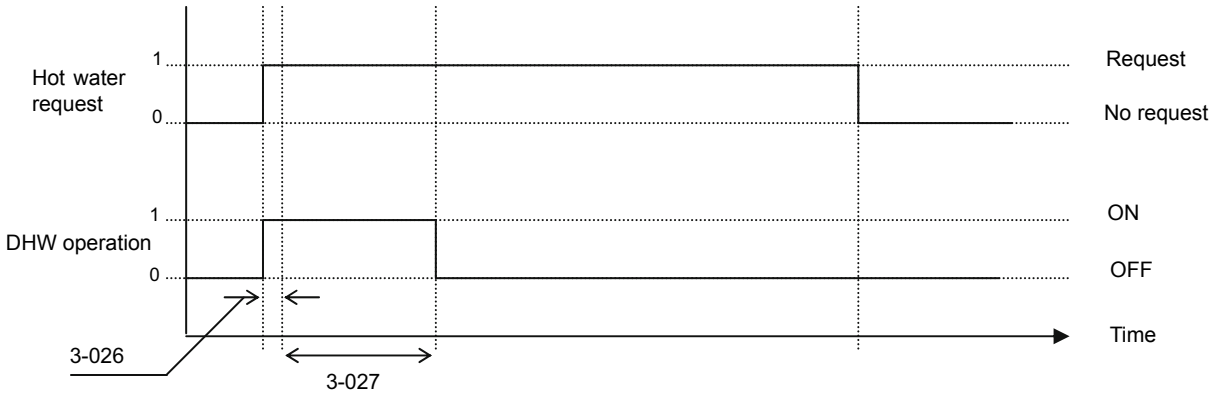
Stoppage by T_{DHWS} (Domestic Hot Water Temperature Setting) has priority over this timer, so it may stop the system regardless of Heat Pump Operation Time.

Heat pump will stop when:

- Heat Pump Operation Time > T_{DHWMAX}

When Heat Pump is stopped by this function, Sanitary Water will continue working by Heater or boiler.

CODE	REF	Description	Default Value	Range	Steps	Units
3-026	T_{DHWMIN}	DHW minimum time	10	0~15	1	min
3-027	T_{DHWMAX}	DHW maximum time	45	2~150	1	min



NOTE

Manual stop has priority above Minimum operation time.

DHW second cycle wait time

This defines the minimum time between two consecutive domestic hot water heat pump cycles.

Sanitary Water will not start if:

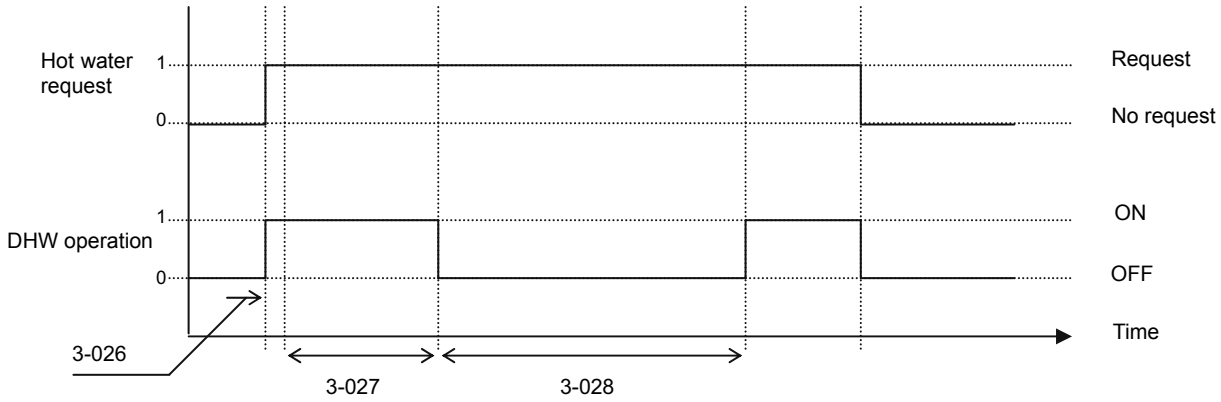
- Sanitary Water Off Time < $_{CDHW}$ (3-028)

Heater Start-Up by T_{DHWON} (High Demand Differential) is not limited by this function.

Sanitary Water start-up by T_{HPON} & T_{HPOFF} is limited and therefore the Sanitary Water mode, including heater, will not start at all by means of this function when timer has not passed.

Sanitary Water Off Time starts being counted after last Sanitary Water Heat Pump operation.

CODE	REF	Description	Default Value	Range	Steps	Units
3-028	C_{DHW}	Cycle DHW time	1	0~24	1	hour



DHW electric heater wait time

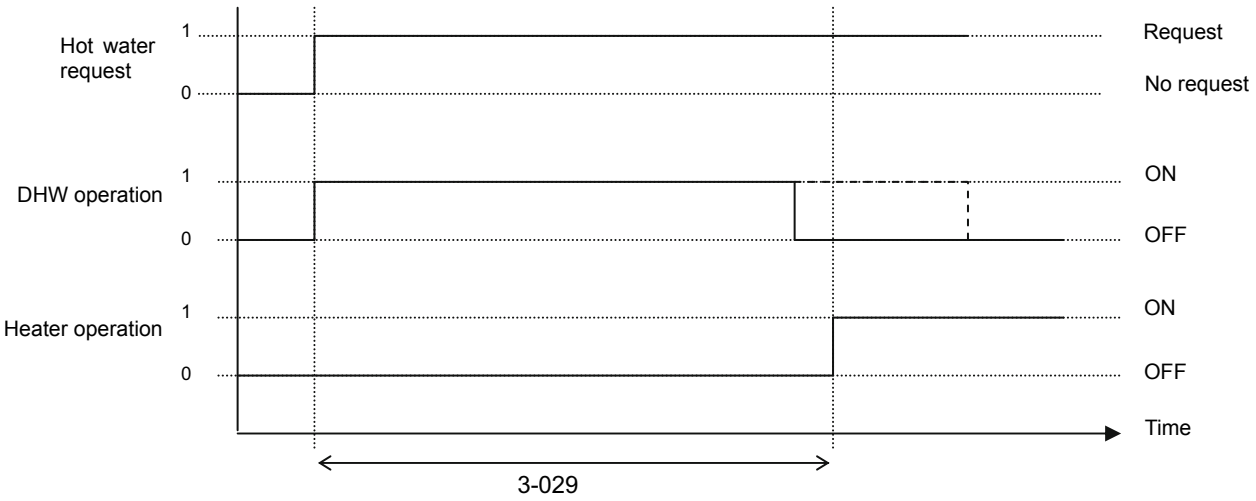
If Heat Pump cannot offer sufficient capacity it will be necessary to start Heater in order to supply additional capacity.

Heater will start if:

- Heat Pump DHW Operation Time > DHW_{EH} (3-029)

Heat Pump will not stop if heat pump stoppage conditions are not met. For example, stoppage by T_{DHWMAX} control or T_{HPOFF}.

CODE	REF	Description	Default Value	Range	Steps	Units
3-029	DHW_{EH}	EH wait time	45	0~60	1	min



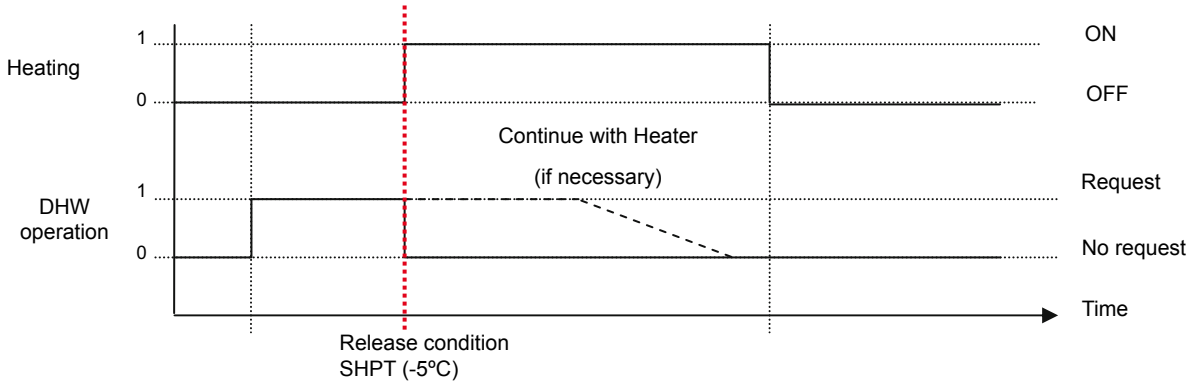
Space heating priority temperature

If Space Heating Priority function is enabled, Heat Pump operation by Sanitary mode will stop if:

- Text (ambient temperature) < SHPT (3-031).

When Heat Pump operation is stopped by this function it will continue working using Heater operation if stoppage conditions for heater are not met.

CODE	REF	Description	Default Value	Range	Steps	Units
3-030	SHPTs	Space priority	0	2~1	1	OFF/ON
3-031	SHPT	Space priority Tº	-5	-20~0	1	ºC



DHW heating by timer

A DHW Time program is provided inside the unit (through LCD Controller). Sanitary Water operation may be enabled or disabled by this timer.

NOTE

For more information, refer to** User interface **chapter.

Using boiler for DHW

The boiler may also be used to raise the temperature of the DHW if the Heat Pump is not able to reach the DHW set-point by itself. The boiler will only start after BWTt has passed since heat pump operation.

However, if DHW Setting temperature is higher than T_{HPOFF} unit will operate with boiler regardless of BWTt (6-009) since it is considered that heat pump cannot supply sufficient capacity.

Using boiler for DHW only applies if the selected complementary heating is Boiler or Heater + Boiler.

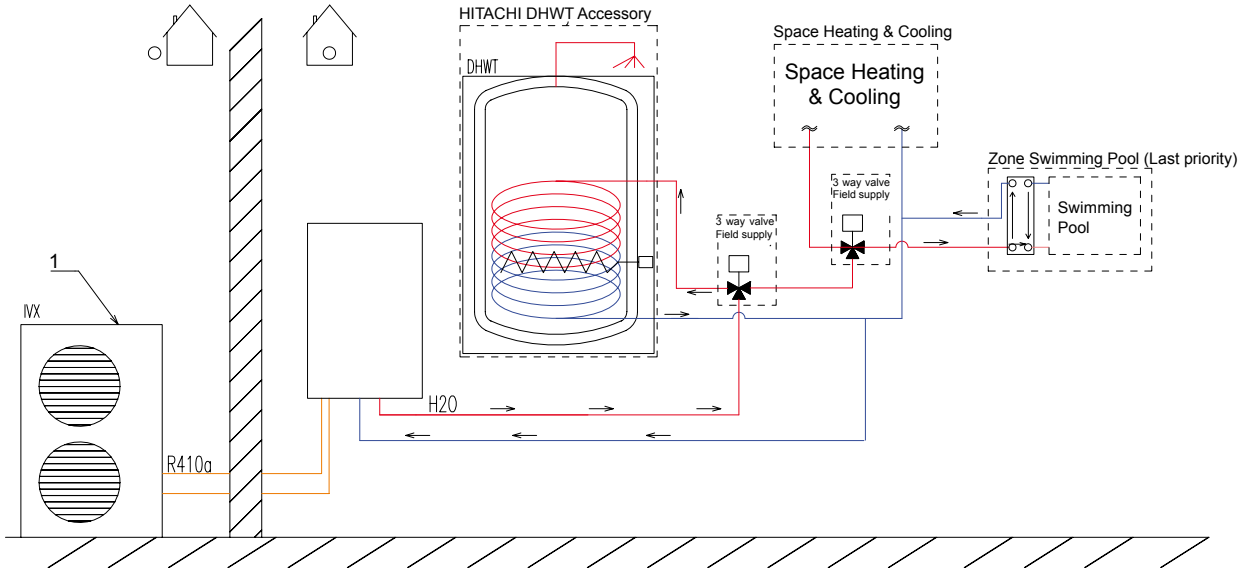
If boiler use for DHW is not desired, set boiler wait time parameter to 0.

User Variable:

CODE	REF	Description	Default Value	Range	Steps	Units
6-009	BWTt	Boiler wait time for DHW	45	0~120	5	min

◆ Swimming pool

When the swimming pool operation is required, the swimming pool pump starts to operate given the swimming pool pump feedback. In this situation, the 3-way valve of the DHWT is not activated and the 3-way valve for the swimming pool changes its normal position diverting to the swimming pool heat exchanger, allowing to heat the swimming pool water temperature to a comfortable value.



Swimming Pool Function will only be enabled if:

- It is enabled by user interface
- Heat Pump is turned OFF (or Thermo OFF) by any other system.
- Swimming pool is enabled by swimming pump feedback.

Swimming Pool will start if:

- Swimming Pool Temperature < SWP_S (3-033) -1ºC

Swimming Pool will stop if:

- Swimming Pool Temperature > SWP_S +1ºC

Remember that unit cannot start in Swimming Pool mode if Swimming Pool Pump feedback is not active.

CODE	REF	Description	Default Value	Range	Steps	Units
3-032	SWP	Swimming pool status	Disabled	Disabled – Enabled	-	-
3-033	SWPs	Swimming pool Tº set-point	24	24~33	1	ºC

NOTE

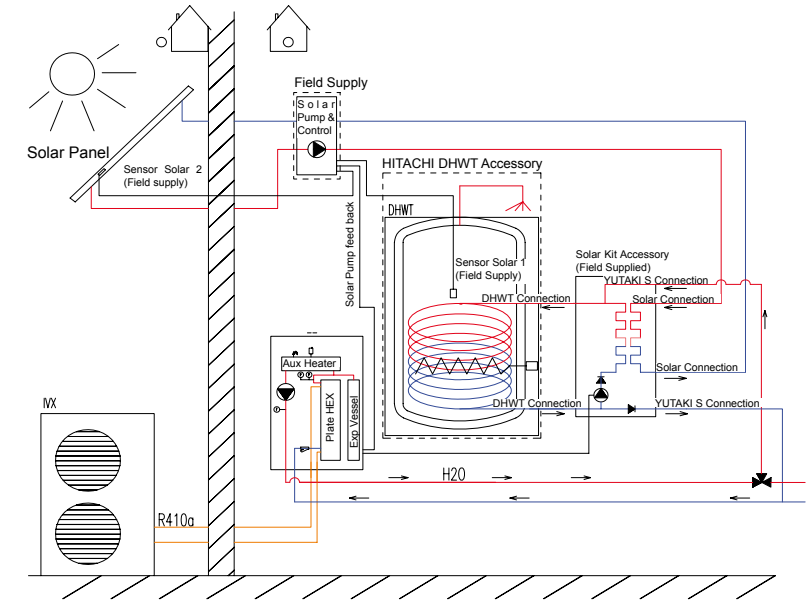
For swimming pool combination it is needed a special swimming pool sensor, see available accessories.

Solar combination

Concept

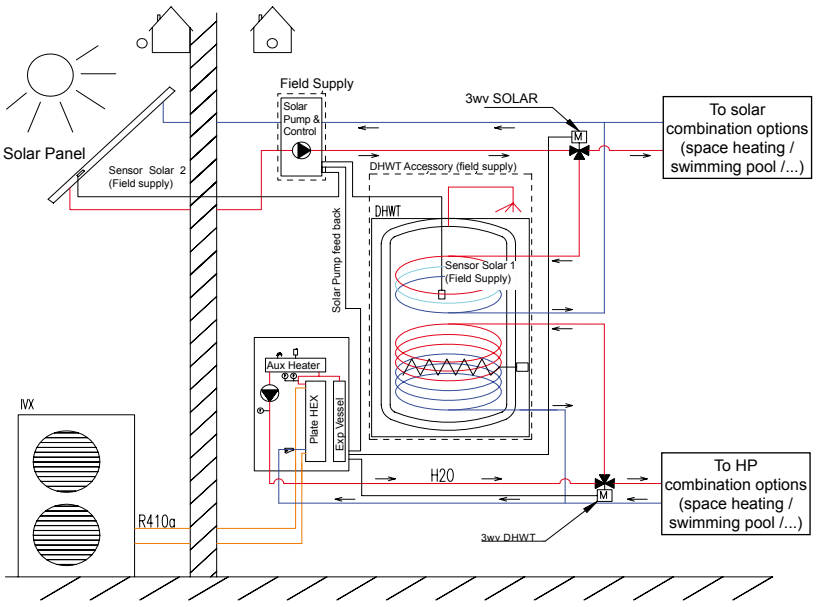
The solar combination will enable you to heat up your domestic water by means of the sun whenever the sun is available.

The solar kit is designed to transfer the heat from the solar panels to the domestic hot water tank's heat exchanger and is to be installed in the YUTAKI S system as shown in the scheme below:



Option 1

The solar panels gather heat from the sun. When the temperature of the glycol solution in the solar panel rises above the water temperature in the domestic hot water tank, the pumps from the solar pump station and the solar kit begin operating in order to transfer the heat to the domestic hot water tank's heat exchanger



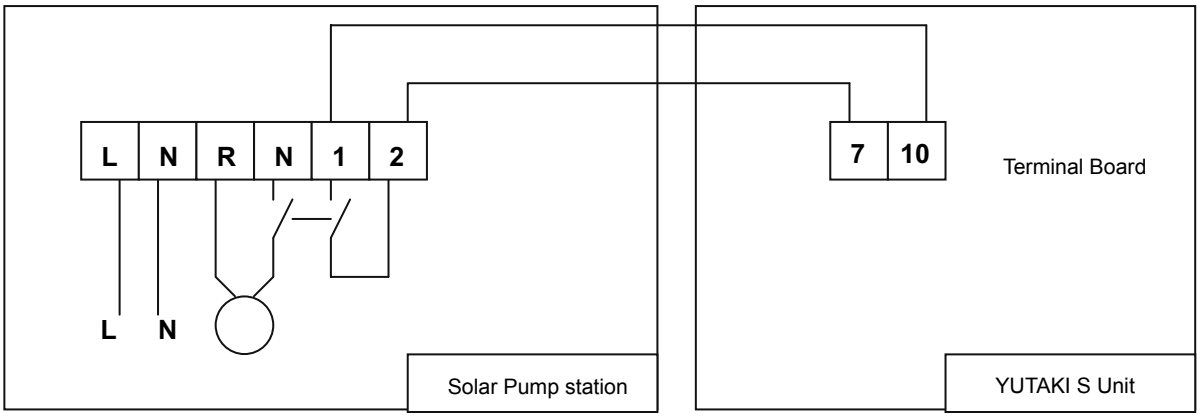
Option 2

The solar panels gather heat from the sun. When the temperature of the glycol solution in the solar panel rises above the water temperature in the domestic hot water tank, solar pump station's pump is switched ON and the solar kit's 3-way valve is diverted to the Sanitary Tank. At the same time the DHW's 3-way valve is switched OFF and the heat pump continues working to heat the space (if necessary).

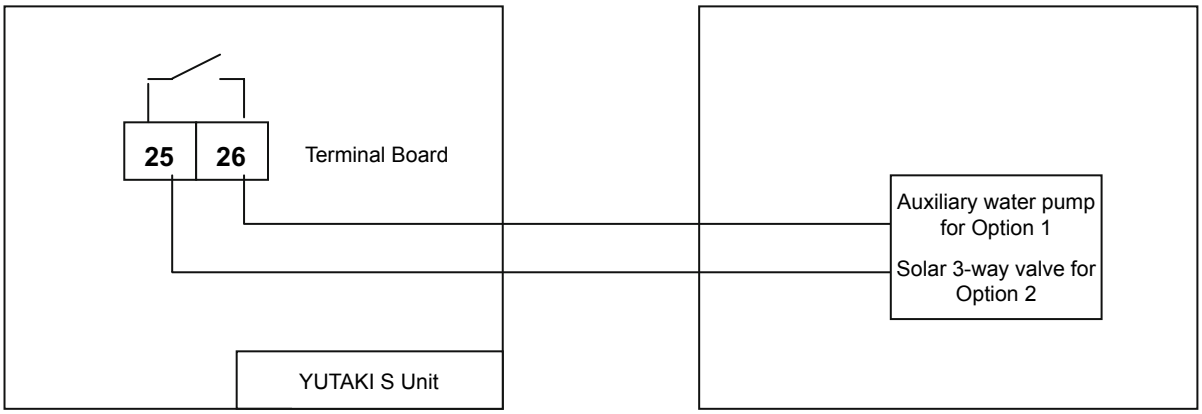
Solar installation requirements

- Electrical connection

The solar pump station have an auxiliary contact that closes when the operation station it is working to heat the domestic hot water tank operated.



When solar mode is enabled by the heat pump and the temperature of the glycol solution in the solar panel has risen above the water temperature in the domestic hot water tank, one of the HP's outputs will be switched ON (terminals 25/26).



Solar station control

If the solar pump station has an ON/OFF/AUTO function, make sure to put it on the AUTO function. This means that the pump will switch ON automatically when the solar panel temperature rises sufficiently above the domestic hot water tank temperature and switch OFF automatically when the difference between the solar panel and the domestic hot water tank temperature becomes too low.

When the temperature of the solar panel reaches 10°C* higher than the domestic hot water tank temperature, the pump of the solar pump station and the pump of the solar kit will start operation.

Description	Ideally Value	Remarks
Solar delta T	10	Depending on solar station

When the temperature of the solar panel becomes lower than the domestic hot water tank temperature, the pumps from the solar pump station and the solar kit will stop operating.

Setting the solar status

This default setting can be changed, so that at all times, when solar heat becomes available, domestic water heating by the heat pump will be (if busy) interrupted and taken over by the sun.

CODE	Description	Default Value
10-001	Solar status (Disabled, Enabled)	Disabled

Solar enabling/disabling conditions

- Solar start conditions

When all of Conditions a, b, c, d, are fulfilled.

a. Solar status enabled by user
b. Solar energy available through solar pump station (Input Terminal 10 enabled)
c. $T_{DHW} < T_{DHWS} - T_{DHWON}$

Where:

T_{DHW} = Domestic Hot Water Tank temperature (ºC)

T_{DHWS} = Domestic Hot Water Tank temperature setting (ºC) (Default 45ºC)

T_{DHWON} = Domestic hot water differential ºC (temperature drop that starts DHW) (Default 10ºC)

T_{DHWMAX} = Domestic Hot Water tank maximum supply temperature (ºC) (Default 70 ºC)

If conditions are fulfilled, heating DHW by Heat Pump will be switched OFF, and heating will be done by solar station through YUTAKI S's auxiliary output signal. If $T_{DHW} > T_{DHWMAX}$ solar station cannot heat DHW by tank at maximum allowed temperature and YUTAKI S's auxiliary output will be switched OFF.

- Solar stop conditions

When any of Conditions e, f, g, h is fulfilled.

d. Solar status disabled by user
e. Solar energy not available through solar pump station (Input Terminal 10 disabled)
f. $T_{DHW} > T_{DHWS}$
g. $T_{DHW} > T_{DHWMAX}$

NOTE

When heating DHW by solar power, DHW Timer has no effect.

Maximum time solar heating for DHW

In some high demand cases this function controls the maximum time that Sanitary Water can operate using Solar power alone. Heater operation is not affected by it.

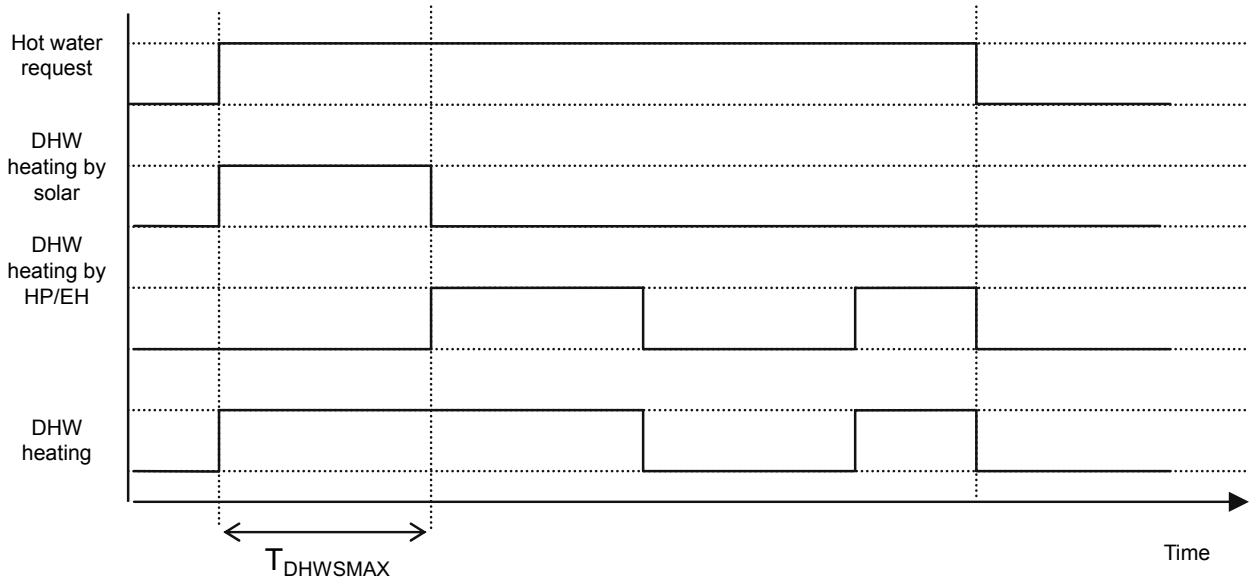
Solar power will be stopped when:

- Solar Operation Time > $T_{DHWMSOL}$

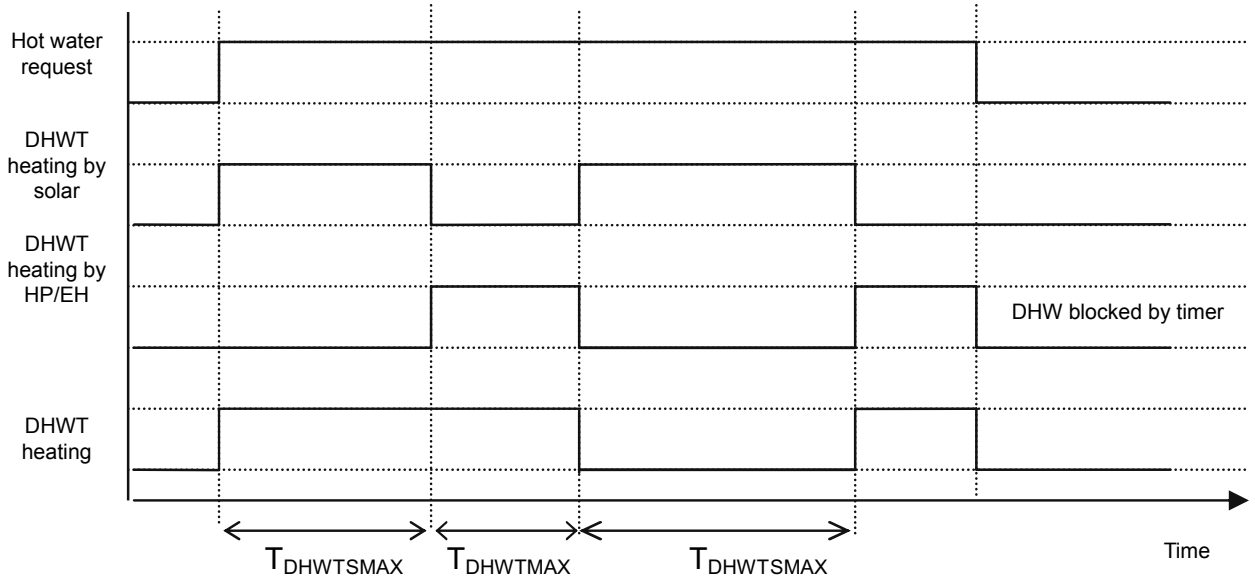
When Solar is stopped by this function, Sanitary Water will continue working by Heat Pump or heater (depending on water condition).

If the DHW is banned by Timer or Tariff function, Sanitary tank will stop.

CODE	REF	Description	Default Value	Range	Steps	Units
3-126	$T_{DHWMSOL}$	DHW SOLAR maximum time	60	30~240	1	min



When $T_{DHWTMSOL}$ passed, wait Maximum DHW Time (defeault 45 min) from MAXIMUM / MINIMUM DHW LOADING TIME (T_{DHWMAX} / T_{DHWMIN}) water control chapter, for next solar mode.

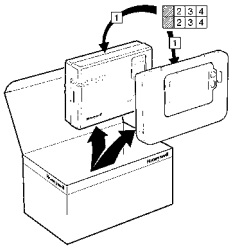


◆ Room Thermostat Unit installation and configuration (as accessory)

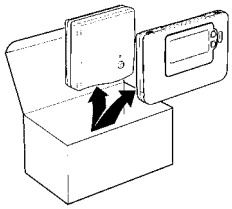
Description

The Room Unit communicates with the RF Receiver on an 868MHz Radio Frequency (RF) band to control the Yutaki S system. Neither product will communicate with other RF products that use different frequencies or communication protocols.

ON/OFF (ATW-RUT-01)



Intelligent (ATW-RTU-02/03)



NOTE

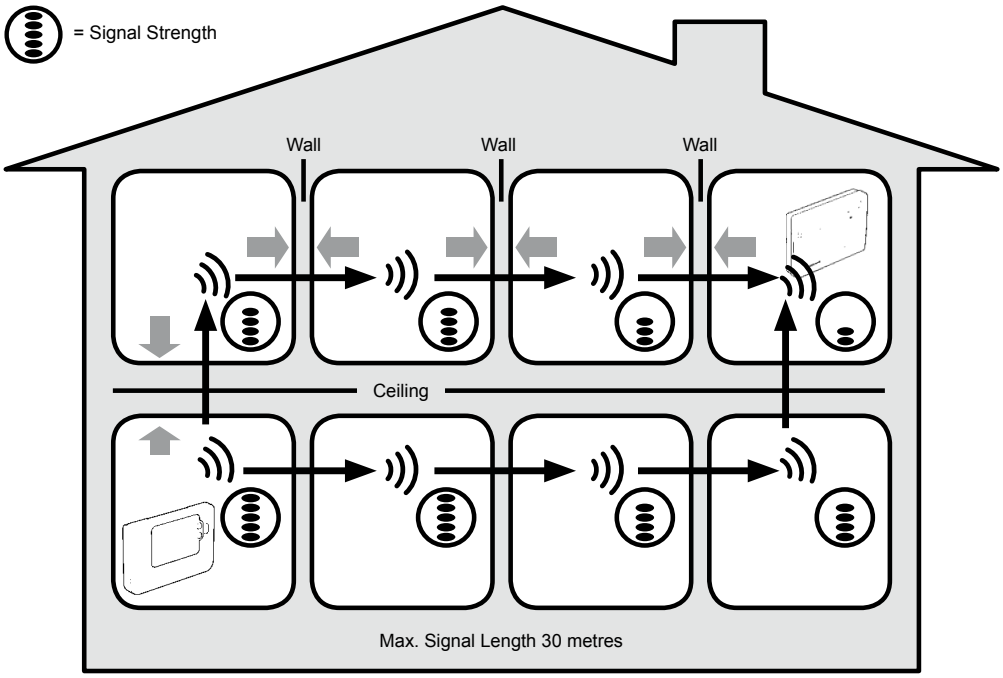
The RF link between the Room Unit and RF Receiver in system packs is pre-configured at the factory and therefore these components SHOULD be installed at the same site. This makes the installation process fast and easy, but if products from individual system packs are separated, or mixed with other pre-configured system packs during installations please refer to section *Binding / Rebinding Procedure* ***to bind the desired units together and allow them to communicate with each other.***

Installation Information

As these products communicate using RF technology special care must be taken during installation. The location of the RF components as well as the building structure may influence performance of the RF system. To assure system reliability, please review and apply the information given below.

Within a typical residential building the two products should communicate reliably within a 30m range. It is important to take into consideration that walls and ceilings will reduce the RF signal. The strength of the RF signal reaching the RF Receiver depends on the number of walls and ceilings separating it from the Room Unit, as well as the building construction - the diagram below illustrates an example of typical signal strength reduction. Walls and ceilings reinforced with steel or plasterboard walls lined with metal foil reduce the RF signal significantly more.

Once a position is selected for the Room Unit this can be checked using the RF Communication Test mode as described in section *Locating the Room Unit*. If the position is unsuitable the RF Receiver will not respond and an alternative position for the Room Unit must be selected.



Typical example of Building Fabric Signal losses

◆ Installing the Programmable thermostat

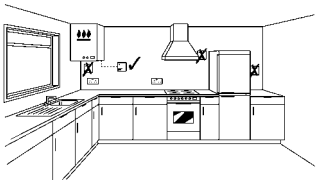
Please follow the illustrations and information below in sequence to install the RF Receiver and Room Unit correctly. To enable special features and see what other system options are available refer to section *Installer Mode*.

Installing the ON/OFF Receiver (ATW-RTU-01)

❶

The receiver box is a RF device. For the best performance install in an open space. Leave at least 30cm distance from any metal objects including wall boxes and boiler housing.

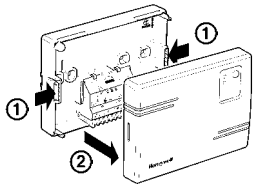
Do not mount on metal wall boxes.



❷

NOTE

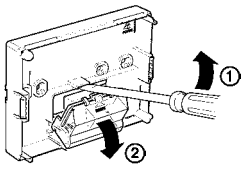
The receiver box contains no user serviceable parts. It should be opened and installed by qualified installer only.



❸

CAUTION

Electrostatic sensitive device! Do not touch the circuit board.



❹

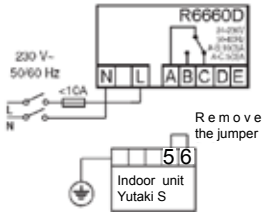
NOTE

All wiring must be in accordance with IEE regulations.

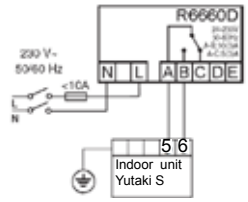
CAUTION

Observe ambient temperature and current limits (see the RF Receiver wiring label)

Step 1: Remove the jumper

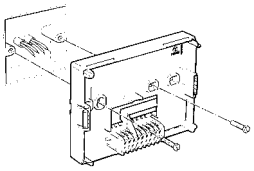


Step 2: YUTAKI S Wiring

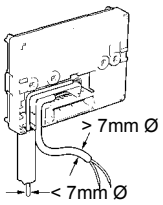


❺

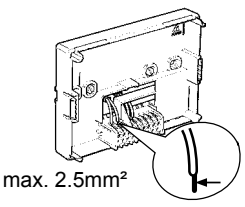
a.



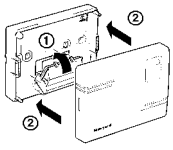
b.



c.



d.



Installing Intelligent Receiver (ATW-RTU-02)

Please follow the illustrations and information below in sequence to install the RF Receiver and Room Unit correctly. To enable special features and see what other system options are available refer to section *Installer Mode*.

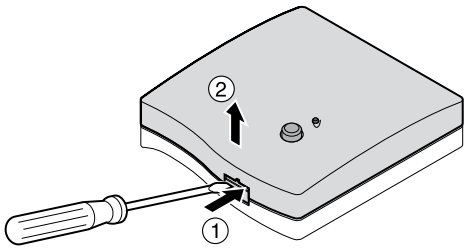
NOTE

The RF Receiver contains no user serviceable parts. It should be opened and installed by qualified installer only.

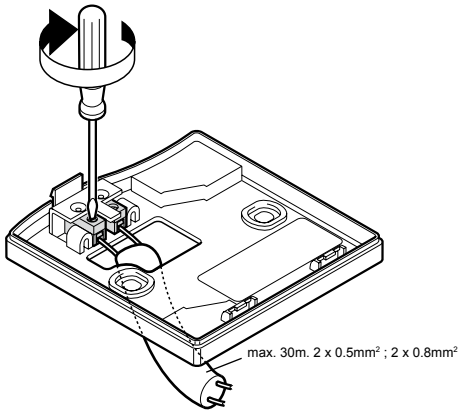
CAUTION

Static electricity. Malfunction. Do not touch the circuit board.

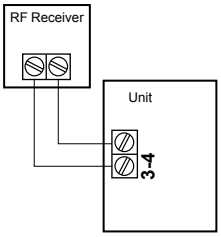
❶



❷

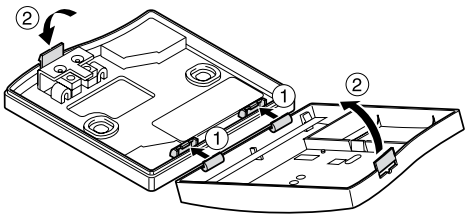


❸



The RF Receiver can be connected to other Open therm appliances. For the correct wiring connections refer to the installation manual of the Open therm device.

❹



NOTE

- ***All wiring must be in accordance with IEE regulations.***
- ***Observe ambient temperature and current limits (see the RF Receiver wiring label).***

Installing the Room Unit (ATW-RTU-01/02/03)

- Power Up
  - Installing the Batteries:

a. Lift up the front cover of the Room Unit to reveal the battery cover and product controls.
b. Remove the battery cover by pressing down and sliding out.
c. Insert the 2 x AA LR6 Alkaline Batteries supplied with the Room Unit, ensuring the correct orientation.
d. After a short pause the Room Unit will display information on the screen and is now ready for use.
e. Replace the battery cover by sliding it firmly back into the front of the Room Unit.

- Setting the Date and Time:

a. Press the button to begin setting the date. When you set the date for the first time after the batteries are inserted, the display will show: Press the ⊕ or ⊖ buttons to set the current day of the month (e.g. *d 01* = 1st day of the month) then press the green OK button to confirm.

b. Press the ⊕ or ⊖ buttons to set the current month of the year (e.g. *m 01* = January) then press the green OK button to confirm.

c. Press the ⊕ or ⊖ buttons to set the current year (e.g. *yr 07* = 2007) then press the green OK button to confirm. The date is now stored and the Day Indicator will be displayed under the current day of the week (e.g. 1 = Monday, 2 = Tuesday, etc.)

d. Use the ⊕ or ⊖ buttons to set the correct time then press the green OK button to confirm. Each press of the buttons will change the time by one minute and holding them down will change the time slowly at first and get progressively quicker.

NOTE

If this mode is entered accidentally then press the Ⓐ, ⇚ or ⏻ buttons to exit.

RF Communication check (test mode) (ON/OFF Thermostat) (ATW-RTU-01)

To check the RF communication, hold the Room Unit about 2-3 metres from the installed RF Receiver. Set the Room Unit to off by pressing the ⏻ button. then press the 🌡 ▲ and ▼ buttons together with the › button for 3 seconds. The unit will display '**tESt**' and it will send test signals to the RF Receiver. If the test signals are received the LED on the RF Receiver, will flash between 1 and 5 times. Flashing the green LED on every 5 seconds (relay output will remain off) for a maximum of 10 minutes. When the green LED flashes on every 5 seconds proceed to the next step.

NOTE

If the green LED is not switched at specified intervals, the red LED is flashing or if you are installing a replacement RF Receiver or Room Thermostat, follow the procedures described in section *Binding / Rebinding Procedure*.

RF Communication check (test mode) (Intelligent Thermostat) (ATW-RTU-02/03)

To check the RF communication, hold the Room Unit about 2-3 metres from the installed RF Receiver. Set the Room Unit to off by pressing the ⏻ button. then press the 🌡 ▲ and ▼ buttons together with the › button for 3 seconds. The unit will display "test" and it will send test signals to the RF Receiver. If the test signals are received the LED on the RF Receiver will flash between 1 and 5 times. The number of flashes indicates the strength of the radio signal. The higher the number of flashes, the stronger the signal is.

NOTE

If the LED does not flash or if you are installing a replacement RF Receiver or Room Unit, follow the procedures described in section *Binding / Rebinding Procedure*.

Locating the Room Unit

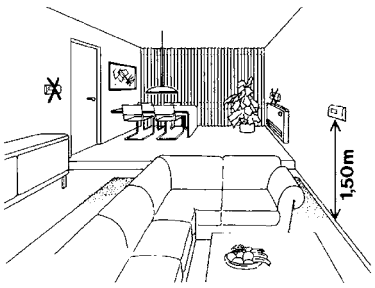
While still in the Test Mode, as described in section above the Room Unit should be located taking the following into consideration and reviewing the illustrations below:

1 Find a suitable location where the signal transmission is reliable. Reliable transmission is indicated when the RF Receiver is flashing the green LED every 5 seconds.

NOTE

The RF Receiver will be off.

2 Install the Room Unit EITHER on the wall using the wall bracket OR attach the optional table stand as shown in below.
3 Exit the Test Mode by pressing the Ⓐ or ⏻ button.



Wall bracket

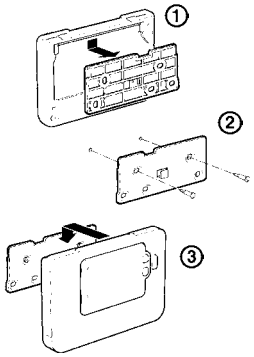
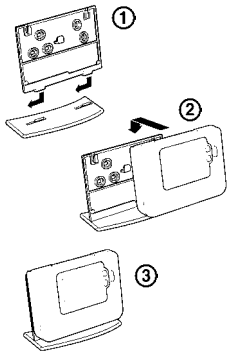


Table stand



- The Room Unit should be installed in an open space for best performance as it is a radio frequency device.
- Leave at least 30cm distance from any metal objects including wall boxes and at least 1 metre from any other electrical equipment eg. radio, TV, PC etc.
- Do not mount onto metal wall boxes.
- It is recommended that the RF Receiver is fully installed.

Communication loss (Only Intelligent thermostat) (ATW-RTU-02/03)

In the event of an RF communications loss, the LED on the RF Receiver will indicate which type of fault has occurred.

- If there is a communications fault between the RF Receiver and the Room Unit, then the LED on the RF Receiver will flash red for 0.1 sec ON every three seconds.
- If there is a fault in communications between the boiler or System Controller, then the LED on the RF Receiver will flash 3 times quickly and then be off for three seconds.
- If there is more than one Room Unit installed, as in multi-zone systems for example, and communications is lost with one zone, then the red LED on the RF Receiver will flash two times quickly and then be off for two seconds.
- If there is more than one Room Unit installed, as in multi-zone systems for example, and communications is lost with both zones, then the red LED on the RF Receiver will flash once for 0.1 sec ON, and 0.9 sec OFF.

Once the faulty device has been identified, replace as necessary and follow the re-binding procedure as described in section *Binding / Rebinding Procedure*.

Installer Mode

Installer Mode is used to alter the system settings for specific applications, to use the special features of the Room Unit in a different way or to alter the factory preset parameters. Parameters are divided into two groups:

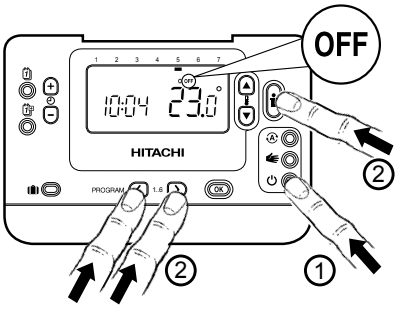
- Category 1 parameters – Room Unit Setup
- Category 2 parameters – System Setup

These are all listed in section *Installer Parameters Table*.

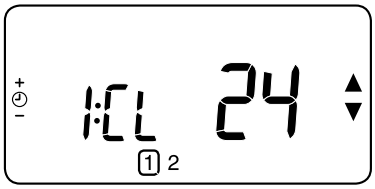
- Entering Installer Mode

❶ Press the ⏻ button.

Press and hold the ℹ button and the **PROGRAM** ‹ & › buttons together.

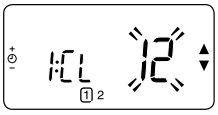


❷ The unit will display the first parameter of installer parameter group **category 1** (from Parameter n.1 to n.19) as shown



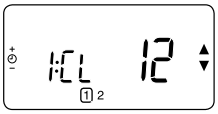
❸ Press the ℹ ▲ or ▼ to change factory setting.

The display will flash indicating that a change has been made.

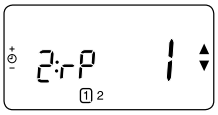


❹ Press the green OK button to confirm the change.

The display will stop flashing.



❺ Press ⏲ ⊕ button to go to the next parameter.



❻ Press the › button to go to Installer parameter group **category 2** (2) (from Parameter n.4 to n.14).

❼ To exit the installer mode press the Ⓐ **or** ⮜ buttons.

Fail-Safe Mode Setup (ON/OFF Thermostat) (ATW-RTU-01)

The fail-safe mode defines the RF Receiver box output relay status if the RF communication is lost (e.g. when the Room Unit stops communicating due to discharged batteries).

The factory setting keeps the relay permanently off when the communication is lost.

Fail-Safe mode setup (Intelligent thermostat) (ATW-RTU-02/03)

The fail-safe mode defines the system status if the RF communication is lost (e.g. when the Room Unit stops communicating due to discharged batteries). If the system is a direct (radiator one), then the factory setting will make the system revert to a set point of 10°C for frost protection. If indirect loops are added, the system will continue to operate at the last communicated setpoint.

Using the Room Unit for Specific Applications (ON/OFF Thermostat) (ATW-RTU-01)

The Room Unit is a versatile controller that can be used to control many different applications. Some of the system parameters within the Room Unit menu will not apply. Please also note other changes to the setting of the optimisation and proportional band settings as shown in the tables of the section *Installer Parameters Table*.

NOTE

In order for the Room Unit to send the heating demand signal to the RF Receiver, it is essential that the Category 2 parameter 8:Su is set to the correct value. Failure to do this will mean that the heating system will not respond to changes in the setpoint on the Room Unit. Under these circumstances the system will operate with no input from the Room Unit and may not therefore provide adequate temperature control.

Using the Special Features of the Room Unit

Special Feature	Description	Enable/Disable
Heating or Cooling Operation	This product can be used for heating or cooling applications. If you select cooling mode the control algorithm and factory default program will be modified. You can independently modify the heating and cooling profile (Only ON/OFF thermostat)	To enable: Set parameter 4:HC (category 2) to 1.
Summer/ Winter Auto time change	This feature moves time automatically on the last Sunday of March and the last Sunday of October. The feature is factory enabled.	To enable: Set parameter 3:tC (category 1) to 1.
Temperature Offset	If the Room Unit is located in a particularly hot/cold location for reliable signal transmission reasons then the measured/displayed temperature can be adjusted by +/- 3°C. This is useful if the homeowner wants the reading to match another appliance temperature display.	Set parameter 12: tO (category 1) to the required offset value.
Upper/Lower Temperature Limit	The normal upper temperature limit of 35°C can be reduced to 21°C to save the homeowner energy. The normal lower limit of 5°C can be increased up to 21°C to protect inhabitants from cold.	Set parameter 6: uL (category 1) to the desired upper limit. Set parameter 7: LL (category 1) to the desired lower limit.

Using the Room Unit for specific applications (Intelligent thermostat) (ATW-RTU-02/03)

The Room Unit is a versatile controller that can be used to control many different applications. Please note that when the Room Unit is installed in conjunction with a System Controller, the functionality will differ to that when installed with a standard boiler system. Most of the functions shown below will be controlled by the System Controller and be set within its parameters. Therefore, some of the system parameters within the Room Unit menu will not apply. Please also note other changes to the setting of the optimisation and proportional band settings as shown in the the next tables.

Installer Parameters Table

- Category 1 - Room Unit Settings

Parameter	Parameter No.	Factory Default Setting		Optional Setting	
Category 1 Parameters – Room Unit Settings					
		Display	Description	Display	Description
AM-PM / 24hr Display	1:CL	24	24 hr clock display format	12	12 hr – AM/PM clock display format
Reset Time/ Temp Program	2:rP	1	Time / Temp profile set to factory default Changes to 0 when one of the time/temp profiles are changed	0	Time / Temperature are as programmed To restore the factory profile set to 1
Auto Summer/Winter Time Change	3:tC	1	Auto Summer/Winter Time Change Enabled	0	Auto Summer/Winter Time Change Disabled
LCD Backlighting	5:bL	1	Backlighting Enable	0	Backlighting Disabled
Upper Temp Limit	6:uL	35	35°C Upper Temp. Limit	21 to 34	21°C to 34°C adjustment in 1°C steps
Lower Temp Limit	7:LL	5	5°C Lower Temp. Limit	5 to 21	6°C to 21°C adjustment in 1°C steps
Optimisation	8:OP	0	Optimisation Disabled	1	Optimisation Enabled
Temperature Offset	12:tO	0	No temperature offset	-3 to +3	-3°C to +3°C adjustment in 0.1°C steps
Proportional Band Width	13:Pb	1.5	Proportional band of 1.5 degrees	1.6 to 3.0	1.6°C to 3.0°C adjustment in 0.1°C steps
Reset Parameters to Factory Defaults	19:FS	1	All settings at factory defaults Changes to 0 when one of the parameter is changed	0	Settings are as modified above To restore the factory profile set to 1

NOTE

Remember to always press the green OK button to confirm that you want to store your new Installer Set-Up setting. To exit the Installer Mode press the A or ⮜ button.

- Category 2 - System Settings

NOTE

To ensure correct heat pump system operation, parameter 8:Su must be set correctly.

Parameter	Parameter No.	Factory Default Setting		Optional Setting	
Category 2 Parameters – System Settings (press the › button to access this category)					
Heat/Cool selection enable / disable	4:HC	0	Disabled	1	Enabled
Room Temperature Sensor Use	8:Su	0	Programmer and room compensation unit	1	Only Intelligent Thermostat
Maximum Flow Setpoint	11:uF	55	55°C Maximum Flow Temp.	0 to 99	0°C to 99°C adjustment in 1°C steps (N.A.)
Minimum Flow Setpoint	12:LF	15	15°C Minimum Flow Temp.	0 to 50	0°C to 50°C adjustment in 1°C steps (N.A.)
Mixing Value Run Time	13:Ar	150	150 seconds	0 to 240	0 to 240 sec. adjustment in 1sec steps (N.A.)
Pump Overrun Run Time	14:Pr	15	15 minutes	0 to 99	0 to 99 mins adjustment in 1min steps (N.A.)

NOTE

Remember to always press the green OK button to confirm that you want to store your new Installer Set-Up setting. To exit the Installer Mode press the A or ⇚ button.

Binding / Rebinding Procedure (ON/OFF Thermostat) (ATW-RTU-01)

The binding operation described below is required if:

- Any of the system components (Room Unit or RF Receiver) are replaced.
- The RF Receiver has incorrect or no binding data stored (e.g. when pre-bound system pack components have been mismatched).

NOTE

During the binding procedure keep approximately 1m distance between the Room Unit and the RF Receiver.

To bind/rebind:

1 Hold button on RF Receiver for 15 seconds. LED will flash red 0.1 sec ON, and 0.9 sec OFF
2 Hold button on RF Receiver for 5 seconds. LED will flash red for 0.5 sec ON, and 0.5 sec OFF.
3 Press the ⏻ button on the Room Unit
4 Hold 🌡, ▲, ▼ and ‹ buttons for 2 seconds. Display will show “InSt CO”. The boiler and RF signal icons will be displayed.
5 Press the green OK button.
6 When Red LED on the RF Receiver goes off, the devices are bound.
7 If binding is unsuccessful, then the LED will stay on. In this case, move the Room Unit and repeat the procedure from the beginning.
8 The LED on the RF Receiver will flash green every 10 seconds to indicate that the device is live.
9 Now go to Section *Installing the Programmable thermostat* to setup the system.

Binding/Rebinding Procedure (Intelligent thermostat) (ATW-RTU-02/03)

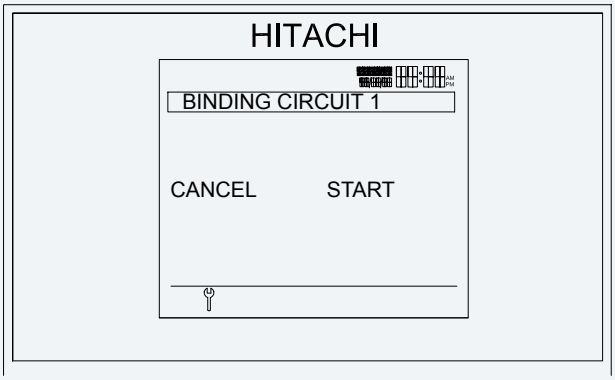
Binding is a necessary process in order to link the room thermostat with the wireless receiver and assign them to the corresponding circuit on the YUTAKI S controller.

Make sure the room thermostats are shut down before starting the binding process. They must be in the Off position.

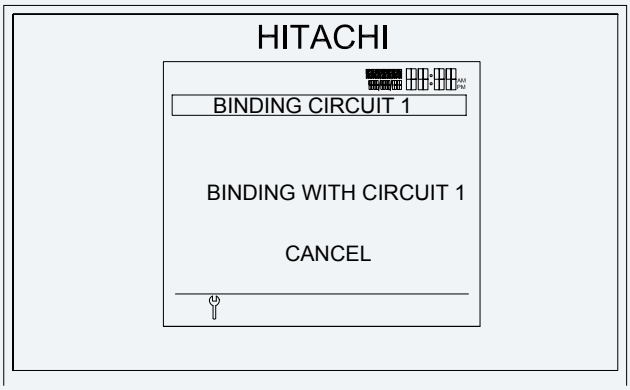
First, reset the wireless receiver by holding down the button for 15 seconds. This will erase the receiver's current configuration.

Next, prepare the wireless receiver to link it to the room thermostat and unit. Press and hold the receiver button for 5 seconds.

Next, select the circuit to be linked inside the binding zone. After selecting between the two circuits the following window will appear.

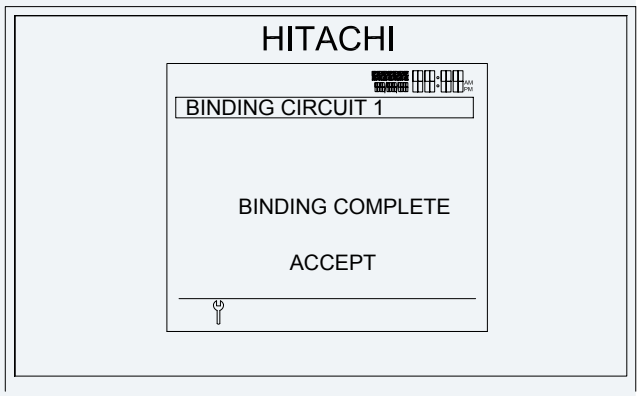


Pressing start will begin the binding mode in the room unit. It will blink each second during the specified binding time. When binding is finished a success message will appear.



Next, activate binding mode on the room thermostat. Refer to the thermostat manual for instructions. After activation, confirm by pressing the OK button.

After that, if binding is completed, the following message will appear on the YUTAKI S controller.



If binding fails, the "BINDING FAILURE" error message will appear.

NOTE

The same process applies to circuit 2 when selected on the menu.

In summary, the binding process for intelligent thermostat follows the steps below:

- Ensure that thermostats are in the off position.
- Press the button on the receiver for 15 seconds in order to remove the current configuration.
- Press the button on the receiver for 5 seconds.
- Select the circuit to be linked on the binding menu. Press the start button on the screen.
- Start the binding mode on the thermostat. Refer to its instruction manual.
- Press Ok button on the thermostat to confirm binding.
- The display will show a confirmation message. If the binding is not confirmed for 30 seconds, an error message will appear.

NOTE

Be carefull because if the power supply is stopped on the remote thermostat or his receiver, it will keep the last temperatures, room setting and room temperature. This values will be send if user change the setting on the remote control, if user do not change the setting value, the communication will send again the last value in a maximum period of one hour.

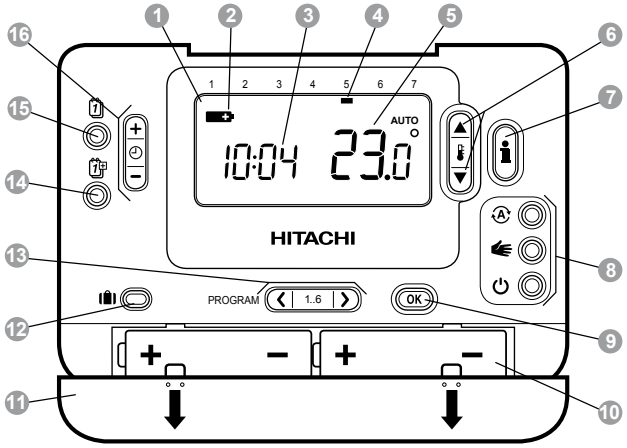
Room Unit

- Description

The Hitachi programmable wireless Room Unit is designed to control your heating system efficiently, providing comfortable temperatures when you are at home and energy savings when you are away. The following instructions explain how to program and use the Room Unit to provide the most home comfort at the least cost.

- Features
  - Ergonomic user interface featuring an 'OK-button'.
  - Large LCD (Liquid Crystal Display) Screen with backlight.
  - 7-day heating / cooling program to match your lifestyle, whilst maximising energy savings.
  - 6 independent temperature levels per day (from 5°C to 35°C).
  - Holiday button saves energy by letting you reduce the temperature for 1 to 99 days.
  - Built-in Memory holds the user program indefinitely.

- Controls Layout



❶ LCD Screen	❺ Temperature Display	❾ Green OK Button	⓭ Program Buttons
❷ Battery Low Indicator	❻ Temperature Change Buttons	❿ Battery Compartment	⓮ Copy Day Button
❸ Time Display	❼ Temperature Enquiry Button	⓫ Battery Cover	⓯ Set Date/Day Button
❹ Day Indicator	❽ Operating Mode Buttons	⓬ Holiday Function Button	⓰ Time Change Buttons

This section shows you how to setup and run the Room Unit in 3 simple steps:

STEP 1: Installing the Batteries

NOTE

Please follow the instructions in this section only if the Room Unit screen is blank (no symbols or digits are displayed). If the room temperature is already displayed move on to Step 2: Setting the Day and Time.

- To install the Batteries:

a. Lift up the front cover of the Room Unit to reveal the battery cover and product controls.
b. Remove the battery cover by pressing down and sliding out.
c. Insert the 2 x AA LR6 Alkaline Batteries supplied with the Room Unit, ensuring the correct orientation (see *Controls Layout*).
d. After a short pause the Room Unit will display information on the screen and is now ready for use.
e. Replace the battery cover by sliding it firmly back into the front of the Room Unit.

STEP 2: Setting the Date and Time

- To set the Date and Time:

a. Press the button to begin setting the date.
b. Press the or buttons to set the current day of the month (e.g. d01 = 1st day of the month) then press the green OK button to confirm.
c. Press the or buttons to set the current month of the year (e.g. m01 = January) then press the green OK button to confirm.
d. Press the or buttons to set the current year (e.g. yr08 = 2008) then press the green OK button to confirm. The date is now stored and the Day Indicator will be displayed under the current day of the week (e.g. 1 = Monday, 2 = Tuesday, etc.)
e. Use the or buttons to set the correct time then press the green OK button to confirm. Each press of the buttons will change the time by one minute and holding them down will change the time slowly at first and get progressively quicker.

NOTE

If this mode is entered accidentally then press the , or buttons to exit.

STEP 3: Running the Built-in Heating Program

The Room Unit is now ready for operation. Press the button and the built-in heating program will start running.

NOTE

The built-in heating program has been designed to provide normal comfort requirements, but if you want to customise the settings please see the next section Programming the Room Unit.

Programming the Room Unit (Heating)

- The Built-in Heating Program

The built-in heating program has 6 temperature level changes per day that can be set between 3.00 am and 2.50 am the following day - allowing you to maintain the evening temperature after midnight. Each temperature level can be set between 5°C and 35°C, and adjusted in 0.5°C increments. The factory default program for heating is as follows.

Monday to Friday (Day 1 to 5)

Period	1	2	3	4	5	6
Time	6:30	8:00	12:00	14:00	18:00	22:30
Temperature	21°C	18°C	21°C	18°C	21°C	18°C

Saturday & Sunday (Day 6 & 7)

Period	1	2	3	4	5	6
Time	8:00	10:00	12:00	14:00	18:00	23:00
Temperature	21°C	21°C	21°C	21°C	21°C	18°C

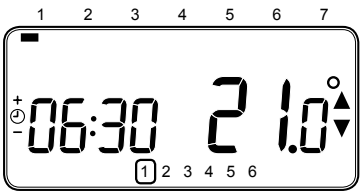
- Reviewing the Heating Program

To review or edit the heating program use the PROGRAM ‹ or › buttons to navigate between the 6 individual programming periods for that day. Use the 1 button to step through each day of the week, so the complete 7 day heating program can be reviewed or edited.

- Modifying the Heating Program
  - To change the heating program:

a. Press either of the PROGRAM ‹ or › buttons to enter the programming mode. The time / temperature settings for period 1 on Monday (Day 1) will be flashing as shown. The active period is highlighted by a flashing square around the numbers at the bottom of the screen and the selected day is shown with the day indicator.

b. To adjust the period start time use the ⊕ or ⊖ buttons, the 'OK?' indicator will be displayed to confirm the change. Holding the button down will change the time quickly.



NOTE

If you are pressing the ⊕ or ⊖ buttons and the display flashes the next period, it means the next period will be pushed forward.

c. Once the required time is reached press the green OK button to confirm.

NOTE

If the original time setting did not require adjustment press the green OK button to move to step 'd'.

d. The temperature setting for period 1 on Monday (Day 1) will now be flashing. To adjust this press the ▲ or ▼ buttons and confirm the setting again by pressing the green OK button.

e. The next time and temperature period will now be active. Adjust this by repeating steps b - d above until all 6 periods are set for Monday or press the A button to run the program as set, at any time.

- You now have a choice of how to set the program for the next day:

f. i) Press the button to copy Monday's program into Tuesday. The display will go blank apart from the 'non flashing' day indicator, which indicates the day copied and the 'flashing' target day to copy the program to. To accept this day press the green OK button. To select a different target day press the button until the 'flashing' day indicator is under the required day, then accept it by pressing the green OK button.

NOTE

Once the target day is confirmed it becomes the day that is copied if the button is pressed again.

OR

g. ii) Press the button to move the day indicator to Tuesday (Day 2). The program for that day can then be adjusted by following steps b to e. Programs for the remaining days can be set in the same way, using the button to move to the next day.

To exit the programming mode select the desired operating mode by pressing the, or buttons.

NOTE

To run the adjusted program select the AUTO mode.

- Disabling / Enabling Time Periods

The Room Unit has 6 periods each day that can be programmed, but you may not need all of these switch points for your heating requirements. Therefore, any period from 2 to 4 can be removed from (or returned to) the heating program profile.

- To disable or enable time periods:

a. To disable unwanted periods go to the desired period (2 to 6) using the PROGRAM or buttons to navigate, ensure the correct period is highlighted with the flashing square symbol. Press and hold the button for at least 2 seconds and the display will indicate the period has been removed from the program.

b. To enable periods again follow the same procedure as above, navigating to the already disabled period. To enable this period again press and hold the button for at least 2 seconds.

- Choosing the Operating Mode

The Room Unit can operate in three different modes: Automatic, Manual or Off. To set the operating mode press either of the, or buttons. The screen indicates which mode is currently active by displaying AUTO, MAN or OFF.

AUTOMATIC () mode sets the Room Unit to follow the built-in temperature program (default or personalised). Operating the Room Unit in this mode is the best way to maintain a high level of temperature comfort whilst maximising your energy savings.

MANUAL () mode allows the Room Unit to be used without following the builtin temperature programme. The setpoint can be adjusted from 5°C to 35°C by using the or buttons. The Room Unit will continue to maintain this temperature until another operating mode or temperature is selected.

OFF () mode sets the Room Unit to control to a minimum temperature setting of 5°C (default) that acts as a frost protection measure for your home.

- During Normal Operation
  - Temperature Override

During normal operation (AUTO (Ⓐ) or MAN (✋) mode) the programmed temperature can be adjusted manually by pressing the ▲ or ▼ buttons or the ⓘ button. The 'target' temperature will be displayed and flash for 5 seconds - during this time the ▲ or ▼ buttons can be used to modify the set value.

NOTE

This temperature override is cancelled at the next programmed temperature change.

  - Temperature Enquiry

When the Room Unit is configured to control the room temperature directly it will display the current room temperature. To review the programmed 'target' temperature (the temperature which the Room Unit is trying to maintain) press the ⓘ button. This 'target' temperature value will be displayed flashing for 5 seconds before returning to the current room temperature value.

Using the Special Functions

  - HOLIDAY Function

The holiday function allows you to set a constant temperature (default = 10°C) for a specified number of days (from 1 - 99 days). This lets you save energy and related costs when you are away from home, but resumes normal operation on the day of your return.

To set the Holiday function:

a. Ensure the Room Unit is running in AUTO (Ⓐ) or MAN (✋) operating modes.
b. Press the holiday 🧳 button to display the holiday days counter and temperature setting, along with the holiday indicator 🧳.
c. Press the 🕘 ⊕ or ⊖ time buttons to set the holiday time (1 - 99 days) and press the green OK button to confirm.
d. Press the ▲ or ▼ buttons to set the holiday temperature (5°C - 35°C) and press the green OK button to confirm.

The Room Unit will now control to the new temperature for the set number of days that your home is vacant. At midnight the holiday counter will be reduced by one until the selected number of days have passed. The Room Unit will then return to normal operation as set by the AUTO (Ⓐ) or MAN (✋) mode. To cancel the HOLIDAY function or to exit the function at any time press the 🧳 button a second time.

- Adjusting the Time

To adjust only the time during normal operation use the 🕘 ⊕ or ⊖ buttons to adjust the time and press the green OK button again to confirm any changes.

Cooling Mode procedure (ATW-RTU-01/02/03)

If your system has been set up correctly you can use your thermostat to control the cooling. To switch the thermostat between heating and cooling modes press the ▲ or ▼ buttons together for 5 seconds in any of the product operating modes (AUTO, MAN or ⏻). The text 'COOLING' will be displayed for a moment on the screen to indicate the cooling operation is now active. The factory default program for cooling is specified in the table below, but this can be modified in the same way as the default heating program:

Monday to Friday (Cooling)

Period	1	2	3	4	5	6
Time	6:30	8:00	12:00	14:00	18:00	22:30
Temperature	24°C	28°C	24°C	28°C	24°C	24°C

Saturday & Sunday

Period	1	2	3	4	5	6
Time	8:00	10:00	12:00	14:00	18:00	23:00
Temperature	24°C	24°C	24°C	24°C	24°C	24°C

- If something happens to my heating system how can I check that the thermostat is working?

Refer to the *Troubleshooting Guide*. If you still need assistance after this call your installer. The thermostat should only be opened or removed by a qualified professional to prevent possible injury from electric shock and/or damage to the product.

Symptom	Possible Cause	Remedy
The Room Unit has a blank LCD screen.	Batteries not installed.	Check to see if there are batteries in the battery compartment and the paper tab has been removed.
	Incorrect battery orientation.	Check that the batteries have been installed in the correct orientation.
	Exhausted batteries.	Replace with new batteries.
The Room Unit shows a flashing symbol on the LCD screen.	Batteries are exhausted and need replacing.	Replace with new batteries.
The Room Unit shows a flashing symbol on the LCD screen.	Fault in Room Unit	Remove and re-insert the batteries in the Room Unit. If the symbol does not clear itself in a few minutes call the installer.
The Room Unit's LCD display works but the heating does not switch on.	No power to heating system.	Check that there is power to the heating system.
	Program does not call for heat.	Press the button and then press the to increase the temperature a few degrees above the current room temperature. The heating should come on after a few seconds.
	Wrong electrical connection.	Call the installer to check the electrical connections
The red LED on the RF Receiver located next to heat pump controller is constantly on or flashing.	RF communication lost due to the wrong location of the Room Unit.	Hook the Room Unit back on the wall bracket or replace the Room Unit on the table stand in the position where RF communication was reliable.
	RF communication fault.	Call installer.

FAQ's

- **How do I change the batteries on the Room Unit when they run out?**

The Room Unit constantly monitors the battery power level, which typically lasts for about 2 years before needing replaced. When the power is running low a flashing symbol will be displayed on the screen. To change the batteries follow the steps in the above section ('STEP 1: Installing the Batteries'), replacing the used batteries with new ones in Step c.

NOTE

While changing the batteries your program settings will be stored but you may need to adjust the time settings to be correct.

- **I want to use the table stand instead of wall mounted bracket. Where can I position the Room Unit?**

It is important to keep the Room Unit in a location where reliable RF communication was proven. Advise your installer where would you like to position the Room Unit and he will check if the RF communication is reliable in the selected location(s).

NOTE

As this is a wireless device certain objects could interfere with the RF signal - Leave at least 30cm distance from any metal objects (including wall boxes) and at least 1 metre from any other electrical equipment eg. radio, TV, PC, etc.

6. LCD user's interface

Index

6.1 Description of the hardware

LCD user control is the new user-friendly interface for controlling the unit. This Control uses OpenTherm Communication that allows for remote control of unit by means of an intelligent Room thermostat.

6.1.1 Button definitions

The control's operating mode is very simple, with 7 user-friendly buttons.

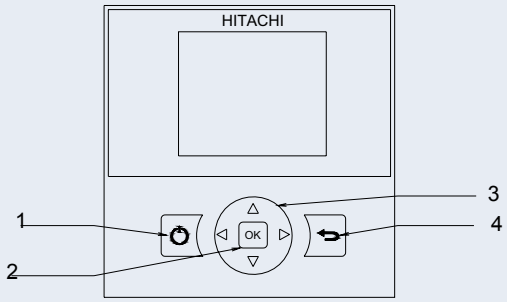
Button descriptions:

1 On/Off: From the comprehensive view, this switches the selected area on or off. If no area is selected, the entire unit will be switched on or off. From other displays it will stop all units, working as an emergency stop.

2 Ok: this button is used to select items and confirm edits to them.

3 4 Arrows: these allow you to navigate within the menus and displays.

4 Return: used as a cancel button when editing an item, and also used to go to the main menu from the general display.



6.2 Comprehensive view

Main screen is called "comprehensive view". It provides the general system information.

Move through this view using the arrow buttons.

"Time & Date", "Alarm indication" and "Unit Status signals" are displayed on all screens.

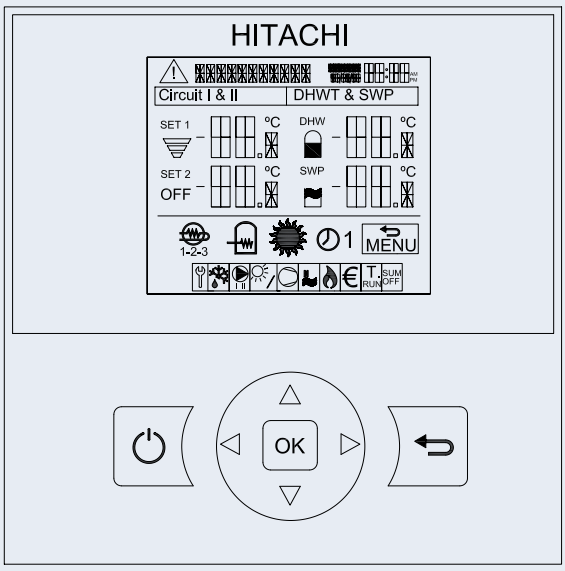
Only the following parameters can be modified on the "comprehensive view" screen:

- DHW temperature
- Unit mode
- On/off circuits, DHW, swimming pool or the entire unit.
- Other values are not editable.

To edit the parameters, first select the desired parameter and press OK button. After that, the new value can be entered using "arrow" buttons. Confirm that the value is correct by again pressing the OK button. The cancel button restores the previous value.

Pressing the "On/Off" button switches the "On/Off" status for all areas (if they are available).

To change the "status" of a single area, select the desired area and press the "On/Off" button.



❶ Time and date

Displays the current date and time information. The information displayed may be changed on the control configuration menu.

❷ Alarm indication

Alarm indication will appear when an alarm is detected. The alarm icon and alarm code will appear.

❸ Control of Circuits I & II

This displays the temperature setting calculated for each circuit and a throughput icon indicating the percentage of the temperature setting being generated.

Pressing the ON/OFF button on one of these circuits will switch it on or off.

When Air to water heat pump System has configured an intelligent room thermostat, temperature settings for circuits I and II may be switched between the following variables.

- **SET**: Control temperature Setting
- **OTC**: OTC Temperature Setting
- **ROOM**: Room Temperature Setting
- **CURR**: Current Room Temperature

❹ Unit mode

This icon shows the unit's mode of operation status. It may be edited by pressing the OK button, and it can be switched between Heating and Cooling mode.

Electrical Heater control:

- 1 - Step 1
- 2 - Step 2
- 3 - Step 3

Electrical Heater DHWT control:

- ON
- Disabled by timer

Unit mode (Status)

- Heat
- Cool

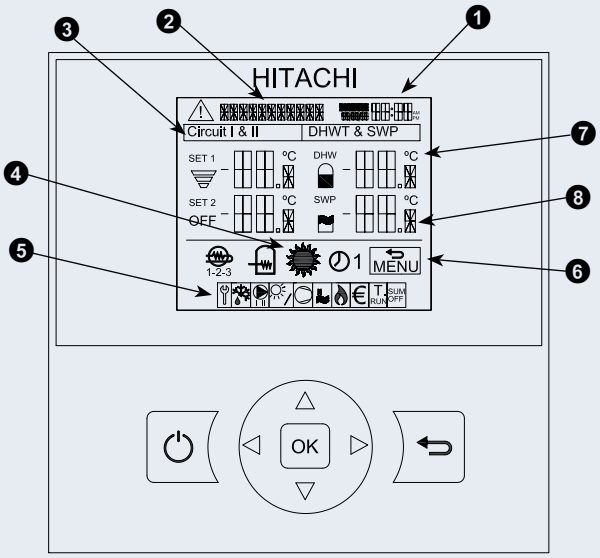
Timer enabled

❺ Unit status signals

This part of the screen displays all the notification icons that offer general knowledge on the unit's situation.

Available signals are from left to right:

- Installer mode indication
- Defrost
- Water pumps
- Supplementary solar system
- Compressor ON
- Swimming Pool
- Boiler working
- Tariff input
- Test Run
- Auto Summer Switch-Off



❻ Configuration Menu

- Unit configuration
- Control configuration

This icon indicates when it is possible to go to the configuration menu. If the icon is displayed, the user may return to the menu by pressing the back button. It has different options that can be configured as shown in the following pages.

❼ Sanitary Tank Control

Available options are:

- DHWT Temperature Setting
- DHWT Water Temperature

This view gives information about the DHW's temperature setting and displays a temperature icon indicating the percentage of temperature the DHW will be generating.

It will also have an icon to show whether or not the electrical heater of the DHW is working and another one that indicates whether there is a timer configured for the current day.

DHW temperature setting may be changed by pressing the OK button above it.

Pressing the ON/OFF button over the DHW area will switch it ON or OFF.

If anti-legionella is working, an ANTL text will appear, and the setting configured on the anti-legionella menu will be displayed.

❽ Swimming pool control

Available options are:

- SWP Temperature setting
- SWP Water temperature

This view gives information about the Swimming pool temperature setting and displays a temperature icon indicating the percentage of temperature the Swimming pool will be generating.Swimming pool temperature setting may be changed by pressing the OK button above it.

Pressing the ON/OFF button over the Swimming pool area will switch it ON or OFF.

6.3 Description of the icons

Icon	Name	Values	Explanation
OFF	Circuit I or II Status	OFF	Circuit I or II is in Demand-OFF
			Circuit I or II is on Thermo-OFF
			Circuit I or II is working far from the desired temperature
			Circuit I or II is working near from the desired temperature
			Circuit I or II is working on the desired temperature
ANTL	DHW Status	ANTL	Anti-legionella is activated and working
			DHW is on Thermo-OFF
			DHW is working far from the desired temperature
			DHW is working near from the desired temperature
			DHW is working on the desired temperature
OFF	Swimming pool statuts	OFF	Swimming pool is OFF
			SWP is on thermo OFF
			SWP is working far from the desired temperature
			SWP is working near from the desired temperature
			SWP is working on the desired temperature
888	Setting Temperatures	Value	Displays the temperature setting of the circuit or DHW
		OFF	Circuit or DHW are stopped
			Ban icon is displayed when a timer bans the tank. This mean that there is a timer assigned for the current day, but the current time is outside the permitted period
	Mode		System is working in heating mode
			System is working in cooling mode
	Pump		This icon informs about pump operation. There are three available pumps on the system. Each one is numbered, and its corresponding number is displayed below to the pump icon when it is operating
	Circuit I and II step		Indicates which of the 3 possible heater steps is applied on space heating circuit
	DHW Heater		Informs about DHW Heater operation
	DHW Heater		When DHW Heater will be banned by the timer, it will appear the banning icon on the same place where goes the DHW Heater icon.
	Installer mode		Informs that LCD is logedd on the installer mode that has special privileges
	Swimming pool		Swimming pool is enabled
	Solar		Auxiliary Solar system is working

Icon	Name	Values	Explanation
	Compressor		Compressor is enabled
	Alarm		Existing alarm. This icon will appear with the alarm code
	Boiler		Boiler system is working
	Tariff		When tariff signal is received, the operation restriction is applied
	DHW Timer		When the timer is configured and enabled, this icon will go with the active timer number
	Defrost		Defrost function is active
	Test Run		Informs about the activation of the "Test Run" function in the outdoor unit
	Summer Switch-Off		Notifies that heating is off because Summer Switch-Off is activated
	Menu		This icon allows user to go to the "main menu" by pressing "Return" button. The "comprehesive view" will appear when it's possible to return to the menu

6.4 Controller configuration

Control configuration contains different configuration options for the control. Those options are explained in the following items.

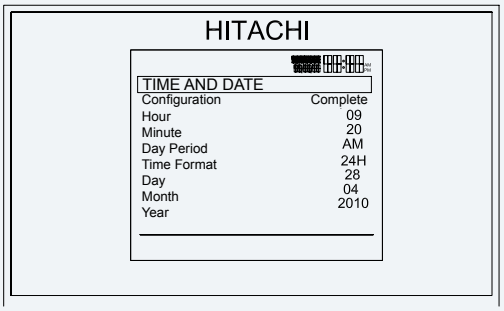
◆ Time and date

Setting the time and date will show the following options:
Configuration can be switched between:

- Complete: display will show date and time
- Time: display will only show the time
- Date: display will only show the date aligned to the right
- None: hide time and date

Time format options can be switched between:

- 24 Hours
- 12 Hours



NOTE

Day period option will be enabled only when Time format is set to 12 Hours.

CAUTION

This configuration only affects the display. Time and date will continue running.

Be aware that functions that depend on time and date will affected even when the format displayed is "None".

◆ Language selection

User can set different languages in order to better understand the menu.They are selectable from the following view. There are 5 available languages:

- English (EN)
- French (FR)
- Italian (IT)
- Spanish (ES)
- German (DE)

Default language is English.

◆ LCD Energy saving

LCD Energy saving turns off the LCD backlight in order to reduce energy consumption. It is activated when:

- User does not touch any button for 2 minutes.
- User presses the run/stop button for 3 seconds.

Press any button to exit this mode.

◆ Screen contrast

User may specify screen contrast. This is modified in the same manner as a normal variable. Changing the variable will also change the contrast. Pressing left or right arrows for 10 seconds will set the contrast to the default value.

6.5 Unit configuration

The following chapters explain all the items contained on the Unit configuration for the user.

NOTE

Menus may be modified during configuration. Configuration will hide or display available options. For example, if Circuit 2 is disabled, all circuit 2 options will be hidden.

6.5.1 Operation display

This is the list of operation display parameters that can be consulted. All of them are read-only. Most of these variables are the same ones that can be consulted by 7-segment, taking information from the outdoor unit.

CODE	Description	Default Value	Range	Steps	Units
			System Operation		
1-000	Operation Status	OFF	OFF Cool D-OFF Cool T-OFF Cool ON Heat D-OFF Heat T-OFF Heat ON DHW OFF DHW ON SWP OFF SWP ON Alarm XXX (XXX= Code number)	-	-
			Unit Status		
1-003	Indoor Exp. valve opening (%)	-	Variable value	-	%
1-103	Outdoor Exp. valve opening (%)	-	Variable value	-	%
1-004	Inverter Operation frequency (Hz)	-	Variable value	-	Hz
1-005	Defrosting	-	Variable value	-	-
1-006	Cause of stoppage	-	Variable value	-	-
1-010	Compressor running current (A)	-	Variable value	-	A
1-011	PCB Firmware	-	Variable value	-	-
1-012	Product spec code	-	Variable value	-	-
1-013	Mixing valve position (%)	-	Variable value	-	%
			Actual Temperature		
1-014	Water Inlet T°	-	Variable value	-	ºC
1-015	Water outlet T°	-	Variable value	-	ºC
1-115	Water outlet T° Boiler	-	Variable value	-	ºC
1-215	Water outlet T° C2	-	Variable value	-	ºC
1-315	DHW Water T°	-	Variable value	-	ºC
1-415	SWP T°	-	Variable value	-	ºC
1-016	Gas T°	-	Variable value	-	ºC
1-016	Liquid T°	-	Variable value	-	ºC
1-017	Outdoor Ambient T°	-	Variable value	-	ºC
1-117	Outdoor Ambient Average T°	-	Variable value	-	ºC
1-217	2nd ambient T°	-	Variable value	-	ºC
1-218	Summer Sw-Off average T°	-	Variable value	-	ºC
1-018	Discharge Gas T°	-	Variable value	-	ºC
1-019	Suction gas T°	-	Variable value	-	ºC
1-020	Room T° C1	-	Variable value	-	ºC
1-120	Room T° C2	-	Variable value	-	ºC
			Set Point		
1-021	OTC Supply set point C1	-	Variable value	-	ºC
1-022	OTC Supply set point C2	-	Variable value	-	ºC
1-023	Water T° Setting	-	Variable value	-	ºC
1-024	Room T° Set point C1	-	Variable value	-	ºC
1-124	Room T° Set point C2	-	Variable value	-	ºC
1-025	DHW T° set point	-	Variable value	-	ºC
			Alarm History		

6.5.2 Space heating configuration

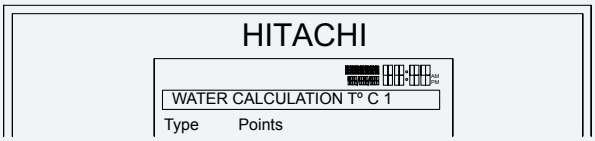
The main thing to configure for space heating is the water calculation.

The water calculation will calculate the temperature setting for each circuit, selecting a function to assign each temperature setting depending on the ambient temperature.

Each circuit will have its own Water Calculation type for heating. Booth circuits may be configured as:

- Point
- Gradient
- Fix
- None

To switch between them the variable type must be edited.



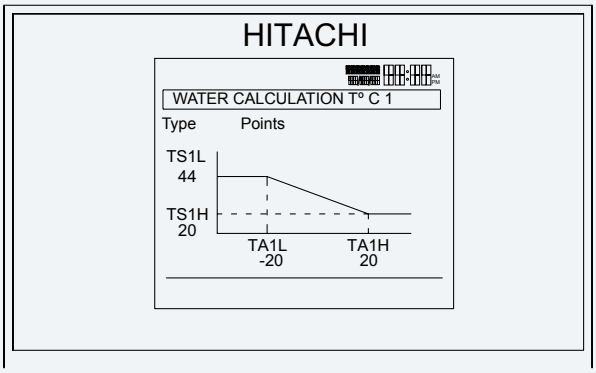
NOTE

Setting a space heating circuit at None will not deactivate it for space cooling. There are independent circuits.

Installer may ban the possibility of switching between water calculation modes. In that case the user will not be able to edit the water calculation variable type.

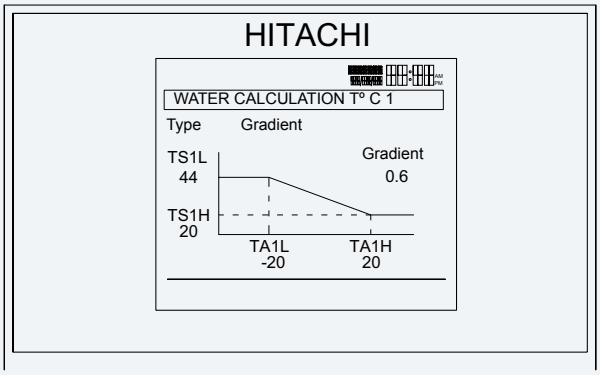
◆ Point

Point is the most versatile calculation type. The user sets four points that will create line representing the function the Air to water heat pump will be use to give the temperature setting according to the current ambient temperature.



◆ Gradient

Calculate the temperature setting using a gradient configured by the installer. In this view the user may configure the same variables as in the point view, only automatically. User can only edit the gradient variable and it will automatically set the values for the other 4 variables on the chart.

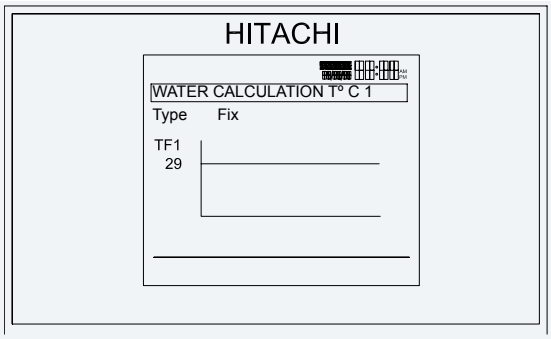


NOTE

The unique editable variable on that view is gradient.

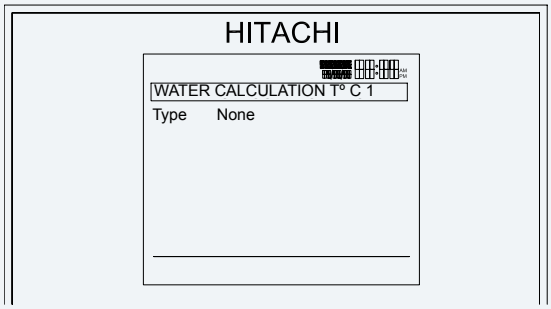
Fix

This calculation mode sets the circuit's temperature setting to a defined value, forcing the unit to maintain it.



None

The None option sets the circuit as disabled.



Variables table

Variables used in these views are displayed in the following table.

CODE	Description	Default Value	Range	Steps	Units
		Water calculation Type			
3-004	Water calculation Tº C1	OTC gradient	None Points Gradient Fix	1	-
3-104	Water calculation Tº C2	None	None Points Gradient Fix	1	-
		Heating OTC points Control C1			
3-005	Low ambient Tº C1	-20	-20~6	1	ºC
3-006	High ambient Tº C1	20	7~25	1	ºC
3-007	Set point at low ambient Tº C1	44	(3-012) ~ (3-011) *	1	ºC
3-008	Set point at high ambient Tº C1	20	(3-012) ~ (3-011) *	1	ºC
		Heating OTC points Control C2			
3-105	Low ambient Tº C2	-20	-20~6	1	ºC
3-106	High ambient Tº C2	20	7~25	1	ºC
3-107	Set point at low ambient Tº C2	44	(3-112) ~ (3-111) *	1	ºC
3-108	Set point at high ambient Tº C2	20	(3-112) ~ (3-111) *	1	ºC
		Heating OTC Gradient Control C1			
3-009	Gradient C1	0.6	0.2~2.2	0.1	-
		Heating OTC Gradient Control C2			
3-109	Gradient C2	0.6	0.2~2.2	0.1	-
		Heating Fixed Temperature C1			
3-010	Fixed Tº C1	40	(3-012) ~ (3-011) *	1	ºC
		Heating Fixed Temperature C2			
3-110	Fixed Tº C2	40	(3-112) ~ (3-111) *	1	ºC

NOTE

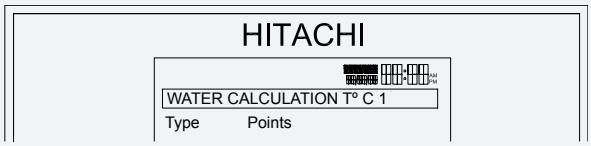
**** Valves (3-(0/1)12)~(3-(0/1)11) are set by installer.***

6.5.3 Space cooling configuration

In space cooling, the water calculation types work in the same way as for space heating, without the gradient view. This leaves the following water calculation types:

- Point
- Fix
- None

To switch between them the variable type must be edited.

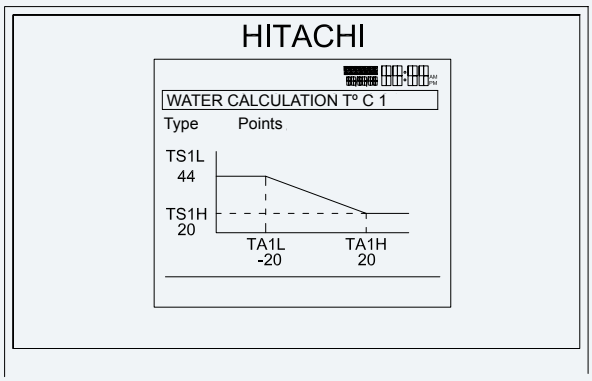


NOTE

Setting a space heating circuit at None will not deactivate it for space cooling. There are independent circuits.
Installer may ban the possibility of switching between water calculation modes. In that case the user will not be able to edit the water calculation variable type.

◆ Point

Point is the most versatile calculation type. The user sets four points that will create line representing the function the Air to water heat pump will use to give the temperature setting according to the current ambient temperature.

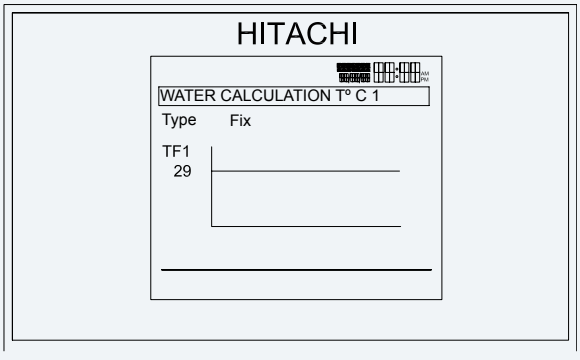


NOTE

In case of refreshing floor application, it is important to set the minimum water outlet temperature upper than condensation floor temperatures (more than 16ºC)

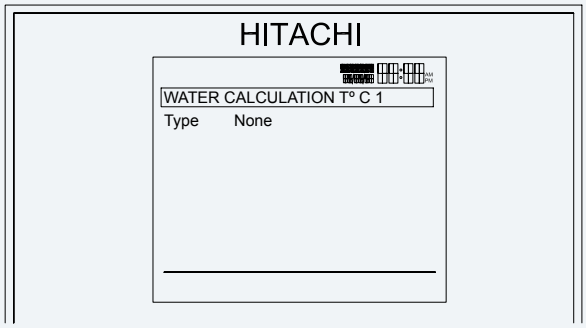
◆ Fix

This calculation mode sets the circuit's temperature setting to a defined value, forcing the unit to maintain it.



None

The None option disables the circuit.



Variables table

Default values and margins will be different than for space heating. Values used in those views are displayed in the following table.

CODE	Description	Default Value	Range	Steps	Units
		Water calculation Type			
3-013	Water calculation T° C1	Fix	None Points Fix	1	-
3-113	Water calculation T° C2	None	None Points Fix	1	-
		Cooling OTC points Control C1			
3-014	Low ambient T° C1	23	17~30	1	°C
3-015	High ambient T° C1	32	31~45	1	°C
3-016	Set point at low ambient T° C1	22	(3-020) ~ (3-019) *	1	°C
3-017	Set point at high ambient T° C1	16	(3-020) ~ (3-019) *	1	°C
		Cooling OTC points Control C2			
3-014	Low ambient T° C2	23	17~30	1	°C
3-015	High ambient T° C2	32	31~45	1	°C
3-016	Set point at low ambient T° C2	22	(3-120) ~ (3-119) *	1	°C
3-017	Set point at high ambient T° C2	16	(3-120) ~ (3-119) *	1	°C
		Cooling Fixed Temperature (Circuit 1)			
3-018	Fixed T° C1	19	(3-020) ~ (3-019) *	1	°C
		Cooling Fixed Temperature (Circuit 2)			
3-118	Fixed T° C2	19	(3-120) ~ (3-119) *	1	°C

NOTE

**** Valves (3-(0/1)20)~(3-(0/1)19) are set by installer.***

6.5.4 DHW

Sanitary tank has its own configurable variables, displayed in the following table.

CODE	Description	Default Value	Range	Steps	Units
3-121	DHW status	Disabled	Disabled Enabled	1	-
3-021	DHW Mode	Standard usage	Standard usage High demand	1	-
3-022	DHW Tº set-point	45	30 ~ (3-122) *	1	ºC
-	DHW timer	-	-	-	-
-	Anti-legionella	-	-	-	-

This menu has different sub-menus that are:

- DHW timer: this is a programmable timer that allows banning the usage of DHW only on the assigned periods.
- Anti-legionella: this is a configuration view designed to set the water desinfection method.

They are explained in the following chapters.

NOTE

**** Valve (3~1/2) is set by installer.***

CAUTION

Anti-legionella function is hidden to the user by default. Installer may display it.

Anti-legionella will set the water temperature to the setting value during the specified time. This temperature will be dangerous to the user and could burn him or her. Installer is responsible for configuring it properly, advising the user, and enabling the function.

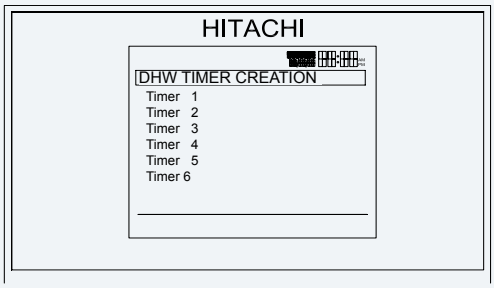
DHW timer

When user selects configure value, another window will be displayed,as seen in the following image.

That screen will included the following options:

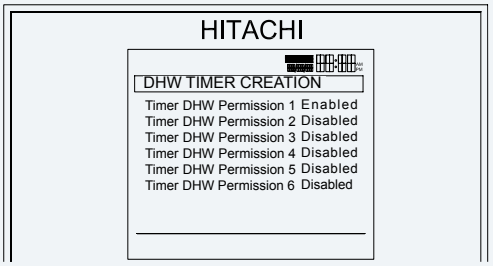
- Timer creation: this will be used to set the different programs.
- Timer assignation: this will be used to set different programs to each day of the week.
- Reset Timer creation: this will ask the user to set all days with disabled timer.

The user will select between 7 Timers in the timer creation menu.



After selecting a timer, the scren will display 6 DHW Permission Periods to select from.

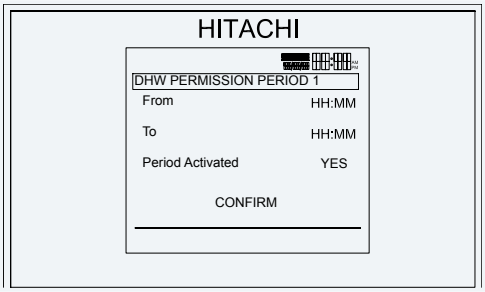
The right column indicates whether the DHW Permission Periods are enabled or not. This can only be changed from inside the menu.



Each of these DHW Permission Periods may be configured as shown in the following image. To enable the permission period this option must be set to "YES".

When permission period configuration is confirmed, it will be saved if the permission period is enabled. Prior to this, it will check to see if "From" time is lower than "To" time, in which case an error message will appear and you will return to this screen.

Note that if one permission period ends within another, DHW will be allowed until the end of the period that ends the latest.



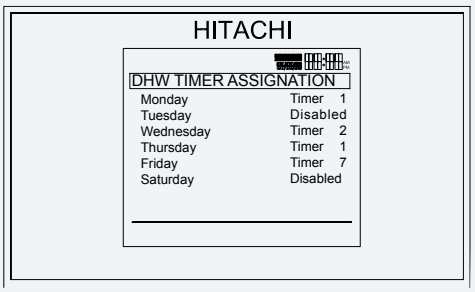
Assigning the day is done in the same way as for normal configuration.

There will be a list of all the days of the week, and the user can either select which timer will be executed for each day, or disable the timer.

If a day's timer is disabled, it will do nothing. If the timer is enabled, it will be applied.

When the tank is working on a timer period, the DHW tank will be available for normal usage. If it is outside of the period, but on a day with an assigned timer, the temperature setting will be replaced in the comprehensive view by the ban icon, and the tank will operating under the OFF mode.

If the user presses OFF, the temperature will read as OFF and it will be considered a normal day without a timer.



Resetting timer assignation will set all the days on the timer assignation to the disabled value. It will ask the user for confirmation.

◆ Anti-legionella

User can only activate or deactivate the anti-legionella function.

Code	Description	Default Value	Range	Steps	Units
8-004	Disinfection function status	Disabled	Disabled Enabled	-	-

This function will work If it is turned on. It will start at selected time and on the selected day (Operation interval) with the selected temperature during the selected time.

In the comprehensive view, the text "ANTL" will appear in the tank area.

CAUTION

Anti-legionella function is hidden to the user by default. Installer can display it.

◆ Swimming pool

Swimming pool configuration parameters are displayed in the following table.

Code	Description	Default Value	Range	Steps	Units
3-032	Swimming pool status	Disabled	Disabled Enabled	-	-
3-033	Swimming pool set point Tº	24	24~33	1	ºC

◆ Optional functions

This menu will display optional functions to the user.

Code	Description	Default Value	Range	Steps	Units
-	Summer Switch-Off	-	-	-	-
-	Tariff function	-	-	-	-

◆ Summer Switch-Off

This summer switch-off function can be configured to auto mode.

Code	Description	Default Value	Range	Steps	Units
8-001	Auto Switch-Off Status	Disabled	Disabled Enabled	-	-
8-102	Switch-Off Tº	22	10~25	1	ºC
8-103	Switching On differential Tº	0.5	0~3	0.5	ºC

◆ Tariff function

The user may set variables to Tariff function on this menu.

Code	Description	Default Value	Range	Steps	Units
8-008	Tariff function status	Disabled	Disabled Enabled	-	-
8-010	Tariff action	HP blocked NC	HP blocked NC HP blocked NO DHW blocked NC DHW blocked NO	-	-
8-009	Boiler when TARIFF	Disabled	Disabled Enabled	-	-
8-011	DHW Heater when TARIFF	Disabled	Disabled Enabled	-	-

NOTE

8-009 and 8-011 only used when Tariff action selected (8-010) is HP blocked (NC/NO).

6.6 Installer access

A special user with higher access privileges can use the controller to configure the system.

This user is referred to as the Installer, and in order to access the controller as Installer, you must hold down the OK and Return buttons for 3 seconds.

OK	+	RETURN

After that, the "Enter the password combination" message will appear.

The password combination for the Installer is:

Right (—►), Down (▼), Left (◄—), Right (—►).

Press Ok to confirm the password.

If the correct access code is entered, the installer mode icon will appear on the notifications bar (bottom line).

Installer mode icon	

Installer level access remains active for 30 minutes. After that time, it is necessary to repeat the log in process. To exit the Installer mode and return to the unit menu, hold down the backspace for 3 seconds or go to the logout option on the menu.

NOTE

The following chapters will explain the special settings the Installer can edit. It is important to understand that the Installer can also perform all the actions available to other users.

6.6.1 Unit configuration

◆ Operation display

This menu is exactly the same than in user mode.

◆ General parameters

General parameters allow for the configuration of the general system variables.

CODE	REF	Description	Default Value	Range	Steps	Units
General Parameters						
-	RTO	Room Thermostat Options				
1-001	OUa	Refrigerant Cycle Address	0	0~63	1	-
1-002	IUa	Indoor Unit Address	0	0~63	1	-

The installer may configure the system address here so as to allow for proper configuration.

CAUTION

OU and IU must be at the same setting as that on the unit PCB address.

The Room Thermostat Options submenu will display the following variables.

CODE	REF	Description	Default Value	Range	Steps	Units
Room Thermostat Options						
3-002	RTT	Thermostat Type	ON/OFF	ON/OFF Intelligent	1	-
-	BIN	Circuit Binding	-	-	-	-
3-003	$Rfact_1$	Compensation Factor C1	2	0~5	1	-
3-103	$Rfact_2$	Compensation Factor C2	2	0~5	1	-
3-032	Roff	Room Thermo OFF Tº	3	0~5	1	ºC
3-030	Rton	Minimum ON Time (min)	6	0~15	1	Min
3-031	Rtoff	Minimum OFF Time (min)	6	0~15	1	Min

Area binding

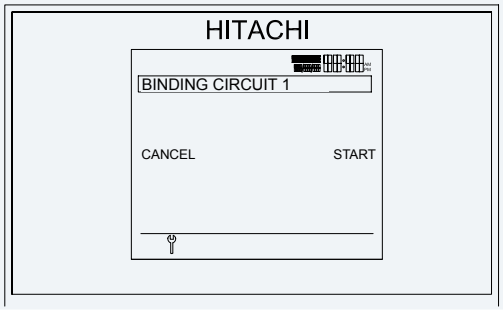
Binding is a necessary process in order to link the room thermostat with the wireless receiver and assign them to the corresponding circuit on the controller.

Make sure the room thermostats are shut down before starting the binding process. They must be in the Off position.

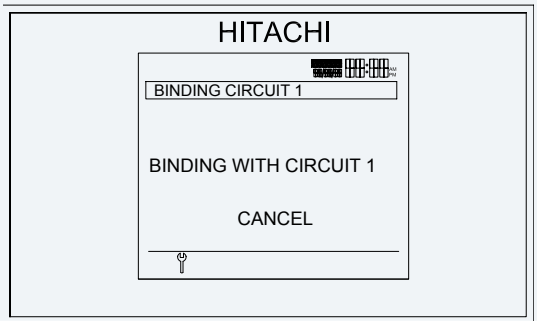
First, reset the wireless receiver by holding down the button for 15 seconds. This will erase the receiver's current configuration.

Next, prepare the wireless receiver to link it to the room thermostat and unit. Press and hold the receiver button for 5 seconds.

Next, select the circuit to be linked inside the binding zone. After selecting between the two circuits the following window will appear.

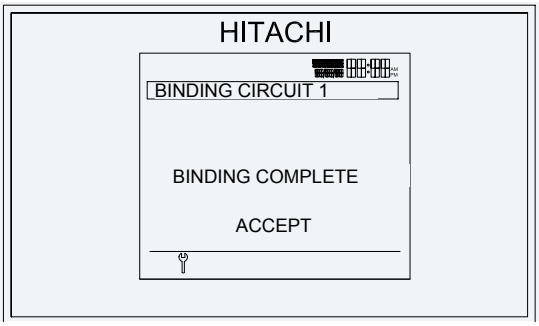


Pressing start will begin the binding mode in the room unit. It will blink each second during the specified binding time. When binding is finished a success message will appear.



Next, activate binding mode on the room thermostat. Refer to the thermostat manual for instructions. After activation, confirm by pressing the OK button.

After that, if binding is completed, the following message will appear on the controller.



If binding fails, the "BINDING FAILURE" error message will appear.

NOTE

The same process applies to circuit 2 when selected on the menu.

In summary, the binding process follows the steps below:

- Ensure that thermostats are in the off position.
- Press the button on the receiver for 15 seconds in order to remove the current configuration.
- Press the button on the receiver for 5 seconds.
- Select the circuit to be linked on the binding menu. Press the start button on the screen.
- Start the binding mode on the thermostat. Refer to its instruction manual.
- Press Ok button on the thermostat to confirm binding.
- The display will show a confirmation message. If the binding is not confirmed for 30 seconds, an error message will appear.

NOTE

"Be carefull because if the power supply is stopped on the remote thermostat or his receiver, it will keep the last temperatures, room setting and room temperature. This values will be send until the setting value will be changed. If never has read any value, it will send the OpenTherm default temperatures of 20ºC."

6.6.2 System configuration

◆ User privileges

This will define what the user may or may not do. For example, the Installer can decide whether or not the user may switch between different water calculation types, or whether or not the user may enable or disable the anti-legionella function.

CODE	REF	Description	Default Value	Range	Steps	Units
Water calculation privilege						
3-999	WTP	Calculation Type Selection	Yes	No / Yes		-
3-998	ALP	Anti-legionella Activation	No	No / Yes	1	-

◆ Space heating

These are the same views as those displayed in user mode, with the addition of maximum and minimum water temperature settings for each circuit.

CODE	REF	Description	Default Value	Range	Steps	Units
C1 Tº Range						
3-011	$Tmax_1$	Maximum Supply Tº	60	35~60(*)(**)	1	ºC
3-012	$Tmin_1$	Minimum Supply Tº	20	20~34	1	ºC
C2 Tº Range						
3-111	$Tmax_2$	Maximum Supply Tº	60	35~60(*)(**)	1	ºC
3-112	$Tmin_2$	Minimum Supply Tº	20	20~34	1	ºC

NOTE

(*) 55ºC for RWM-2.0FSN3E

(**) 80ºC when boiler combination

◆ Space cooling

These are the same views as those displayed in user mode, with the addition of maximum and minimum water temperature settings for each circuit.

CODE	REF	Description	Default Value	Range	Steps	Units
C1 Tº Range						
3-019	$Tmax_1$	Maximum Supply Tº	22	19~22	1	ºC
3-020	$Tmin_1$	Minimum Supply Tº	16	5~18	1	ºC
C2 Tº Range						
3-119	$Tmax_2$	Maximum Supply Tº	22	19~22	1	ºC
3-120	$Tmin_2$	Minimum Supply Tº	16	5~18	1	ºC

◆ DHW

These are the same views as those displayed in the user mode, with the addition of the following adjustable parameters.

CODE	REF	Description	Default Value	Range	Steps	Units
3-122	T_{DHWmx}	DHW Maximum Set Point Tº	55	40~70	1	ºC
3-024	T_{HPOFF}	HP OFF Tº Differential	6	0~10	1	ºC
3-025	T_{HPON}	HP ON Tº Differential	10	0~15	1	ºC
3-026	T_{DHWMIN}	DHW Minimum Time (min)	10	0~15	1	Min
3-027	T_{DHWMX}	DHW Maximum Time (min)	45	20~150	1	Min
3-028	C_{DHW}	Cycle DHW Time (hours)	1	0~24	1	Hour
3-029	DHW_{EH}	EH Waiting Time (min)	45	0~60	1	Min
3-030	$SHPT_s$	Space Priority Status	OFF	OFF / ON	-	-
3-031	SHPT	Space Priority Tº	-5	-20~0	1	ºC

DHW Timer

DHW Timer is the same as that displayed in user mode.

Anti-legionella

The user can only activate or de-activate it, while the Installer will have access to all configuration parameters.

CODE	REF	Description	Default Value	Range	Steps	Units
8-003	OpInt	Operation Day	Sunday	Daily / Mon ~ Sun	-	Day
8-005	StTim	Starting Time	01:00	(00~24)	-	Time
8-006	DHWSP	DHW Tº Set Point	70	50~70	-	ºC
8-007	KeepP	Duration (min)	10	10~60	-	Min

If function is turned ON (Status), it will start at selected time (Start Time) and on the selected day (Operation Interval) at the selected temperature (Anti-legionella Set Point) for the selected amount of time (Interval Time).

CAUTION

Anti-legionella function is hidden by default. The Installer can choose to reveal it.

◆ Swimming pool

This view is the same as that displayed in user mode.

◆ Complementary heating

It will display the same parameters, with the addition of the those listed below.

CODE	REF	Description	Default Value	Range	Steps	Units
		Electrical Heater Configuration				
5-006	MOT	Bivalent Point for EH	0	-20~20	1	ºC
5-001	ksco	Supply Set Point Offset	4	0 ~10	1	K
5-002	PB	Proportional Band (ºC/100%)	6.0	0~20	0.2	ºC/100%
5-003	IRF	Reset Factor (%/ºCmin)	2.5	0~20	0.1	%/ºC Min
5-004	ISWT	Inter-Stage Waiting Time (min)	5	0~10	1	Min
5-005	WTEH	Waiting Time for EH (min)	30	1~90	1	Min
		Boiler Configuration				
6-007	BB	Bivalent Point for Boiler	-5	-20~20	1	ºC
6-004	Bon	Minimum ON Time (min)	2	1~30	1	Min
6-005	Boff	Minimum OFF Time (min)	5	1~30	1	Min
6-006	WTBO	Waiting Time (min)	30	1~90	1	Min
6-001	Kscob	Boiler Offset Tº	4	0~10	1	ºC
6-009	BWTt	Waiting Time for DHW (min)	45	0~120	5	ºC
		Solar Configuration				
10-001	Sprior	Status	Disabled	Disabled Enabled	-	-
3-126	$T_{DHWMSOL}$	DHW SOLAR Max Time (min)	60	30~240	1	Min

NOTE

In the case of the Heating + Boiler configuration (5-000), BB (6-007) will have a range of –20~20 and the controller must ensure that: BB (6-007) < 5ºC + MOT (5-006).

◆ Mixing valve for C2

The following table lists the settings that may be edited to control circuit 2's mixing valve.

CODE	REF	Description	Default Value	Range	Steps	Units
3-133	PBMV	Proportional Band (K)	6.0	0~20	0.2	K
3-134	IRFMV	Integral Reset Factor (%)	2.5	0.0~20	0.1	%
3-135	RTMV	Running Time Factor (sec)	140	10~500	10	Sec

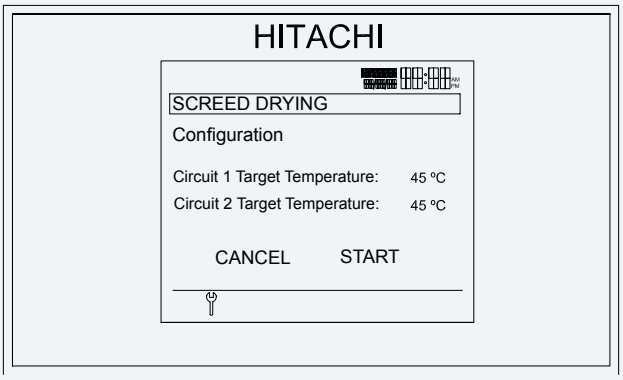
◆ Water Pump

The following table lists the variables that may be configured to manage the water pump.

CODE	REF	Description	Default Value	Range	Steps	Units
7-002	PMinOff	Minimum Time OFF (min)	40	0~120	10	Min
7-003	PMinOn	Minimum Time ON (min)	10	0~120	10	Min
7-001	POT1	Pump Overrun Time (min)	10	0~120	5	Min
7-202	OTO	Over-Tº Offset C2	5	1~10	1	ºC

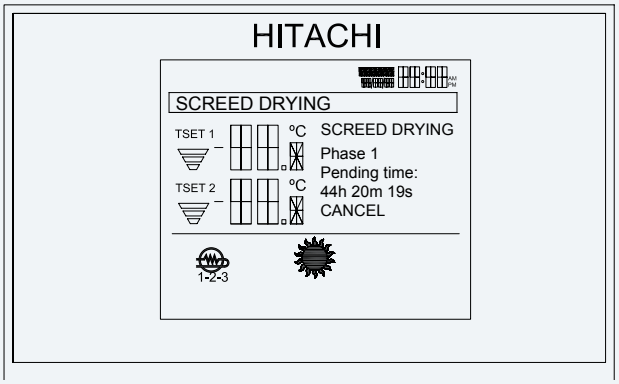
◆ Screed drying

It takes 7 days, and the Installer must configure target temperatures for the available circuits in order for it to work properly.



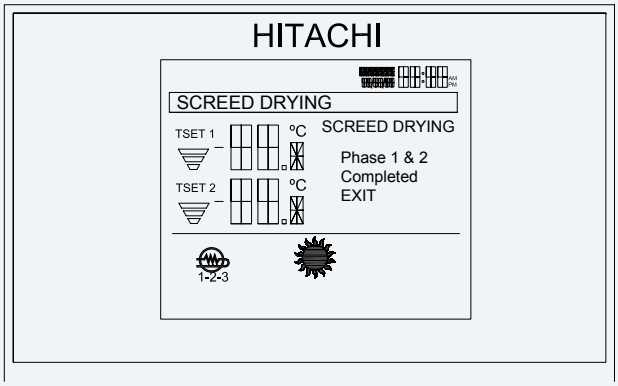
It is advisable to exit the Installer mode by pressing the Start button, as the operation takes 7 days to carry out.

The Screed Drying display allows user to keep track of or cancel the screed drying process.



Phase 1 takes three days and phase 2 takes four. During these phases it will attempt to reach target temperatures using different drying procedures.

When the process is completed the following screen will appear.



◆ Test Run

When outdoor test run is selected, the remote control will ask for the duration of the test, and the working mode will be the same as that explained in the normal user chapter, only with the Installer mode icon on the notifications bar.

◆ Optional Function

This will include the same parameters as those in user mode, with the addition of the following parameters.

CODE	REF	Description	Default Value	Range	Steps	Units
-	SP	Seizure Protection	-	-	-	-
8-020	hsb	Hydraulic Separator Status	Disabled	Disabled Enabled	-	-

Seizure Protection

This view includes the following variables.

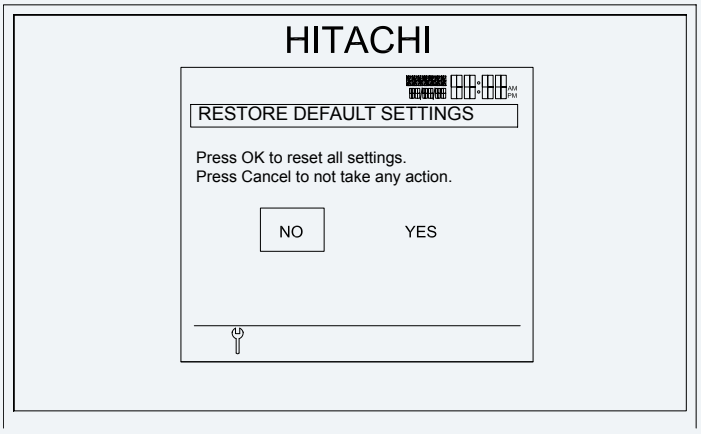
CODE	REF	Description	Default Value	Range	Steps	Units
8-002	SeizPr	Seizure Protection Status	Disabled	Disabled Enabled	-	-
8-010	OpInt	Operation Day	Mon	Mon ~ Sun	-	Day
8-011	StTim	Start Time (00~24)	01:00	(00~24)	-	Time

These Installer parameters control the optional seizure function. They are used to enable seizure protection and set its activation time. When this happens, follow these instructions:

- Make sure mixing valves are fully opened and then fully closed (time depends on runtime parameter).
- Diverting valves are switched on for 1 minute.
- Pumps are switched on for 1 minute.

Restore default settings

When "Restore Default Settings" is selected, the unit control will ask the user to confirm.



The "No" option is selected by default. Pressing "Yes" will reset the factory settings.

HITACHI
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7. Optional functions

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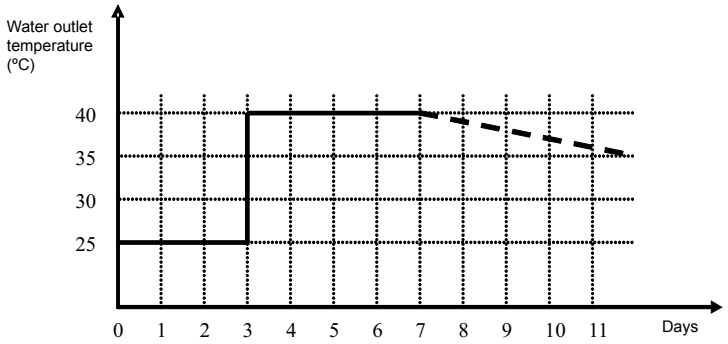
7.1 Indoor unit

Yutaki S unit has different optional functions designed to give the user better control over the facilities that the user can apply.

7.1.1 Floor screed drying function (circuits 1 & 2)

New air to water heat pump has a new special optional function used exclusively for the process of drying of newly applied screed on floor heating system. This process is based on EN1264 part 4.

When the user activates the floor screed drying function, the water set point follows a predetermined schedule:



1 Water set-point is kept constant at 25ºC (*) for 3 days.

2 Water set-point is set to the Heating maximum supply temperature (but always limited to ≤ 55ºC) for 4 days.

3 After 7 days started the floor screed drying, the water outlet temperature will return at the assigned water temperature setting, depending on the water rule selected.

Upon completion of the above sequence, the controller returns to normal operation.

All the other heating modes are overdriven except hot sanitary water. The room thermostat is disabled during this function.

CODE	Description	Default Value
8-000	Screed drying function c1 (OFF, ON)	OFF
8-100	Screed drying function c2 (OFF; ON)	OFF

NOTE

- ***Tariff input has no effect***
- ***Screed drying function process is showed in LCD***
- ***(*) Unit heating working range has priority instead of 25ºC***

7.1.2 Automatic summer switch-off

At higher outside temperatures it doesn't make sense to keep heating the building. The YUTAKI S system will switch the heating off when the daily average outdoor temperature of the previous day rises above the Summer Switch-Off Activation Temperature.

Variables used:

CODE	Description	Default Value	Range	Steps	Units
8-001	Auto Summer Switch-OFF	Disable	Disable/Enabled	-	-
8-102	Summer Switch-Off Tº	22	10~25	1	ºC
8-103	Switching On differential	0.5	0~3	0.5	ºC

It will calculate the average of last 24 hours.

In the first 24 hours it will not check anything. After that it will adjust the average with the new sample and check the conditions every 5 minutes.

NOTE

- ***Deactivate space heating when checking conditions. User may activate it using on/off button, which will restart the function and reset the average.***
- ***The checking conditions are:***

Condition	Action
Average > Summer Switch-OFF Tº [8-102]	HEATING OFF
Average < (Sum. Sw-Off Tº [8-102] – Sw.differential [8-103])	HEATING ON

NOTE

- ***Average is an internal variable of controller***
- ***A switching differential [8-103] is applied.***
- ***Function must remember status (ON or OFF). When second condition is activated, status will be restored.***
- ***When changing Summer Switch OFF Tº or switching ON differencial or Run/Stop any circuit (1&2) the average calculation will restart.***

If circuits are forced OFF, a notification icon will appear on the LCD.

7.1.3 Pump and valve seizure protection

The pump/valve seizure protection function helps to prevent these components sticking during long periods of inactivity.

Every week the components will run for a short period.

Mixing valves are fully opened and then fully closed (time depends on runtime parameter)

- Diverting valves are switched on for 1 minute.
- Pumps are switched on for 1 minute

CODE	Description	Default Value	Range	Steps	Units
8-002	Seizure protection (00:OFF, 01: ON)	OFF	-	-	-
8-010	Operation Day	Mon	Mon~Sun	-	Day
8-011	Start Time (00~24)	01:00	(00~24)	-	Time

7.1.4 DHW anti-legionella protection function

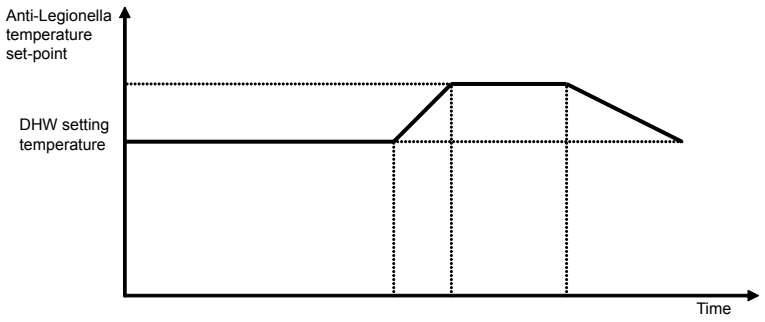
In order to help protect against Legionella in the domestic hot water system, the DHW set-point can be raised to a higher than normal temperature. The Legionella protection only makes sense if there is a DHW electric heater to raise the DHW temperature to this high temperature.

NOTE

According to national regulation, the installer must configure this disinfection function field setting

Configuration parameters:

- Operation interval: day(s) of the week at which the domestic water should be heated
- Status: defines whether the disinfection function is turned ON (1) or OFF (0).
- Start time: time of the day at which the domestic water should be heated
- Set-point: high water temperature to be reached.
- Interval: time period defining how long the set-point temperature should be maintained.



CODE	Description	Default Value	Range	Steps	Units
8-004	Disinfection function status	Disabled	Disabled / Enabled	-	-
8-003	Operation Interval (Mon~Sun)	Sunday	Daily / Mon ~Sun	-	day
8-005	Start Time (00~24)	01:00	(00~24)	-	Time
8-006	DHW set-point	70	50~70	-	ºC
8-007	Keeping period	10	10~60	-	min

NOTE

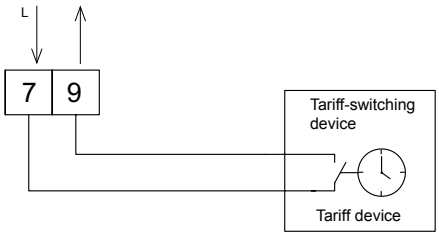
- ***Tariff or DHW timer has no effect.***
- ***When antillegionella function, it is shown in LCD (by ANTL sentence)***

7.1.5 Tariff input (electrical tariff input)

This function can be used to block the heat pump.

It allows an external tariff switch device to switch off the heat pump during peak electricity demand period.

When the system is working in combination with Boiler, the boiler will be switched ON to provide the necessary heating.



CODE	Description	Default Value	Range
8-008	Tariff function enabled/disabled	Disabled	Disabled / Enabled
8-010	Tariff action (00~03)	00	00:Heat pump blocked when signal is closed. 01:Heat pump blocked when signal is open. 02:DHW blocked when signal is closed. 03:DHW blocked when signal is open.
8-009	Use boiler instead of heat pump when TARIFF Mode is ON	Disabled	Disabled / Enabled
8-011	Use DHW Heater instead of heat pump when TARIFF Mode is ON	Disabled	Disabled / Enabled

NOTE

- ***User boiler o DHW Heater instead heat pump when Tariff Mode ON (8-009 & 8011) only has effect when tariff action selected is heat pump blocked (NC or NO) (00 or 01).***
- ***8-009 has priority instead 8-011.***
- ***When tariff action ON is it shown in LCD and seven segments.***

7.1.6 Electrical heater or boiler emergency mode

To use the electrical heater or boiler in the event of outdoor unit failure, apply additional setting to IU setting

- DSW4-4:ON –> Heater/Boiler Emergency enabled ON
- DSW4-4:OFF –> Heater/Boiler Emergency disabled OFF

◆ Conditions for Activation

- Heating Mode is enabled
- Electric Heater or Boiler is allowed by user selection
- Water temperature (Two) < Water Temperature target (Ttwo)

◆ Conditions for Disabling

When Emergency Heater or Boiler is enabled, water calculation is based on the difference between water outlet (Two) (for Heater) or Water outlet3 (Two3) (for Boiler) and water target (Ttwo)

Conditions for disabling:

When any of Conditions a,b,c,d is fulfilled.

a. Measured outlet temp value targeted

b. Outlet water temp set at Max water range temp by installer

c. Thermo OFF by Room Thermostat

d. Indoor unit alarm

NOTE

- ***Water pump1 (primary) will be activated with electric heater.***
- ***Water pump3 will be activated with boiler***
- ***If Heater emergency mode is activated, the Hot sanitary water electric heater will be activated in the same way for emergency mode***

Additional complementary disable functions:

- Step will be forced to 0 (heater and boiler OFF) in any of the following conditions. This change will occur regardless of minimum ON time:

1 DSW4-4:OFF

NOTE

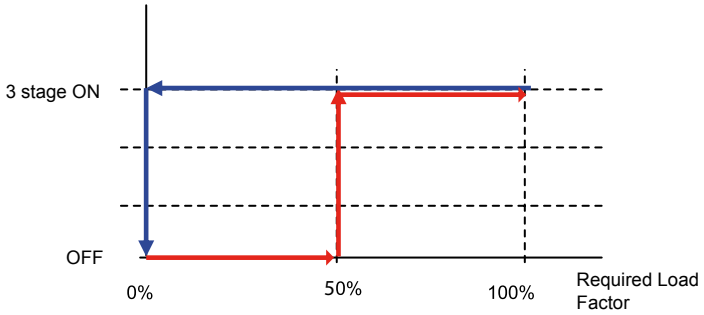
When emergency operation, the signal from outdoor units has no learned, the ambient temperature is considered at 10ºC (fixed) and water calculation (in case of Point or gradient) has calculated at 10ºC Outdoor temperature. It's recommended to change to fixed water calculation when emergency mode.

7.1.7 Step heater for 3-phase imbalance option

Only applies when power source of indoor unit is 3-phase (3N 400V 50Hz).

In order to prevent 3-phase imbalance by Heater Steps, this option will be used to switch all 3 steps at the same time.

When user allows 1-step heater mode (DSW3-3 ON), heater can only operate in one step.



7.1.8 Hydraulic separator combination

In some facilities, the YUTAKI S unit's water pump is not sized for heating installation (small water pump). In this case, a hydraulic separator or buffer tank and additional water pump (WP3) must be used to ensure proper water pump sizing.

When the boiler is configured to alternate with the heat pump, a hydraulic separator or buffer tank must be used to ensure proper hydraulic balancing. Additional Water pump (WP3) and water sensor (Two3) are necessary for boiler combination control.

User variables:

CODE		Description	Default Value
8-010	hsb	Hydraulic Separator (Disabled, Enabled)	Disabled

7.1.9 Secondary outdoor sensor accessory

Optional outside temperature sensor: an outside temperature sensor can be directly connected to the controller if the heat pump is located in a position that is unsuitable for this measurement.

If a wired outside sensor is selected (DSW4-2 ON), use the wired outside temperature instead of the Outdoor unit outside temperature.

NOTE

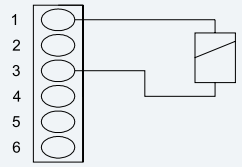
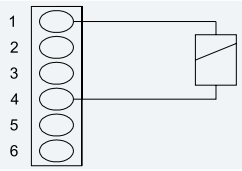
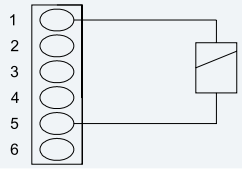
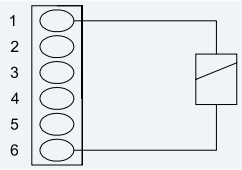
For more information refer to 2nd ambient temperature sensor (ATW-2OS-01 7E549909).

7.1.10 Indoor external output signals

The system has four output optional signals. Signals are programmed on the indoor unit's PCB using the CN7b. The output connectors have four ports (CN7b) to configure four output options out of the eleven options the system has

◆ Available ports

The system has the following input and output ports.

Indication		Port Setting on the Indoor Unit's PCB	Remarks	Output
Output	o1	1-3 on CN7b		DC 12V
	o2	1-4 on CN7b		DC 12V
	o3	1-5 on CN7b		DC 12V
	o4	1-6 on CN7b		DC 12V

Additional HAPE accessory can be used for easy connection, for more information refer to PCB relay outputs manual

◆ Configuration

Unit switches to this mode when DSW4-8 is turned ON during unit stoppage.

Available optional signals

The unit have optional signals, described in the following table:

Code	Name	Description	Port
o1	Operation signal	This signal allows control of the machine's status at all times; it is very useful for centralized applications. The signal will be enabled when Thermo ON operation	CN7b / 1-3
o2	Alarm signal	This signal allows activation of mechanisms that protect from and warn of possible failures in the unit. The signal will be enabled when the unit is in alarm (indoor or outdoor)	CN7b / 1-4
o3	Cooling signal	This signal allows control of cooling operation status. For closed valves in Radiators or On signal for Fan coils. The signal will be enabled when Cooling operation.	CN7b / 1-5
o4	Thermo-OFF signal during circuit 1	Signal is enabled when circuit 1 is operating in Demand-OFF. The signal will be enabled when Demand OFF in circuit 1.	CN7b / 1-6

Component		Manufacturer or specifications	Remarks
Auxiliary relay (X3)		OMRON mini power relay model: MY1F or equivalent	Voltage between relay terminals 12 Vdc - 75 mA
Wire (control)	Voltage 12V DC	0.5 mm²	
Wire (power)	Voltage 230V	2.0 mm²	

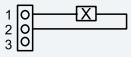
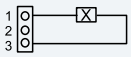
7.2 Outdoor units

The system has the following output signals which are programmed in the PCB of the outdoor unit using connectors.

The system has the following optional functions which are programmed in the PCB of the outdoor unit.

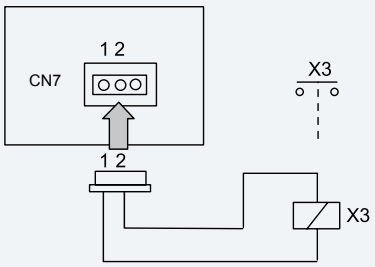
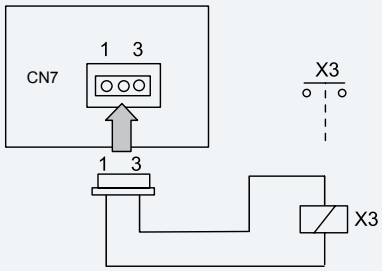
7.2.1 Available ports

The system has the following input and output ports.

Content		Setting of the port in the PCB of the indoor unit	Remarks	Outlet
Outputs	o1	1-2 of CN7		DC 12V
	o2	1-3 of CN7		DC 12V

Connection:

The system has the following connections.

Output connections	
Indication	Connections
o1	
o2	

Specification of the components for a correct installation

Component		Manufacturer or specifications	Remarks
Auxiliary relay (X3)		OMRON mini power relay model: MY1F or equivalent	Voltage between relay terminals 12 Vdc - 75 mA
3P connector cable		Optional part PCC-1A (capable of connecting the JST XHP –3 connector)	Five wires with connectors as one set
Wire (control)	Voltage 12V DC	0.5 mm²	
Wire (power)	Voltage 230V	2.0 mm²	

NOTE

- ***The connection of the input signal is only an example.***
- ***Keep the CN1 and CN2 wires as short as possible.***
- ***Do not run the wires along 230 V/400 V CA power cables Separately install them at a distance of more than 30cm. (The cables may intersect.)***
- ***If you install the wires along a power supply wire, insert the wires in a metal conduit tube and ground one end of the tube.***
- ***The maximum wiring length is 70 m. If you use this function, it is recommended that you use safety devices such as an electrical leakage breaker or a smoke detector.***

7.2.2 Configuration

◆ Available optional signals

HVRN2 and HRNME-AF units have the following signals that are described in the following table. These signals are set up through the PCB of the outdoor unit.

- Output signals

Ind.	Output signal	Application	Port
0	Nº setting application	Nº setting	-
01	Operation signal	This signal allows to pick up the machine's operation signal. This is very useful to start up additional systems such as humidifiers, fans and other additional air-conditioning systems.	CN7
02	Alarm signal	This signal picks up the machine's alarm. This is very useful to warn that an alarm has been tripped.	CN7
03	Compressor ON signal	This single allows to pick up the compressor's operation signal. It is very useful for checking signals during remote-control operation and for the interlock of the outdoor unit.	CN7
04	Defrost operation signal	This signal allows to pick up the defrosting of the unit. This is very useful to know how the indoor unit is operating if there is an abnormal situation. .	CN7

NOTE

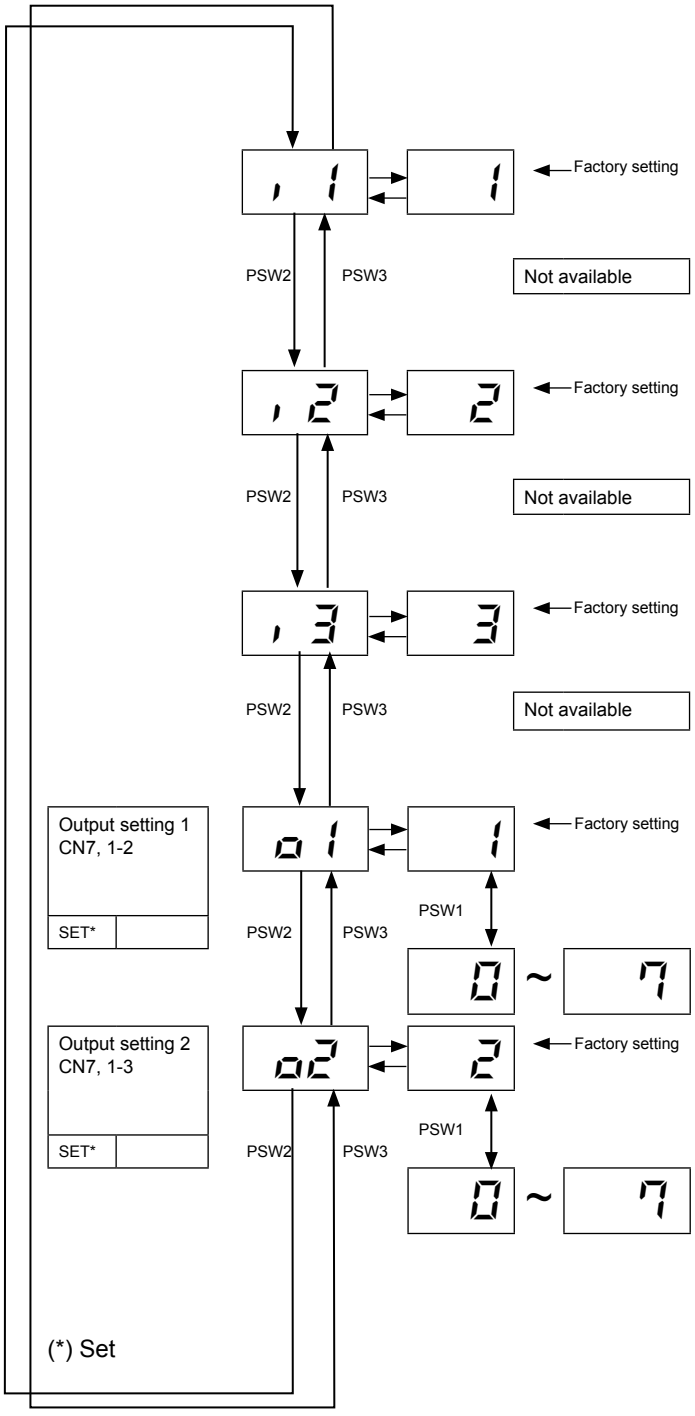
Do not set same function (01~04) to multiple input port.

Programming

The optional signals are programmed through the PCB of the outdoor unit.

Setting of the optional signals

The optional signals of the outdoor unit are set up from the PCB of the outdoor unit and push switches PSW1, PSW2 and PSW3.



7.2.3 Description of optional output signals

- **Operation signal (1)**

  This optional signal is used to pick up the operation signal. It can be used to turn on or off complementary units of the air-conditioning system,such as fans, humidifiers, etc.

  Connect the cabling and use the materials as shown in section *Available ports*.

  Note that the contact of auxiliary relay X3 is closed when an operation signal is issued.

- **Alarm signal (2)**

  This optional signal is used to pick up the activation of safety devices.

  Connect the cabling and use the materials as shown in section *Available ports*.

  Note that the contact of auxiliary relay X3 is closed when an operation signal is issued.

- **Operation signal of the compressor (3)**

  This optional signal is used to pick up the signal when the compressor is ON. It can be used to check how the compressor is running at all times. It is very useful for locking the compressor when the fans are locked.

  Connect the cabling and use the materials as shown in section *Available ports*.

  Note that the contact of auxiliary relay X3 is closed when an operation signal is issued.

- **Defrosting signal (4)**

  This optional signal is used to pick up when defrosting turns on. It is very useful to check if the indoor unit is in thermo-OFF.

  Connect the cabling and use the materials as shown in section *Available ports*.

  Note that the contact of auxiliary relay X3 is closed when an operation signal is issued.

8. Commissioning

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When installation is complete, perform commissioning according to the following procedure, and hand over the system to the customer. Perform the commissioning of the units methodically, and check that the electrical wiring and the piping are connected correctly.

Indoor and outdoor unit must be configured by the installer to get the prefect setting and the unit working.

8.1 Preliminary check

8.1.1 Checking the unit

- Check external appearance of the unit to look for any damage due to transportation or installation
- Does installation space carry out Hitachi installations (see *Unit spaces* in outdoor and indoor manual)

8.1.2 Electrical checking

DANGER

Do not operate the system until all the check points have been cleared:

- ***Check to ensure that the electrical resistance is more than 1 MΩ, by measuring the resistance between ground and electrical parts terminal. If not, do not operate the system until the electrical leakage is found and repaired. Do not impress the voltage on the terminals for transmission (1 and 2, 3 and 4).***
- ***Check to ensure that the switch on the main power source has been ON for more than 12 hours, in order to give the oil heater time to warm the compressor.***
- ***In three-phase unit check phase sequence connection on terminal board.***
- ***Check the power supply voltage (±10% of the rated voltage).***
- ***Check that field-supplied electrical components (main switches, breakers, wires, conduit connectors and wire terminals) have been properly selected according to the electrical specifications given in the unit's Technical Catalogue, and check that the components comply with national and local standards.***
- ***Do not touch any electrical components for more than three minutes after turning OFF the main switch***
- ***Check the dip switch settings of the indoor unit and the outdoor unit are connected as shown in the corresponding chapter.***
- ***Check to ensure the electrical wiring of the indoor unit and the outdoor unit are connected as shown in the chapter.***
- ***Check to ensure the external wiring is correctly fixed. To avoid problems with vibrations, noises and cut out wires with the plates.***

8.1.3 Hydraulic circuit checking

- Check that the circuit has been properly flushed and filled with water and that the installation has been drained: the pressure of the heating circuit must be 1.8 bar (at least 1.5 bar)
- Check for any leakage in water cycle
- Make sure the system's internal water volume is correct (see Technical catalogue)
- Check that the hydraulic circuit's valves are open.

DANGER

Operating the system with closed valves will damage the unit.

- Make sure the water supply pressure is lower than 6 bar.
- Check to see that air purge valve is open.

NOTE

During filling, the air in the circuit may not be able to be removed. Additional air purge in the installation should be installed.

- Check to see that electrical heater is completely filled with water by operating pressure of safety valve.

DANGER

Electrical heater operation when not completely filled with water will damage the heater.

- Check to see that additional water pumps (WP2 or/and WP3) are correctly connected to terminal board.

DANGER

- ***The minimum required water flow is 5 liters/minute (RWM-2.0FSN3E), 12 liters/minute (RWM-3-6FSN3E) and 35 liters/minute (RWM 8/10FSN3E). Even when water flow is lower than this (with flow switch tolerance), alarm will be displayed on the unit.***
- ***Remember that water connection must be accordance with local regulations.***
- ***Water quality must comply with EU directive 98/83 EC.***

8.1.4 Checking the Refrigerant circuit

- Check to ensure that the stop valves on the gas and liquid lines are fully open.
- Check that the size of the piping and the refrigerant charge comply with the applicable recommendations.
- Check the inside of the unit for refrigerant leakage. If there is a refrigerant leak, call your dealer.
- Check outdoor unit commisioning procedure manual

8.2 Commissioning procedure

This procedure is valid regardless of what options are on the module.

- When installation is complete and all necessary settings (Dip-switches in PCBs and User interface configuration) have been carried out, close the E.BOX and place the cabinet as shown in the manual.
- Select operation mode (cooling or heating) using the User interface.
- Make a test run as shown in item *Indoor unit test run*.
- After rest run is completed, start the entire unit or the selected circuit by pressing the Run/Stop button.

◆ Initial start-up at low outdoor ambient temperatures

- During commissioning and when water temperature is very low, it is important for the water to be heated gradually. Additional optional function can be used for starting at low water temperature conditions:
  Screed drying function:
  - The screed function is used exclusively for the process of drying a newly applied screed to the floor heating system. The process is based on EN-1264 par 4.
  - When user activates screed function, the water set point follows a predetermined schedule:
    - Water set point is kept constant at 25ºC for 3 days
    - Water set-point is set to the maximum Heating supply temperature (but always limited to ≤ 55ºC) for 4 days.

DANGER

Heating at lower water temperatures (approximately 10ºC to 15ºC) and lower outdoor ambient temperatures (<10ºC) can be damaging to the heat pump when defrosting.

As a result, Heating up to 15ºC when outdoor temperature is lower than 10ºC. is performed by the Electrical Heater.

NOTE

In case of Heater Forced OFF (by optional dip switch setting) these condition is not performed and heating is performed by Heat Pump. HITACHI is not responsible for its operation.

CAUTION

It is recommended start the unit (first power ON) with heater forced OFF (DSW4-7: ON). In order to circulate water by water pump and remove possible air into the heater (Check heater completely filled).

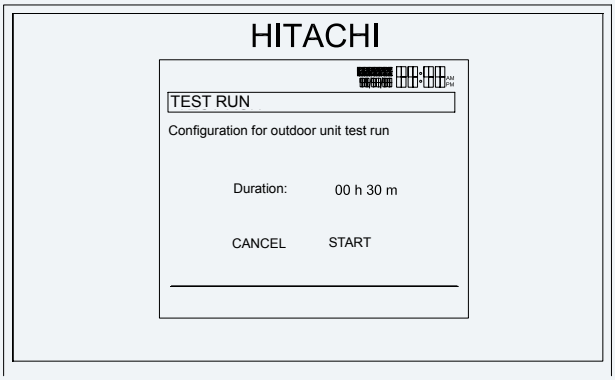
8.3 Indoor unit test run

This option is not available on the menu. User may execute test run function by pressing the **OK** and **Down** arrow keys for 3 seconds.

After that combination, the remote control will ask about the duration of this test.

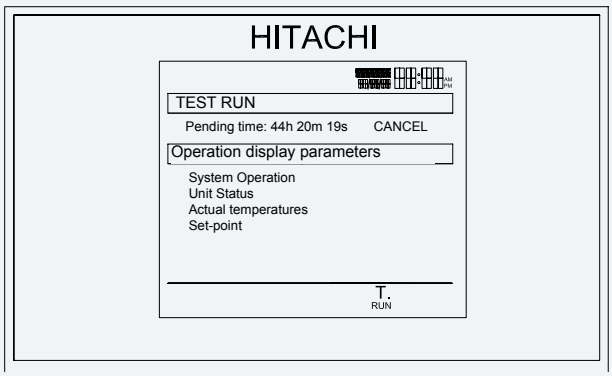
Note that test run mode will be the same than unit mode selected on the global view.

Select unit mode, heating or cooling, before starting test run.



The duration will be between 00:30 and 12:00 hours.

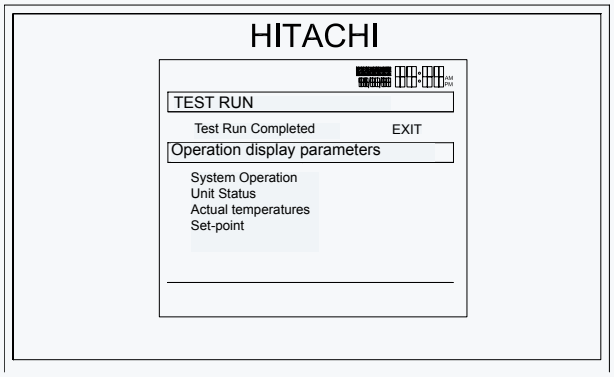
After pressing start, Outdoor unit will begin the test run. During the execution of this test, the following screen will be displayed.



When test run is set on the outdoor unit, the test run icon will appear on the notifications bar.

When test run finishes the following screen will appear.

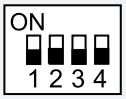
Pressing the Exit key will take the user to the comprehensive view.



8.4 Outdoor unit test run

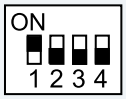
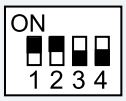
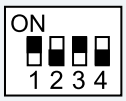
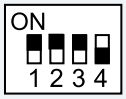
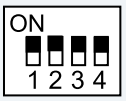
The test run procedure from the outdoor unit side is shown below. You can set this DIP switch while the power source is ON.

◆ **Setting of dip switch (before shipment)**

DSW1		
	1	Cooling: Pin 1 ON
	2	Heating: Pin 1, 2 ON
	3	Cooling intermediate season: Pin 1, 3 ON
	4	Heating intermediate season: Pin 1, 2, 3 ON
	5	Manual compressor OFF: Pin 1~4 ON

CAUTION

- ***Do not touch any other electrical components while you are setting the switches on the PCB.***
- ***Do not attach or detach the service access panel when the power source for the outdoor unit is ON and the outdoor unit is operating.***
- ***Set all the DIP switches of DSW1 to OFF after completing the test run.***

	Dip switch seting	Operation	Remarks
Test run	1. Setting operation mode (a) Cooling: Set DSW1-1 ON  (b) Heating SET DSW1-1 and 2 ON  (c) Cooling intermediate season: Set DSW1-1 and 3 ON  (d) Heating intermediate season: Set DSW1-1, 2 and 3 ON 	• The indoor unit automatically starts to operate when the test run of the outdoor unit is set. • You can perform the ON/OFF operation from the remote control switch or the DSW1-1 of the outdoor unit. • Continuous operation during 2 hours is performed without the Thermo-OFF condition.	• Make sure that the indoor units start to operate in accord with the test run of the outdoor unit. • If you start the test run from the outdoor unit and you stop the test run from the remote control switch, the test run function of the remote control switch is cancelled. However, the test run function of the outdoor unit is not cancelled. • If the more than one indoor unit is connected with one remote control switch, all the units start the test run at the same time. Therefore, turn OFF the power source so that the indoor units do not perform the test run. If this is the case, the TEST RUN indication of the remote control switch may flicker. This is not abnormal. • The setting of DSW1 is not required for the test run from the remote control switch.
Manual OFF of compressor	2. Forced stoppage of compressor: Set DSW1-1 ON 	• When DSW1-4 is ON during the compressor operation, the compressor stops operating immediately and the indoor unit is under the Thermo-OFF condition. • When DSW1-4 is OFF, the compressor starts to operate after the cancellation of the 3-minute guard.	• Do not turn ON and OFF the compressor frequently

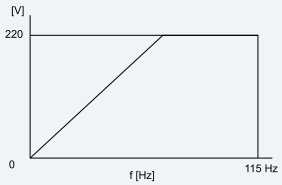
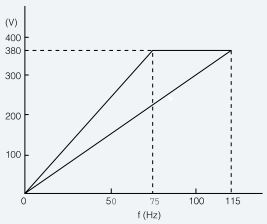
8

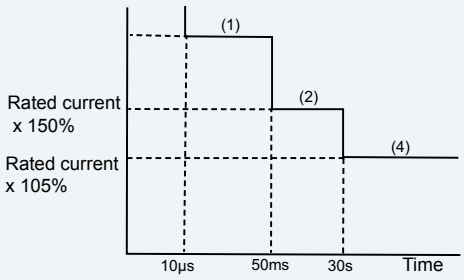
9. Electrical checks of the main parts

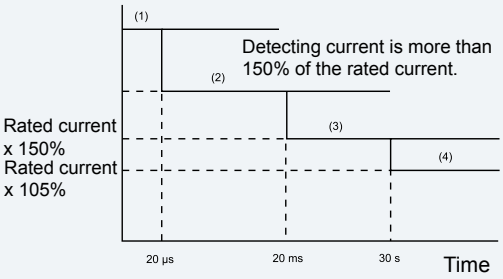
Index

9.1 Inverter

9.1.1 Specifications of inverter

Aplicable model	RAS-2HVRN2	RAS-(3-6)HVRNME-AF	RAS-(4-10)HRNME-AF
Aplicable power source	1~ 230V+10% 50Hz		RAS-(4-6)HRNME-AF (3N~ 400V±10% 50Hz) RAS-(8-10)HRNME (3N~ 380-415V±10% 50Hz)
Input current	10.5A	RAS-(3-6)HVRNME-AF: 15-30A	RAS-(4-10)HRNME-AF: 6-25A
Control method	Vector control		
Range output frequency	31-115Hz	20-115HZ	
Accuracy of frequency	0,01 Hz at applicable frequency range		
Output / characteristics	Conditions **1** Power source voltage AC220/240V **2** Non-loading (free output) **3** Ammeter type volt-meter (X1.1) 		Conditions: **1** Power source voltage AC380/415V **2** Non-loading (free output) **3** Ammeter type volt-meter (X1.1) 
Soft start stop	0.1, 0.5, 1, 3 Hz/s (4 steps)	0.125, 0.5, 1, 2 Hz/s (4 steps)	0.125~3.00 Hz/s
Protection function			
Excessive high or low voltage for inverter	Excessive low voltage at a voltage is lower than 194V DC Excessive high voltage at a voltage is higher than 420V DC		Excessive low voltage at a voltage is lower than 350V DC Excessive high voltage at a voltage is higher than 750V DC
Abnormality of current sensor (0A detection)	Stoppage at a current of compressor smaller than 1.5A. When the frequency is 6 to 10Hz after starting. Cause of abnormality: Failure of current sensor Failure of IPM Failure of compressor / fan motor Disconnected wiring	Stoppage at a current of compressor smaller than 1.5A. When the frequency is 15 to 18Hz after starting. Cause of abnormality: Failure of current sensor Failure of IPM/DIP-IPM/ ISPM Failure of compressor / fan motor Disconnected wiring	

<table>
<tr><th>Protection function</th><th>RAS-2HVRN2</th><th>RAS-(3-6)HVRNME-AF</th><th>RAS-(4-10)HRNME-AF</th></tr>
<tr><td>Overcurrent protection for inverter</td><td colspan="3"> 



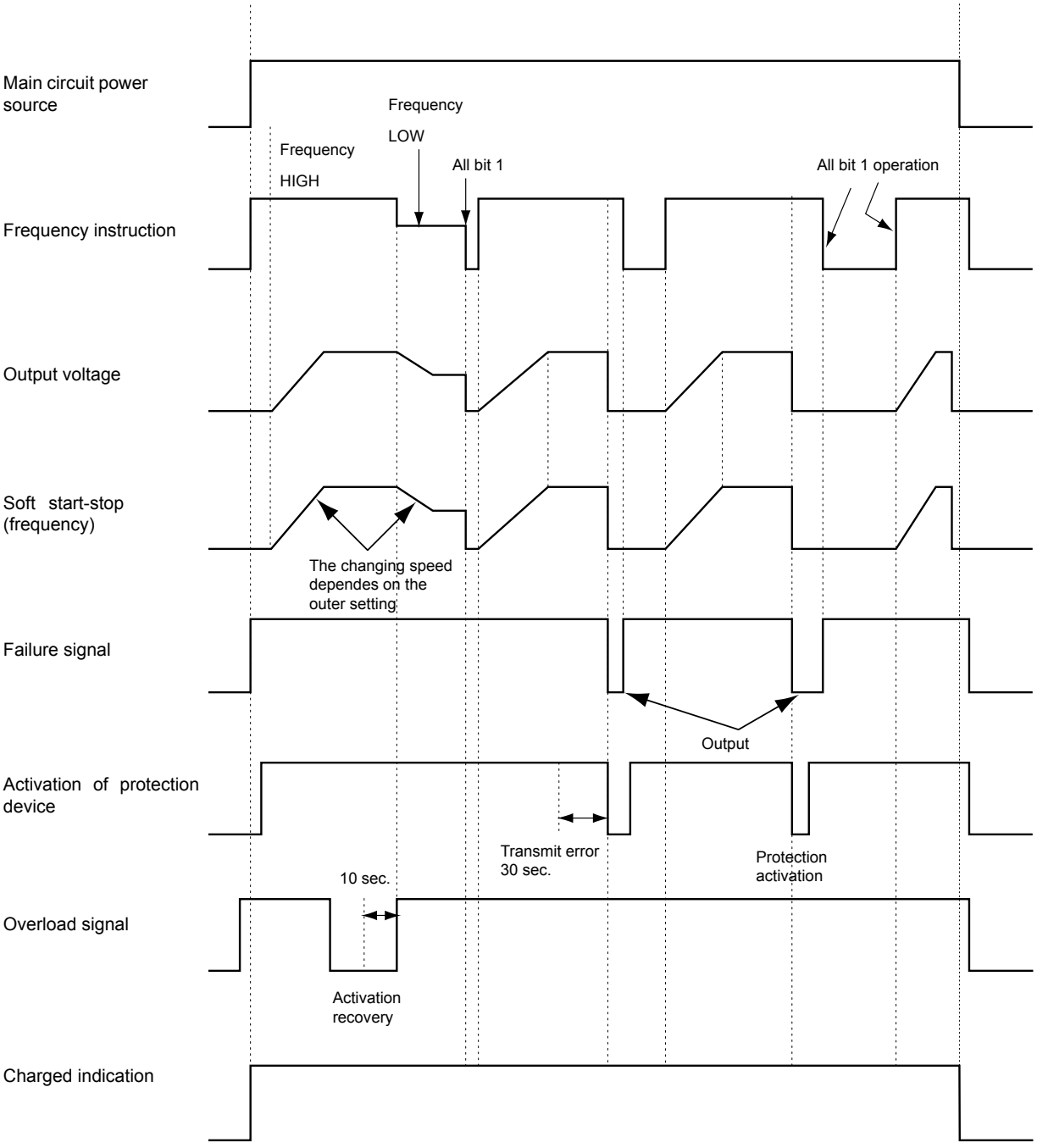
*) Internal protection IPM

1 Short-circuit trip of arm *)
2 Instantaneous overcurrent trip *)
3 Instantaneous overcurrent trip
4 Electronic thermal trip

Condition is maintained longer than 30 seconds or accumulated longer than 3 minutes during 10 minutes sampling time.</td></tr>
<tr><td>Protection of transistor module</td><td colspan="3">IPM has four protection function for self-protection..

1 Some of the output terminals between "U" and "V", "V" and "W", "W" and "U" has a short-circuit.
2 Running current reaches the maximum rated current.
3 Abnormal temperature is measured by internal thermistor.
4 Control voltage decreases abnormally.</td></tr>
<tr><td>Overload control</td><td colspan="3">Overload control as a current greater than (rated current X105%).
Overload control release at a current smaller than (rated current X 88%).</td></tr>
<tr><td>Fin temperature increase</td><td colspan="3">The unit is stopped when the fin temperature is higher than 80ºC (1~) 100°C (3N~).</td></tr>
<tr><td>Earth detection</td><td colspan="3">The unit is stopped when the compressor is earthing.</td></tr>
</table>

9.1.2 Inverter time chart



9.1.3 Protective function

1 Excessive high or low voltage for inverter

a. Level of detection

- When the voltage of direct current is greater than (A) V, abnormalities are detected.
- When the voltage of direct current is smaller than (B) V, abnormalities are detected.

Power supply	400V, 50Hz / 380-415V, 50Hz	230V, 50Hz
(A)	750	440
(B)	350	194

b. Function
When abnormalities are detected, the inverter compressor is stopped and transmit the signal code of stoppage cause to PCB1.

c. Cancellation of protection function
Transmission for signal code of stoppage cause is cancelled when a stopping order is given or main power source is cut off.

2 Abnormality of current sensor

a. Level of detection
When current of the inverter compressor decreases lower than 0.5A during the inverter compressor frequency between 15Hz and 18Hz, an abnormality is detected.

b. Function
When abnormalities are detected, the inverter compressor is stopped, and transmit the signal code of stoppage cause to PCB1.

c. Cancellation of Protection Function
Transmission for signal code of stoppage cause is cancelled when a stopping order is issued or main power source is cut off.

3 Overcurrent protection for inverter

a. Level of detection
When the current detected by current sensor reaches 150% of the rated current, overcurrent is detected. (Instantaneous overcurrent)
When the current detected by current sensor exceeds 105% of the rated current continuously for 30 seconds or for 3.5 minutes in total during a 10 minutes period, overcurrent is detected. (Electric thermal relay)

b. Function
When abnormalities are detected, the inverter compressor is stopped and transmit the signal code of stoppage cause to PCB1.

c. Cancellation of protection function
Transmission for signal code of stoppage cause is canceled by stopping order is issued or main power source is cut off.

4 Protection of IPM/DIP-IPM/ISPM

a. Level of detection
When some of the output terminals between “U” and “V”, “V” and “W”, “W” and “U” of IPM/dip IPM/ISPM are short-circuited, an abnormality is detected.
When the running current of IPM/DIP-IPM/ISPM reaches (maximum rated current x 105%), an abnormality is detected.
When an internal temperature is measured by internal thermistor of IPM, an abnormality is detected.
When the control voltage of IPM/DIP-IPM/ISPM decreases, an abnormality is detected.

b. Function
When abnormalities are detected, the inverter compressor is stopped and the signal code of stoppage cause is transmitted to PCB1.

c. Cancellation of protection function
Transmission for signal code of stoppage cause is canceled when a stopping order is issued or main power source is cut off.

5 Fin temperature increase

a. Level of detection
When the temperature of internal thermistor exceeds more than 100 ºC, an abnormality is detected.

b. Function
When abnormalities are detected, the inverter compressor is stopped and the signal code of stoppage cause is transmitted to PCB1.

c. Cancellation of protection function
Transmission for signal code of stoppage cause is canceled when a stopping order is issued or main power source is cut off.

6 Earth detection

a. Level of detection
When the starting current of the compressor reaches 80% of the overcurrent protection value, an abnormality is detected.

b. Function
When abnormalities are detected, the inverter compressor is stopped and the signal code of stoppage cause is transmitted to PCB1.

c. Cancellation of protection function
Transmission for signal code of stoppage cause is canceled when a stopping order is issued or main power source is cut off.

9.1.4 Overload control

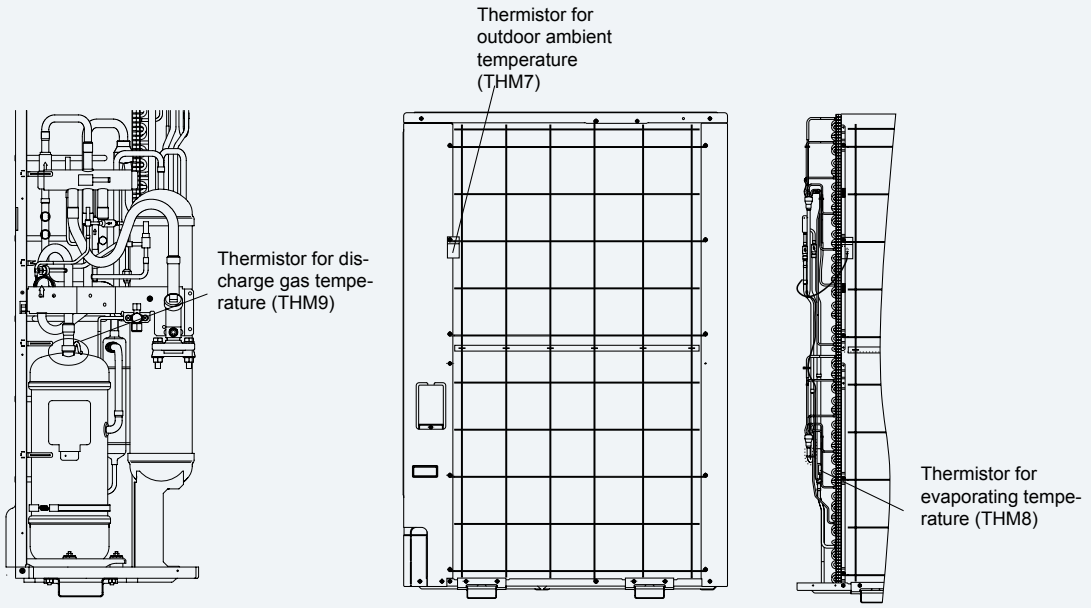
a. Level of detection
When the output current exceeds 105% of the maximum output current, an abnormality is detected.

b. Function
An overload signal is issued when output current exceeds 105% of the maximum output current, and the frequency decreases.
For 10 seconds after the output current decreases lower than 88% of the rated current, the operation is performed with the compressor frequency limited to the upper level frequency when the output current decreases lower than 88% of the rated one.
However, if the frequency order is smaller than the maximum value, the operation is performed according to the order.

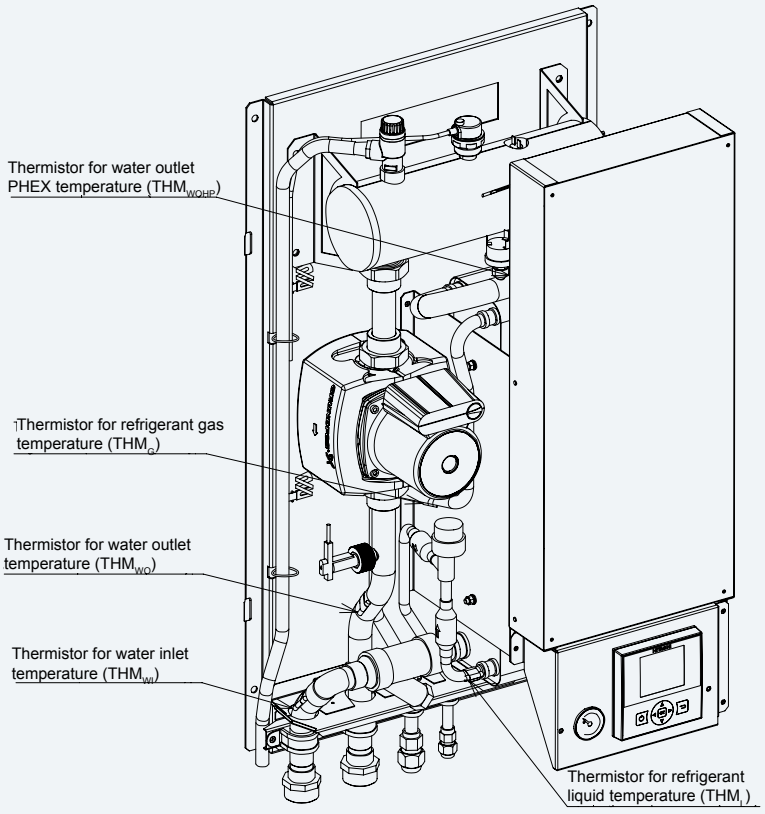
c. Cancellation of protection function
After the operation described in the above item b. is performed for 10 seconds, this control is canceled.

9.2 Thermistor

Thermistors for the outdoor unit



Thermistors for the indoor unit



◆ Thermistor for upper part temperature of compressor

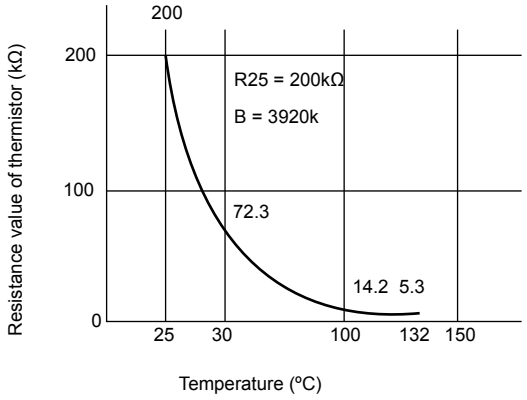
(For prevention of discharge gas overheating)

a. A thermistor for the upper part temperature of the compressor is installed to prevent discharge gas from overheating.
If discharge gas temperature increases excessively lubricating oil deterioration occurs and lubricating properties deteriorate, resulting in short compressor life.

b. If discharge gas temperature increases excessively, compressor temperature increases. At the worst, compressor motor winding will be burnt out.

c. When the upper part temperature of compressor increases during heating operation, the unit is controlled according to the following method

- An electronic expansion valve of outdoor units is (are) opened to return the liquid refrigerant to the compressor through the accumulator, decreasing compressor temperature.
- If the compressor upper part temperature increases exceeding 132ºC even if an electronic expansion valve opens, the compressor is stopped, in order to protect the compressor.
- In cooling operation, the above function is also available.



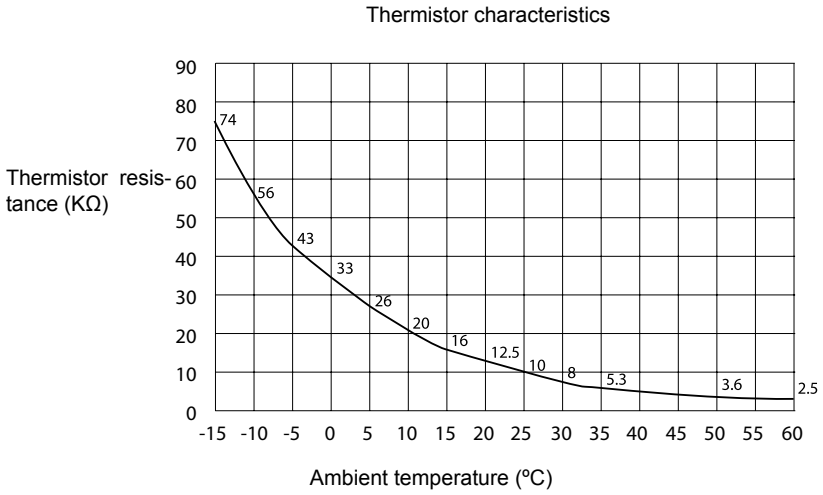
Resistance characteristics of thermistor for discharge gas overheating protection

d. If compressor upper part temperature increases excessively, the protection control is activated and the compressor is stopped according to the following method.

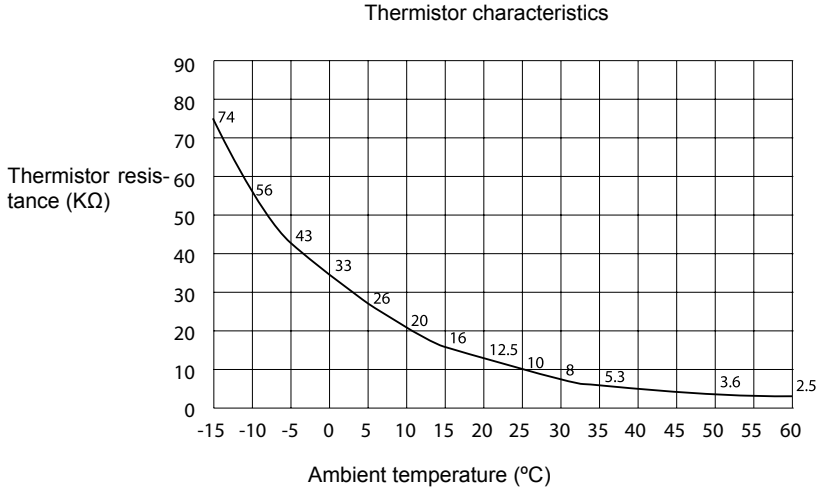
Operation	Upper part temperature of compressor	Defecting period
Cooling	Over 132ºC	10 minutes (continuously)
	Over 140ºC	5 seconds (continuously)
Heating	Over 132ºC	10 minutes (continuously)
	Over 140ºC	5 seconds (continuously)
Defrosting	Over 132ºC	5 seconds (continuously)

◆ Thermistor for outdoor ambient temperature

The thermistor resistance characteristics are shown in the next figure.

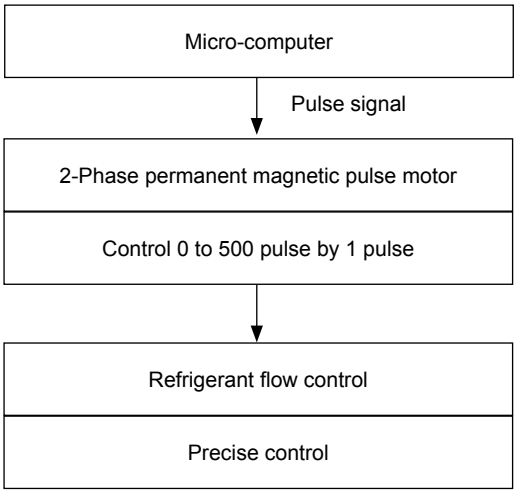


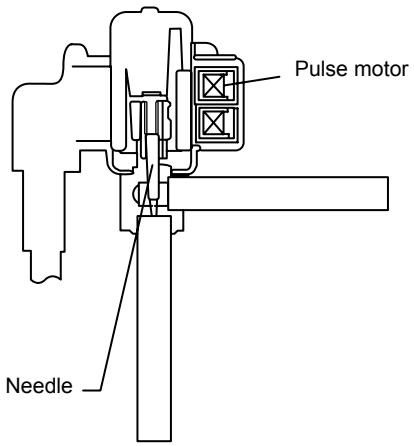
◆ Thermistor for evaporating temperature of outdoor unit in heating operation (for defrosting)

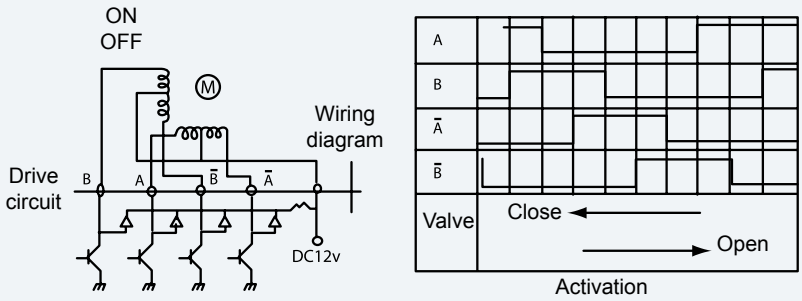


9.3 Electronic expansion valve

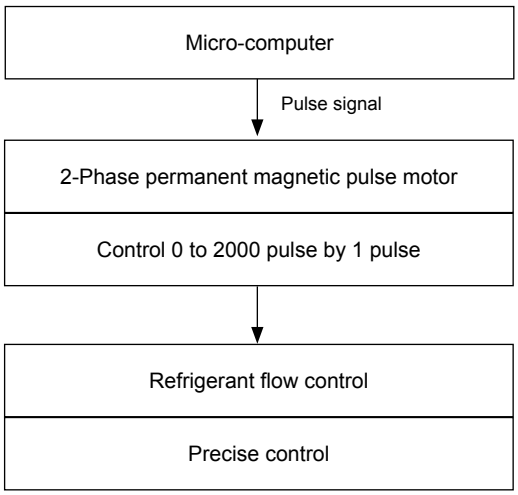
9.3.1 Electronic expansion valve for the outdoor unit

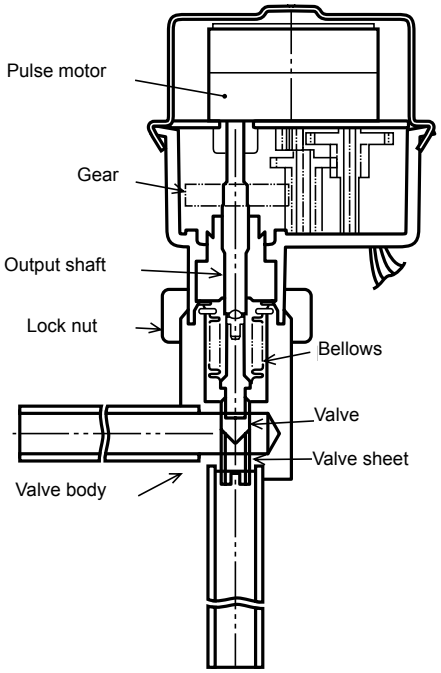


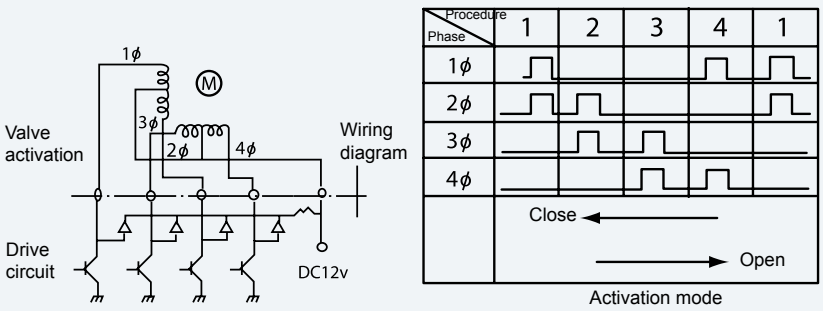


Items	Specifications
Applicable to the models	For the main cycle of: RAS-(4-10)H(V)RNM(E)
Type	UKV(10.0 USRT) series/UKV (5.0USRT) series for MVB
Refrigerant	R410A
Working temperature range	-30°C ~ 65°C (operation time of the coil: less than 50%)
Mounting direction	Drive shaft in vertical direction within an angle of 45° as maximum
Flow direction	Reversible
Drive method	4-Phase canned motor method
Rated voltage	DC12V±1.8V
Drive condition	83PPS (pulse width at ON: 36mm sec, OFF: 60mm sec) 1,2 phase excitation
Coil resistance (each phase)	46Ω ± 10% (at 20°C)
Wiring diagram, drive circuit and activation mode	

9.3.2 Electronic expansion valve for the indoor unit



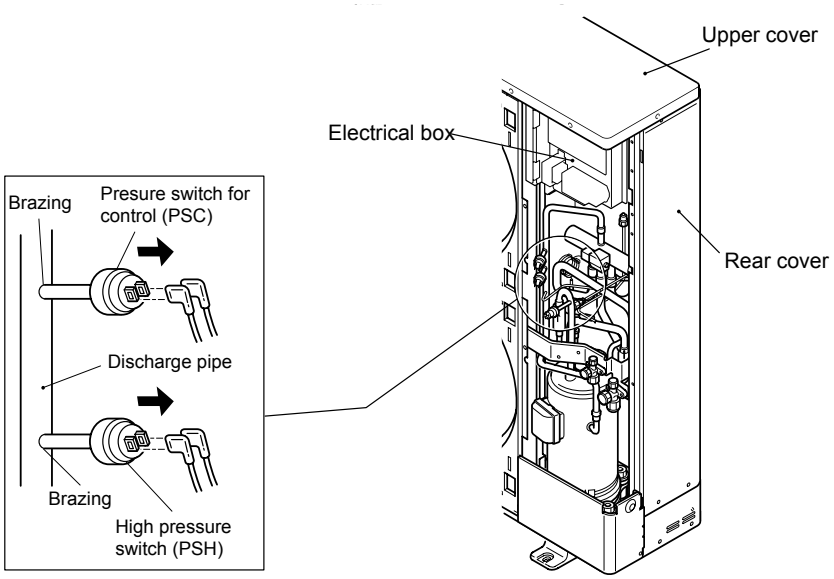


Items	Specifications
Type	EDM type
Refrigerant	R410A
Working temperature range	-30°C ~ 70°C (with coils which are not electrified)
Mounting direction	Drive shaft in vertical direction, motor upside and 90° in four direction
Flow direction	Reversible
Drive method	4-phase pulse motor
Voltage rate	DC12V±1.2V
Drive condition	100Ω ± 250PPS (pulse width over 3mm) 2 phase excitation
Coil resistance (each phase)	150Ω ± 10% (at 20°C)
Wiring diagram, drive circuit and activation mode	

9

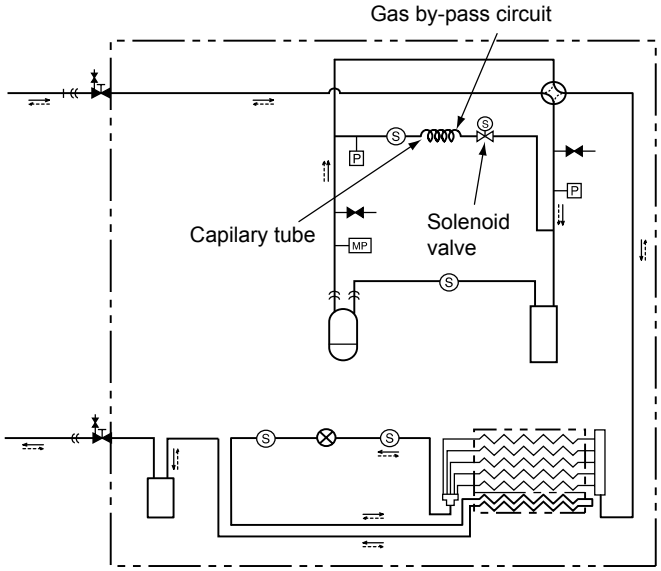
9.4 High pressure protection device

If the discharge pressure is excessively high, the compressor and the component parts of the refrigeration cycle can be damaged. Therefore, in case that the discharge pressure is higher than 4.15MPa (R410A), the protection control is activated and the compressor is stopped.



1 For controlling the high pressure not to increase excessively during heating operation, the gas by-pass circuit and the air volume of the outdoor fan is controlled automatically.

2 The gas by-pass circuit, which is composed of the solenoid valve and the capillary tube for flow adjustment, control the high pressure not to increase excessively by leading the high pressure gas to the low pressure side.

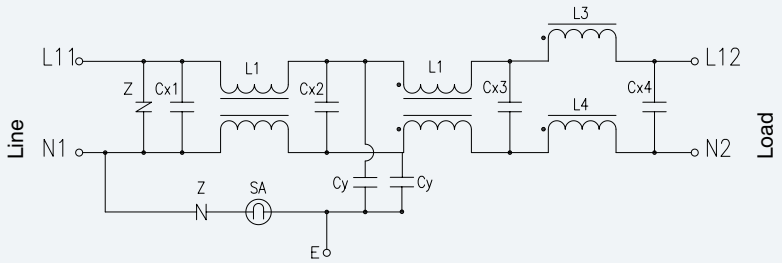


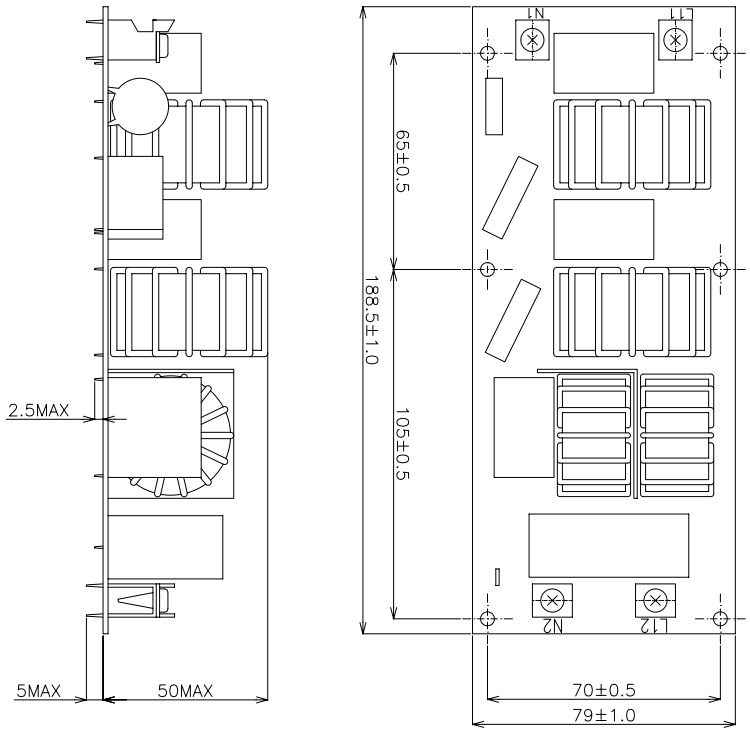
9.5 Noise filter (NF)

The noise filter decreases the leakage of noise made by the inverter to the power supply side. Terminals indicated with “LOAD” are connected to the inverter side and terminals indicated with “LINE” to the power supply side.

9.5.1 Noise filter for 1~

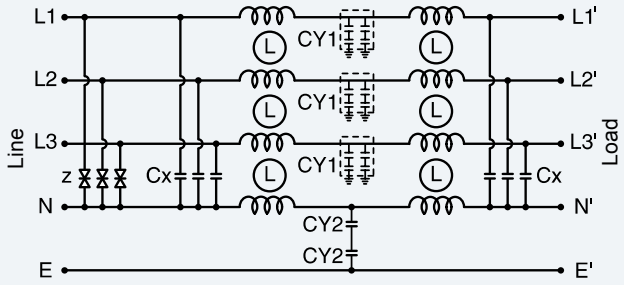
RAS-(3-6)HVRNME-AF (230V 50Hz)

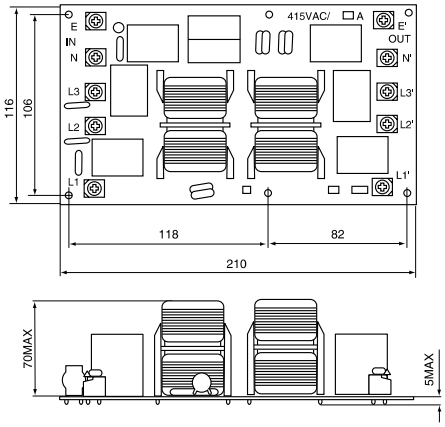
Items	Specifications
Model	LFB-14930-3M
Rated current	AC230V 30 A
Permissible temperature range.	-25 ºC to 85 ºC
Circuit diagram	



9.5.2 Noise filter for 3N~

RAS-(4-10)HRNME-AF (400V 50Hz)

Items	Specifications
Model	4LFB-16830-2FA
Rated current	AC415V 27A
Permissible temperature range	-25ºC to 85ºC
Circuit diagram HRNM(E)	

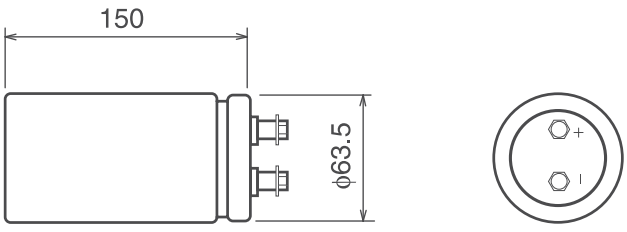


9.6 Capacitor (CB1, CB2)

This part is used for changing the alternative current to the direct current for the inverter. Connect two capacitor in line and used.

RAS-(4~6)HRNME-AF (400V/50Hz)

Items	Specifications
Models	LNX2G472MSEAHE
Capacity of static electricity	4700μF
Rated voltage	400 VDC
Permissible temperature range	-25ºC to 95ºC



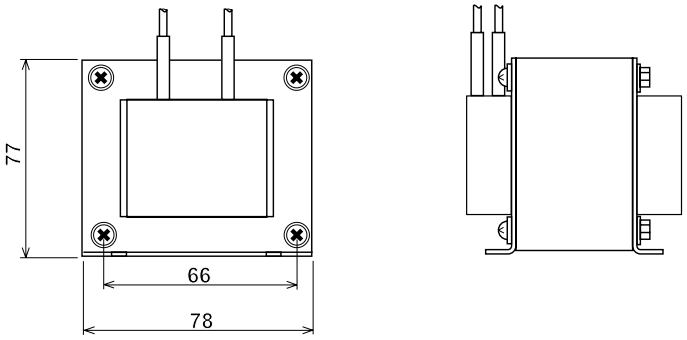
9.7 Reactor (DCL)

This part is used for changing the alternative current to the direct current for the inverter.

9.7.1 Reactor (DCL) for 1~

RAS-(3-6)HVRNME-AF (230V 50Hz)

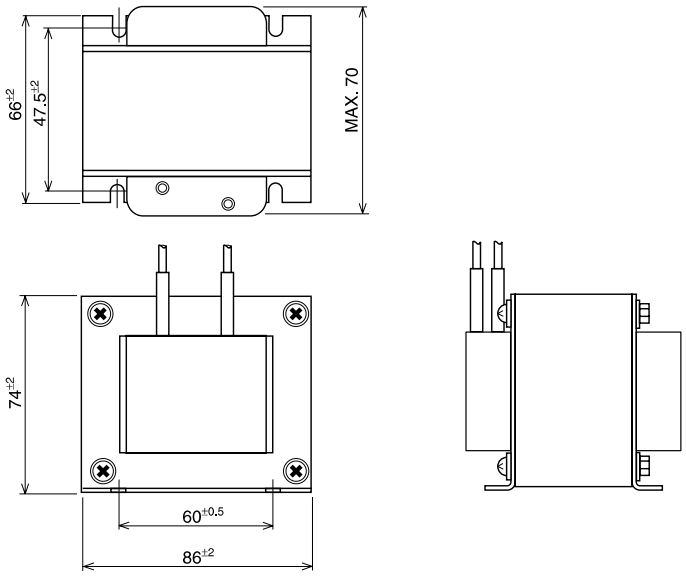
Items	Specifications
Character	0.59 mH±15 (at 1 kHz)
Rated current	30 A
DC Resistance	26 mΩ (at 20 °C)
Permissible temperature range	-20ºC to 60ºC



9.7.2 Reactor (DCL) for 3N~

RAS-(4-10)HRNME-AF (400V 50Hz)

Items	Specifications
Character	1.0 mH+10 (at 1 kHz)
Rated current	30 A
Direct resistance	22.8 mΩ+20 (at 20 °C)
Permissible temperature range	-20 ºC to 60 ºC



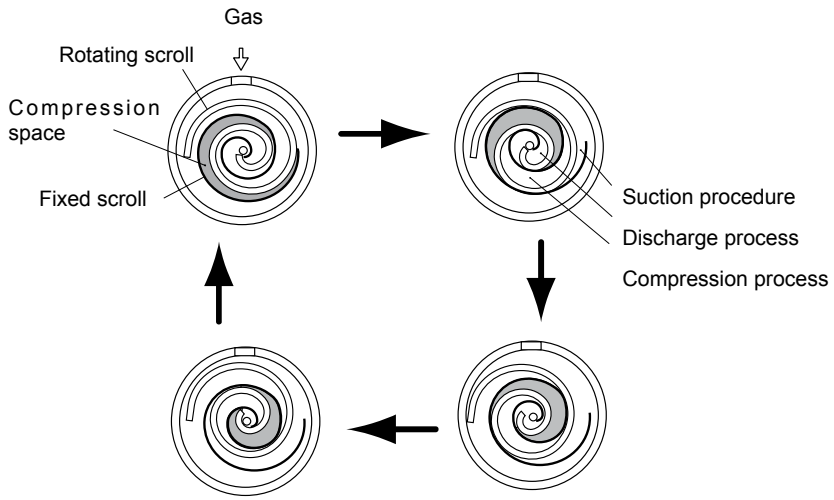
9.8 Scroll compressor

◆ Reliable mechanism for low vibrating and low sound

1. The rotating direction is definite.
2. The pressure inside of the chamber is high pressure, and the surface temperature of the chamber is 60 °C to 110 °C.

◆ Principle of compression

1. The gas is inhaled from the inlet port at the outer frame of the fixed scroll.
2. The gas inside of the compression space is compressed toward the center of the scroll.
3. The compression space is minimum at the center of the scroll, and the gas compressed at the maximum is discharged from the outlet port of at the center of the scroll.
4. The above procedures (suction compression discharge) is repeated continuously.



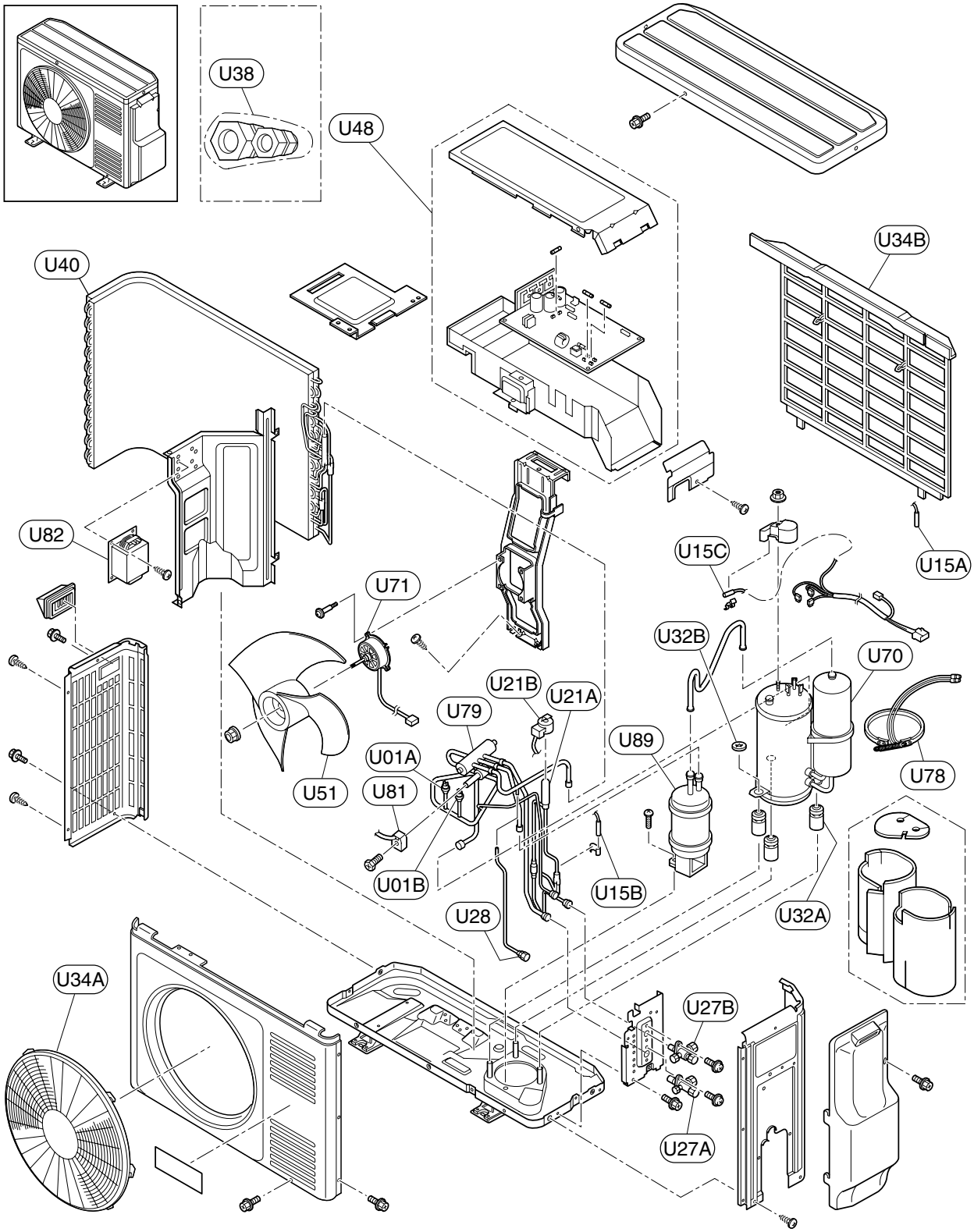
10. Spare parts

Index

10.1 Outdoor units

10.1.1 RAS-2HVRN2

◆ **Cycle, structural and electrical parts**

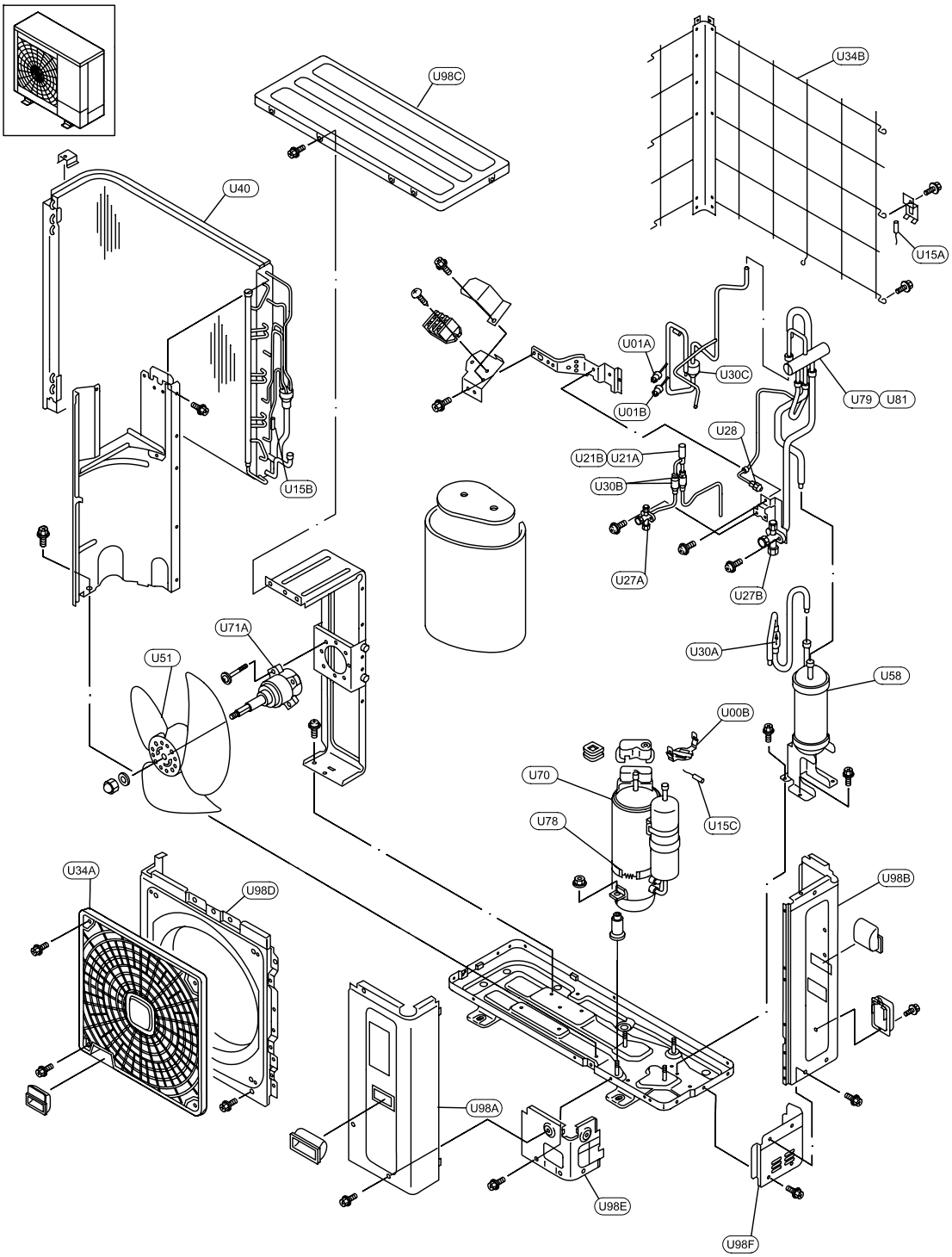


Spare Parts Document: EPN-200702

No.	Part name	Remarks
U01A	Pressure SW	High pressure
U01B	Pressure SW	For control
U15A	Thermistor	TA (Ambient)
U15B	Thermistor	TE (Evaporation)
U15C	Thermistor	TD (Discharge)
U21A	Expansion valve	—
U21B	Coil for expansion valve	—
U27A	Stop valve	Gas line
U27B	Stop valve	Liquid line
U28	Check joint	—
U32A	Vibration absorber	—
U32B	Vibration absorber	—
U34A	Air grille	Outlet
U34B	Air grille	Inlet
U38	Piping set	—
U40	Condenser assembly	—
U48	Electrical box assembly	—
U51	Propeller fan	—
U70	Compressor	—
U71	Motor	—
U78	Oil heater	—
U79	Four-way valve assembly	—
U81	Coil for 4-way valve	—
U82	Transformer	—
U89	Accumulator	—

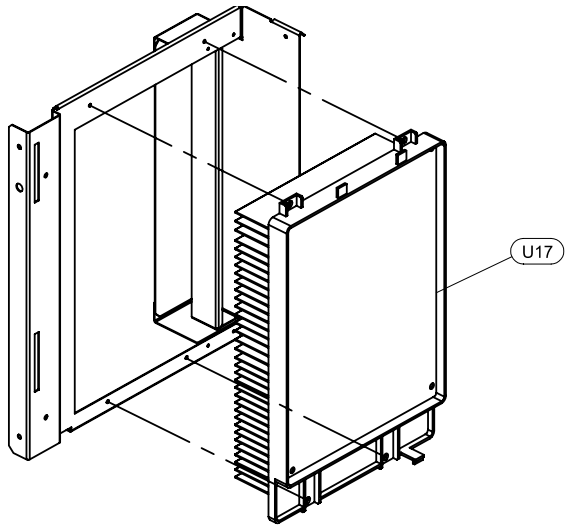
10.1.2 RAS-3HVRNME-AF

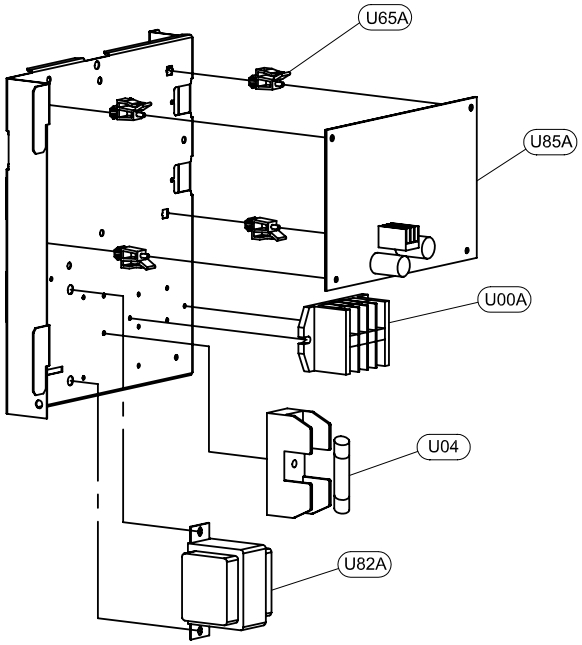
◆ Cycle and structural parts

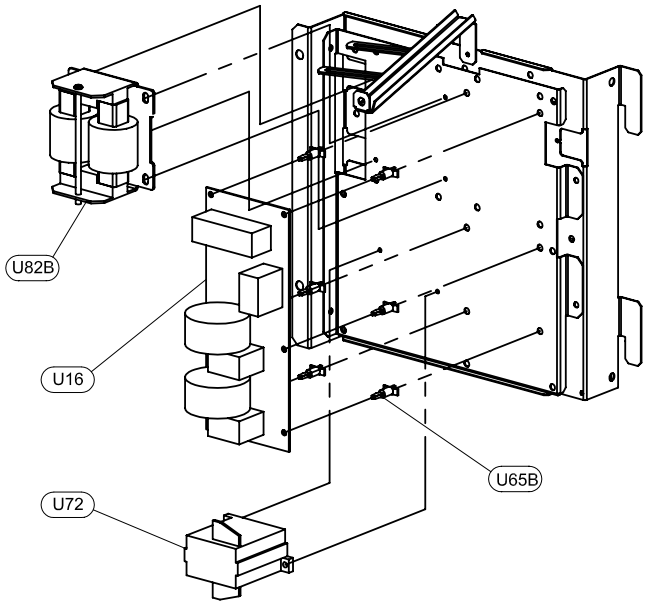


Spare Parts Document: EPN-201005

Electrical parts







Spare Parts Document: EPN-201005

Cycle and structural parts

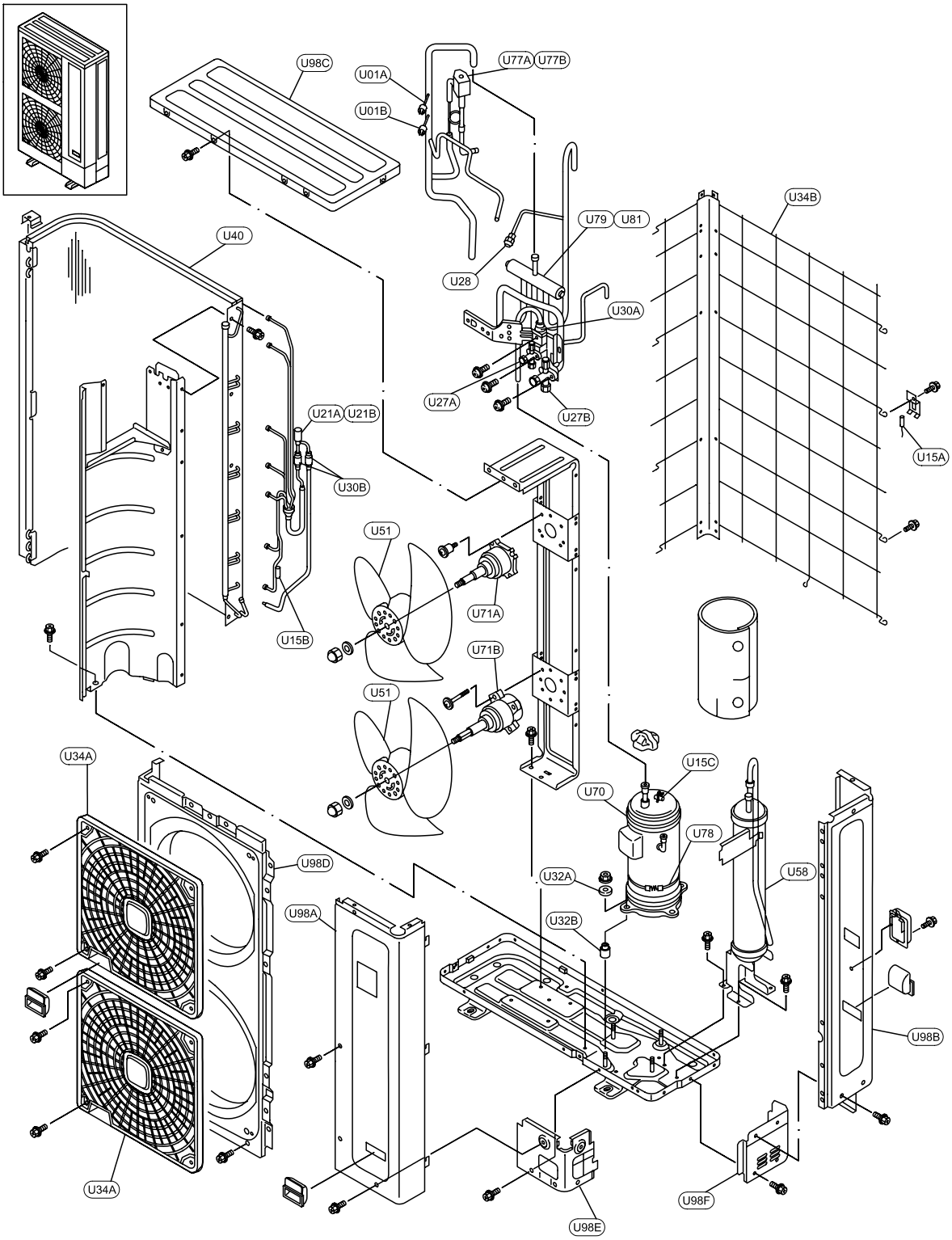
No.	Part name	Remarks
U00A	Terminal board	
U00B	THM support D	
U01A	Pressure SW	Protection
U01B	Pressure SW	Control
U04	Fuse	40A
U15A	Thermistor	Air
U15B	Thermistor	Piping
U15C	Thermistor	Compressor
U16	Noise filter	30A
U17	Inverter fin assy	DIP-IPM (17A)
U21A	Expansion valve	
U21B	EXPV coil	
U27A	S valve 3/8	Liquid
U27B	S valve 5/8	Gas
U28	Check JA	
U30A	Strainer	
U30B	Strainer	
U30C	Silencer	
U32A	VP-RUBBER 2	
U32B	VP-RUBBER 1	
U34A	Front protector net	Outlet
U34B	Protector net S assy	Inlet
U40	Condenser	Assembly
U51	Propeller fan	
U58	Accumulator	
U65A	Holder	
U65B	Spacer	

Electrical parts

No.	Part name	Remarks
U71A	Fan motor	74W
U72	MG SW	
U78	Oil heater	30W
U79	4 way valve	
U81	Coil for 4 way valve	
U82A	Transformer	
U98A	Service cover S assy	Assembly
U98B	Rear cover S assy	Assembly
U98C	Upper cover assy	Assembly
U98D	Shroud S	
U98E	S cover B	
U98F	Pipe cover B	

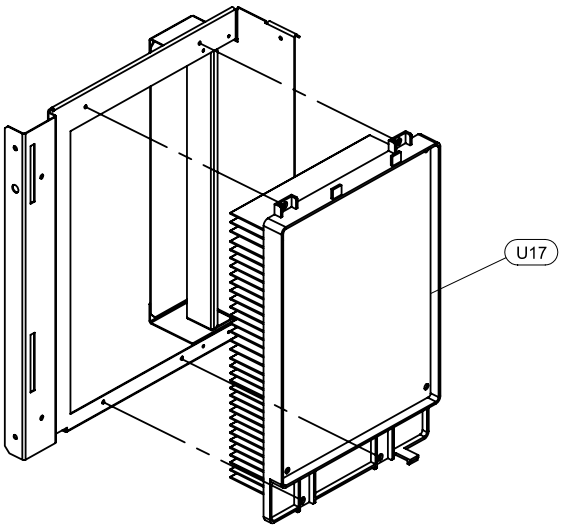
10.1.3 RAS-(4-6)HVRNME-AF

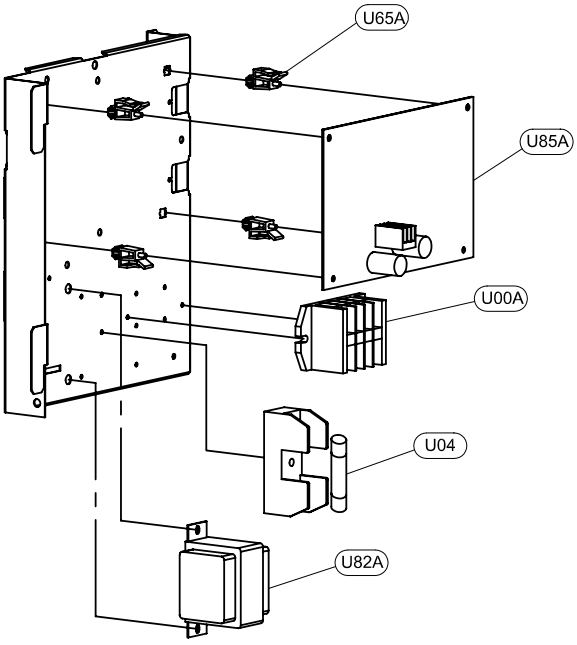
◆ **Cycle and structural parts**

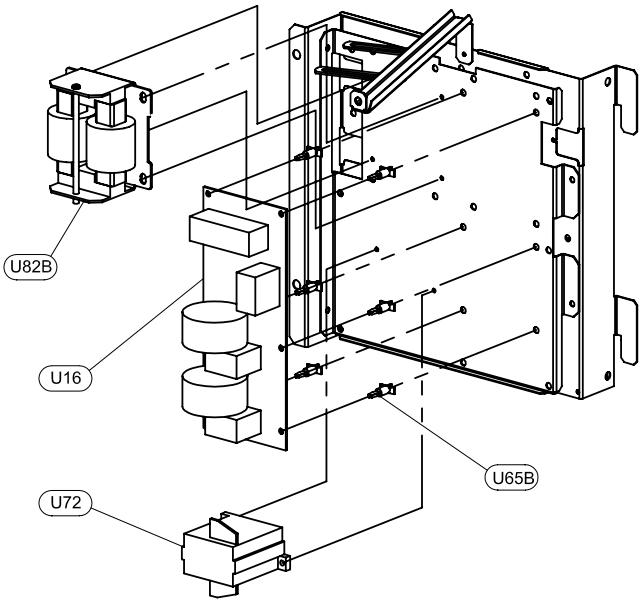


Spare Parts Document: EPN-201005

◆ Electrical parts







Spare Parts Document: EPN-201005

Cycle and structural parts

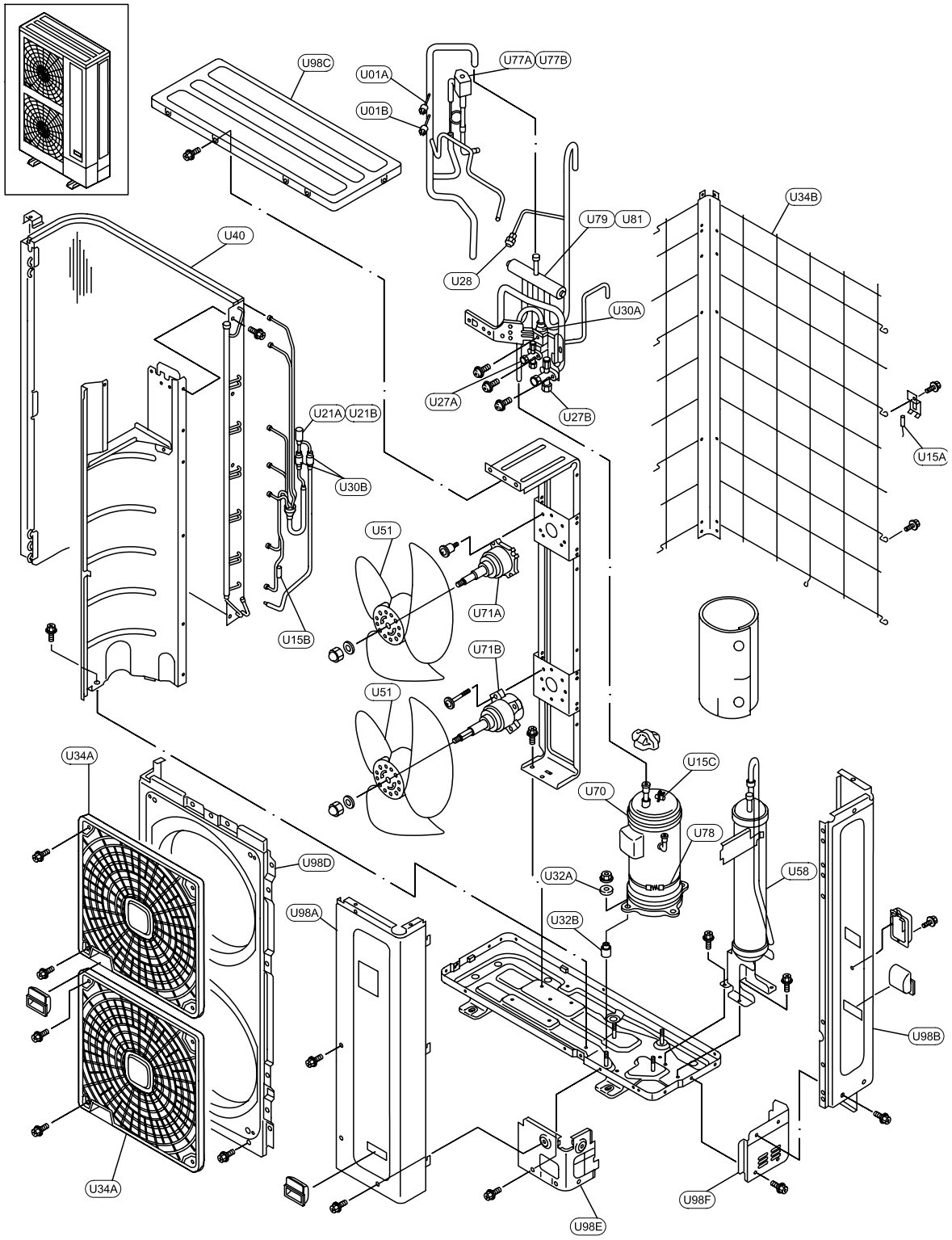
No.	Part name	Remarks
U00A	Terminal board	
U01A	Pressure SW	Protection
U01B	Pressure Sw	Control
U04	Fuse	40A, 5/6 HP 50A
U15A	Thermistor	Air
U15B	Thermistor	Piping
U15C	Thermistor	Compressor
U16	Noise filter	30A
U17	Inverter fin assy	DIP-IPM (17A) 576 (25A)
U21A	Expansion valve	
U21B	EXPV Coil	
U27A	S valve 3/8	Liquid
U27B	S valve 5/8	Gas
U28	Check JA	
U30A	Strainer	
U30B	Strainer	
U32A	VP-RUBBER 2	
U32B	VP-RUBBER 1	
U34A	Front protector net	Outlet
U34B	Protector net L assy	Inlet
U40	Condenser	Assembly
U40	Condenser	Assembly
U51	Propeller fan	
U58	L-Tank	
U65A	Holder	
U65B	Spacer	

Electrical parts

No.	Part name	Remarks
U70	Compressor	
U71A	Fan motor	74W
U71B	Fan motor	74W
U72	MG SW	
U77A	Solenoid valve	
U77B	Coil for solenoide valve	
U78	Oil heater	40W
U79	4 way valve	
U81	Coil for 4 way valve	
U82A	Transformer	
U85A	Printed circuit board	PCB main (PO052 assy)
U98A	Service cover L assy	Assembly
U98B	Rear cover S assy	Assembly
U98C	Upper cover assy	Assembly
U98D	Shroud L	
U98E	S cover B	
U98F	Pipe cover B	

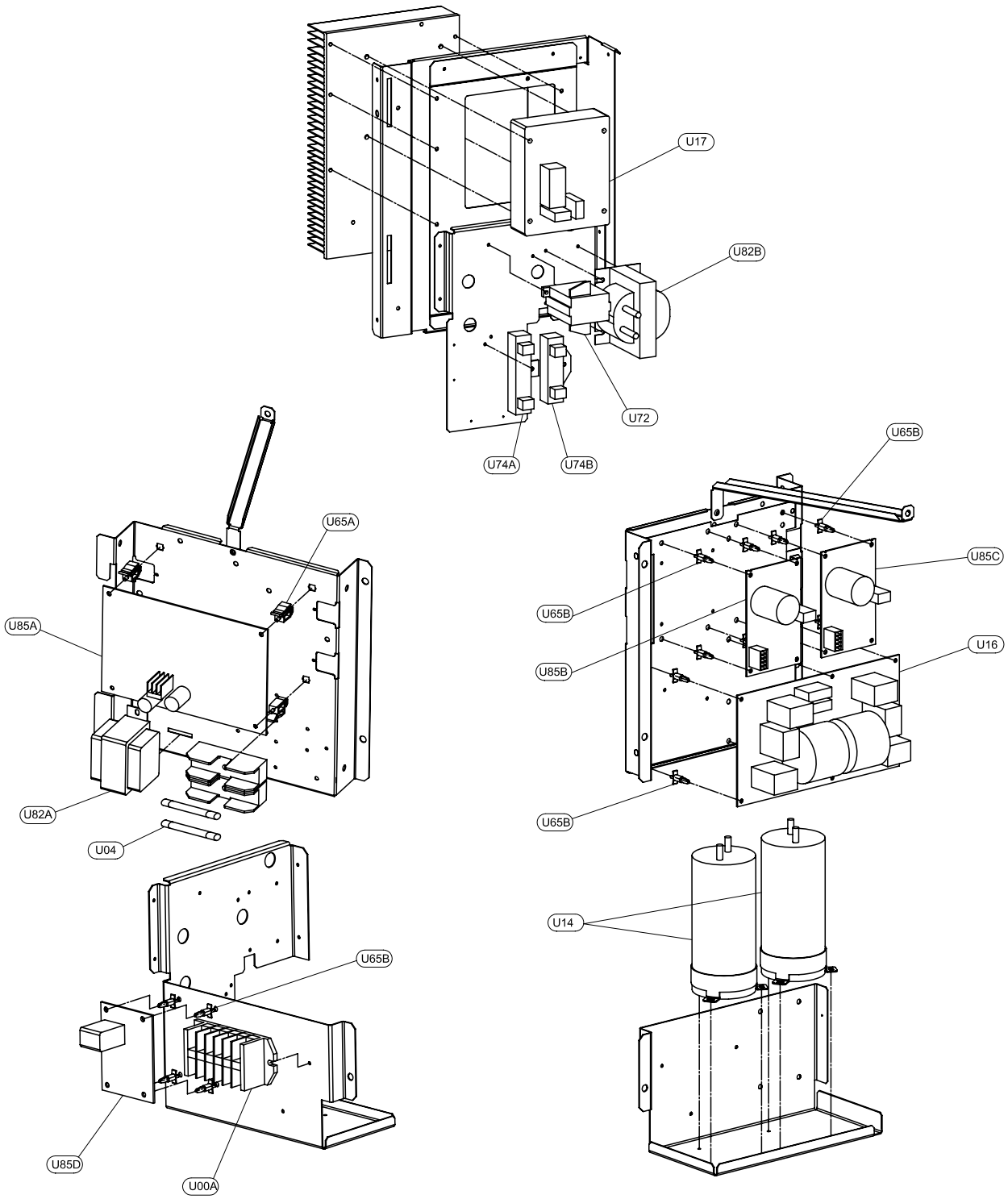
10.1.4 RAS-(4-6)HRNME-AF

◆ **Cycle and structural parts**



Spare Parts Document: EPN-201005

◆ Electrical parts



Spare Parts Document: EPN-201005

Cycle and structural parts

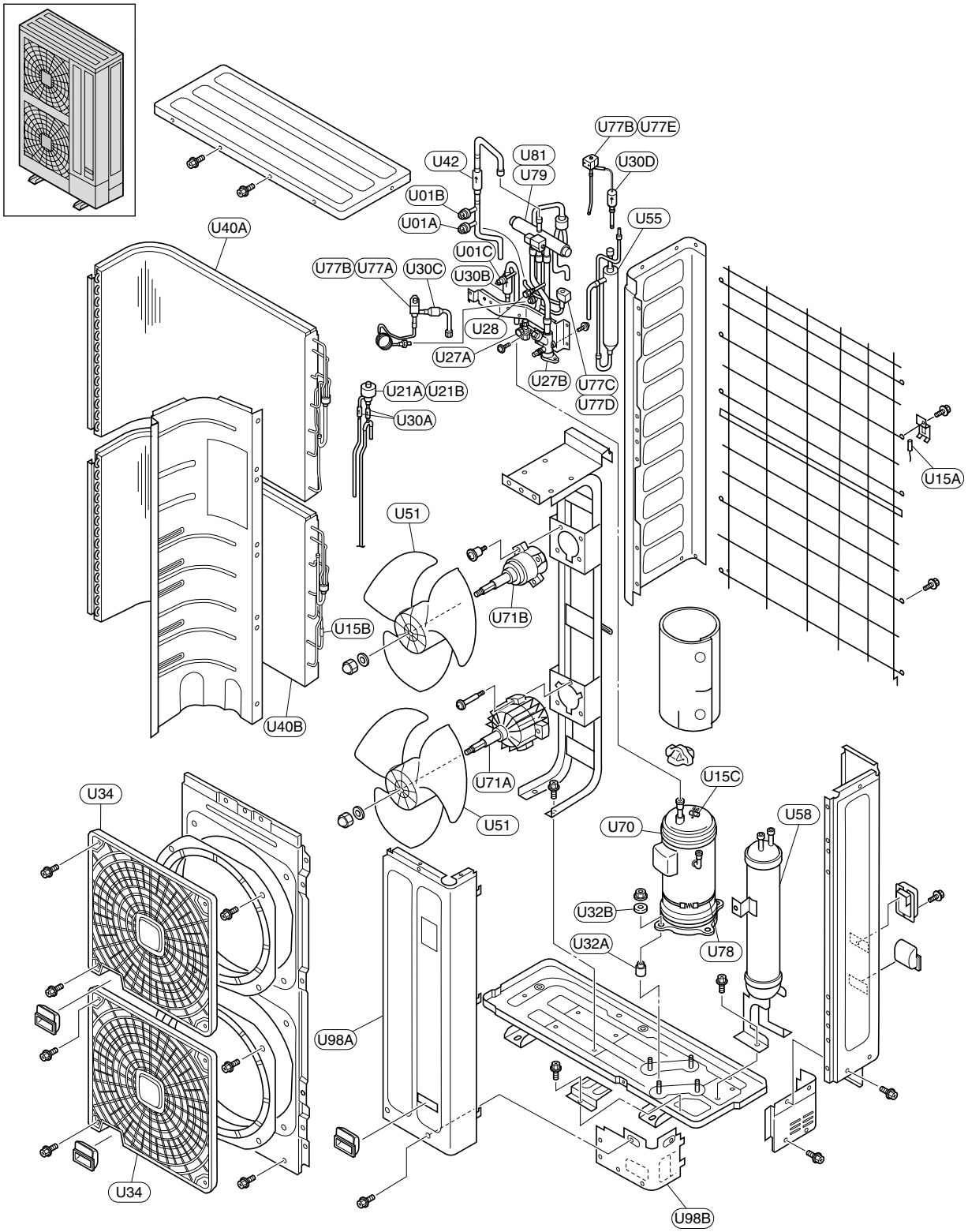
No.	Part name	Remarks
U00A	Terminal board	
U01A	Pressure SW	Protection
U01B	Pressure Sw	Control
U04	Fuse	20A
U14	Capacitor	2700µf
U15A	Thermistor	Air
U15C	Thermistor	Compressor
U16	Noise filter	30A
U17	Inverter module	ISPM
U21A	Expansion valve	
U21B	EXPV coil	
U27A	S valve 3/8	Liquid
U27B	S valve 5/8	Gas
U28	Check JA	
U30A	Strainer	
U30B	Strainer	
U32A	VP-RUBBER 2	
U32B	VP-RUBBER 1	
U34A	Front protector net	Outlet
U34B	Protector net L assy	Inlet
U40	Condenser	Assembly
U51	Propeller fan	
U58	L-Tank	
U65A	Holder	
U65B	Spacer	

Electrical parts

No.	Part name	Remarks
U70	Compressor	
U71A	Fan motor	74W
U71B	Fan motor	74W
U72	MG SW	
U74A	Resistor	
U74B	Resistor	
U77A	Solenoid valve	
U77B	Coil for solenoide valve	
U78	Oil heater	40W
U79	4 way valve	
U81	Coil for 4 way valve	
U82A	Transformer	
U82B	Reactor	
U85A	Printed circuit board	PCB main (PO052 assy)
U85B	Printed circuit board	PCB2 for motor 1(PO024 assy)
U85C	Printed circuit board	PCB2 for motor 2 (PO024 assy)
U85D	RPP relay	Reversing phase protection
U98A	Service cover L assy	Assembly
U98C	Upper cover assy	Assembly
U98D	Shroud L	
U98E	S cover B	
U98F	Pipe cover B	

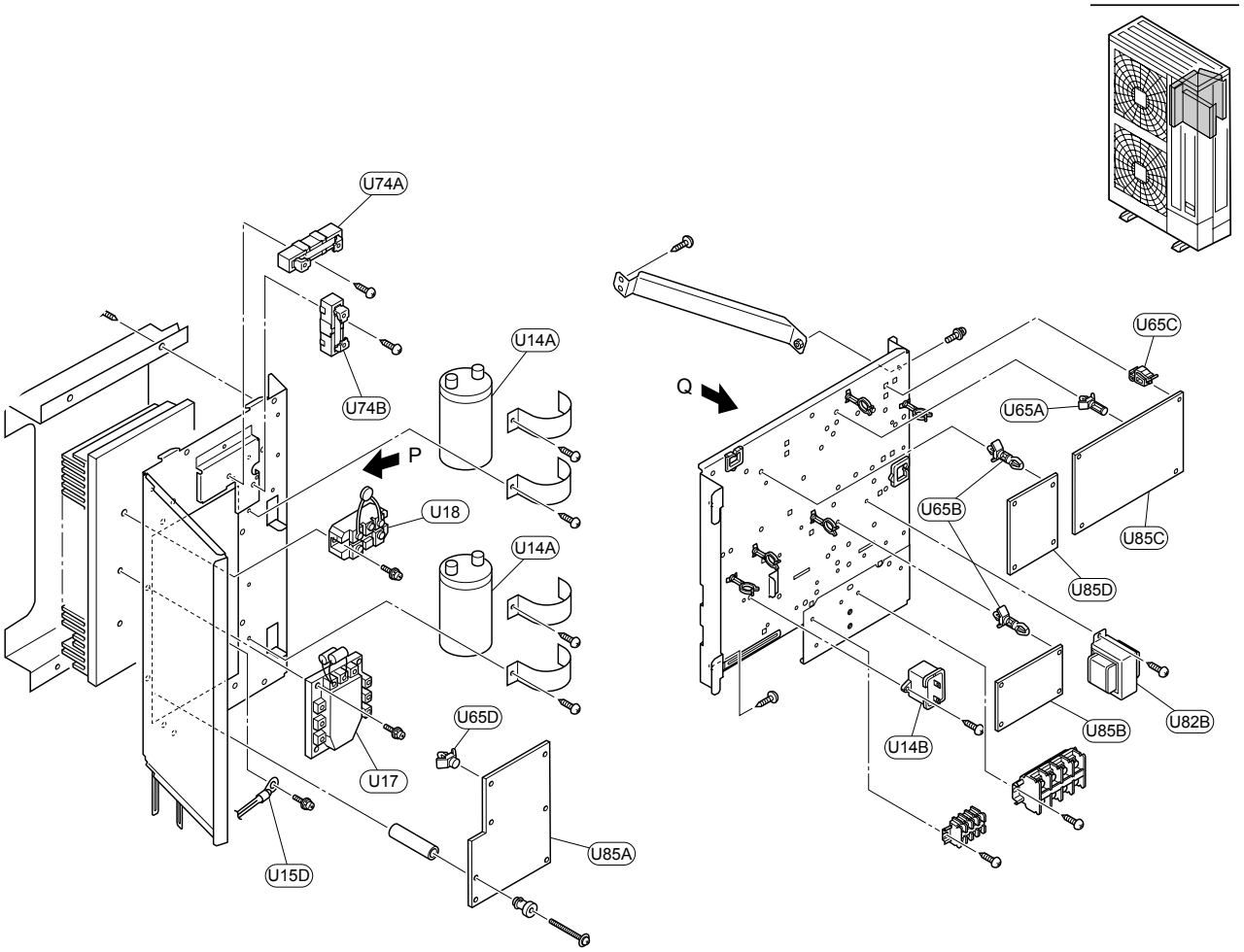
10.1.5 RAS-(8/10)HRNME-AF

◆ **Cycle and structural parts**

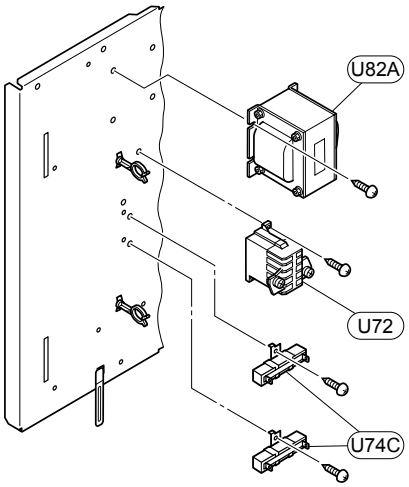


Spare Parts Document: SPN-200617

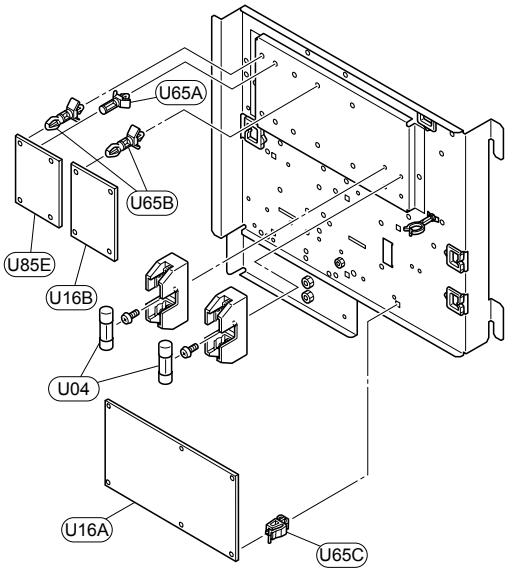
◆ Electrical parts



View from P



View from Q



Spare Parts Document: SPN-200617

Cycle and structural parts

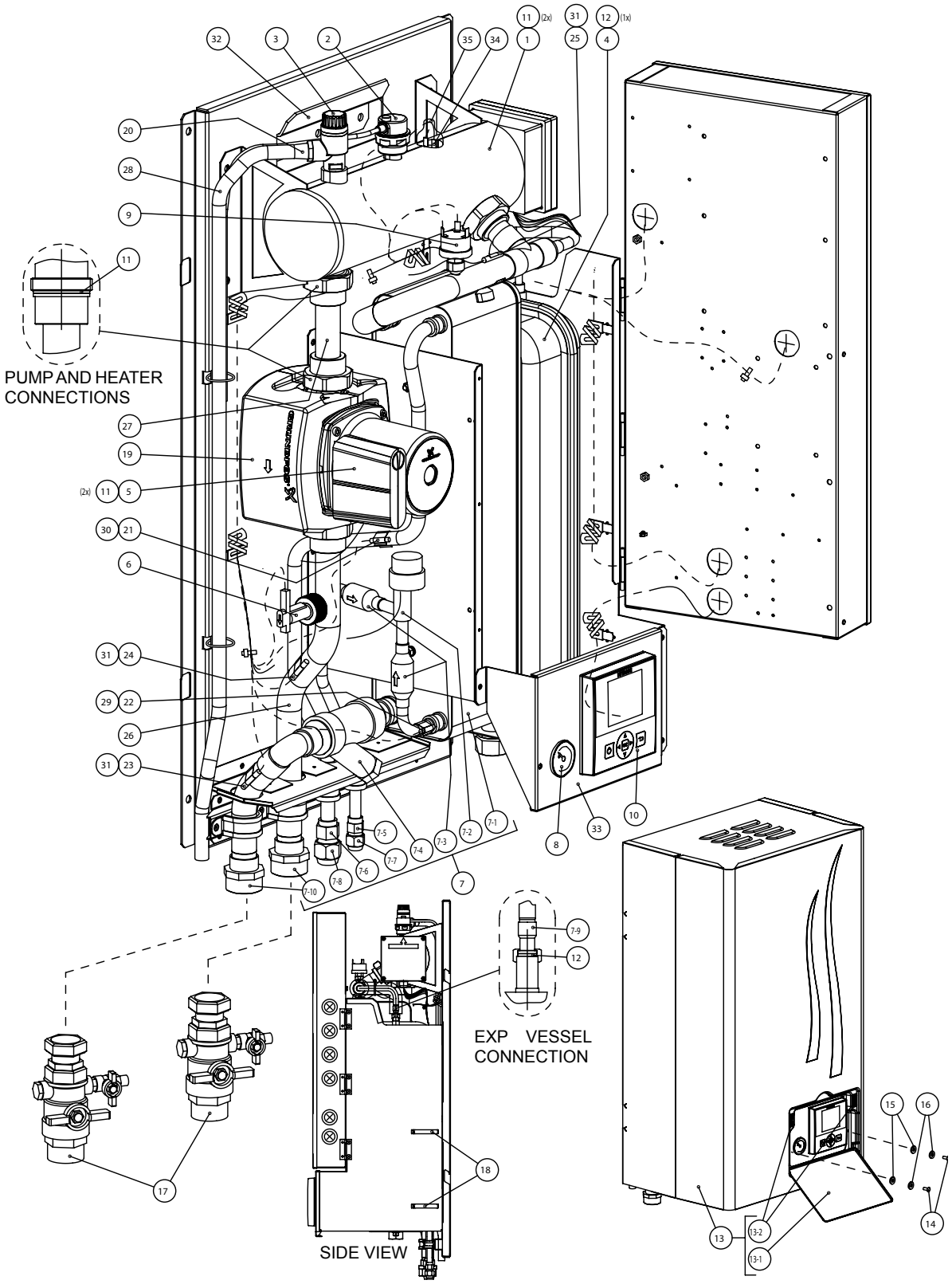
No.	Part name	Remarks
U01A	Pressure Sw	High pressure
U01B	Pressure Sw	For control
U01C	Pressure Sw	Low pressure
U04	Fuse	40A - 60A
U14A	Capacitor	4700µF
U14B	Capacitor	7µF
U15A	Thermistor	
U15B	Thermistor	
U15C	Thermistor	
U15D	Thermistor	
U16A	Noise filter	
U16B	Noise filter	
U17	Transistor module	
U18	Diode module	
U21A	Exp. valve coil for	
U21B	Exp. valve	
U27A	Stop valve	
U27B	Stop valve	
U28	Check joint	
U30A	Strainer	
U30B	Strainer	
U30C	Strainer	
U30D	Strainer	
U32A	Vibration absorber	
U32B	Vibration absorber	
U34	Air grille	Air outlet
U40A	Condenser assembly	
U40B	Condenser assembly	
U42	Check valve	
U51	Propeller fan	
U55	Oil separator ass'y	
U58	L-tank ass'y	
U65A	Plastic material	

No.	Part name	Remarks
U65B	Plastic material	
U65C	Plastic material	
U65D	Plastic material	
U70	Compressor	
U71A	Motor	
U71B	Motor	
U72	Mag. contactor	
U74A	Resistor	
U74B	Resistor	
U74C	Resistor	
U77A	Solenoid valve	
U77B	Solenoid valve	
U77C	Solenoid valve	
U77D	Solenoid valve	
U77E	Solenoid valve	
U78	Oil heater	
U79	Four-way valve ass'y	
U81	Coil for 4-way valve	
U82A	Reactor	
U82B	Transformer	
U85A	Printed circuit board	
U85A	Printed circuit board	For inverter P
U85B	Printed circuit board	Fan control
U85C	Printed circuit board	For control
U85D	Printed circuit board	Fan control
U85E	Printed circuit board	Phase detection
U98A	Cabinet panel	
U98B	Cabinet panel	

10.2 Indoor units

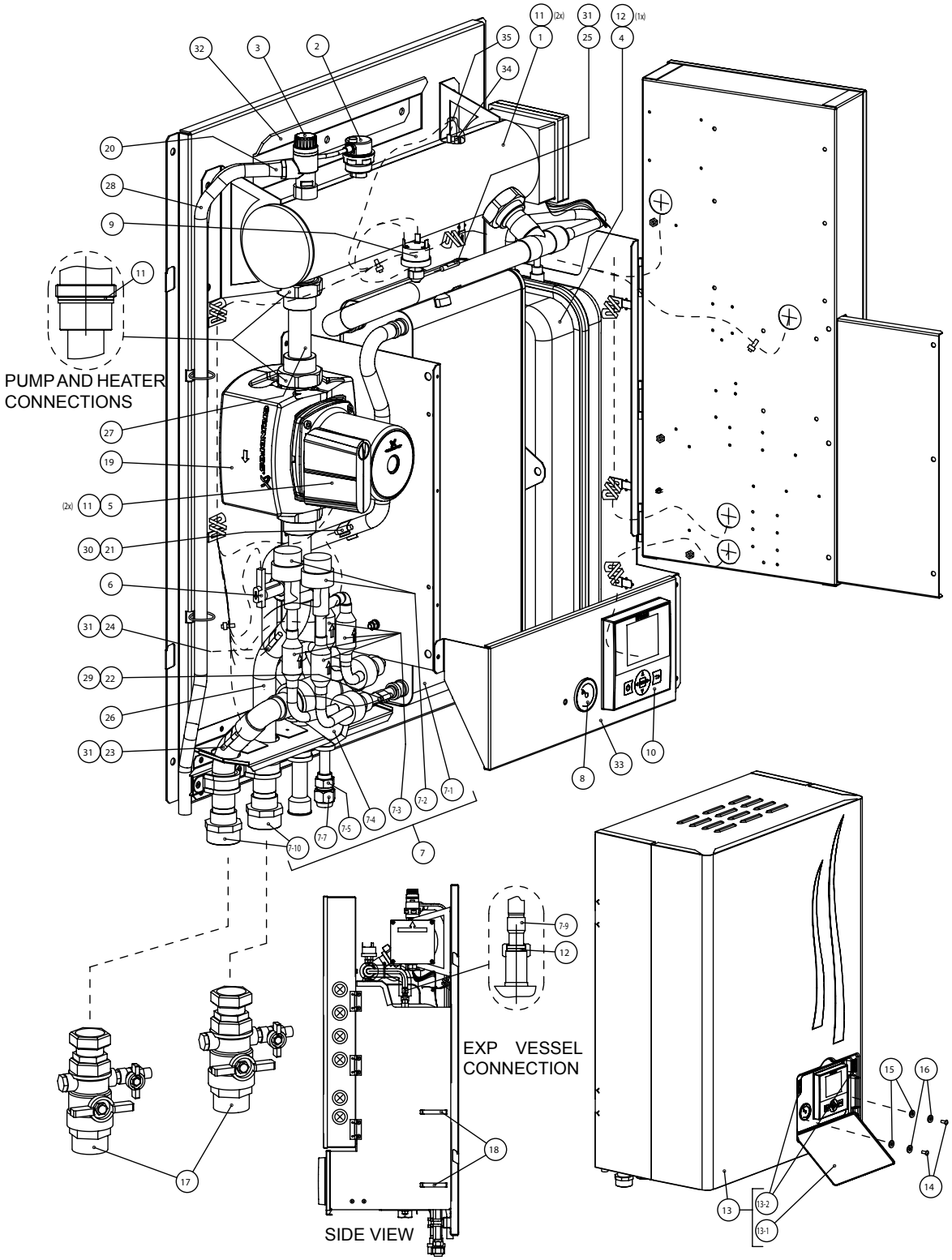
◆ Cycle and structural parts

RWM-(2.0-6.0)FSN3E



Spare Part Document: EPN-201010

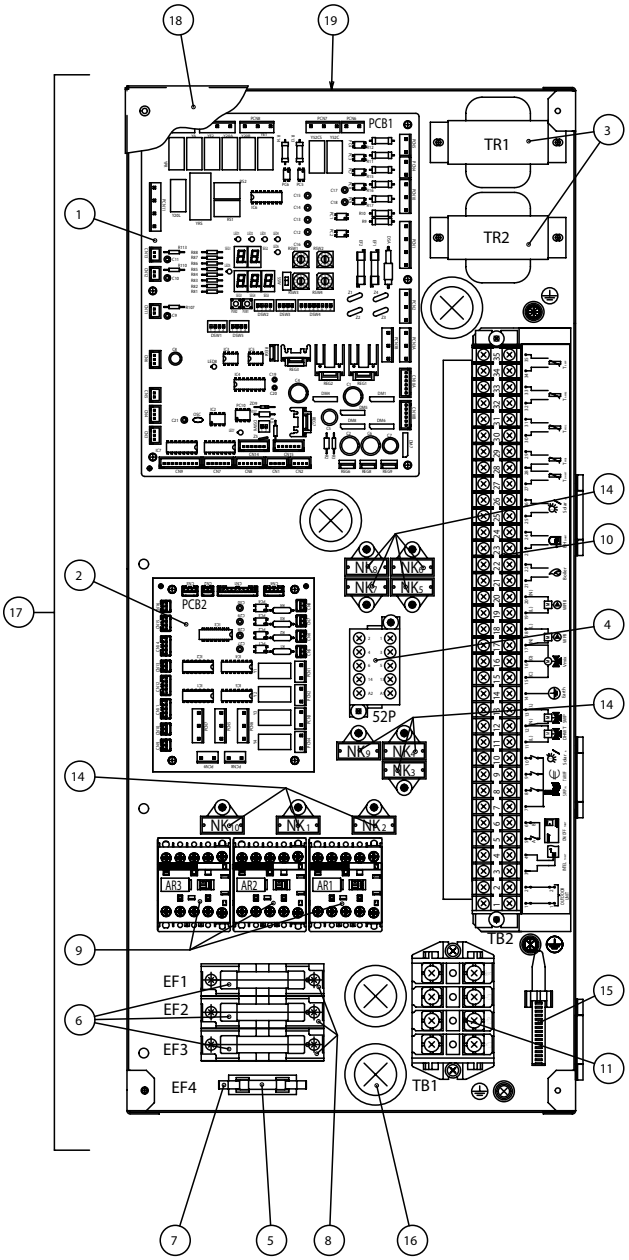
RWM-(8/10)FSN3E

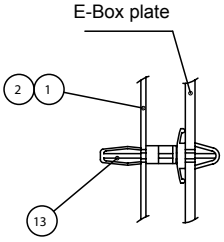


Spare Part Document: EPN-201010

◆ Electrical parts

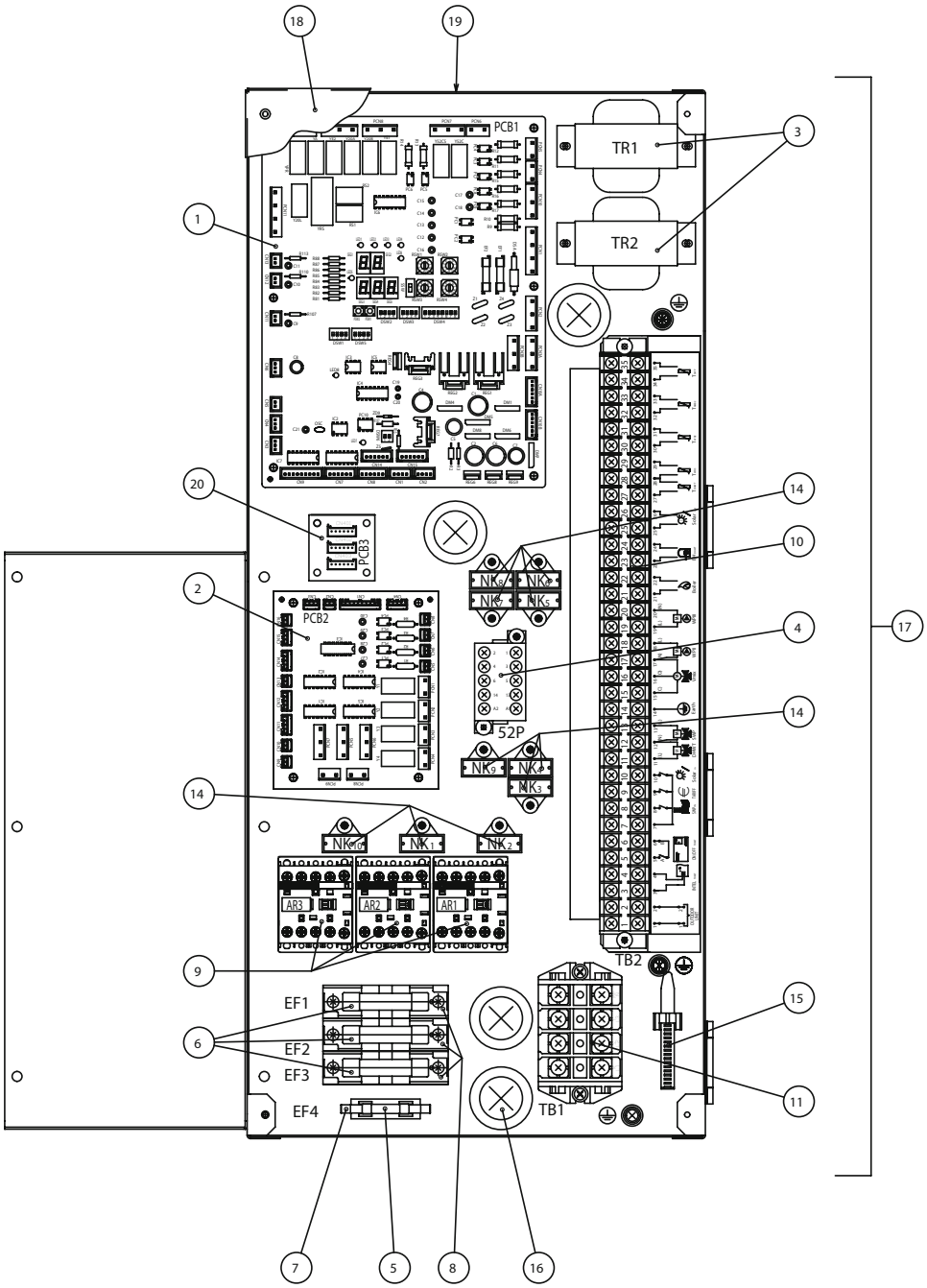
RWM-(2.0-6.0)FSN3E

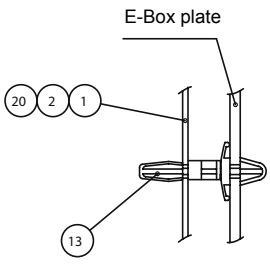




Spare Part Document: EPN-201010

RWM-(8/10)FSN3E





Spare Part Document: EPN-201010

Cycle and structural parts

No.	Description	Remarks
1	Electric Heater Assy	Gaskets 11 not included
2	Air Purge	
3	Security Valve	
4	Expansion Vessel	RWM-(2.0-6.0)FSN3E: 6L RWM-(8.0/10.0): 10L Gasket 12 not included
5	Pump	Gaskets 11 and pump insulation 19 not included
6	Flow Switch	
7	PHEX Unit	Assembly (from 7-1 to 7-10)
7-1	Plate HEX	
7-2	Expansion Valve	
7-3	Strainer	
7-4	Water Strainer	
7-5	Union	Liquid connection
7-6	Union	Gas connection
7-7	Flare Nut	Liquid connection
7-8	Flare Nut	Gas connection
7-9	Union	Vessel connection
7-10	Union	Water connection
8	Manometer	
9	Pressure Switch	
10	LCD Control	
11	Gasket	For electric heater and pump connections
12	Gasket	For expansion vessel connection
13	Cover Assy.	Assembly (screws and washers not included)
13-1	LCD Cover	Assembly (LCD Cover + Shaft + Washers)
13-2	Magnet	

No.	Description	Remarks
14	Screw	For cover assy fixing
15	Nylon washer	For cover assy fixing (material: nylon)
16	Washer	For cover assy fixing (material: steel)
17	Shutdown valve (1-1/4")	
18	Clamp	For installer wiring
19	Pump insulation	Only insulation around the pump
20	Union	For security valve drain connection
21	Thermistor Assy	THM G (Gas)
22	Thermistor Assy	THM L (Liquid)
23	Thermistor Assy	THM WI (Water In)
24	Thermistor Assy	THM WO (Water Out)
25	Thermistor Assy	THM WOHP (Water Out PHEX)
26	Pump Pipe Assy 1	
27	Pump Pipe Assy 2	
28	Drain pipe	Vinyl tube (diameter 16mm - 1 meter length)
29	P-Spring	For liquid THM fixing
30	P-Spring	For gas THM fixing
31	P-Spring	For water THM fixing
32	Wall Support	
33	Control Support	
34	Thermostat	Thermal cut-off thermostat for Electric heater
35	Thermostat cap	Protector cap for thermostat 34

Electrical parts

No.	Part Name	Remarks
1	PCB1	
2	PCB2	
3	Transformer	
4	Magnetic contactor	16 A
5	Fuse	3,15 A
6	Fuse	RWM-(2.0/3.0)FSN3E: 6A RWM-(4.0-6.0)FSN3E: 12A RWM-(8.0/10.0): 16A
7	Fuse holder	
8	Fuse holder	
9	Magnetic contactor	12 A
10	Terminal board	Before serial number 4HE87914

No.	Part Name	Remarks
11	Terminal board 2	
12	Terminal board 1	
13	Spacer	
14	Spark killer	Before serial number 4HE87914
15	Clamp	
16	Rubber bush	
17	Electrical wiring diagram	Assembly (Components + Harness)
18	E-Box cover Assy	(Plate + Labels)
19	E-Box subAssy	Only plate (without components) before serial number 4HE87914
19	E-Box subAssy	Only plate (without components)

11. Servicing

Index

11.1 Outdoor unit

11.1.1 RAS-2HVRN2

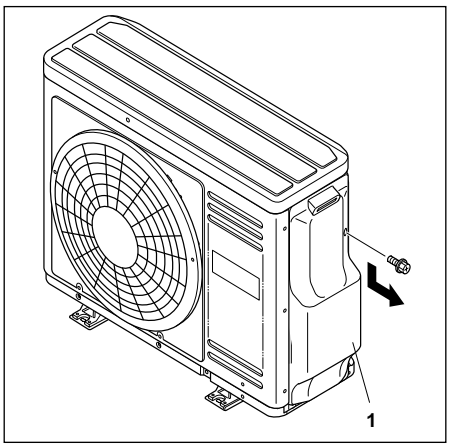
◆ Removing pipe cover

Follow the procedure below to remove main parts and components. For mounting follow the reverse procedure of removal.

Do not expose the refrigerant cycle to the atmosphere for a long period to avoid moisture or dust entering into the cycle. Be sure to replace parts immediately after removing. Seal the refrigerant cycle when left unattached for a long period.

Remove pipe cover downward after removing one (1) screw.

No.	Part
1	Pipe cover

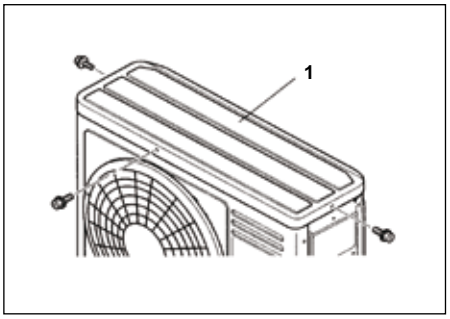


◆ Removing front cover

Remove the pipe cover following *Removing pipe cover, see on page 258*.

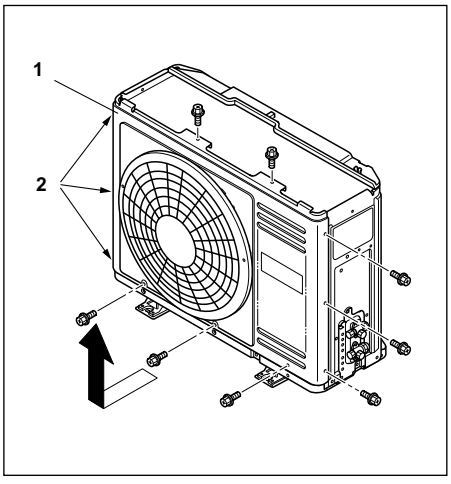
Remove three (3) fixing screws and remove the upper cover.

No.	Part
1	Upper cover



To remove the front cover remove eight (8) fixing screws and three (3) left nails.

No.	Part
1	Pipe cover
2	Nails



◆ Removing outdoor fan

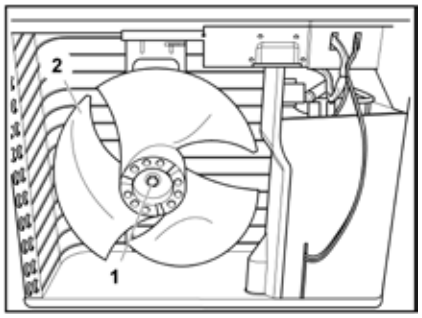
Remove the pipe cover following *Removing pipe cover, see on page 258*.

Remove three (3) fixing screws and remove the upper cover.

Remove the front cover following *Removing front cover, see on page 258*.

To remove the propeller fan remove the cap nut which fixes the propeller fan onto the motor shaft.

No.	Part
1	Cap nut
2	Propeller fan

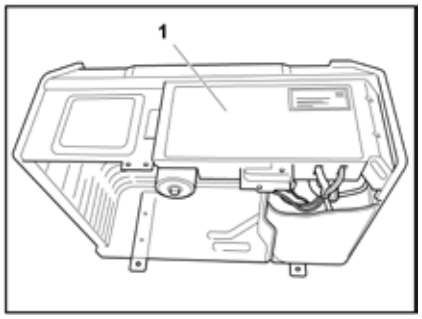


NOTE

- ***Use a puller when the propeller fan and motor shaft are fixed too tightly.***
- ***The cap nut is left thread. For removal turn to the reverse direction to the propeller fan.***

Remove the electrical box cover.

No.	Part
1	Electrical box cover

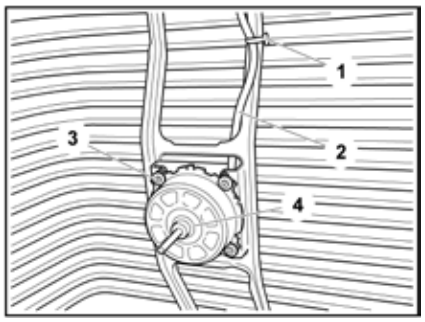


Remove the fan motor connector (CN24) inserted into the PCB in the electrical box.

Remove the fan motor lead wire fixed onto the motor clamp using a cord band.

Remove four (4) screws which fixes the motor.

No.	Part
1	Cord band
2	Fan motor lead wire
3	Four (4) screws
4	Fan motor



NOTE

- ***To mount the motor be sure to place the lead wire outlet downward.***
- ***Fix the motor lead wire onto the motor clamp using a cord band as before to avoid obstructing the propeller fan.***
- ***Mounting the propeller fan:***
- ***Insert the skidding protection part of the fan boss matching with the motor shaft notch; tighten the nut after the shaft screw fully comes out. (Tightening Torque 3.0 Nm).***
- ***Connect the motor lead wire to the electrical box PCB. (To connect insert into the connector (CN24) on the PCB).***

◆ Removing the compressor

NOTE

- ***Do not expose the refrigerant cycle to the atmosphere for a long period to avoid moisture or dust into the cycle. Be sure to replace the compressor immediately after removing. Seal to the suction and discharge pipes when the refrigerant cycle is left unattached for a prolonged time.***
- ***Remove the cap of new compressor right before the replacement. Before mounting the compressor seal the suction and discharge pipes with a tape to protect the compressor from dust. Remove the tape at pipe connection.***
- ***To connect wiring at reassembling ensure that the compressor terminal numbers and wiring mark band codes are matched. Incorrect wiring numbers may result in inverse rotation and damage the compressor.***

Remove the pipe cover following *Removing pipe cover, see on page 395*.

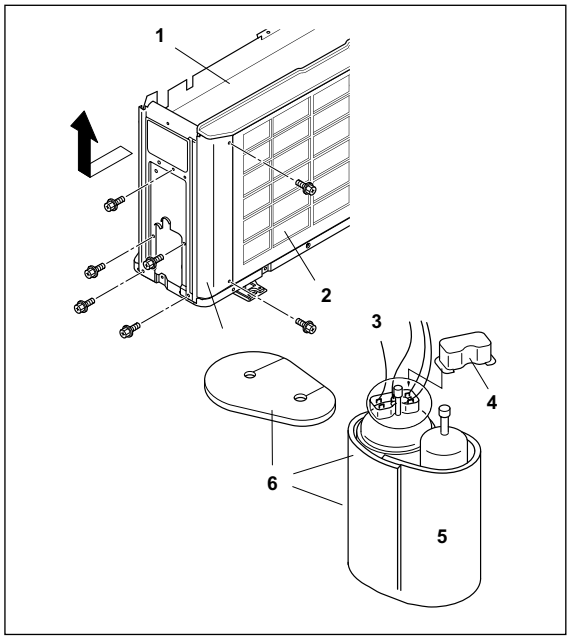
When the outdoor unit is installed close to a wall move the unit from the wall removing the refrigerant piping.

Collect the refrigerant from the check joint.

Remove the front cover following *Removing front cover, see on page 395*.

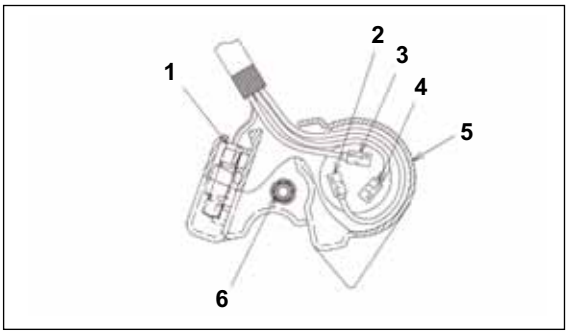
Remove seven (7) fixing screws and remove the side cover.

Open the soundproof cover wrapped around the compressor and remove the terminal box cover of the compressor body. Disconnect the compressor wires in the terminal box and remove the thermistor on top of the compressor.



No.	Part
1	Electrical box
2	Heat exchanger
3	Compressor-top thermistor
4	Compressor wiring
5	Terminal cover
6	Side cover Soundproof cover

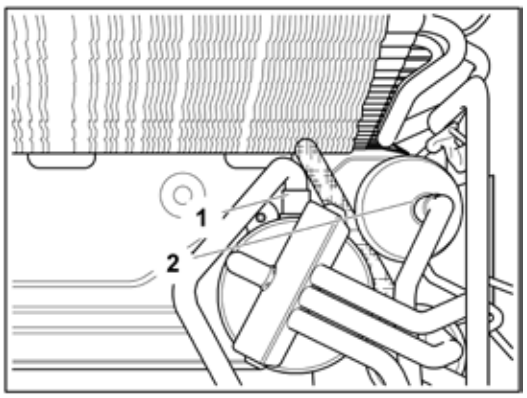
Check the wiring color and layout when disconnecting. Connecting wires in wrong order at reassembling may result in compressor damage.



No.	Part
1	Compressor-Top Thermistor Mount onto Terminal Cover with Metal Fitting
2	Yellow
3	White
4	Red
5	Terminal cover
6	M5 nut

Remove the suction and discharge pipes from the compressor.

Be sure to separate the blazing burner flame sufficiently from the wires and electrical components around the brazed part in order to avoid burning.



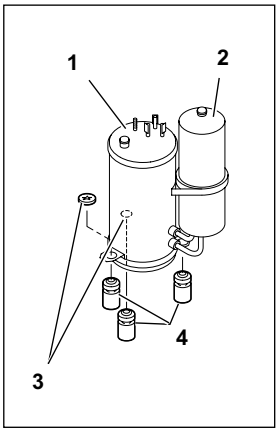
No.	Part
1	Blazing discharge pipe
2	Blazing suction pipe

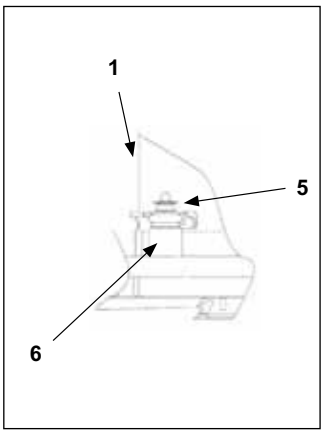
Remove push nuts A and B which fixes the compressor. Lift the compressor and remove from the unit body. (C in the figure does not have a push nut).

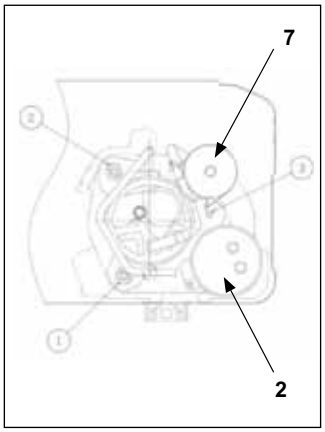
Check if the Faston terminal has any abnormality when replacing the compressor. (Ensure the pull out force greater than 20 N). If the Faston terminal is identified faulty replace to a new one.

Ensure the fixture of the lead wires.

No.	Part
1	Compressor
2	Accumulator
3	Push nut
4	Vibration-proof rubber
5	Two push nut
6	Three vibration-proof rubber
7	Accumulator







◆ Removing high pressure switch and pressure switch for control

Remove the pipe cover following *Removing pipe cover, see on page 395*.

Remove three (3) fixing screws and remove the upper cover.

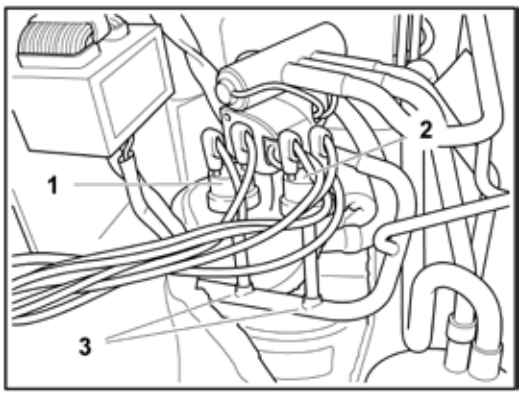
Remove the front cover following *Removing front cover, see on page 395*.

Collect the refrigerant from the check joint.

Disconnect the Faston Terminals.

Remove the high pressure switch and the pressure switch for control from the brazed part of discharge piping.

No.	Part
1	High pressure switch
2	Pressure switch for control
3	Brazing



◆ Removing four-way valve coil

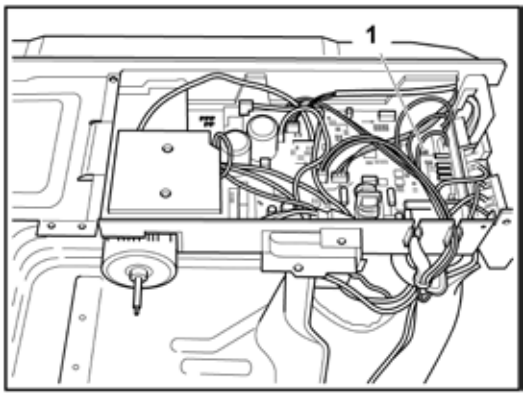
Remove the pipe cover following *Removing pipe cover, see on page 395*.

Remove three (3) fixing screws and remove the upper cover.

Remove the front cover following *Removing front cover, see on page 395*.

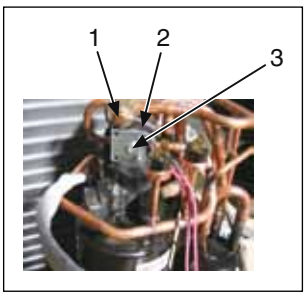
Remove the electrical box cover.

Disconnect the PCN6 connector on the control PCB of the electrical box.



No.	Part
1	PCN6 connector (green)

Remove one (1) fixing screw to remove the 4-way valve coil.



No.	Part
1	4-way valve
2	4-way valve coil
3	Screw

NOTE

DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

◆ Removing electronic expansion valve coil

Remove the pipe cover following *Removing pipe cover, see on page 395*.

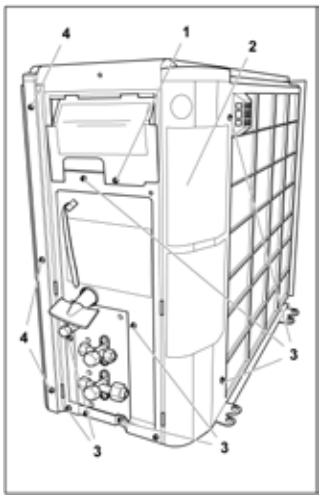
Remove three (3) fixing screws and remove the upper cover.

Remove the front cover following *Removing front cover, see on page 395*.

Remove the electrical box cover.

Remove the CN5A connector on the control PCB of the electrical box.

Hold and disconnect the coil of the expansion valve.The expansion valve coil is equipped with a lock mechanism.Ensure that the coil is locked when replacing.



No.	Part
1	One terminal cover screw
2	Side cover
3	Seven side cover screws
4	Three front cover screws

No.	Part
1	Expansion valve coil
2	Expansion valve body

NOTE

DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.

◆ Removing electrical components

Removing Electrical Box

Remove the pipe cover following *Removing pipe cover, see on page 395*.

Remove three (3) fixing screws and remove the upper cover.

Remove the electrical box cover.

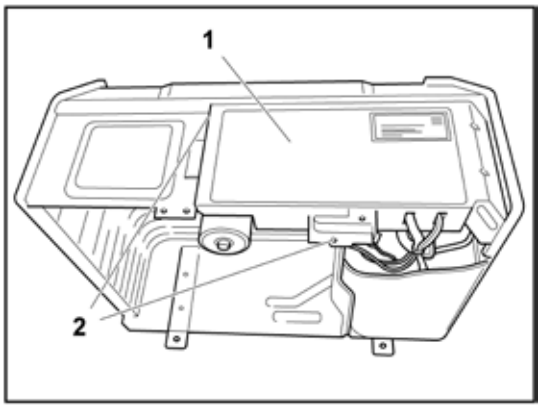
Remove one (1) fixing screw and remove the terminal cover.

Disconnect all the wiring connected to the control PCB.

Remove two (2) screws which fix the electrical box.

Pull up and remove the electrical box.

No.	Part
1	Electrical box cover
2	Two screws



Removing Display PCB

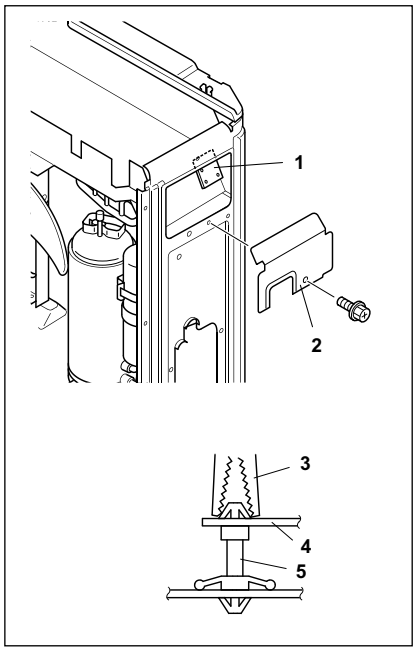
Remove the pipe cover following *Removing pipe cover, see on page 395*.

Remove one (1) fixing screw and remove the terminal cover.

Disconnect all the wiring connected to the display PCB.

Hold the upper part of four (4) holders with long nose pliers and remove the display PCB.

No.	Part
1	Display PCB (PWB2)
2	Terminal cover
3	Long nose pliers
4	Display PCB
5	Holder



NOTE

DO NOT touch electrical components on the PCB. Pay attention not to bend or apply much force onto PCB in order to avoid PCB failure.

NOTE

- ***To connect wiring at reassembling ensure that the terminal numbers and wiring mark band codes are matched. Incorrect wiring may result in malfunction or damage of electrical components.***
- ***Different dip switch setting shall be applied for each model when the electrical box is replaced; See chapter 8 Troubleshooting.***
- ***Pay attention not to clamp any wiring between plates or electrical components when closing electrical box cover or front cover at reassembling.***

Removing other electrical components

Remove the pipe cover following *Removing pipe cover, see on page 395*.

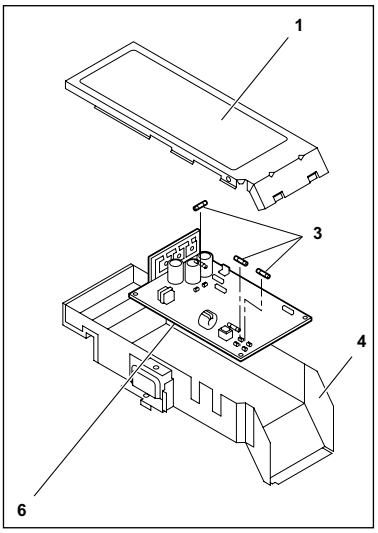
Remove three (3) fixing screws and remove the upper cover.

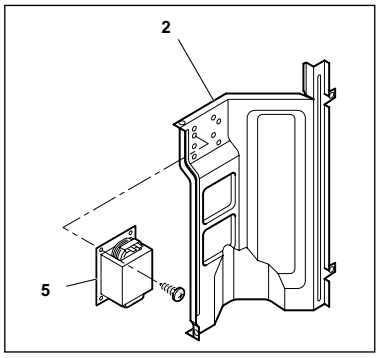
Remove the electrical box cover.

Removing Electrical Components.

Remove the fixing screw and remove the reactor.

To mount components be sure to match the wiring connection with the mark band codes.





No.	Part
1	Electrical box cover
2	Partition plate
3	Fuse
4	Electrical box
5	Reactor
6	See the note

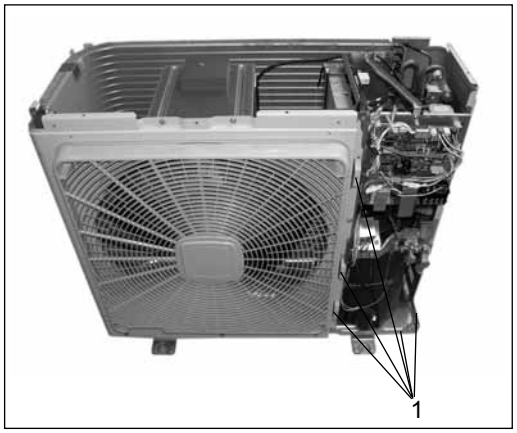
NOTE

- ***The PCB cannot be removed from the electrical box. To replace PCB the entire electrical box must be replaced.***
- ***DO NOT touch electrical components while the LED1 (Red) is ON to avoid electrical shock. Wait until the LED turns off.***

11.1.2 RAS-3HVRNME-AF

◆ Removing service cover

No.	Part
1	Screws



Remove the main parts according to the following procedures:

Remove the five (5) fixing screws.

Slide the service cover downward and remove it.

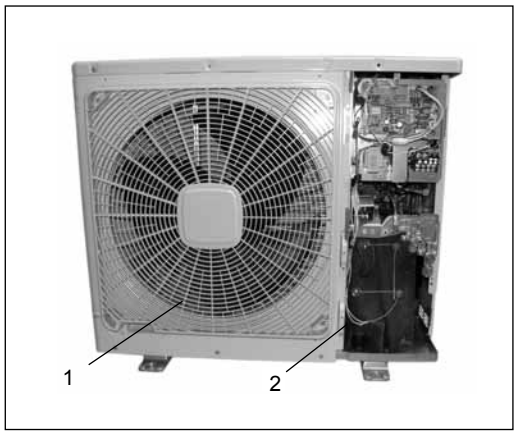
Pay attention of not falling off the service cover.

NOTE

- ***To reassemble perform the procedures in reverse.***
- ***To prevent contamination of the refrigerant with water or foreign particles, do not expose open to atmosphere for long periods.***
- ***If necessary, seal pipe ends using caps or tape.***

◆ Removing air outlet grille

No.	Part
1	Air outlet grille
2	Shroud



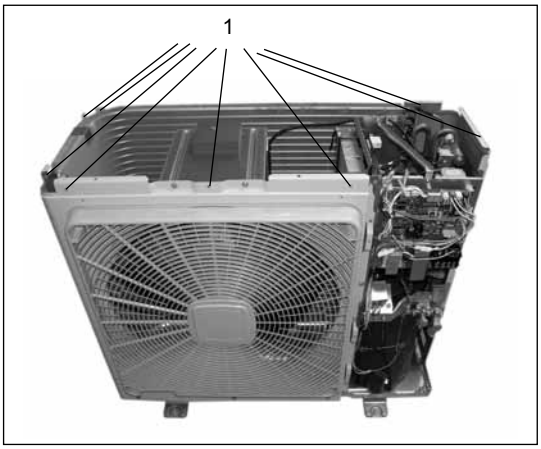
Remove the four (4) fixing screws.

Lift the air outlet grille holding the lower parts.

Release the extruded hook of the air outlet grille from the shroud.

◆ Removing upper cover

No.	Part
1	Screws



Remove the eight (8) fixing screws.

Lift the upper cover upwards.

◆ Removing outdoor fan motor

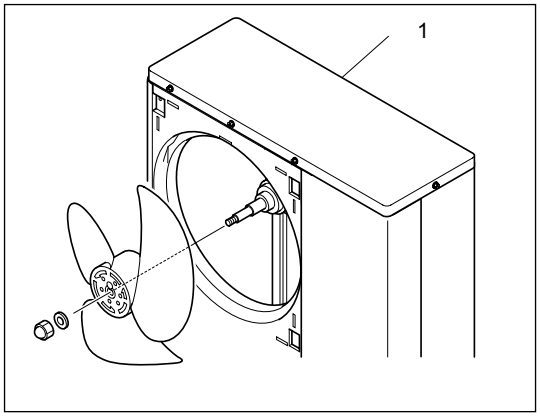
No.	Part
1	Upper cover

Remove the service cover according to the section *Removing service cover* in this chapter.

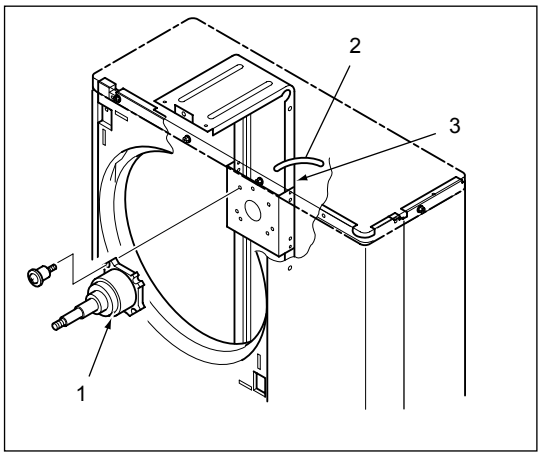
Remove the air outlet grille according to the section *Removing air outlet grille* in this chapter.

Remove the upper cover according to the section *Removing upper cover* in this chapter.

Disassemble the fan blade by removing the cap nuts and washers fixing the fan blade onto the motor shaft.



No.	Part
1	Fan motor
2	Fan motor lead wire
3	Motor clamp



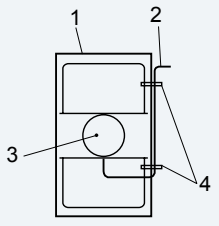
Remove the fan motor connector from the PCN202 at the electrical box.

Cut off the cable tie that fixes the lead wire of the fan motor.

Remove the four (4) screws that fix the motor to the motor clamp.

Fix the motor wire with the cable tie or the cord clamp. If not, it may cause the disconnection of the fan motor's lead wire.

In order to avoid cutting edges, mount the rubber bush at the partition plate when inserting the motor wire through it. If not, it may cause the disconnection to the fan motor's lead wire.

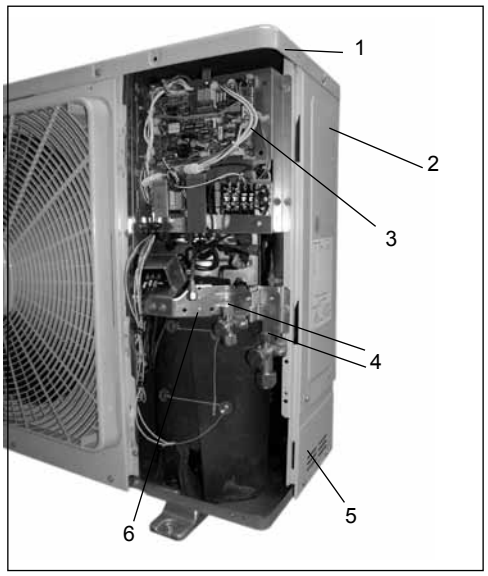
Fan components and technical features		
Power supply	1~ 230V 50Hz	
DC fan motor	DPI IPM PCN202 CN202	
Screw for motor fixing	M5 Screw with spacer x 4	
Motor clamp and wiring fixing position	No. / Part: 1 Motor clamp 2 Fan motor lead wire 3 DC fan motor 4 Cable tie	

NOTE

- ***When assembling the motor, ensure the cables section directly downwards. Fix the protection tube edge end downwards to ensure water from keeping inside it.***
- ***Fix the motor wires onto the motor clamp with a cable tie to prevent them from collisioning the fun blades.***
- ***Assembling the fan blade: Insert the skidding protection part of fan boss in accordance with the cutting part of the motor shaft, and fix the screw after dismounting the screwed part of the shaft. (Tightening Torque of 20 N.m).***
- ***When connecting the motor wire, check to ensure that the colors of the connectors on the PCN202 are matched with the wires.***
- ***Fix the air outlet grille firmly to the shroud.***

◆ Removing the compressor

No.	Part
1	Upper cover
2	Rear panel
3	PCB
4	Check joint
5	Rear pipe cover
6	Valve stay



Remove the service cover and the lower part of the service panel according to the section *Removing service cover* and the section *Removing lower part of service panel and rear panel*. In case that the outdoor unit is installed close to a wall closely, sepparate first the outdoor unit from the wall.

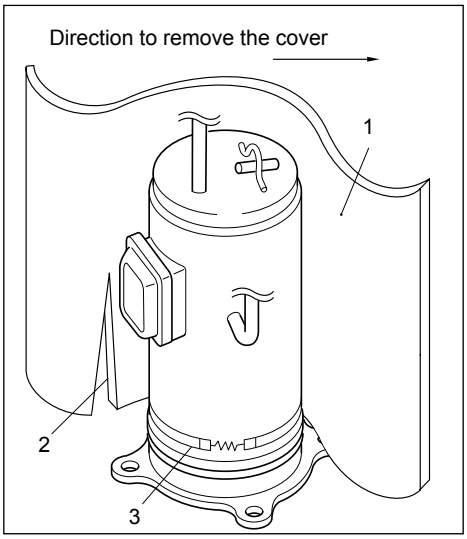
Collect the refrigerant from the liquid stop valve, the gas stop valve and the check joint at the piping.

Open the sound insulation cover wrapped around the compressor and remove the terminal box cover at the compressor fixed by one (1) screw. Disconnect the compressor wires in the terminal box and remove the sound insulation cover.

Remove the rubber cap and the thermistor on the top of the compressor.

Remove the crankcase heater. (Oil heater on the lower case).

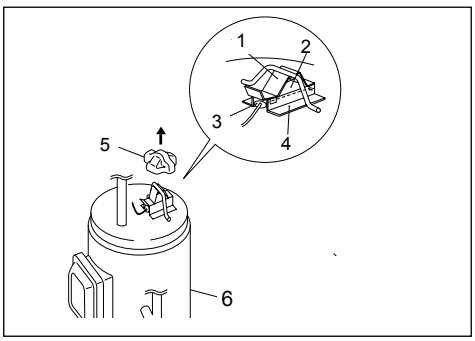
No.	Part
1	Sound-proof cover
2	Cut part
3	Oil heater



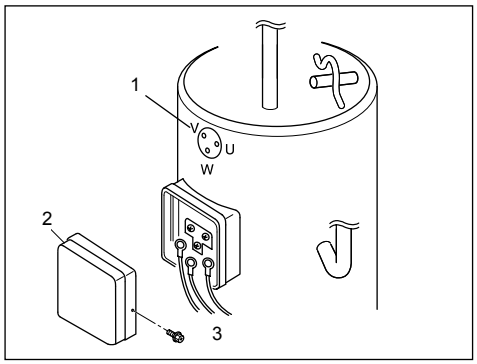
NOTE

Check and take note of each terminal number and indications for its correct connection at the reasembling process. If wires are connected in incorrect order, it will lead to a compressor failure.

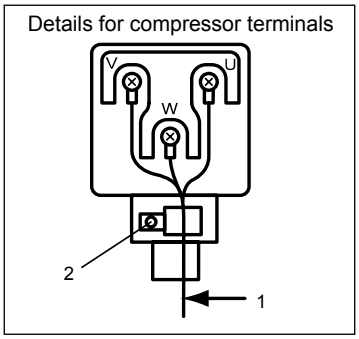
No.	Part
1	Thermistor holder
2	Holder
3	Td Thermistor
4	Thermistor fixing plate
5	Rubber cap Th Thermistor
6	Compressor



No.	Part
1	Indication of terminal number
2	Terminal box cover
3	Compressor wires



No.	Part
1	Compressor wires (3 wires)
2	Fix it with screw



NOTE

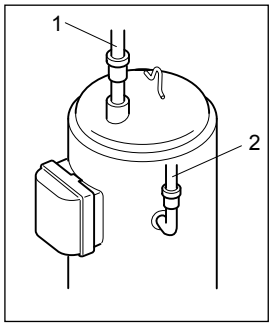
- ***The compressor is connected by brazing. Check to ensure whether there are flammable things around or not when using a burner for pipe connections. If you do not´, oil existing pipe inside may ignite.***
- ***Do not expose the refrigerant cycle to the atmosphere for a long period in order to avoid water and foreign particles entering into the refrigerant cycle. After removing the compressor, replace it quickly. If it is exposed to the ambiance for a long period, seal both suction and discharge pipes.***
- ***Remove the cap for the compressor just before replacing the compressor. Before assembling the compressor, seal the suction pipe and discharge pipe with tape to protect the compressor interior from foreign particles. Remove the tape when connecting the pipes.***
- ***Match the terminal No. with the mark band No. when reassembling. If the wiring is connected incorrectly, the compressor may be damaged due to reverse rotation.***
- ***If there is a clearance between the oil heater and the compressor due to wire overlapping, excessive heat is generated there. Then the oil heater is failed due to overheating. When mounting the reassembled oil heater, this point should be taken into account.***
- ***If the oil heater lead wire is caught on the spring, the lead wire may be cut due to vibration. When reassembling, attention should be paid to the lead wire.***

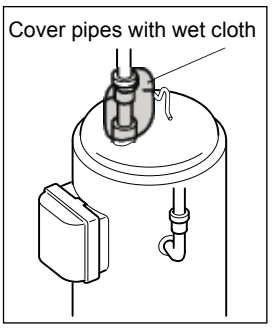
CAUTION

All compressor pipes must be brazed to be connected to the refrigerant circuit. Ensure that all the sourrounding is free of flammable objects and liquids when performing piping brazing work.

Remove the suction pipe and the discharge pipe from the compressor. Isolate the wires and electrical components to protect them from the burner flame when brazing the connection pipes.

No.	Part
1	Suction pipe
2	Discharge pipe

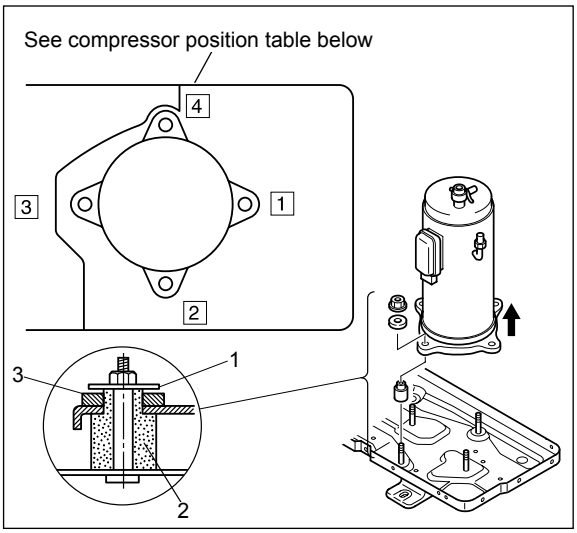




Remove the two (2) nuts fixing the compressor and remove the compressor from the unit by lifting it. Slightly incline it forward and lift.

For brazing the compressor connection pipes, first cool down the compresor piping side covering it with wet clooth. Then brazing material will not enter into the compressor. If the brazing material enters the compressor, it will cause compressor failures.

Fixation of the compressor to the bottom plate				
Compressor position	1	2	3	4
Vibration-proof rubber 1	○	○	○	○
Vibration-proof rubber 2	○	○	–	–
Nut	○	○	–	–



No.	Part
1	Nut and washer
2	Vibration-Proof rubber 1
3	Vibration-Proof rubber 2

Reassemble the parts in the reverse order of the indicated removing procedures.

- Tighten the screws (U, V and W) for compressor wires with 2.5 N.m.
- Fix the lead wire firmly.
- Attach the oil heater firmly to the compressor and fix it with the spring.

NOTE

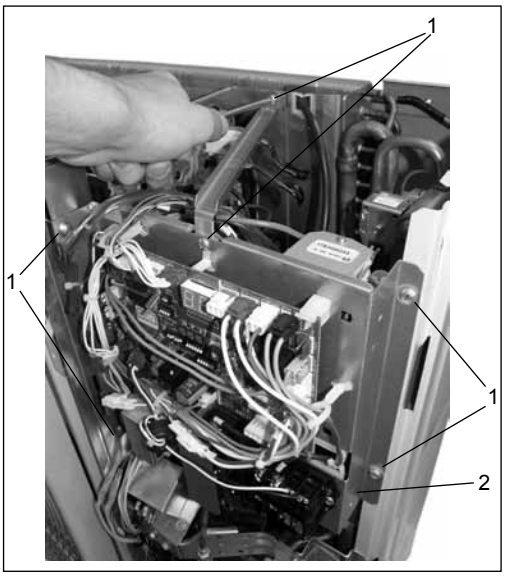
Fix the lead wire for the compressor firmly using a cable tie to aviod contacting the metal sheet sharp edges and the high temperature piping.

◆ Opening electrical box (P-mounting plate)

Remove the service cover according to the section *Removing the service cover* in this chapter.

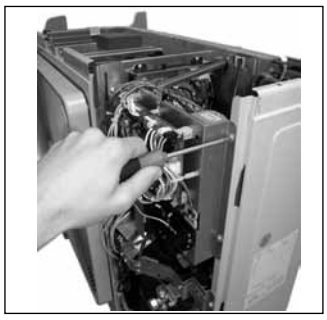
Remove the six (6) screws fixing the electrical box. Open the P-mounting plate by rotating it to the left.

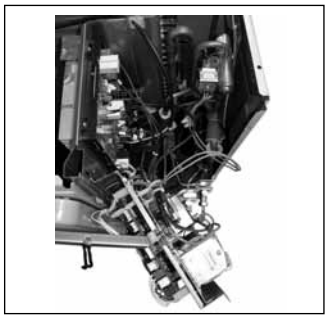
No.	Part
1	2 Screws
2	P-Mounting plate



DANGER

- ***Check that the LED201 (red) located on the "W" surface PCB is OFF when opening the P-mounting plate.***
- ***Do not touch the electrical components when LED201 (Red) located on the "W" surface PCB is ON in order to avoid an electrical shock.***

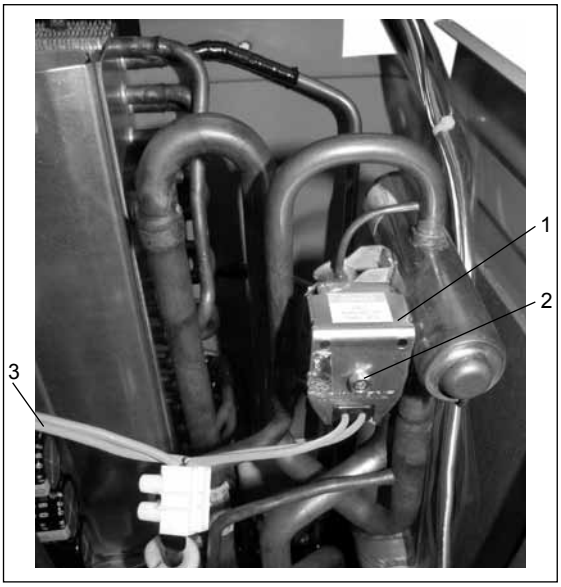




Removing reversing valve coil

Remove the service cover according to the section *Removing service cover* in this chapter.

Open the P-mounting plate according to the section *Opening electrical box (P-Mounting Plate)* in this chapter.



DANGER

- ***Check that the LED201 (red) located on the "W" surface PCB is OFF when opening the P-mounting plate.***
- ***Do not touch the electrical components when LED201 (Red) located on the "W" surface PCB is ON in order to avoid an electrical shock.***

Remove the connectors on the control PCB of the electrical box.

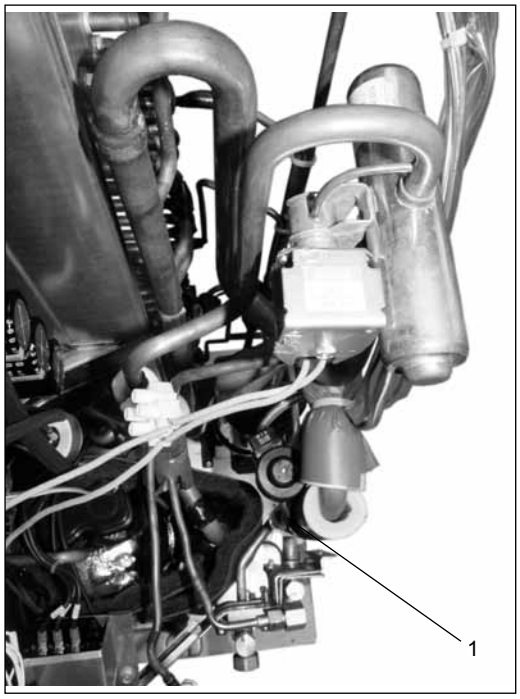
Remove the reversing valve coil by removing the screw fixing the coil.

No.	Part
1	Reversing valve coil
2	Screw
3	To PCN6 on PCB1

Removing expansion valve coil

Remove the service cover according to the section *Removing service cover* in this chapter.

Open the P-mounting plate according to the section *Opening electrical box (P-Mounting Plate)* in this chapter.



DANGER

- ***Check that the LED201 (red) located on the "W" surface PCB is OFF when opening the P-mounting plate.***
- ***Do not touch the electrical components when LED201 (Red) located on the "W" surface PCB is ON in order to avoid an electrical shock.***

Remove the CN5A connector on the control PCB of the electrical box.

Hold the expansion valve coil and slightly rotate, then pull it up. Refer to the figure below to replace the electrical valve. The lock mechanism is equipped with the expansion valve coil. Check to ensure that the expansion valve coil is locked.

No.	Part
1	Electronic expansion valve coil

◆ Removing reversing valve

Remove the service cover and the rear service panel according to the section *Removing Service Cover* and the section *Removing lower part of service panel and rear service panel* in this chapter.

Collect the refrigerant from the check joint according to the section *Removing compressor*.

Remove the reversing valve coil according to the section *Removing reversing valve coil*.

Remove one (1) fixing screw for the valve-mounting plate.

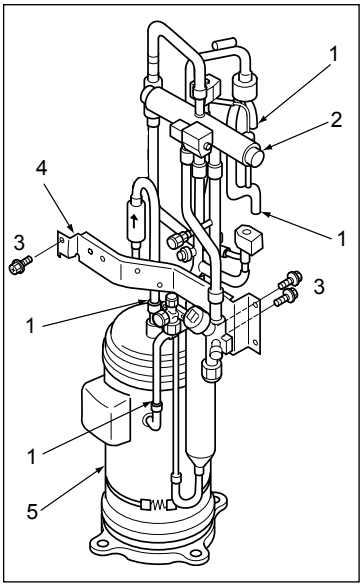
Remove the stop valve at the gas side from the valve-mounting plate by removing the two (2) screws.

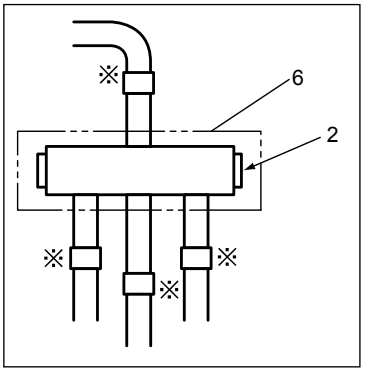
Remove the reversing valve assemblies from the 4 brazed parts where it is fixed. Remove the brazing of the reversing valve and the stop valve at the gas using a blowtorch. Cool down the piping side covering it with wet cloth, in order to avoid brazing material entering the reversing valve. Protect the connecting wires and pipe insulation from the brazing frame.

Remove the reversing valves from its assemblies 4 brazed parts ※.

Perform the brazing with a blowtorchto remove and reassemble the reversing valve by cooling the pipes first with wet cloth in order to avoid brazing material entering the reversing valve.

Reassemble the parts in the reverse order of removing procedures contained in this chapter. When SFV is removed, fix it according to the section *Removing the Reversing Valve and the Solenoid Valve* contained in this chapter.





No.	Part
1	Brazing
2	Reversing valve
3	Screw
4	Mounting plate
5	Compressor
6	Cover by wet cloth

Removing expansion valve

Remove the service cover and rear service panel according to the section *Removing Service Cover* and the section *Removing Lower Part of Service Panel and Rear Service Panel*.

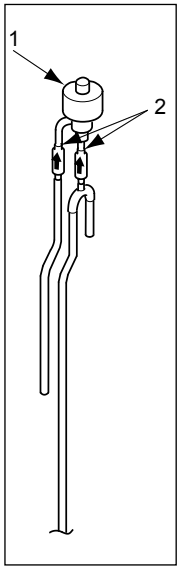
Collect the refrigerant from the check joint according to the section *Removing Compressor*.

Remove the coils according to the section *Removing Electronic Expansion Valve Coil*.

Remove the brazing as shown in the figure below.

- Electronic Expansion Valve (EV0): 2 brazing parts.
- Perform the brazing to remove and reassemble the electronic expansion valve by cooling with wet cloth.
- Protect the connecting wires and pipe insulation from brazing flame.

Reassemble the parts in the reverse order of removing procedures.



No.	Part
1	Expansion valve (EV0)
2	Brazing part

Removing solenoid valve

Remove the service cover and the rear service panel according to the sections *Removing Service Cover* and *Removing lower part of service panel and rear panel*, described in this chapter.

Collect the refrigerant from the check joint according to the section *Removing compressor* in this chapter.

Remove the solenoid valve coil according to the section *Removing coils for reversing valve and solenoid valve* in this chapter.

Remove the brazing and flare nuts. Using a blowtorch and previously cooling the pipe side with wet cloth in order to avoid brazing material entering the reversing valve.

Perform the brazing to remove and reassemble the solenoid valve.

Protect the connecting wires and pipe insulation from the brazing flame.

Remove the flare nuts with two spanners to avoid twisting.

Reassemble the parts in the reverse order of removing order of removing procedures.

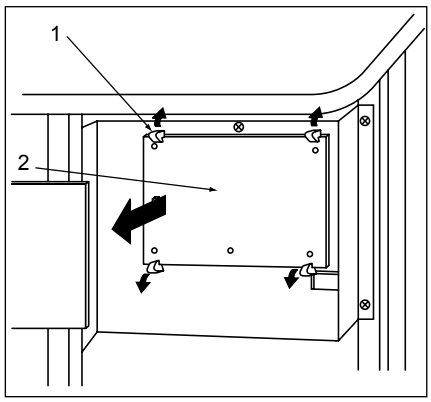
Removing electrical components

DANGER

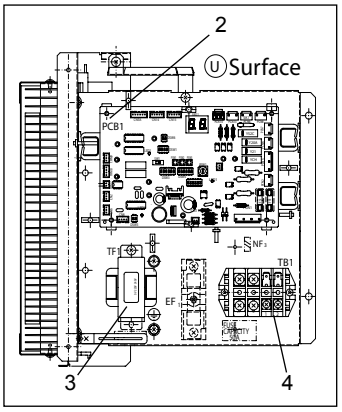
- ***Do not touch the electrical components of the PCB directly.***
- ***When handling the PCB, take care of components. Do not apply excesive force to them, in order to avoid damaging the motherboard and failures.***

Remove the service cover according to section *Removing service cover* in this chapter.

- Disconnect all the connectors in the PCB.
- Remove the PCB by sliding four (4) holders in the arrow direction.
- Remove the PCB for power distribution of the compressor and the motor.
- To remove the PCB, slide de four (4) holders in the arrow direction.

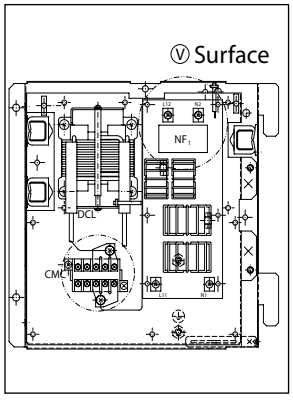


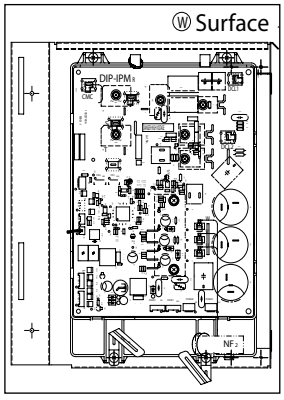
No.	Part
1	Holder (4 pcs.)
2	PCB1 for control
3	Transformer
4	Terminal board

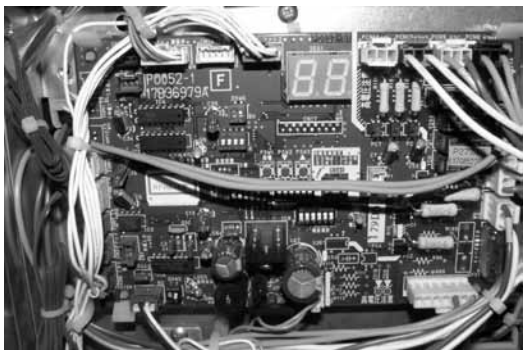


Removing the relay PCB

- Remove the service cover according to the section *Removing Service Cover* in this chapter.
- Disconnect all the wires connected to the relay PCB.







Removing “W” electrical components surface

Remove the service cover according to the section *Removing service cover* in this chapter.

Open the P-mounting plate by rotating 90 degrees to the left according to the section *Opening electrical box (P-Mounting Plate)* in this chapter.

Use a screw driver to push and release the plastic holders retaining the “W” electrical components surface

DANGER

- ***Check that the LED201 (red) located on the “W” surface PCB is OFF when opening the P-mounting plate.***
- ***Do not touch the electrical components when LED201 (Red) located on the “W” surface PCB is ON in order to avoid an electrical shock.***
- ***Identify the terminal numbers with mark band. When reassembling, the terminals have to be connected to the correct numbers. If incorrectly connected, malfunctions or damages will occur.***
- ***In case of replacing control PCB, set all the dip switches as the same position before replacing. If not, malfunction may occur. Refer to the manual attached with the service PCB.***
- ***Do not apply strong force to the electric components and PCBs to avoid damage.***

NOTE

Check to ensure that the electrical wires will not be caught between the assembled electrical components and the mounting plates when the “W” electrical components surface is reassembled.

Removing other electrical components

Remove the service cover according to the section *Removing service cover* in this chapter.

Open the P-mounting plate by rotating it to the left according to the section *Opening electrical box (P-Mounting Plate)* in this chapter.

Check to ensure the LED201 (Red) of the inverter PCB is off when opening P-mounting plate.

Remove other electrical components according to the procedure below, and the figures on Chapter 9.

DANGER

- ***Check that the LED201 (red) located on the “W” surface PCB is OFF when opening the P-mounting plate.***
- ***Do not touch the electrical components when LED201 (Red) located on the “W” surface PCB is ON in order to avoid an electrical shock.***
- ***Identify the terminal numbers with mark band. When reassembling, the terminals have to be connected to the correct numbers. If incorrectly connected, malfunctions or damages will occur.***

NOTE

- ***Disconnect all the wires connected with the smoothing capacitor (CB, CB1, CB2, CA).***
- ***The wire has polar characters. Identify the wire mark band and the indication on the smoothing capacitor when wire connecting.***
- ***Remove the two (2) screws fixing the smoothing capacitor and remove the smoothing capacitor.***
- ***Disconnect all the wires connecting with the magnetic contactor (CMC1).***
- ***Remove the two (2) screws fixing the magnetic contactor and remove the magnetic contactor.***
- ***Remove the four (4) screws fixing the reactor and remove the reactor (DCL).***
- ***Disconnect all the wires connected with the noise filter (NF1).***
- ***Remove the noise filter by clamping the top of the holder (6 portions) with a pincher.***

11.1.3 RAS-(4-6)H(V)RNME-AF

◆ Removing service cover

Remove the main parts according to the following procedures.

NOTE

- ***To reassemble perform the procedures in reverse.***
- ***To prevent contamination of the refrigerant with water or foreign particles, do not expose open to atmosphere for long periods.***
- ***If necessary, seal pipe ends using caps or tape.***

Remove the four (4) fixing screws.

Slide the service cover downward and remove it.

Pay attention of not falling off the service cover.

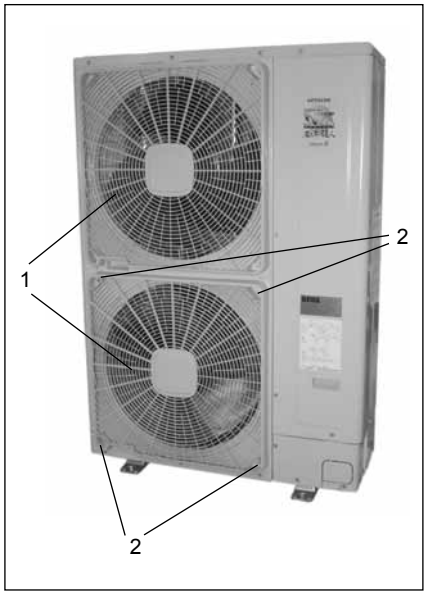
No.	Part
1	Service cover
2	Screws

◆ Removing air outlet grille

Remove the eight (8) fixing screws.

Lift the air outlet grille holding the lower parts.

Release the extruded hook of the air outlet grille from the shroud.



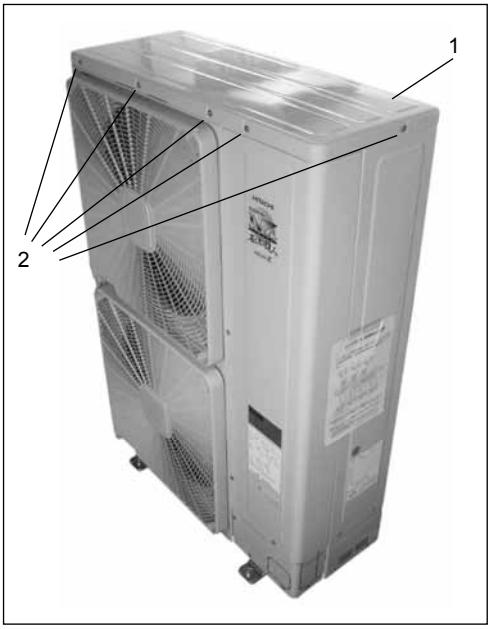
No.	Part
1	Air outlet grille
2	Shroud

◆ Removing upper cover

Remove all the screws fixing the upper cover, both on the front and back of the machine.

Lift the upper cover upwards.

No.	Part
1	Upper cover
2	Screws



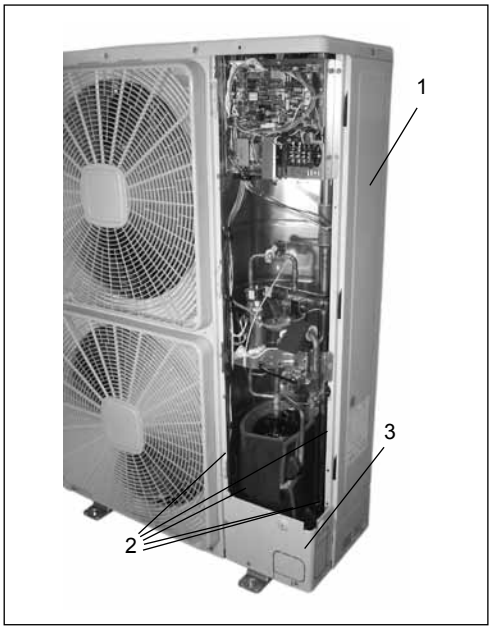
◆ Removing the lower part of service panel and rear panel

Remove the five (5) fixing screws at the lower part of the service panel and remove the lower part of the service panel by pulling towards the front side. Remove the upper cover according to section “Removing upper cover” in this chapter.

NOTE

The length of fixing scews for the outdoor temperature thermistor is different than all other screws in the machine, as an assembly poka-yoke.

No.	Part
1	Rear panel
2	Screws
3	The lower part of service panel



Removing outdoor fan motor

Remove the service cover according to the section *Removing service cover* in this chapter.

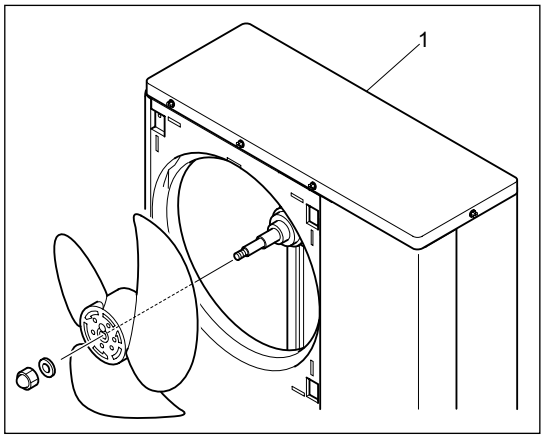
Remove the air outlet grille according to the section *Removing air outlet grille* in this chapter.

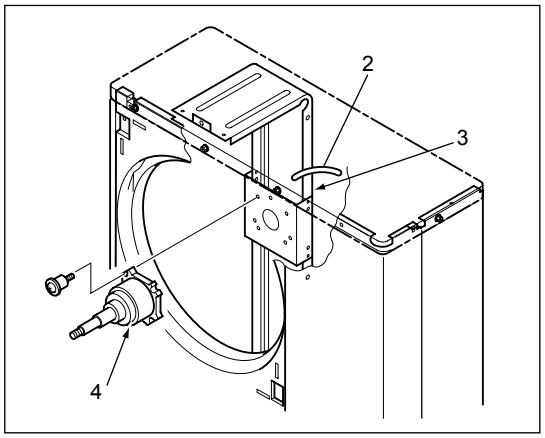
Remove the upper cover according to the section *Removing upper cover* in this chapter.

Disassembly the fan blade by removing the cap nuts and washers fixing the fan blade onto the motor shaft.

If the fan blade get stuck when trying to remove it, use a puller to disassembly the fan.

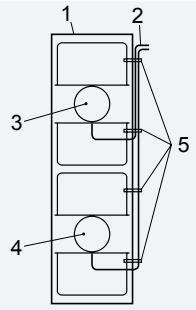
No.	Part
1	Upper cover
2	Fan motor lead wire
3	Motor clamp
4	Fan motor





Fan components and technical features		
Power supply		1~ 230V 50Hz 3N~ 400V 50Hz
Fan motor	DC fan motor UP	DIP IPM PCN202 CN202
	DC fan motor DOWN	DIP IPM PCN201 CN201
Screw for motor fixing	DC Fan Motor UP	M4 Screw with spacer x 4
	DC Fan Motor DOWN	M4 Screw with spacer x 4
Motor clamp and wiring fixing position		

No.	Part
1	Motor clamp
2	Fan motor lead wire
3	DC fan motor UP
4	DC fan motor DOWN
5	Cable tie



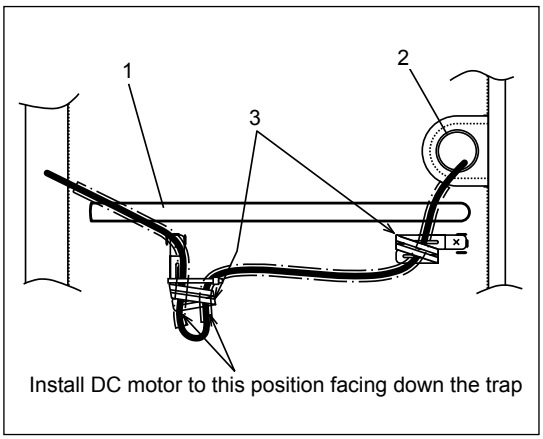
Remove the fan motor connector from the PCN202 and PCN203 at the electrical box.

- Cut off the cable tie that fixes the lead wire of the fan motor.
- Remove the four (4) screws that fix the motor to the motor clamp.

Fix the motor wire with the cable tie or the cord clamp. If not, it may cause the disconnection of the fan motor's lead wire.

In order to avoid cutting edges, mount the rubber bush at the partition plate when inserting the motor wire through it. If not, it may cause the disconnection to the fan motor's lead wire.

No.	Part
1	Partition plate
2	Rubber bush
3	Cord holder or cable tie



NOTE

- ***When assembling the motor, ensure the cables section directly downwards. Fix the protection tube edge end downwards to ensure water from keeping inside it.***
- ***Fix the motor wires onto the motor clamp with a cable tie to prevent them from collisioning the fun blades.***
- ***Assembling the fan blade: Insert the skidding protection part of fan boss in accordance with the cutting part of the motor shaft, and fix the screw after dismounting the screwed part of the shaft. (Tightening Torque of 20 N.m)***
- ***When connecting the motor wire, check to ensure that the colors of the connectors on the PCN201 and PCN202 are matched with the wires.***
- ***Fix the air outlet grille firmly to the shroud.***

◆ Removing the compressor

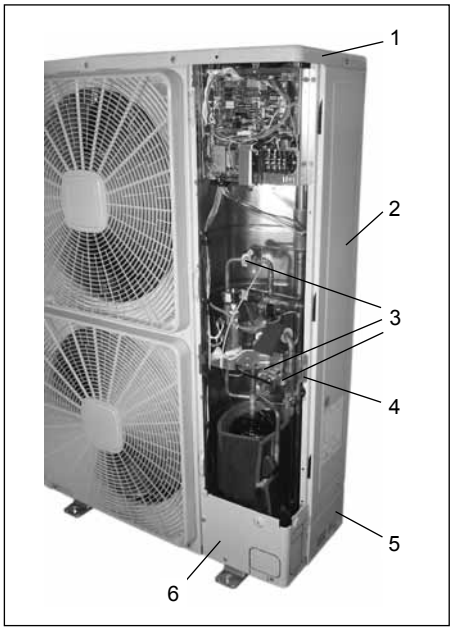
Remove the service cover and the lower part of the service panel according to the section *Removing service cover* and the section *Removing lower part of service panel and rear panel*. In case that the outdoor unit is installed close to a wall closely, sepparate first the outdoor unit from the wall.

Collect the refrigerant from the liquid stop valve, the gas stop valve and the check joint at the piping.

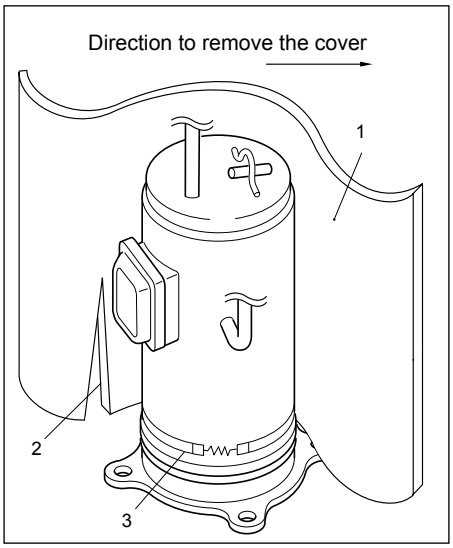
Open the sound insulation cover wrapped around the compressor and remove the terminal box cover at the compressor fixed by one (1) screw. Disconnect the compressor wires in the terminal box and remove the sound insulation cover.

Remove the rubber cap and the thermistor on the top of the compressor.

Remove the crankcase heater.(Oil heater on the lower case).



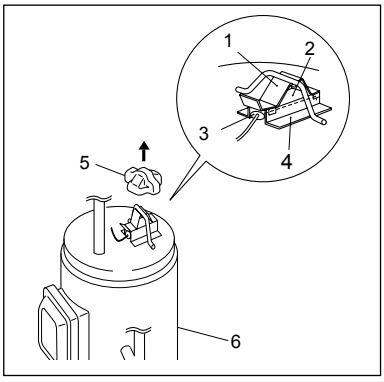
No.	Part
1	Upper cover
2	Rear panel
3	Check joint
4	Valve stay
5	Rear pipe cover
6	Lower part of service panel



No.	Part
1	Sound-proof cover
2	Cut part
3	Oil heater

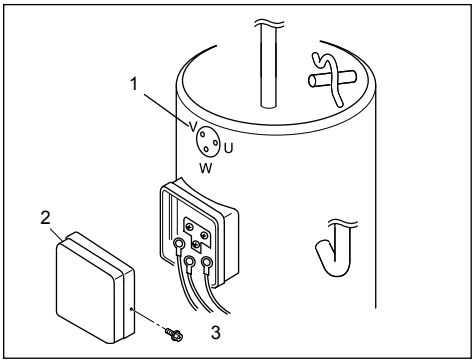
NOTE

Check and take note of each terminal number and indications for its correct connection at the reasembling process. If wires are connected in incorrect order, it will lead to a compressor failure.

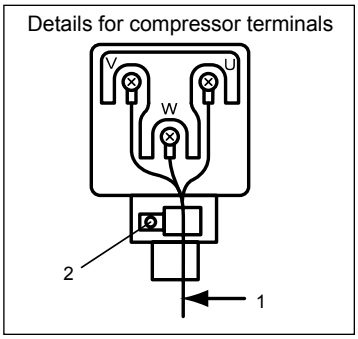


No.	Part
1	Thermistor holder
2	Holder
3	Td Thermistor
4	Thermistor fixing plate
5	Rubber cap Th Thermistor
6	Compressor

No.	Part
1	Indication of terminal number
2	Terminal box cover
3	Compressor wires



No.	Part
1	Compressor wires (3 wires)
2	Fix it with screw



NOTE

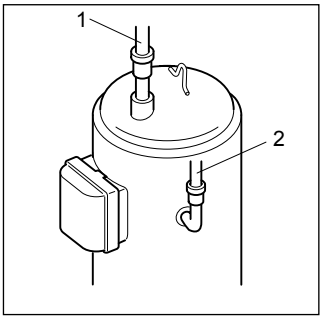
- ***The compressor is connected by brazing. Check to ensure whether there are flammable things around or not when using a burner for pipe connections. If you do not´, oil existing pipe inside may ignite.***
- ***Do not expose the refrigerant cycle to the atmosphere for a long period in order to avoid water and foreign particles entering into the refrigerant cycle. After removing the compressor, replace it quickly. If it is exposed to the ambiance for a long period, seal both suction and discharge pipes.***
- ***Remove the cap for the compressor just before replacing the compressor. Before assembling the compressor, seal the suction pipe and discharge pipe with tape to protect the compressor interior from foreign particles. Remove the tape when connecting the pipes.***
- ***Match the terminal No. with the mark band No. when reassembling. If the wiring is connected incorrectly, the compressor may be damaged due to reverse rotation.***
- ***If there is a clearance between the oil heater and the compressor due to wire overlapping, excessive heat is generated there. Then the oil heater is failed due to overheating. When mounting the reassembled oil heater, this point should be taken into account.***
- ***If the oil heater lead wire is caught on the spring, the lead wire may be cut due to vibration. When reassembling, attention should be paid to the lead wire.***

CAUTION

All compressor pipes must be brazed to be connected to the refrigerant circuit. Ensure that all the sourrounding is free of flammable objects and liquids when performing piping brazing work.

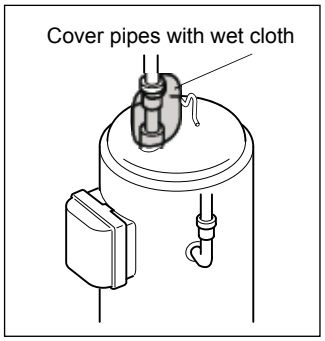
Remove the suction pipe and the discharge pipe from the compressor. Isolate the wires and electrical components to protect them from the burner flame when brazing the connection pipes.

No.	Part
1	Suction pipe
2	Discharge pipe



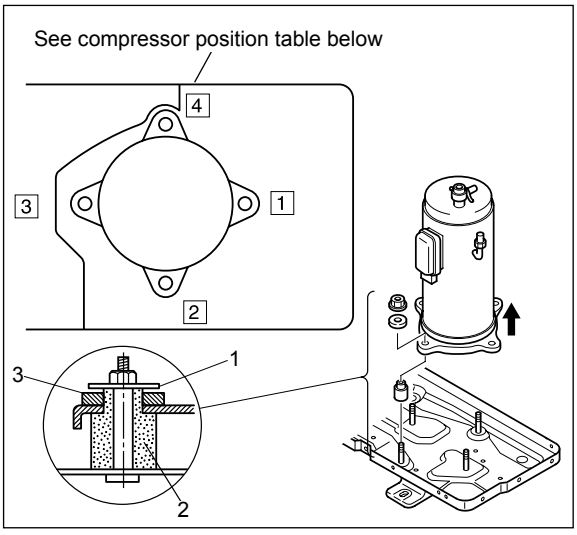
Remove the two (2) nuts fixing the compressor and remove the compressor from the unit by lifting it. Slightly incline it forward and lift.

For brazing the compressor connection pipes, first cool down the compresor piping side covering it with wet clooth. Then brazing material will not enter into the compressor. If the brazing material enters the compressor, it will cause compressor failures.



Fixation of the compressor to the bottom plate				
Compressor position	1	2	3	4
Vibration-proof rubber 1	○	○	○	○
Vibration-proof rubber 2	○	○	–	–
Nut	○	○	–	–

No.	Part
1	Nut and washer
2	Vibration-Proof rubber 1
3	Vibration-Proof rubber 2



Reassemble the parts in the reverse order of the indicated removing procedures.

- Tighten the screws (U, V and W) for compressor wires with 2.5 N.m.
- Fix the lead wire firmly.
- Attach the oil heater firmly to the compressor and fix it with the spring.

NOTE

Fix the lead wire for the compressor firmly using a cable tie to aviod contacting the metal sheet sharp edges and the high temperature piping.

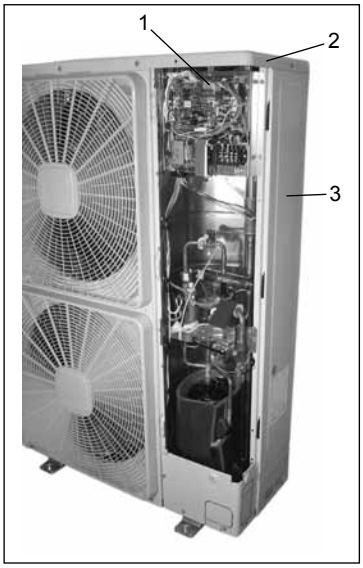
◆ Removing high pressure switch and control pressure switch

Remove the service cover according to the section *Removing service cover* in this chapter.

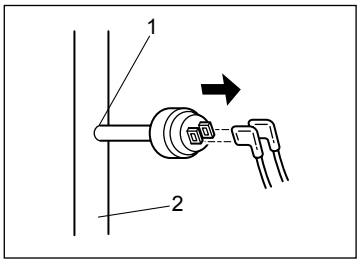
Collect the refrigerant from the check joint according to the section *Removing the compressor* in this chapter.

Disconnect the fasten terminals from the pressure switches.

- Cut the high pressure switch and control pressure switch from the brazing neck using a burner.



No.	Part
1	PCB
2	Upper cover
3	Rear cover



No.	Part
1	Brazing
2	Discharge pipe

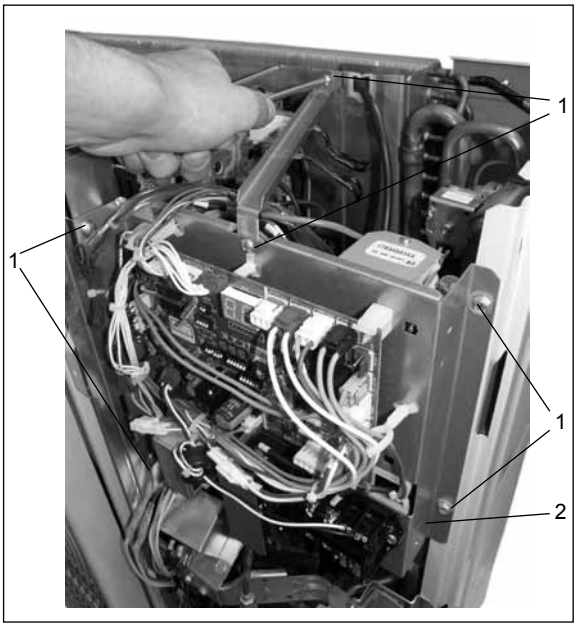
No.	Part
1	Pressure switch for control
2	High pressure switch

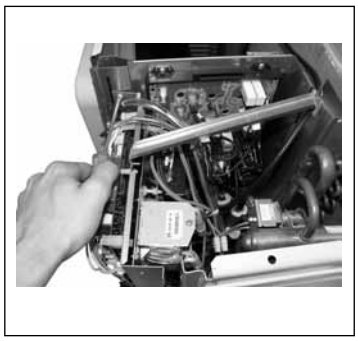
◆ Opening electrical box (P-mounting plate)

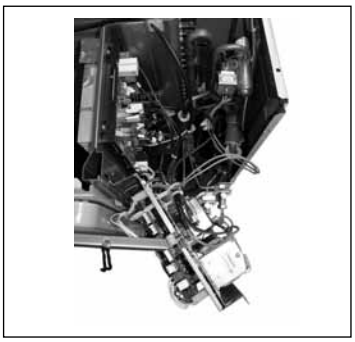
Remove the service cover according to the section *Removing the service cover* in this chapter.

Remove the six (6) screws fixing the electrical box. Open the P-mounting plate by rotating it 90 degrees to the left.

No.	Part
1	2 Screws
2	P-Mounting plate







DANGER

- ***Check that the LED201 (red) located on the "W" surface PCB is OFF when opening the P-mounting plate.***
- ***Do not touch the electrical components when LED201 (Red) located on the "W" surface PCB is ON in order to avoid an electrical shock.***

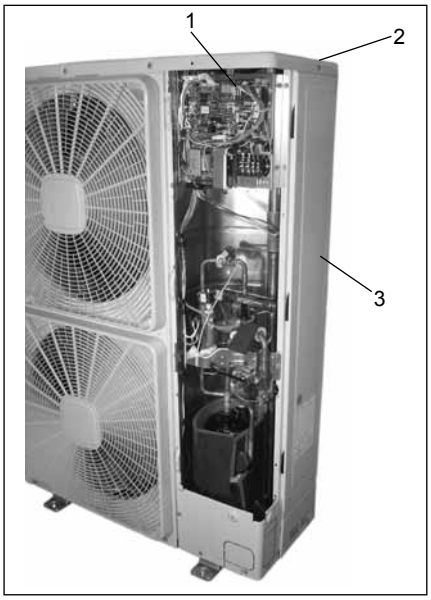
◆ Removing the coils for the reversing and solenoid valves (SVA1, SVA2 and SVF)

Remove the service cover according to the section *Removing service cover* in this chapter.

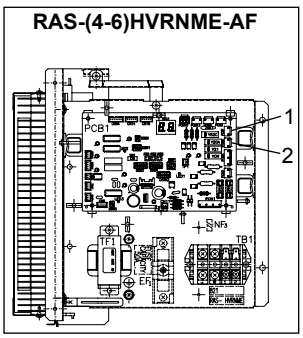
Open the P-mounting plate according to the section *Opening electrical box (P-Mounting Plate)* in this chapter.

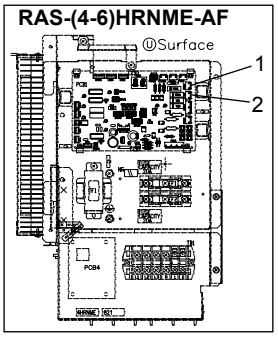
NOTE

- ***Do not touch the electrical components when the LED201 (Red), located on surface "W" PCB is ON in order to avoid electrical shock.***
- ***Remove the connectors on the control PCB of the electrical box.***
- ***Remove the reversing valve coil by removing the screw fixing the coil.***

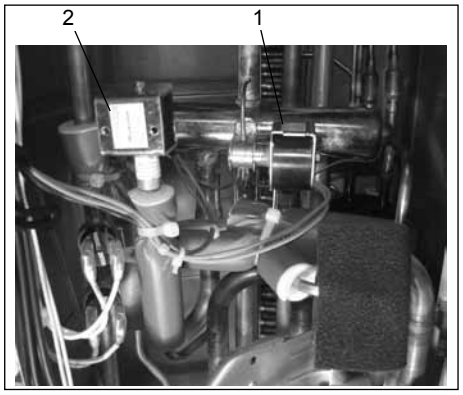


No.	Part
1	PCB
2	Upper cover
3	Rear cover





No.	Part
1	PCN7 (SVA) Solenoid valve
2	PCN6 (RVR) Reversing valve coil



No.	Part
1	Reversing valve coil
2	SVA

Removing expansion valve coil

Remove the service cover according to the section *Removing service cover*.

Open the P-mounting plate according to the section *Opening electrical box (P-Mounting Plate)* in this chapter.

DANGER

- ***Check that the LED201 (red) located on the "W" surface PCB is OFF when opening the P-mounting plate.***
- ***Do not touch the electrical components when LED201 (Red) located on the "W" surface PCB is ON in order to avoid an electrical shock.***

Remove the CN5A connector on the control PCB of the electrical box.

Hold the expansion valve coil and slightly rotate, then pull it up. Refer to the figure below to replace the electrical valve. The lock mechanism is equipped with the expansion valve coil. Check to ensure that the expansion valve coil is locked.

No.	Part
1	Electronic expansion valve coil

Removing reversing valve

Remove the service cover and the rear service panel according to the section *Removing Service Cover* and the section *Removing lower part of service panel and rear service panel* in this chapter.

Collect the refrigerant from the check joint according to the section *Removing compressor*.

Remove the reversing valve coil according to the section *Removing reversing valve coil*.

Remove one (1) fixing screw for the valve-mounting plate.

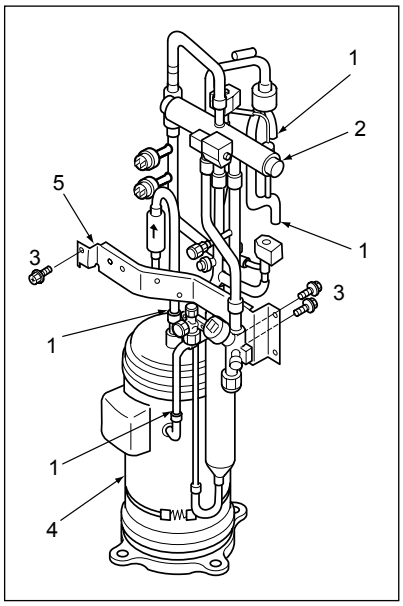
Remove the stop valve at the gas side from the valve-mounting plate by removing the two (2) screws.

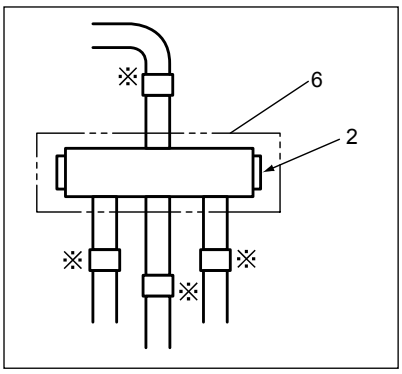
Remove the reversing valve assemblies from the 4 brazed parts where it is fixed. Remove the brazing of the reversing valve and the stop valve at the gas using a blowtorch. Cool down the piping side covering it with wet cloth, in order to avoid brazing material entering the reversing valve. Protect the connecting wires and pipe insulation from the brazing frame.

Remove the reversing valves from its assemblies 4 brazed parts ※.

Perform the brazing with a blowtorchto remove and reassemble the reversing valve by cooling the pipes first with wet cloth in order to avoid brazing material entering the reversing valve.

Reassemble the parts in the reverse order of removing procedures contained in this chapter. When SFV is removed, fix it according to the section *Removing the Reversing Valve and the Solenoid Valve* contained in this chapter.





No.	Part
1	Brazing
2	Reversing valve
3	Screw
4	Compressor
5	Mounting plate
6	Cover by wet cloth

Removing expansion valve

Remove the service cover and rear service panel according to the section *Removing Service Cover* and the section *Removing Lower Part of Service Panel and Rear Service Panel*.

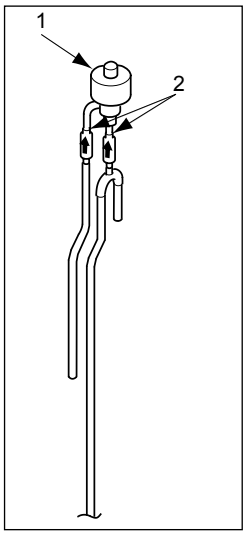
Collect the refrigerant from the check joint according to the section *Removing Compressor*.

Remove the coils according to the section *Removing Electronic Expansion Valve Coil*.

Remove the brazing as shown in the figure below.

- Electronic Expansion Valve (EV0): 2 brazing parts.
- Perform the brazing to remove and reassemble the electronic expansion valve by cooling with wet cloth.
- Protect the connecting wires and pipe insulation from brazing flame.

Reassemble the parts in the reverse order of removing procedures.



No.	Part
1	Expansion valve (EV0)
2	Brazing part

Removing solenoid valve

Remove the service cover and the rear service panel according to the sections *Removing Service Cover* and *Removing lower part of service panel and rear panel*, described in this chapter.

Collect the refrigerant from the check joint according to the section *Removing compressor* in this chapter.

Remove the solenoid valve coil according to the section *Removing coils for reversing valve and solenoid valve* in this chapter.

Remove the brazing and flare nuts as shown. Using a blowtorch and previously cooling the pipe side with wet cloth in order to avoid brazing material entering the reversing valve.

Perform the brazing to remove and reassemble the solenoid valve.

Protect the connecting wires and pipe insulation from the brazing flame.

Remove the flare nuts with two spanners to avoid twisting.

Reassemble the parts in the reverse order of removing procedures.

Removing electrical components

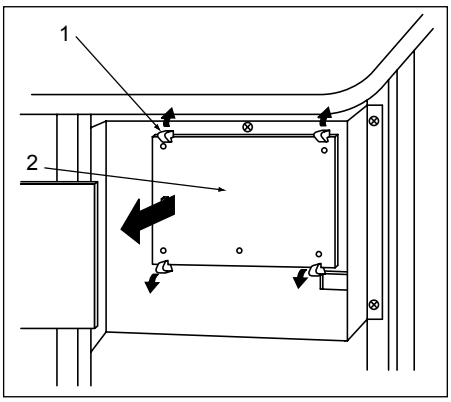
DANGER

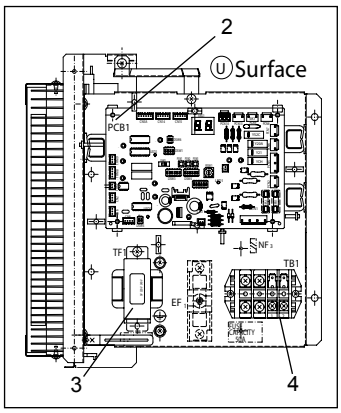
- ***Do not touch the electrical components of the PCB directly.***
- ***When handling the PCB, take care of components. Do not apply excesive force to them, in order to avoid damaging the motherboard and failures***

Remove the service cover according to section *Removing service cover* in this chapter.

- Disconnect all the connectors in the PCB.
- Remove the PCB by sliding four (4) holders in the arrow direction.
- Remove the PCB for power distribution of the compressor and the motor.
- To remove the PCB, slide de four (4) holders in the arrow direction.

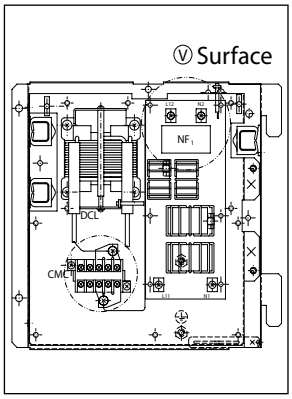
No.	Part
1	Holder (4 pcs.)
2	PCB1 for control
3	Transformer
4	Terminal board

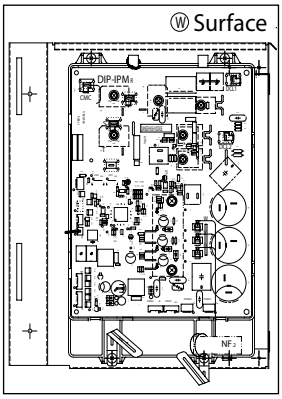


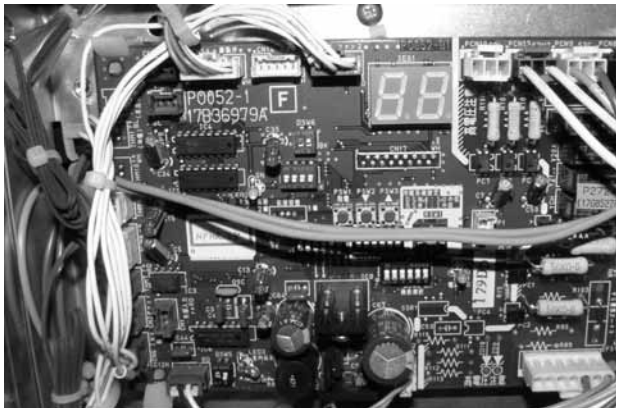


Removing the relay PCB

- Remove the service cover according to the section *Removing Service Cover* in this chapter.
- Disconnect all the wires connected to the relay PCB.







◆ Removing “W” electrical components surface

Remove the service cover according to the section *Removing service cover* in this chapter.

Open the P-mounting plate by rotating 90 degrees to the left according to the section *Opening electrical box* (P-Mounting Plate) in this chapter.

Use a screw driver to push and release the plastic holders retaining the “W” electrical components surface.

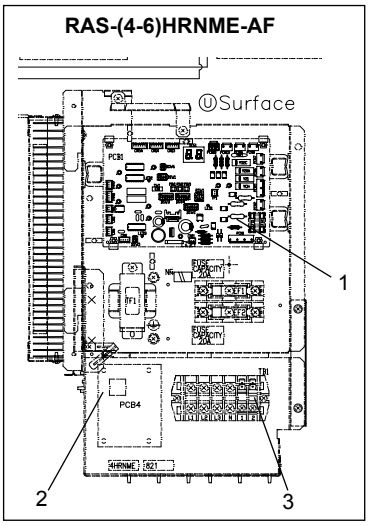
DANGER

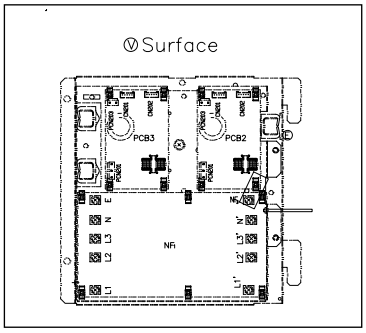
- ***Check that the LED201 (red) located on the “W” surface PCB is OFF when opening the P-mounting plate.***
- ***Do not touch the electrical components when LED201 (Red) located on the “W” surface PCB is ON in order to avoid an electrical shock.***
- ***Identify the terminal numbers with mark band. When reassembling, the terminals have to be connected to the correct numbers. If incorrectly connected, malfunctions or damages will occur.***
- ***In case of replacing control PCB, set all the dip switches as the same position before replacing. If not, malfunction may occur. Refer to the manual attached with the service PCB.***
- ***Do not apply strong force to the electric components and PCBs to avoid damage.***

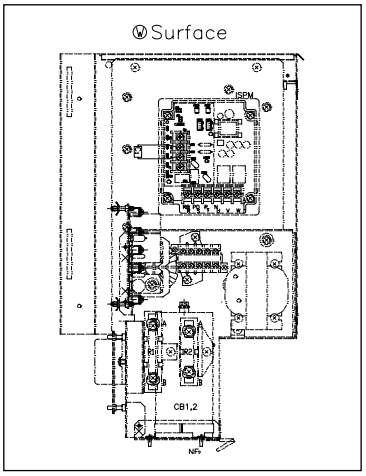
NOTE

Check to ensure that the electrical wires will not be caught between the assembled electrical components and the mounting plates when the “W” electrical components surface is reassembled.

No.	Part
1	PCB1 for control
2	Transformer
3	Terminal board







Removing other electrical components

Remove the service cover according to the section *Removing service cover* in this chapter.

Open the P-mounting plate by rotating it 90 degrees to the left according to the section *Opening electrical box (P-Mounting Plate)* in this chapter.

Check to ensure the LED201 (Red) of the inverter PCB is off when opening P-mounting plate.

Remove other electrical components according to the procedure below.

DANGER

- ***Check that the LED201 (red) located on the "W" surface PCB is OFF when opening the P-mounting plate.***
- ***Do not touch the electrical components when LED201 (Red) located on the "W" surface PCB is ON in order to avoid an electrical shock.***
- ***Identify the terminal numbers with mark band. When reassembling, the terminals have to be connected to the correct numbers . If incorrectly connected, malfunctions or damages will occur.***

NOTE

- ***Disconnect all the wires connected with the smoothing capacitor (CB, CB1, CB2, CA).***
- ***The wire has polar characters. Identify the wire mark band and the indication on the smoothing capacitor when wire connecting.***
- ***Remove the two (2) screws fixing the smoothing capacitor and remove the smoothing capacitor.***
- ***Disconnect all the wires connecting with the magnetic contactor (CMC1).***
- ***Remove the two (2) screws fixing the magnetic contactor and remove the magnetic contactor.***
- ***Remove the four (4) screws fixing the reactor and remove the reactor (DCL).***
- ***Disconnect all the wires connected with the noise filter (NF1).***
- ***Remove the noise filter by clamping the top of the holder (6 portions) with a pincher.***

11.1.4 RAS-(8/10)HRNME-AF

◆ Removing service cover

Remove the main parts according to the following procedures.

NOTE

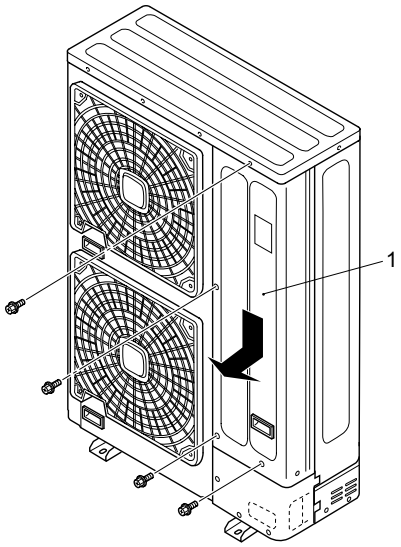
- ***To reassemble perform the procedures in reverse.***
- ***To prevent contamination of the refrigerant with water or foreign particles, do not expose open to atmosphere for long periods.***
- ***If necessary, seal pipe ends using caps or tape.***

Remove the four (4) fixing screws.

Slide the service cover downward and remove it.

Pay attention of not falling off the service cover.

No.	Part
1	Service cover



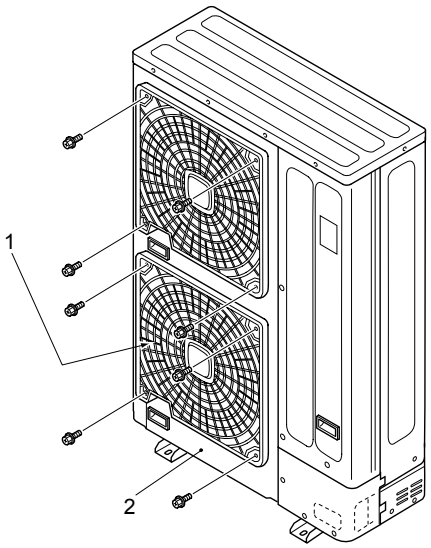
◆ Removing air outlet grille

Remove the eight (8) fixing screws.

Lift the air outlet grille holding the lower parts.

Release the extruded hook of the air outlet grille from the shroud.

No.	Part
1	Air outlet grille
2	Shroud

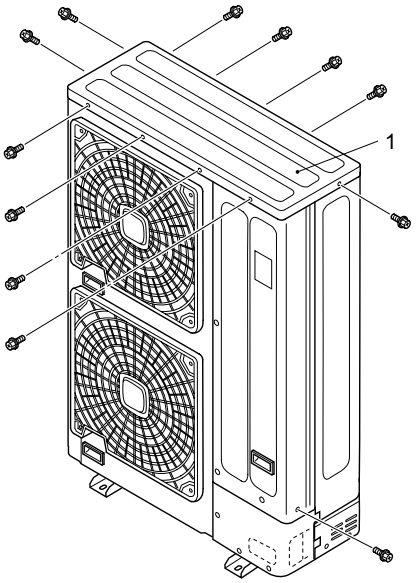


◆ Removing upper cover

Remove the eleven (11) screws fixing the upper cover

Lift the upper cover upwards.

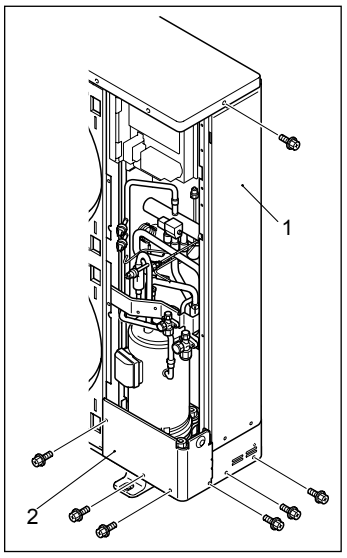
No.	Part
1	Upper cover



◆ Removing the lower part of service panel and rear panel

Remove the five (5) fixing screws at the lower part of the service panel and remove the lower part of the service panel by pulling towards the front side. Remove the upper cover according to section *Removing upper cover* in this chapter.

No.	Part
1	Rear panel
2	The lower part of service panel



NOTE

The length of fixing scews for the outdoor temperature thermistor is different than all other screws in the machine, as an assembly poka-yoke.

◆ Removing outdoor fan motor

Remove the service cover according to the section *Removing service cover* in this chapter.

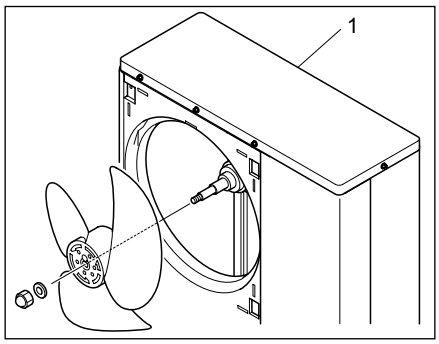
Remove the air outlet grille according to the section *Removing air outlet grille* in this chapter.

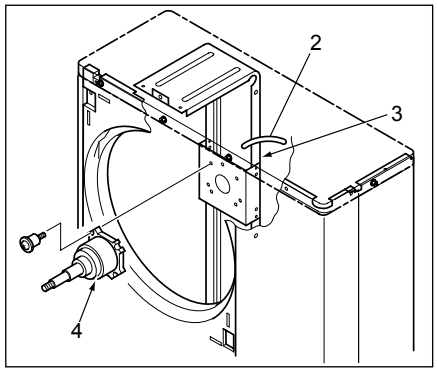
Remove the upper cover according to the section *Removing upper cover* in this chapter.

Disassembly the fan blade by removing the cap nuts and washers fixing the fan blade onto the motor shaft.

If the fan blade get stuck when trying to remove it, use a puller to disassembly the fan.

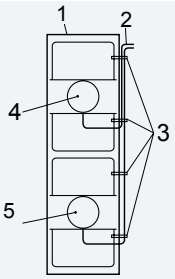
No.	Part
1	Upper cover
2	Fan motor lead wire
3	Motor clamp
4	Fan motor





Fan components and technical features		
Power supply		3N~ 380-415V 50Hz
Fan motor comp.No.	DC fan motor	PCB5 PCN203 CN201
	AC fan motor	PCB3 PCN404 (White)
Screw for motor fixing	DC Fan Motor	M6 Screw with spacer x 4
	AC Fan Motor	M8 Screw x 4
Motor clamp and wiring fixing position		

No.	Part
1	Motor clamp
2	Fan motor lead wire
3	Cable tie
4	DC fan motor
5	AC fan motor



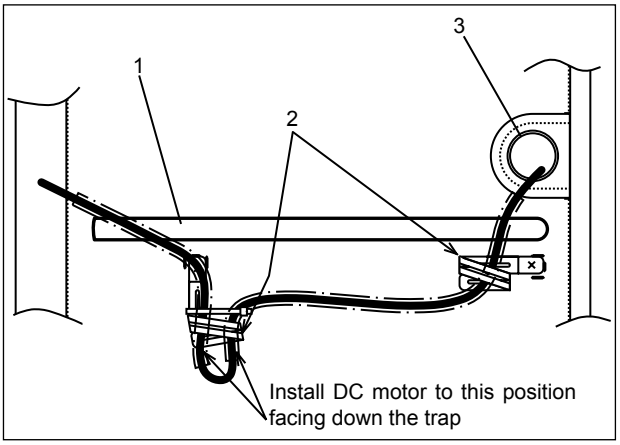
Remove the fan motor connector from the PCB3 and PCB5 at the electrical box.

- Cut off the cable tie that fixes the lead wire of the fan motor.
- Remove the four (4) screws that fix the motor to the motor clamp.

Fix the motor wire with the cable tie or the cord clamp. If not, it may cause the disconnection of the fan motor's lead wire.

In order to avoid cutting edges, mount the rubber bush at the partition plate when inserting the motor wire through it. If not, it may cause the disconnection to the fan motor's lead wire.

No.	Part
1	Partition plate
2	Cord holder or cable tie
3	Rubber bush



NOTE

- ***When assembling the motor, ensure the cables section directly downwards. Fix the protection tube edge end downwards to ensure water from keeping inside it***
- ***Fix the motor wires onto the motor clamp with a cable tie to prevent them from collisioning the fun blades.***
- ***Assembling the fan blade: Insert the skidding protection part of fan boss in accordance with the cutting part of the motor shaft, and fix the screw after dismounting the screwed part of the shaft. (Tightening Torque of 20 N.m)***
- ***When connecting the motor wire, check to ensure that the colors of the connectors on the PCB3 and PCB5 are matched with the wires.***
- ***Fix the air outlet grille firmly to the shroud.***

◆ Removing the compressor

Remove the service cover and the lower part of the service panel according to the section *Removing service cover* and the section *Removing lower part of service panel and rear panel*. In case that the outdoor unit is installed close to a wall closely, sepparate first the outdoor unit from the wall.

Collect the refrigerant from the liquid stop valve, the gas stop valve and the check joint at the piping.

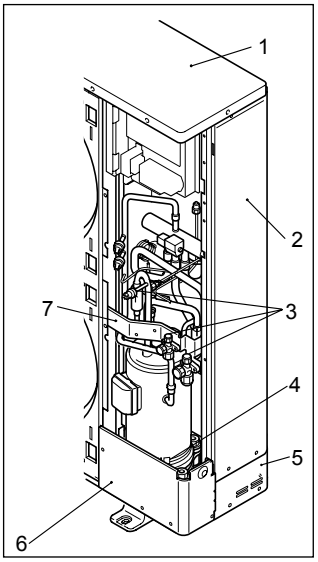
Open the sound insulation cover wrapped around the compressor and remove the terminal box cover at the compressor fixed by one (1) screw. Disconnect the compressor wires in the terminal box and remove the sound insulation cover.

NOTE

Check and take note of each terminal number and indications for its correct connection at the reasembling process. If wires are connected in incorrect order, it will lead to a compressor failure.

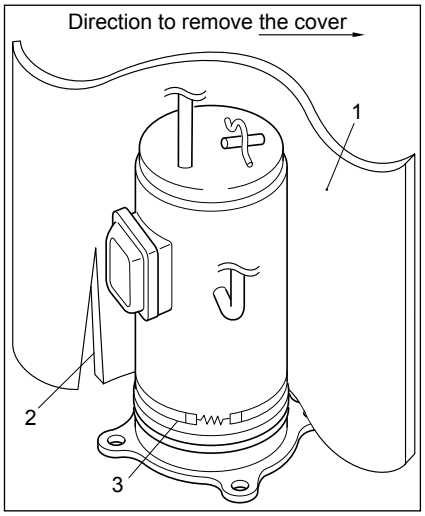
Remove the rubber cap and the thermistor on the top of the compressor.

Remove the crankcase heater (Oil heater on the lower case).

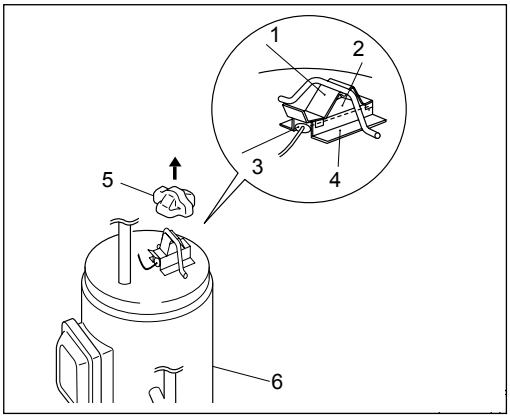


No.	Part
1	Upper cover
2	Rear panel
3	Check joint
4	Crankcase heater
5	Rear pipe cover
6	Lower part of service panel
7	Valve stay

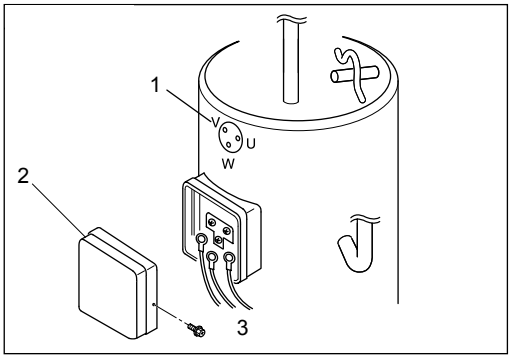
No.	Part
1	Sound-proof cover
2	Cut part
3	Oil heater



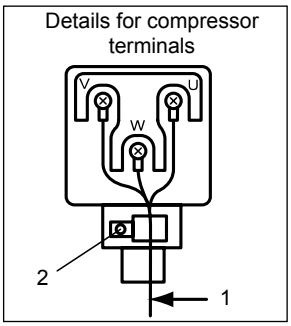
No.	Part
1	Thermistor holder
2	Holder
3	Td Thermistor
4	Thermistor fixing plate
5	Rubber cap Th Thermistor
6	Compressor



No.	Part
1	Indication of terminal number
2	Terminal box cover
3	Compressor wires



No.	Part
1	Compressor wires (3 wires)
2	Fix it with screw



NOTE

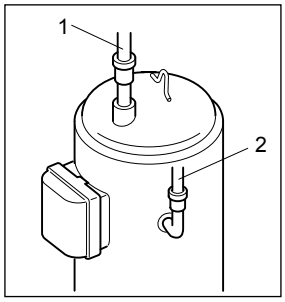
- ***The compressor is connected by brazing. Check to ensure whether there are flammable things around or not when using a burner for pipe connections. If you do not´, oil existing pipe inside may ignite.***
- ***Do not expose the refrigerant cycle to the atmosphere for a long period in order to avoid water and foreign particles entering into the refrigerant cycle. After removing the compressor, replace it quickly. If it is exposed to the ambiance for a long period, seal both suction and discharge pipes.***
- ***Remove the cap for the compressor just before replacing the compressor. Before assembling the compressor, seal the suction pipe and discharge pipe with tape to protect the compressor interior from foreign particles. Remove the tape when connecting the pipes.***
- ***Match the terminal No. with the mark band No. when reassembling. If the wiring is connected incorrectly, the compressor may be damaged due to reverse rotation.***
- ***If there is a clearance between the oil heater and the compressor due to wire overlapping, excessive heat is generated there. Then the oil heater is failed due to overheating. When mounting the reassembled oil heater, this point should be taken into account.***
- ***If the oil heater lead wire is caught on the spring, the lead wire may be cut due to vibration. When reassembling, attention should be paid to the lead wire.***

CAUTION

All compressor pipes must be brazed to be connected to the refrigerant circuit. Ensure that all the sourrounding is free of flammable objects and liquids when performing piping brazing work.

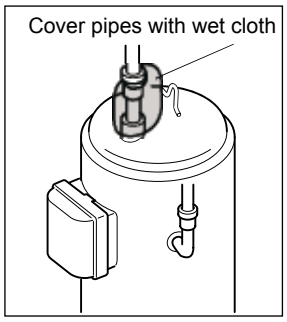
Remove the suction pipe and the discharge pipe from the compressor. Isolate the wires and electrical components to protect them from the burner flame when brazing the connection pipes.

No.	Part
1	Suction pipe
2	Discharge pipe

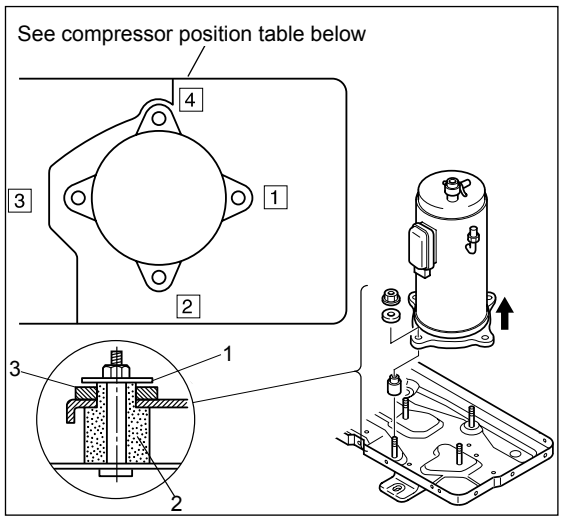


Remove the two (2) nuts fixing the compressor and remove the compressor from the unit by lifting it. Slightly incline it forward and lift.

For brazing the compressor connection pipes, first cool down the compresor piping side covering it with wet clooth. Then brazing material will not enter into the compressor. If the brazing material enters the compressor, it will cause compressor failures.



Fixation of the compressor to the bottom plate				
Compressor position	1	2	3	4
Vibration-proof rubber 1	○	○	○	○
Vibration-proof rubber 2	○	○	–	–
Nut	○	○	–	–



No.	Part
1	Nut and washer
2	Vibration-Proof rubber 1
3	Vibration-Proof rubber 2

Reassemble the parts in the reverse order of the indicated removing procedures.

- Tighten the screws (U, V and W) for compressor wires with 2.5 N.m.
- Fix the lead wire firmly.
- Attach the oil heater firmly to the compressor and fix it with the spring.

NOTE

Fix the lead wire for the compressor firmly using a cable tie to aviod contacting the metal sheet sharp edges and the high temperature piping.

◆ Removing high pressure switch and control pressure switch

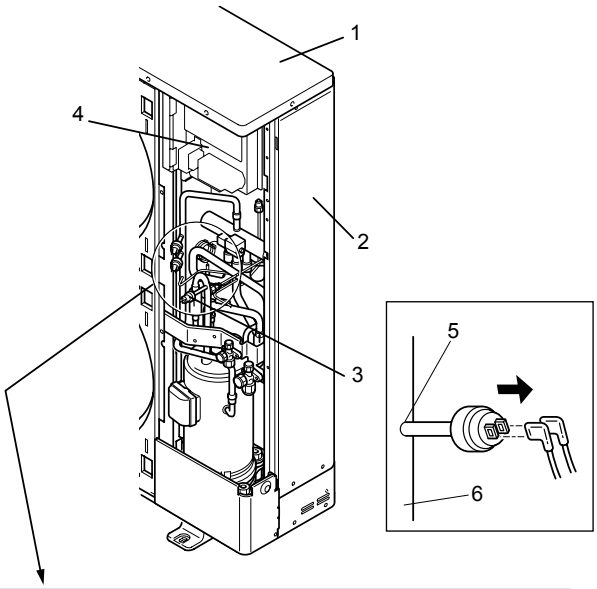
Remove the service cover according to the section *Removing service cover* in this chapter.

Collect the refrigerant from the check joint according to the section *Removing the compressor* in this chapter.

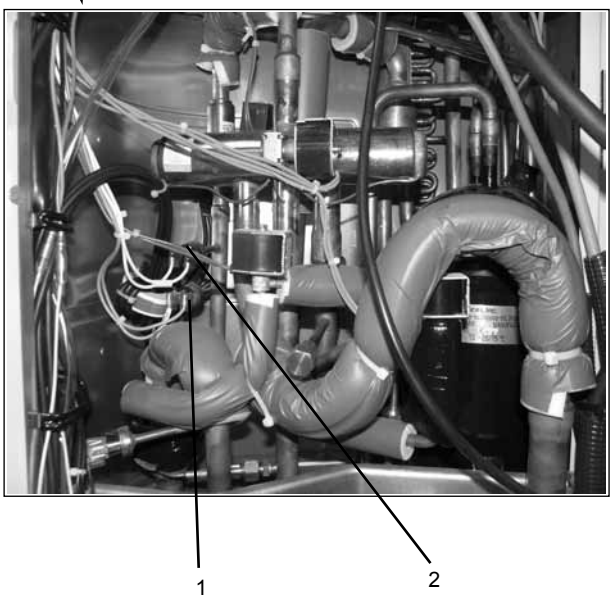
Disconnect the fasten terminals from the pressure switches.

- Cut the high pressure switch (63H1) and control pressure switch (63H2) from the brazing neck using a burner.

No.	Part
1	Upper cover
2	Rear cover
3	Pressure switch for control (63L)
4	Electrical box
5	Brazing
6	Discharge pipe



No.	Part
1	High pressure switch (63H1)
2	Pressure switch for control (63H2)

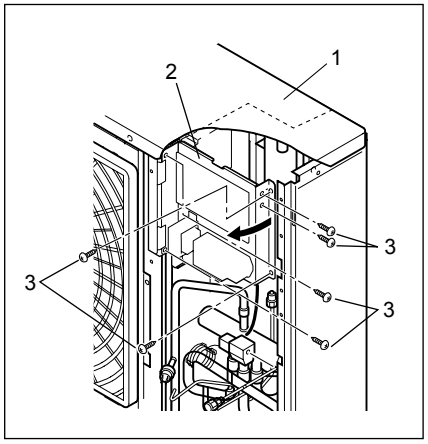


◆ Opening electrical box (P-mounting plate)

Remove the service cover according to the section *Removing the service cover* in this chapter.

- Remove the six (6) screws fixing the electrical box. Open the P-mounting plate by rotating it 90 degrees to the left.

No.	Part
1	Upper cover
2	P-Mounting plate
3	2 Screws



DANGER

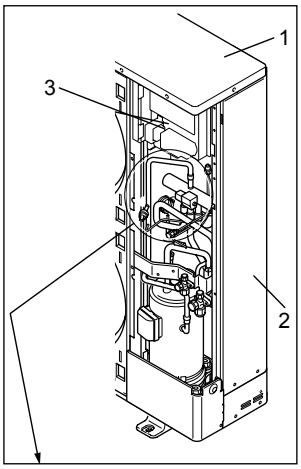
- ***Check that the LED201 (red) located on the "W" surface PCB is OFF when opening the P-mounting plate.***
- ***Do not touch the electrical components when LED201 (Red) located on the "W" surface PCB is ON in order to avoid an electrical shock.***

◆ Removing the coils for the reversing and solenoid valves (SVA1, SVA2 and SVF)

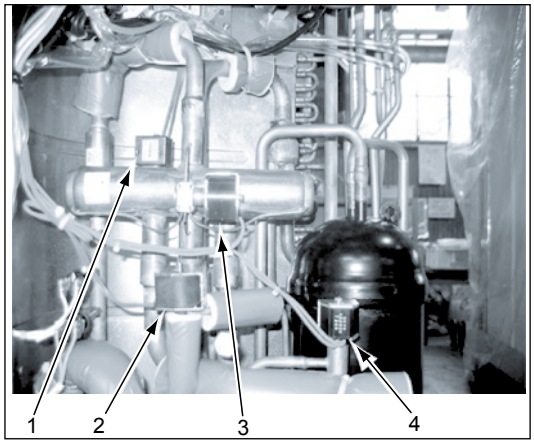
Remove the service cover according to the section *Removing service cover* in this chapter.

Open the P-mounting plate according to the section *Opening electrical box (P-Mounting Plate)* in this chapter.

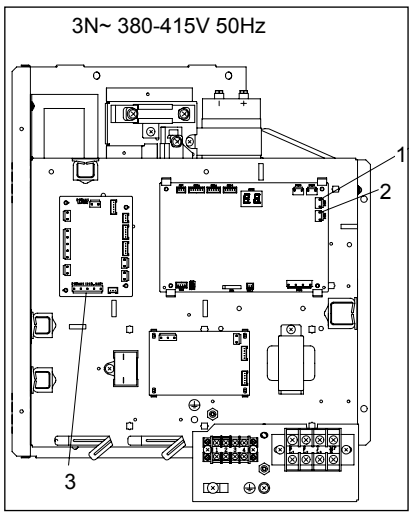
No.	Part
1	Upper cover
2	Rear cover
3	Electrical box



No.	Part
1	SVA2
2	SVF
3	Reversing valve coil
4	SVA1



No.	Part
1	PCN7 (SVA2)
2	PCN6 (RVR)
3	PCN402 (SVA1, SVF)



NOTE

- ***Do not touch the electrical components when the LED201 (Red), located on "W" surface PCB is ON in order to avoid electrical shock.***
- ***Remove the connectors on the control PCB of the electrical box.***
- ***Remove the reversing valve coil by removing the screw fixing the coil.***

◆ Removing expansion valve coil

Remove the service cover according to the section *Removing service cover*.

Open the P-mounting plate according to the section *Opening electrical box (P-Mounting Plate)* in this chapter.

DANGER

- ***Check that the LED201 (red) located on the "W" surface PCB is OFF when opening the P-mounting plate.***
- ***Do not touch the electrical components when LED201 (Red) located on the "W" surface PCB is ON in order to avoid an electrical shock.***

Remove the CN5A connector on the control PCB of the electrical box.

Hold the expansion valve coil and slightly rotate, then pull it up. Refer to the figure below to replace the electrical valve. The lock mechanism is equipped with the expansion valve coil. Check to ensure that the expansion valve coil is locked.

No.	Part
1	Electronic expansion valve coil

◆ Removing reversing valve

Remove the service cover and the rear service panel according to the section *Removing Service Cover* and the section *Removing lower part of service panel and rear service panel* in this chapter.

Collect the refrigerant from the check joint according to the section *Removing compressor*.

Remove the reversing valve coil according to the section *Removing reversing valve coil*.

Remove one (1) fixing screw for the valve-mounting plate.

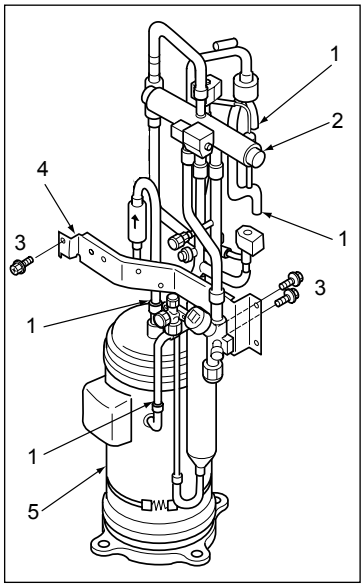
Remove the stop valve at the gas side from the valve-mounting plate by removing the two (2) screws.

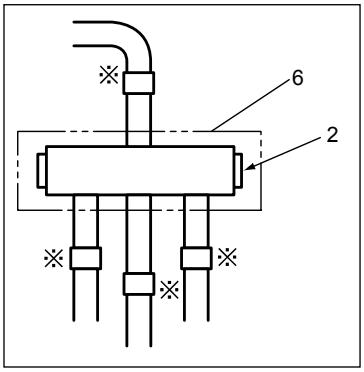
Remove the reversing valve assemblies from the 4 brazed parts where it is fixed. Remove the brazing of the reversing valve and the stop valve at the gas using a blowtorch. Cool down the piping side covering it with wet cloth, in order to avoid brazing material entering the reversing valve. Protect the connecting wires and pipe insulation from the brazing frame.

Remove the reversing valves from its assemblies 4 brazed parts ※.

Perform the brazing with a blowtorchto remove and reassemble the reversing valve by cooling the pipes first with wet cloth in order to avoid brazing material entering the reversing valve.

Reassemble the parts in the reverse order of removing procedures contained in this chapter. When SFV is removed, fix it according to the section *Removing the Reversing Valve and the Solenoid Valve* contained in this chapter.





No.	Part
1	Brazing
2	Reversing valve
3	Screw
4	Mounting plate
5	Compressor
6	Cover by wet cloth

◆ Removing expansion valve

Remove the service cover and rear service panel according to the section *Removing Service Cover* and the section *Removing Lower Part of Service Panel and Rear Service Panel*.

Collect the refrigerant from the check joint according to the section *Removing Compressor*.

Remove the coils according to the section *Removing Electronic Expansion Valve Coil*.

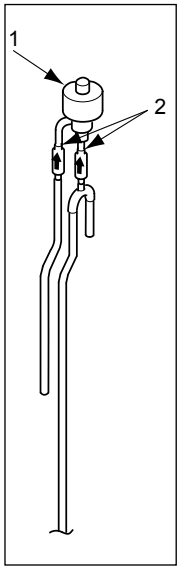
Remove the brazing as shown in the figure below.

Electronic Expansion Valve (EV0): 2 brazing parts.

Perform the brazing to remove and reassemble the electronic expansion valve by cooling with wet cloth.

Protect the connecting wires and pipe insulation from brazing flame.

Reassemble the parts in the reverse order of removing procedures.



No.	Part
1	Expansion valve (EV0)
2	Brazing part

◆ Removing solenoid valve

Remove the service cover and the rear service panel according to the sections *Removing Service Cover* and *Removing lower part of service panel and rear panel*, described in this chapter .

Collect the refrigerant from the check joint according to the section *Removing compressor* in this chapter.

Remove the solenoid valve coil according to the section *Removing coils for reversing valve and solenoid valve (SVA1, SVA2 and SVF)* in this chapter.

Remove the brazing and flare nuts as shown in the figure below. Using a blowtorch and previously cooling the pipe side with wet cloth in order to avoid brazing material entering the reversing valve.

- Solenoid Valve (SVA1): 2 brazing parts
- Solenoid Valve (SVA2): 2 brazing parts
- Solenoid Valve (SVF): 2 brazing coils

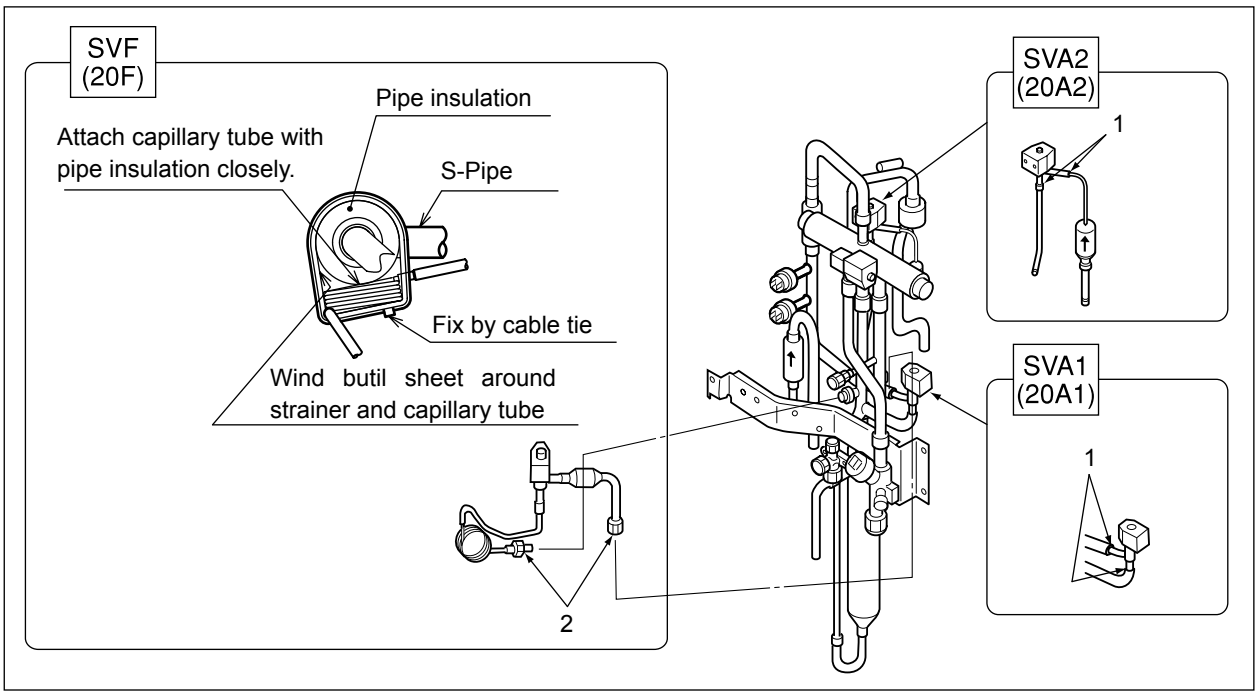
Perform the brazing to remove and reassemble the solenoid valve.

Protect the connecting wires and pipe insulation from the brazing flame.

Remove the flare nuts with two spanners to avoid twisting.

Reassemble the parts in the reverse order of removing order of removing procedures.

Fix the solenoid valve SVF as shown in the figure below.



No.	Part
1	Brazing
2	Flare connection

◆ Removing electrical components

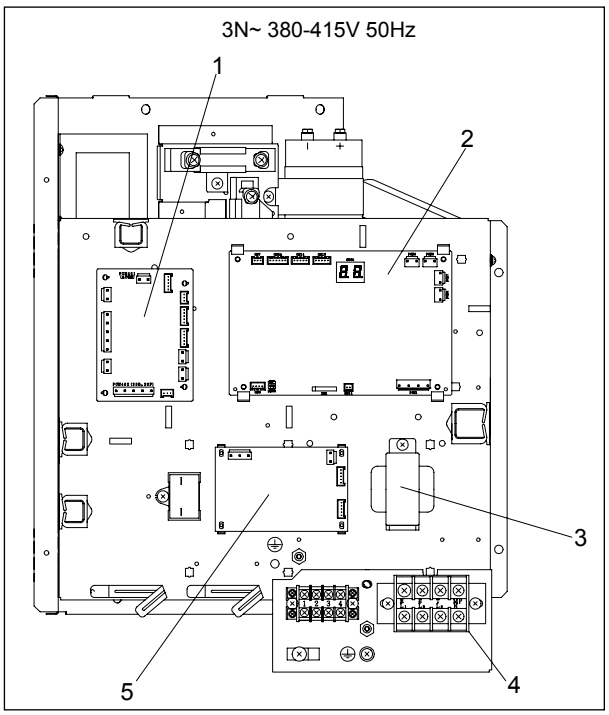
DANGER

- ***Do not touch the electrical components.***
- ***When handling the PCB1, take care not to use excessive force to avoid damage.***

Remove the service cover according to section *Removing service cover* in this chapter.

- Disconnect all the connectors in the PCB.
- Remove the PCB by sliding four (4) holders in the arrow direction.
- Remove the PCB for power distribution of the compressor and the motor.

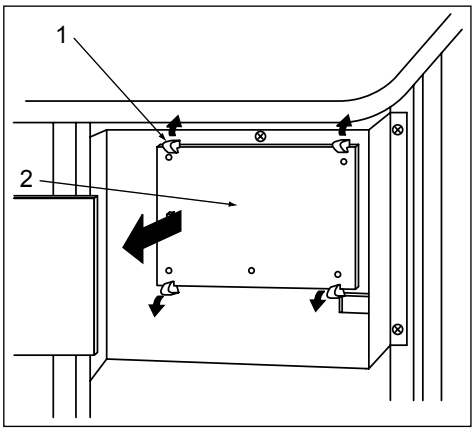
No.	Part
1	PCB3
2	PCB1 for control
3	Transformer
4	Terminal board
5	PCB5



Removing the relay PCB

- Remove the service cover according to the section *Removing Service Cover* in this chapter.
- Disconnect all the wires connected to the relay PCB.

No.	Part
1	Holder (4 pcs.)
2	PCB 1 for control



NOTE

- ***Do NOT touch the electrical components of the PCB.***
- ***Do NOT apply strong force to the electrical components and PCBs to avoid failure.***

◆ Removing inverter components

DANGER

- **Do not touch the electrical parts when LED201 (Red) on the PCB2 is lit to prevent from an electrical shock.**
- ***When replacing the transistor module (IPM) and diode module (DM) on heat radiation fin, slightly apply the heat conducting silicon grease (Manufacture: Shin-Etsu Chemical Co., Ltd, Product No.: G-746) over the fin contact surface.***
- ***Identify the terminal numbers with mark band. When reassembling, the terminals have to be connected to the correct numbers . If incorrectly connected, malfunctions or damages will occur.***
- ***Correctly insert two wires of U and V phases for the power cable of inverter compressor into the current sensor, CTU and CTV on PCB2. Connect Phase U power cable with the current sensor Phase U (CTU) and Phase V power line with current sensor Phase V (CTV). If connected incorrectly, malfunction or electrical component damage will occur.***
- ***When mounting PCB and the sheet metal part for PCB, pay attention not to clamp the electrical wiring together.***
- ***Screws, bushes and collars are used for fixing inverter PCB. Check to ensure that the bushes and collars are used for PCB remounting. If not used, it may cause malfunction.***
- ***In case of replacing control PCB, set all the dip switches as the same position before replacing. If not, malfunction may occur. Refer to the manual attached with the service PCB.***
- ***Do not apply strong force to the electric components and PCBs to avoid damage.***
- ***Do NOT touch the electrical components when the LED201 (Red) is ON to avoid electrical shock.***

Remove the service cover according to the section *Removing service cover* in this chapter.

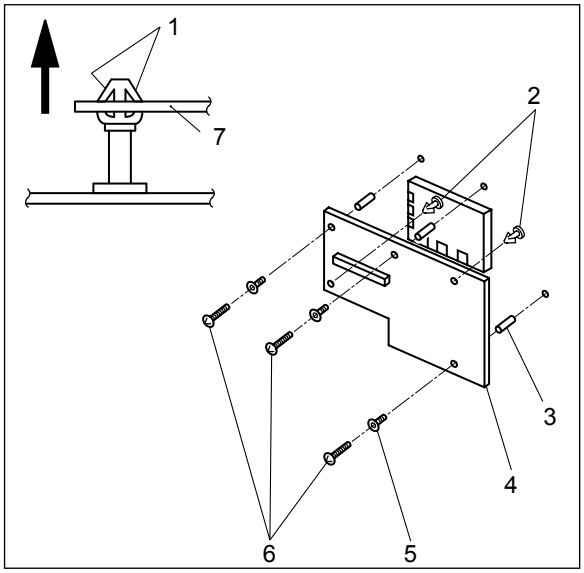
Open the P-mounting plate by rotating 90 degrees to the left according to the section *Opening electrical box (P-Mounting Plate)* in this chapter.

Removing the PCB2

Check to ensure that the LED201 (Red) of the PCB2 is OFF.

After removing the three (3) M3 fixing screws, remove the bushes and the collars from the PCB2. When reassembling the components, attach those bushes and collars.

No.	Part
1	Middle part of holder
2	Holder
3	Collar
4	PCB3
5	Bush
6	Screw (M3)
7	PCB



NOTE

- ***Identify the terminal numbers with mark band. When reassembling, the terminals have to be connected to the correct numbers . If incorrectly connected, malfunctions or damages will occur.***
- ***Check to ensure that the electrical wires will not be caught between the assembled electrical components and the mounting plates when the PCB2 is reassembled.***

Removing diode module and transistor module

DANGER

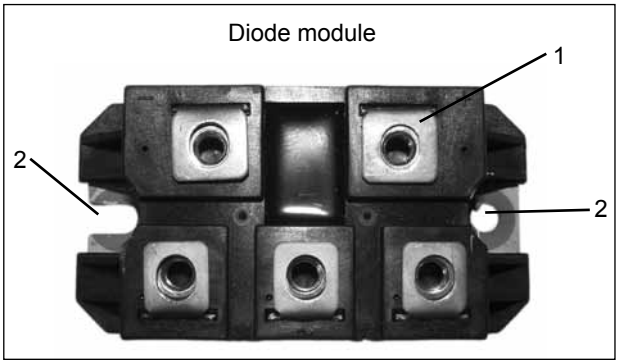
Do NOT touch the electrical components when the LED201 (Red) on PCB2 is ON to avoid electrical shock.

Check to ensure that the LED201 (Red) of the PCB2 is off.

Disconnect all the wirings connected to the diode module as shown in the figure:

- Disconnect the wirings of the terminals +, - , U, V, W on the diode module.
- Remove the two (2) screws fixing the diode module.
- Remove the diode module from the electrical box.

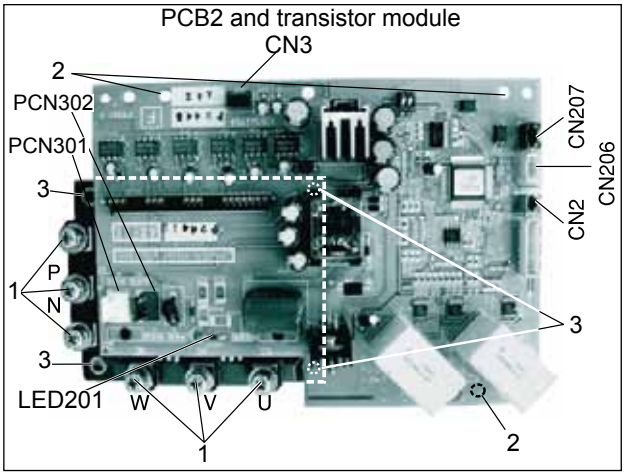
No.	Part
1	5 Screws (M5)
2	Fixing screw (M5)



Disconnect all the wirings connected to the transistor module as shown in the figure:

- Disconnect the wirings of connector CN2, CN206 and CN207.
- Disconnect the wirings from P, N, U, V, W on the transistor module.
- Remove the three (4) screws fixing the PCB2 and then remove the PCB2 from the transistor module.
- Remove the four (4) fixing screws on the transistor module.
- Remove the transistor module from the electrical box.

No.	Part
1	Screw (M5)
2	Screws for PCB2 (M3)
3	Fixing screws for transistor module (M4)



NOTE

- ***The correct position of the marks on the PCB2 is upside down when being assembled.***
- ***Identify the terminal Nos. with the mark band Nos. when reassembling. If incorrectly connected, malfunction or damage will occur.***
- ***Check to ensure that the electrical wires will not be caught between the mounting electrical components and the mounting plates when the PCB2 is remounted.***
- ***Apply silicon grease evenly on the whole rear side of the diode module and the transistor module when mounting. Silicon grease is available as a field-supplied accessory.***

◆ Removing other electrical components

DANGER

Do NOT touch the electrical components when the LED201 (Red) on PCB2 is ON to avoid electrical shock.

Remove the service cover according to the section *Removing service cover* in this chapter.

Open the P-mounting plate by rotating it 90 degrees to the left according to the section *Opening electrical box (P-Mounting Plate)* in this chapter.

Check to ensure the LED201 (Red) of the inverter PCB is off when opening P-mounting plate.

Remove other electrical components according to the procedure below, and the figures on *Removing service cover* in this chapter.

NOTE

- ***Disconnect all the wires connected with the smoothing capacitor (CB, CB1, CB2, CA).***
- ***The wire has polar characters. Identify the wire mark band and the indication on the smoothing capacitor when wire connecting.***
- ***Remove the two (2) screws fixing the smoothing capacitor and remove the smoothing capacitor.***
- ***Disconnect all the wires connecting with the magnetic contactor (CMC1).***
- ***Remove the two (2) screws fixing the magnetic contactor and remove the magnetic contactor.***
- ***Remove the four (4) screws fixing the reactor and remove the reactor (DCL).***
- ***Disconnect all the wires connected with the noise filter (NF1).***
- ***Identify the terminal numbers with mark band. When reassembling, the terminals have to be connected to the correct numbers . If incorrectly connected, malfunctions or damages will occur.***

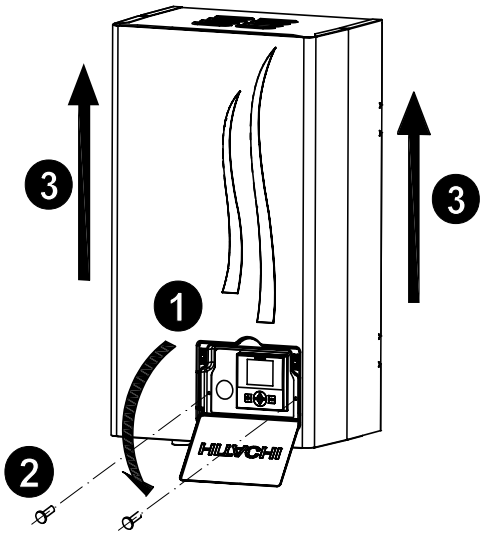
11.2 Indoor unit

CAUTION

- Before performing any of the service operations described in this chapter, turn all the main switches off and place security lockers or convenient warning indicators in order to prevent them from turning on accidentally.
- In case of blocked or sticked parts, use appropriated tools and eventually lubricants to release them.
- In case of sharped edged parts, as covers, use security gloves to avoid getting injured.
- When performing brazing work, besides security gloves it is a must to wear convenient eye protection.

11.2.1 Removing service cover

1 First, open the user's interface service cover.
2 Unscrew the two screws with the nylon washers between the screw and the cover.
3 Slide the service cover upward and remove it turning it from your left side.

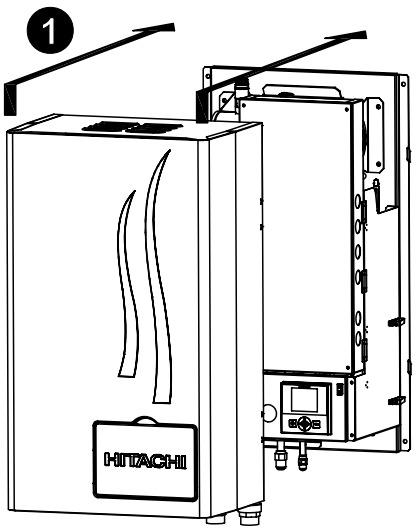


CAUTION

- ***Take care, do not damage the LCD when removing the service cover.***
- ***Pay attention of no falling off the service cover.***
- ***Take care when removing service cover; the parts inside the unit could be hot.***

NOTE

Check cover assembling label sticked on the Electrical Box for reference or Chapter *Cover assembly* ***for reverse instruction.***



11.2.2 Replacing electrical components

DANGER

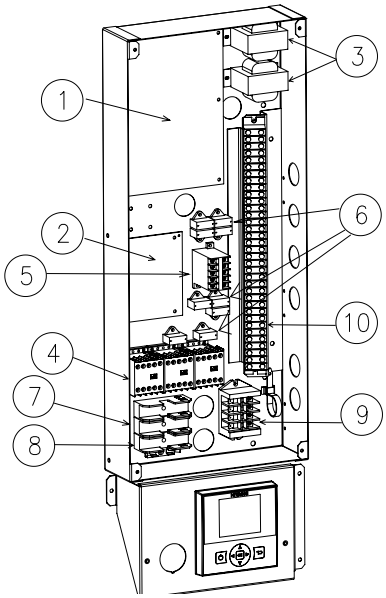
- ***Disconnect the Yutaki S from the power supply before touching any of the parts. Do not touch the electrical box before disconnecting it in order to avoid an electrical shock.***
- ***When handling the electrical box, take care of components. Do not apply excessive force to them, in order to avoid damaging the electrical components.***

◆ Removing electrical box components

1 Remove electrical box cover, for accessing to the electrical components (x4 screws).

Electrical box components

Item	Part name	Remarks
1	Printed circuit board (PCB1)	Main printed circuit board for control of the unit.
2	Printed circuit board (PCB2)	Secondary printed circuit board for additional control signals.
3	Transformers (TR1/TR2)	Current transformer.
4	Electrical heater contactors (AR1/2/3)	Heater contactors for the control step and cut off system.
5	Pump contactor (52P)	Water pump contactor.
6	Noise filters (NK1~9)	Noise filter for PCB current peak protection.
7	Electrical heater fuses (EF1/2/3)	Fuses for electrical heater protection.
8	Water pump fuse (EF4)	Fuse for water pump protection.
9	Terminal Board 1 (TB1)	Terminal board for power supply.
10	Terminal Board 2 (TB2)	Terminal board for indoor/outdoor communication and Intelligent room thermostat and accessory devices.



◆ Replace electrical box

1 Remove Electrical box cover, for accessing to the electrical components (x4 screws).
2 Removing Electrical box:

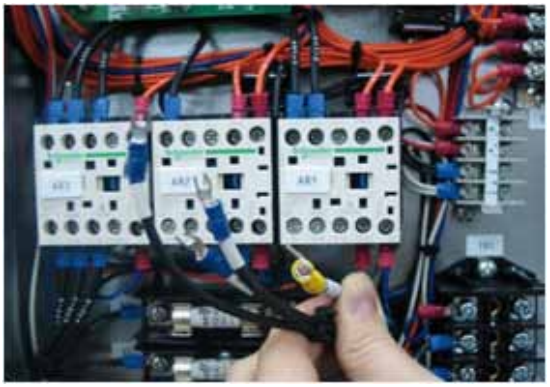
- Step 1: Disconnect all external devices from Terminal Board
- Step 2: Disconnect all internal unit devices inside electrical box:
  - Step 2a (Indoor unit devices 1)
    - Electrical Heater power connection:

      Disconnect AR2-2 wire

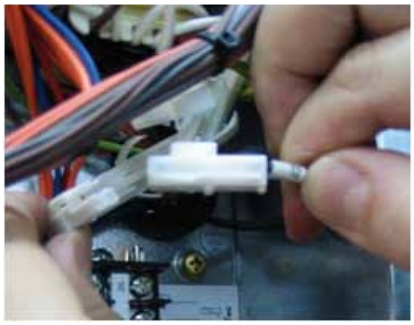
      Disconnect AR3-2 wire

      Disconnect AR3-4 wire

      Disconnect TB1-N wire



- Step 2b (Indoor unit devices 2)
  - Water flow switch wire (CN25)
  - Water pressure switch wire (CN24)
  - Electrical heater thermal fuse wire (CN23)
  - Electrical heater surface thermostat wire (THe)
  - Water pump wire (CN23)



- Step 2c (Indoor unit sensors)
  - Water inlet sensor (THM_{WI}) (CN9)
  - Water outlet sensor HP (THM_{WOHP})(CN14)
  - Water outlet sensor (THM_{WO})(CN13)
  - Refrigerant liquid sensor (THM_{L})(CN11)
  - Refrigerant gas sensor (THM_{G})(CN12)

- Step 2d (Expansion valve and LCD Controller)
  - Expansion valve wires (CN7A) (*1)
  - LCD Controller wire (CN1 of LCD Controller) (*2)

NOTE

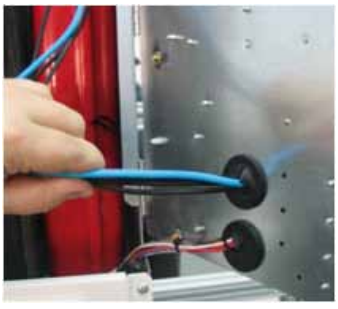
(*1): 8/10HP: Disconnect CN402 & CN403 from PCB3.

(*2): Check Replace LCD controller instruction.

- Step 3: After disconnecting all internal devices from the electrical box, remove electrical box as shown:

  - Step 3a (Remove fixed screws)
    - Remove internal electrical box fixation screws (x3) (in the left side)

  - Step 3b (Remove wires)
    - Turn Electrical box and removes all cables from the packing glands.



- Step 3c (Remove hinges screws)
  - Remove x6 hinges screws on the right side of electrical box. *

NOTE

**** Pay attention to avoid Electrical box falling down when removing screws.***

3 Assembly new electrical box by perform the procedure above in reverse way.

◆ Replacing thermistors (THM_{WO}, THM_{WOHP}, THM_{WI}, THM_{L}, THM_{G})

DANGER

Disconnect the Yutaki S from the power supply before touching any of the parts. Do not touch the electrical box before disconnecting it in order to avoid an electrical shock.

When handling the electrical box, take care of components. Do not apply excessive force to them, in order to avoid damaging the electrical components and failures.

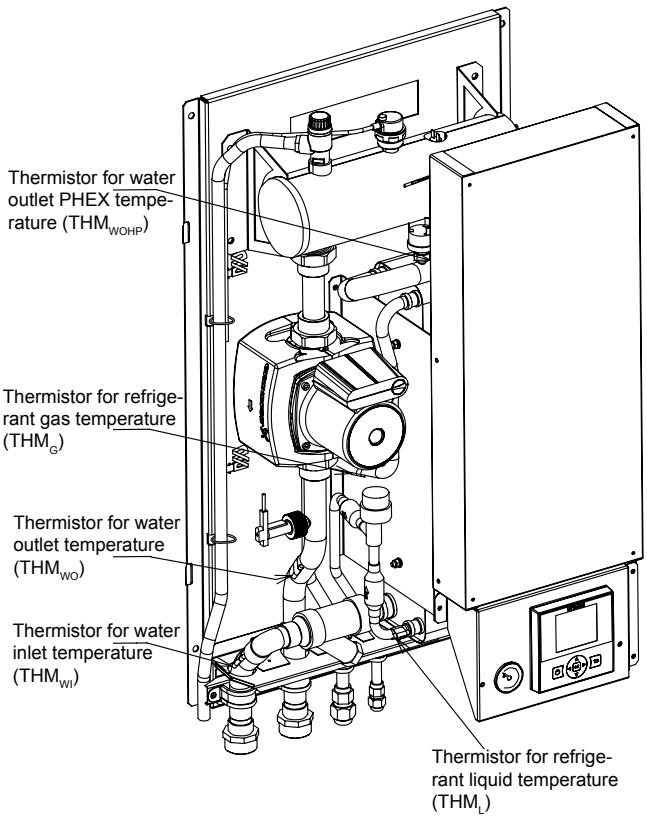
To disconnect these components properly from the PCB, see the Electrical wiring diagram chapter of this manual.

Cover the thermistors with the cork tape or pipe insulation according to each location. Both materials are factory supplied. Replace them if damaged during the servicing.

1 Remove service cover.
2 Remove the electrical box cover.
3 Disconnect these components properly from the connector of PCB 2:

THM_{WO}	--> CN13
THM_{WOHP}	--> CN14
THM_{WI}	--> CN9
THM_{L}	--> CN11
THM_{G}	--> CN12

4 Remove the wire sensor from the electrical box.
5 Remove the pipe insulation of thermistor.
6 Remove special clamp that is attached with copper pipe and sensor.

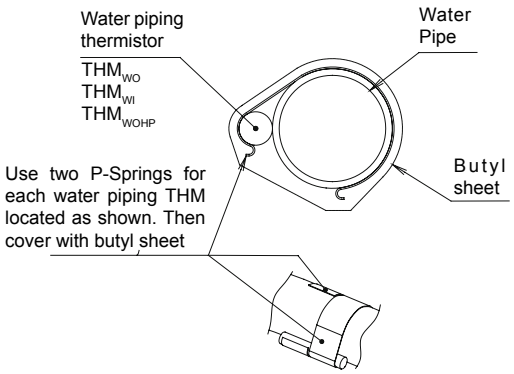


CAUTION

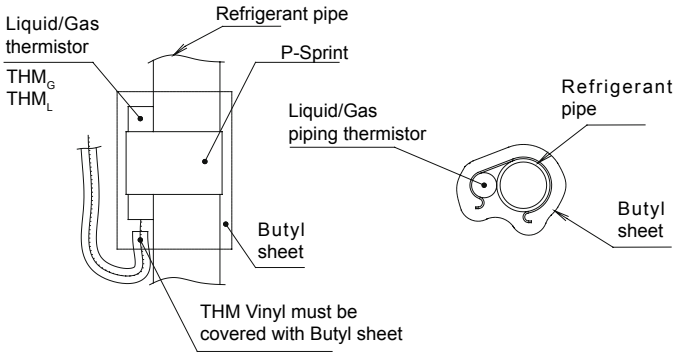
In case of P-Spring deforming, it needs to be replaced.

7 Install new thermistor using P-Spring and Butyl Sheet as shown in the following drawing:

Replacing water thermistor



Replacing water thermistor



8 Install thermistor wire by perform the process in reverse.

◆ Replacing LCD controller

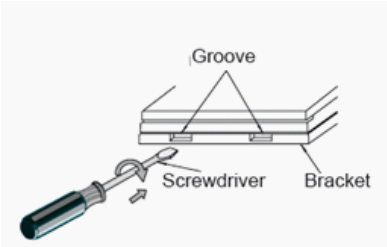
NOTE

To disconnect this component properly from the Electrical Box, see the Electrical wiring diagram chapter of this manual.

CAUTION

- ***Pay attention do not touch the micro and other components on LCD controller PCB. (This is malfunction protection by static electricity).***
- ***Pay attention do not disconnect the flat cable between LCD Buttons and LCD PCB.***

1 Using a flat-head screwdriver, separate the control unit bracket from the front section as indicated.



2 Disconnect connector CN1

3 Replace LCD controller by a new one.

◆ Replace electrical heater safety surface thermostat (THe)

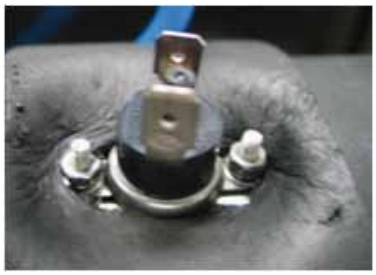
NOTE

To disconnect this component properly from the Electrical box, see the *Electrical wiring diagram* chapter of this manual.

1 Remove service cover.

2 Disconnect the safety thermostat (THe) by pulling upwards the faston connections.

3 Open the insulation carefully over the fixing nuts (both sides).



4 Remove x2 nuts (M3) by using box spanner.

5 Install the Surface thermostat by using thermic paste on the contact surface.

NOTE

Be sure that the contact surface of the new thermostat is completely joined with the heater surface.

6 Tighten the nuts with box spanner.

7 Cover the surface thermostat with the insulation remove in point 2.

8 Connect again the faston connections in to a new surface thermostat and cover it by using cap attached with the wire.

NOTE

Ensure a perfect insulation inside Surface thermostat, in case of not good insulation can be a dangerous by condensing water in to the top of the heater.

11.2.3 Replacing hydraulic components

DANGER

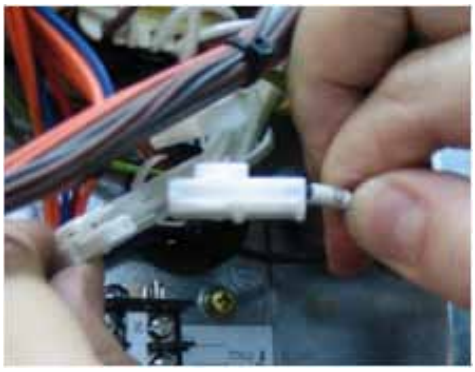
- ***Disconnect the Yutaki S from the power supply before touching any of the parts. Do not touch the electrical box before disconnecting it in order to avoid an electrical shock.***
- ***Wait minimum 10 minutes or more from all power supplies have been turned OFF.***
- ***In case of replacing Hydraulic parts, drain water from the unit its needed. Close Shutdown valves and open the drain valves.***

◆ **Replace water flow switch (WFS)**

NOTE

To disconnect this component properly from the Electrical box, see the Electrical wiring diagram chapter of this manual.

1 Remove service cover.
2 Remove the electrical box cover.
3 Disconnect the water flow switch (WTS) from electrical box by disconnect CN25 connector.

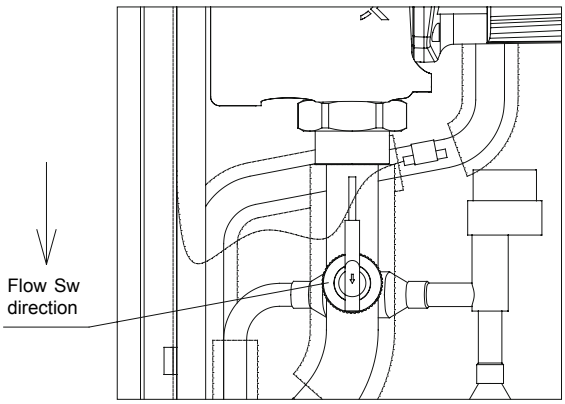


4 Unscrew the flow switch nut.

5 Install the new one by performing the procedures above in reverse way.

NOTE

- **Be sure of the position of the flow switch. The arrow has to look down to indicate the correct flow direction.**
- ***Be careful, do not lose the gasket of the Water Flow.***
- ***Check the gasket. If it is defective, replace by a new one.***

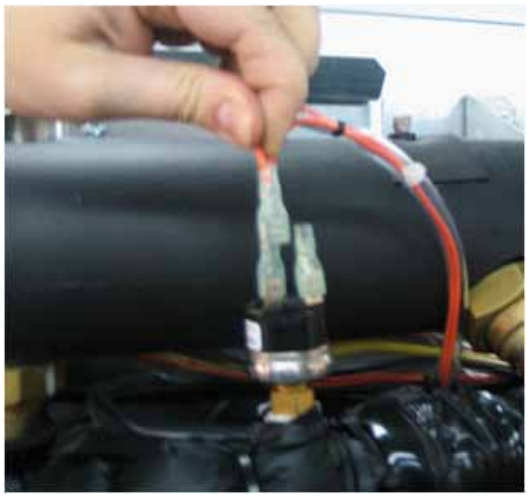


◆ Replace low water pressure switch (LWPS)

NOTE

To disconnect this component properly from the Electrical box, see the *Electrical wiring diagram* chapter of this manual.

1 Remove service cover.
2 Disconnect the low water pressure switch (LWPS by pulling upwards the faston connections.



3 Unscrew the low water pressure switch (LWPS).

4 Install the new one by performing the procedures above in reverse way.

NOTE

- ***Be sure the faston connections of low water pressure switch (LWPS).***
- ***Connect low water pressure wires into 1-2 sockets.***
- ***Cover free socked by using an empty faston.***
- ***Apply Teflon to the thread of Union before assembling.***

◆ Replace water pump (WP1)

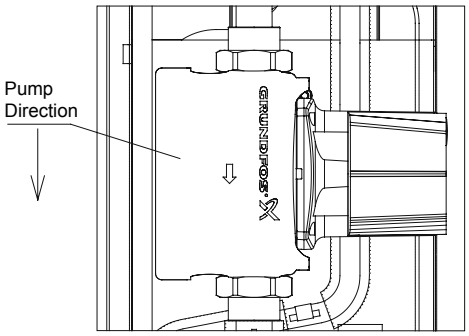
NOTE

To disconnect this component properly from the electrical box, see the *Electrical wiring diagram* chapter of this manual.

1 Remove service cover.
2 Disconnect the water pump 1 by CN22 connector.

3 Unscrew the both water piping nuts that fixing the water pump.

4 Install the new one by performing the procedures above in reverse way.



NOTE

- ***Be sure of the position of the water pump***
- ***Be careful, do not lose the gaskets of the water pump.***
- ***Check the gaskets. If it is defective, replace by a new ones.***
- ***Remember to put pump insulation before pump installation.***

◆ Replace manometer

1 Remove service cover.
2 Open electrical box, unscrews fixing nuts and turn left.
3 Remove clamps which attach the Manometer capillary pipe with steel plate.

4 Unscrew manometer capillary joint from the water pipe.

5 Press two rings of the manometer rear side and remove it passing the capillary through the hole of the LCD controller support.

6 Install the new one by performing the procedures above in reverse way.

NOTE

Be sure of the position of the manometer.

Apply teflon to the thread of union before assembling.

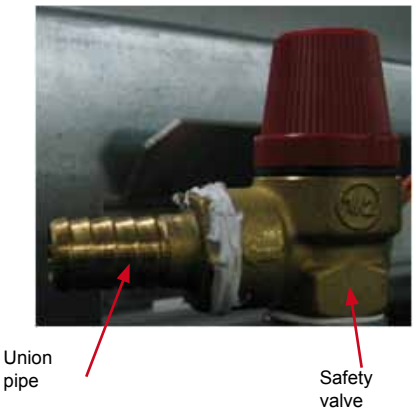
◆ Replace safety valve

1 Remove service cover.

2 Remove clamp that are attached with safety valve and drain pipe.

3 Unscrew safety valve from the top of Electrical heater.

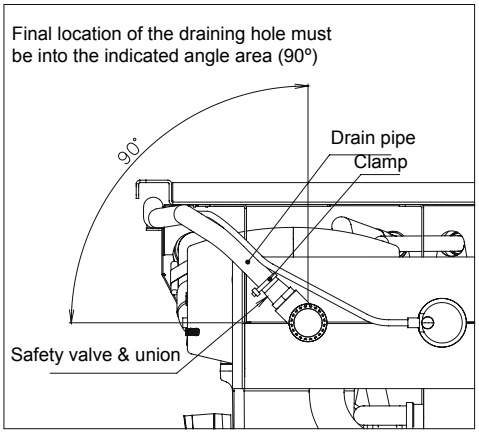
4 Unscrew union pipe from safety valve.



5 Install the new one by performing the procedures above in reverse way.

NOTE

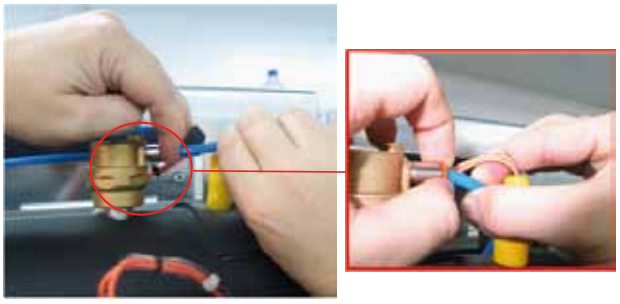
- ***Be sure of the position of the safety valve.***
- ***Apply teflon to the thread of unions before assembling.***



◆ Replace air purger

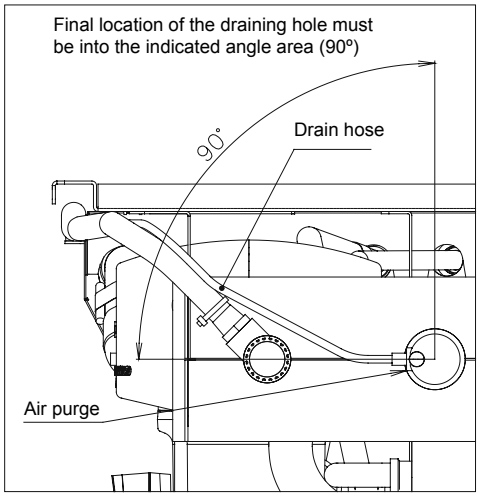
1 Remove service cover

2 Disconnect drain hose of the air purger as shown in the drawing:



3 Unscrew air purger from the top of the electrical heater.

4 Unscrew fitting of air purger.
5 Install the new one by performing the procedures above in reverse way.



NOTE

Be sure of the position of the air purge:

◆ Replace electrical heater

1 Remove service cover.
2 Remove electrical box cover.
3 Disconnect electrical heater device inside electrical box.
- 3a (Indoor unit devices 1)
  - Electrical Heater power connection:

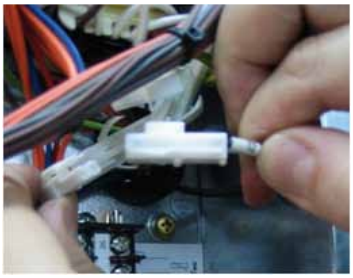
    Disconnect AR2-2 wire

    Disconnect AR3-2 wire

    Disconnect AR3-4 wire

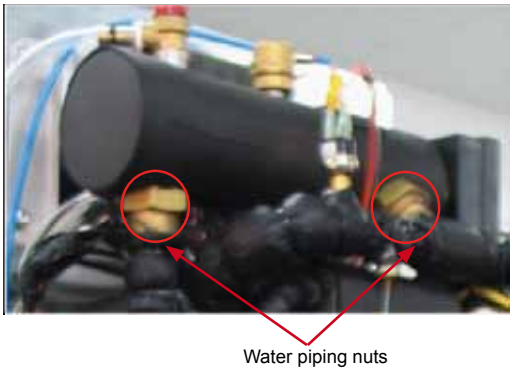
    Disconnect TB1-N wire

- 3b (Indoor unit devices 2)
  - Electrical heater thermal fuse wire (CN23)
  - Electrical heater surface thermostat wire (THe) from the faston connections.



4 Turn electrical box and removes all cables from the packing glands.

5 Unscrew the two water piping nuts connect to the electrical heater.



6 Unscrew safety valve as shown in section *Replace safety valve*.
7 Unscrew air purger shown in section *Replace air purger*.
8 Unscrew the four screws fixing the electrical heater.

9 Install the new one by performing the procedures above in reverse way.

NOTE

- ***Check safety valve notes when disassembling/assembling.***
- ***Check air purger notes when disassembling/assembling.***
- ***Be careful do not lose the gaskets of the water pump.***
- ***Check the gaskets, if it is defective, replace by a new ones.***
- ***After assembling electrical heater, check that the electrical heater is completely filled with water by operating pressure of safety valve.***

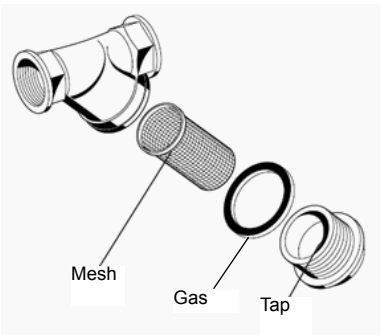
Replace water strainer

- In case of maintenance (cleaning) or replacing mesh:

The water strainer should be clear or replaced as appropriate for system condition.

1 Remove service cover.
2 Unscrew (3) water strainer as shown.

3 Replace or clean the mesh.



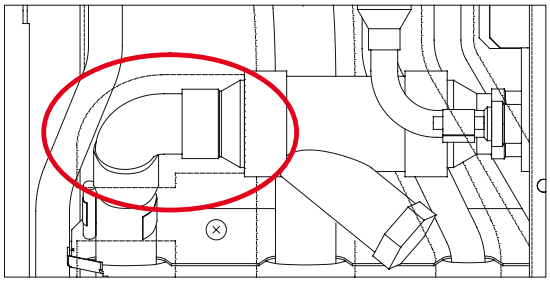
4 Install water strainer by performing the procedures above in reverse way.

NOTE

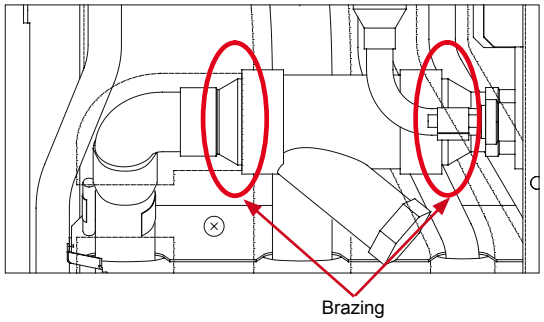
Check the gasket, it is recommended to replace by a new one.

- In case of replacing water strainer entire.

1 Remove service cover.
2 Remove insulation of water strainer pipes.



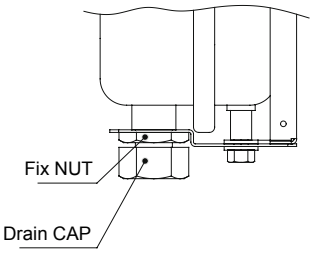
3 Remove brazing from the two places, and then remove water strainer.



◆ Replace expansion vessel

1 Remove service cover.
2 Remover electrical box cover.
3 Turn electrical box by removing screws.
4 Closes shut down valves and open the drain valves.

Drain water from the bottom side of the expansion vessel by unscrewing the lower place.



5 Unscrew the copper pipe connected to the pressure gage from expansion vessel.

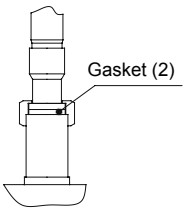
6 Unscrew (3) nuts on the bottom for the expansion vessel.

NOTE

Be sure that the expansion vessel is being subjected all the time.

7 Install new one by performing the procedures above in reverse way.

Expansion vessel connection



NOTE

- ***Be careful do not lose the gasket of the expansion vessel.***
- ***Check the gasket (2), if it is defective, replace by a new one.***

11.2.4 Replacing refrigerant parts

DANGER

- ***Disconnect the Yutaki S from the power supply before touching any of the parts. Do not touch the electrical box before disconnecting it in order to avoid an electrical shock.***
- ***Wait minimum 10 minutes or more from all power supplies have been turned OFF.***

NOTE

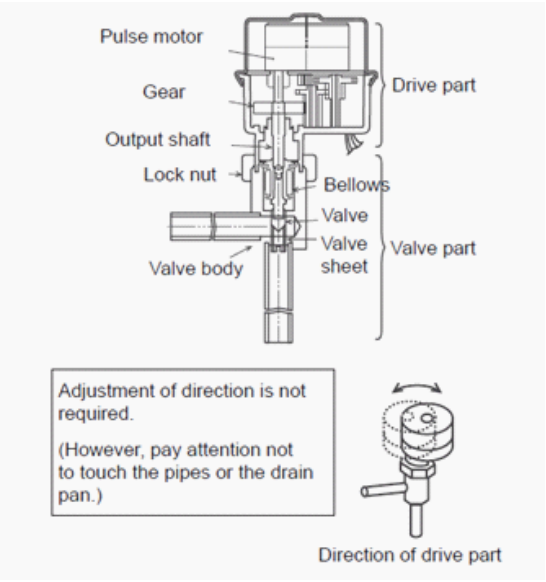
- ***In case of replacing Refrigerant parts, in some cases drain water from the unit it is needed. Close the shutdown valves and open the drain valves.***
- ***In case of replacing refrigerant parts, collect refrigerant to the outdoor unit by pump down procedure.***
- ***All refrigerant parts are connected by brazing. Check to ensure whether there are flammable things around or not when using a burner for pipe connections, if not, oil existing pipe inside may ignite.***
- ***Do not expose the refrigerant cycle to the atmosphere for a long period in order to avoid mixing the water and foreign particles into the refrigerant cycle. After removing refrigerant parts, replace it quickly. If exposed for a long period, seal the liquid pipe and gas pipe.***

◆ Replace expansion valve

1 Remove service cover.
2 Remove the CN26 connector on the expansion valve control.
3 The butyl sheet is adhered around the piping of the heat exchanger, the electronic expansion valve and the inlet piping and outlet piping of the electronic expansion valve. Remove the butyl sheet of the surface of the piping, the coil part of the expansion valve and the part of the valve body.

In case of replacing mixing valve motor (drive part):

4 Prepare two spanners. Hold the part of the valve body with one spanner and loosen the lock nut with another spanner by turning the lock nut counterclockwise.
5 Turn the lock nut by a few turns. Then, the drive part separates from the screw and can be removed.
6 Prepare the new drive part for replacement (servicing part) with the position of the driver (drive screw) already adjusted.



NOTE

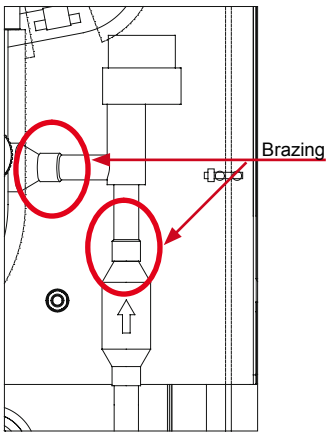
During replacement work, pay attention to the separation part and prevent the dust, foreign particle, etc. from entering into the separation part. (The sensitive part of the valve is its mechanical system.)Do not damage the junction part of the valve with the tools.

7 Put the drive part onto the valve body, hold them with their axes matching and attach the lock nut to the screw part of the valve body.
8 Tighten the lock nut with spanner after tightening lightly by hand. The tightening torque must be within the range of: 12 N•m – 15 N•m.
9 After the replacement, attach the electronic expansion valve in the reverse procedures for removing. Apply the butyl sheet firmly.

NOTE

Do not apply great forces, such as the rotating torque and the bending load, to the motor by holding the motor by hand when you are tightening the lock nut. Although the direction of the eccentric part of the motor is assembled with the eccentric part of the motor directed toward the counter direction of the fittings for piping at the valve body, the alteration of this direction does not affect the open/close function of the valve.

Therefore, the adjustment of the direction of the motor part is not required if the position of the motor is moved toward the rotating direction after the replacement, as shown in the figure. However, make sure that the direction of the motor for the coil of the electronic expansion valve does not touch other piping and the side plate of the electrical box.



In case of In case of replacing mixing valve

10 Remove brazing from the two places, and then remove expansion valve.
11 Install new one by performing the procedures above in reverse way.

◆ Replace plate heat exchanger

In case of remove plate heat exchanger and components.

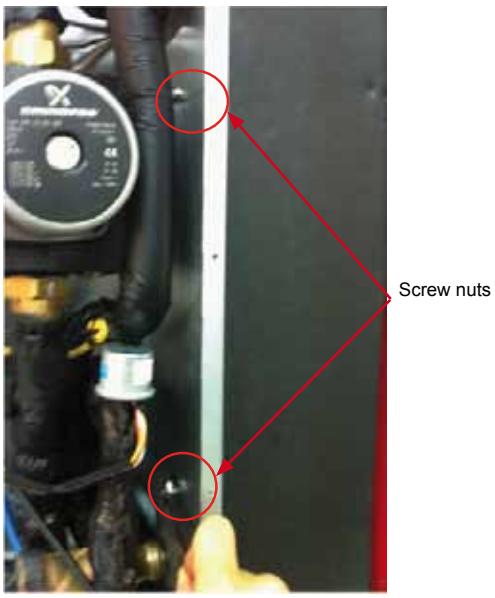
1 Remove service cover.
2 Remover electrical box cover.
3 Turn electrical box by removing screws.
4 Remove manometer by perform procedure *Replace manometer*.
5 Remove LCD controller by perform procedure *Replace LCD controller*.
6 Remove LCD control support by unscrewing nuts.

7 Remove drain stay by unscrew nuts.
8 Remove water band and refrigerant band.

9 Remove low water pressure switch (LWPS) by perform procedure *Replace low water pressure switch*.
10 Unscrew the copper pipe connected to the pressure gage from expansion vessel.

11 Remove refrigerant liquid thermistor (THM_L) from pipe by perform procedure *Replace thermistors*.
12 Remove refrigerant gas thermistor (THM_G) from pipe by perform procedure *Replace thermistors*.
13 Remove water inlet thermistor (THM_{WI}) from pipe by perform procedure *Replace thermistors*.
14 Remove water outlet plate heat exchanger thermistor (THM_{WOHP}) from pipe by perform procedure *Replace thermistors*.
15 Disconnect expansion valve connection (CN26).
16 Unscrew the water piping nut connect to the electrical heater.

17 Unscrew the two nuts holding the plate heat exchanger.



18 Remove plate heat exchanger with water and refrigerant pipes and expansion valve.
19 Install new one by performing the procedures above in reverse way.

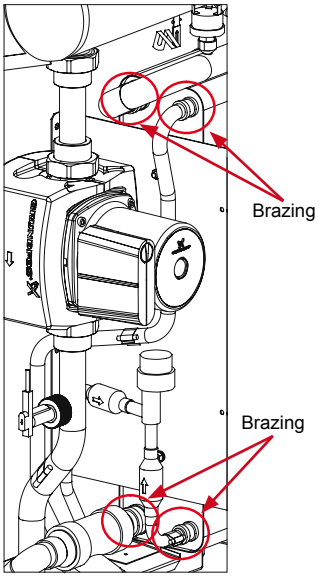
NOTE

- ***Be careful do not lose the gaskets.***
- ***Check the gaskets, if it is defective, replace by a new ones.***

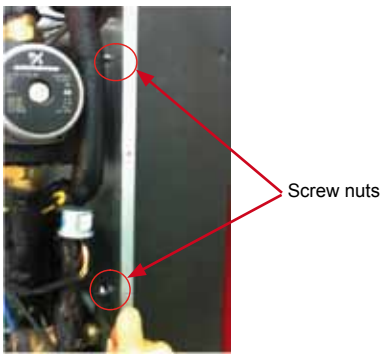
In case on remove only the heat exchanger.

1 Remove service cover.
2 Remover electrical box cover.
3 Turn electrical box by removing screws.
4 Remove manometer by perform procedure *Replace manometer*.
5 Remove LCD controller by perform procedure *Replace LCD controller*.
6 Remove LCD control control support by unscrew nuts.

7 Remove Refrigerant liquid thermistor (THM_L) from pipe by perform procedure *Replace thermistors*.
8 Remove brazing from the four places (refrigerant side and water side).



9 Unscrew the two nuts holding the plate heat exchanger.



10 Remove plate heat exchanger .
11 Install new one by performing the procedures above in reverse way.

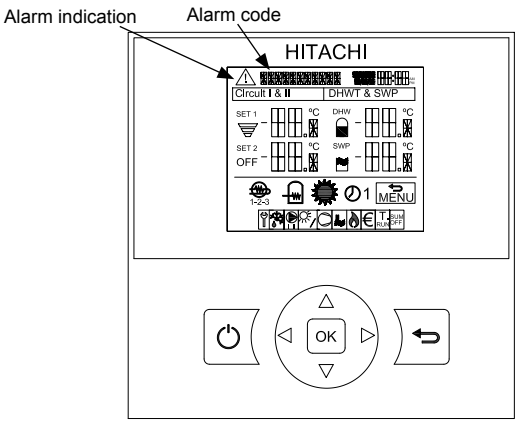
12. Troubleshooting

Index

12.1 Troubleshooting procedure

12.1.1 Alarm code

Alarm Code Indication on Remote Control Switch:



◆ Alarm code table

Alarm code	Retry stop code	Origin	Detail of abnormality	Main cause
02	-	Outdoor	Activation of outdoor unit protection device (Except for Alarm Codes 41, 42)	High pressure interrupting device activated
03	-	Outdoor	Transmission error	Outdoor fuse meltdown, indoor/outdoor connection wiring (breaking, wiring error, etc.)
04	-	Outdoor	Inverter transmission abnormality	Control PCB – Inverter PCB connection wiring (breaking, wiring error, etc.)
05	-	Outdoor	Power phase detection abnormality	Power source wiring open phase in indoor units
06	18	Outdoor	Undervoltage, overvoltage	Outdoor PCB abnormality, inverter PCB abnormality, DM, CB abnormality
07	16	Outdoor	Abnormal decrease of discharge gas superheat degree	Excessive refrigerant, expansion valve open-locked, fan motor locked
08	15	Outdoor	Compressor-top Temperature over-increase	Shortage or leakage of refrigerant, piping clogging, fan motor locked
11	-	Indoor	Water inlet thermistor abnormality	Loose, disconnected, broken or short-circuited connector
12	-	Indoor	Water outlet thermistor abnormality	Loose, disconnected, broken or short-circuited connector
13	-	Indoor	Indoor liquid pipe temperature thermistor abnormality	Loose, disconnected, broken or short-circuited connector
14	-	Indoor	Indoor gas pipe temperature thermistor abnormality	Loose, disconnected, broken or short-circuited connector
15	-	Indoor	Water outlet C2 thermistor abnormality	Loose, disconnected, broken or short-circuited connector
16	-	Indoor	Water DHWT thermistor abnormality	Loose, disconnected, broken or short-circuited connector
17	-	Indoor	Auxiliary thermistor abnormality	Loose, disconnected, broken or short-circuited connector
18	-	Indoor	Water outlet boiler thermistor abnormality	Loose, disconnected, broken or short-circuited connector
19	-	Indoor	Water outlet HP thermistor abnormality	Loose, disconnected, broken or short-circuited connector
20	-	Outdoor	Compressor-Top temperature thermistor abnormality	Loose, disconnected, broken or short-circuited connector
22	-	Outdoor	Outdoor temperature thermistor abnormality	Loose, disconnected, broken or short-circuited connector
24	-	Outdoor	Outdoor heat exchanger liquid pipe thermistor abnormality	Loose, disconnected, broken or short-circuited connector
31	-	Outdoor	Indoor/Outdoor combination setting error	Outdoor/Indoor unit capacity setting error, indoor total capacity excessively large/small

Alarm code	Retry stop code	Origin	Detail of abnormality	Main cause
35	-	Outdoor	Indoor unit number setting error	Indoor units with the same number in a refrigerant piping system
38	-	Outdoor	Outdoor protection detection circuit abnormality	Outdoor PCB abnormality, error in wiring to outdoor PCB
41	-	Outdoor	Cooling overload	Outdoor heat exchanger clogging/short circuit, broken outdoor fan motor
42	-	Outdoor	Heating overload	Outdoor heat exchanger clogging/short circuit, expansion valve close-locked
47	15	Outdoor	Suction pressure decrease prevention activated	Shortage or leakage of refrigerant, piping clogging, expansion valve close-locked, fan motor locked
51	17	Outdoor	Inverter current sensor abnormality	Error in CT wiring, outdoor PCB abnormality, inverter PCB abnormality
48	17	Outdoor	Overload operation protection activation	Cycle abnormality, inverter PCB abnormality, DM abnormality, heat exchanger clogging, etc.
53	17	Outdoor	Inverter module error	Compressor, ISPM abnormality, heat exchanger clogging, etc.
54	17	Outdoor	Inverter fin temperature abnormality	Fin thermistor abnormality, heat exchanger clogging, fan motor abnormality
55	18	Outdoor	Inverter non-operation	Inverter not operating or broken
59	-	Outdoor	Inverter fin temperature thermistor abnormality	Loose, disconnected, broken or short-circuited connector
b1	-	Outdoor	Error in address/refrigerant system setting	Address/refrigerant system setting over 64
EE	-	Outdoor	Compressor factor alarm	Alarm to notify damage to compressor occurs 3 times within 6 hours
70	P-70	Indoor	Hydraulic alarm	Water pressure or water flow is not detected in the hydraulic cycle
71	-	Indoor	Water pump feedback	
72	-	Indoor	Thermostat heater alarm	High temperature is detected in electric heater T>75ºC
73	-	Indoor	Mixing overheating limit protection for mixed circuit.	Circuit 2 supply temperature > target temperature + offset
74	P-74	Indoor	Unit overheating limit protection	Two > Tmax +5K
75	-	Indoor	Freeze protection by cold water inlet, outlet temperature detection	
76	-	Indoor	Freeze protection stop by indoor liquid temperature thermistor	Tl or Tg < -20ºC for 30 seconds (Only heating mode)
77	-	Indoor	Opentherm communication failure	No Opentherm communication for a continuous period of 1 minute.
78	-	Indoor	RF Communication failure	No communication for 1 hour with one or two RF receivers which are bound to the RF-Bridge.
79	-	Indoor -outdoor	Unit capacity setting error	No concordance between indoor and outdoor unit capacities
80	-	Indoor-LCD	LCD H-link transmission error	No H-link communication for a continuous period of 1 minute between indoor and LCD user control by connection wiring (breaking, wiring error, etc.)

◆ Cause of compressor stop

When the compressor stops due any of the factors below, Stop Reason Code (d1 Code) is sent to Indoor Unit.

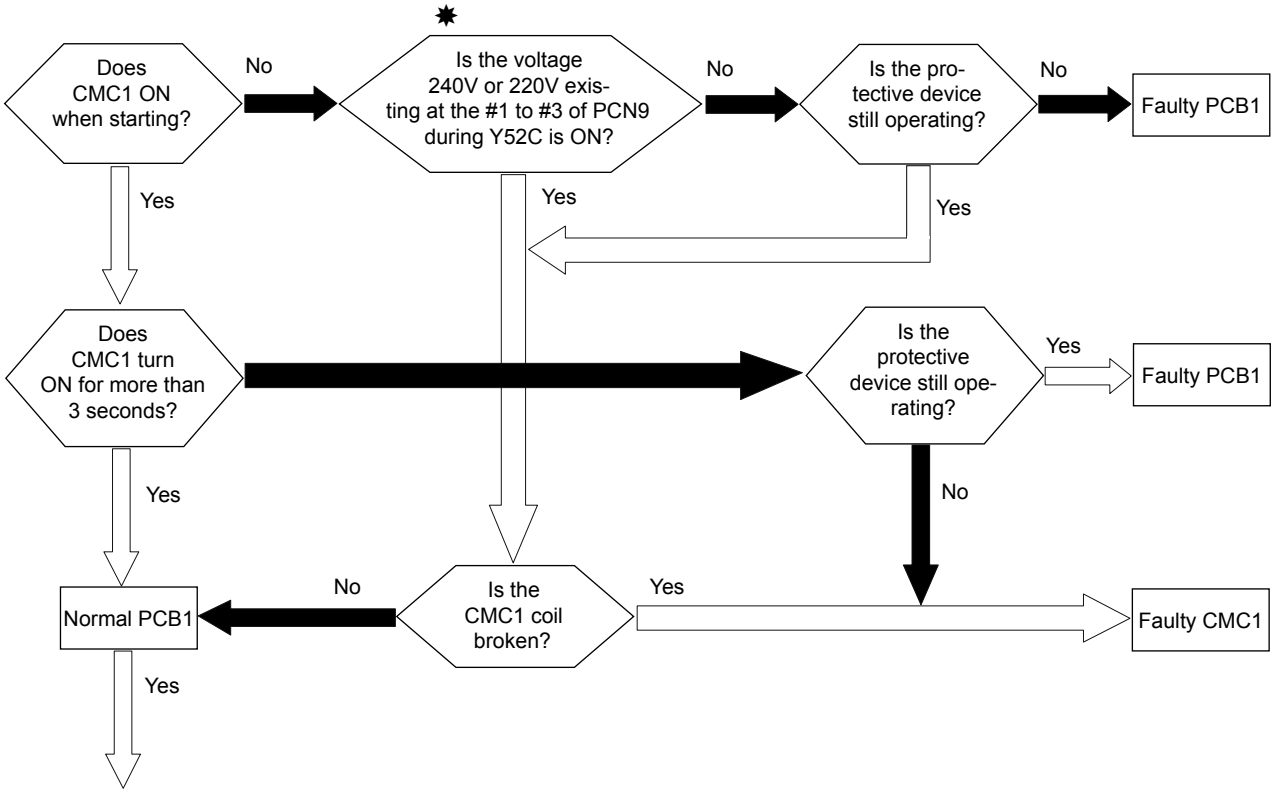
The Code will be overridden when another Code is sent before it.

Stop Reason Code	Stop Factors	52C Process
02	Alarm	OFF
03	Freeze protection	ON
05	Momentary power failure detection in Outdoor Unit	OFF
07	Outdoor temperature at cooling lower than -5 °C (Outdoor temperature -15 °C at annual cooling setting)	ON
	Outdoor air temperature and indoor suction temperature for heating (Overload condition)	ON
	Stop due to outdoor heating temp. lower than -20 °C (Low temp. condition)	ON
10	Demand (external input)	ON
13	Discharge pressure increase prevention for cooling and heating	ON
	Discharge pressure increase prevention for cooling and heating by control of former refrigerant piping	ON
15	Gas shortage detection (detected by pipe temperature: gas shortage detection I)	OFF
	Gas shortage detection (detected by compressor-top temperature: gas shortage detection II)	OFF
	Compressor-top overheating	OFF
16	Abnormal decrease of discharge gas superheat degree	ON
17	Inverter trip (Instantaneous overcurrent, Electronic thermal activation, Current sensor abnormality)	OFF
18	Inverter trip (Inverter undervoltage, Overvoltage, Transmission error, Microcomputer reset)	OFF
19	Prevention Control for expansion valve opening deviance	OFF
21	Simultaneous Twin, Triple, Quad forced Thermo OFF (other unit at Thermo OFF)	ON
22	Outdoor unit Heat Start Control	OFF
24	Energy saving mode Thermo OFF	ON

12.1.2 Troubleshooting by alarm code

Alarm code	02	Activation of the safety device in the outdoor unit

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - This alarm is indicated when one of safety devices is activated during compressor running.



Check activation of the following safety devices and the power source wiring.

Remove the cause after checking.

(1) High pressure switch

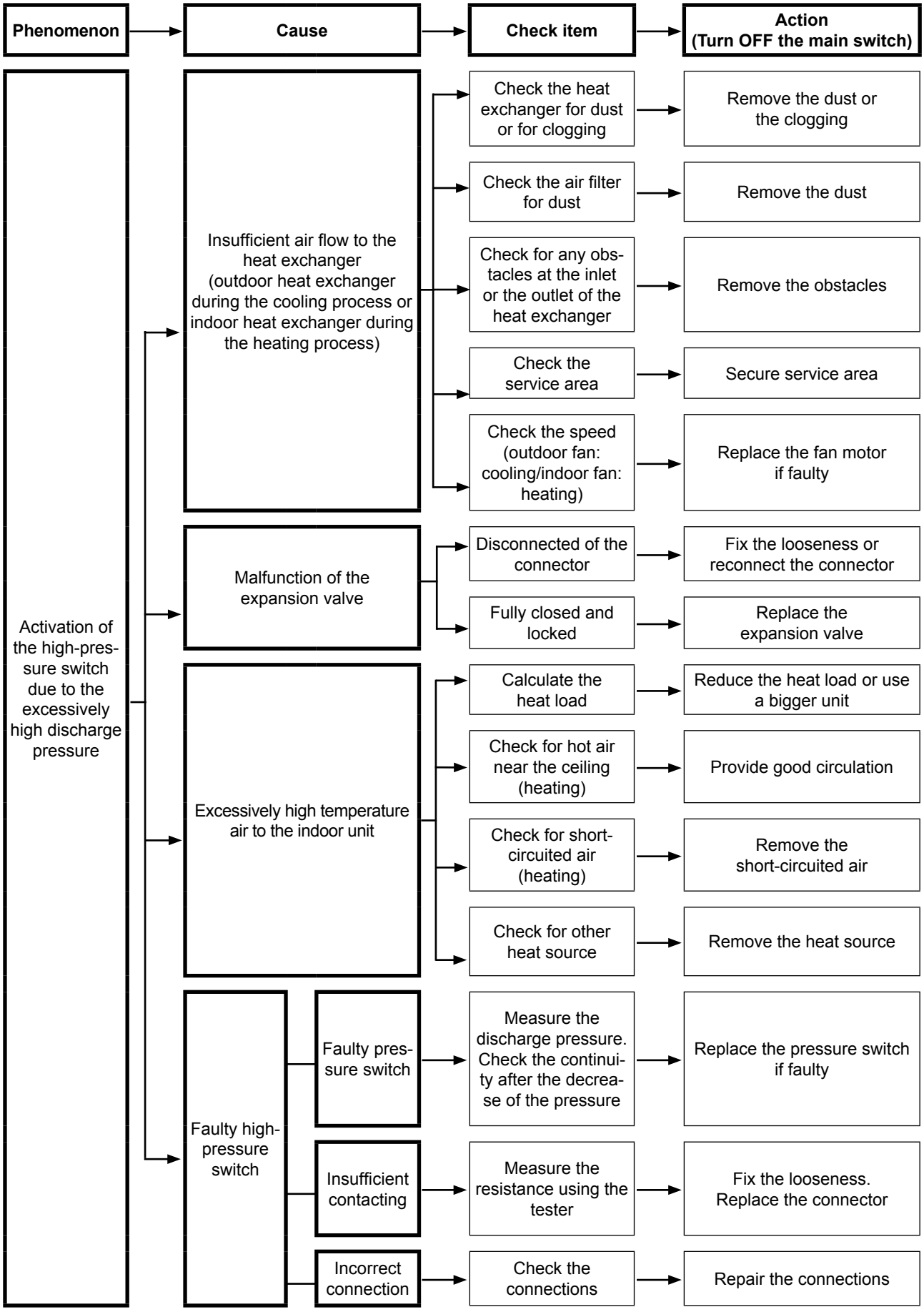
(PSH: 4.15MPa (41.5 kgf/cm²G))

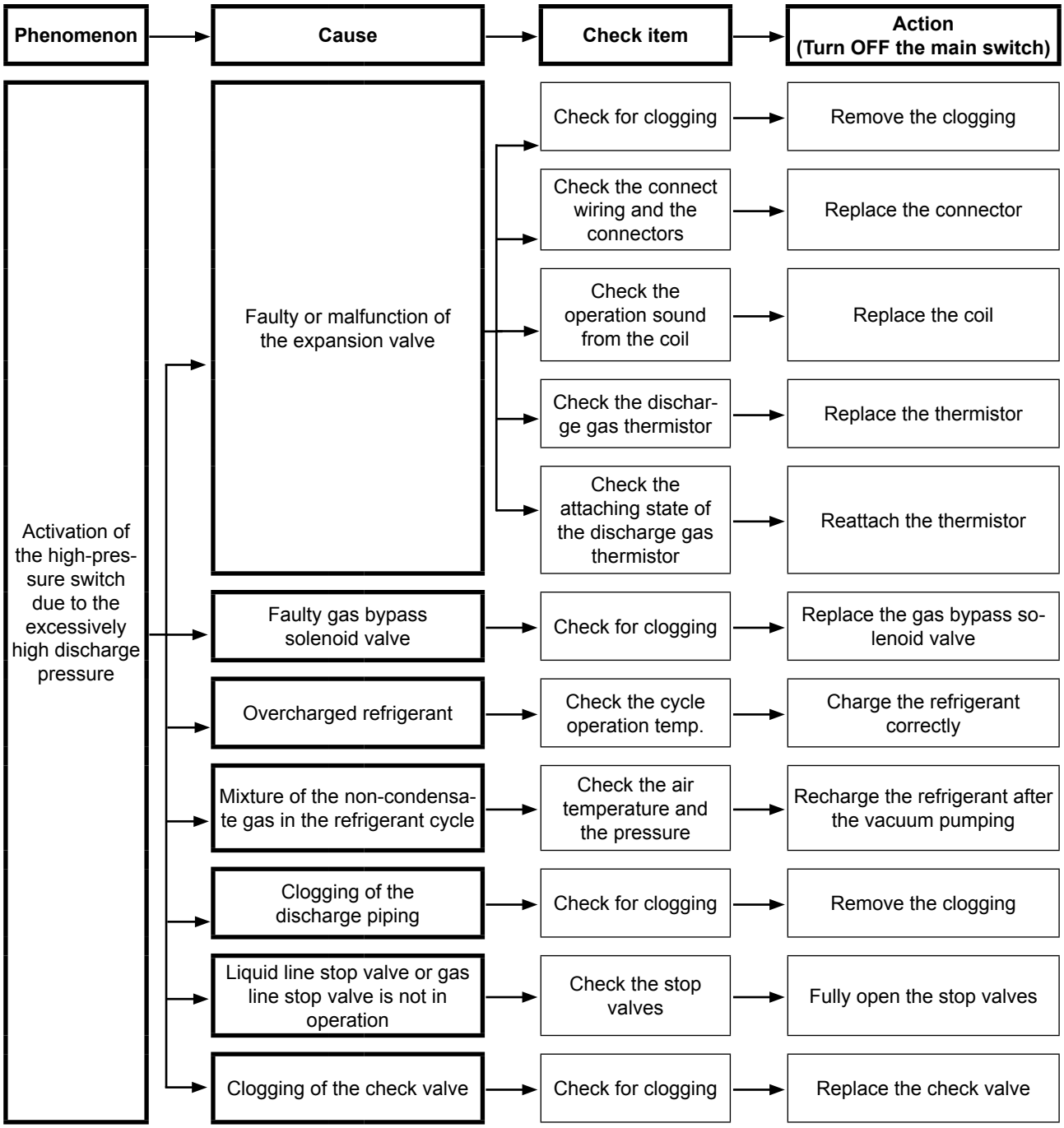
(2) Is the power source line reverse phase or open phase?

If the wiring is incorrect, perform the wiring correctly again.

✸ Check item

Connector No.	Pin No.
PCN9	#1 to #3

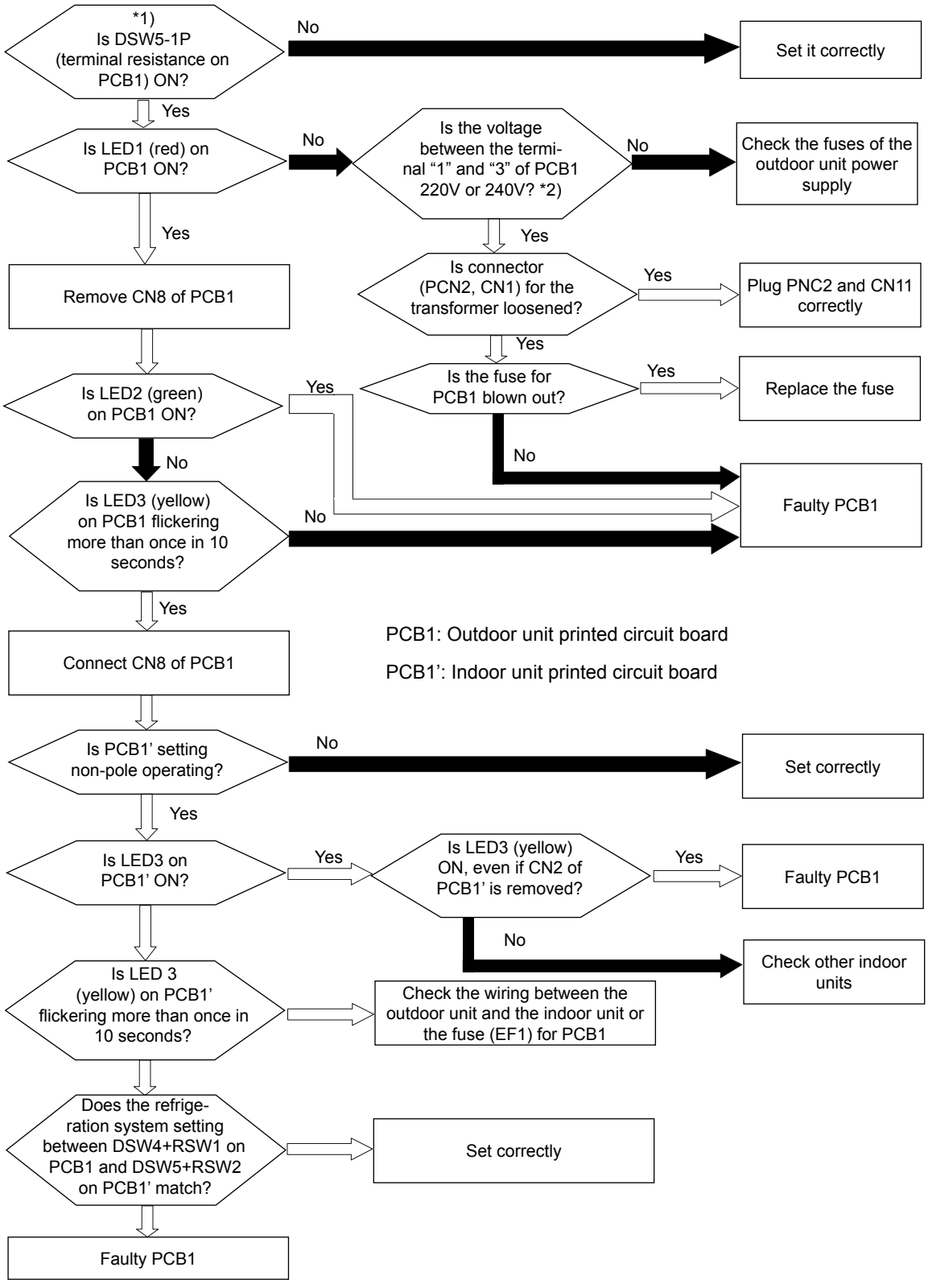

Phenomenon
Cause
Check item
Action (Turn OFF the main switch)
Activation of the high-pressure switch due to the excessively high discharge pressure
Insufficient air flow to the heat exchanger (outdoor heat exchanger during the cooling process or indoor heat exchanger during the heating process)
Check the heat exchanger for dust or for clogging
Remove the dust or the clogging
Check the air filter for dust
Remove the dust
Check for any obstacles at the inlet or the outlet of the heat exchanger
Remove the obstacles
Check the service area
Secure service area
Check the speed (outdoor fan: cooling/indoor fan: heating)
Replace the fan motor if faulty
Malfunction of the expansion valve
Disconnected of the connector
Fix the looseness or reconnect the connector
Fully closed and locked
Replace the expansion valve
Excessively high temperature air to the indoor unit
Calculate the heat load
Reduce the heat load or use a bigger unit
Check for hot air near the ceiling (heating)
Provide good circulation
Check for short-circuited air (heating)
Remove the short-circuited air
Check for other heat source
Remove the heat source
Faulty high-pressure switch
Faulty pressure switch
Measure the discharge pressure. Check the continuity after the decrease of the pressure
Replace the pressure switch if faulty
Insufficient contacting
Measure the resistance using the tester
Fix the looseness. Replace the connector
Incorrect connection
Check the connections
Repair the connections


Phenomenon
Cause
Check item
Action (Turn OFF the main switch)
Activation of the high-pressure switch due to the excessively high discharge pressure
Faulty or malfunction of the expansion valve
Check for clogging
Remove the clogging
Check the connect wiring and the connectors
Replace the connector
Check the operation sound from the coil
Replace the coil
Check the discharge gas thermistor
Replace the thermistor
Check the attaching state of the discharge gas thermistor
Reattach the thermistor
Faulty gas bypass solenoid valve
Check for clogging
Replace the gas bypass solenoid valve
Overcharged refrigerant
Check the cycle operation temp.
Charge the refrigerant correctly
Mixture of the non-condensate gas in the refrigerant cycle
Check the air temperature and the pressure
Recharge the refrigerant after the vacuum pumping
Clogging of the discharge piping
Check for clogging
Remove the clogging
Liquid line stop valve or gas line stop valve is not in operation
Check the stop valves
Fully open the stop valves
Clogging of the check valve
Check for clogging
Replace the check valve

Alarm code		Abnormal transmission between the indoor units and the outdoor unit

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - This alarm is displayed when an abnormal operation is maintained for three minutes after the normal transmission between the indoor units and the outdoor unit. Also, an abnormal operation is maintained for 30 seconds after the micro-computer is automatically reset. The alarm is displayed when the abnormal transmission is maintained for 30 seconds from the starting of the outdoor unit.
  - Investigate the cause of the overcurrent and take the necessary action when the fuses are blown out or the breaker for the outdoor unit is activated.

(Refer to the next page)



*1) In case that terminal resistance (DSW5-1P) is OFF when H-Link II connection is performed.

- Set the terminal resistance to ON when CN8 is removed.
- Set the terminal resistance to OFF when CN8 is reconnected.

*2) Check item

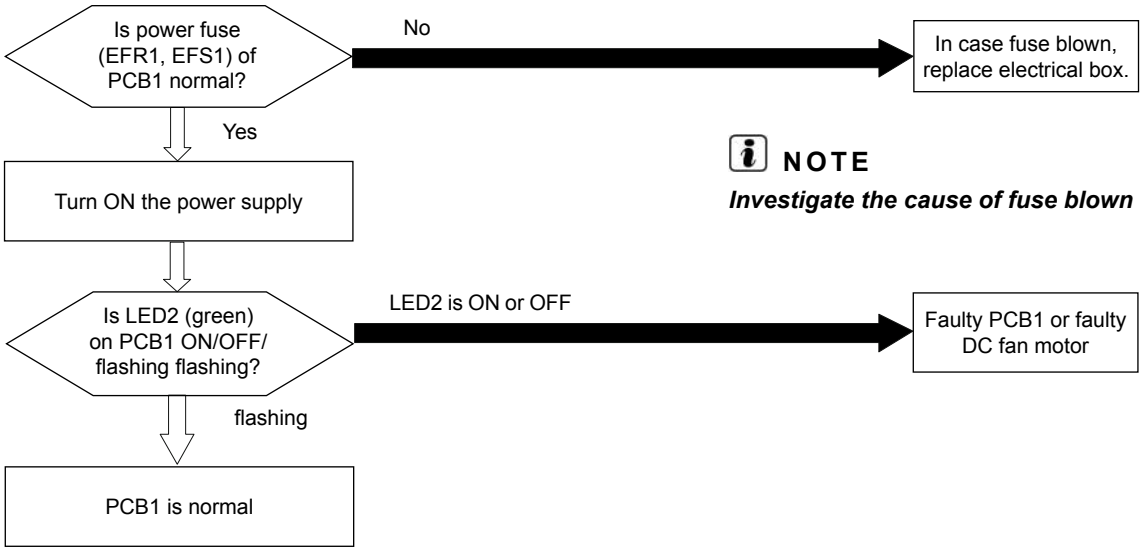
Power supply	Faston terminal
1~ 230V 50Hz 3N~ 400V 50Hz	Between 1 and 3 of PCN1 on PCB

*1)

PCB1 output voltage	Voltage
Vcc 12 - GND2	12VDC
Vcc 05 - GND1	5 VDC
Vcc 15 - GND1	15 VDC
Vcc 24 - GND1	24 VDC
Vcc 12T - GND1	12 VDC

Alarm code	04	Abnormal transmission between inverter and Outdoor PCB1 (RAS-2HVRN2)

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - This alarm is displayed when the abnormal operation is maintained for 30 seconds after the normal transmission between the outdoor unit PCB1 and IPM. Also, the abnormal operation is maintained for 30 seconds after the micro-computer is automatically reset. The alarm is displayed when the abnormal transmission is maintained for 30 seconds from the starting of the outdoor unit.

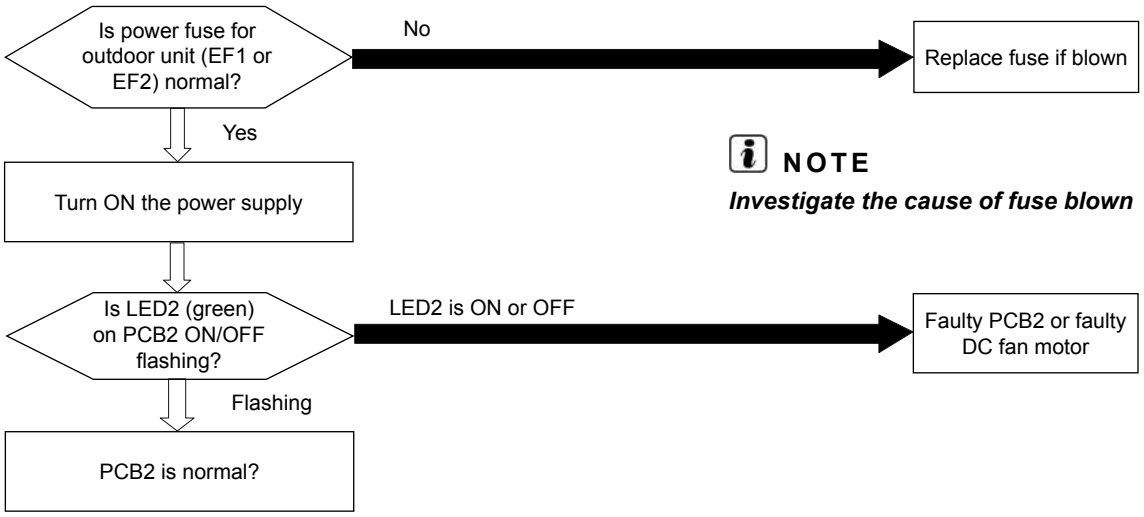


NOTE

Investigate the cause of fuse blown

Alarm code	04	Abnormal transmission between inverter PCB2 and outdoor PCB1 (RAS-(3-6)H(V)RNME-AF)

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - This alarm is displayed when the abnormal operation is maintained for 30 seconds after the normal transmission between the outdoor unit PCB1 and inverter PCB2. Also, the abnormal operation is maintained for 30 seconds after the micro-computer is automatically reset. The alarm is displayed when the abnormal transmission is maintained for 30 seconds from the starting of the outdoor unit.



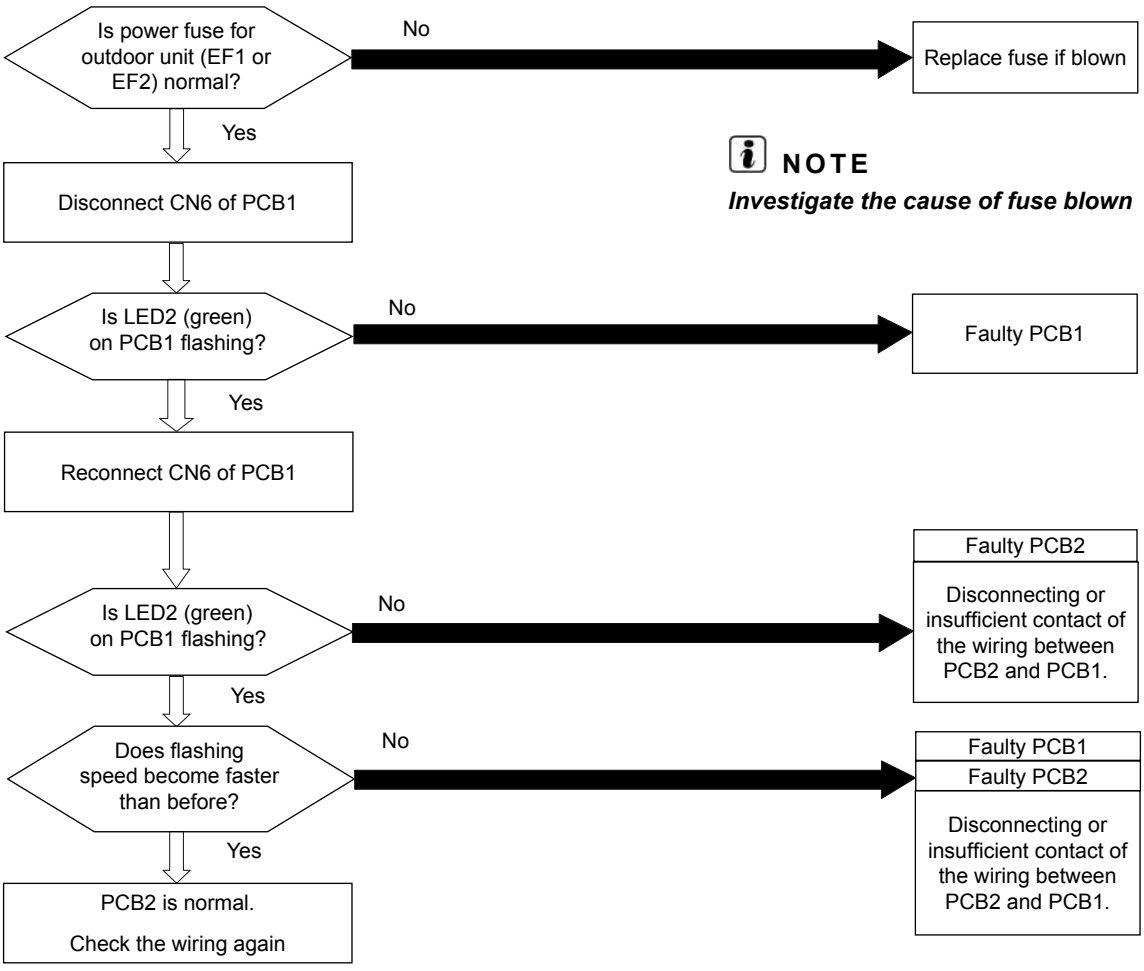
PCB1: Inverter PCB

Inverter DIP IPM RAS-(3-6)HVRNME-AF

Inverter ISPM RAS-(4-6)HRNME-AF

Alarm code	04	Abnormal transmission between Inverter PCB2 and outdoor PCB1 (RAS-(8-10)HRNME-AF)

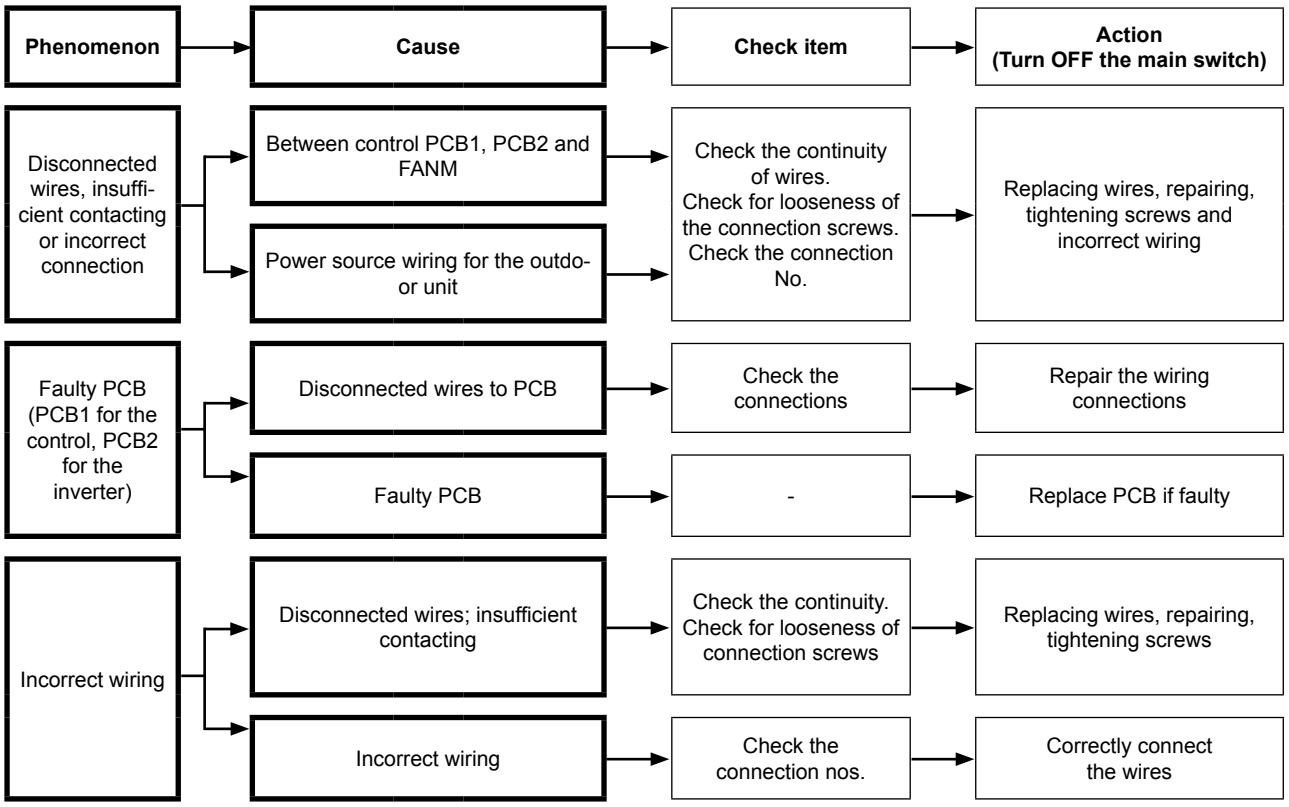
- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - This alarm is displayed when the abnormal operation is maintained for 30 seconds after the normal transmission between the outdoor unit PCB1 and PCB2. Also, the abnormal operation is maintained for 30 seconds after the micro-computer is automatically reset. The alarm is displayed when the abnormal transmission is maintained for 30 seconds from the starting of the outdoor unit.



PCB1: Control PCB in outdoor unit

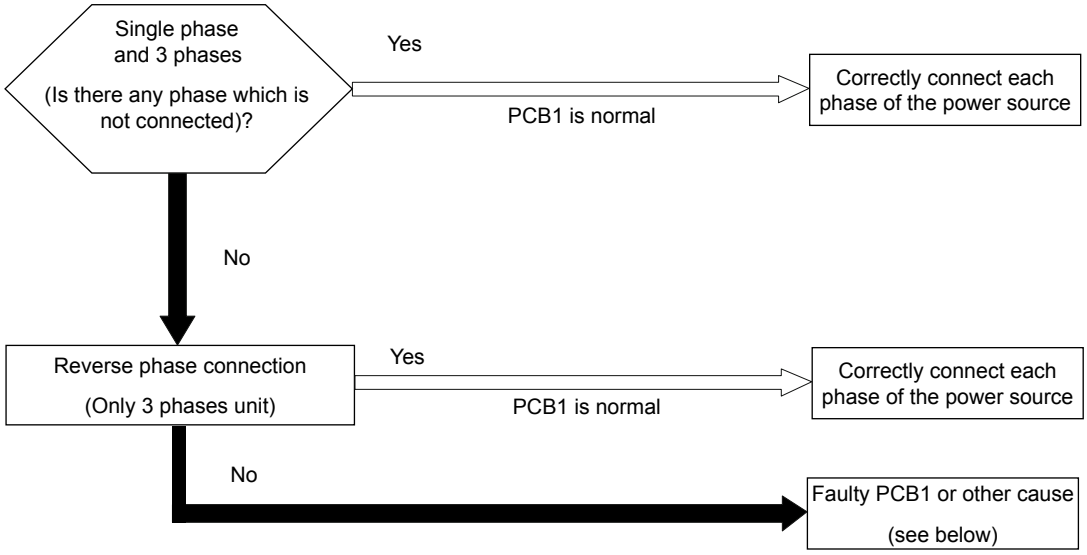
PCB2: Inverter PCB

Inverter IPM RAS-(8-10)HRNME-AF

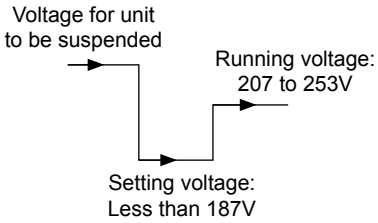

Phenomenon
Cause
Check item
Action (Turn OFF the main switch)
Disconnected wires, insufficient contacting or incorrect connection
Between control PCB1, PCB2 and FANM
Power source wiring for the outdoor unit
Check the continuity of wires. Check for looseness of the connection screws. Check the connection No.
Replacing wires, repairing, tightening screws and incorrect wiring
Faulty PCB (PCB1 for the control, PCB2 for the inverter)
Disconnected wires to PCB
Faulty PCB
Check the connections
-
Repair the wiring connections
Replace PCB if faulty
Incorrect wiring
Disconnected wires; insufficient contacting
Incorrect wiring
Check the continuity. Check for looseness of connection screws
Check the connection nos.
Replacing wires, repairing, tightening screws
Correctly connect the wires

Alarm code 05 Code abnormal operation of picking up phase signal

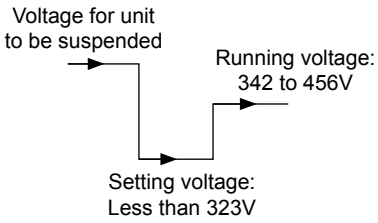
- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - This alarm is displayed when the main power source phase is reversely connected or one phase is not connected.



RAS-(2-6)(HVRN2/HVRNME-AF)



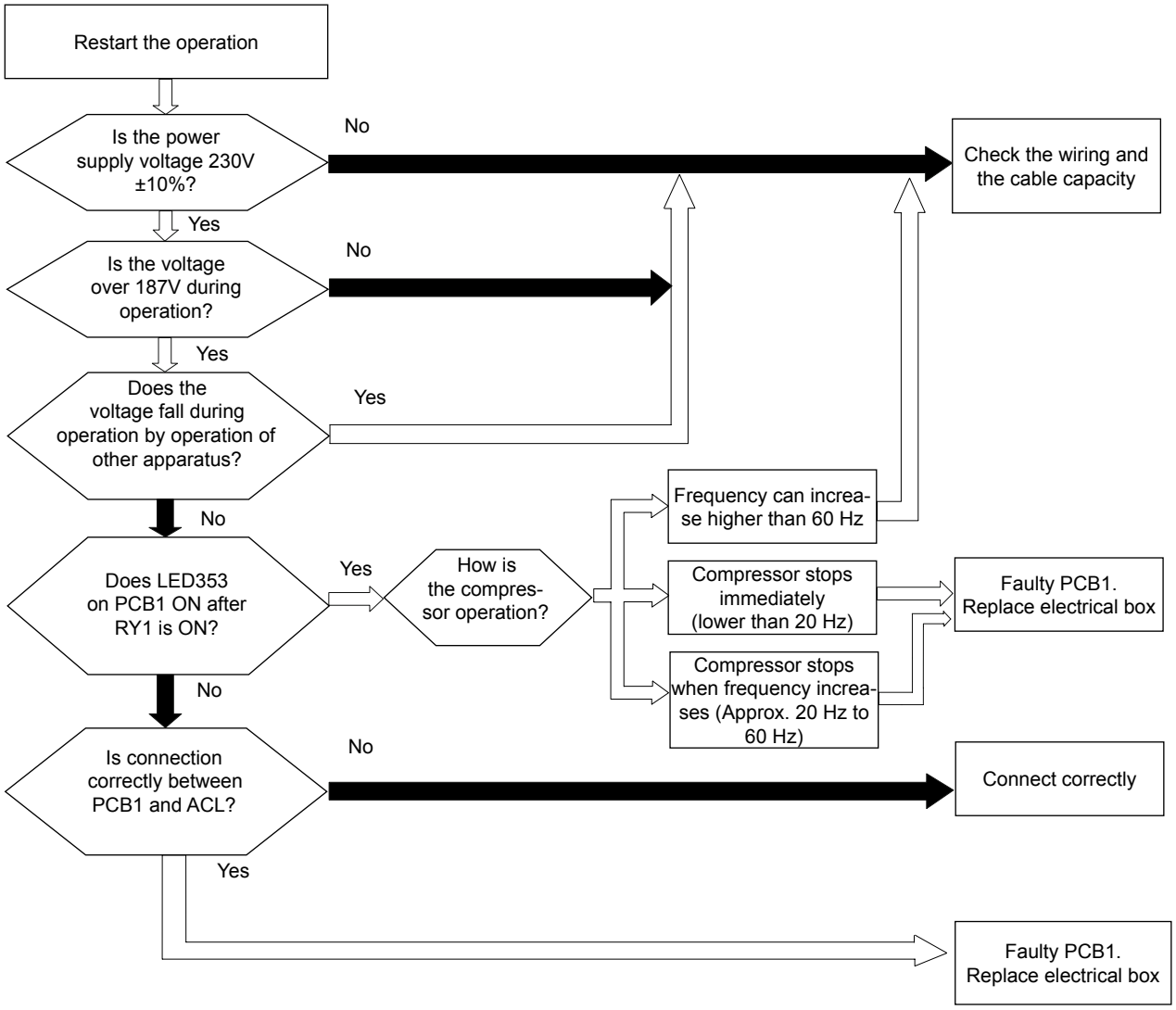
RAS-(4-10)HRNME-AF



Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Activation of reverse phase sensor in the outdoor unit	Reverse or single phase	Check it according to the electrical wiring	Replacing wires, repair, tightening screws or correct wiring
	Faulty outdoor unit PCB	-	Replace PCB if faulty

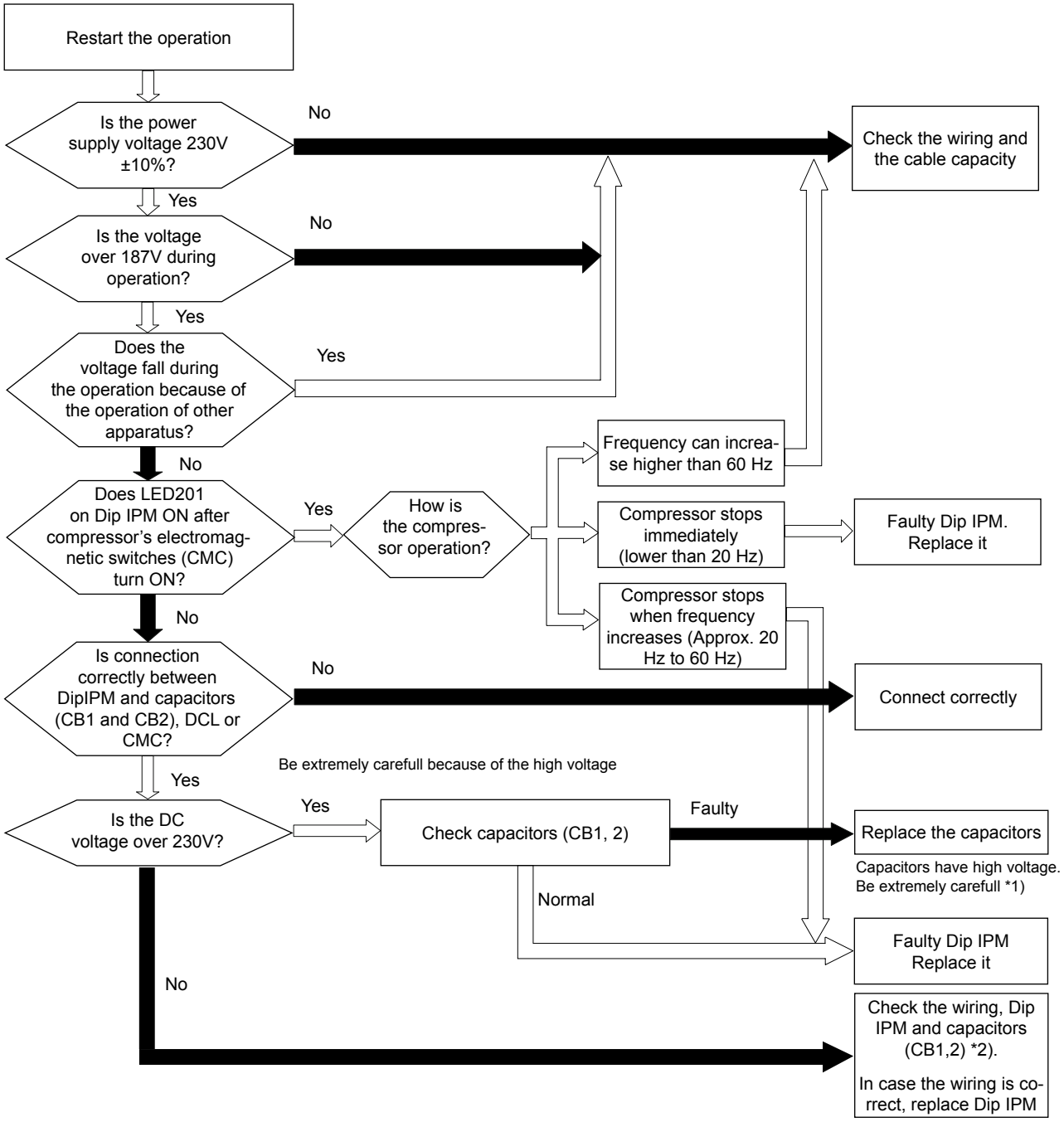
Alarm code	06	Excessively low voltage or excessively high voltage for the inverter (RAS-2HVRN2)

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section.
- The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - This alarm code is displayed when the voltage of IPM is insufficient and the alarm has three occurrences in 30 minutes. If the number of occurrences is smaller than two, the retry operation is performed. The alarm code “06.” Means fan controller Abnormal Operation.



Alarm code	06	Excessively low voltage or excessively high voltage for the inverter (RAS-(3-6)HVRNME-AF)

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - This alarm code is displayed when the voltage between terminal “P” and “N” of Dip IPM is insufficient and the alarm has three occurrences in 30 minutes. If the number of occurrences is smaller than two, the retry operation is performed. The alarm code “06” means fan controller Abnormal Operation.

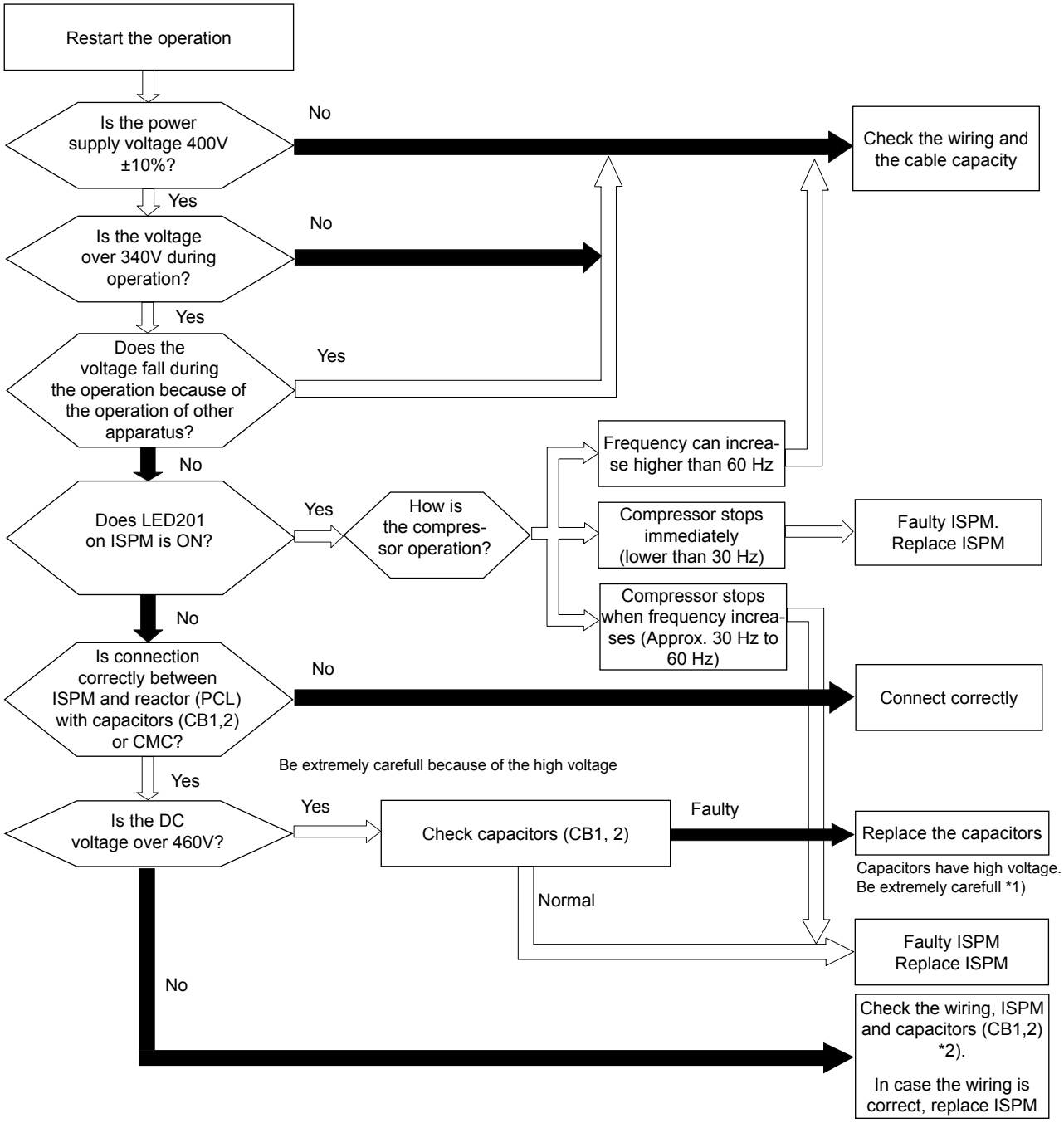


*1) If the capacitor has a high voltage, perform the high-voltage discharge procedure. Refer to *Procedure of checking other main parts*.

*2) Checking procedures of the diode module are displayed in item *Procedure of checking other main parts*.

Alarm code	06	Excessively low voltage or excessively high voltage for the inverter (RAS-(4-6)HRNME-AF)

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - This alarm code is displayed when the voltage between terminal “P” and “N” of ISPM is insufficient and the alarm has three occurrences in 30 minutes. If the number of occurrences is smaller than two, the retry operation is performed. The alarm code “06” means fan controller abnormal operation.



*1) If the capacitor has a high voltage, perform the high-voltage discharge procedure. Refer to *Procedure of checking other main parts*.

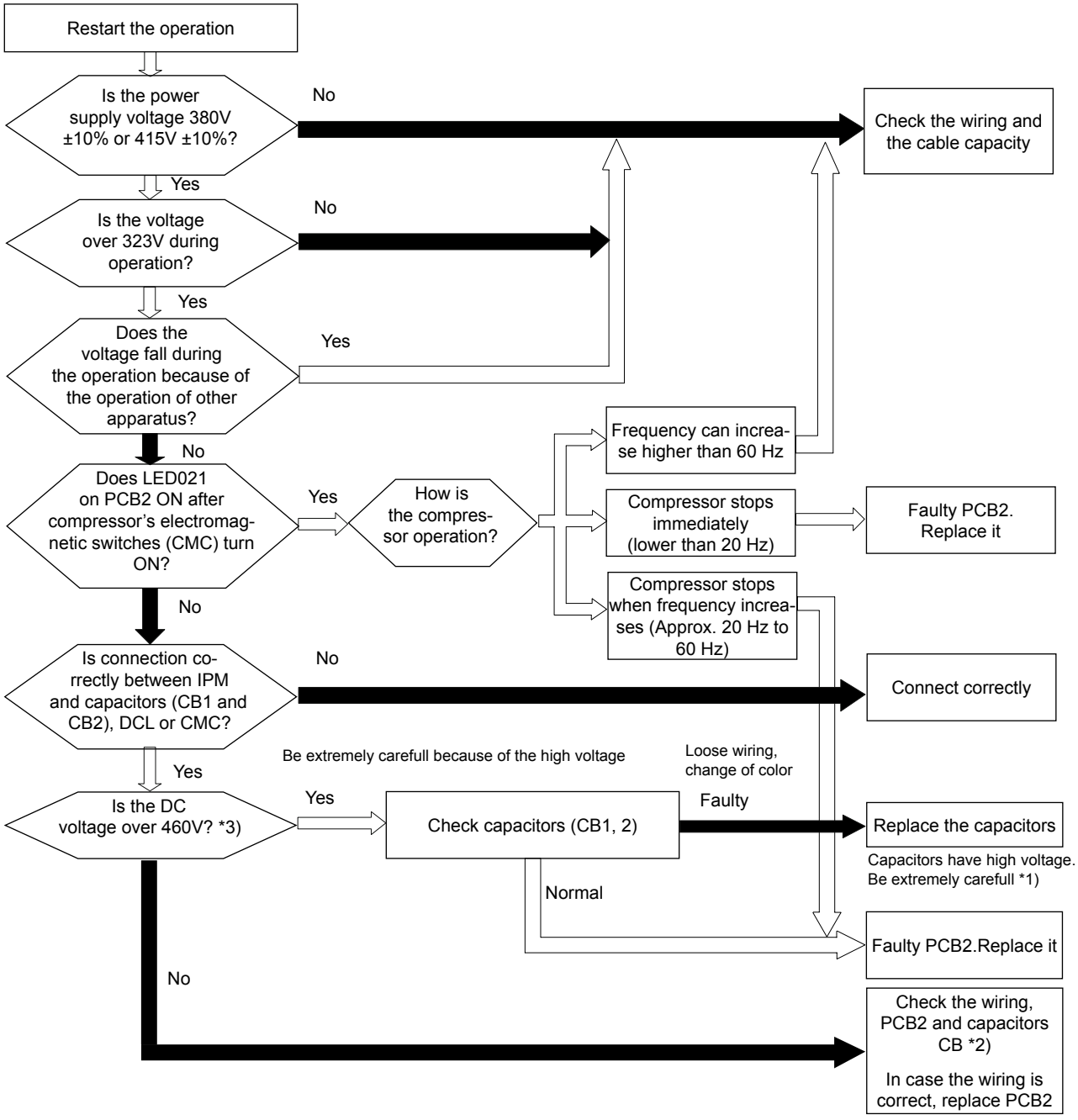
*2) Checking procedures of the diode module are displayed in item *Procedure of checking other main parts*.

*3) DC voltage measuring position:

ISPM “P” terminal to “+” terminal of tester, “N” terminal to “–” terminal of tester measuring position: DC 1000V.

Alarm code	05	Excessively low voltage or excessively high voltage for the inverter (RAS-(8/10)HRNME-AF)

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - This alarm code is displayed when the voltage between terminal “P” and “N” of ISPM is insufficient and the alarm has three occurrences in 30 minutes. If the number of occurrences is smaller than two, the retry operation is performed. The alarm code “6”means fan controller abnormal operation.

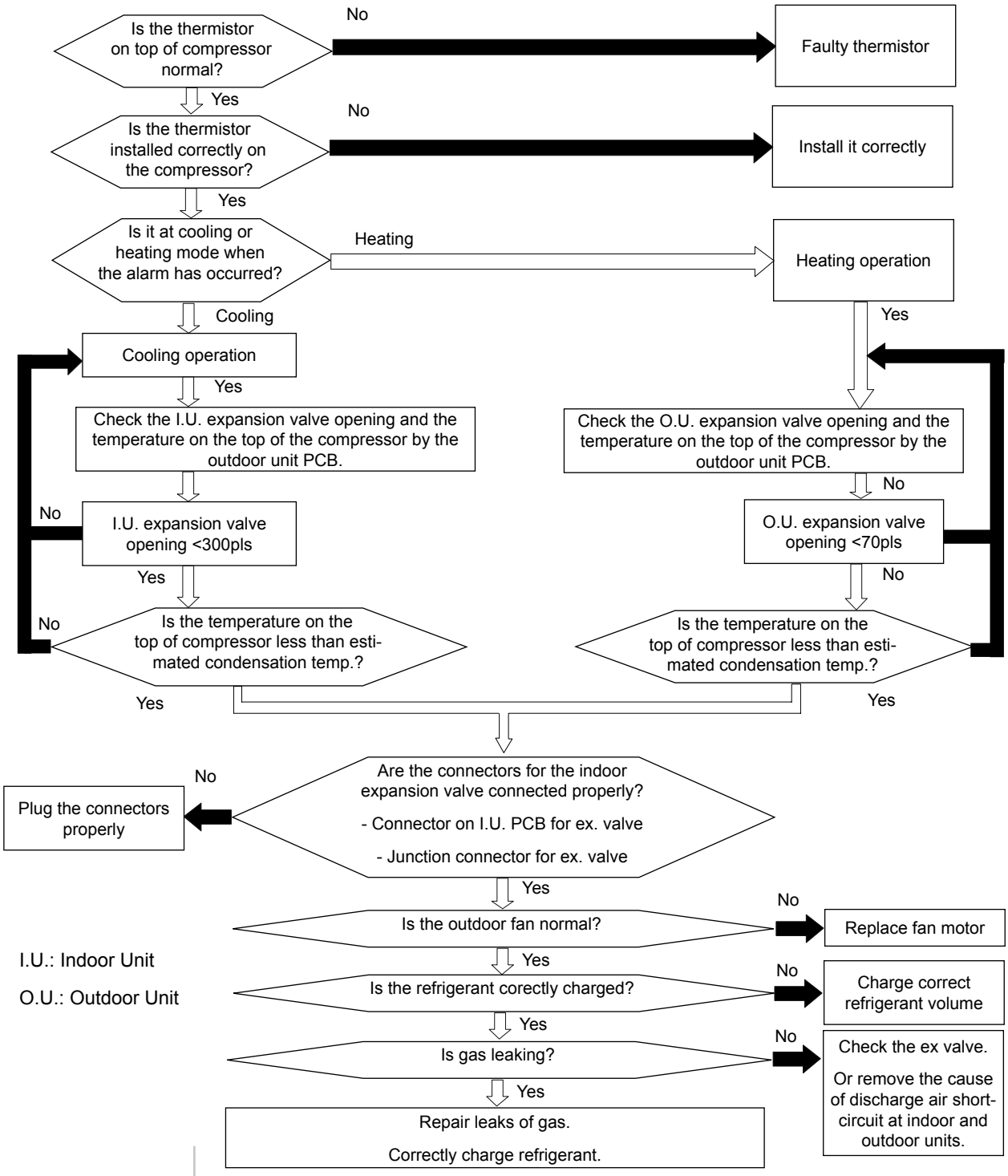


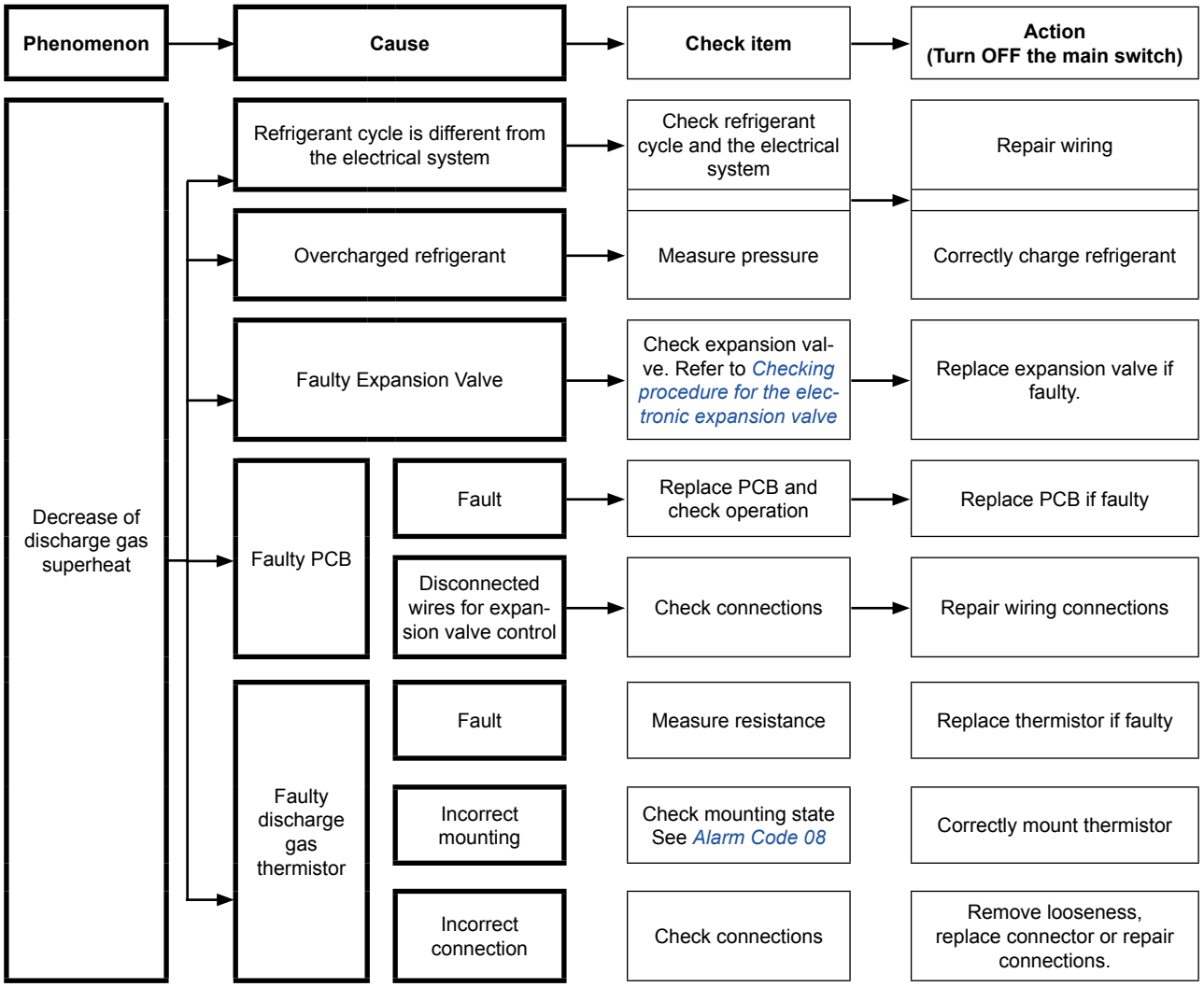
- ***1) If the capacitor has a high voltage, perform the high-voltage discharge procedure. Refer to section Procedure of checking other main parts.***
- ***2) Checking procedures of the diode module are displayed in item Procedure of checking other main parts.***
- ***3) DC voltage measuring position:***
  ISPM “P” terminal “+” terminal of tester, “N” terminal to “–” terminal of tester measuring position: DC 1000V.

Alarm code 07 Decrease of Discharge Gas Superheat

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.

  This alarm code is indicated as follows:
  - The temperature on the top of the compressor is less than the target and also the I.U. expansion valve opening is under 300pls at cooling operation for 30 minutes.
  - The temperature on the top of compressor is less than the target and also the O.U. expansion valve opening is under 70 pls at heating operation for 30 minutes.
  - The compressor is stopped and then the retry operation is performed after 30 minutes.




Phenomenon
Cause
Check item
Action (Turn OFF the main switch)
Decrease of discharge gas superheat
Refrigerant cycle is different from the electrical system
Check refrigerant cycle and the electrical system
Repair wiring
Overcharged refrigerant
Measure pressure
Correctly charge refrigerant
Faulty Expansion Valve
Check expansion valve. Refer to Checking procedure for the electronic expansion valve
Replace expansion valve if faulty.
Faulty PCB
Fault
Replace PCB and check operation
Replace PCB if faulty
Disconnected wires for expansion valve control
Check connections
Repair wiring connections
Faulty discharge gas thermistor
Fault
Measure resistance
Replace thermistor if faulty
Incorrect mounting
Check mounting state See Alarm Code 08
Correctly mount thermistor
Incorrect connection
Check connections
Remove looseness, replace connector or repair connections.

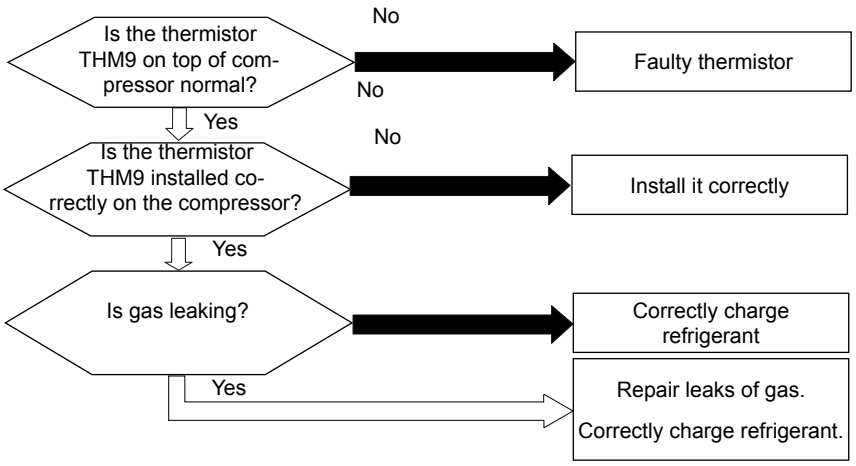
Alarm code 08 Excessively high discharge gas temperature at the top of compressor

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - The alarm appears during cooling operation when the compressor-top thermistor remains at Tdc1 or above for 10 minutes, or at Tdc2 or above for 5 seconds.
  - The alarm appears during heating operation when the compressor-top thermistor remains at Tdh1 or above for 10 minutes, or at Tdh2 or above for 5 seconds.

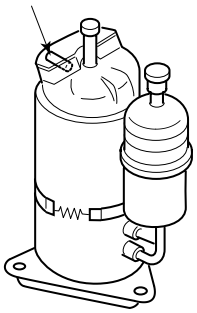
Tdc: Discharge gas temperature of the thermistor on the top of the compressor for cooling operation.

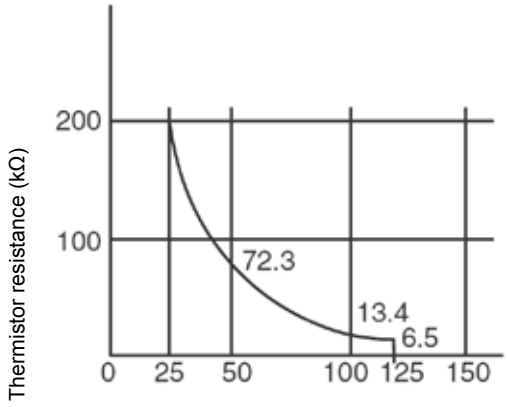
Tdh: Discharge gas temperature of the thermistor on the top of the compressor for heating operation.

Outdoor capacity	Tdc1	Tdc2	Tdh1	Tdh2
RAS-2HVRN2 and RAS-3HVRNME-AF	115	125	115	125
RAS-(4-6)HRNME-AF	127	140	120	140



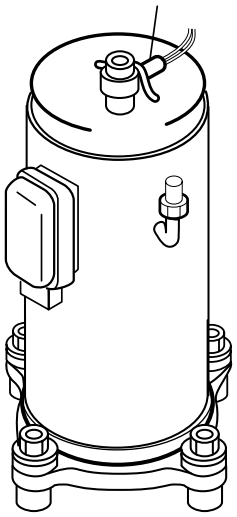
Compressor-top thermistor (THM9)





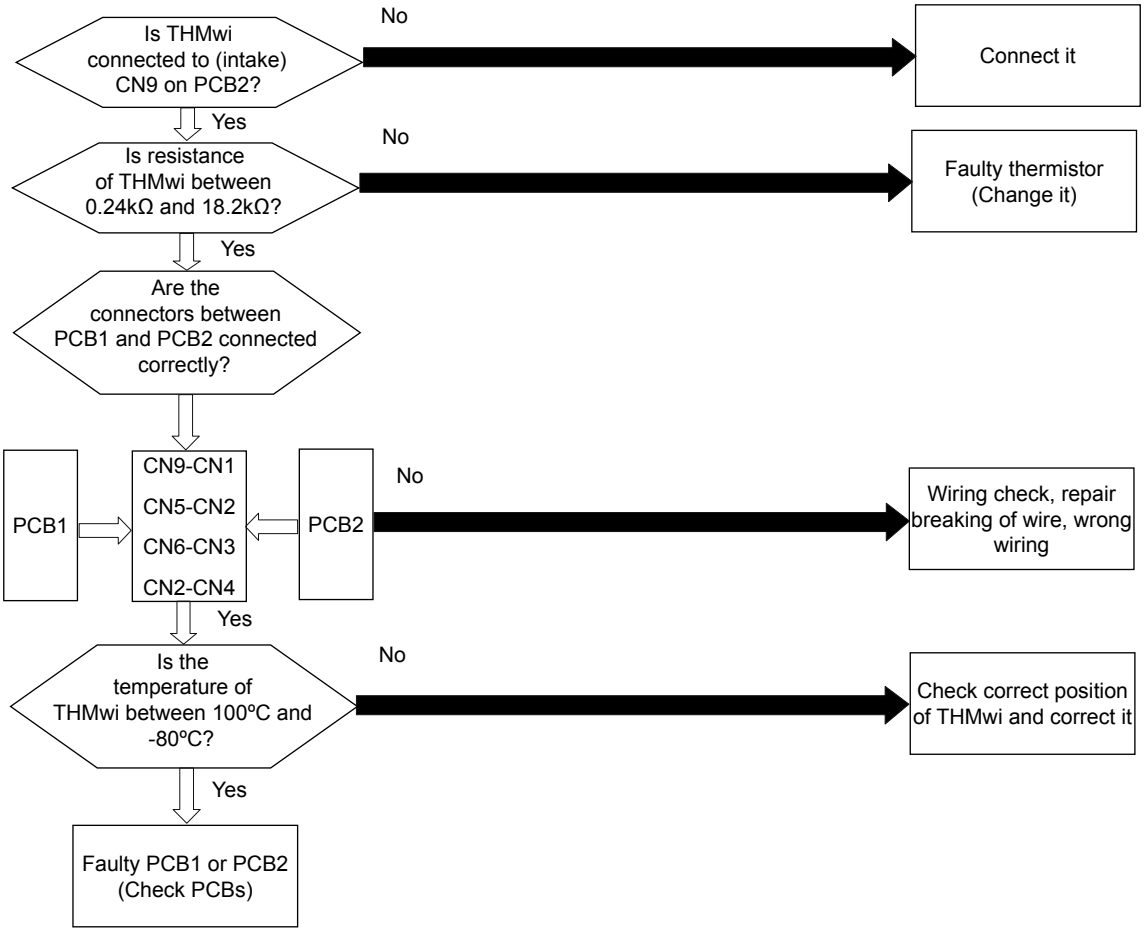
Thermistor resistance characteristics

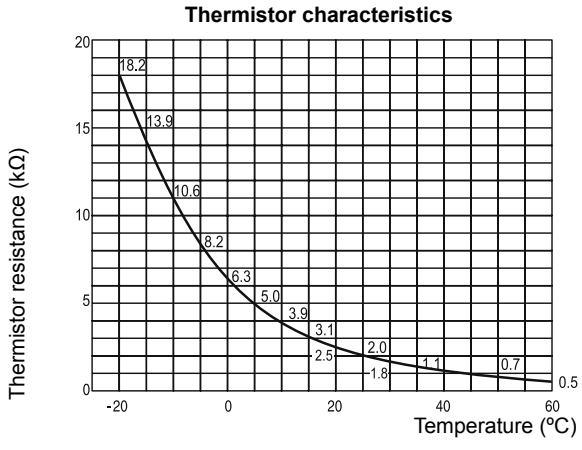
Thermistor for high discharge gas temperature at the top of compressor chamber (TH9)

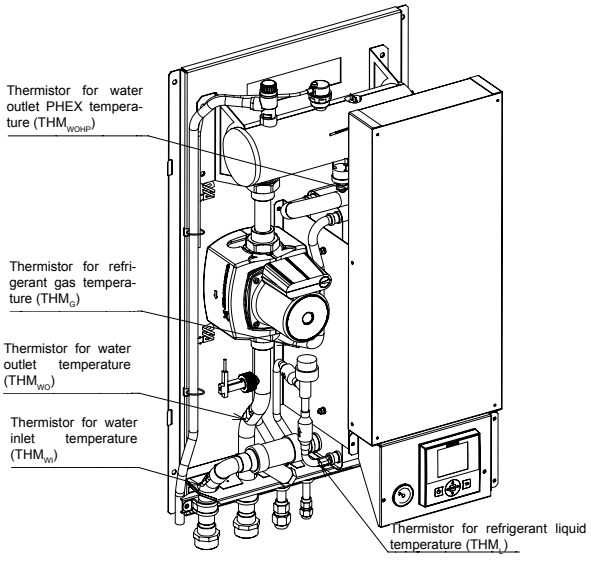


Alarm code	11	Water inlet Temperature (Twi) Thermistor Abnormality

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB
- This alarm code is displayed when the thermistor is short-circuited (less than 0.24 kΩ) or cut (greater than 18.2 kΩ) during the cooling process or the heating process.

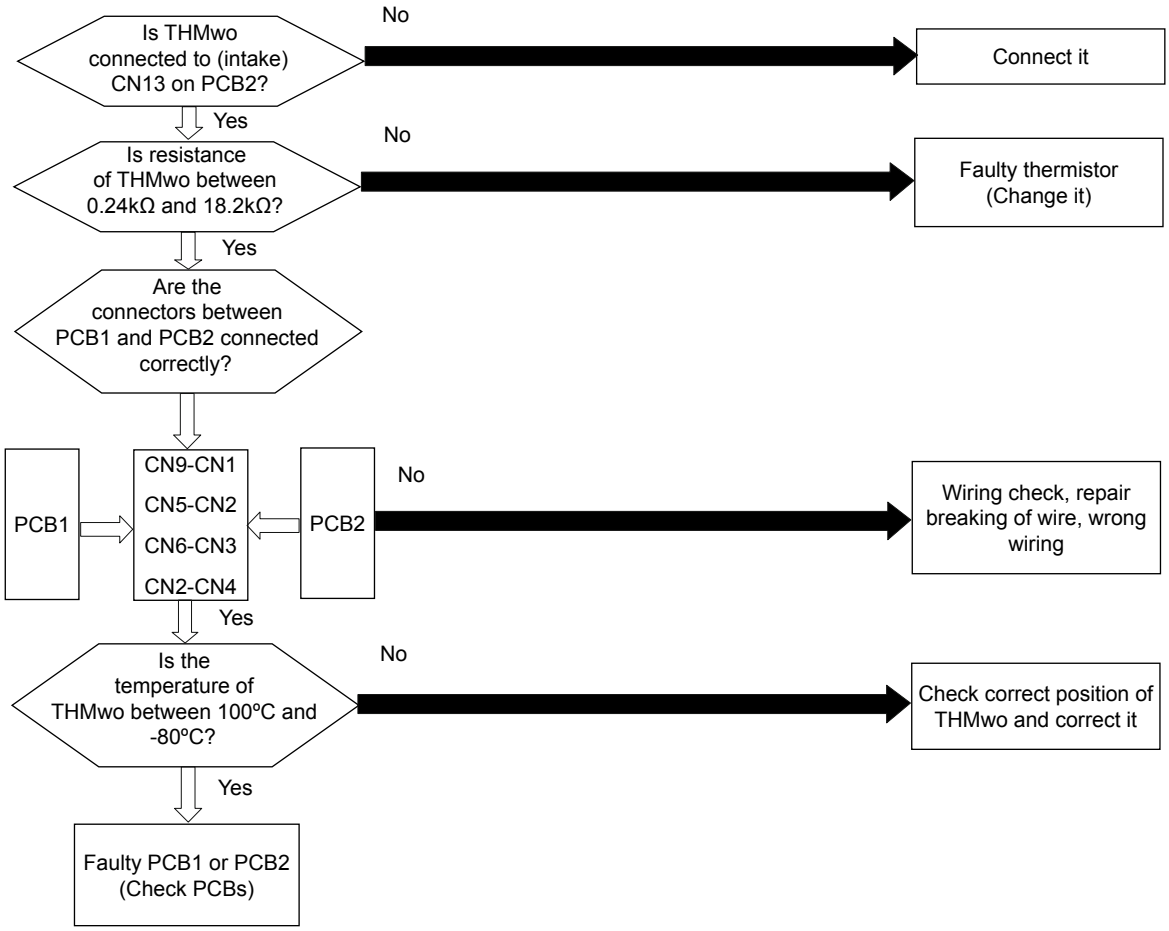


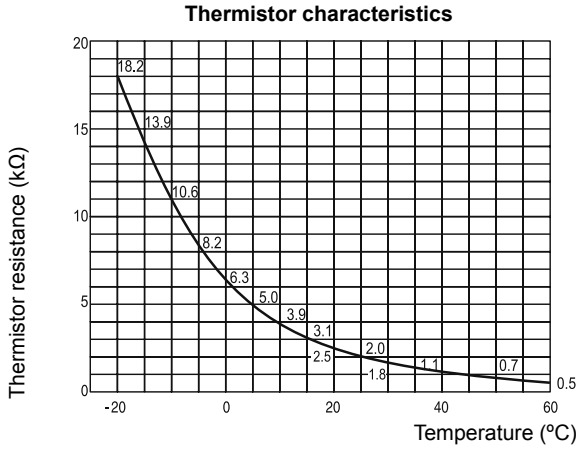


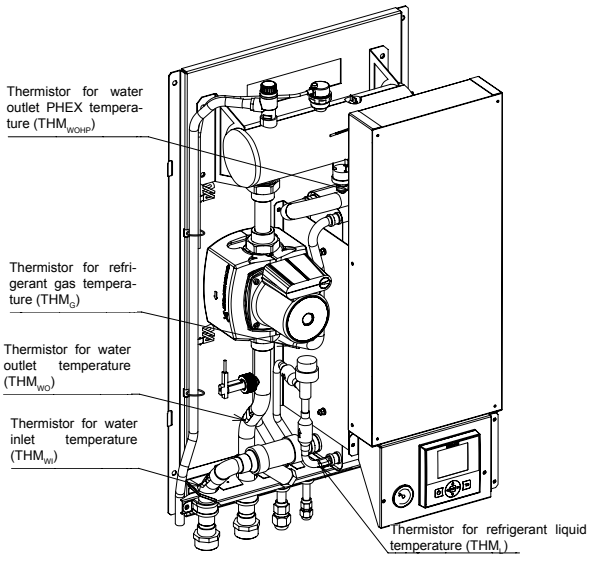


Alarm code	12	Water outlet Temperature (Two) Thermistor Abnormality

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- This alarm code is displayed when the thermistor is short-circuited (less than 0.24 kΩ) or cut (greater than 18.2 kΩ) during the cooling process or the heating process.

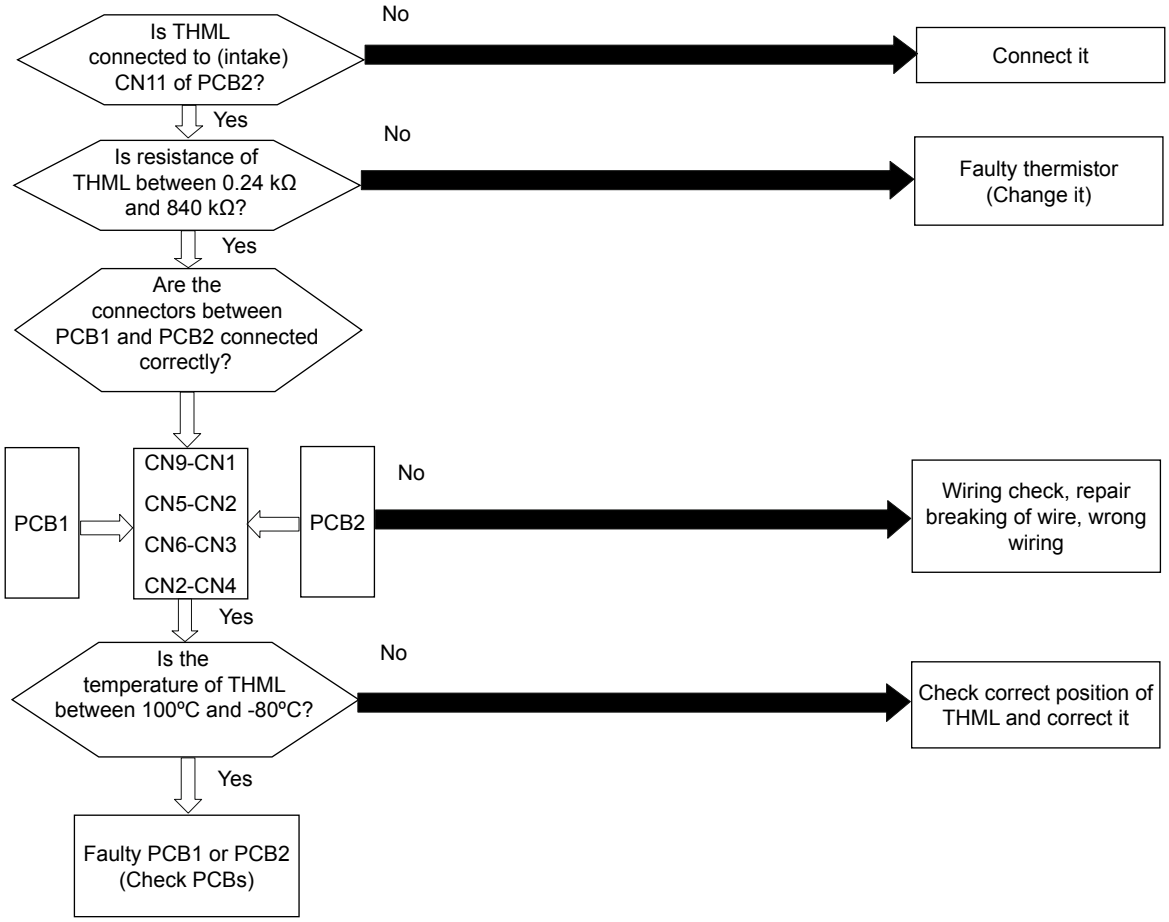




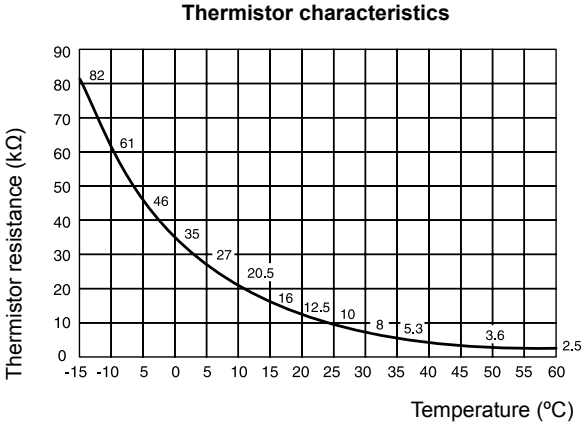


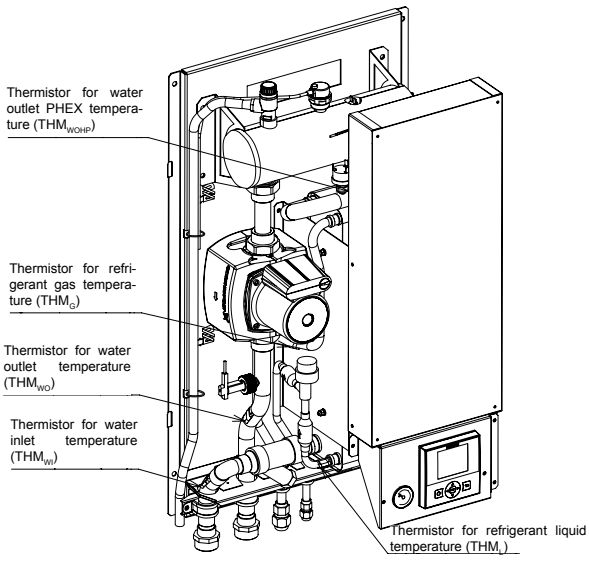
Alarm code	13	Indoor liquid pipe Temperature (TI) Thermistor Abnormality

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- This alarm code is displayed when the thermistor is short-circuited (less than 0.24 kΩ) or cut (greater than 840 kΩ) during the cooling process or the heating process.



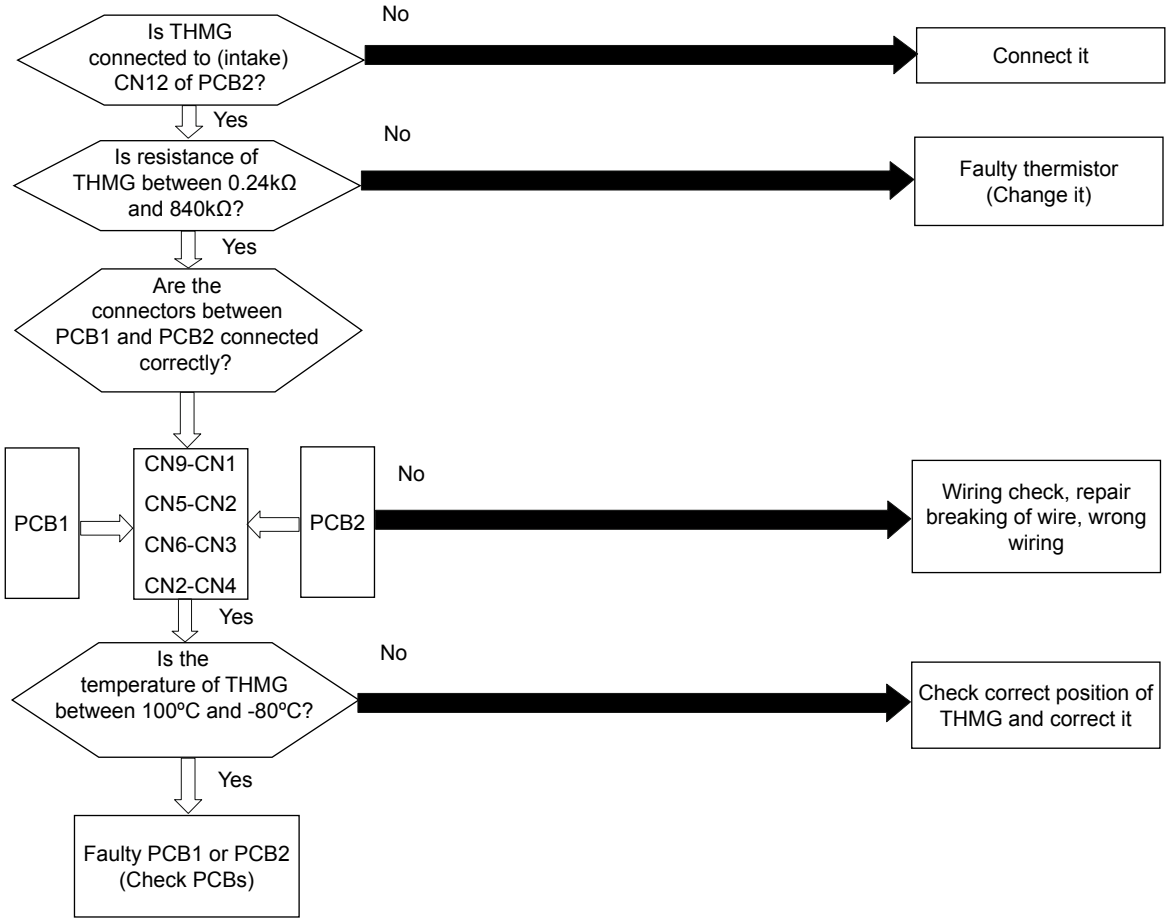
Measuring the thermistor resistance value:





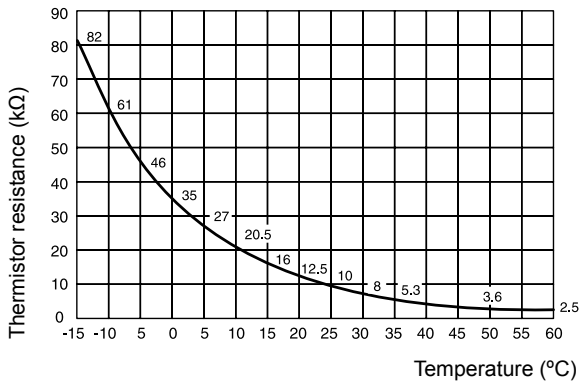
Alarm code	14	Indoor gas pipe Temperature (Tg) Thermistor Abnormality

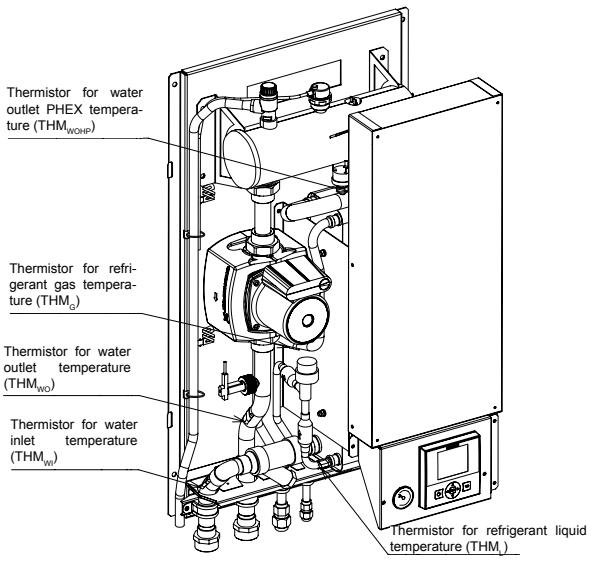
- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- This alarm code is displayed when the thermistor is short-circuited (less than 0.24 kΩ) or cut (greater than 840 kΩ) during the cooling process or the heating process.



Measuring the thermistor resistance value:

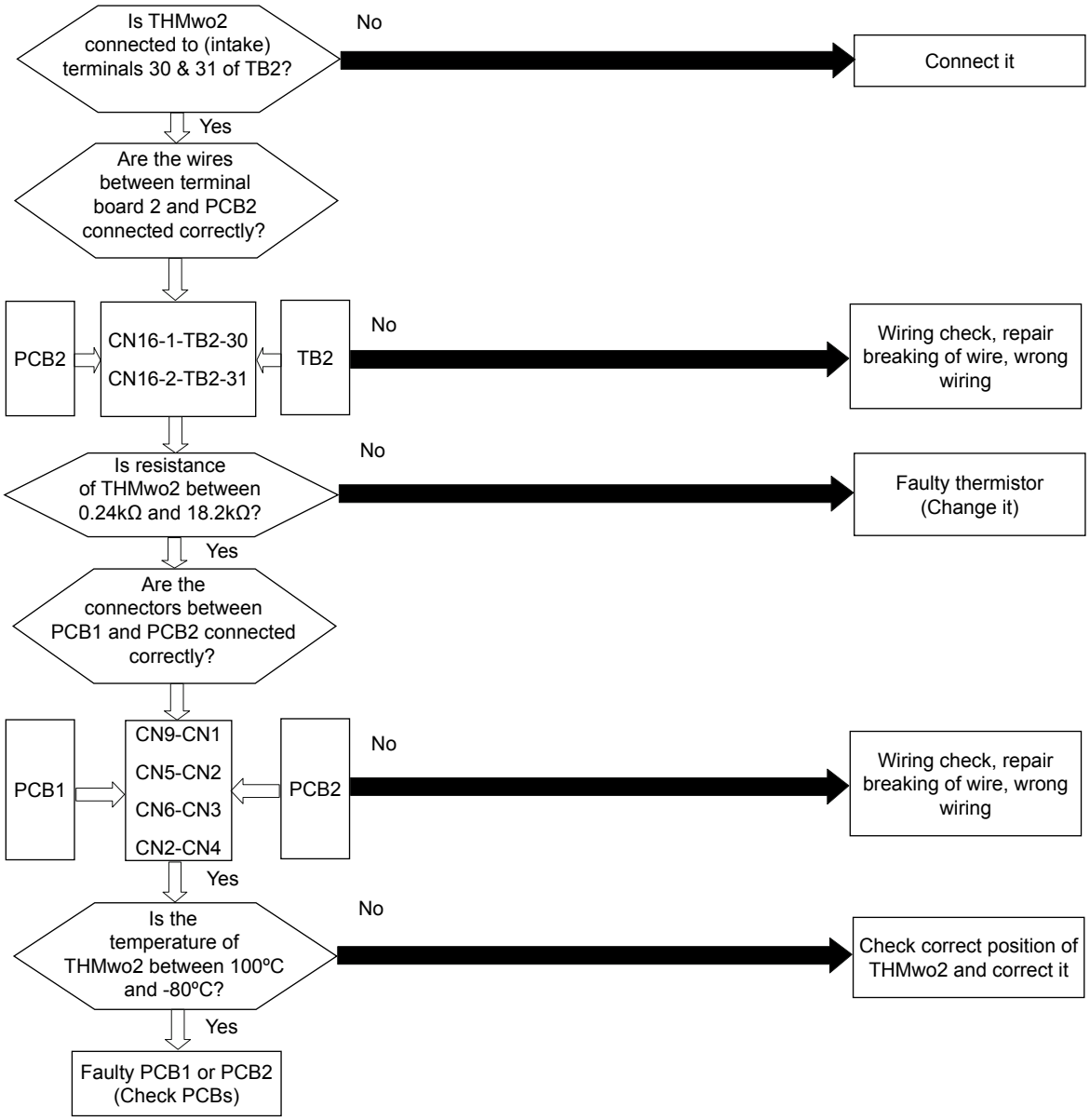
Thermistor characteristics



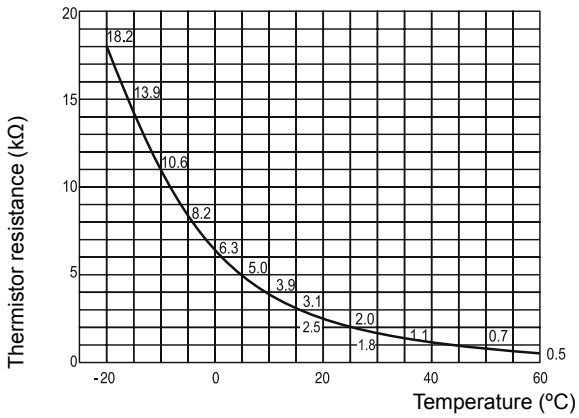


Alarm code	15	Water outlet circuit 2 (mix circ.) Temperature (Two2) Thermistor Abnormality

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- This alarm code is displayed when the thermistor is short-circuited (less than 0.24 kΩ) or cut (greater than 18.2 kΩ) during the cooling process or the heating process and circuit 2 enabled.

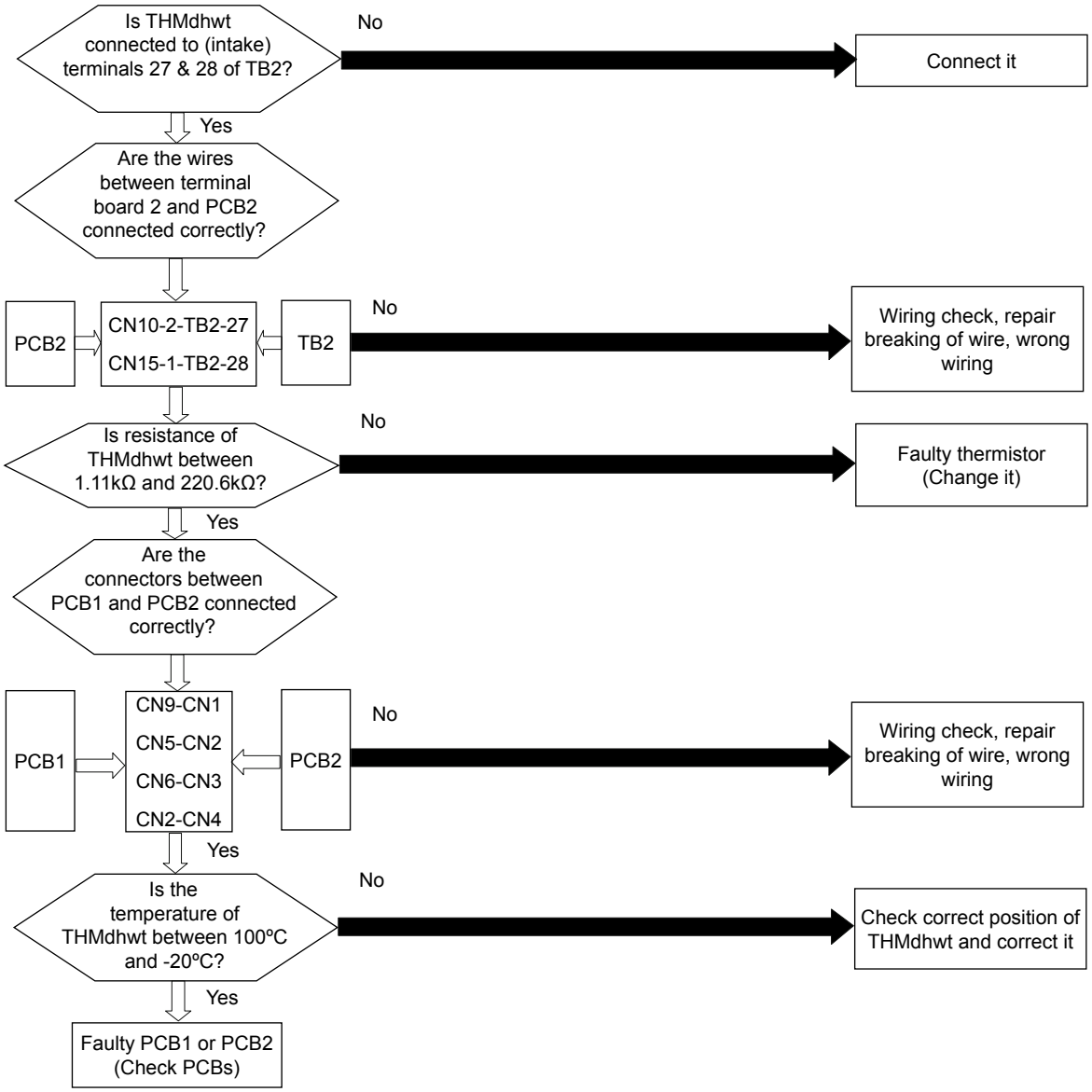


Thermistor characteristics



Alarm code	16	Domestic Hot Water Temperature (TDHW) Thermistor Abnormality

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- This alarm code is displayed when the thermistor is short-circuited (less than 1.11 kΩ) or cut (greater than 220.6 kΩ) when DHWT is enabled.



NOTE

DHW Water sensor is the same as Yutaki system controller.

Temp (ºC)	Resist (Ω)	Temp (ºC)	Resist (Ω)	Temp (ºC)	Resist (Ω)	Temp (ºC)	Resist (Ω)	Temp (ºC)	Resist (Ω)	Temp (ºC)	Resist (Ω)
-20.0	220600	1.0	66515	22.0	23032	43.0	8983	64.0	3877	85.0	1824
-19.0	207607	2.0	63046	23.0	21967	44.0	8612	65.0	3734	86.0	1763
-18.0	195459	3.0	59777	24.0	20958	45.0	8258	66.0	3596	87.0	1705
-17.0	184096	4.0	46697	25.0	20000	46.0	7920	67.0	3464	88.0	1648
-16.0	173463	5.0	53793	26.0	19089	47.0	7598	68.0	3338	89.0	1594
-15.0	163508	6.0	51055	27.0	18224	48.0	7291	69.0	3216	90.0	1542
-14.0	154185	7.0	48472	28.0	17404	49.0	6998	70.0	3100	91.0	1491
-13.0	145450	8.0	46034	29.0	16624	50.0	6718	71.0	2989	92.0	1443
-12.0	137262	9.0	43733	30.0	15884	51.0	6450	72.0	2882	93.0	1396
-11.0	129583	10.0	41560	31.0	15180	52.0	6195	73.0	2779	94.0	1351
-10.0	122380	11.0	39500	32.0	14511	53.0	5951	74.0	2681	95.0	1308
-9.0	115575	12.0	37553	33.0	13875	54.0	5718	75.0	2587	96.0	1266
-8.0	109189	13.0	35714	34.0	13270	55.0	5495	76.0	2496	97.0	1226
-7.0	103194	14.0	33975	35.0	12695	56.0	5282	77.0	2409	98.0	1187
-6.0	97564	15.0	32331	36.0	12148	57.0	5078	78.0	2325	99.0	1150
-5.0	92274	16.0	30775	37.0	11627	58.0	4883	79.0	2245	100.0	1114
-4.0	87303	17.0	29303	38.0	11131	59.0	4696	80.0	2168		
-3.0	82628	18.0	27909	39.0	10659	60.0	4518	81.0	2094		
-2.0	78232	19.0	26590	40.0	10210	61.0	4347	82.0	2022		
-1.0	74094	20.0	25340	41.0	9781	62.0	4184	83.0	1954		
0.0	70200	21.0	24155	42.0	9373	63.0	4027	84.0	1888		

Alarm code	17	Swimming pool (THM_{SWP}) Thermistor Abnormality

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- This alarm code is displayed when the sensor is abnormality when SWIMMING POOL is enabled.

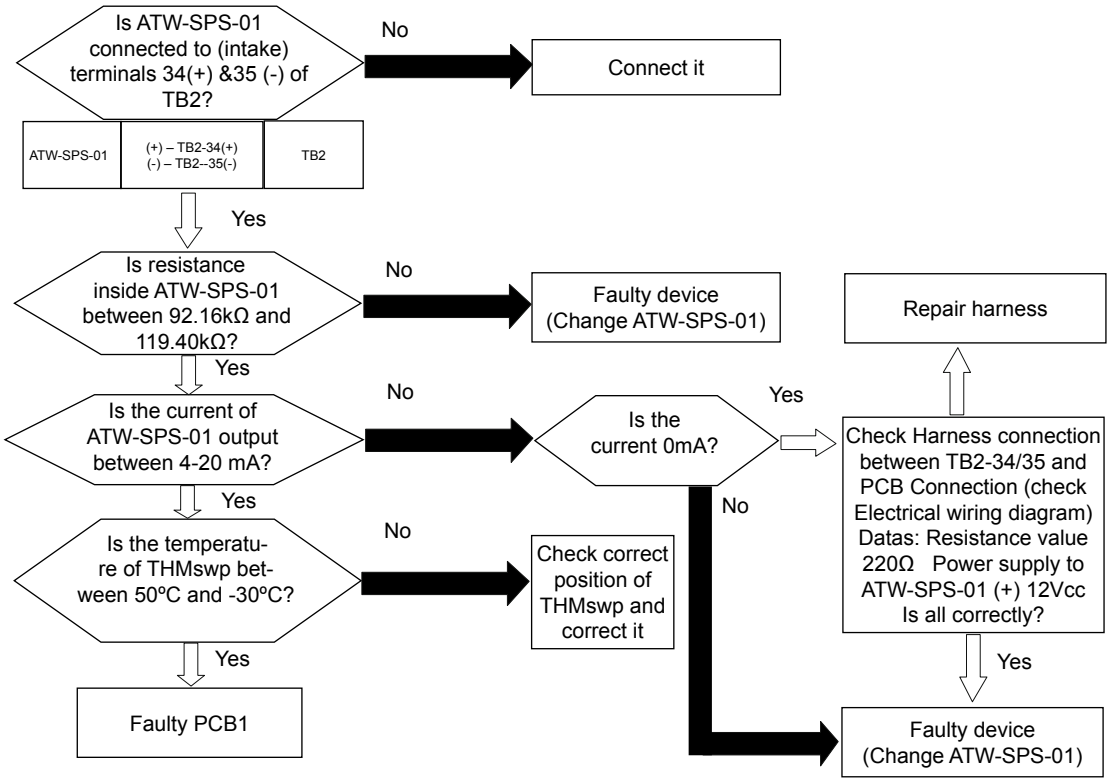


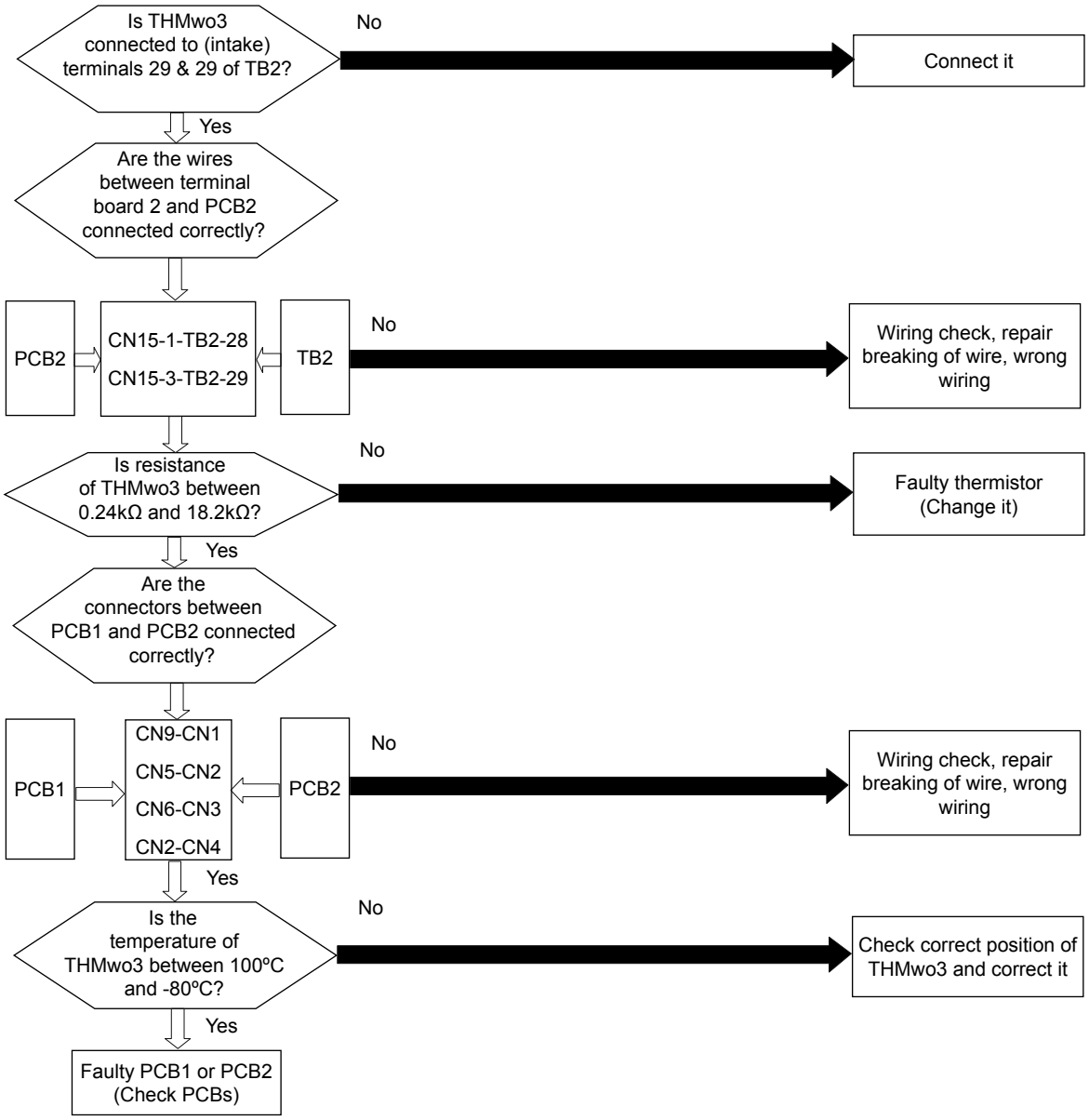
Table 1 - Temperature/resistance relationship, R_0 = 100.00 Ω

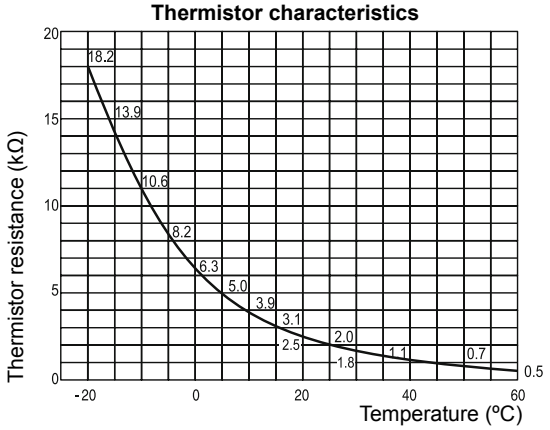
t_{90}1°C	Resistance at the temperature t_{90}1°C Ω										t_{90}1°C
	0	-1	-2	-3	-4	-5	-6	-7	-8	-9	
-200	18.52										-200
-190	22.83	22.40	21.97	21.54	21.11	20.68	20.25	19.82	19.38	18.95	-190
-180	27.10	26.67	26.24	25.82	25.39	24.97	24.54	24.11	23.68	23.25	-180
-170	31.34	30.91	30.49	30.07	29.64	29.22	28.80	28.37	27.95	27.52	-170
-160	35.54	35.12	34.70	34.28	33.86	33.44	33.02	32.60	32.18	31.76	-160
-150	39.72	39.31	38.89	38.47	38.05	37.64	37.22	36.80	36.38	35.96	-150
-140	43.88	43.46	43.05	42.63	42.22	41.80	41.39	40.97	40.56	40.14	-140
-130	48.00	47.59	47.18	46.77	46.36	45.94	45.53	45.12	44.70	44.29	-130
-120	52.11	51.70	51.29	50.88	50.47	50.06	49.65	49.24	48.83	48.42	-120
-110	56.19	55.79	55.38	54.97	54.56	54.15	53.75	53.34	52.93	52.52	-110
-100	60.26	59.85	59.44	59.04	58.63	58.23	57.82	57.41	57.01	56.60	-100
-90	64.30	63.90	63.49	63.09	62.68	62.28	61.88	61.47	61.07	60.66	-90
-80	68.33	67.92	67.52	67.12	66.72	66.31	65.91	65.51	65.11	64.70	-80
-70	72.33	71.93	71.53	71.13	70.73	70.33	69.93	69.53	69.13	68.73	-70
-60	76.33	75.93	75.53	75.13	74.73	74.33	73.93	73.53	73.13	72.73	-60
-50	80.31	79.91	79.51	79.11	78.72	78.32	77.92	77.52	77.12	76.73	-50
-40	84.27	83.87	83.48	83.08	82.69	82.29	81.89	81.50	81.10	80.70	-40
-30	88.22	87.83	87.43	87.04	86.64	86.25	85.85	85.46	85.06	84.67	-30
-20	92.16	91.77	91.37	90.98	90.59	90.19	89.80	89.40	89.01	88.62	-20
-10	96.09	95.69	95.30	94.91	94.52	94.12	93.73	93.34	92.95	92.55	-10
0	100.00	99.61	99.22	98.83	98.44	98.04	97.65	97.26	96.87	96.48	0

t_{90}1°C	0	1	2	3	4	5	6	7	8	9	t_{90}1°C
0	100.00	100.39	100.78	101.17	101.56	101.95	102.34	102.73	103.12	103.51	0
10	103.90	104.29	104.68	105.07	105.46	105.85	106.24	106.63	107.02	107.40	10
20	107.79	108.18	108.57	108.96	109.35	109.73	110.12	110.51	110.90	111.29	20
30	111.67	112.06	112.45	112.83	113.22	113.61	114.00	114.38	114.77	115.15	30
40	115.54	115.93	116.31	116.70	117.08	117.47	117.86	118.24	118.63	119.01	40
50	119.40	119.78	120.17	120.55	120.94	121.32	121.71	122.09	122.47	122.86	50
60	123.24	123.63	124.01	124.39	124.78	125.16	125.54	125.93	126.31	126.69	60
70	127.08	127.46	127.84	128.22	128.61	128.99	129.37	129.75	130.13	130.52	70
80	130.90	131.28	131.66	132.04	132.42	132.80	133.18	133.57	133.95	134.33	80
90	134.71	135.09	135.47	135.85	136.23	136.61	136.99	137.37	137.75	138.13	90
100	138.51	138.88	139.26	139.64	140.02	140.40	140.78	141.16	141.54	141.91	100
110	142.29	142.67	143.05	143.43	143.80	144.18	144.56	144.94	145.31	145.69	110
120	146.07	146.44	146.82	147.20	147.57	147.95	148.33	148.70	149.08	149.46	120
130	149.83	150.21	150.58	150.96	151.33	151.71	152.08	152.46	152.83	153.21	130
140	153.58	153.96	154.33	154.71	155.08	155.46	155.83	156.20	156.58	156.95	140
150	157.33	157.70	158.07	158.45	158.82	159.19	159.56	159.94	160.31	160.68	150
160	161.05	161.43	161.80	162.17	162.54	162.91	163.29	163.66	164.03	164.40	160
170	164.77	165.14	165.51	165.89	166.26	166.63	167.00	167.37	167.74	168.11	170
180	168.48	168.85	169.22	169.59	169.96	170.33	170.70	171.07	171.43	171.80	180
190	172.17	172.54	172.91	173.28	173.65	174.02	174.38	174.75	175.12	175.49	190
200	175.86	176.22	176.59	176.96	177.33	177.69	178.06	178.43	178.79	179.16	200
210	179.53	179.89	180.26	180.63	180.99	181.36	181.72	182.09	182.46	182.82	210
220	183.19	183.55	183.92	184.28	184.65	185.01	185.38	185.74	186.11	186.47	220
230	186.84	187.20	187.56	187.93	188.29	188.66	189.02	189.38	189.75	190.11	230
240	190.47	190.84	191.20	191.56	191.92	192.29	192.65	193.01	193.37	193.74	240
250	194.10	194.46	194.82	195.18	195.55	195.91	196.27	196.63	196.99	197.35	250
260	197.71	198.07	198.43	198.79	199.15	199.51	199.87	200.23	200.59	200.95	260
270	201.31	201.67	202.03	202.39	202.75	203.11	203.47	203.83	204.19	204.55	270
280	104.90	205.26	205.62	205.98	206.34	206.70	207.05	207.41	207.77	208.13	280
290	208.48	208.84	209.20	209.56	209.91	210.27	210.63	210.98	211.34	211.70	290
300	212.05	212.41	212.76	213.12	213.48	213.83	214.19	214.54	214.90	215.25	300
310	215.61	215.96	216.32	216.67	217.03	217.38	217.74	218.09	218.44	218.80	310
320	219.15	219.51	219.86	220.21	220.57	220.92	221.27	221.63	221.98	222.33	320

Alarm code	18	Water outlet 3 (boiler circ.) Temperature (Two3) Thermistor Abnormality

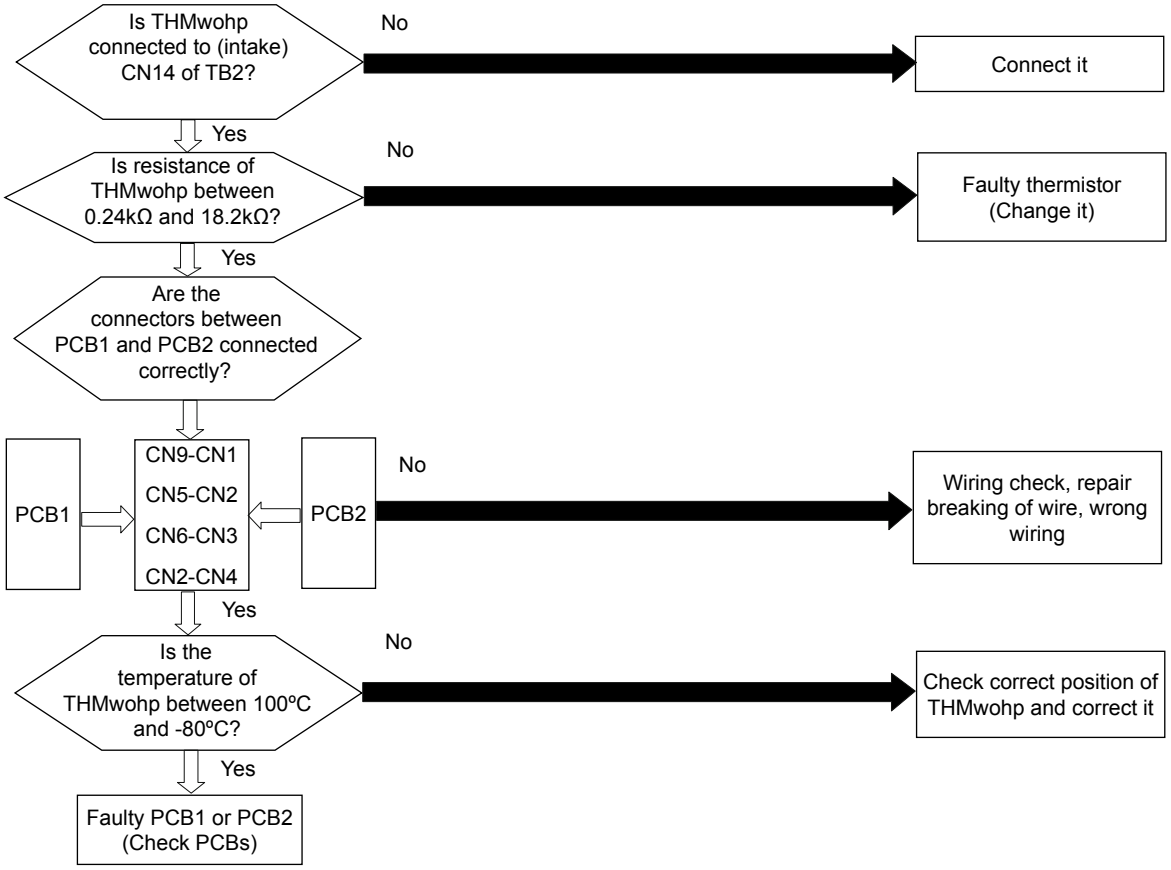
- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- This alarm code is displayed when the thermistor is short-circuited (less than 0.24 kΩ) or cut (greater than 18.2 kΩ) when boiler enabled.

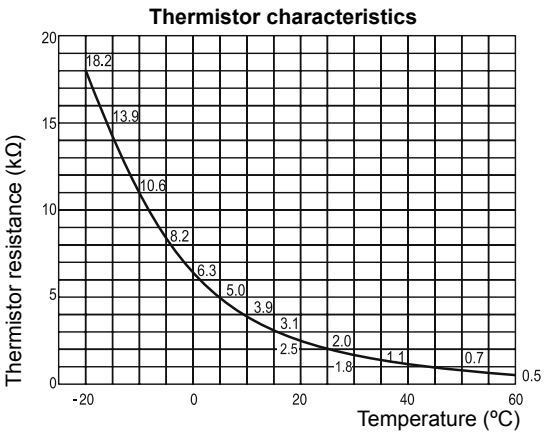


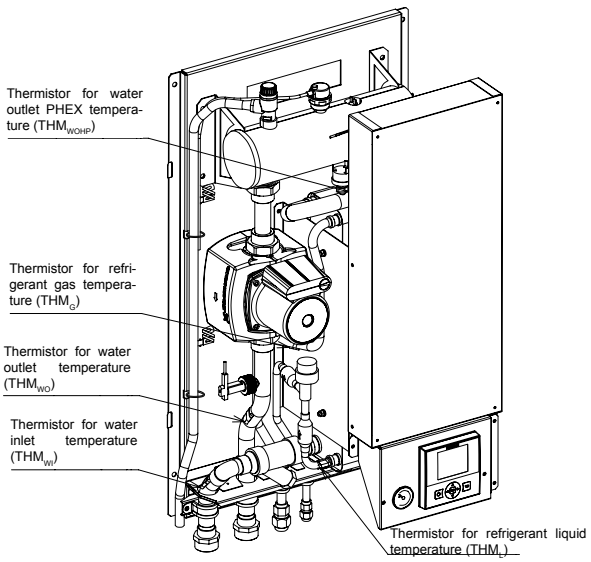


Alarm code	19	Water outlet HP (After Heat Exchanger) Temperature (TwoHP) Thermistor Abnormality

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- This alarm code is displayed when the thermistor is short-circuited (less than 0.24 kΩ) or cut (greater than 18.2 kΩ) during the cooling process or the heating process.

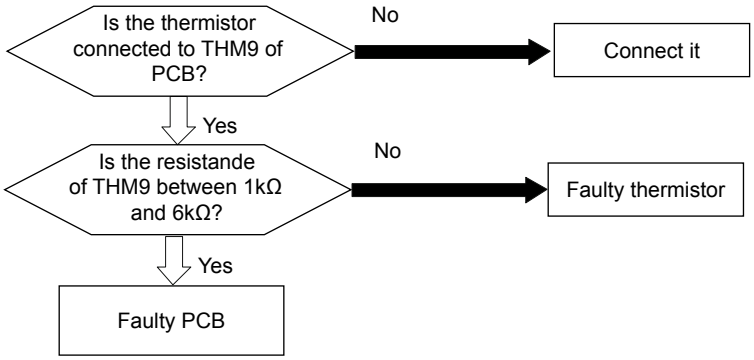


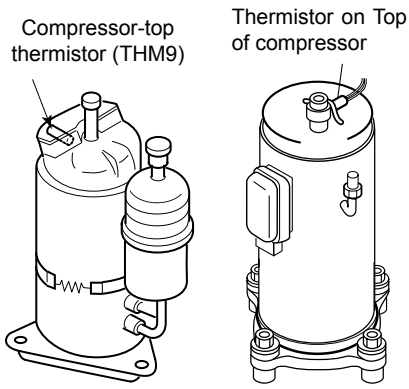




Alarm code	20	Abnormality of Thermistor for Discharge Gas Temperature (Compressor Thermistor)

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
- This alarm code is indicated when the thermistor is short-circuited (less than 1 kΩ) or cut (greater than 6 MΩ) during the cooling or heating operation.





Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Faulty top of compressor thermistor	Fault	Check resistance	Replace thermistor if faulty
	Incorrect connection	Check wiring to PCB1	Repair wiring and connections
Faulty PCB1		Replace PCB1 and check operation	Replace PCB1 if faulty

Temperature (ºC)	Resistance (kΩ)	Temperature (ºC)	Resistance (kΩ)	Temperature (ºC)	Resistance (kΩ)
0	640.44	45	87.74	90	18.17
5	500.66	50	72.32	95	15.55
10	394.16	55	59.97	100	13.35
15	312.41	60	49.96	105	11.50
20	249.20	65	41.79	110	9.93
25	200.00	70	35.11	115	8.60
30	161.45	75	29.61	120	7.47
35	131.06	80	25.07	125	6.51
40	106.96	85	21.31		

The resistance value have fudge factor (+10%).

Alarm code	21	2nd ambient temperature sensor (THM_{AMB2}) Thermistor Abnormality

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- This alarm code is displayed when the sensor is abnormality when 2ND ambient sensor option is enabled.

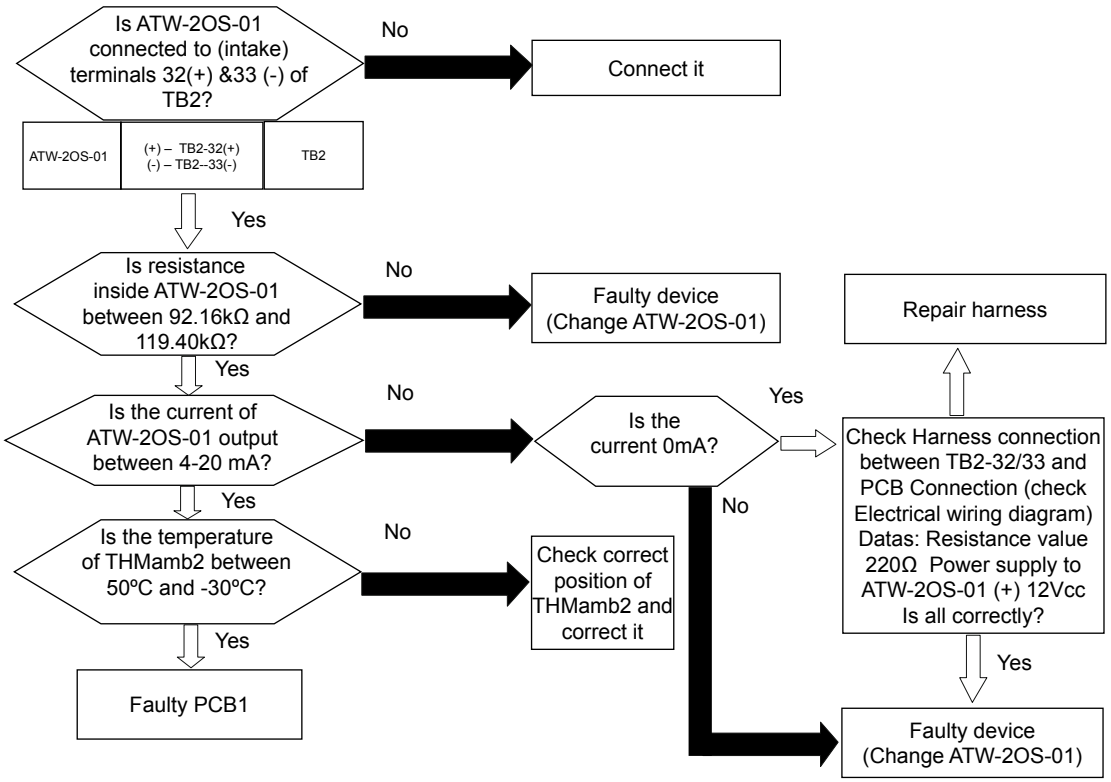


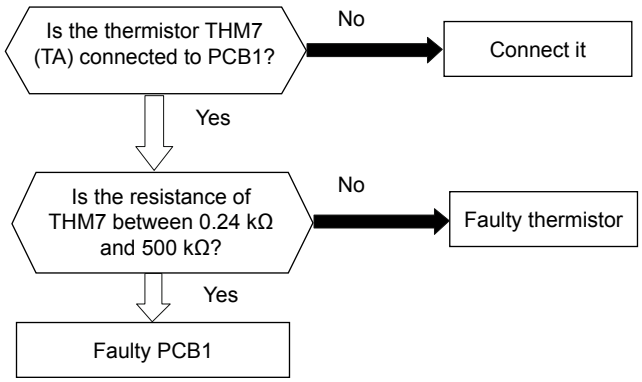
Table 1 - Temperature/resistance relationship, R_0 = 100.00 Ω

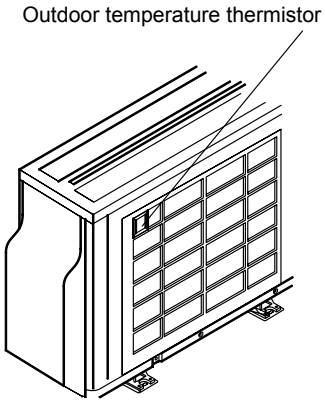
t_{90}1°C	Resistance at the temperature t_{90}1°C Ω										t_{90}1°C
	0	-1	-2	-3	-4	-5	-6	-7	-8	-9	
-200	18.52										-200
-190	22.83	22.40	21.97	21.54	21.11	20.68	20.25	19.82	19.38	18.95	-190
-180	27.10	26.67	26.24	25.82	25.39	24.97	24.54	24.11	23.68	23.25	-180
-170	31.34	30.91	30.49	30.07	29.64	29.22	28.80	28.37	27.95	27.52	-170
-160	35.54	35.12	34.70	34.28	33.86	33.44	33.02	32.60	32.18	31.76	-160
-150	39.72	39.31	38.89	38.47	38.05	37.64	37.22	36.80	36.38	35.96	-150
-140	43.88	43.46	43.05	42.63	42.22	41.80	41.39	40.97	40.56	40.14	-140
-130	48.00	47.59	47.18	46.77	46.36	45.94	45.53	45.12	44.70	44.29	-130
-120	52.11	51.70	51.29	50.88	50.47	50.06	49.65	49.24	48.83	48.42	-120
-110	56.19	55.79	55.38	54.97	54.56	54.15	53.75	53.34	52.93	52.52	-110
-100	60.26	59.85	59.44	59.04	58.63	58.23	57.82	57.41	57.01	56.60	-100
-90	64.30	63.90	63.49	63.09	62.68	62.28	61.88	61.47	61.07	60.66	-90
-80	68.33	67.92	67.52	67.12	66.72	66.31	65.91	65.51	65.11	64.70	-80
-70	72.33	71.93	71.53	71.13	70.73	70.33	69.93	69.53	69.13	68.73	-70
-60	76.33	75.93	75.53	75.13	74.73	74.33	73.93	73.53	73.13	72.73	-60
-50	80.31	79.91	79.51	79.11	78.72	78.32	77.92	77.52	77.12	76.73	-50
-40	84.27	83.87	83.48	83.08	82.69	82.29	81.89	81.50	81.10	80.70	-40
-30	88.22	87.83	87.43	87.04	86.64	86.25	85.85	85.46	85.06	84.67	-30
-20	92.16	91.77	91.37	90.98	90.59	90.19	89.80	89.40	89.01	88.62	-20
-10	96.09	95.69	95.30	94.91	94.52	94.12	93.73	93.34	92.95	92.55	-10
0	100.00	99.61	99.22	98.83	98.44	98.04	97.65	97.26	96.87	96.48	0

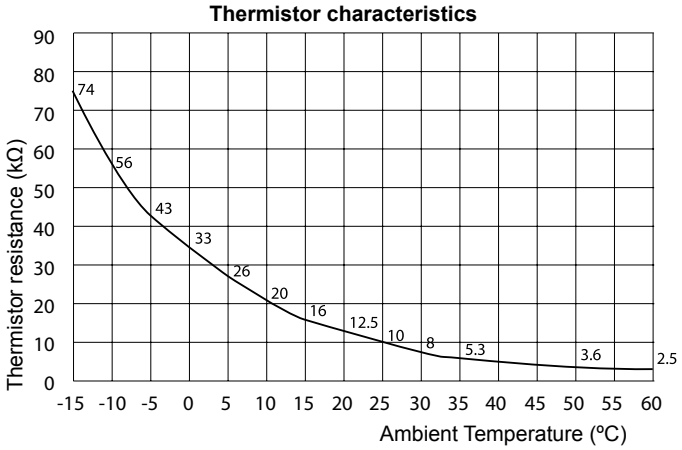
t_{90}1°C	0	1	2	3	4	5	6	7	8	9	t_{90}1°C
0	100.00	100.39	100.78	101.17	101.56	101.95	102.34	102.73	103.12	103.51	0
10	103.90	104.29	104.68	105.07	105.46	105.85	106.24	106.63	107.02	107.40	10
20	107.79	108.18	108.57	108.96	109.35	109.73	110.12	110.51	110.90	111.29	20
30	111.67	112.06	112.45	112.83	113.22	113.61	114.00	114.38	114.77	115.15	30
40	115.54	115.93	116.31	116.70	117.08	117.47	117.86	118.24	118.63	119.01	40
50	119.40	119.78	120.17	120.55	120.94	121.32	121.71	122.09	122.47	122.86	50
60	123.24	123.63	124.01	124.39	124.78	125.16	125.54	125.93	126.31	126.69	60
70	127.08	127.46	127.84	128.22	128.61	128.99	129.37	129.75	130.13	130.52	70
80	130.90	131.28	131.66	132.04	132.42	132.80	133.18	133.57	133.95	134.33	80
90	134.71	135.09	135.47	135.85	136.23	136.61	136.99	137.37	137.75	138.13	90
100	138.51	138.88	139.26	139.64	140.02	140.40	140.78	141.16	141.54	141.91	100
110	142.29	142.67	143.05	143.43	143.80	144.18	144.56	144.94	145.31	145.69	110
120	146.07	146.44	146.82	147.20	147.57	147.95	148.33	148.70	149.08	149.46	120
130	149.83	150.21	150.58	150.96	151.33	151.71	152.08	152.46	152.83	153.21	130
140	153.58	153.96	154.33	154.71	155.08	155.46	155.83	156.20	156.58	156.95	140
150	157.33	157.70	158.07	158.45	158.82	159.19	159.56	159.94	160.31	160.68	150
160	161.05	161.43	161.80	162.17	162.54	162.91	163.29	163.66	164.03	164.40	160
170	164.77	165.14	165.51	165.89	166.26	166.63	167.00	167.37	167.74	168.11	170
180	168.48	168.85	169.22	169.59	169.96	170.33	170.70	171.07	171.43	171.80	180
190	172.17	172.54	172.91	173.28	173.65	174.02	174.38	174.75	175.12	175.49	190
200	175.86	176.22	176.59	176.96	177.33	177.69	178.06	178.43	178.79	179.16	200
210	179.53	179.89	180.26	180.63	180.99	181.36	181.72	182.09	182.46	182.82	210
220	183.19	183.55	183.92	184.28	184.65	185.01	185.38	185.74	186.11	186.47	220
230	186.84	187.20	187.56	187.93	188.29	188.66	189.02	189.38	189.75	190.11	230
240	190.47	190.84	191.20	191.56	191.92	192.29	192.65	193.01	193.37	193.74	240
250	194.10	194.46	194.82	195.18	195.55	195.91	196.27	196.63	196.99	197.35	250
260	197.71	198.07	198.43	198.79	199.15	199.51	199.87	200.23	200.59	200.95	260
270	201.31	201.67	202.03	202.39	202.75	203.11	203.47	203.83	204.19	204.55	270
280	104.90	205.26	205.62	205.98	206.34	206.70	207.05	207.41	207.77	208.13	280
290	208.48	208.84	209.20	209.56	209.91	210.27	210.63	210.98	211.34	211.70	290
300	212.05	212.41	212.76	213.12	213.48	213.83	214.19	214.54	214.90	215.25	300
310	215.61	215.96	216.32	216.67	217.03	217.38	217.74	218.09	218.44	218.80	310
320	219.15	219.51	219.86	220.21	220.57	220.92	221.27	221.63	221.98	222.33	320

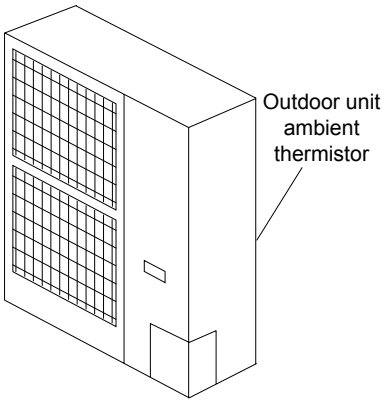
Alarm code	22	Abnormal operation of the thermistor for the outdoor temperature (outdoor unit ambient thermistor)

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - This alarm code is displayed when the thermistor is short-circuited (less than 0.2 kΩ) or cut (greater than 500 kΩ) during the operation. However, this alarm occurs during the test run mode only. In the case that the thermistor is abnormal during the operation, the operation continues based on the assumption that the outdoor temperature is 35 °C (cooling) / 6 °C (heating).





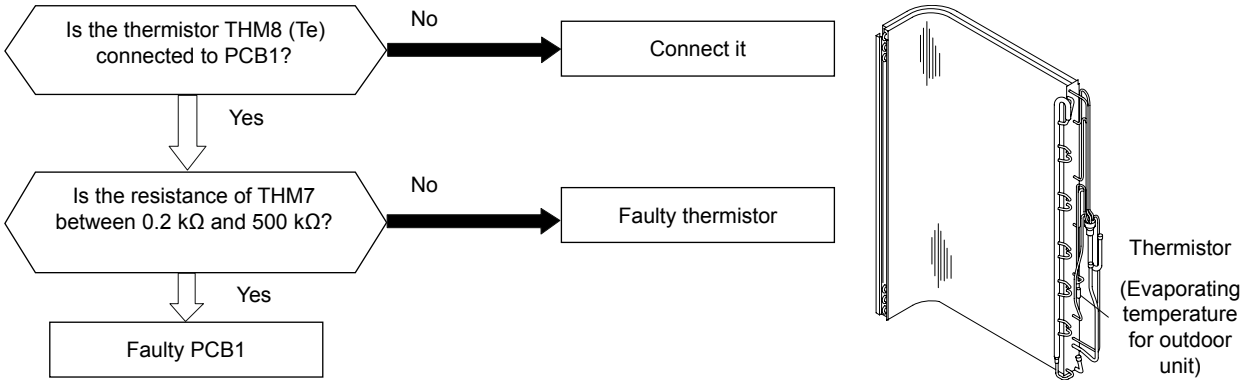


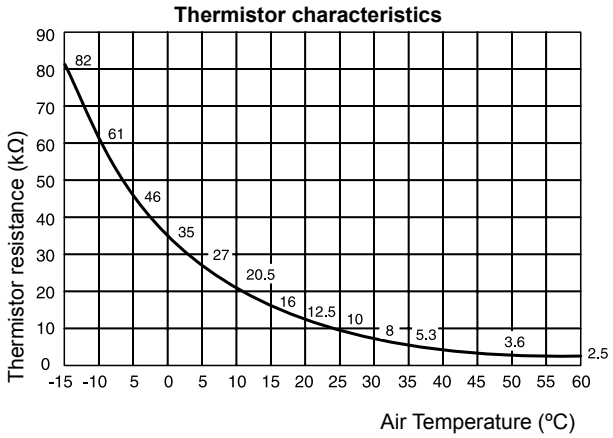


Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Faulty thermistor for the outdoor unit ambient	Fault	Check resistance	Replace thermistor if faulty
	Incorrect connection	Check wiring to PCB1	Repair wiring and connections
Faulty PCB1		Replace PCB1 and check operation	Replace PCB if faulty

Alarm code	24	Abnormal operation of the thermistor for the evaporating temperature during the heating process (outdoor unit)

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB. If you find an abnormal operation of the thermistor, check all the thermistors as shown below.
  - The evaporating thermistor during the heating process is attached to the heat exchanger as shown in the figure below. If this thermistor is faulty, such as short-circuit (less than 0,2kΩ) or cut (more than 840kΩ) during eight minutes continuously, this alarm is displayed. The position is indicated below.

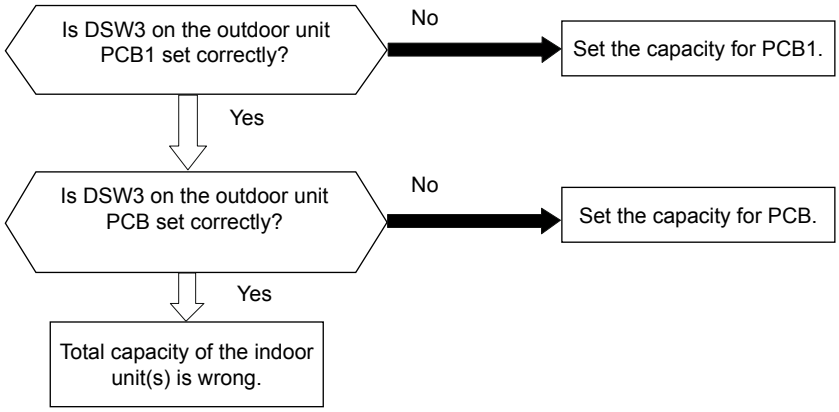




Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Faulty thermistor for the evaporating temperature during heating	Fault	Check resistance	Replace thermistor if faulty
	Incorrect connection	Check wiring to PCB1	Repair the wiring and the connections
Faulty PCB1		Replace PCB1 and check the operation	Replace PCB1 if faulty

Alarm code	3 1	Incorrect capacity setting or combined capacity between indoor units and outdoor unit

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - This alarm code is indicated when the total indoor unit capacity is not equal to the combined outdoor unit capacity. Outdoor unit capacity setting is not correct.



Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
	Incorrect capacity setting of indoor unit	Check combination of indoor units and capacity setting on PCB.	Correctly set dip switch, DSW3.
	Incorrect capacity setting of outdoor unit	Check capacity setting on outdoor unit PCB.	Correctly set dip switch, DSW3.

NOTES

- ***In case of H-LINK system, this alarm code is indicated when the refrigerant system setting on the outdoor unit PCB and indoor unit PCB are incorrectly set.***
- ***In this case, set correctly refering to the section*** *Setting of DIP switches and RSW switches* ***after turning OFF main switch.***

Alarm code		Incorrect indoor number setting

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - This alarm code is indicated 3 minutes after power is supplied to the outdoor unit when the indoor unit no. connected to the outdoor unit is duplicated by setting of RSW.

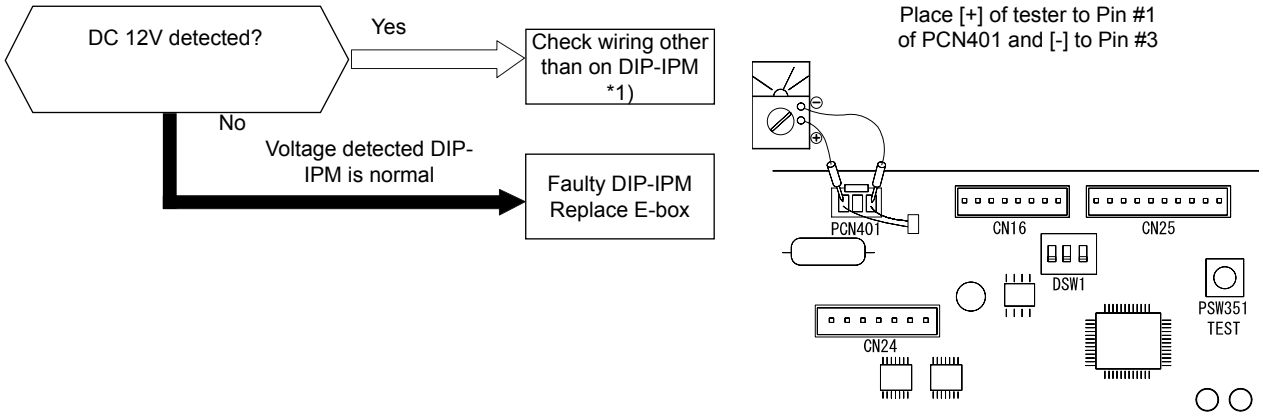
NOTES

- ***In case of H-LINK system, this alarm code is indicated when the refrigerant system setting on the outdoor unit PCB and the indoor unit PCB are incorrectly set.***
- ***In this case, set correctly refering to the section*** *Setting of DIP switches and RSW switches* ***after turning OFF main switch.***

Alarm code	38	Abnormality of Protective Circuit for Protection (Outdoor Unit) (RAS-2HVRN2)

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - The alarm code appears if approx. DC12V is supplied to the DIP-IPM connector (see table below) when the inverter operation is commanded (after five seconds following activation of the remote control switch).

Place the tester as shown in the diagram below to check the connector of PCN401. The connector shall remain inserted. DC12V will constantly be detected and disturb the diagnosis if the connector of PCN401 is pulled out.

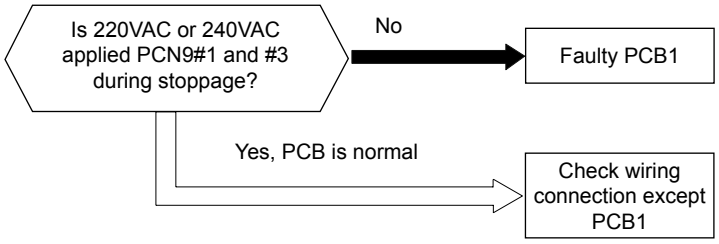


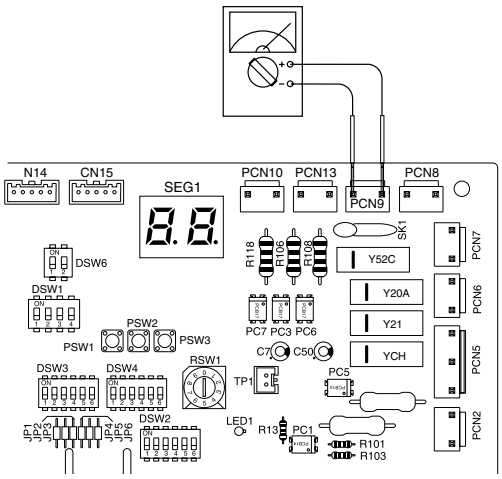
Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Faulty DIP-IPM		Check DIP-IPM by seft-checking	Replace DIP-IPM

*1): This alarm (Alarm Code: 38) may appear when the operation is started, if the Faston terminal of the high pressure switch (63H1) is improperly connected or damaged (open-circuit fault). See also *Alarm Code: 02 Activation of Outdoor Unit Protection Device*.

Alarm code	38	Abnormality of protective circuit for protection (outdoor unit) (RAS-(3-10)H(V)RNME-AF)

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is indicated when AC 220V or 240V is supplied to voltage PCN9#1 and #3 on PCB1 in the outdoor unit during CMC is opened.

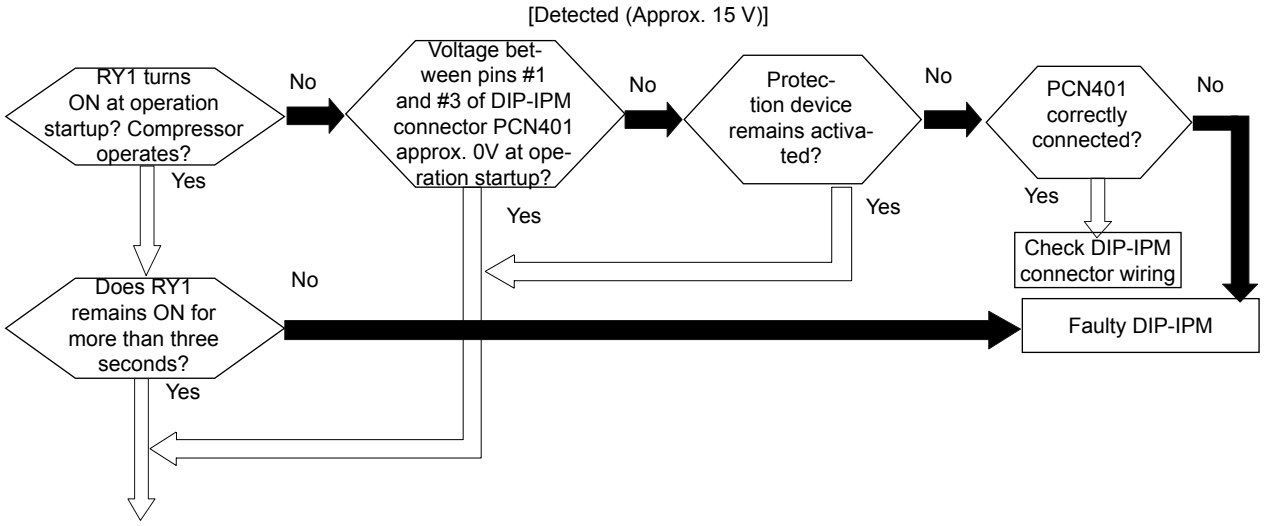




Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Faulty PCB1		Check PCB1 by seft-checking	Replace PCB1

Alarm code	4 1	Cooling Overload (High pressure switch will be activated) (RAS-2HVRN2)

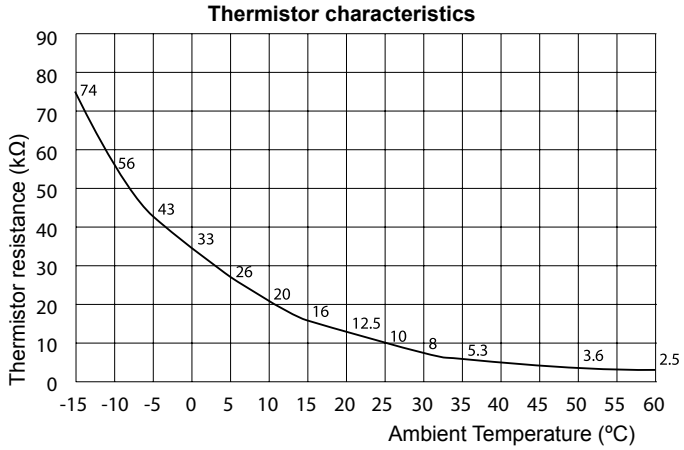
- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - Abnormality indication will appear when the protection device is activated during compressor operation at cooling, with the outdoor unit evaporation temperature higher than 55°C and the compressor-top temperature higher than 95°C.



Check the temperature of the following places with the remote control switch in checking mode.

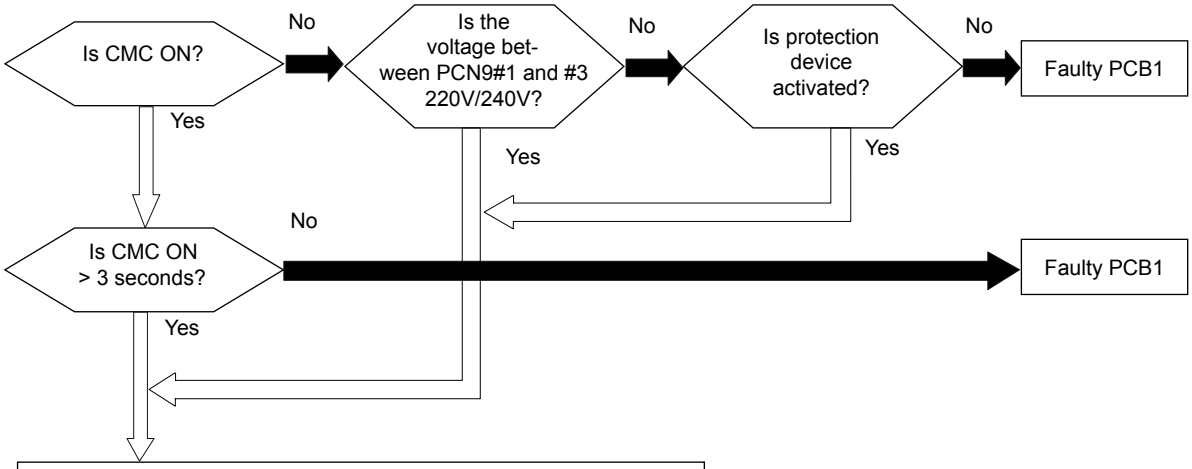
Check the temperature of [1] compressor top temperature and [2] outdoor unit evaporation (piping). Examine the cause and address the problem if the measurements surpass the preset temperature:

1 Compressor top temperature: 95ºC or less
2 Outdoor unit evaporation (piping) temperature: 55ºC or less



Alarm code	4 1	Cooling overload (high pressure switch will be activated) (RAS-(3-10)H(V)RNME-AF)

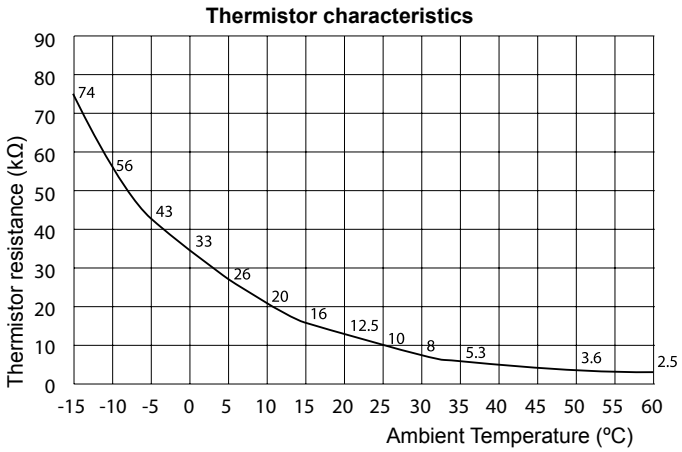
- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - This alarm code is indicated when the protection device is activated at following condition. Evaporation temperature of outdoor unit higher than 55 degree and top of compressor temperature higher than 95 degree.

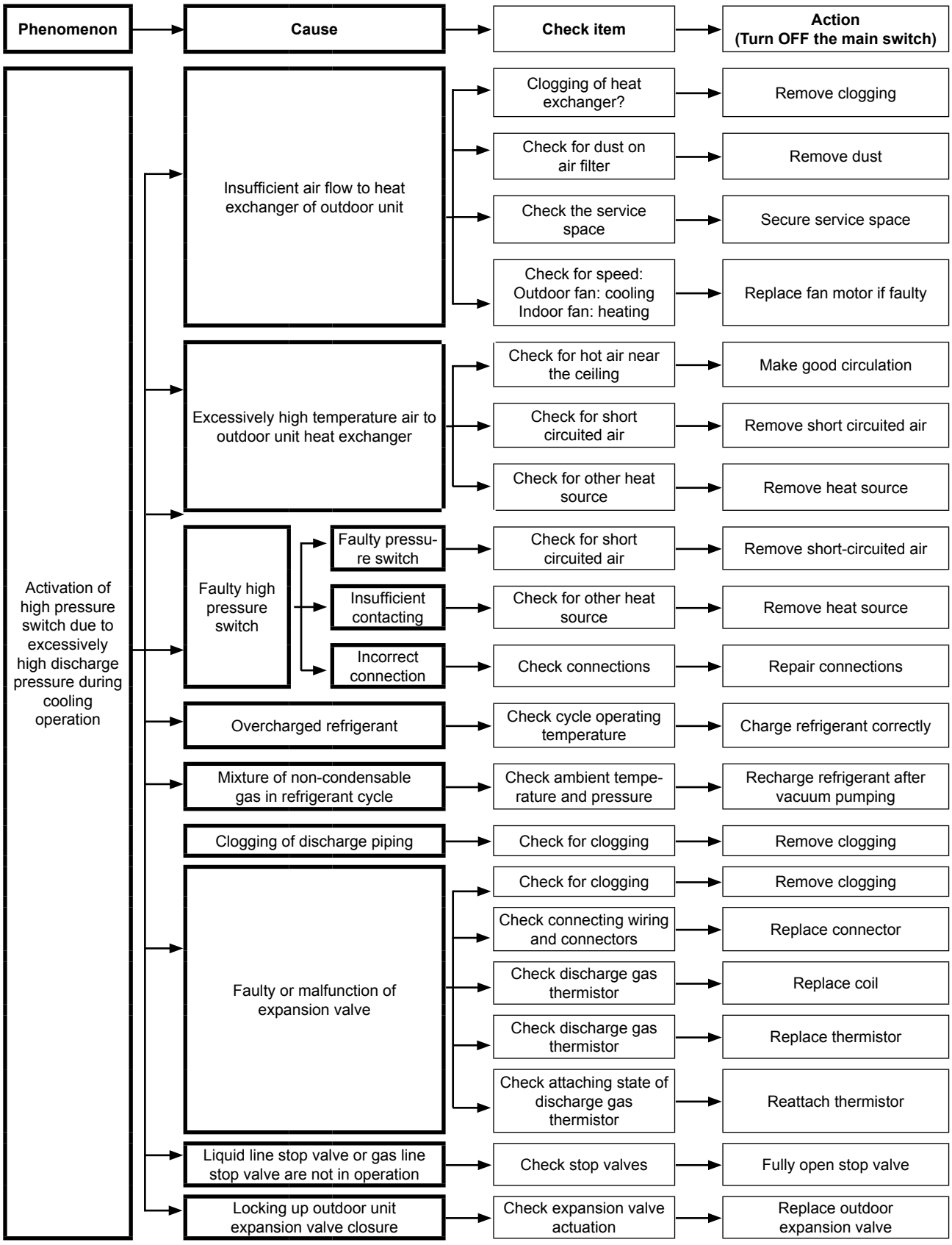


Check the temperature of the following places with the remote control switch in checking mode.

Check the temperature of [1] compressor top temperature and [2] outdoor unit evaporation (piping). Examine the cause and address the problem if the measurements surpass the preset temperature:

1 Compressor top temperature: 95ºC or less
2 Outdoor unit evaporation (piping) temperature: 55ºC or less



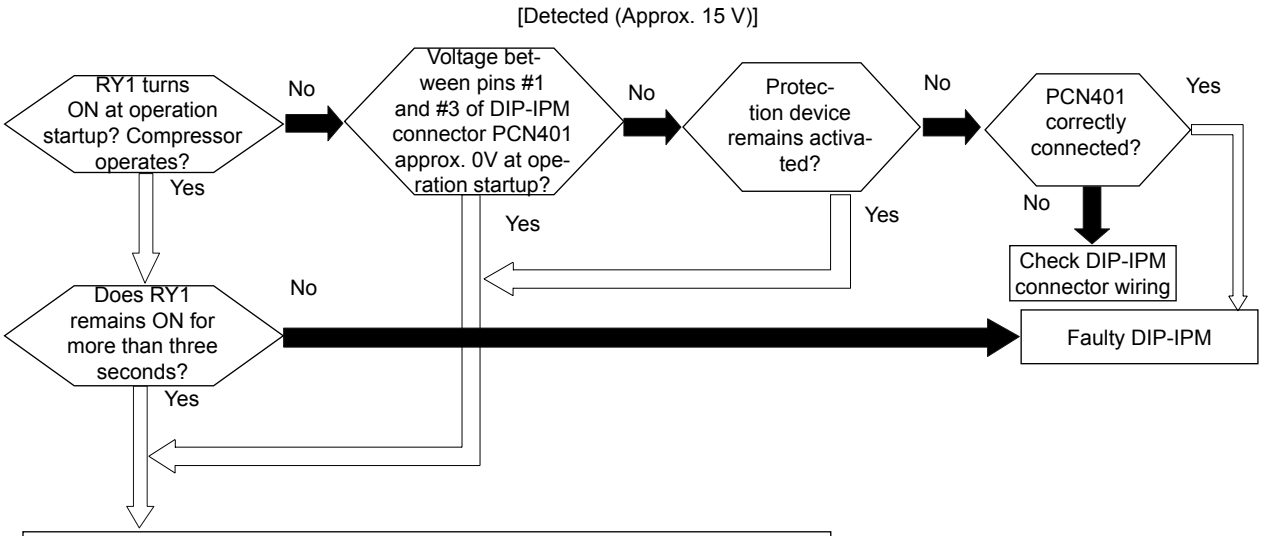


NOTE

This alarm code is indicated when the outdoor unit protective device is activated by high discharge pressure during cooling operation. Accordingly, when this alarm code is indicated, there is high possibility of high pressure switch actuation and the above troubleshooting actions are based on such cases.

Alarm code	42	Heating Overload (High pressure switch will be activated) (RAS-2HVRN2)

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - Abnormality indication will appear when the protection device is activated during compressor operation at heating, with the indoor unit liquid refrigerant (piping) temperature higher than 55 °C and the compressor-top temperature higher than 95 °C.



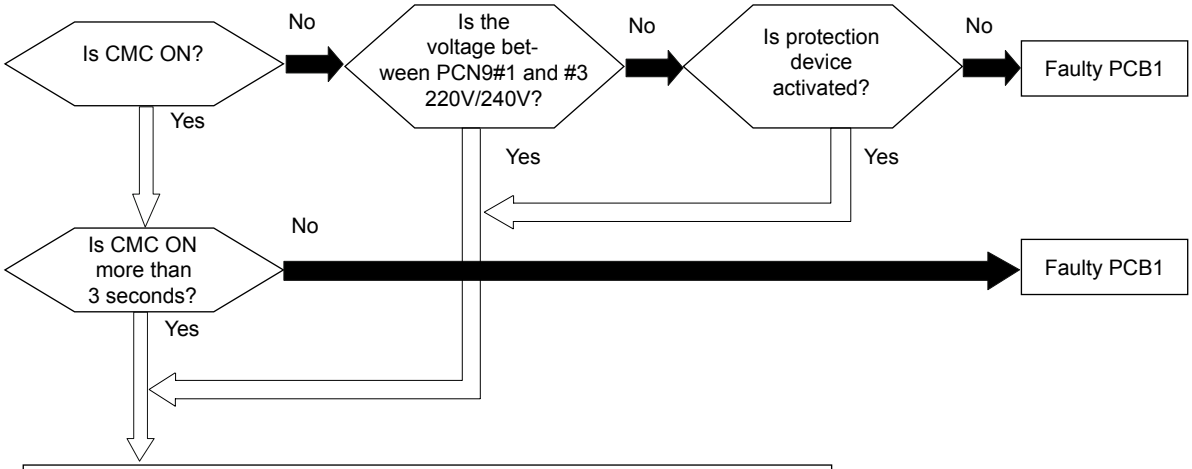
Check the temperature of the following places with the remote control switch in checking mode.

Check the temperature of [1] compressor top temperature and [2] indoor unit liquid refrigerant (piping) temperature. Examine the cause and address the problem if the measurements surpass the preset temperature.

1 Compressor top temperature: 95ºC or less
2 Indoor unit liquid refrigerant (piping) temperature: 55ºC or less

Alarm code	42	Heating overload (high pressure switch will be activate) (RAS-(3-10)H(V)RNME-AF)

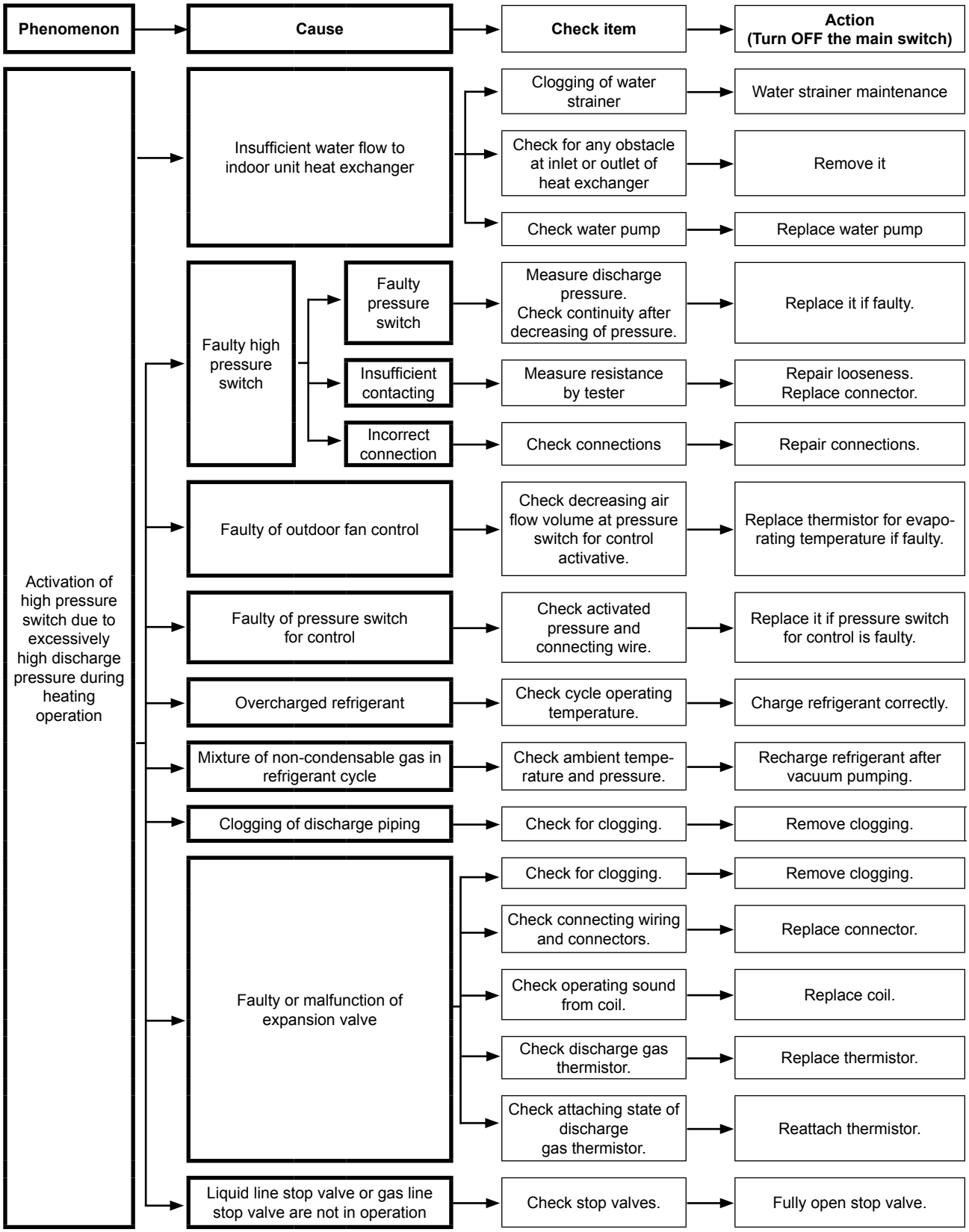
- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - This alarm code is indicated when the protection device is activated at following condition. Indoor unit liquid refrigerant (piping) temperature higher than 55 ºC and top of compressor temperature higher than 95 ºC.



Check the temperature of the following places with the remote control switch in checking mode.

Check the temperature of [1] compressor top temperature and [2] indoor unit liquid refrigerant (piping) temperature. Examine the cause and address the problem if the measurements surpass the preset temperature.

1 Compressor top temperature: 95ºC or less
2 Indoor unit liquid refrigerant (piping) temperature: 55ºC or less

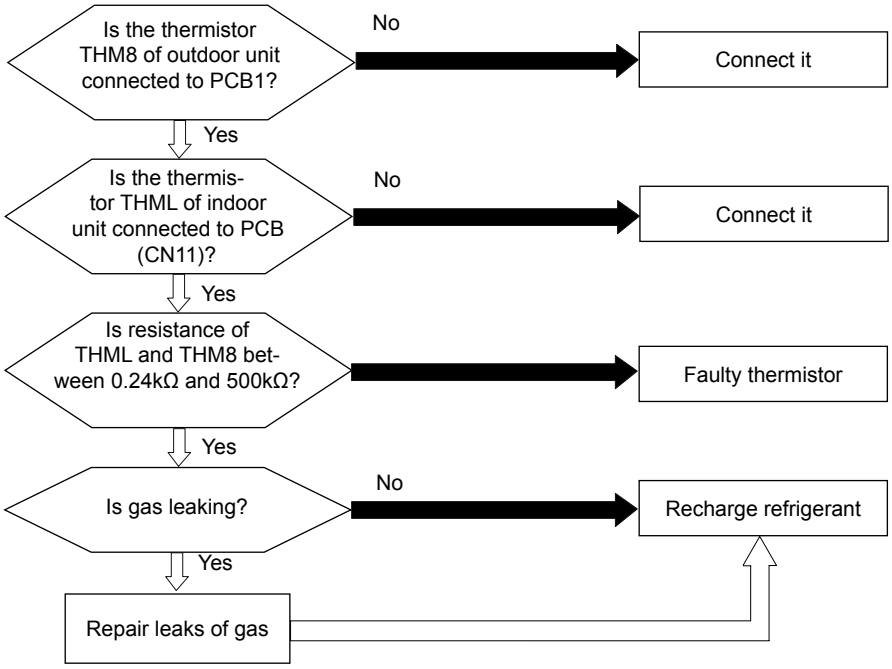


NOTE

This alarm code is indicated when the outdoor unit protective device is activated by high discharge pressure during heating operation. Accordingly, when this alarm code is indicated, there is high possibility of high pressure switch actuation and the above troubleshooting actions are based on such cases.

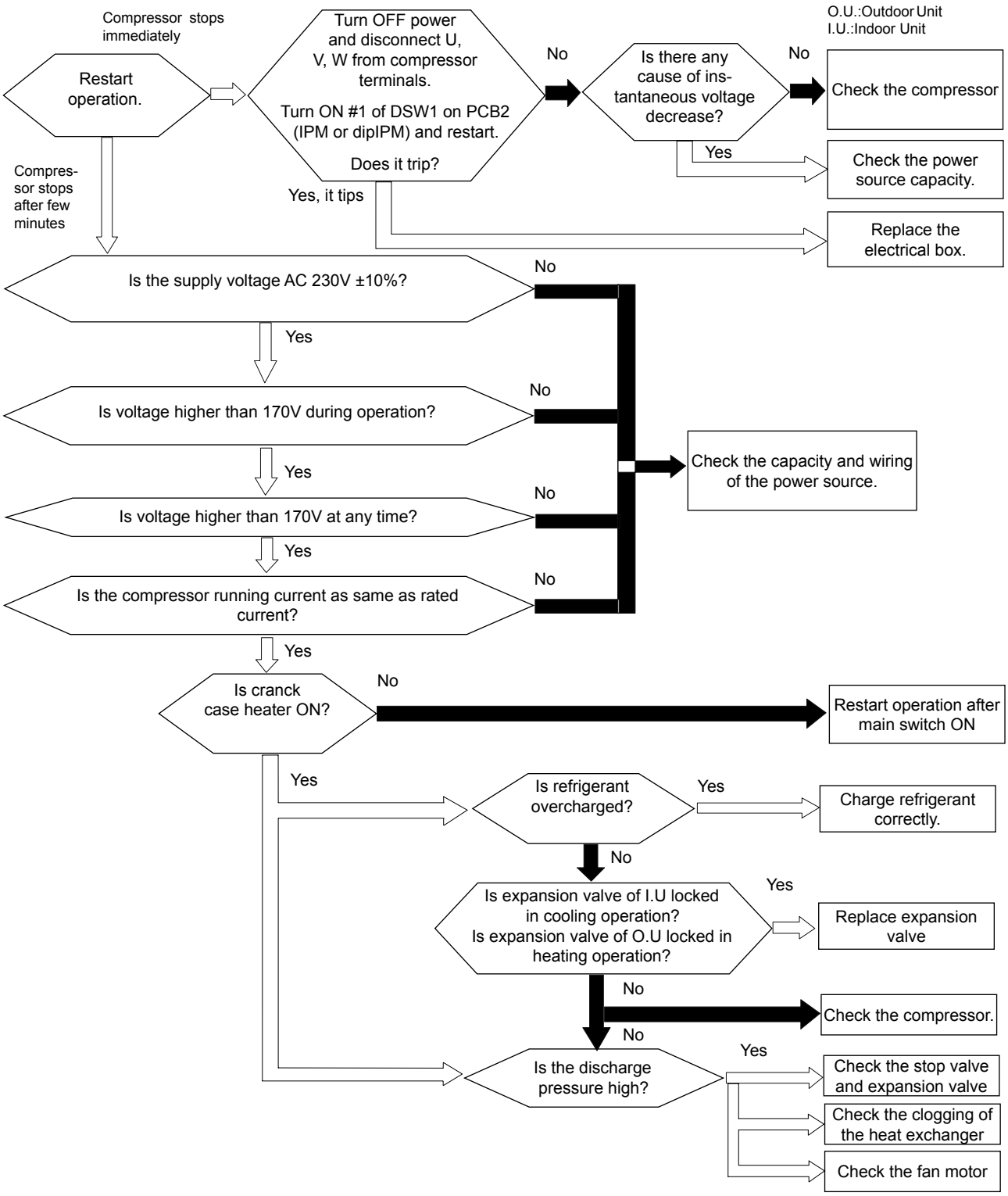
Alarm code	47	Activation to protect system from excessively low suction pressure (protection from vacuum operation)

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - In the case that the evaporating temperature (Cooling: liquid refrigerant piping temperature of indoor unit, heating: evaporating temperature of outdoor unit) is lower than -37 ºC (250~350 kΩ) and the thermistor on top of compressor is higher than 90 ºC for 3 minutes, retry operation is performed 3 minutes after compressor stoppage. However, when the state occurs more than 3 times including 3 in one hour, this alarm code is indicated.

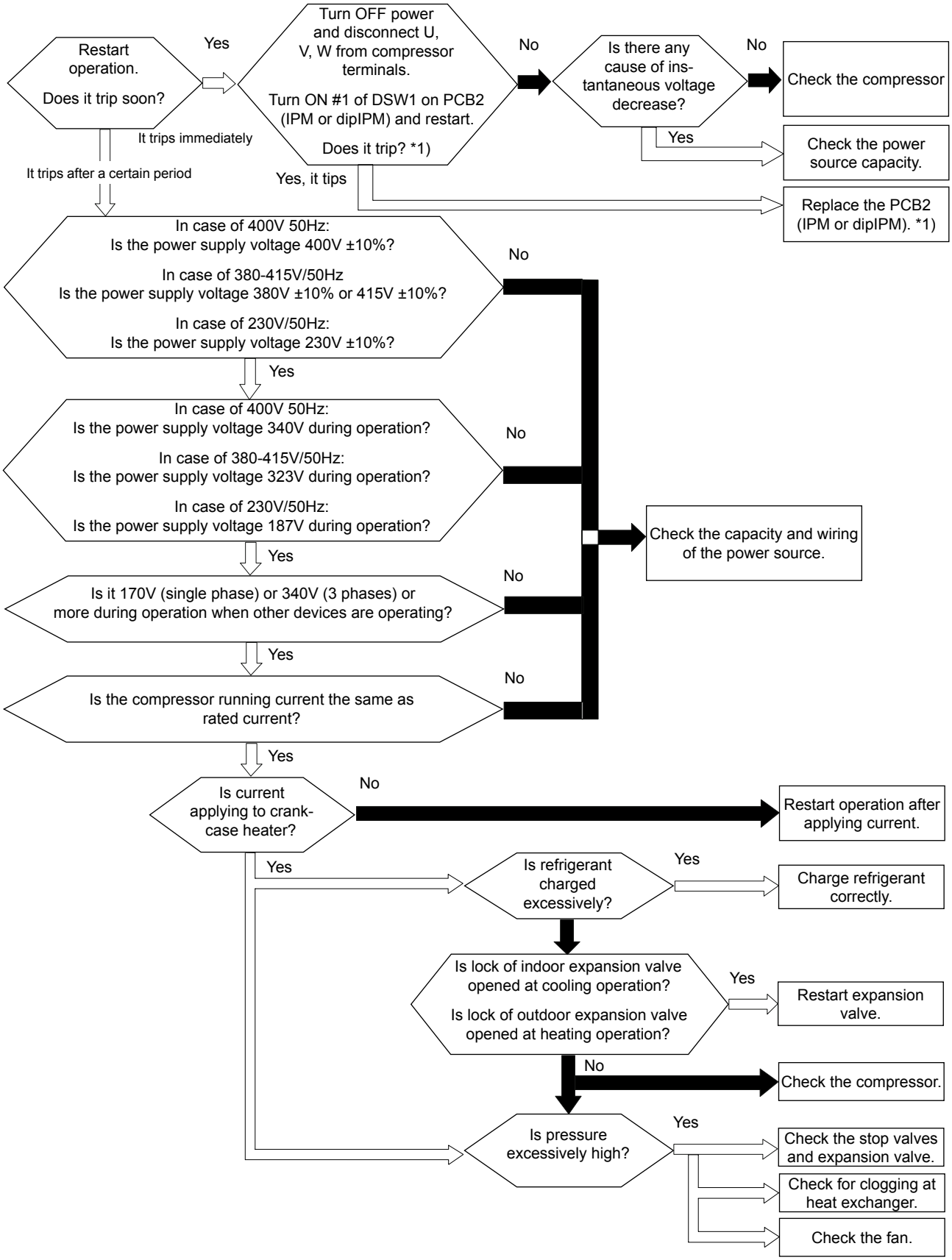



Phenomenon
Cause
Check item
Action (Turn OFF the main switch)
Faulty freeze protection.
Thermistor of indoor unit.
Evaporating thermistor of outdoor unit.
Fault
Check resistance
Replace thermistor if faulty
Incorrect connection
Check wiring to PCB
Repair wiring and connections
Faulty PCB (outdoor unit, indoor unit)
Replace PCB and check operation
Replace PCB if faulty
Excessively low suction pressure (in vacuum)
Liquid line stop valve is not open before operation
Check stop valve
Fully open stop valve
Faulty or malfunction of expansion valve
Check for clogging
Remove clogging
Check connecting wiring and connectors
Replace connector
Check operating sound from coil
Replace coil
Check discharge gas thermistor
Replace thermistor
Check attaching state of discharge gas thermistor
Reattach thermistor
Refrigerant leakage
Check each temperature and pressure
Charge refrigerant after vacuum pumping
Check gas leakage part
Correctly charge refrigerant after repairing gas leakage
Faulty outdoor fan at heating operation
Faulty outdoor fan motor
Measure coil resistance and insulating resistance
Replace outdoor fan motor if faulty

Alarm code 48 Activation Protection Against Instantaneous Overcurrent of Inverter (RAS-2HVRN2)



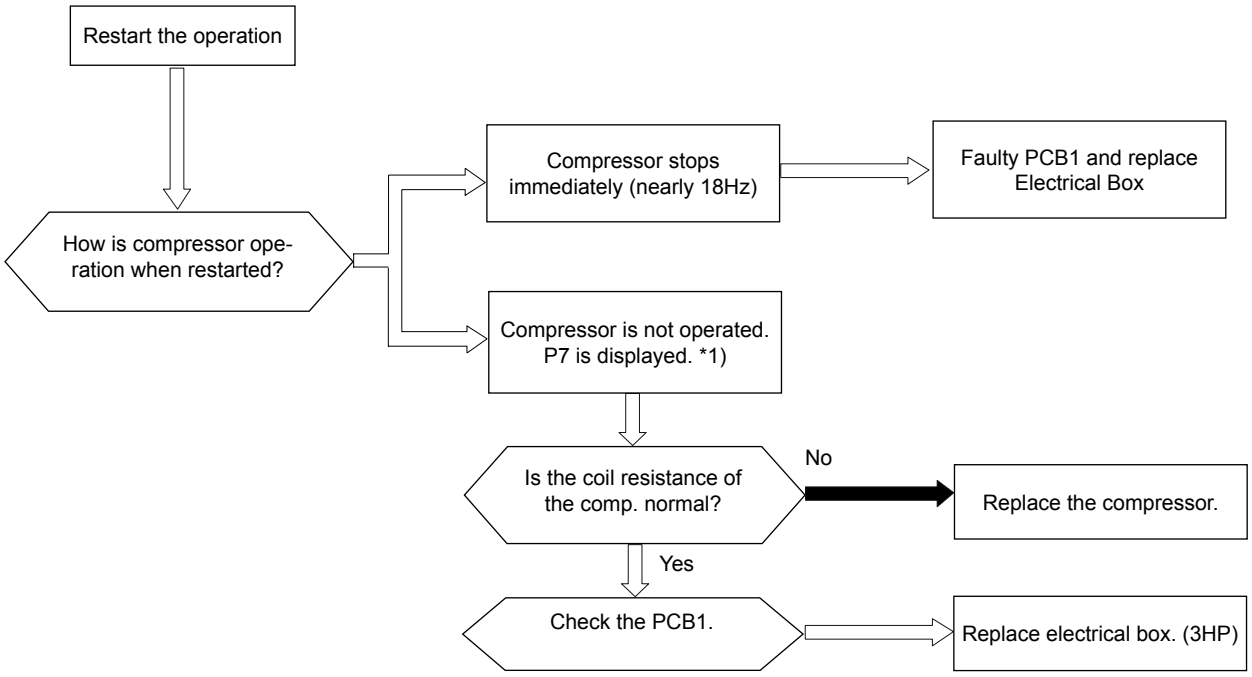
Alarm code 48 Overcurrent protection activation (RAS-(3-10)H(V)RNME-AF)



*1) Perform the high voltage discharge work by referring to the item *Procedure of checking other main parts* before checking and replacing the inverter PCB.

Alarm code	5 1	Abnormality of current sensor (RAS-2HVRN2)

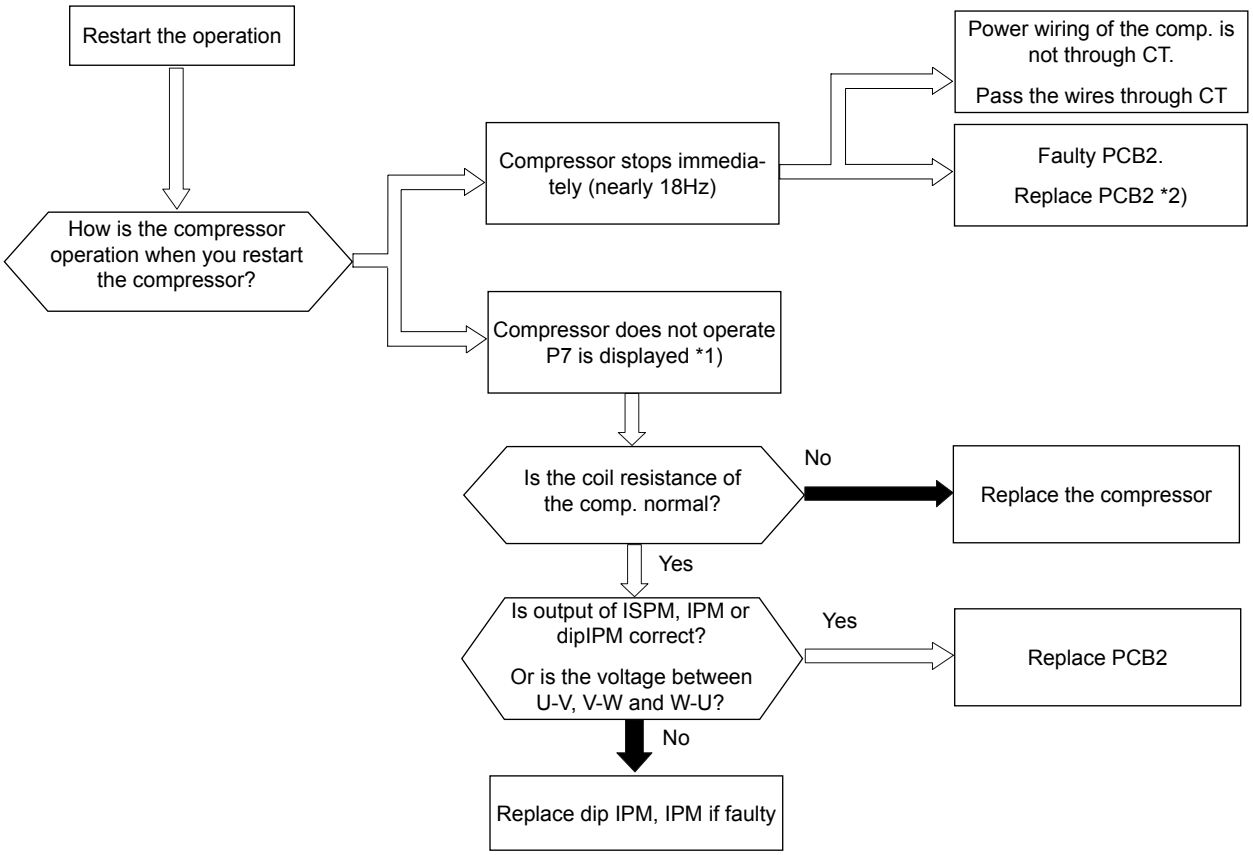
- “RUN” light flashes and “ALARM” is indicated on the remote control switch.
- The unit number, alarm code and the unit code is alternately indicated on the set temperature section, and the alarm code is indicated on the display of the outdoor unit PCB.
  - This alarm code is indicated when the below condition is activated 3 times including 3 in 30 minutes. Retry operation is performed up to the occurrence of 2 times.
  - Condition of activation:
    - When the frequency of compressor is maintained at 6 to 10Hz (3HP) after compressor is started, one of the absolute value of running current at each phase is less than 1.5A (including 1.5A).



*1) P17 is shown at 7-segment on the outdoor unit PCB.

Alarm code	51	Abnormal operation of the current transformer (0A detection) (RAS-(3-10)H(V)RNME-AF)

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - This alarm code is indicated when the below condition is activated 3 times including 3 in 30 minutes. Retry operation is performed up to the occurrence of 2 times.
  - Condition of activation:
    - When the frequency of compressor is maintained at 15 to 18Hz after compressor is started, one of the absolute value of running current at each phase is less than 1.5A (including 1.5A).



*1) P7 is shown at 7-segment on the outdoor unit PCB.

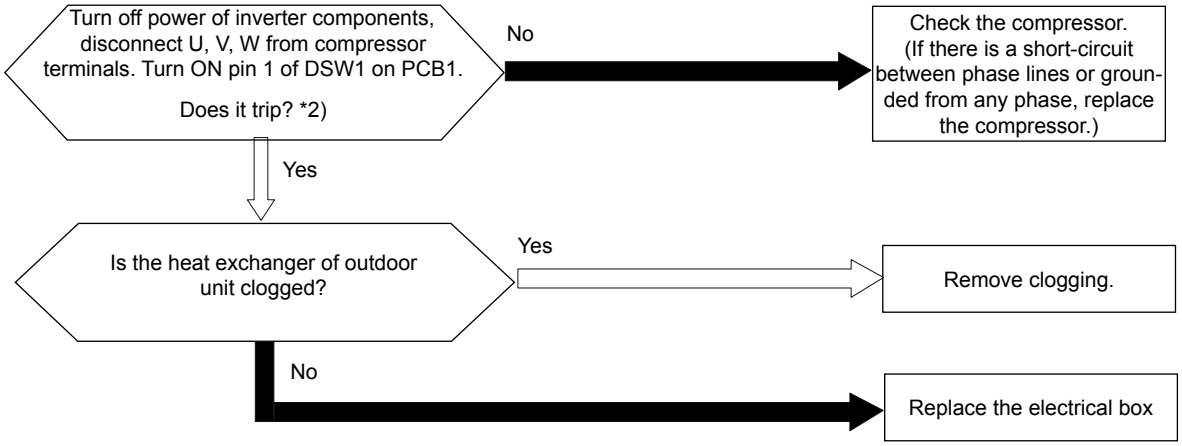
*2) Perform the high voltage discharge work by referring to the item *Procedure of checking other main parts* before checking and replacing the inverter parts.

Alarm code	53	Transistor module protection activation (RAS-2HVRN2)

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - This alarm is displayed when the inverter PCB or DIP-IPM module detects the abnormal operation 7 times or more than 7 times in 30 minutes. The retry operation is performed six times.

Conditions:

The abnormal current to the inverter PCB or DIP-IPM, such as short-circuited, grounded, overcurrent or control voltage decrease.



Alarm code	53	Protection activation of IPM or DipIPM and PCB2 (RAS-(3-6)HVRNME-AF and RAS-(8/10)HRNME-AF)

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - IPM or Dip IPM and PCB2 have detecting function of abnormality.
    - This alarm is indicated when the transistor module detect the abnormality 7 times in 30 minutes including 7. Retry operation is performed up to the occurrence of 6 times.

Conditions:

Abnormal current to the transistor module such as

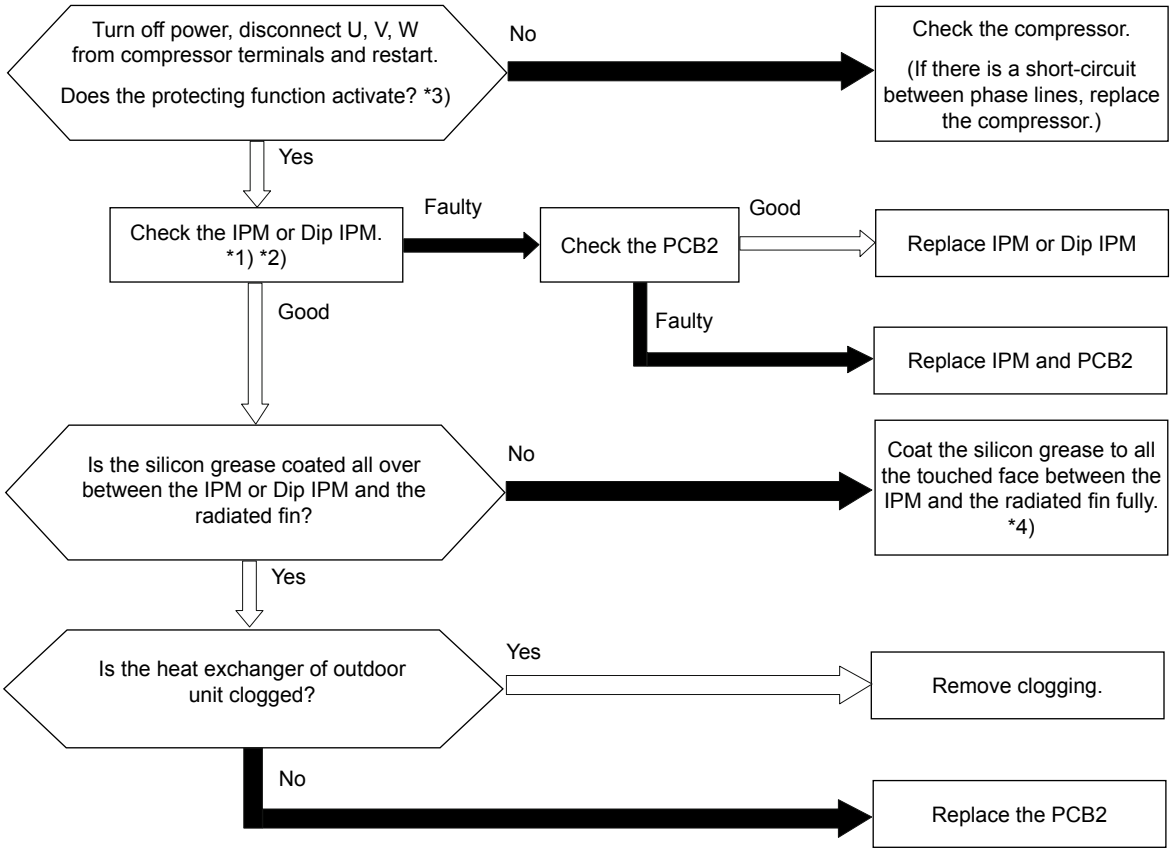
Short circuited or grounded

or

Abnormal temperature of the IPM or Dip IPM and PCB2

or

Control voltage decrease



*1) Perform the high voltage discharge work by referring to the item *Procedure of checking other main parts* before checking and replacing the inverter components.

*2) Regarding replacing or checking method for inverter components, refer to *Procedure of checking other main parts*.

*3) Turn ON the Nº 1 switch of the dip switch DSW1 on PCB2 when restarting with disconnecting the terminals of the compressor. After troubleshooting, turn OFF the Nº 1 switch of the dip switch DSW1 on PCB2.

*4) Use the silicon grease.

NOTE

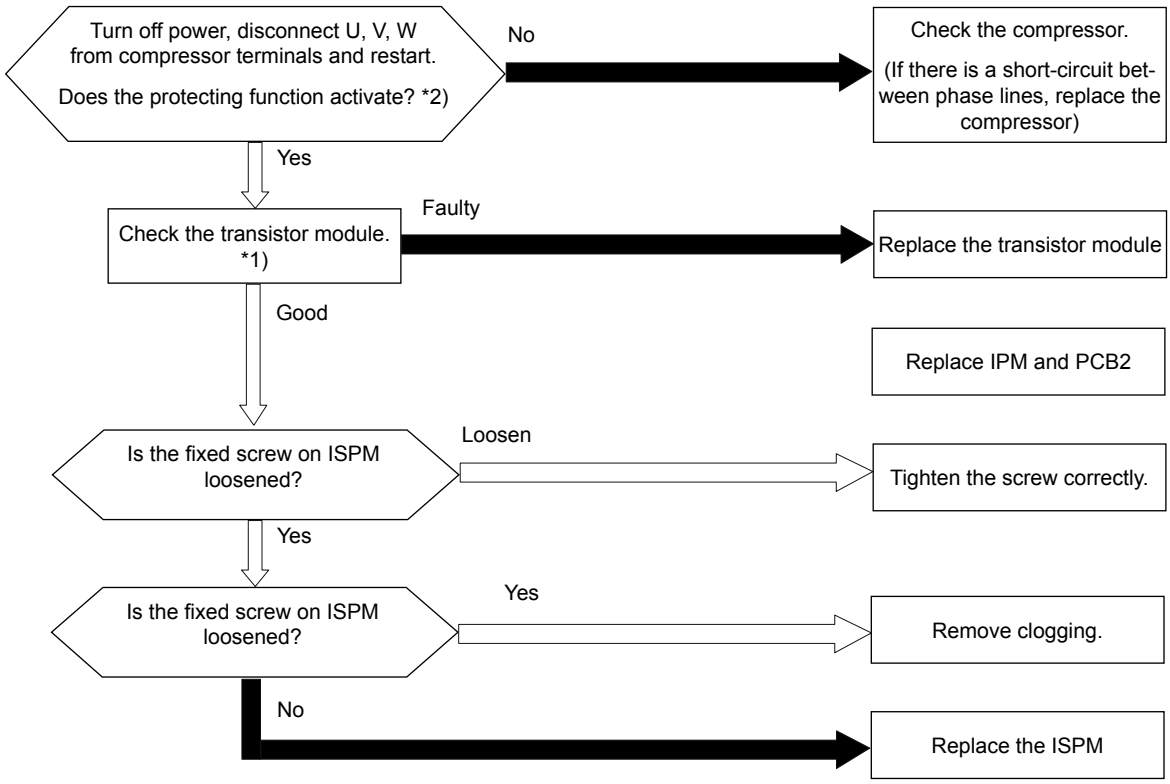
When alarm code “53” is indicated, the outdoor fan motor (DC motor) ensure that DC fan motor is checked according to the item Procedure of checking other main parts.

Alarm code	53	Activation for protecting the ISPM (RAS-(4-6)HRNME-AF)

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ISPM has a detection function of the abnormal operation. This alarm is displayed when the ISPM module detects the abnormal operation 7 times or more than 7 times in 30 minutes. The retry operation is performed six times.

Conditions:

The abnormal current to the ISPM, such as short-circuited, grounded, overcurrent or control voltage decrease.



*1) Regarding replacing or checking method for the ISPM refer to item *Procedure of checking other main parts*.

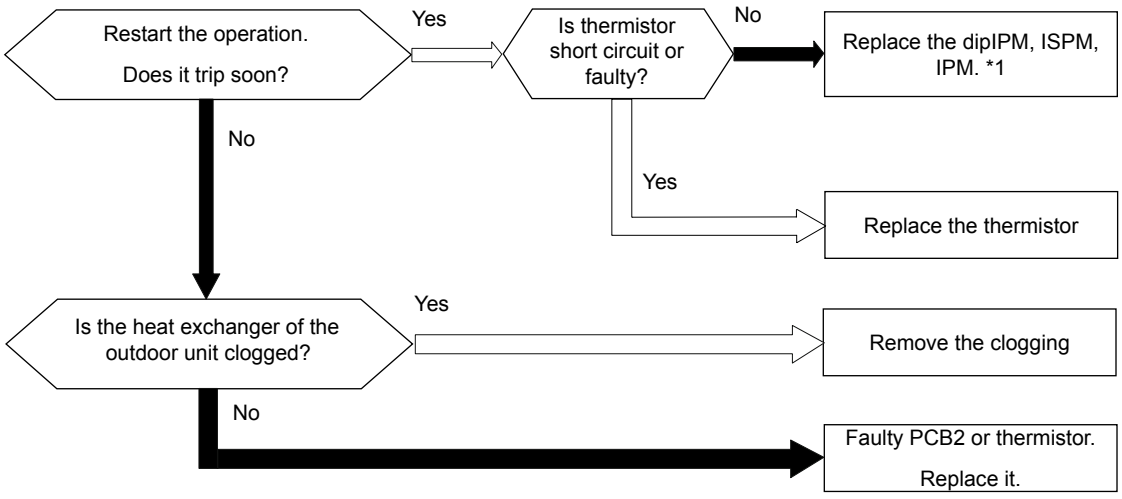
*2) Set the #1 pin of DIP switch DSW1 on ISPM to ON when you are restarting with the terminals of the compressor disconnected. After the troubleshooting, set the #1 pin of DIP switch DSW1 on ISPM to OFF.

Alarm code	54	Increase in the inverter fin temperature

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - If the alarm code “51” or “54” occurs three times within 30 minutes, the alarm code which occurred for the third time is displayed. The retry operation is performed twice.

Conditions:

When the temperature of the thermistor for inverter fin excess 100 ºC (RAS-(3-6)HVRNME-AF), 80 ºC (RAS-(4-10) HRNME-AF) 3 times in 30 minutes, this alarm is indicated and the operation is stopped. In the case the occurrence is smaller than 2 times, retry is performed.



*1) Perform the high voltage discharge work by referring to the item *Procedure of checking other main parts* before checking and replacing the inverter components.

Alarm code		IPM or PCB2 abnormality

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - In case that the abnormality of alarm code 55 occurs four times within 30 minutes, the alarm code of abnormality occurred for the fourth time is indicated. Retry operation is performed up to third time of abnormality occurrence.

Conditions:

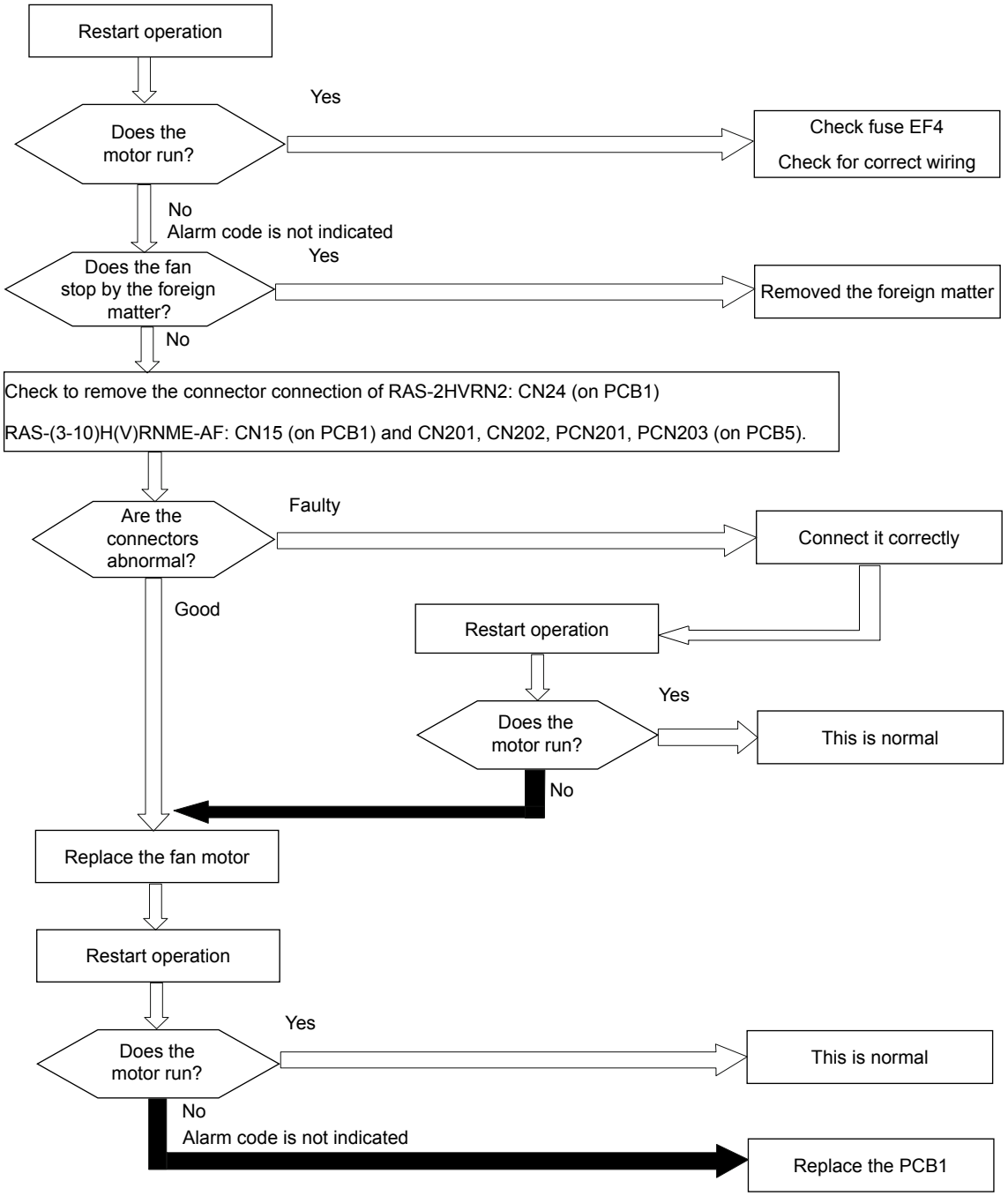
When the transmitting abnormality occurs between dipIPM (or IPM) and PCB2), this alarm is indicated and the operation is stopped.

Troubleshooting:

Replace the PCB2.

Alarm code	57	Abnormality of fan motor protection (DC fan motor)

- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - The fan motor stops when the revolution output from the fan motor is 20 rpm (RAS-2HVRN2) or 10 rpm (RAS-(3-10)H(V)RNME-AF) or lower during 30 seconds (RAS-2HVRN2) or 10 seconds (RAS-(3-10)H(V)RNME-AF) after the fan motor activation.
  - The alarm is indicated when the abnormality is repeated 4 times within 5 minutes (RAS-2HVRN2) or 10 times within 30 minutes (RAS-(3-10)H(V)RNME-AF) after the first detection.



NOTE

In the case that the fan motor does not run even the PCB1 is replaced, replace PCB5

Check to ensure that DC Fan Motor is checked according to the item *Procedure of checking other main parts.*

Alarm code	EE	Compressor protection

This alarm code is displayed when one of the following alarms occurs three times within six hours. If the outdoor unit operates continuously without removing the cause of the alarm, the compressor may be seriously damaged.

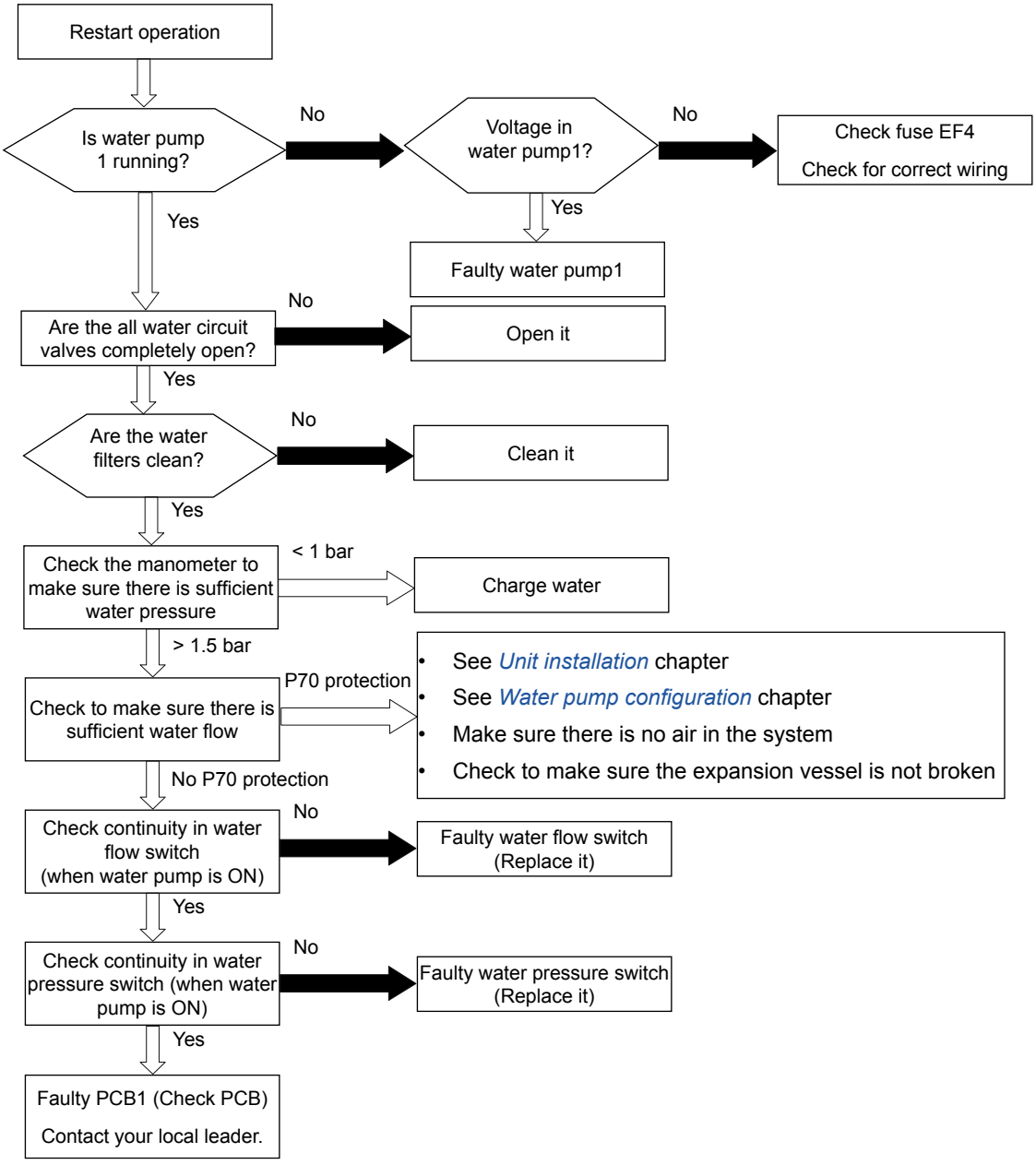
Alarm code	Content of abnormality
02	Tripping of protection device in outdoor unit
07	Decrease in discharge gas superheat
08	Increase in discharge gas temperature
41	Cooling overload
42	Heating overload
47	Low pressure decrease protection activating

NOTE

You can check these alarms using the check mode 1. Follow the action that is indicated in each alarm chart. You can clear these alarms only by turning OFF the main switch to the system. However, you must pay careful attention before starting, because there is a possibility of causing serious damages to the compressors.

Alarm code	70	Hydraulic alarm

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- This alarm code is displayed when there is a flow or pressure failure (water flow too low) (water pressure to low).

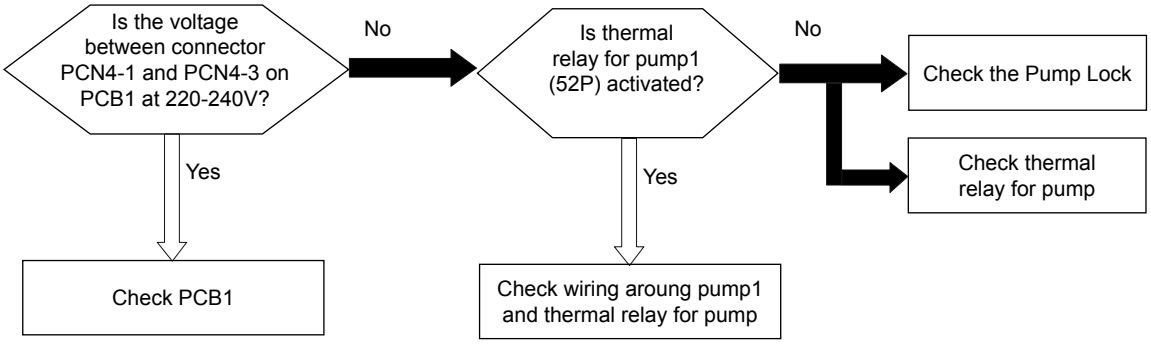


Alarm control procedure:

- Perform retry operation for 6 minutes the first time (Seven-segment shows P70) and keep Outdoor and Indoor Unit running (except Electrical Heater). After 6 minutes have passed (P70), Switch Stop status OFF for Outdoor and Indoor Units

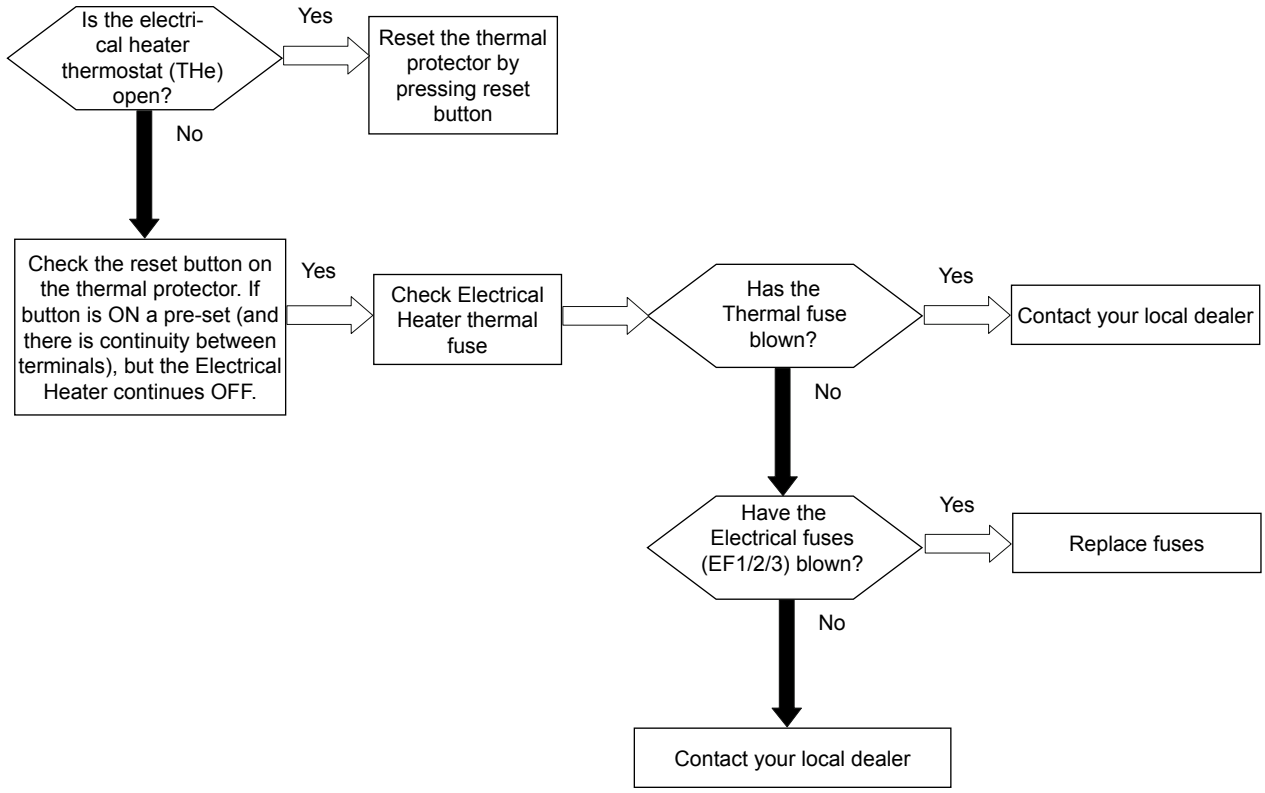
Alarm code	70	No feed back signal from water pump

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- This alarm code is displayed when pump1 operation feedback signal is OFF while pump interlock is ON.



Alarm code	72	Thermostat Heater Alarm

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- This alarm code is displayed when electrical heater's thermal protection is open (>75ºC).

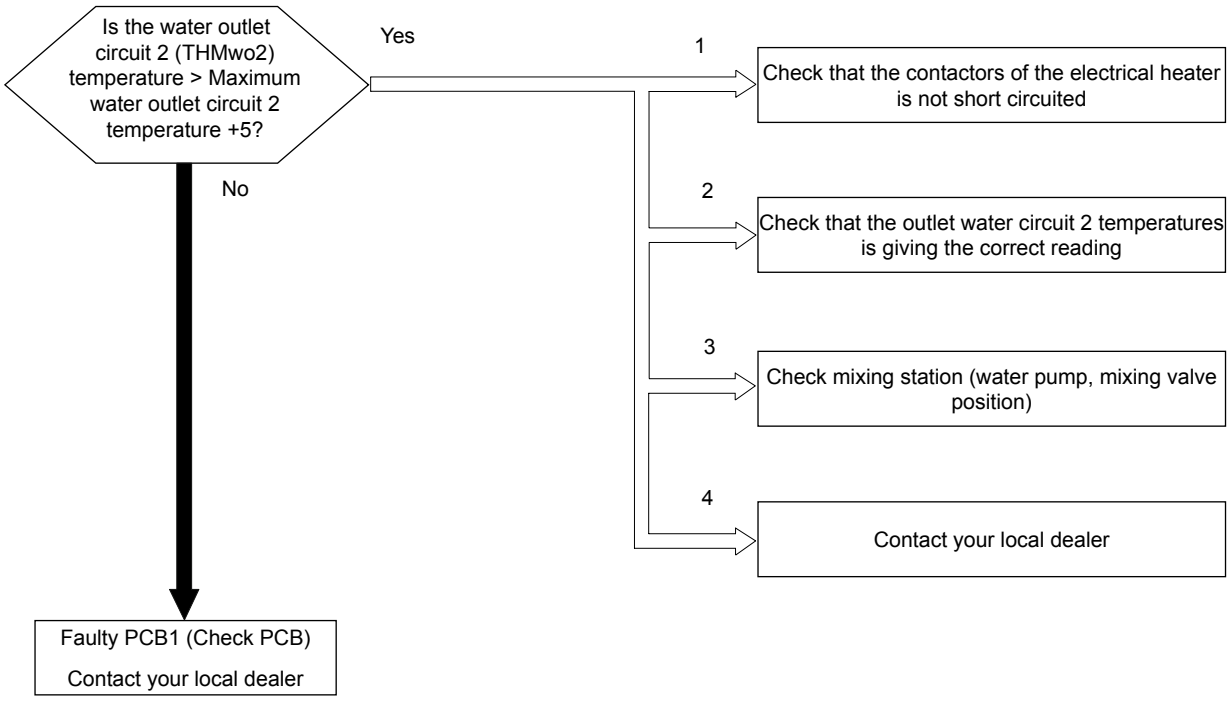


Alarm control procedure:

- Switch OFF Outdoor and Indoor Units
- Electrical Heater Disabled
- Water pumps continue running up to water <55ºC.

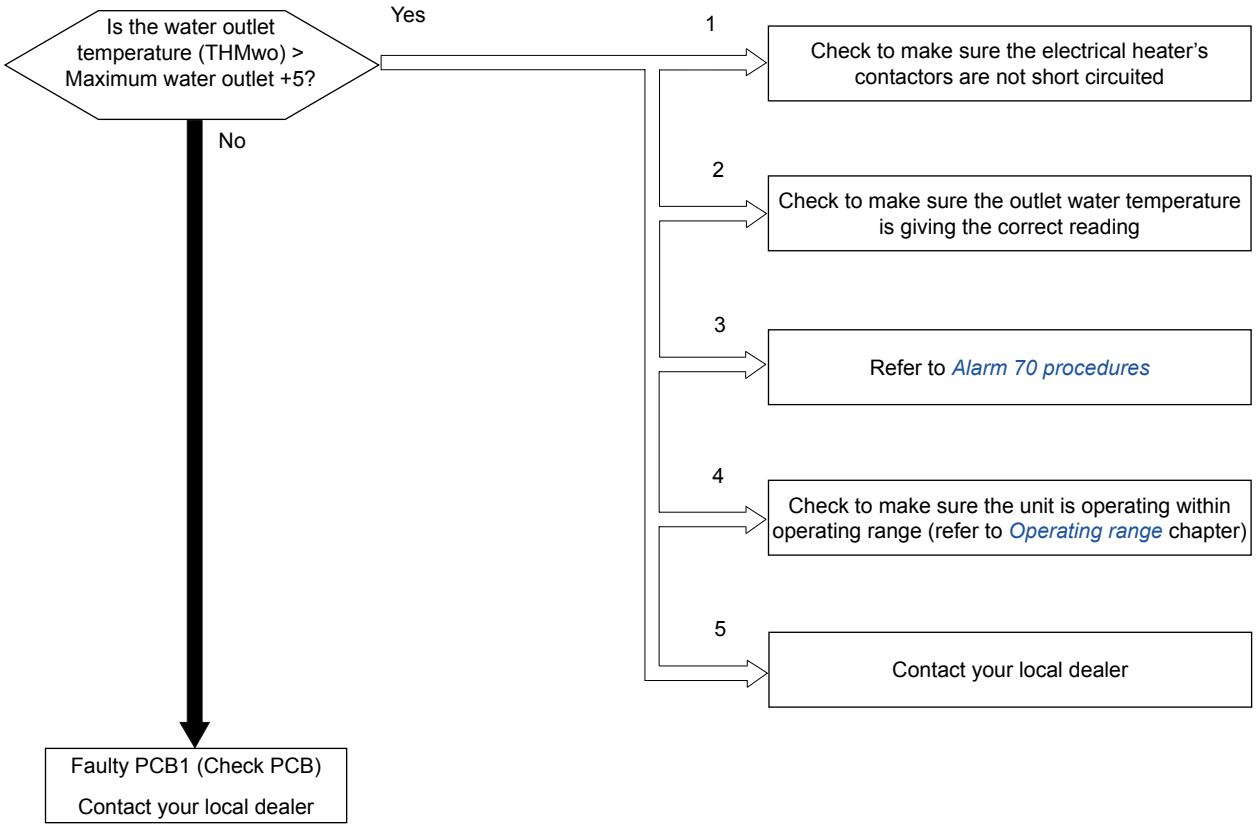
Alarm code	73	Mixing Overheating Limit Protection for mixed circuit (Only if Circuit 2 is enabled)

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- This alarm code is displayed when temperature of circuit 2 (mixed circuit) is 5ºC more than maximum water outlet installer configuration for circuit 2.



Alarm code	74	Unit Overheating Limit Protection

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- This alarm code is displayed when temperature of the unit is 5ºC more than maximum water outlet installer configuration for circuit 2 or 5ºC more than maximum water outlet by unit operating range.



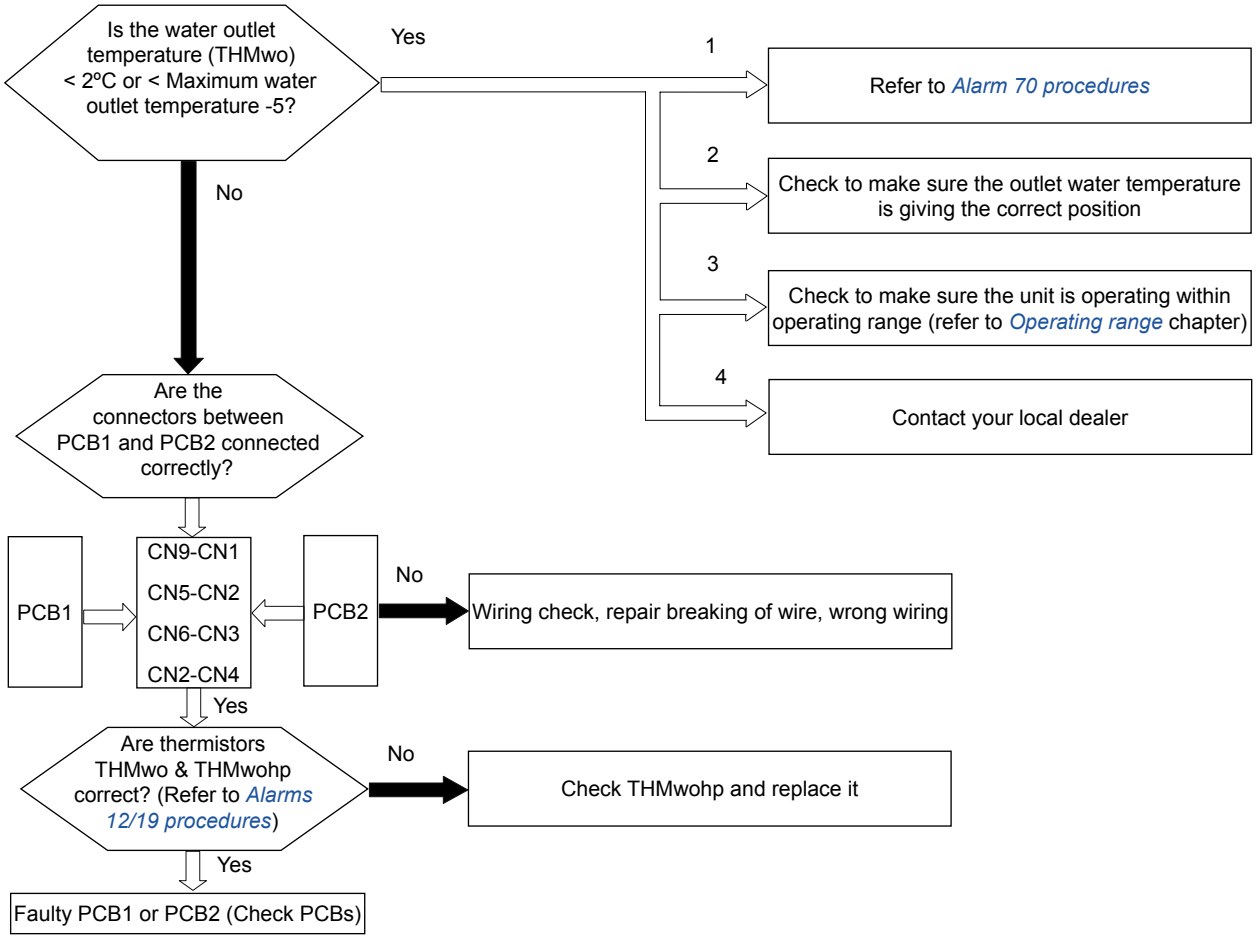
Alarm control procedure:

- Perform retry operation for 90 seconds the first time (Seven-segment shows P74) and keep Outdoor and indoor unit running (except Electrical Heater). After 90 seconds have passed (P74), Switch Stop status OFF for Outdoor and Indoor Units.
  - Switch water pump1 to OFF (if water outlet < 55ºC).
  - Mixing valve closed.

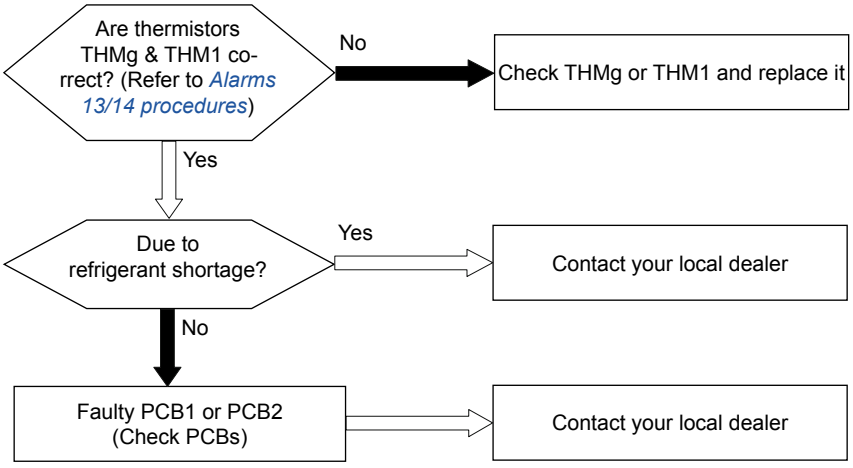
Alarm code	75	Freeze Protection by Cold water inlet, outlet temperature detection

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- This alarm code is displayed when temperature the unit is less than 2ºC or 5ºC lower than maximum water outlet installer configuration (cooling) during operation.

Due to low water:



Due to low refrigerant:

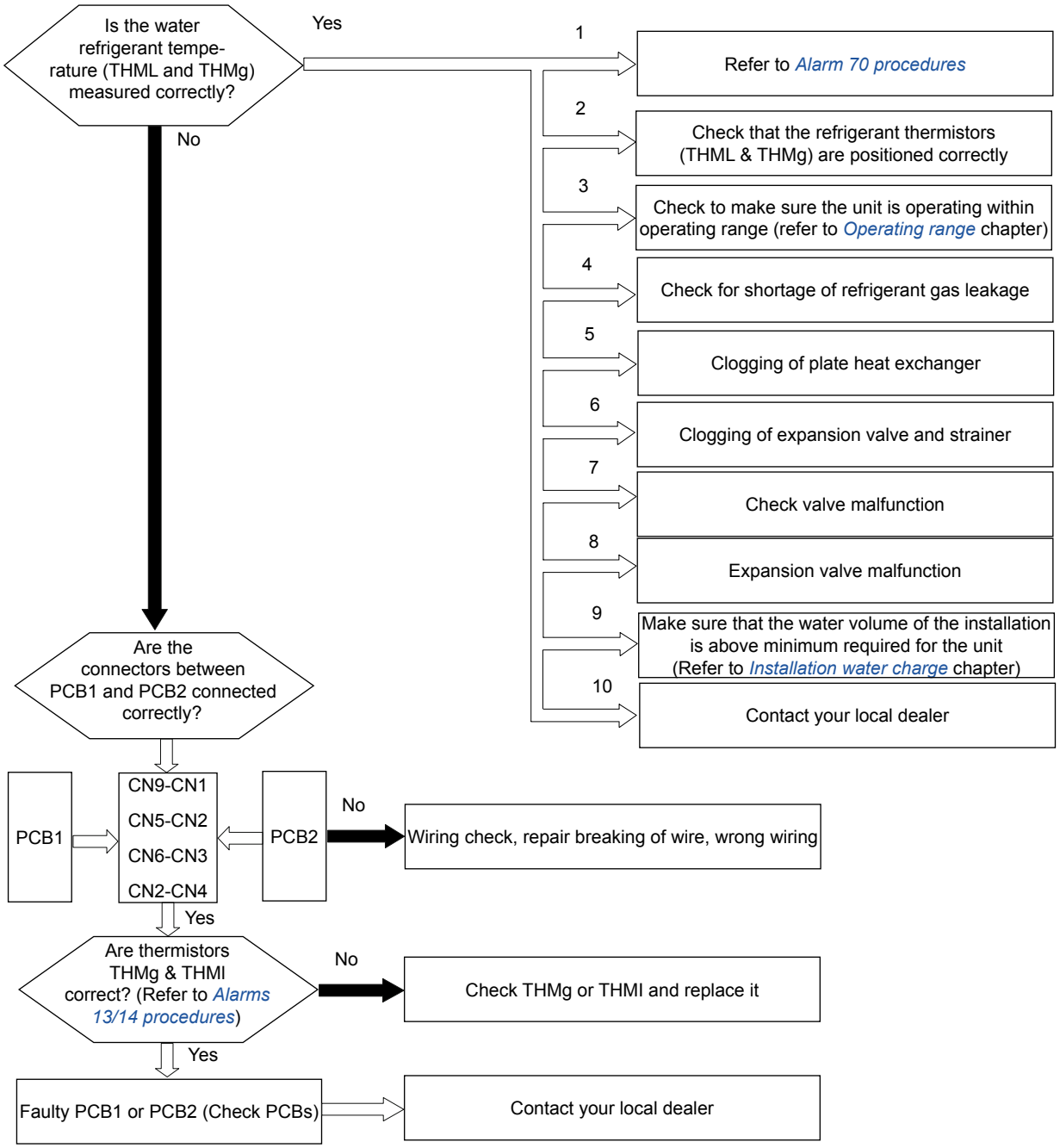


Alarm control procedure:

- Switch OFF Outdoor and Indoor Units

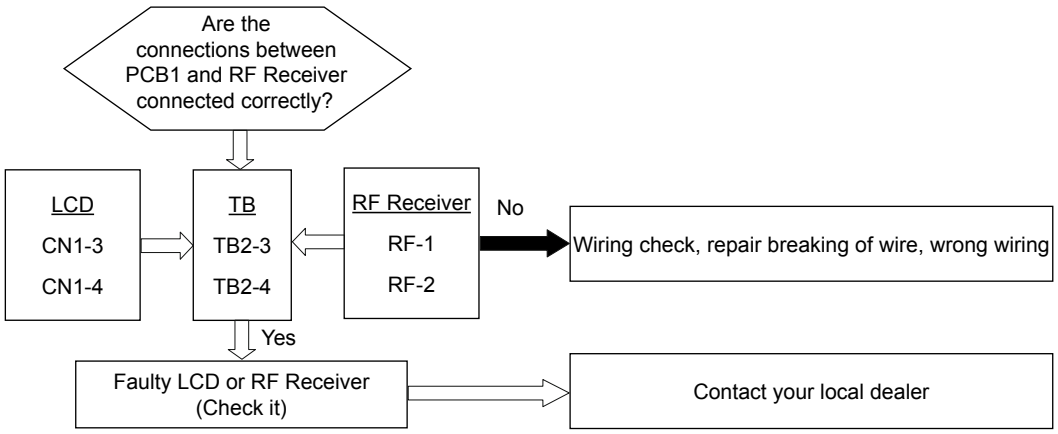
Alarm code	76	Freeze Protection Stop by indoor liquid temperature thermistor

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- This alarm code is displayed when refrigerant temperature of the indoor unit is lower than -20ºC for 30 seconds.



Alarm code	77	Opentherm communication failure (Only with intelligent thermostat accessory)

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- This alarm code is displayed when there is no Opentherm communication for a continuous period of 1 minute.



Alarm control procedure

The control will continue in normal operation with the following fixed Opentherm values:

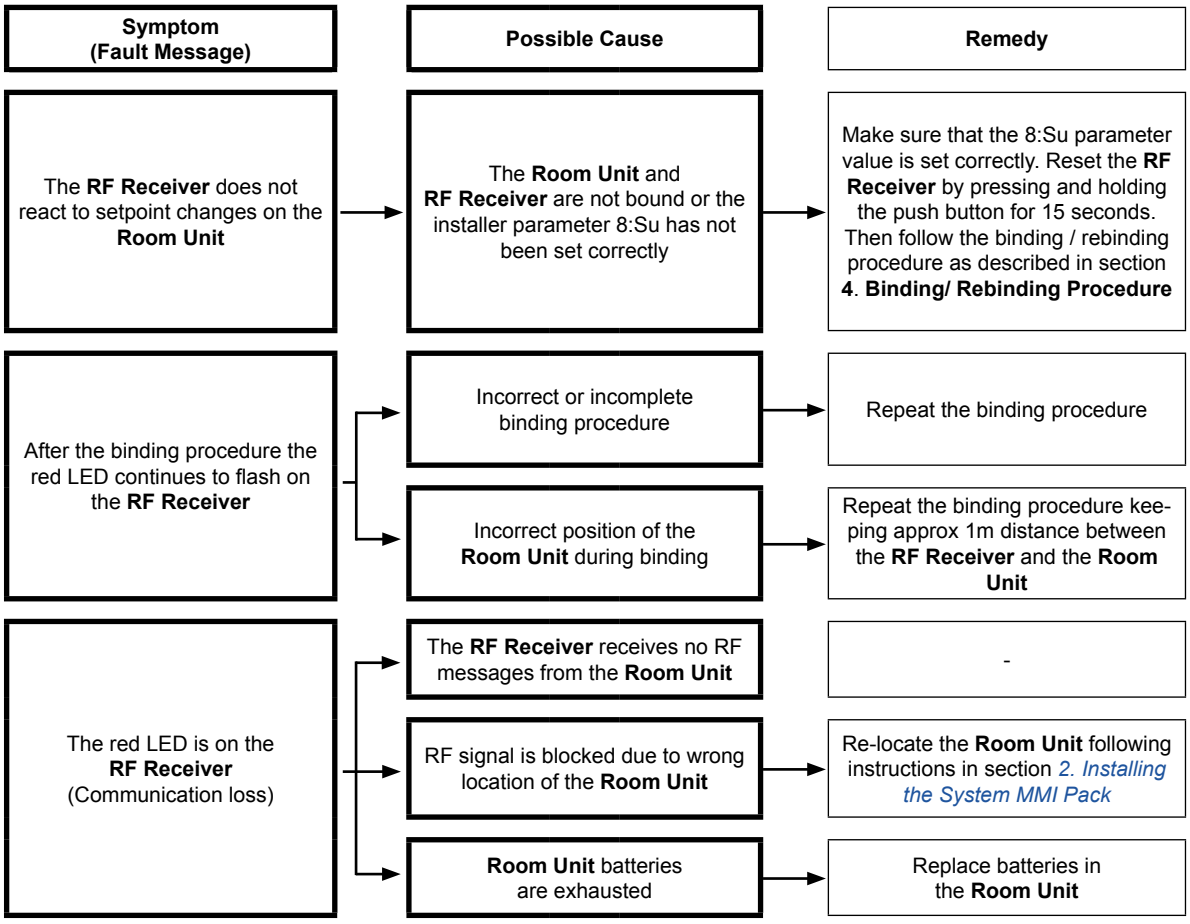
- Circuit 1: Uses the last received Room Set-point. The Room temperature is assumed to be equal to the Room Set-point.
- Circuit 2: Uses the last received Room Set-point. The Room temperature is assumed to be equal to the Room Set-point.
- Control will not obey the thermostat time programme and OFF function.

NOTE

For more information refer to** Room unit installation guide**.

Alarm code	78	RF communication failure (Only with intelligent thermostat accessory)

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- This alarm code is displayed when there is no communication for 1 hour with one or two Room thermostat devices that are bound to the RF-bridge.



Alarm control procedure:

The control will continue in normal operation with the following fixed Opentherm values:

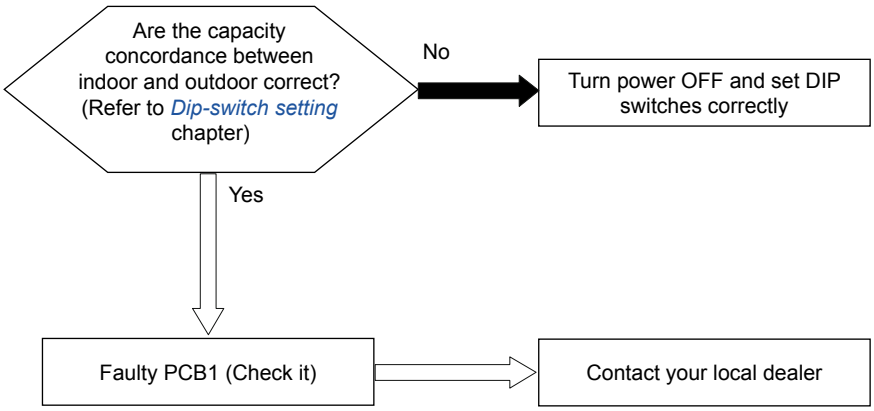
- Circuit 1: Uses the last received Room Set-point. The Room temperature is assumed to be equal to the Room Set-point
- Circuit 2: Uses the last received Room Set-point. The Room temperature is assumed to be equal to the Room Set-point
- Control will not obey the thermostat time programme and OFF function

NOTE

For more information refer to** Room unit installation and user's guide**.

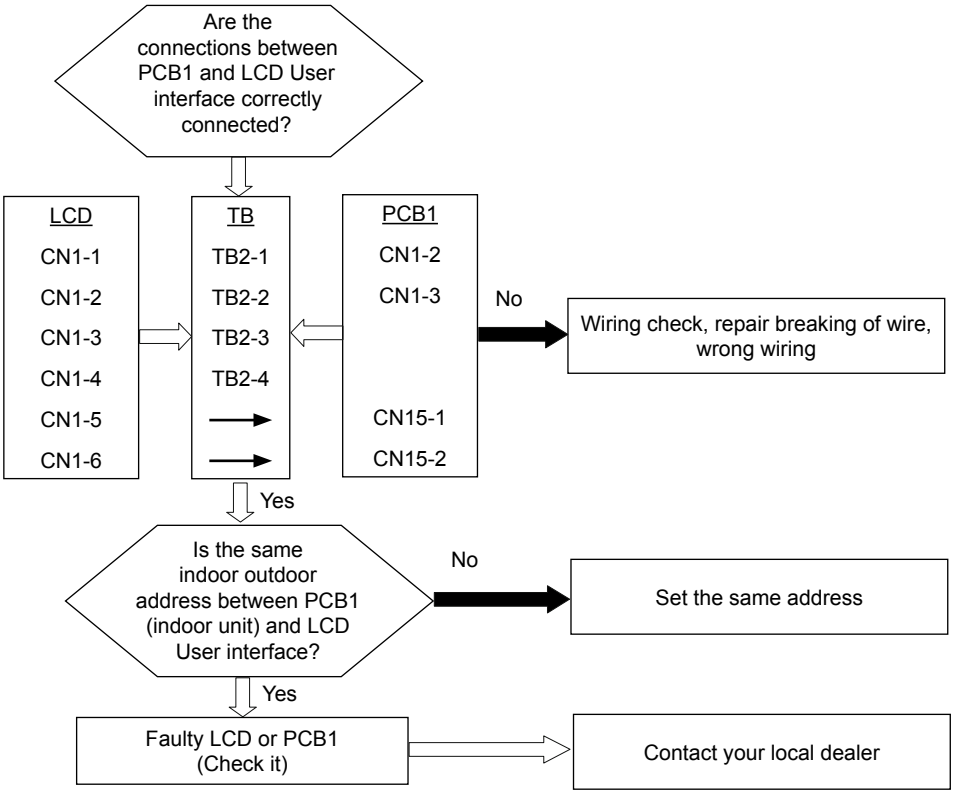
Alarm code	79	Incorrect capacity setting

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- This alarm code is displayed when there is no concordance between indoor outdoor unit capacity.



Alarm code	80	H-Link communication failure between Indoor and LCD User interface

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- This alarm code is displayed when there is no communication for 3 minutes between Indoor PCB1 and LCD User interface.



Alarm control procedure:

- Switch OFF Outdoor and Indoor Units.

12.1.3 Troubleshooting in check mode

Refer to chapter *6 User interface.*

12.1.4 Troubleshooting using the 7 segment display (outdoor unit)

◆ Simple checking by 7-segment display

1	Turn ON indoor unit connected to the outdoor unit
↓	
2	Turn ON the outdoor unit
↓	
3	Auto-addressing starts
↓	

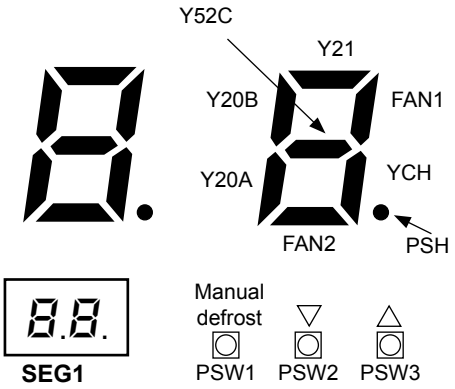
Outdoor unit, circuit board, PCB1

During auto-addressing, the following items can be checked using the outdoor unit's on-board 7-segment LED display:

1 Disconnection of power supply to the indoor unit.
2 Reverse connection of the operating line between the outdoor and indoor units.
3 Duplication of indoor unit number.

◆ Checking method by 7-segment display

Operating conditions and each part of refrigeration cycle can be checked by 7-segment and push switches (PSW) on the PCB in the outdoor unit. During checking data, do not touch the electric parts except for the indicated switches because 220-240V is applied to them. Pay attention not to contact the tools with electrical parts. If contacted, electrical parts will be damaged.



- To start checking, press PSW2 switch for more than three seconds.
- To proceed checking, press the PSW2 switch.
- To back to the previous item, press the PSW3 switch.
- To cancel this checking, press the PSW2 switch for more than 3 seconds.

Item	Item		Indication data		
	Check No.	In-dic.	In-dic.	Contents	
Total capacity of indoor unit connected	01	CP	22	00~96	
Input/output state of outdoor micro-computer	02	SC	3	Indicates only for the segments corresponding to the equipment in the figure. (See figure above)	
Alarm code for abnormal stoppage of compressor	03	AC	08	Alarm code on compressor	
Inverter order frequency to compressor	04	H1	74	30~115 (Hz) In case that frequency is higher than 100Hz, the last two digits flicker	
Indoor order frequency to compressor	05	H2	74	30~115 (Hz) In case that frequency is higher than 100Hz, last two digits flicker	
Air flow ratio	06	Fo	80	00~100 (%) In case that air flow ratio is 100%, "00" flashes	
Outdoor unit expansion valve opening	07	Eo	30	00~100 (%) In case that expansion valve opening is 100%, "00" flashes	
Temperature at the top of compressor	08	Td	02	00~142 (ºC) In case that temperature is higher than 100ºC, the last two digits flash	
Evaporating temperature at heating	09	TE	-2	-19~80ºC	
Ambient air temperature	10	To	-3	-19~80ºC	
Cause of stoppage at inverter	11	dF	1	(See table at the next page)	
Control information	12	TF	20	Internal information of outdoor unit PCB	
Control information	13	A1	12	Internal information of outdoor unit PCB	
Inverter secondary current	14	A2	20	00~199 (A)	
Outdoor unit address	15	nA	00	00~15	In case of twin/triple/quad-type unit, the information of 2nd to the 4th indo-or units is indicated repeatedly. The right character of the indication represents the indoor unit setting No. Single: A Twin: A, b Triple: A, b, c Quad: A, b, c, d
Indoor unit expansion valve opening	16	EA	20	00~100 (%) In case that opening is 100%. "00" flashes	
Liquid pipe temperature of indoor unit (freeze protection)	17	LA	05	-19~127 (ºC)	
Indoor unit intake air temperature	18	iA	28	-19~127 (ºC)	
Indoor unit discharge air temperature	19	oA	20	-19~127 (ºC)	
Cause of indoor unit stoppage	20	dA	05	(See table at the next page)	

Cause of inverter stoppage (11)

Indication	Contents
1	IPM, ISPM, dipIPM error
2	Instantaneous over current
3	Inverter fin thermistor protection activation
4	Electronic thermal activation
5	Inverter voltage decrease
6	Over voltage
7	Abnormal transmission
8	Abnormal current detection
9	Instantaneous power failure detection
11	Reset of micro-computer for inverter
12	Earth fault detection from compressor
13	Open phase detection
14	Inverter malfunction
15	Inverter malfunction
16	Inverter malfunction
17	Transmission error
18	Abnormal current detection
19	Abnormal protective device

Cause of indoor unit stoppage (20)

Indication	Contents
00	Operation OFF, Power OFF
01	Thermo-OFF
02	Alarm
03	Freeze protection overheating protection
05	Instantaneous power failure at outdoor unit
06	Instantaneous power failure at indoor unit
07	Stoppage of cooling operation due to low outdoor air temperature Stoppage of heating operation due to high outdoor air temperature
10	Demand thermo OFF
13	Retry for Pd increase prevention
15	Vacuum/discharge gas temperature increase retry
16	Retry due to discharge gas SUPERHEAT decrease
17	IPM error retry, instantaneous over current of inverter retry, electronic thermal activation of inverter retry, abnormal current sensor of inverter retry
18	Retry due to inverter voltage decrease Retry due to Inverter Overvoltage
19	Other retry
20	Different operation mode between indoor/outdoor units (Only for individual twin/triple/quad types)
21	Forced thermo-OFF (Only for simultaneous twin/triple/quad types)
22	Forced thermo-OFF (During compressor pre-heating)
24	Thermo-OFF during energy saving operation mode

NOTE

To finish checking: press the PSW2 switch for more than 3 seconds

Cancelation of Forced Thermo OFF

Turn ON the power source and wait for more than 30 seconds. Then press PSW1 and PSW3 simultaneously for more than 3 seconds.

Forced thermo-OFF (indoor unit error code 22) will be cancelled.

However, this function may damage the compressor, use only on inevitable occasion.

In case of using the remote control switch (PC-P1HE), the cancellation is also available with it.

When “operation is limited” indication flashes on the remote control LCD, press FAN SPEED and LOUVER switches simultaneously for more than 3 seconds.

“Operation is limited” indication is disappeared and operation is available.

Cause of inverter stoppage

Code	Cause	Cause of stoppage for corresponding unit	Remark	
			Indication during retry	Alarm code
1	Automatic stoppage of transistor module (IPM, ISPM, dipIPM Error) (Over current, decrease voltage, short circuit protection)	17	P7	53
2	Instantaneous over current	17	P7	48
3	Abnormal inverter fin thermistor	17	P7	54
4	Electronic thermal activation	17	P7	48
5	Inverter voltage decrease	18	P8	06
6	Over voltage	18	P8	06
7	Abnormal inverter transmission	18	-	-
8	Abnormal current detection	17	P7	51
9	Instantaneous power failure detection	18	-	-
11	Reset of micro-computer for inverter	18	-	-
12	Earth fault detection from compressor (Only starting)	17	P7	53
13	Abnormal power source phase (Open phase)	18	-	-
16	Inverter PCB abnormality	18	P8	55
17	Abnormal transmission	18	P8	55
18	Abnormal current detection	-	-	02
19	Abnormal protective device	-	-	38
20 ~ 63	Other factors	18	-	-

◆ Protection control code on 7-segment display

1 Protection control code is displayed on 7-segment when a protection control is activated.
2 Protection control code is displayed while function is working, and goes out when released.
3 When several protection control are activated, code number with higher priority will be indicated (see below for the priority order).

a. Higher priority is given to protection control related to frequency control than the other. Priority order:

- High-pressure increase protection
- Over current protection
- Cold draft protection
- Low-pressure ratio control at cooling operation

b. In relation to retry control, the latest retrial will be indicated unless a protection control related to frequency control is indicated.

Code	Protection control
P0	Low-pressure ratio control at cooling operation
P1	High-pressure ratio control at heating operation
P2	High-pressure increase protection
P3	Over current protection
P4	IPM fin temperature increase protection
P5	Discharge gas temperature increase protection
P6	Frost formation protection
P9	Unbalance power source detecting
PA	Current demand control
Pb	Low-pressure decrease protection
PC	Cold draft protection

- Retry indication continues for 30 minutes unless a protection control is indicated.
- Retry indication disappears if the stop signal comes from all rooms.

Code	Protection control
P7	Inverter retry
P8	

NOTE

The protection control code being indicated on 7-segment display is changed to an alarm code when the abnormal operation occurs. Also, the same alarm code is indicated on the remote control switch.

◆ Activating condition of protection control code

For following the conditions as the temperature change, etc., the control of frequency, etc. is performed to prevent the abnormal conditions by the protection control. The activating conditions of protection control are shown in the table below.

Code	Protection control	Activating condition	Remarks
P0	Low-pressure ratio control at cooling operation	Compression ratio ε < 2.2 => frequency increase	ε = (Pd+0.1)/(Ps+0.1)
P1	High-pressure ratio control at heating operation	Compression ratio ε > 7.5 => frequency decrease	ε = (Pd+0.1)/(Ps+0.1)
P2	High-pressure increase protection	High pressure switch for control is activated => frequency decrease	
P3	Over current protection	Inverter output current > (*1)A => frequency decrease	
P4	DipIPM, ISPM or IPM temperature increase protection	Inverter fin temperature RAS-(4-10)HRNME-AF > 100 ºC RAS-(3-6)HVRNME > 80 ºC => Frequency decrease	
P5	Discharge gas temperature increase protection	Temperature at the top of compressor is high => frequency decrease Temperature at the top of compressor > 107ºC => indicate P5	
P6	Frost formation protection	TL ≤ 2ºC Over 3 minutes => Frequency decrease	TL: liquid piping, temperature of indoor unit
P9	Unbalance power source detecting	Inverter output current > 13A (380A) => frequency decrease	
PA	Current demand control	Inverter output current > (*2)A => frequency decrease	In case of demand control setting
Pb	Low-pressure decrease protection	Low pressure switch for control is activated => frequency decrease	
PC	Cold draft protection	TO ≤ 10ºC and ε ≥ 2.6 => frequency decrease	ε = (Pd+0.1)/(Ps+0.1) TO: outlet temperature of indoor unit
P7	Inverter retry	Automatic stoppage of transistor module, activation of electronic thermal or abnormal current sensor	When activating 3 times in 30 minutes, “48”, “51”, “53” or “54” alarm is indicated.
P8	Inverter retry	Insufficient/excessive voltage at inverter Circuit or PCB connector part	When activating 3 times in 30 minutes, “06” or “55” alarm is indicated.

NOTES

- ***During protection control (except during alarm stoppage), the protection control code is indicated.***
- ***The protection control code is indicated during protection control and turns off when canceling the protection control.***
- ***After retry control, the condition of monitoring is continued for 30 minutes.***
- ***The maximum value (*1) and (*2) are as follows:***

(*1)

HP	380 – 415V		220 – 240V		
	4	5	3	4	5
Current (A)	8.0	12.0	16.0	16.0	24.0

(*2)

	HP / Demand setting	380 – 415V		220 – 240V		
		4	5	3	4	5
Current (A)	100%	4.0	5.5	11.5	13.0	17.0
	75%	3.0	4.0	8.5	10.0	13.0
	50%	2.0	2.0	5.5	6.5	8.5

12.1.5 Procedure of checking other main parts

1 High voltage discharge work for replacing parts

DANGER

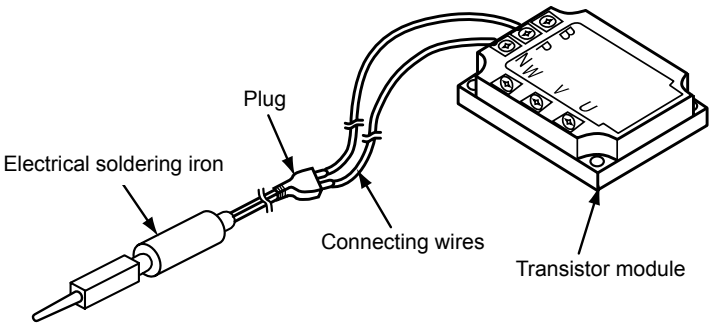
Perform this high voltage discharge work to avoid an electric shock

Procedure:

a. Turn OFF the main switches and wait for three minutes. Check to ensure that no high voltage exists. If LED201 is ON after start-up and LED201 is OFF after turning OFF power source, the voltage will decrease lower than DC50V.

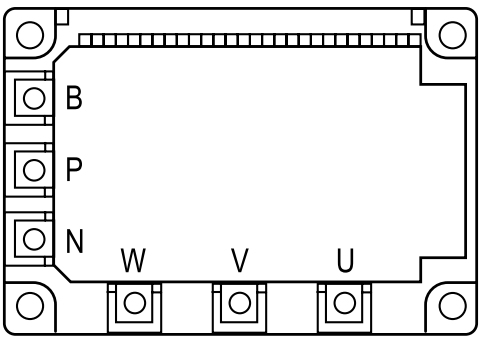
b. Connect connecting wires to an electrical soldering iron.

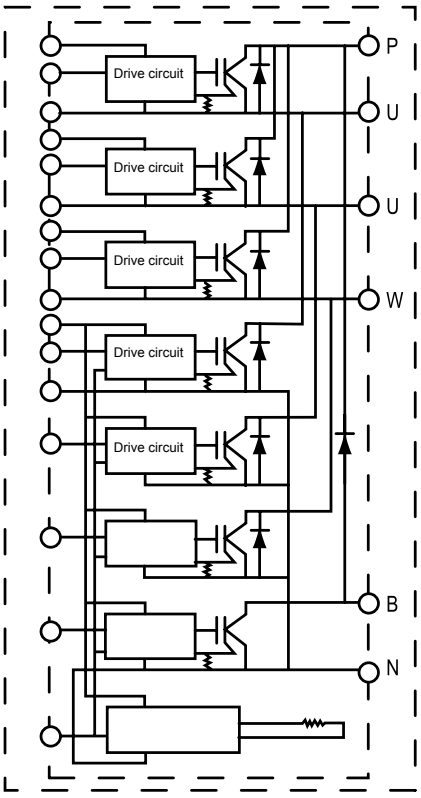
c. Connect the wires to terminals, P and N on IPM. => Discharging is started, resulting in hot soldering iron. Pay attention not to short-circuit between terminal P and N.



d. Wait for 2 or 3 minutes and measure the voltage once again. Check to ensure that no voltage is charged.

2 Checking method of transistor module Outer appearance and internal circuit of transistor module

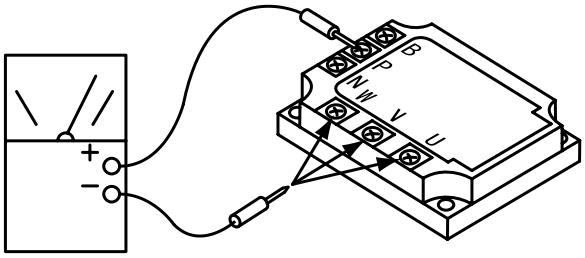




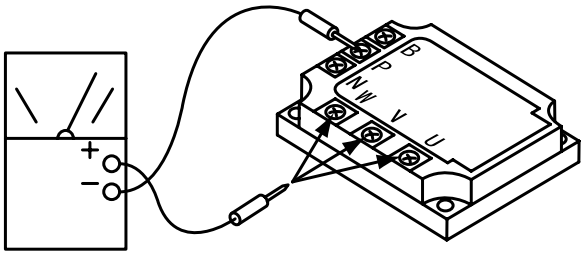
Remove all the terminals of the transistor module before check. If items (a) to (d) are performing and the results are satisfactory, the transistor module is normal. Measure it under 1kΩ range of a tester.

Do NOT use a digital tester.

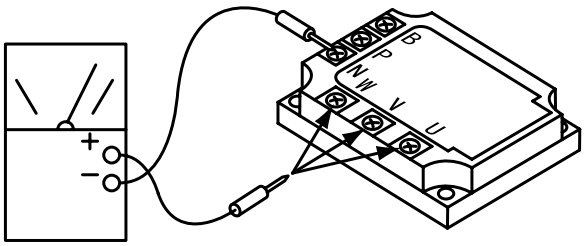
a. By touching the + side of the tester to the P terminal of transistor module and the - side of tester to U, V and W of transistor module, measure the resistance. If all the resistances are from 1 to 5kΩ, it is normal.



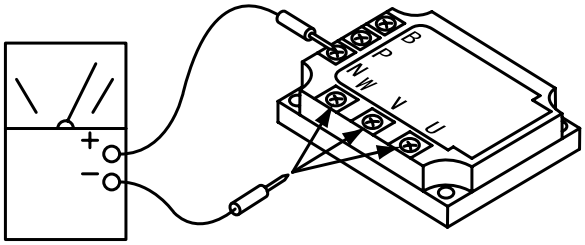
b. By touching the - side of the tester to the P terminal of transistor module and the + side of tester to U, V and W of transistor module, measure the resistance. If all the resistances are greater than 100kΩ, it is normal.



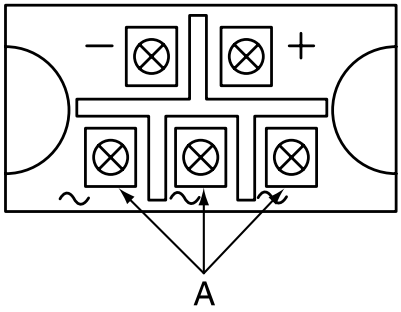
c. By touching the - side of the tester to the N terminal of transistor module and the + side of tester to U, V and W of transistor module, measure the resistance. If all the resistances are from 1 to 5kΩ, it is normal.

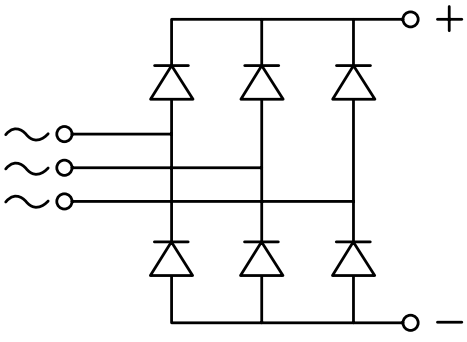


d. By touching the + side of the tester to the N terminal of transistor module and the - side of tester to U, V and W of transistor module, measure the resistance. If all the resistances are greater than 100kΩ, it is normal.



3 Checking method of diode module Outer appearance and internal circuit of diode module

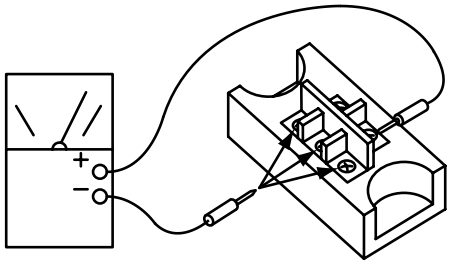




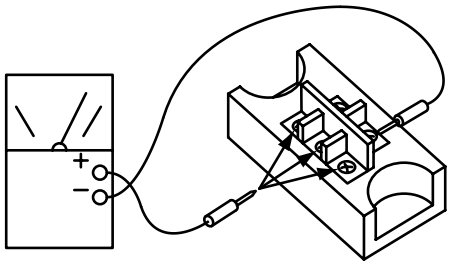
If items (a) to (d) are performing and the results are satisfactory, the diode module is normal.

Measure it under 1kΩ range of a tester. Do NOT use a digital tester.

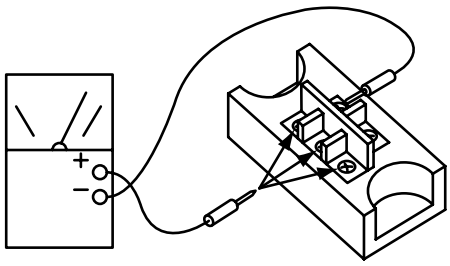
a. By touching the + side of the tester to the + terminal of diode module and the - side of tester to the ~ terminals (3 NOs.) of the diode module, measure the resistance. If all the resistances are from 5 to 50kΩ, it is normal.



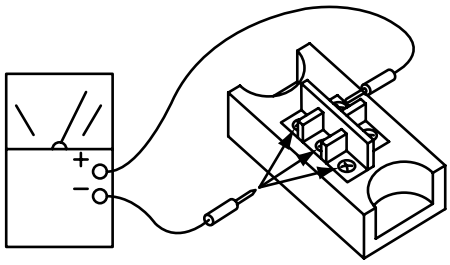
b. By touching the - side of the tester to the + terminal of diode module and the + side of tester to the ~ terminals (3 NOs.) of the diode module, measure the resistance. If all the resistances are greater than 500kΩ, it is normal.



c. By touching the - side of the tester to the - terminal of diode module and the + side of tester to the ~ terminals (3 NOs.) of the diode module, measure the resistance. If all the resistances are from 5 to 50kΩ, it is normal.



d. By touching the + side of the tester to the - terminal of diode module and the - side of tester to the ~ terminals (3 NOs.) of the diode module, measure the resistance. If all the resistances are greater than 500kΩ, it is normal.



◆ Fault diagnosis procedure

Fault diagnosis of DC fan motor. About fan motor fault diagnosis:

When ISPM/DIP-IPM is faulty and alarm 53 appears, the fan motor may also be damaged. After replacing the new ISPM/DIP-IPM, ISPM/DIP-IPM will be damaged again if it operates with a damaged fan motor. Check also if the fan motor is not damaged when IPM/DIP-IPM is replaced.

⚠ CAUTION

- ***Turn OFF main power before start working.***
- ***Working and checking with the power ON may disturb correct diagnosis and may result in failure.***

Models with DC motor(s)	Nº of motors
RAS-2HVRN2	1 Piece
RAS-3HVRNME-AF	
RAS-(4-10)H(V)RNME-AF	2 Pieces
RAS-(8/10)HRNME-AF	

Procedure in case of error diagnosis

1 Remove fan motor connectors from the control PCB, ISPM or DIP-IPM and turn the fan motor shaft by hand.

Normal	Fan motor shaft turns smoothly
Faulty	No continuous rotary torque movement felt when turning the motor by hand. This occurs because the internal magnet of the fan motor breaks the movement when the internal electronic circuit of the fan motor has a short-circuit fault.

2 Measure the fan motor resistance:

Measurement procedure	
1	Remove the fan motor connector from the control PCB, ISPM or DIP-IPM.
2	Connect the black test lead of the tester to the black wire pin of the fan motor connector.
3	Connect the red test lead to the wire connector pin to be checked.
Results	
Normal	Observed values will be close to the normal values in the table below.
Faulty	Obbserved values will be deviated from the normal values in the table below. (Generally, an open-circuit fault shows ∞, and a short-circuit fault shows several Ω - kΩ). Internal electronic circuit fault of the fan motor including short-circuit and breakage can be checked.

Model	Motor model	Wire color for checking (Normal value)			
		Red-black	White-black	Yellow-black	Blue-black
RAS-2HVRN2	FPD10U4OS-902 or DAJ12-55V71	13.5 - 14.4kΩ	1MΩ or greater	225-226kΩ	1MΩ or greater
RAS-4H(V)RNME-AF (upper) RAS-(4-6)H(V)RNME-AF (lower)	SIC-65FV-D840-1	1MΩ or greater	26-50kΩ	168-312kΩ	1MΩ or greater
RAS-3HVRNME-AF RAS-(5/6)HVRNME-AF (upper)	SIC-68FV-D851-7	1MΩ or greater	42-78kΩ	168-312kΩ	1MΩ or greater
RAS-(8/10)HRNME-AF	SIC-81FV-D8138-1	1MΩ or greater	42 - 78kΩ	168-312kΩ	1MΩ or greater

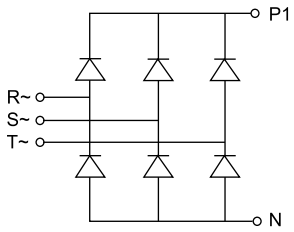
Values are shown for referential purpose. While actual values may vary depending on the type of the tester, any tester can be used to determine any short-circuit or breakage based on ∞ or several Ω or 0 Ω or ∞.

◆ Checking procedure for the ISPM

Remove all the terminals of the ISPM before check.

If items (a) to (h) are performed and the results are satisfactory, ISPM is normal. Measure it under 1 kΩ range of a tester.

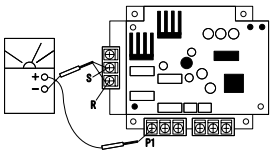
Rectification parts of internal circuit of ISPM (common)



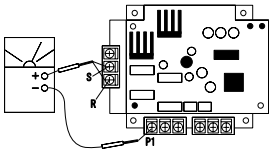
⚠ CAUTION

- ***Perform the high voltage discharge procedure as described***
- ***Do not use a digital tester.***

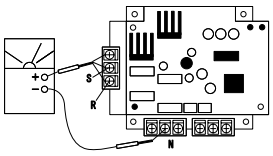
a. By touching the + side of the tester to the P1 terminal of ISPM and the - side of the tester to R and S of ISPM, measure the resistance. If all the resistances are more than 1 kΩ, it is normal.



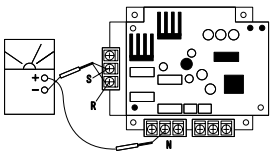
b. By touching the - side of the tester to the P1 terminal of ISPM and the + side of the tester to R and S of ISPM, measure the resistance. If all the resistances are more than 100 kΩ, it is normal.



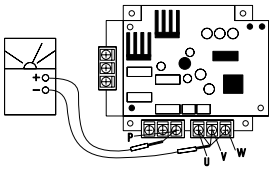
c. By touching the - side of the tester to the N terminal of ISPM and the + side of the tester to R and S of ISPM, measure the resistance. If all the resistances are more than 1 kΩ, it is normal.



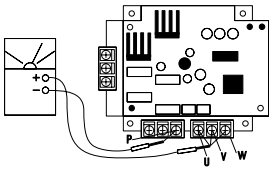
d. By touching the + side of the tester to the N terminal of ISPM and the - side of the tester to R and S of ISPM, measure the resistance. If all the resistances are more than 100 kΩ, it is normal.



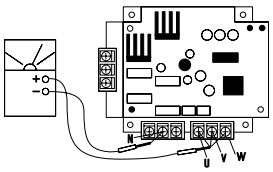
e. By touching the + side of the tester to the P terminal of ISPM and the - side of the tester to U, V and W of ISPM, measure the resistance. If all the resistances are more than 1 kΩ, it is normal.



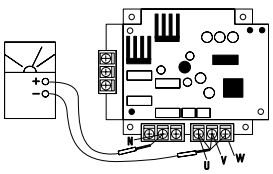
f. By touching the - side of the tester to the P terminal of ISPM and the + side of the tester to U, V and W of ISPM, measure the resistance. If all the resistances are more than 100 kΩ, it is normal.



g. By touching the - side of the tester to the N terminal of ISPM and the + side of the tester to U, V and W of ISPM, measure the resistance. If all the resistances are more than 100 kΩ, it is normal.

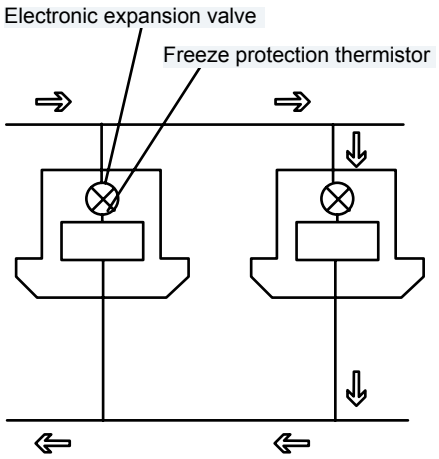


h. By touching the + side of the tester to the N terminal of ISPM and the - side of the tester to U, V and W of ISPM, measure the resistance. If all the resistances are more than 1 kΩ, it is normal.



◆ Checking procedure for the electronic expansion valve

	Indoor unit electronic expansion valve	Outdoor unit electronic expansion valve
Locked with fully closed	Check the liquid pipe temperature during the heating process. It is abnormal if the temperature does not increase.	It is abnormal if the liquid pipe pressure does not increase during the cooling process.
Locked with slightly open	It is abnormal under the following condition: The temperature of the freeze protection thermistor becomes lower than the suction air temperature when the unit which is under chechink stops and the other units are under the cooling process.	It is abnormal if the liquid pipe pressure does not increase and the outlet temperature of the expansion valve decreases after the cooling process starts.
Locked with fully open		It is abnormal under the following conditions: after the heating process for more than 30 minutes, the discharge gas temperature of the compressor is not 10°C higher than the condensing temperature and there is no other faults, such as an excessive charge of refrigerant and others.



◆ Checking procedure for the compressor

Check list on compressor		
Client:_____	Model: _____	Date: _____
Serial No.: _____	Production date: _____	Checker: _____

No.	Check item	Check method	Result	Remarks
1	Is THM9 correctly connected? THM9: discharge gas thermistor	1. Is wire of thermistor correctly connected by viewing? 2. Check to ensure the 7-segment indication of Td when compressor is operating. Td: temperature of THM9		
2	Is thermistor THM9 disconnected?	1. Check to ensure that thermistor on the top of compressor is correctly mounted by viewing? 2. Check to ensure that actually measured temperature is the same as the indication during check mode.		
3	Is current sensor faulty?	1. Check to ensure that indication A1 and A2 are 0 during compressor stopping. 2. Check to ensure that indication A1 and A2 are not 0 during compressor running.		
4	Is current sensing part on PCB2 faulty?			
5	Is the direction of current sensor (CTU, CTV) reverse?	Check the direction => by viewing.		
6	Are power source wires, U and V inserted correctly into current sensor?	Check to ensure that wires are correctly inserted		
7	Is expansion valve (MV1) correctly connected?	Check to ensure that MV1 to CN5A is correctly connected		
8	Is exp. valve coil (MV1) correctly connected?	Check to ensure that each coil is correctly mounted on the valve.		
9	Are the refrigeration cycle and electrical wiring system incorrectly connected?	Check to ensure that refrigerant is flowing into indoor units by operating one refrigerating cycle only from the outdoor unit.		
10	Is opening of expansion valve completely closed (locked)?	Check the following by the check mode of outdoor units. 1. Liquid pipe temperature (TL) < Control information B2 during cooling operation 2. Liquid pipe temperature (TL) > Control information B2 during heating operation		
12	Are the contacts for compressor magnetic switch CMC1 faulty?	Check the surface of each contact (L1, L2 and L3) by viewing.		
13	Is there any voltage abnormality among L1-L2, L2-L3 and L3-L1?	Check to ensure that voltage imbalance is smaller than 3%. Please note that power source voltage must be within 380V or 220V+10%.		
14	Is the compressor oil acidified during compressor motor burning?	Check to ensure that the oil color is not black.		

- Additional Information for “CHECK LIST ON COMPRESSOR”

Check item	Additional information (mechanism of the compressor failure)
1 & 2	The liquid refrigerant return volume to the compressor is controlled by the discharge gas temperature Td when compressor is operating. If Td thermistor is disconnected, the liquid refrigerant return volume will become small by detecting the temperature even if the actual discharge gas temperature is high. Therefore, this abnormal overheating by detecting the temperature operation will result in insulation failure of the motor winding.
3 & 4	Overcurrent control (operating frequency control) is performed by detecting current by the PCB2. In this case, winding insulation failure will occur, since control is not available in spite of actually high current.
5 & 6	The current sensor checks phase and adjusts output electrical wave in addition to the above mentioned items. If fault occurs, the output electrical wave becomes unstable giving stress to the motor winding, resulting in winding insulation failure.
7 &8	During a cooling operation, SH is controlled by MV of each indoor units. During a heating operation, Td is controlled by MV1. If expansion valves are incorrectly connected, correct control is not available, resulting in compressor seizure depending on liquid refrigerant returning conditions or motor winding insulation failure depending on overheating conditions.
9	If the refrigeration cycle and electrical system are incorrectly connected, abnormally low suction pressure operation is maintained or abnormally high discharge pressure operation is maintained, resulting in giving stress to the compressor, since their correct control is not available.
10	If the expansion valve and electrical system are incorrectly connected, abnormally low suction pressure operation is maintained or abnormally high discharge pressure operation is maintained, resulting in giving stress to the compressor, since their correct control is not available.
11	The compressor may be locked due to the liquid return operation during the cooling operation.
12	In the case that the contacting resistance becomes big, voltage imbalance among each phase will cause abnormal overcurrent.
13	In this case, overcurrent will occur, efficiency will decrease or the motor winding will be excessively heated.
14	In the case, it will result in motor burning or compressor seizure.

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Hitachi Air Conditioning Products Europe, S.A.
Ronda Shimizu, 1 - Políg. Ind. Can Torrella
08233 Vacarisses (Barcelona) España

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