HITACHI
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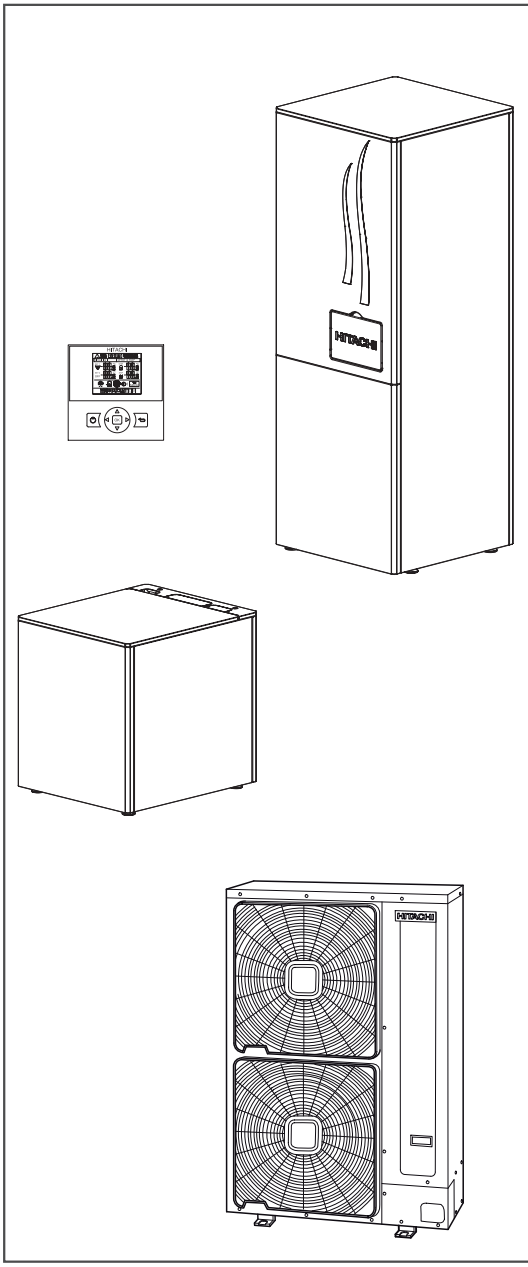
YUTAKI S80 SERIES



Service Manual

RWH-(4.0-6.0)FS(V)NFE Indoor unit
RAS-(4-6)H(V)RNME-AF Outdoor unit
DHWS-(195/260)S-2.0H1E DHW tank
PC-S80TE LCD controller

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1. General information

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1.1 General information

1.1.1 General notes

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As a result, some of the images or data used to illustrate this document may not refer to specific models. No claims will be accepted based on the data, illustrations and descriptions included in this manual.

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

NOTE

This air conditioner has been designed for standard air conditioning for human beings. For use in other applications, please contact your HITACHI dealer or service contractor.

CAUTION

This unit is designed for commercial and light industrial application. If installed in house hold appliance, it could cause electromagnetic interference.

1.1.2 Introduction

HITACHI is introducing another innovative heat pump to its award-winning YUTAKI range. The YUTAKI S80 will generate hot water up to 80ºC; the hottest water temperature on the domestic heating market using renewable energy.

The YUTAKI air to water heat pump has a high COP, and this new innovation makes further strides in seasonal efficiency.

HITACHI's YUTAKI heat pumps produce sanitary hot water and heating like any oil or gas boiler but transforms renewable energy from the air outside into heat. Every 1kW of electricity used to power the heat pump can provide up to 4kW of energy for heating; this can reduce heating bills by up to 60% and cut CO_2 emissions by 50% compared to traditional boiler-led systems.

The extra innovation in the YUTAKI S80 is that it has two compressors, working in a smart cascade system, with two refrigerant cycles (R-410A and R-134a). To maximize seasonal efficiency, the second refrigerant cycle is only operated as a booster, when very high water temperature is required - the rest of the time, only one cycle is used.

The YUTAKI S80 will be ideal for existing properties, in particular older establishments where higher water supply temperatures may be required to keep the house warm – as well as for new builds. It is designed for boiler substitution, offering heating and sanitary hot water all year round, without boiler back-up.

The YUTAKI S80 is easy to install and operate; it's a split system, using HITACHI's IVX outdoor unit with a brand new standalone indoor unit.

Six different models are available in single phase or three phase versions. The indoor unit is a standard width of <600 mm allowing seamless integration into kitchens and utility rooms.

For DHW operation (optional), HITACHI offers two DHW tanks (DHWS195S-2.0H1E and DHWS260S-2.0H1E) with the possibility to combine with the indoor unit as integrated over it or beside it, allowing the user to benefit from the heat pump's high efficiency and achieve hot water up to 75ºC.

The DHW tank is made with high advanced technology using stainless steel chemically descaled and passivated materials. It has been designed to be high thermal efficient insulated with rigid, mould-injected, Neopor EPS in grey colour.

The DHW Tank has been designed to have a compact size to reduce the installation space and to eliminate the cold zones at the bottom of the storage tank to prevent the risk of bacteria proliferation (e.g. Legionella).

The system is simple to control; its wireless remote controller (PC-S80TE) is a variation of the well-received and successful design used with the existing YUTAKI S system, which includes a helpful LCD graphic display, one-touch holiday button, weekly timer and frost protection.

◆ Additional combinations

YUTAKI S80 system can be used for the following additional combinations:

Solar combination for DHW

YUTAKI S80 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

YUTAKI S80 can also be used to heat up the swimming pool water temperature up to a value between 24 and 33ºC.

1.1.3 Environment-friendly units

The new HITACHI's YUTAKI S80 series uses environmentally-friendly R410A / R134a gas refrigerants, 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 and R134a are totally environmentally-friendly since it does not contain any substances that damage the ozone layer: ODP (ozone depleting potential) =0.

HITACHI's YUTAKI S80 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 Product guide

◆ Outdoor unit

Outdoor unit			
Single phase (1~ 230V 50Hz)		Three phase (3N~ 400V 50Hz)	
Unit	Code	Unit	Code
RAS-4HVRNME-AF	7E300020	RAS-4HRNME-AF	7E300120
RAS-5HVRNME-AF	7E300021	RAS-5HRNME-AF	7E300121
RAS-6HVRNME-AF	7E300022	RAS-6HRNME-AF	7E300122

◆ Indoor unit

Indoor unit			
Single phase (1~ 230V 50Hz)		Three phase (3N~ 400V 50Hz)	
Unit	Code	Unit	Code
RWH-4.0FSVNFE	7E480007	RWH-4.0FSNFE	7E480107
RWH-5.0FSVNFE	7E480008	RWH-5.0FSNFE	7E480108
RWH-6.0FSVNFE	7E480009	RWH-6.0FSNFE	7E480109

◆ Domestic hot water tank (DHWT)

Domestic hot water tank			
Single phase (1~ 230V 50Hz)			
Unit	Code	Unit	Code
DHWS195S-2.0H1E (*)	7E544102	DHWS260S-2.0H1E (*)	7E544103
			

NOTE

(*): Models with integrated LCD controller (PC-S80TE).

◆ LCD controller

LCD controller	
Unit	Code
PC-S80TE (*)	7E543001
	

NOTE

(*): For indoor unit alone (without tank) or indoor unit with other tank (non HITACHI tank beside the indoor unit), the LCD controller is needed.

1.3.2 Model's classification

◆ Classification of outdoor unit model

Unit type: Outdoor unit									
	Position-separating hyphen (fixed)								
		Compressor power (HP): 4, 5, 6.							
			Heat pump						
				V= Single phase unit (1~ 230V 50Hz)					
				- = Three phase unit (3N~ 400V 50Hz)					
					Inverter system				
						R410A refrigerant			
							IVX series		
								Made in Europe	
									YUTAKI (S/S80)
RAS	-	X	H	(X)	R	N	M	E	-AF

◆ Classification of indoor unit model

Unit type: indoor unit water module - high temperature								
	Position-separating hyphen (fixed)							
		Compressor power (HP): 4.0, 5.0, 6.0.						
			System Free					
				V = Single phase unit (1~ 230V 50Hz)				
				- = Three phase unit (3N~ 400V 50Hz)				
					R-410A refrigerant			
						R-134a refrigerant		
							Made in Europe	
RWH	-	X.X	FS	(X)	N	F	E	

◆ Classification of Domestic Hot Water Tank accessory

Unit type: YUTAKI S80 domestic hot water tank							
	Model: 195/260						
		Stainless					
			Position-separating hyphen (fixed)				
				Electric heater of 2.0 kW			
					Series		
						Made in Europe	
DHWS	XXX	S	-	2.0H	1	E	

◆ Classification of LCD user controller

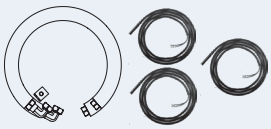
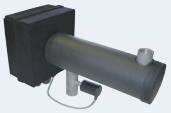
Unit type: Individual remote controller					
	Position-separating hyphen (fixed)				
		YUTAKI S80			
			Timer		
				Made in Europe	
PC	-	S80	T	E	

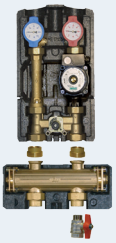
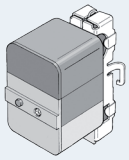
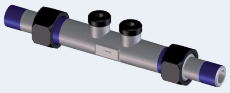
1.3.3 Accessory code list

◆ 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-FWP-01	Tank beside the indoor unit installation kit	7E549915	
WEH-6E	Water electric heater	90500002 (WEH-6E)	
ATW-HSK-01 (BDHM1)	Hydraulic separator	7E549905 (BDHM1)	
ATW-3WV-01 (VID3V1)	3-way valve (Type 1) (Internal thread and spring return)	7E549906 (VID3V1)	
ATW-3WV-02	3-way valve (Type 2) (External thread and 2 points SPST)	7E549914	
ATW-AOS-01	Auxilliary output signal box (Relay board for additional output signals)	7E549910	

Accessory	Name	Code	Figure
ATW-2KT-01 (CDH2Z1)	2nd. temperature kit (*)	7E549904 (CDH2Z1)	
ATW-MVM-01	Mixing valve motor	7E549912	
ATW-AQT-01 (ASMSH1)	Aquastat	7E549907 (ASMSH1)	
ATW-2OS-01	Ambient temperature sensor (2nd. outdoor temperature sensor)	7E549909	
ATW-SPS-01	Swimming pool sensor	7E549908	
ATW-WTS-02	Water temperature sensor (Second temperature control)	7E549911	
ATW-WTS-02Y	Universal water temperature sensor (DHW, boiler and electric heater combination)	9E500004	
ATW-WCV-01	Water check valve	9E500014	
DHWT-SWG-01	Security water valve for DHW tank	70544902	

NOTE

(*): The 2nd temperature kit (ATW-2KT-01) must be installed with the following accessories:

- ***Mixing valve motor (ATW-MVM-01)***
- ***Water temperature sensor for second temperature control (ATW-WTS-02)***
- ***Aquastat for heating floor protection (ATW-AQT-01)***

All these products are separately sold.

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

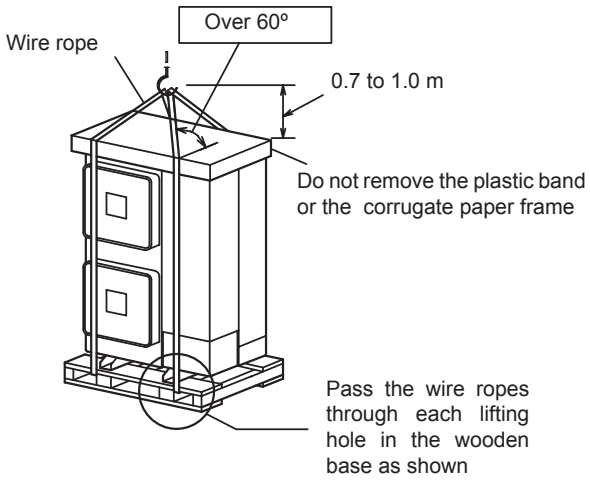
DANGER

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-(4-6)H(V)RNME-AF



CAUTION

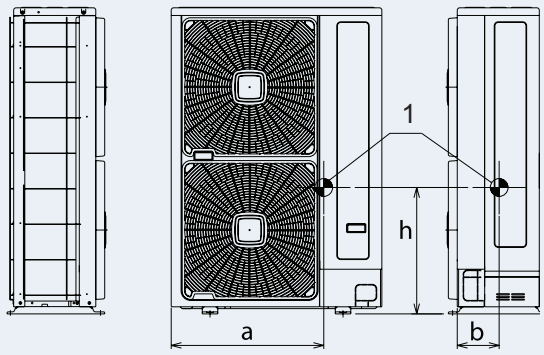
- ***Lift the outdoor unit in its factory packaging with 2 wire ropes.***
- ***For safety reasons ensure that the outdoor unit is lifted smoothly and does not lean.***
- ***Do not attach lifting equipment to the plastic band or the corrugated paper frame, because of the ropes will slip or break the materials.***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

◆ Handling unit (center of gravity)

When the unit is lifted manually (using the handles), pay attention to the following points:

1 Do not remove the wooden base from the unit.

2 To prevent the unit from overturning, pay attention to the center of gravity as shown in the below figure:

RAS-(4-6)H(V)RNME-AF	a. 615 mm b. 190 mm h. 570 mm **1** Center of gravity	

3 Two or more personnel should be used to move the unit.

Net weight (kg)			
RAS-4HVRNME-AF	RAS-(5-6)HVRNME-AF	RAS-4HRNME-AF	RAS-(5-6)HRNME-AF
103	104	107	108

2.1.3 Installation space

- **RAS-(4-6)H(V)RNME-AF**

<table>
<tr><th colspan="2">Blocked in Inlet Side</th></tr>
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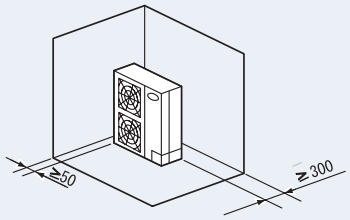
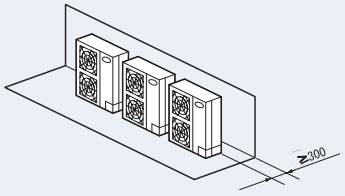
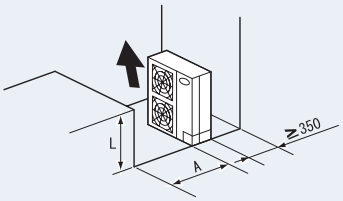
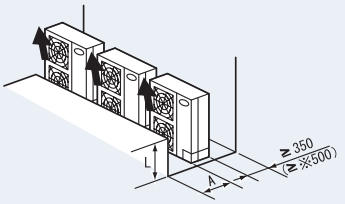
<tr><td>Single Installation</td><td>Multiple Installation (Two units or more)</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>100 mm or more of the side space is acceptable on the service cover side. 200 or more of the back space is acceptable when the right and left sides are open.</td><td>Allow 100 mm of space between units. Leave open both right and left sides.</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Be sure to use the fan direction guide. Leave open both right and left sides.</td><td>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.</td></tr>
<tr><td colspan="2">Upper Side Blocked</td></tr>
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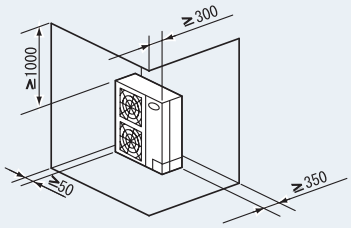
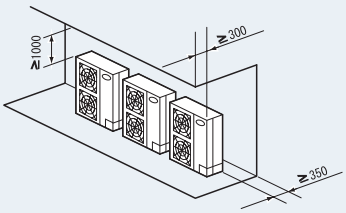
<tr><td> 
</td><td> 
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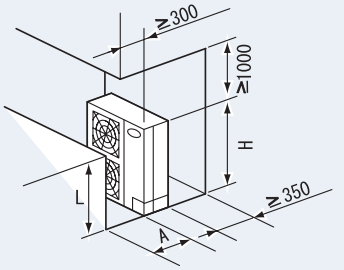
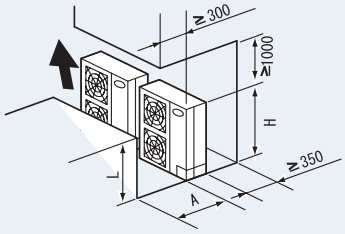
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Be sure to use the fan direction guide.
Leave open both right and left sides.</td><td>Be sure to use the fan direction guide. Allow 100 mm of space between units. Leave open both right and left sides.
Serial installation allowed up to two units.</td></tr>
</table>

Blocked in Inlet Side

The length A is as shown in the following table:

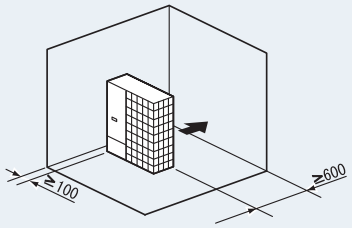
L	A
0 < L ≤ 1/2H	600 or greater
1/2H < L≤ H	1200 or greater

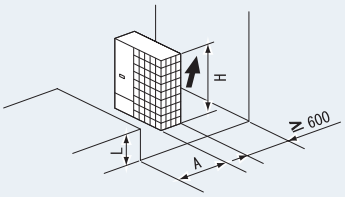
Be sure to use the fan direction guide. Allow 100 mm of space between units. Leave open both right and left sides. Serial installation allowed up to two units.

Outlet Side Blocked

Upper Side Open

Single Installation





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

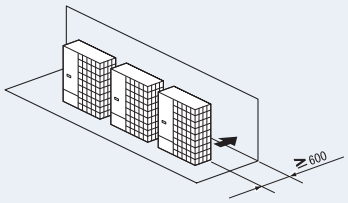
The length A is as shown in the following table:

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

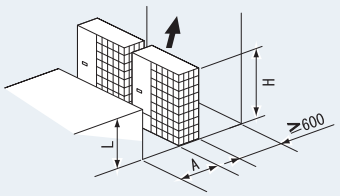
When L > H use a base for outdoor unit to make L ≤ H.

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

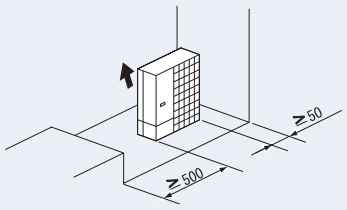
When L > H use a base for outdoor unit to make L ≤ H.

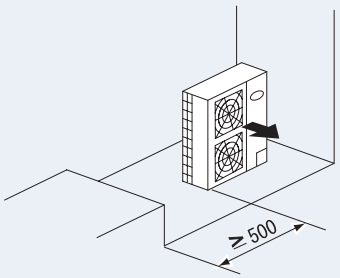
Close the base not to allow the outlet air bypassed.

Lateral Side Blocked

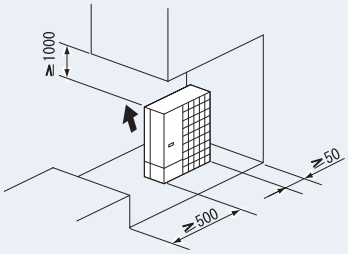
Upper Side Open

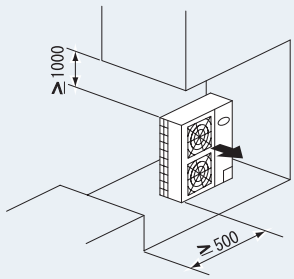
Single Installation





Upper Side Blocked

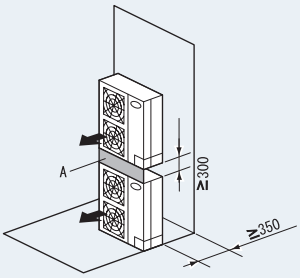




Stack installation (allowed up to 2 Units)

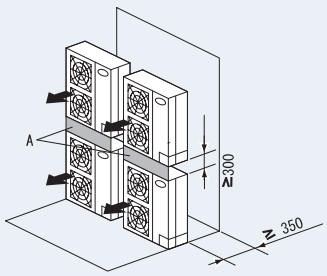
Upper Side Open

Single Installation



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.

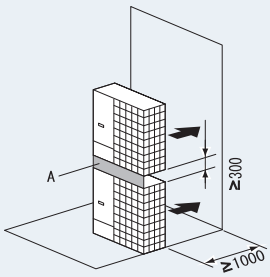
Multiple Installation



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.

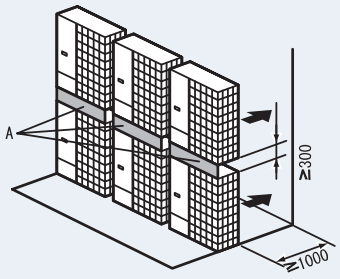
Upper Side Blocked

Single 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.

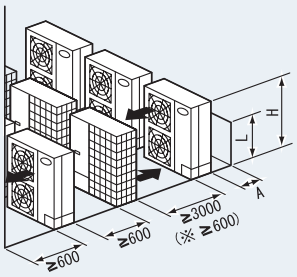
Multiple Installation



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

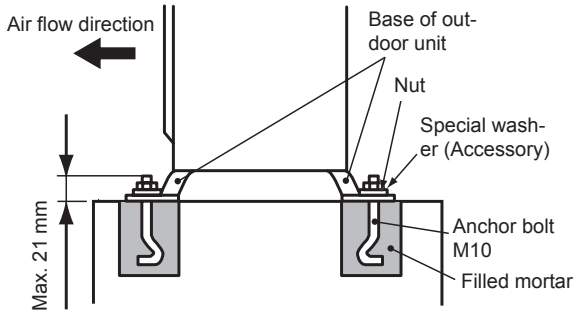
NOTE

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 ※.

2.1.4 Installation place provision

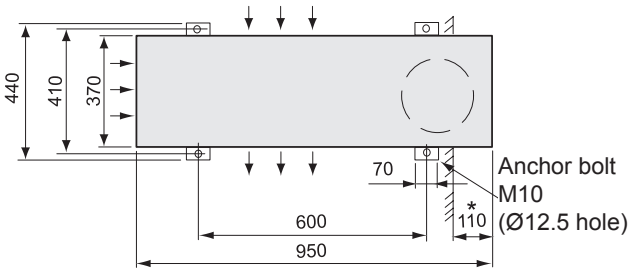
◆ Concrete foundation

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



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

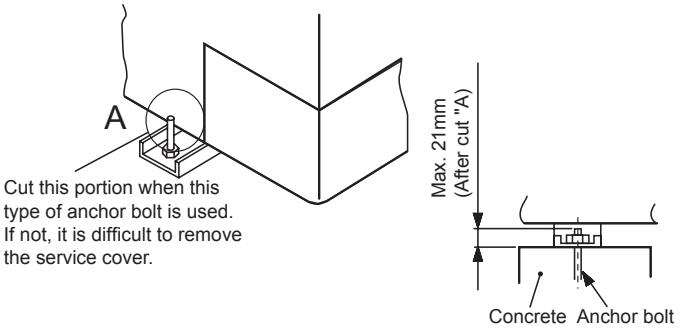
Please, refer to the following figure regarding the location of fixing holes:



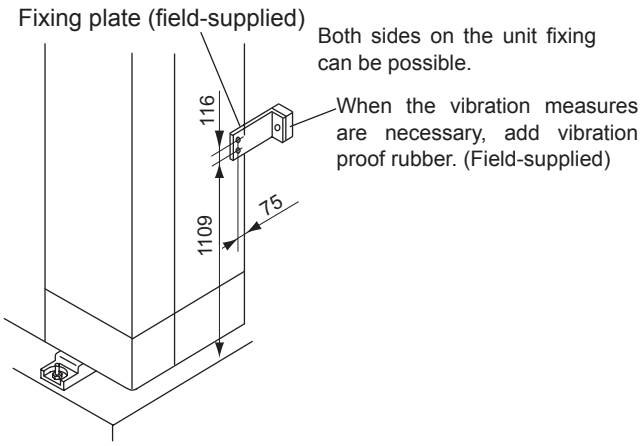
NOTE

: Space for downward piping.

Example of fixing outdoor unit by anchor bolts.



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



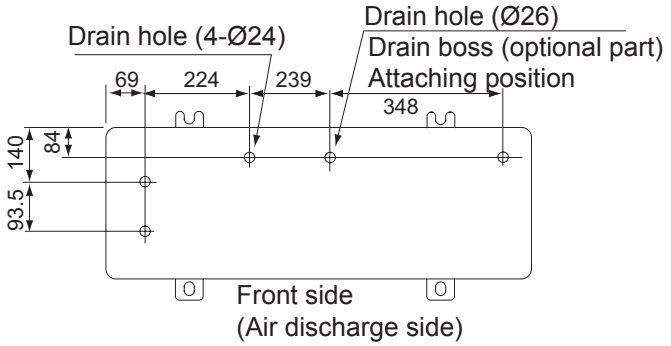
3 During the heating or defrosting operations, drain water is discharged from the unit.

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.)

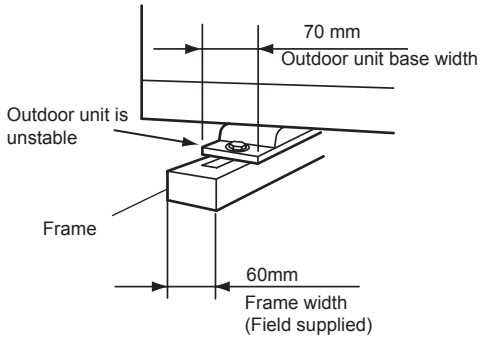
4 In case of the drain piping is necessary for the outdoor unit, use the drain-kit (DBS-26: Optional Part).



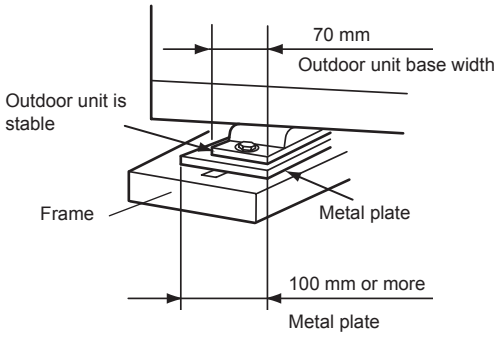
5 The whole base of the outdoor unit should be installed on a foundation or frame. When using vibration-proof material, it should also be positioned in the same place.

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

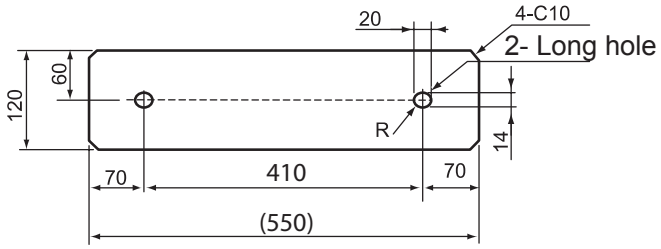


CORRECT



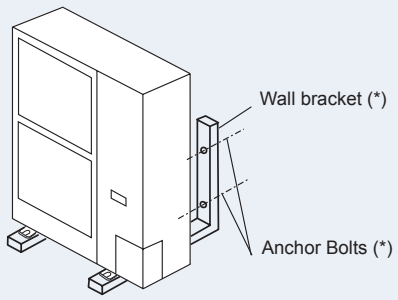
Recommended metal plate size (Field supplied)

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



◆ 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

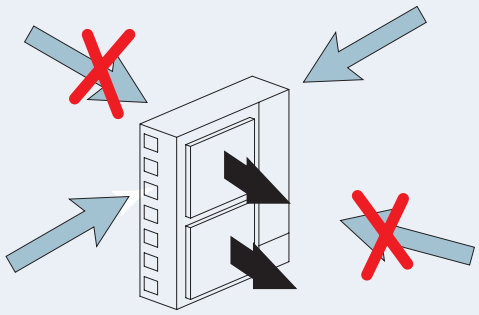
Pay attention to the following for installation:

- ***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.



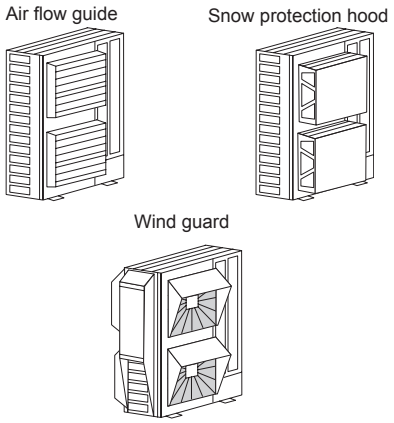
⚠ CAUTION

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

2.1.5 Optional parts and installation

◆ Air flow guide, wind guard and snow protection hood

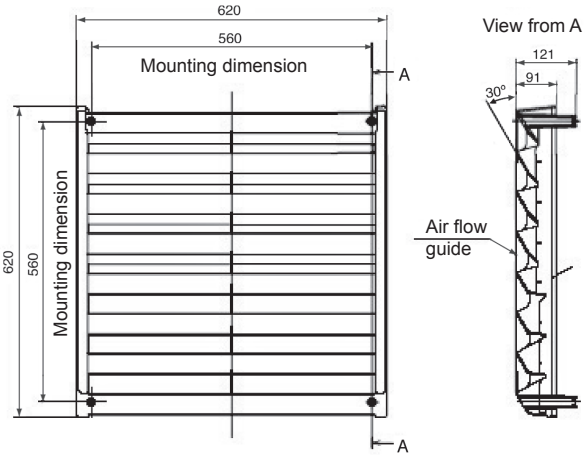
Optional parts			Model
Air flow guide			AG-335A x 2
Wind guard			WSP-335A x 2
Snow protection hood	Zinc plate	Air outlet	ASG-NP335F x 2
		Air inlet of rear side	ASG-NP280B
		Air inlet of side face	ASG-NP280L
	Stainless plate (NSSC 180)	Air outlet	ASG-NP335FS2 x 2
		Air inlet of rear side	ASG-NP280BS2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

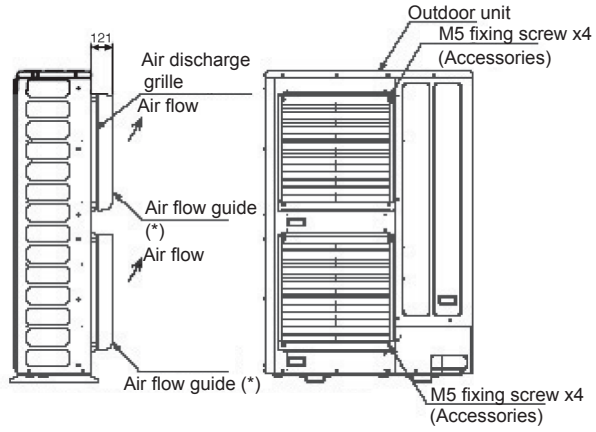


- Attaching example of air flow guide
  - Attach the air flow guide to the air discharge grille with four (4) screws (supplied).
  - The fixing holes are located at 4 positions on the grille. (Screw tightening torque 2.4~3.1N.m)
  - Do not remove the air discharge grille for air flow guide installation.

⚠ CAUTION

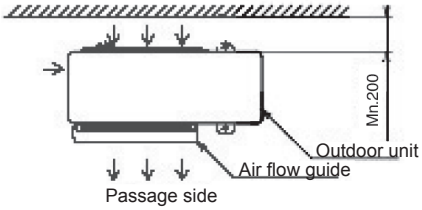
If the air guide is installed without discharge grille, it may cause injury due to rotating fan.

- Two air flow guides installation



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

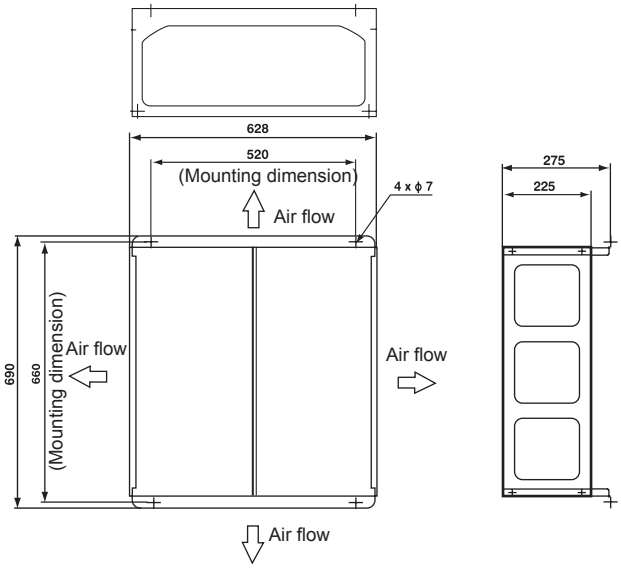
- Service space (In case of upward air discharge)
  - In case of right and left sides air discharge, enough space for air discharge is required.
  - The downward air discharge is also available. In such case, install the base under the unit to secure enough space for air discharge.
  - In case of serial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

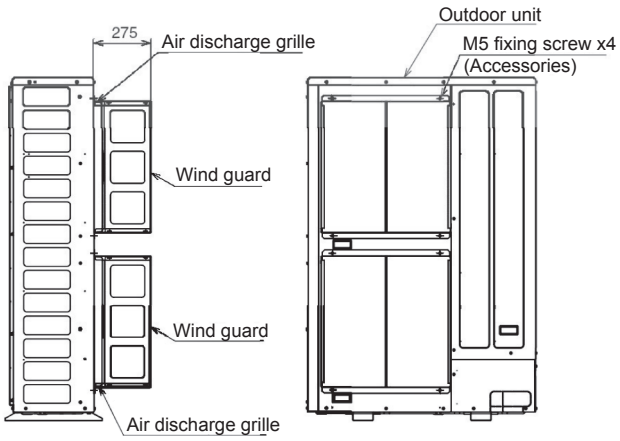


- Attaching example of wind guard
  - Attach the wind guard to the air discharge grille with four (4) screws (supplied).
  - The fixing holes are located at 4 positions on the grille (Screw tightening torque 2.4~3.1N.m).
  - Do not remove the air discharge grille for wind guard installation.

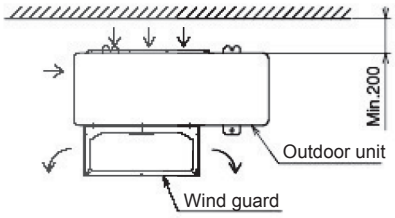
CAUTION

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

- Two windguard covers installation



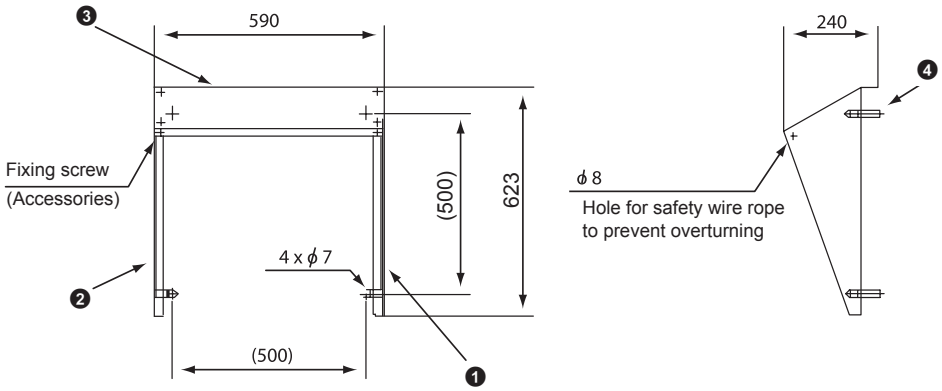
- Service space
  - Both sides of the outdoor unit should be open.
  - No obstacles should be placed in the air discharge side.



Snow protection hood

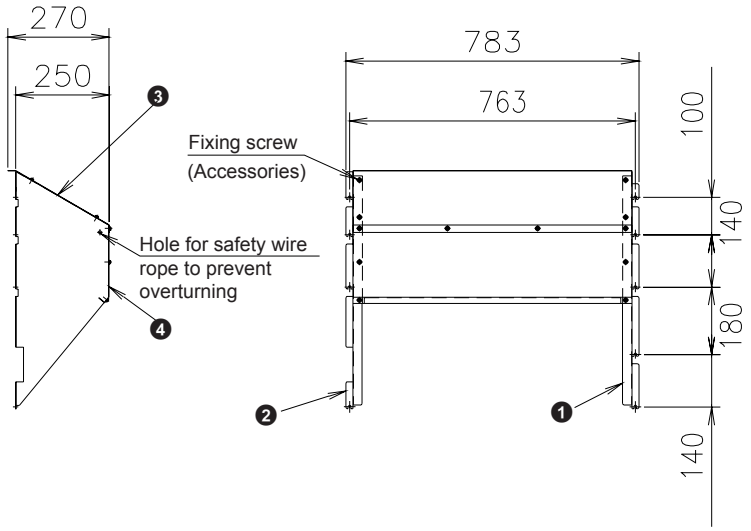
- Air discharge hood

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



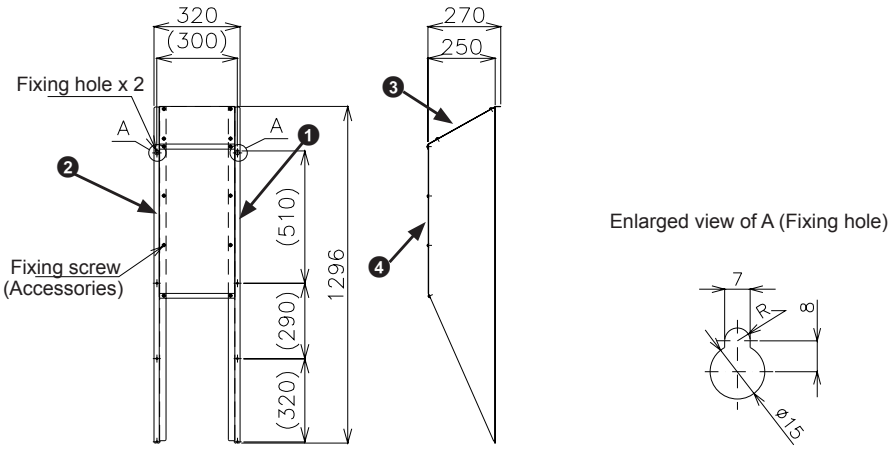
- Rear suction hood

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

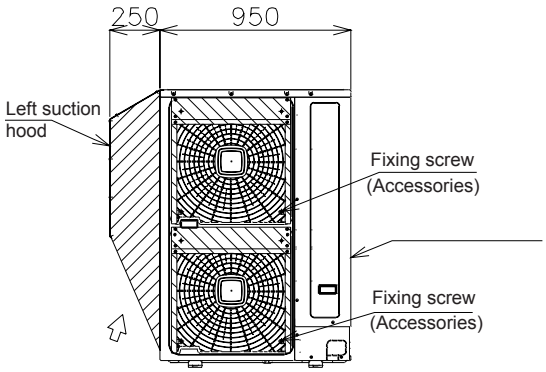


- Left suction hood

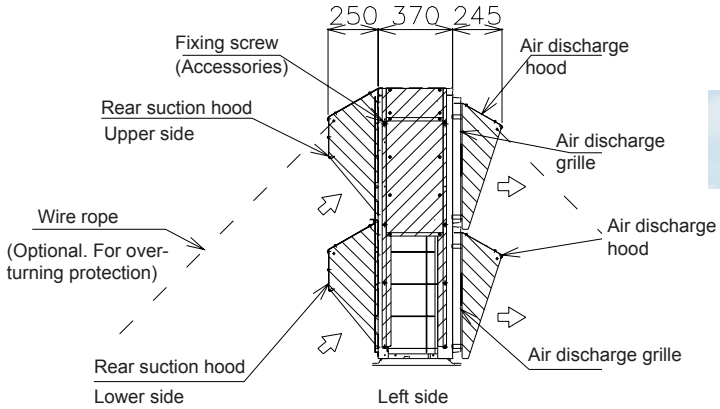
No.	Part name	Qty.
❶	Right side plate	1
❷	Left side plate	1
❸	Front panel (Upside)	1
❹	Front panel (Downside)	1



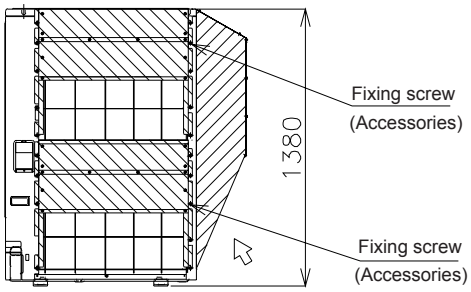
- Attaching example of snow protection hood



Front side



Left side



Rear side

- Specifications of snow protection hood

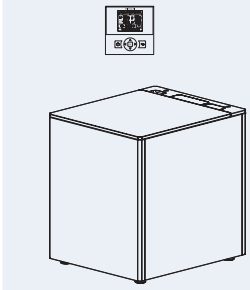
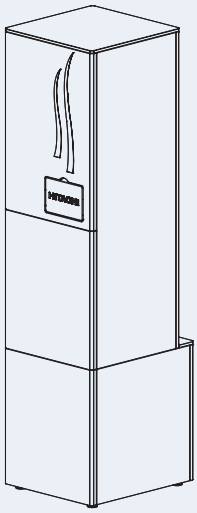
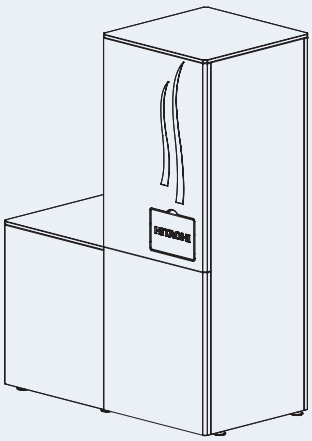
Product name		Air discharge hood		Rear suction hood		Left suction hood	
Model		ASG-NP335F	ASG-NP335FS2	ASG-NP280B	ASG-NP280BS2	ASG-NP280L	ASG-NP280LS2
Quantity		2 per unit		1 per unit			
Material		Bonderized steel sheet Iron	Stainless (NSSC 180)	Bonderized steel sheet Iron	Stainless (NSSC 180)	Bonderized 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					

2.2 Indoor unit installation

2.2.1 Selecting an installation configuration

2.2.1.1 Indoor unit and DHW tank configurations

YUTAKI S80 system can work for space heating only or for space heating + DHW. Depending on the desired working mode, the configuration possibilities are the following:

SPACE HEATING ONLY	SPACE HEATING + DHW		
A) Indoor unit alone (Without tank)	B) Indoor unit with HITACHI tank (Tank integrated over the indoor unit)	C) Indoor unit with HITACHI tank (Tank beside the indoor unit)	D) Indoor unit with other tank (Non HITACHI tank beside the indoor unit)
			

IMPORTANT NOTE

- ***A) Indoor unit alone (Without tank):***
  All the installation information is explained in this section 2.2 Indoor unit installation.
- ***B) and C) Indoor unit with HITACHI tank:***
  The installation information about the space heating connection and indoor unit refrigerant / wiring connection is explained in this section 2.2 Indoor unit installation. For the specific information about DHW connection, refer to the following section 2.3 DHW Tank (optional) installation.
- ***D) Indoor unit with other tank (Non HITACHI tank beside the indoor unit):***
  The installation information about the space heating connection and indoor unit refrigerant / wiring connection is explained in this section 2.2 Indoor unit installation. For the specific information about the non HITACHI tank, see its own technical documentation.

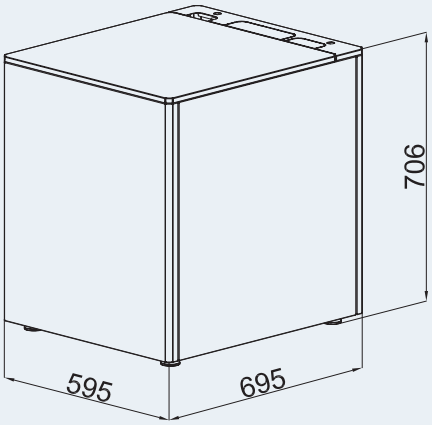
Depending on the configuration type, the installation procedure will be different.

2.2.1.2 Dimensions

NOTE

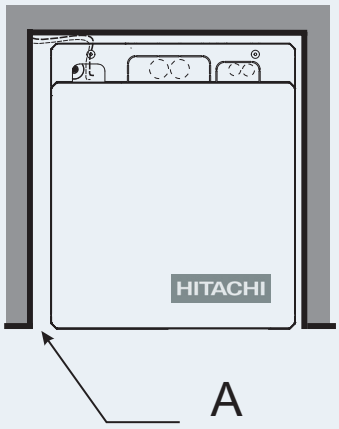
- ***Height dimensions are shown with the minimum mounting foot height. These values can be adjusted up to +30 mm.***
- ***All dimension in mm.***

◆ **Indoor unit alone (Without tank)**

RWH-(4.0-6.0)FS(V)NFE


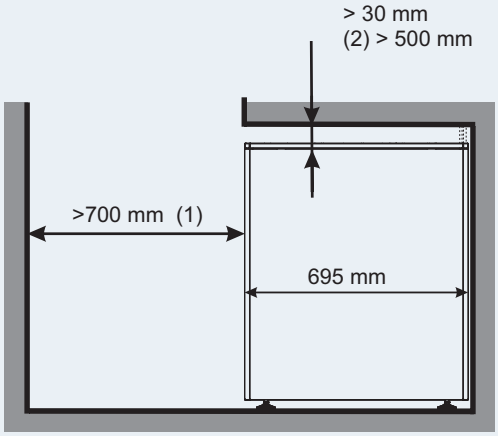
2.2.1.3 Service space

◆ **Indoor unit alone (Without tank)**



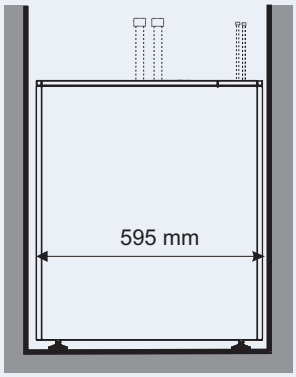
Upper view

A : Service without this space is available. But, for easy servicing of some components is recommended to let a space of >500 mm.



Right view

(1): e.box removal
(2) if no space at left side



Front view

2.2.2 General notes

2.2.2.1 Reception

◆ Components at receipt

Outdoor unit	Indoor unit	Domestic hot water tank (Optional)
		

NOTE

- ***For Indoor unit alone (Without tank) installation and Indoor unit with other tank (Non HITACHI tank beside the indoor unit), the LCD controller (PC-S80TE) is needed.***
- ***For outdoor unit installation information, please refer to the outdoor unit Installation and operational manual.***
- ***If the unit will be installed with the DHW HITACHI tank (optional), please refer to its Installation and operation manual.***

◆ Selection of the installation location

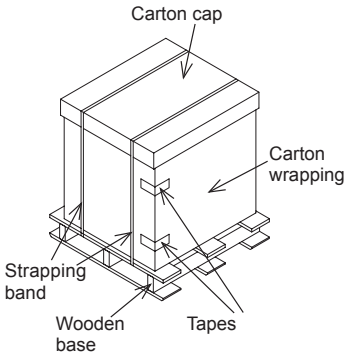
The indoor unit of the split-type air to water must be installed following these basic requirements:

- The indoor unit is intended to be installed in an indoor place.
- The indoor unit is prepared to be floor mounted, so make sure that selected floor is flat and is made of a non-combustible surface, strong enough for supporting the indoor weight and also the DHW tank's weight completely water filled (in case of indoor unit with HITACHI tank integrated over the indoor unit).
- Be sure to maintain the recommended servicing space for future unit servicing and guarantee enough air circulation around the unit. (See Service space section)
- Take into account that two shut-off valves (field supplied) must be installed at the indoor unit inlet/outlet connections.
- Protect the indoor unit against the entry of small animals (like rats) which could making contact with the wires, the drain pipe, electrical parts and may damage unprotected parts, and at the worst, a fire will occur.
- Install it in a no-frost environment.
- Do not install the indoor unit in a location with very high humidity.
- Do not install the indoor units where electromagnetic waves are directly radiated to the electrical box.
- Install the unit in a place where in case of water leakage, any damage to the installation space cannot be produced.
- If the selected configuration is Indoor unit alone (Without tank) and Indoor unit with other tank (Non HITACHI tank beside the indoor unit), it will be necessary a LCD controller installation place.
- Install noise filter when the power supply emits harmful noises.
- To avoid fire or explosion, do not install the 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.
- Try to avoid to put any objects or tools over the indoor unit.

◆ Unpacking

All units are supplied with a wooden base, packed by a cardboard box and plastic bag.

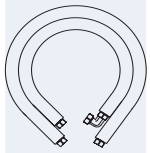
1. Firstly to unpack it, place the unit on the assembly area as close as possible to its final installation location, to avoid damages in transport. Two persons are required.
2. Cut the strapping bands and remove the tapes (in two corners of the packing).
3. Remove the carton casing (wrapping and cap).
4. Remove the plastic bag covering the unit.
5. Remove the wooden base.



NOTE

There are four adjustable mounting foot on the bottom of the unit. Each one can be adjusted up to 30 mm, but keep the mounting foot in the factory supplied position until the unit has been installed in its final position.

Factory-supplied indoor unit components

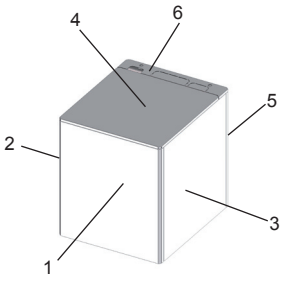
Accessory	Image	Qty.	Purpose
Flexible water pipes (1")		2	Space heating pipes (For space heating connection)
Gasket		4+1	Two gasket for each flexible water pipe. One additional as spare part.
Refrigerant liquid / gas piping accessory		2	To make easy the connection to the installation refrigerant piping. One for liquid connection and other for gas connection.
Installation manual		1	Installation and operation unit instructions
Declaration of conformity	-	1	-

NOTE

- ***The previous accessories are supplied inside the indoor unit, and are accessible removing the indoor unit upper cover.***
- ***Additional refrigerant piping (field supplied) for connections to outdoor unit needs to be available.***
- ***If some of these accessories are not packed with the unit or any damage to the unit is detected, please contact your dealer.***

Indoor unit main parts (Descriptions)

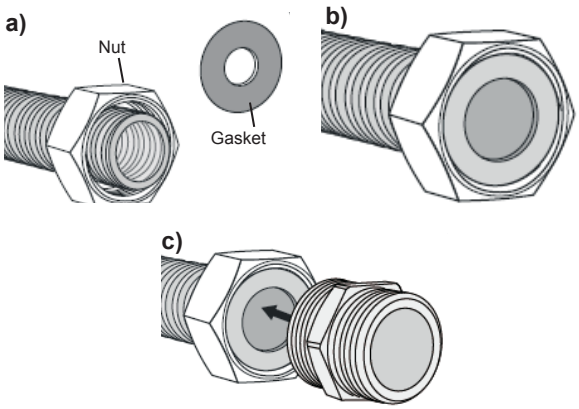
No.	Part
1	Indoor unit front cover
2	Indoor unit left cover
3	Indoor unit right cover
4	Indoor unit upper cover
5	Indoor unit back cover
6	Indoor unit cover for upper piping outlet



2.2.2.2 Flexible water pipes considerations

Process for water pipes connection (to avoid water leakage).

1 Put a gasket inside the nut.



2 Check that the nut turn free.

3 Be sure that the tube is aligned with the connection.

4 IMPORTANT! Be sure that the gasket is in contact and is seating uniformly with the connection.

5 By hand rotates smoothly the nut and screw it into the connection. The screwing by hand not have to offer much resistance, so if this happen, loosens the nut and check that the water tube and the gasket position are correct and proceed again with point 3 and 4.

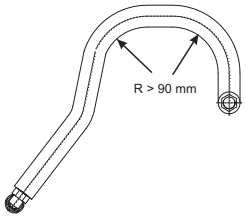
6 With a spanner finishes the screwing of the nut insuring the sealing but without damaging the gasket.

NOTE

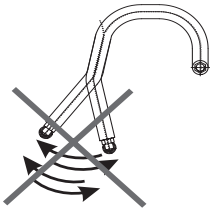
- ***There's one spare gasket for the space heating and one for the DHW (in case of installation with domestic hot water tank).***
- ***Be careful with the flexible water pipes insulation protection. Sharp edges of the units could damage it when installing the pipes.***

CAUTION

- ***Always bend the water tubes with a radius > 90 mm.***



- ***The tube will not spring back.***
- ***Don't install the stainless steel tube in a twisted position.***
- ***Don't bend these stainless steel tube more often than required to avoid breaking it.***



2.2.3 Removal of parts during the installation process

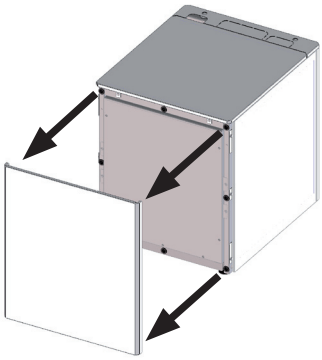
2.2.3.1 Removing the indoor unit covers

NOTE

- ***Front cover need to be remove for any task inside the indoor unit.***
- ***Back cover no needs to be removed.***

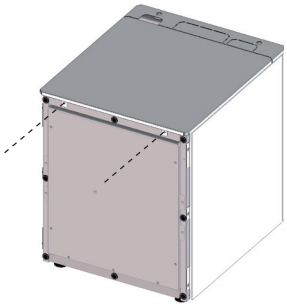
◆ Removing the indoor unit front cover

1 Remove the indoor unit front cover by pulling it, preferably by lower part of the front cover.

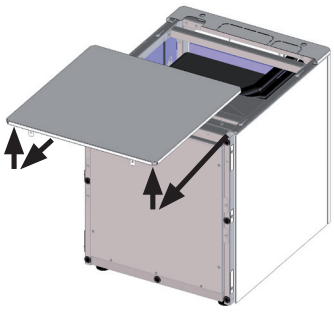


◆ Removing the indoor unit upper cover

1 Remove the indoor unit front cover
2 Unscrew the 2 front fixing screws.

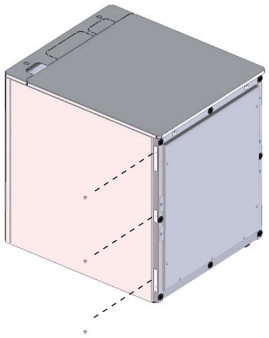


3 Pull the indoor unit upper cover forward and then remove it.

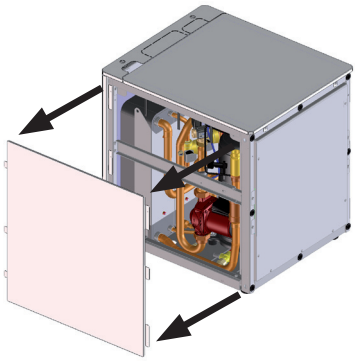


◆ Removing the indoor unit left cover

1 Remove the indoor unit front cover.
2 Unscrew the 3 screws.



3 Remove the indoor unit left cover.

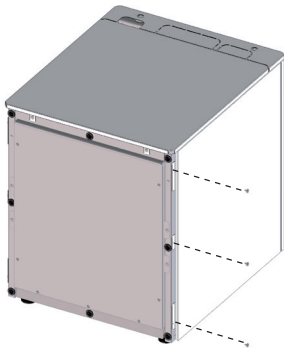


NOTE

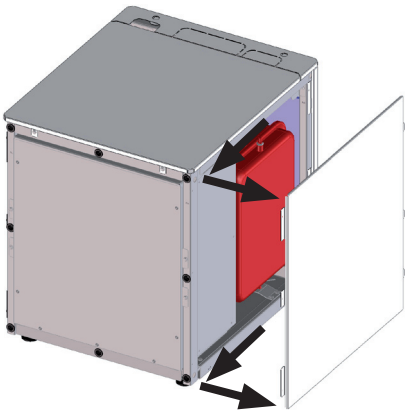
When reassembling, take into account that this cover is not symmetric. Upper and lower hooks are not at the same distance from the central hook.

◆ Removing the indoor unit right cover

1 Remove the indoor unit front cover.
2 Unscrew the 3 screws.



3 Remove the indoor unit right cover.



NOTE

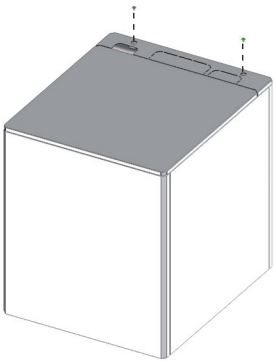
When reassembling, take into account that this cover is not symmetric. Upper and lower hooks are not at the same distance from the central hook.

◆ Removing the auxiliary indoor unit covers

There are other indoor unit covers which its removing can ease the service work.

Removing the indoor unit cover for upper piping outlet

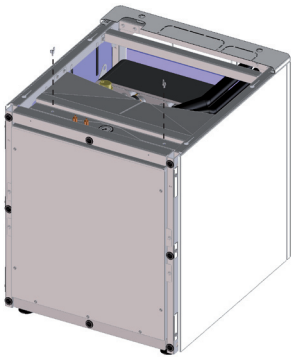
1 Unscrew the 2 upper side fixing screws.



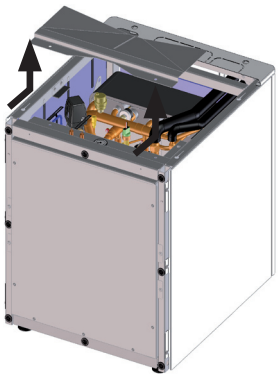
2 Pull the indoor unit cover for upper piping outlet backward and remove it.

Removing the indoor unit cover's protection for the draining of the tank

1 Remove the indoor unit front cover.
2 Remove the indoor unit upper cover.
3 Unscrew the 2 wing screws.



4 Remove the indoor unit cover's protection.



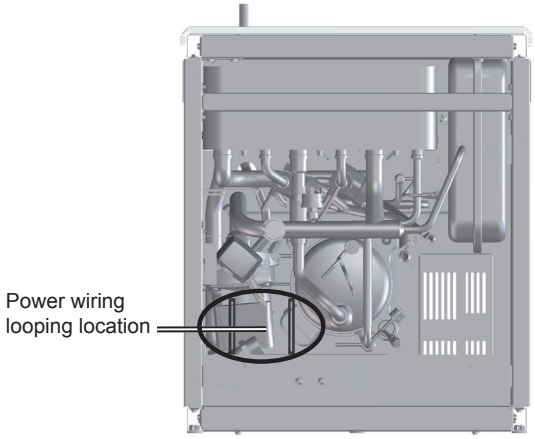
2.2.3.2 Removing indoor unit electrical box

DANGER

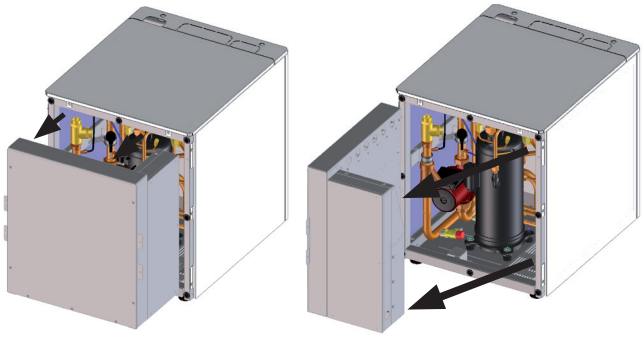
Disconnect the unit from the power supply before touching any of the parts in order to avoid an electrical shock.

◆ Remove the electrical box

1 Remove the indoor unit front cover.
2 Unscrew the 4 front screws of the electrical box.
3 Undo the power wiring looping that must be done in the installation procedure before rotating/removing the electrical box.



4 Take out the electrical box from the indoor unit until it has passed the edge. Choose one of the following steps:
   a. Electrical box can be rotated 90º approximately, making easy the indoor unit component's accessibility, without the necessity to remove all the electrical box.
   b. If it is needed, the electrical box can be completely extracted by only disconnecting the wire-to-wire connections.



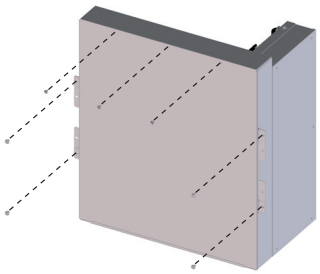
◆ Remove the internal electrical box covers

CAUTION

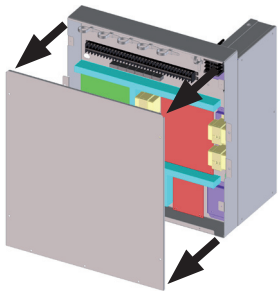
When handling the internal electrical or inverter box, take care of components in order to avoid damaging it.

Internal electrical box cover (Front cover)

1 Unscrew the 7 screws of the internal electrical box cover.

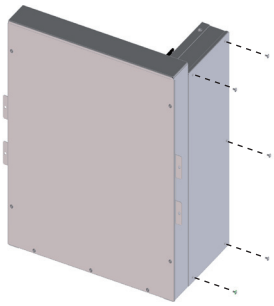


2 Remove the internal electrical box cover.

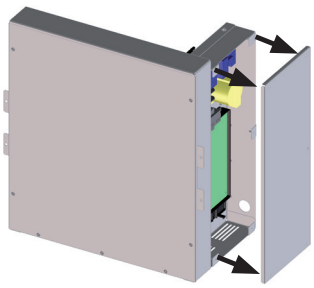


Internal inverter box cover (Right cover)

1 Unscrew the 5 screws of the internal inverter box cover.



2 Remove the internal inverter box cover.

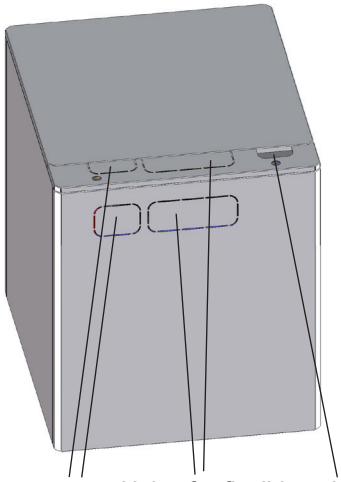


2.2.4 Installation of Indoor unit alone (Without tank)

NOTE

Please, try to perform all this procedure following all the steps in the exact order which they are presented below.

Before connecting the flexible water piping, and the refrigerant liquid/gas piping it must be decided its outlet position.



Holes for refrigerant piping | Holes for flexible water piping | Hole for wiring connection

CAUTION

- ***When making the holes by cutting along the guideline of the cover, take care with the remaining parts and remember cutting it in order to avoid injuring.***
- ***Do not make more holes than necessary to prevent small animals (like rats) from entering.***
- ***If possible, try to insulate the part of the holes unoccupied by the pipes.***
- ***Take care with the pipes insulation when taking the flexible water pipes through the holes as the structural beams are sharp and the pipes could be damaged.***

Installation procedure

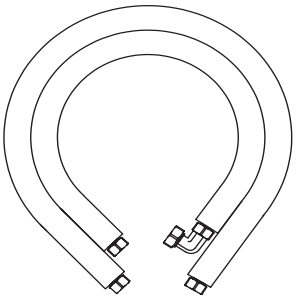
1. Water pipes connection to the indoor unit (Space heating pipes).
2. Drain pipes connection.
3. Refrigerant piping connection and indoor unit's placing.
4. Water pipes connection to the space heating (Space heating pipes).
5. Power and transmission wiring connection.
6. LCD wiring connection.
7. Levelling procedure.
8. Test and check.
9. Cover's assembly.

2.2.4.1 Water pipes connection to the indoor unit (Space heating pipes)

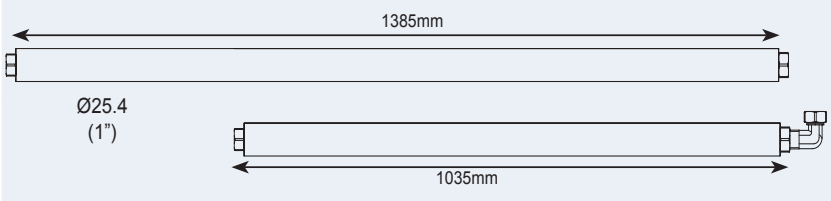
Place the indoor unit in the available assembly space and follow these instructions:

◆ **Flexible water pipes identification**

Indoor unit is provided with two flexible water pipes (space heating pipes) for connection between the space heating and the indoor unit (to the T-branch and to the 3-way valve).

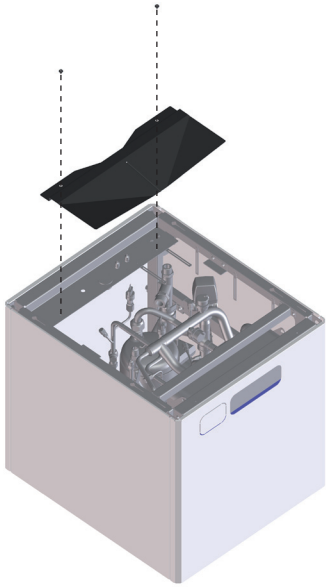


Factory-supplied with the indoor unit

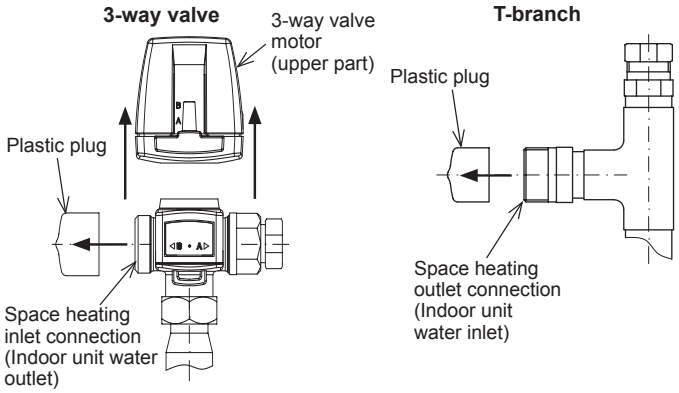
Item	Connection
	Space heating outlet pipe (Without elbow) For the connection between the T-branch water inlet and the space heating outlet.
	Space heating inlet pipe (With elbow) For the connection between the 3-way valve water outlet and the space heating inlet.

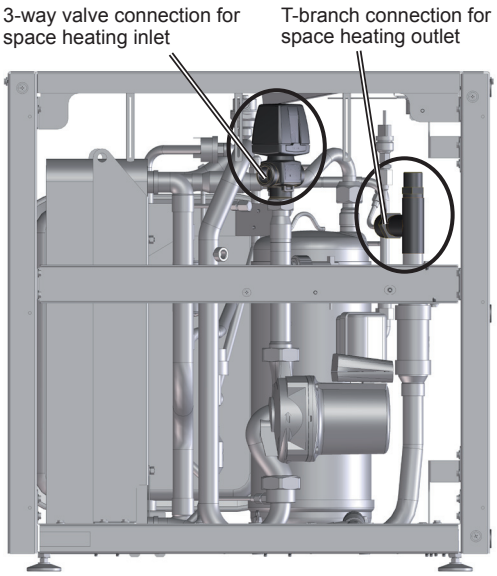
Connection procedure

1 Remove the indoor unit cover's protection to facilitate the connection procedure.



2 Remove the plastic plugs (space heating connections) from the 3-way valve and the T-branch. If necessary, disconnect the 3-way valve motor (upper part) to ease the installation procedure.

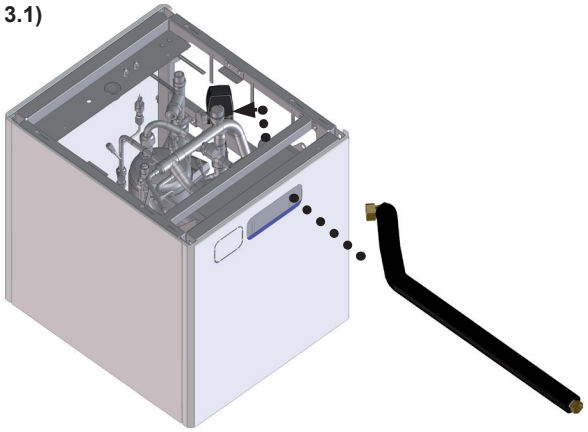




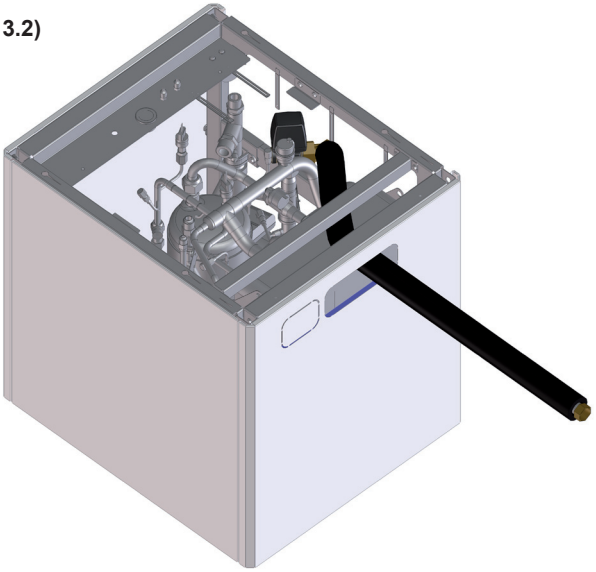
(Left side view)

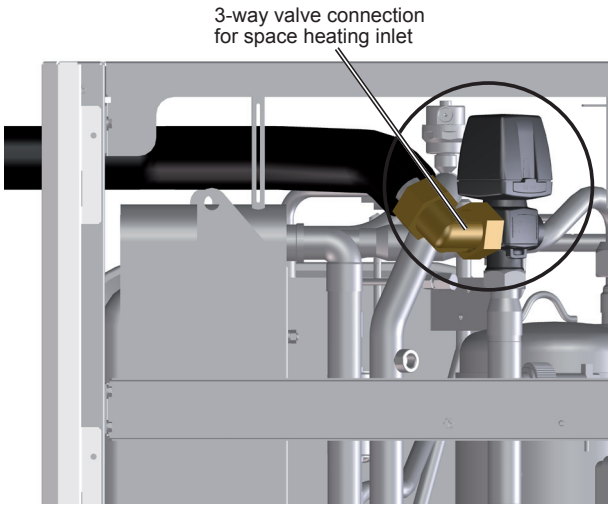
3 Introduce from outside of the unit the space heating inlet pipe (with elbow) (1") through the preferable outlet cover hole and connect the elbow end to the 3-way valve connection for space heating inlet.

3.1)



3.2)

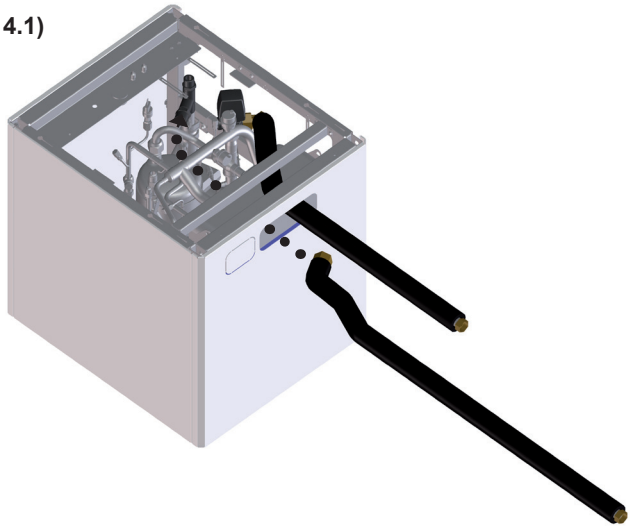




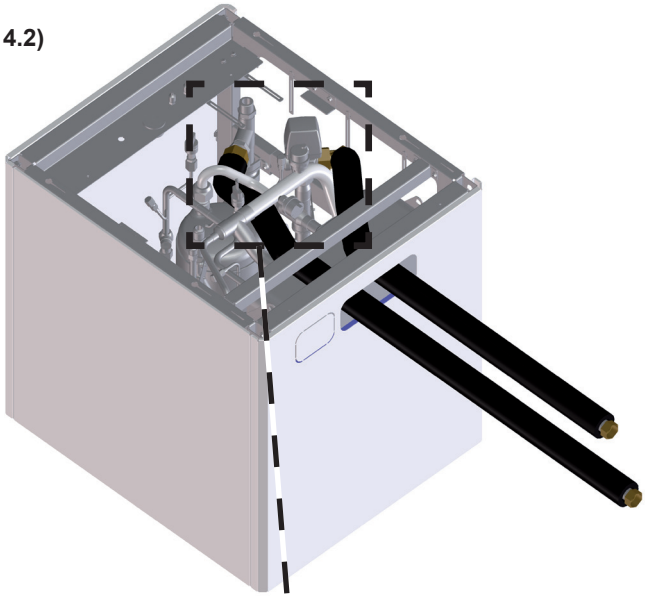
(Left side view)

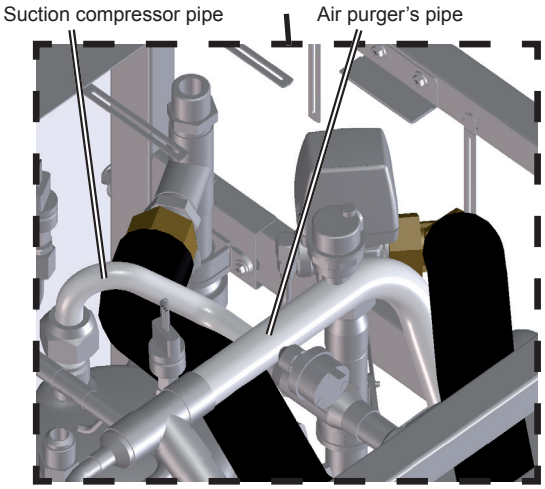
4 Introduce from outside of the unit the space heating outlet pipe (without elbow) (1”) through the preferable outlet cover hole and connect it to the T-branch connection for space heating outlet passing it under the suction compressor and air purger’s pipes.

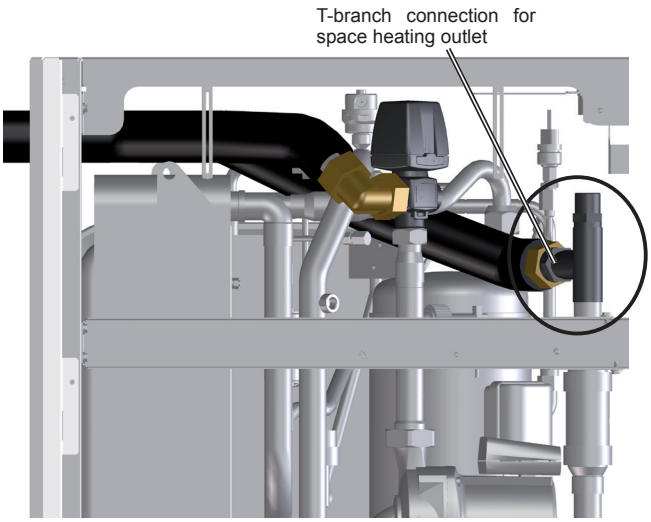
4.1)



4.2)







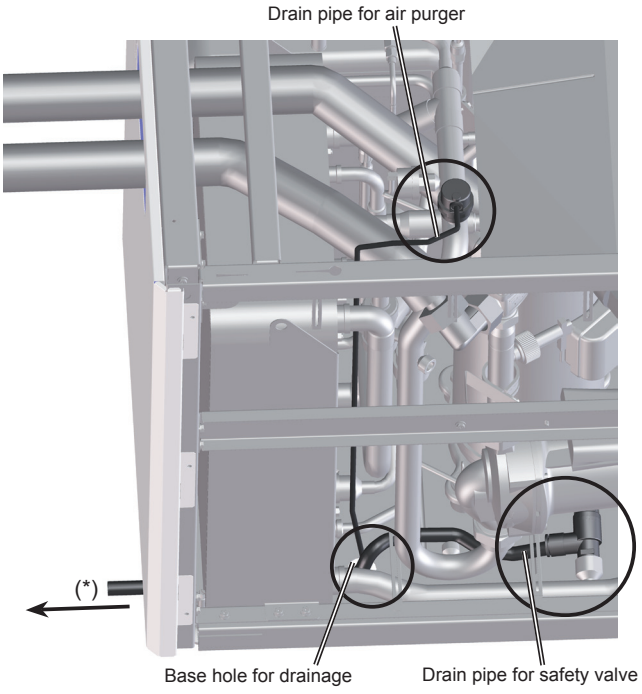
(Left side view)

5 Reconnect the 3-way valve motor.

6 Reassembly the indoor unit cover’s protection.

2.2.4.2 Drain pipes connection

1 For a correct drainage take the drain pipes connected to the safety valve and to the air purger and pass it through the base hole near the heat exchanger. In case of drain pipe for safety valve, place it as far as possible from the indoor unit (*).

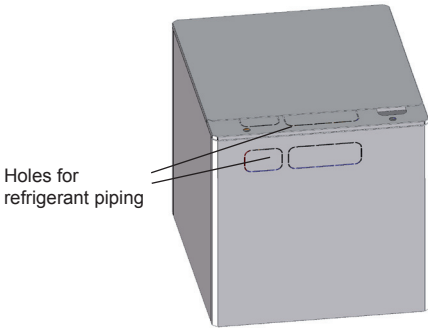


2.2.4.3 Refrigerant piping connection and indoor unit's placing

There are two options:

A) Back refrigerant piping outlet

B) Upper refrigerant piping outlet.



NOTE

- ***Take into account the position where the LCD controller will be installed, because the wiring length of the LCD controller is only 4 meters approximately.***
- ***Take into account the recommended service space.***
- ***If the domestic hot water tank is integrated with the indoor unit, follow these steps before installing it.***

◆ Refrigerant piping connection accessory

YUTAKI S80 is provided with an accessory for the liquid/gas refrigerant piping connection. This accessory assist in the refrigerant pipe connection, allowing an easy assembly in both outlet configurations (back or upper outlet).

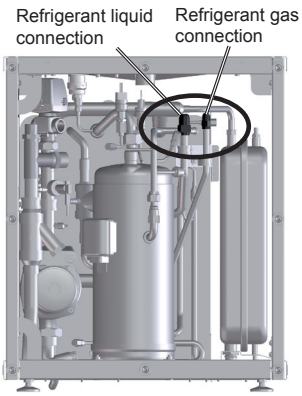
NOTE

- ***All the following instructions are for the use of annealed to half hard or hard AC/R copper tube (example in bar).***
- ***The images of the accessories could be slightly different than real accessories.***

A) Piping connection - Back outlet

- **Step 0 - Identification**

Indoor unit (Front view)

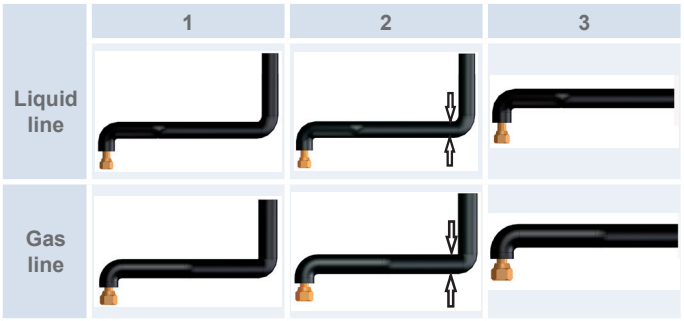


Accessory (1)

NOTE

(1): Some images are showing the accessory without insulation for more comprehensible image explanation.

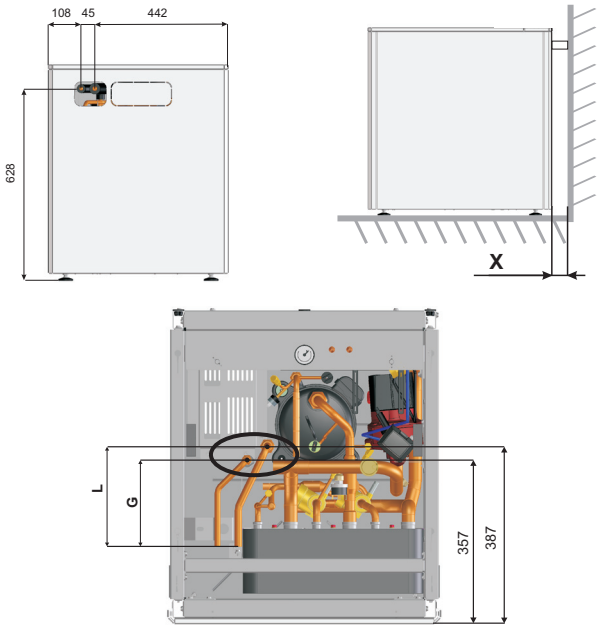
- **Step 1 - Cut the accessory**



NOTE

Cut as close as possible to the elbow as indicated in the figure.

- **Step 2 - Indoor unit, identify the position of connecting pipes.**



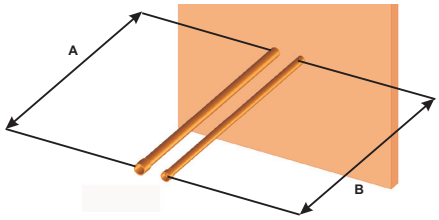
L size: measure

G size: measure

- **Step 3 - Field installation, determinate the piping connection position.**

A size (Gas line):
387 + 18 - G + X (1)

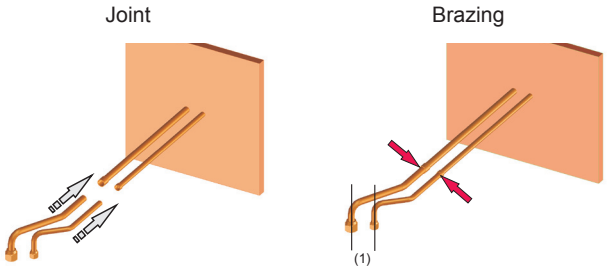
B size (Liquid line):
357 + 10 - L + X (1)



NOTE

(1): 18/10 mm for A/B sizes respectively is the field piping length which is introduced into the accessory connection.

- **Step 4 - Joint and brazing the accessory with the field refrigerant pipes.**



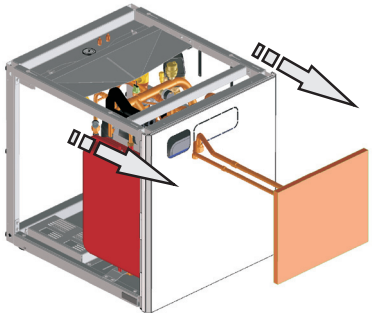
NOTE

(1): Ensure that the nuts are in vertical position.

- **Step 5 - Positioning of the indoor unit and connection nut.**

Indoor unit movement

To introduce the refrigerant lines in the indoor unit through the back outlet window (1).

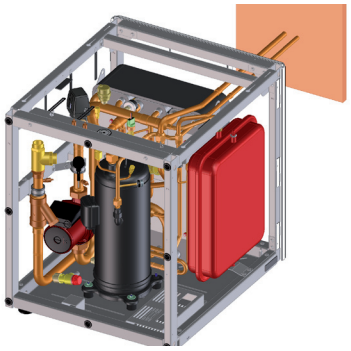


NOTE

If the indoor unit back hole for refrigerant piping is not totally aligned with the refrigerant lines, the indoor unit's height can be modified by adjusting the height of the mounting foots. Please, refer to the Levelling procedure in this chapter for the detailed information about the mounting foots.

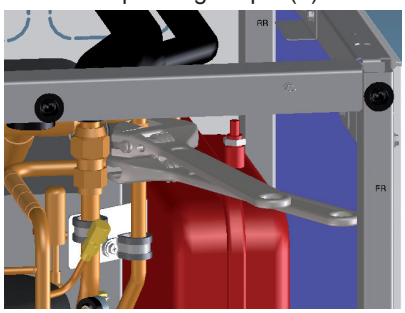
Face the nuts

in the gas and liquid refrigerant pipe connection (2).



Fix the nuts

according to the corresponding torque (3).

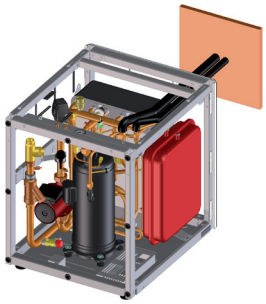


NOTE

- ***Prior to cross the back outlet window, push the refrigerant pipes/lines in order to avoid to interfere with the back cover.***
- ***When the nuts connection are inside the indoor unit, push up the piping lines, approximately 15 mm, in order to avoid the interference with the expansion vessel tube.***
- ***Use two spanners to perform the connections.***

- **Step 6 - Final operation - Insulations.**

Insulate the field pipes

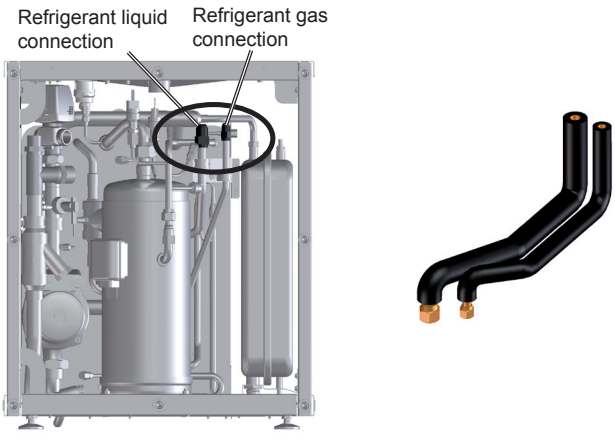


B) Piping connection - Upper outlet

- **Step 0 - identification.**

Indoor unit (Front view)

Accessory

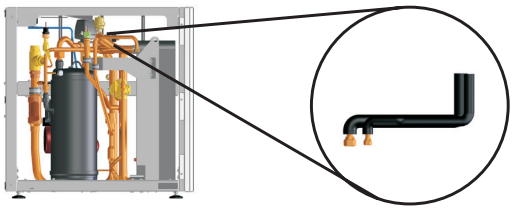


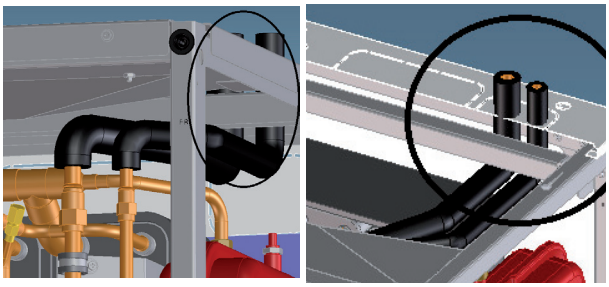
NOTE

(1) Some images are showing the accessory without insulation for more comprehensible image explanation.

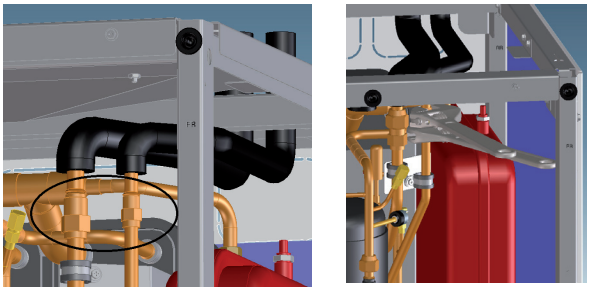
- **Step 1 - Assembly the accessory in the indoor unit.**

From inside the indoor unit, go through the upper outlet window with the accessory tube connection.





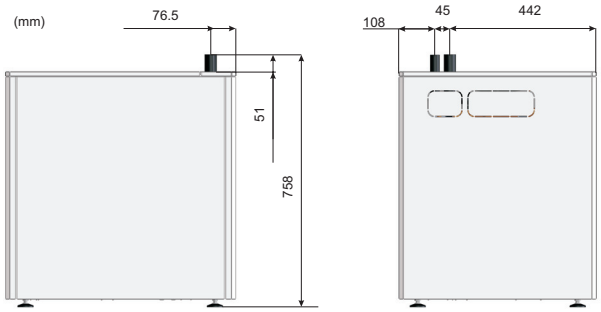
- **Step 2 - Positioning the accessory connection nut.**
  - Gas refrigerant pipe connection (ø15.88)
  - Liquid refrigerant pipe connection (ø9.53)
  - Fix the nuts smoothly



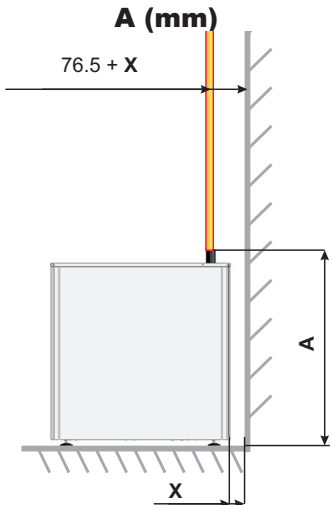
NOTE

Use two spanners to perform the connections.

- **Step 3 - Indoor unit, identify the position of connecting pipes.**



- **Step 4 - Field installation, determine the piping connection position.**



Liquid refrigerant pipe connection (ø9.53) = 758 - 10 = 748

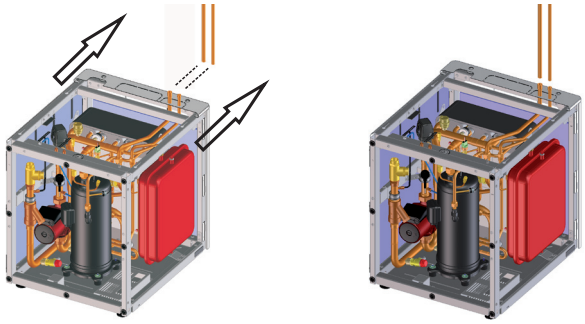
Gas refrigerant pipe connection (ø15.88) = 758 - 18 = 740

NOTE

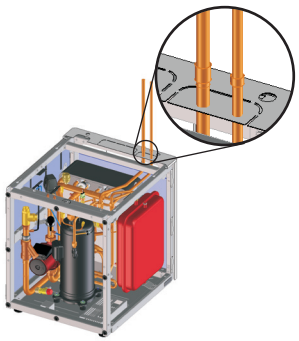
Size A is calculated with mounting foot at minimum height.

- **Step 5 - Positioning of the indoor unit.**

Indoor unit location



Field installation



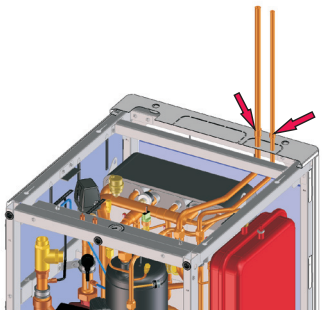
NOTE

- ***In order to allow to connect the accessory pipe and field piping, slacken nuts, insert the field pipe inside the accessory pipe connection and tighten nuts.***

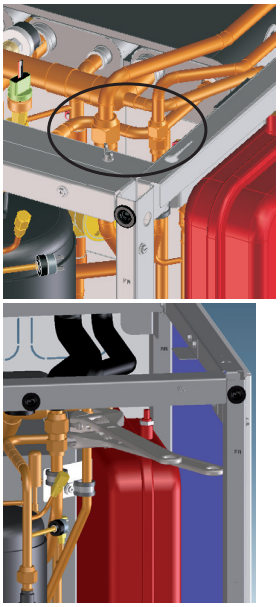
- ***Use two spanners to perform the nuts connection.***
- ***If the refrigerant liquid/gas piping accessory is not totally aligned at the same height than the refrigerant lines, the indoor unit's height can be modified by adjusting the height of the mounting foots. Please, refer to the Levelling procedure in this chapter for the detailed information about the mounting foots.***

- **Step 6 - Piping braze and fixing nuts**

Brazing the field tubes



Check the nuts torque



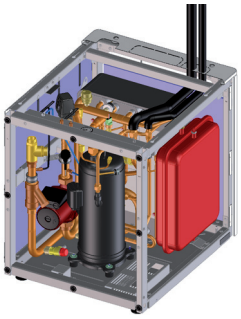
NOTE

Use two spanners to perform the nuts connections.

- **Step 7 - Final operations - Insulations.**

If other operations are done (like water piping connections, electrical wiring, etc.) proceed with the following:

Insulate the field pipes



2.2.4.4 Water pipes connection to the space heating (Space heating pipes)

Connect the space heating pipes (one end already connected to the indoor unit) to the shut off valves of the space heating inlet and outlet (field supplied).

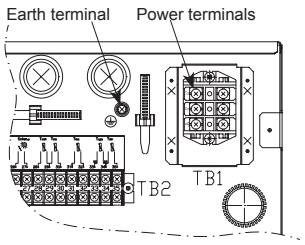
2.2.4.5 Power and transmission wiring connection

Access to the electrical box before performing the next steps:

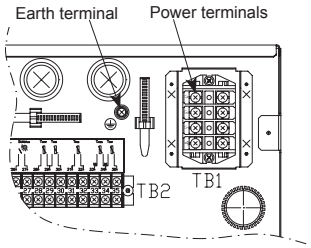
1 Using the appropriate cable, connect the power circuit to the appropriate terminals as shown on the wiring label and the illustration below. Connect the power supply cables L1 and N (for 230V 50Hz) or L1, L2, L3 and N (for 400V 50Hz) to the terminal board (TB1), and the earth conductor to the earth screw in the electrical box base plate.

TERMINAL BOARD 1 (TB1)

1~ 230V 50Hz

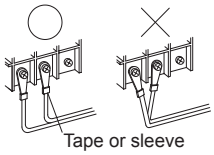


3N~ 400V 50Hz



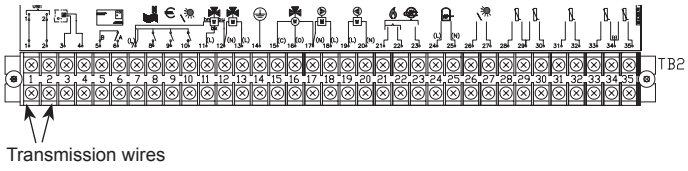
CAUTION

- ***Be sure to use a dedicated power circuit for the indoor unit. Never use a power circuit shared by another appliance (Outdoor unit).***
- ***Keep a distance between each wiring terminal and attach insulation tape or sleeve as shown in the figure.***

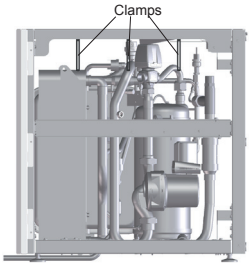


2 Connect the transmission wires between outdoor and indoor units to the terminals 1 and 2 on the terminal board 2 (TB2).

TERMINAL BOARD 2 (TB2)



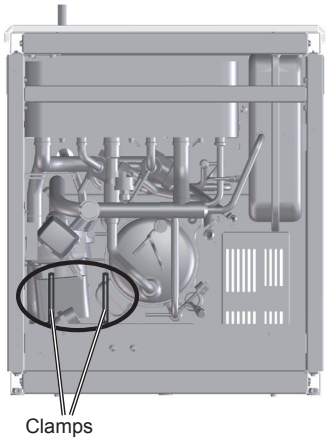
3 Pass the electrical wiring through the clamps placed in the upper part of the indoor unit.



NOTE

Try to keep the maximum possible distance between the control cables and the power cables.

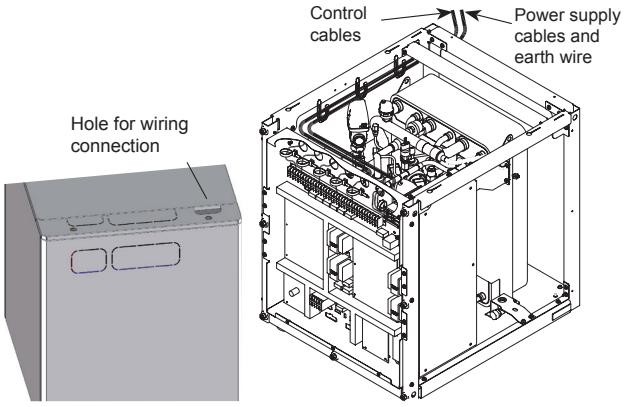
4 Perform a looping in the wiring through the clamps placed below the indoor unit cover's protection.



NOTE

This is done in order to ensure the electrical box removing without problems with the power wiring. In this case, undo the wiring looping before removing the electrical box.

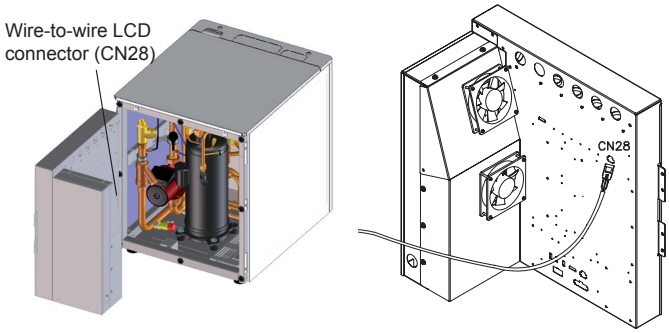
5 Take out the electrical wiring by the hole for wiring connection placed on the back side of the unit.



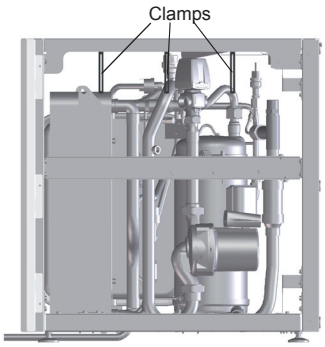
2.2.4.6 LCD wiring connection

For indoor unit alone (without tank), it must be used the HITACHI LCD user's interface (PC-S80TE) supplied as accessory with a connector cable. The installation must be as follows:

1 Connect the LCD connector cable (supplied with PC-S80TE) to the wire-to-wire connector in the electrical box back side (CN28).



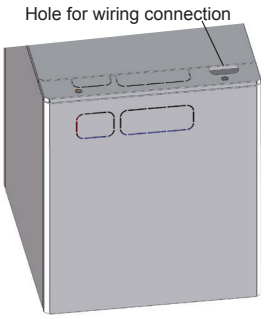
2 Pass the connector cable through the clamps placed in the upper part of the indoor unit.



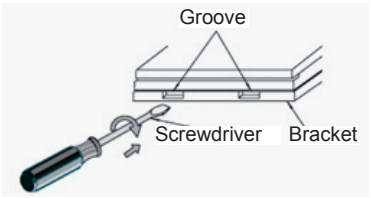
NOTE

Try to keep the maximum possible distance between the LCD connector and the power cables.

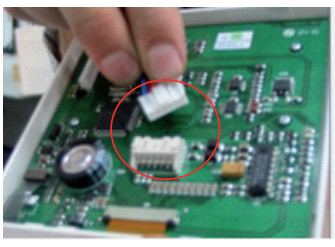
3 Take out the connector cable by the hole for wiring connection placed on the back side of the unit.



4 Using a flat-head screwdriver, separate the control unit bracket from the front section as indicated.



5 Connect the free end of the LCD connector cable (whose other end had been connected before to the electrical box) to the PCB of the LCD controller. Then, reassembly the LCD covers.



CAUTION

Do not touch the micro and other components on LCD controller PCB. It is the malfunction protection by static electricity.

6 Finally, close the LCD covers and fix the LCD controller to the wall at an optimum height.

2.2.4.7 Levelling procedure

Once the indoor unit connections have finished, adjust the height of the mounting foot to align perfectly the refrigerant piping outlet to the installation connection.

NOTE

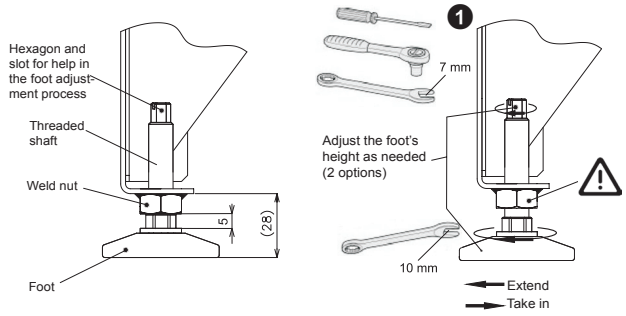
- ***Adjust only the necessary mounting foot of the unit.***
- ***Start with all four feet screwed in as far as possible (factory supplied position).***
- ***Use two people for levelling procedure.***

Follow the process:

1 Turn the mounting foot to extend the height (use the hexagon or slot designed for this purpose in the shaft end).

CAUTION

- ***Take care do not turn the weld nut when turning the mounting foot. Use an slot with a height profile lower than 5 mm.***
- ***Never work over one foot at the same time. When finishing, all 4 locknuts must be tightened firmly.***



2.2.4.8 Test and check

Before assembling the covers, test and check the following items:

- Water leakage
- Refrigerant leakage
- Electrical connection
- ...

NOTE

Please refer in this document to chapter 3 Piping work and refrigerant charge for water filling and refrigerant charge of the indoor unit and chapter 8 Commissioning for the commissioning procedure of the indoor unit and refer to the Outdoor unit Installation and Operation manual for the specific details about refrigerant charge tasks if necessary.

DANGER

DO NOT CONNECT THE POWER SUPPLY TO THE INDOOR UNIT AND DHW TANK PRIOR FILLING OF WATER BOTH CIRCUITS AND CHECKING WATER PRESSURE AND THE TOTAL ABSENCE OF ANY WATER LEAK.

2.2.4.9 Cover's assembly

Finally, reassembly all the cover's removed.

2.3 DHW Tank (optional) Installation

2.3.1 General notes

2.3.1.1 Reception

◆ **Components at receipt**

Domestic hot water tank

NOTE

The LCD controller (PC-S80TE) is integrated on the DHW tank.

◆ **Selection of the installation location**

The domestic hot water tank must be installed following these basic requirements:

- The tank is intended to be installed in an indoor place.
- The tank is prepared to be integrated over the YUTAKI S80 indoor unit, so make sure that selected floor is flat and is made of a non-combustible surface, strong enough for supporting the indoor weight and also the DHW tank's weight completely water filled.
- The tank can be also floor mounted (Tank beside the indoor unit both left or right sides). In this case, try to keep an access point for the connection of the dedicated Flexible Water Pipes Kit (ATW-FWP-01).
- Be sure to maintain the recommended servicing space for future unit servicing. (See Service space section)
- It is necessary to plan a fixing point between the wall and the DHW tank (See factory supplied accessory intended for this purpose).
- Take into account the space needed to install the necessary security valve (DHWT-SWG-01 accessory), which must be installed at the DHW inlet connection of the tank (as close as possible to the tank). 1 shut-off valve (field supplied) must be also installed at the DHW outlet connection.

NOTE

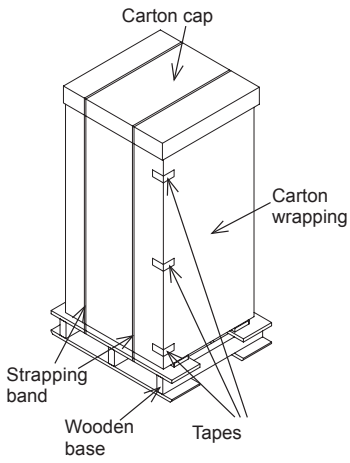
For more details, please refer to the section DHW hydraulic circuit.

- Protect the tank unit against the entry of small animals (like rats) which could making contact with the wires and electrical parts and may damage unprotected parts, and at the worst, a fire will occur.
- Install the tank in a no-frost environment.
- Install the DHW tank as far as possible from all sources of electromagnetic wave radiation.
- Install the tank in a place where in case of water leakage, any damage to the installation space cannot be produced.
- To avoid fire or explosion, do not install the set in a flammable environment.
- The tank must be installed by a service technician. The installation must comply with local and European regulations.

◆ **Unpacking**

The DHW tank is supplied with a wooden base, packed by a cardboard box and plastic bag.

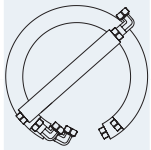
1. Firstly to unpack it, place the tank on the assembly area as close as possible to its final installation location, to avoid damages in transport. Two persons are required.
2. Cut the strapping bands and remove the tapes (in two corners of the packing).
3. Remove the carton casing (wrapping and cap).
4. Remove the plastic bag covering the unit.
5. Remove the wooden base.



NOTE

There are four adjustable mounting foot on the bottom of the domestic hot water tank. Each one can be adjusted up to 30 mm but keep them in the factory supplied position until the DHW tank has been installed in its final position.

◆ Factory-supplied domestic hot water tank components

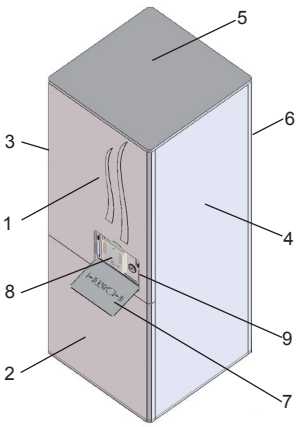
Accessory	Image	Qty.	Purpose
Flexible water pipe (3/4”)		2	Heating coil pipes (For connection between indoor unit and domestic hot water tank)
Flexible water pipe (3/4”)		2	DHW pipes (For tank and DHW connection)
Bolts M10		4	For fixing between indoor unit and DHW tank
Gasket		8+1	Two gasket for each flexible water pipe. One additional as spare part
Wall fixing accessory		2	For fixing the DHW tank to the wall.
Installation manual		1	Installation and operation unit instructions
Declaration of conformity	-	1	-

NOTE

- ***The previous accessories are supplied inside the DHW tank, and are accessible removing the tank lower front cover.***
- ***If some of these accessories are not packed with the tank or any damage to the tank is detected, please contact your dealer.***

◆ DHW tank main parts (Descriptions)

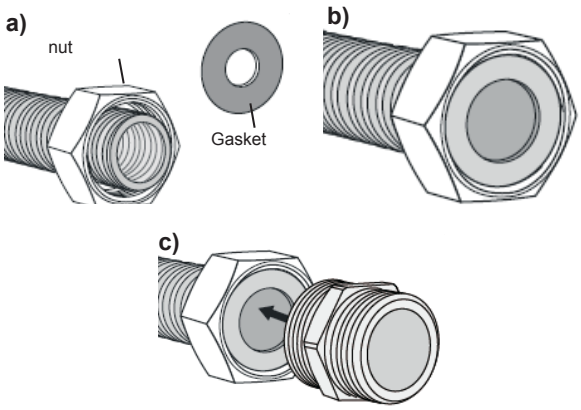
No.	Part
1	Tank upper front cover
2	Tank lower front cover
3	Tank left cover
4	Tank right cover
5	Tank upper cover
6	Tank back cover
7	User’s interface service cover
8	LCD user’s interface
9	Pressure gauge



2.3.1.2 Flexible water pipes considerations

Process for water pipes connection (to avoid water leakage).

1 Put a gasket inside the nut.



2 Check that the nut turn free.

3 Be sure that the tube is aligned with the connection.

4 IMPORTANT! Be sure that the gasket is in contact and is seating uniformly with the connection.

5 By hand rotates smoothly the nut and screw it into the connection. The screwing by hand not have to offer much resistance, so if this happen, loosens the nut and check that the water tube and the gasket position are correct and proceed again with point 3 and 4.

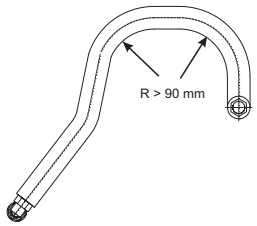
6 With a spanner finishes the screwing of the nut insuring the sealing but without damaging the gasket.

NOTE

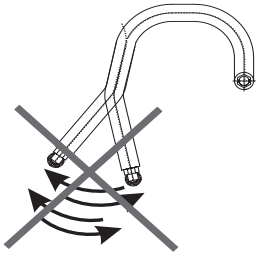
- ***There’s one spare gasket for the DHW connections.***
- ***Be careful with the flexible water pipes insulation protection. Sharp edges of the units could damage it when installing the pipes.***

CAUTION

- ***Always bend the water tubes with a radius > 90 mm.***



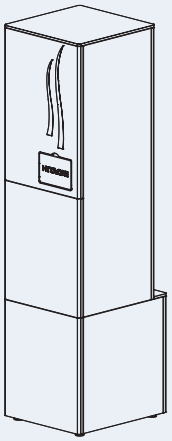
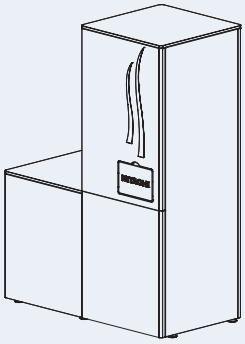
- ***The tube will not spring back.***
- ***Don’t install the stainless steel tube in a twisted position.***
- ***Don’t bend these stainless steel tube more often than required to avoid breaking it.***



2.3.2 Selecting an installation configuration

2.3.2.1 DHW tank configurations

DHW tank has the following installation configuration possibilities with the YUTAKI S80 indoor unit:

A) Indoor unit with HITACHI tank (Tank integrated over the indoor unit)	B) Indoor unit with HITACHI tank (Tank beside the indoor unit)
	

IMPORTANT NOTE

All the installation information about DHW connection is explained in this section 2.3 DHW Tank (optional) installation.

The installation information about the space heating connection and indoor unit refrigerant / wiring connection is explained in section 2.2 Indoor unit installation.

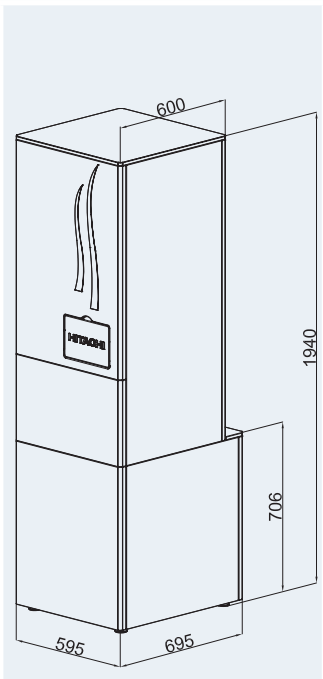
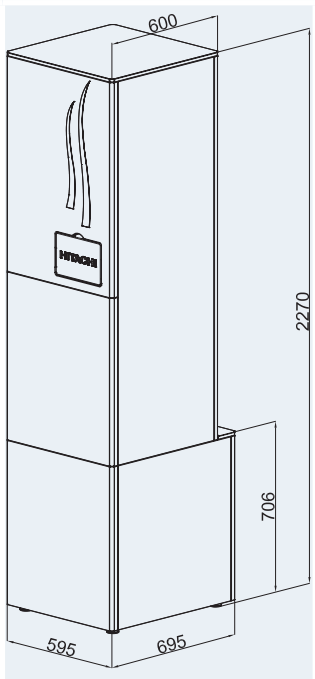
Depending on the configuration type, the installation procedure will be different.

2.3.2.2 Dimensions

NOTE

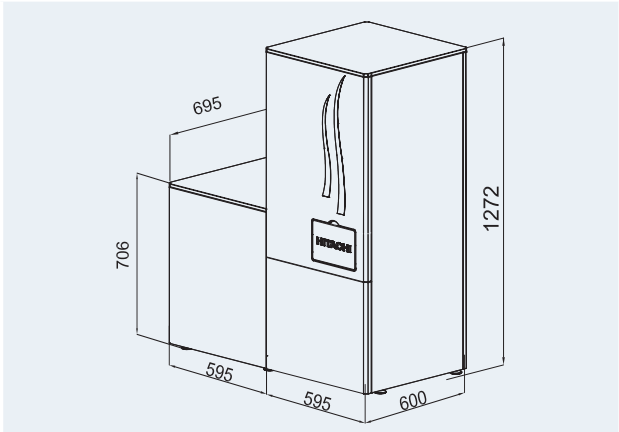
- ***Height dimensions are shown with the minimum mounting foot height. These values can be adjusted up to +30 mm.***
- ***All dimension in mm.***

◆ Indoor unit with HITACHI tank (Tank integrated over the indoor unit)

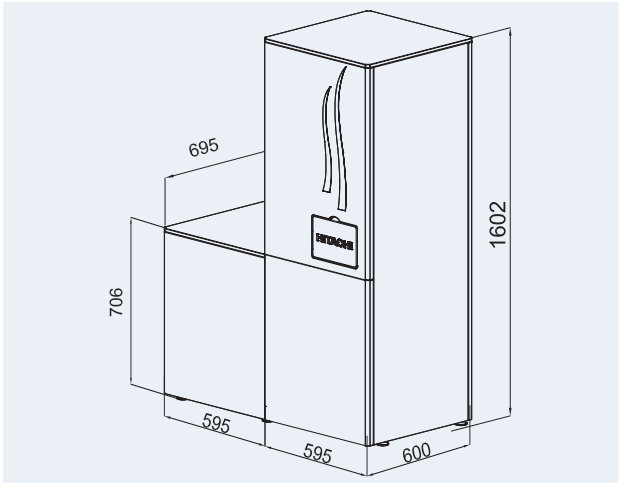
RWH-(4.0-6.0)FS(V)NFE + DHWS195S-2.0H1E	RWH-(4.0-6.0)FS(V)NFE + DHWS260S-2.0H1E
	

◆ Indoor unit with HITACHI tank (Tank beside the indoor unit)

RWH-(4.0-6.0)FS(V)NFE + DHWS195S-2.0H1E

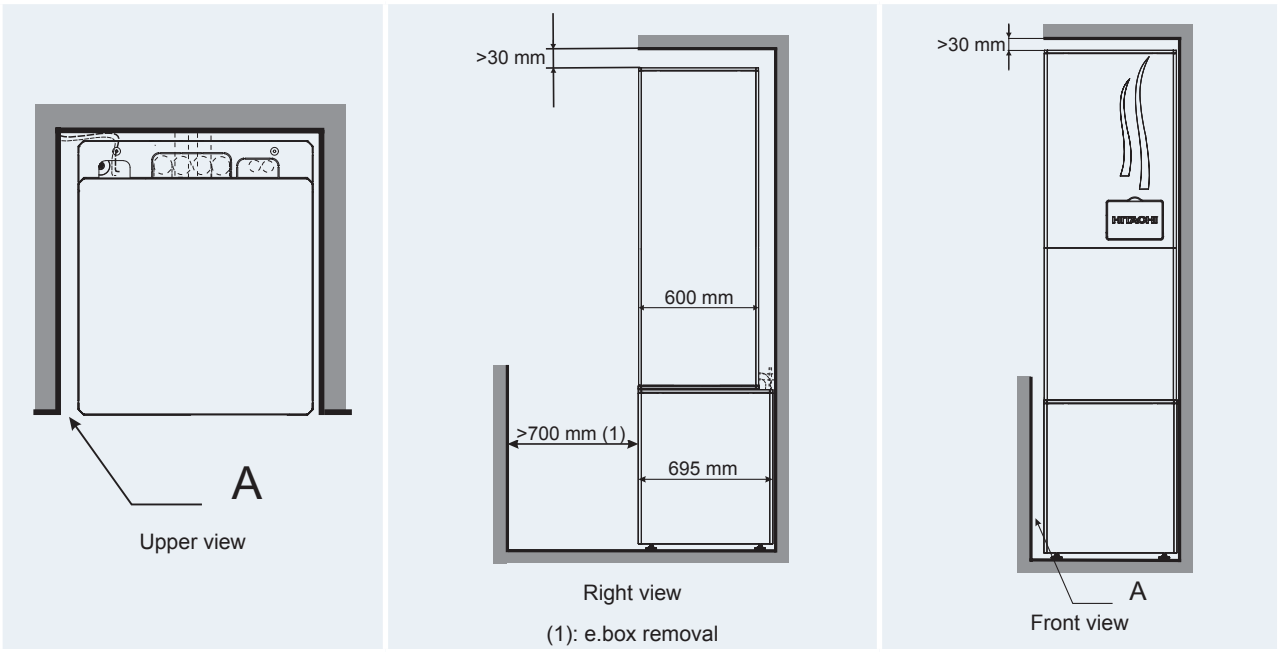


RWH-(4.0-6.0)FS(V)NFE + DHWS260S-2.0H1E

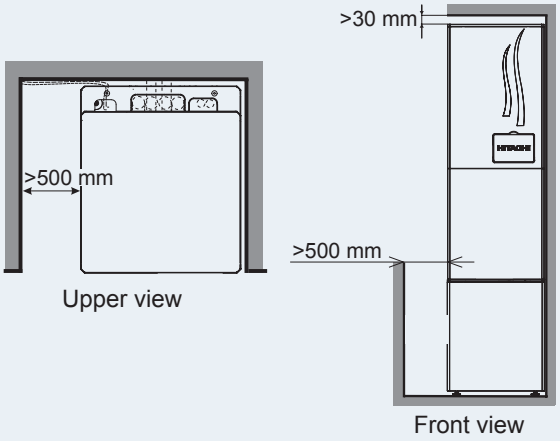


2.3.2.3 Service space

◆ **Indoor unit with HITACHI tank (Tank integrated over the indoor unit)**

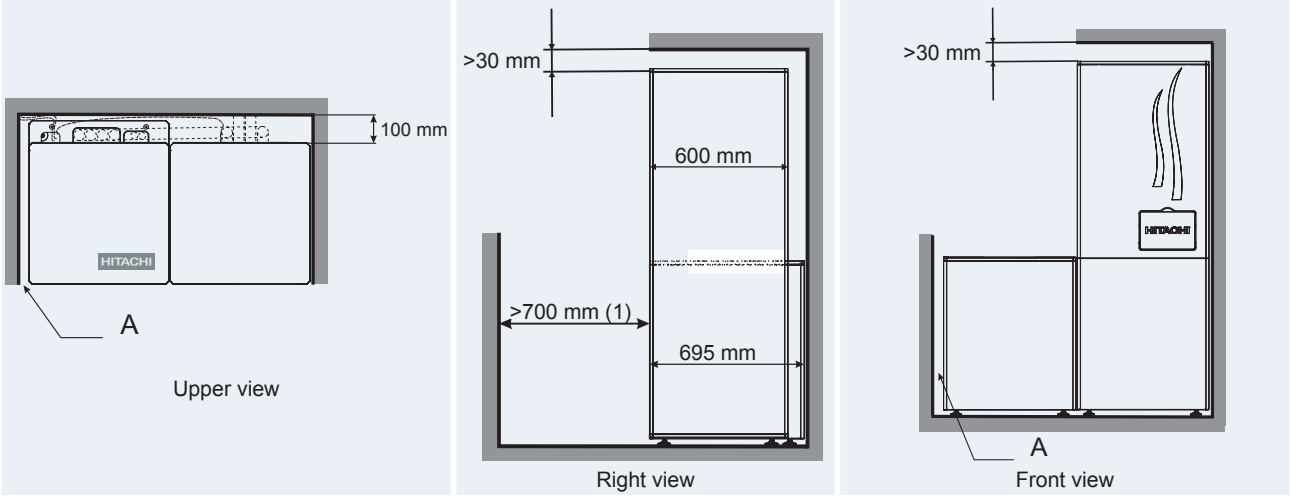


A : Service without this space is available. But, for easy servicing of some components is recommended to let a space of >500 mm.



NOTE: If there is no space at left and right side, it could be necessary to disassemble the tank or the indoor unit for some special servicing (for example to change the heat exchangers, etc)

◆ **Indoor unit with HITACHI tank (Tank beside the indoor unit)**



A : Service without this space is available. But, for easy servicing of some components is recommended to let a space of >500 mm.

(1): e.box removal

A : Service without this space is available. But, for easy servicing of some components is recommended to let a space of >500 mm.

2.3.3 Removal of parts during the installation process

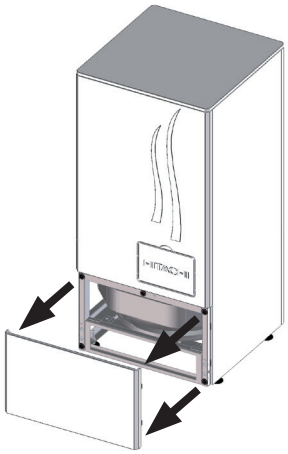
2.3.3.1 Removing the domestic hot water tank covers

NOTE

Back cover, left cover, right cover and upper cover no need to be removed unless tank's insulation wants to be removed.

◆ **Removing the tank lower front cover**

1 Remove the tank lower front cover only by pulling it out.

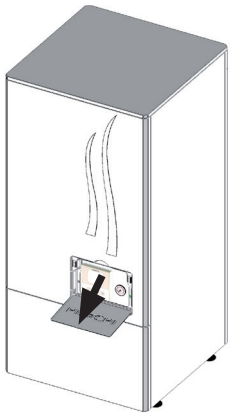


NOTE

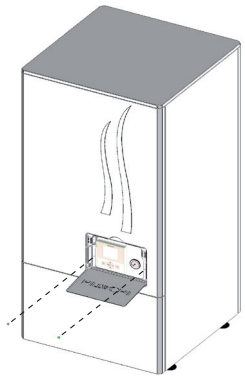
When reassembling, take into account that this cover is not symmetric. Upper and lower hooks are not at the same distance from the upper and lower cover edges.

◆ **Removing the tank upper front cover**

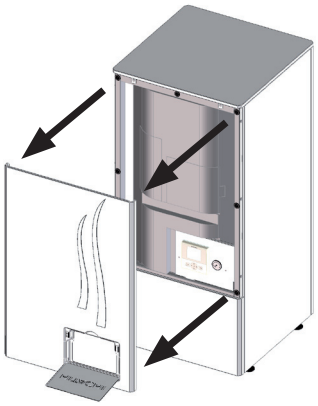
1 Open the LCD user's interface service cover.



2 Unscrew the 2 screws with the nylon washers between the screw and the cover.



3 Remove the tank lower front cover only by pulling it out.



NOTE

Take care, do not damage the LCD when removing the service cover.

2.3.4 Installation of Indoor unit with HITACHI tank (Tank integrated over the indoor unit)

NOTE

Please, try to perform all this procedure following all the steps in the exact order which they are presented below.

Installation procedure

1 Water pipes connection to the indoor unit (Space heating pipes).
2 Drain pipes connection.
3 Water pipe connection to the indoor unit (heating coil pipes).
4 Refrigerant piping connection and indoor unit's placing.
5 Water pipes connection to the space heating (Space heating pipes).
6 Water pipe connection to the tank (DHW pipes).
7 Removing the mounting foot.
8 Tank over the indoor unit assembly.
9 Water pipe connection to the tank (heating coil pipes).
10 Water pipe connections to the DHW (DHW pipes).
11 Power wiring connection.
12 Tank wiring connection.
13 Levelling procedure.
14 Tank's fixation to the wall.
15 Test and check.
16 Cover's assembly.

2.3.4.1 Water pipes connection to the indoor unit (Space heating pipes)

Follow the same procedure explained in *Installation of indoor unit alone (without tank)* in section *2.2 Installation of indoor unit.*

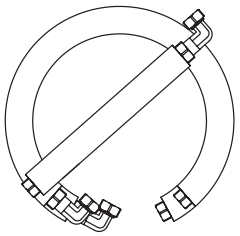
2.3.4.2 Drain pipes connection

Follow the same procedure explained in *Installation of indoor unit alone (without tank)* in section *2.2 Installation of indoor unit.*

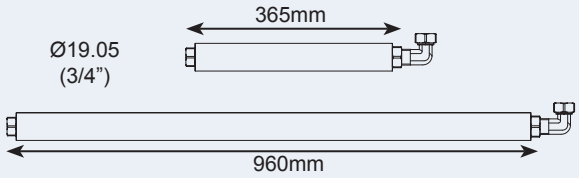
2.3.4.3 Water pipe connection to the indoor unit (Heating coil pipes)

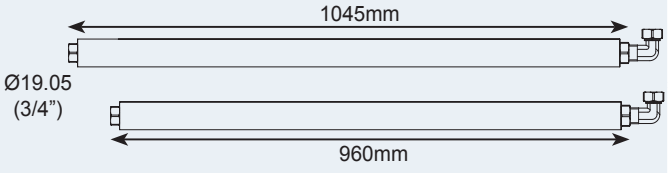
◆ Flexible water pipes identification

The DHW tank is factory supplied with four water pipes: two water pipes (heating coil pipes) to connect with the indoor unit (to the T-branch and to the 3-way valve) and other two (DHW pipes) for connection with the DHW tank. It is necessary to identify which are the two pipes for connection to the tank and which are the other two pipes for connection to the DHW tank.



Factory-supplied
with the indoor unit

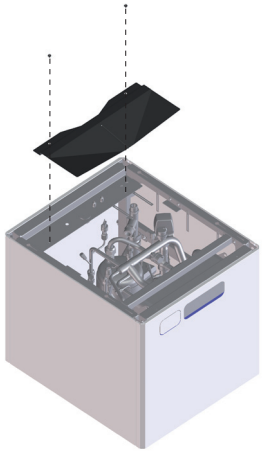
Heating coil pipes	
Item	Connection
	Heating coil inlet pipe For the connection between the 3-way valve water outlet and the heating coil inlet. Heating coil outlet pipe For the connection between the T-branch water inlet and the heating coil outlet.

DHW pipes	
Item	Connection
	DHW inlet pipe For the connection between the DHW inlet connection (cold water to the tank) and the DHW installation. DHW outlet pipe For the connection between the DHW outlet connection (hot water from the tank) and the DHW installation.

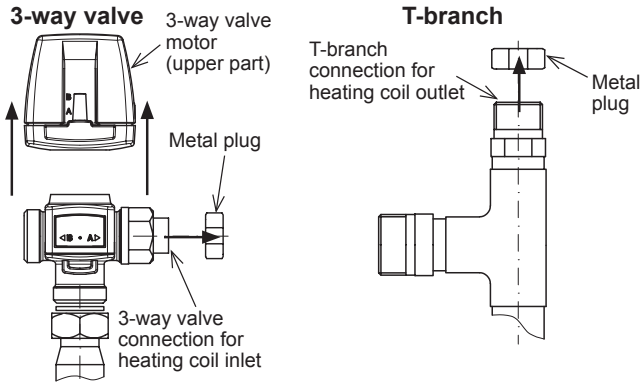
◆ Connection procedure

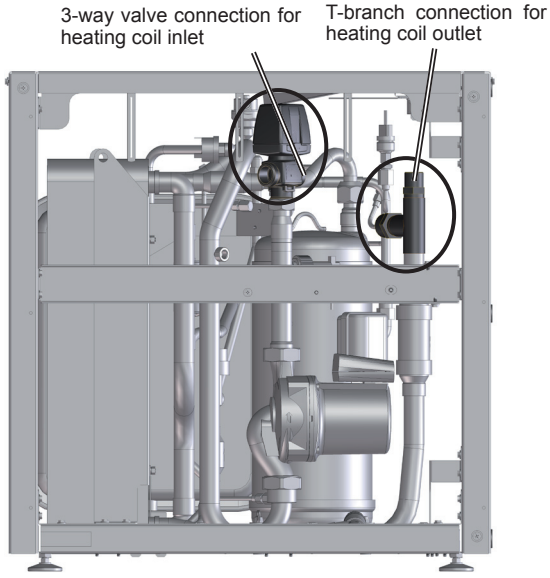
Perform the flexible water pipes connection between indoor unit and domestic hot water tank (Indoor unit water connections) as follows:

1 Remove the indoor unit cover's protection to facilitate the connection procedure.



2 Remove the metal plugs (Heating coil connections) from the 3-way valve and the T-branch. If necessary, disconnect the 3-way valve motor (upper part) to ease the installation procedure.

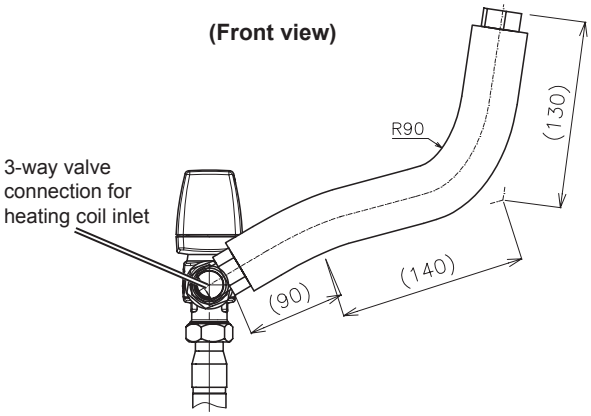




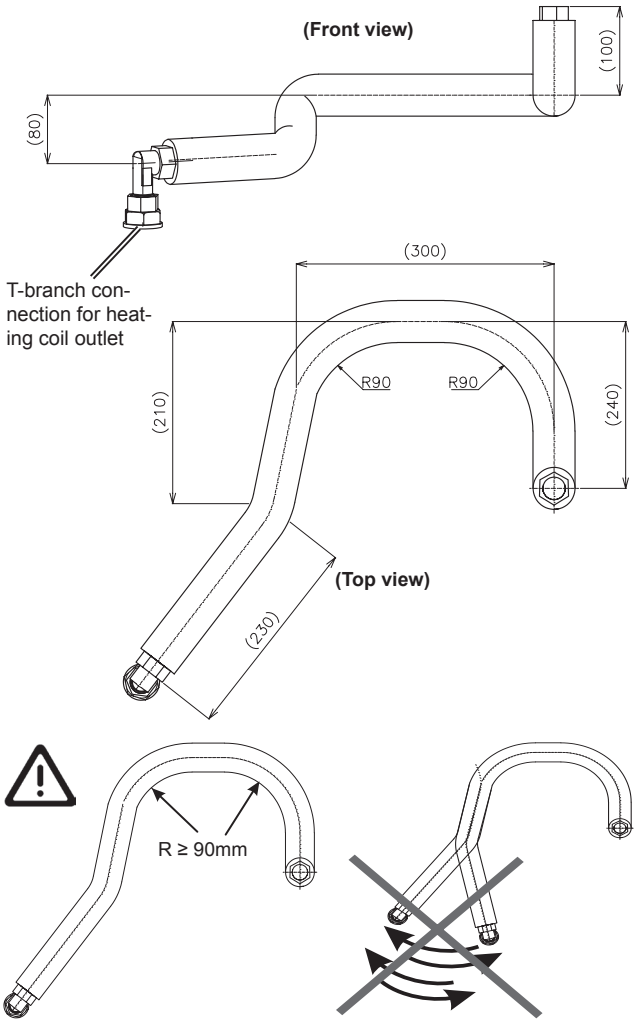
(Left side view)

3 Before performing the water pipe connections, bend the pipes approximately as in the following figures. By this way, the pipe end which will be connected to the tank's heating coil, will be placed closer to its final connection position.

Recommended position of the heating coil inlet pipe (short pipe 365 mm tube length)

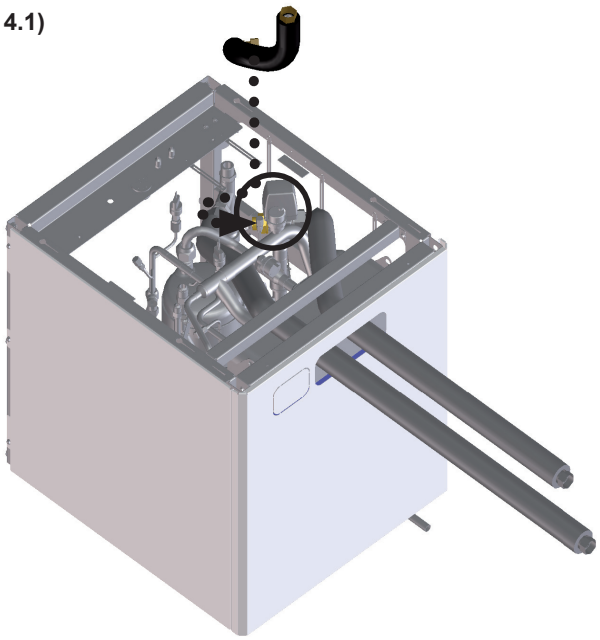


Recommended position of the heating coil outlet pipe (long pipe 960 mm tube length)

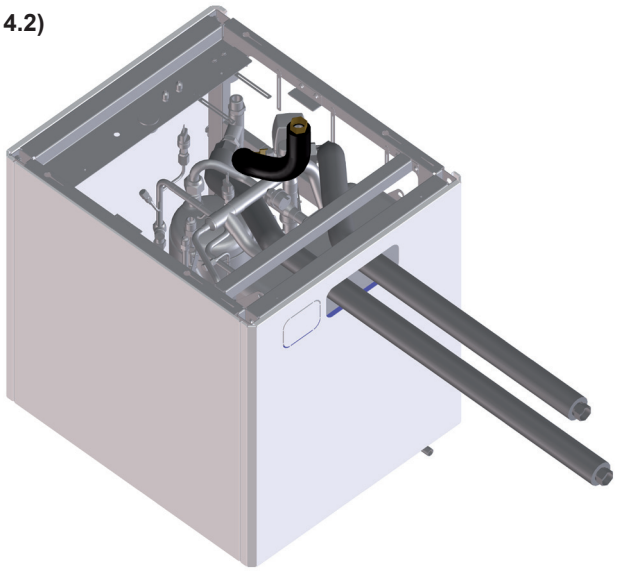


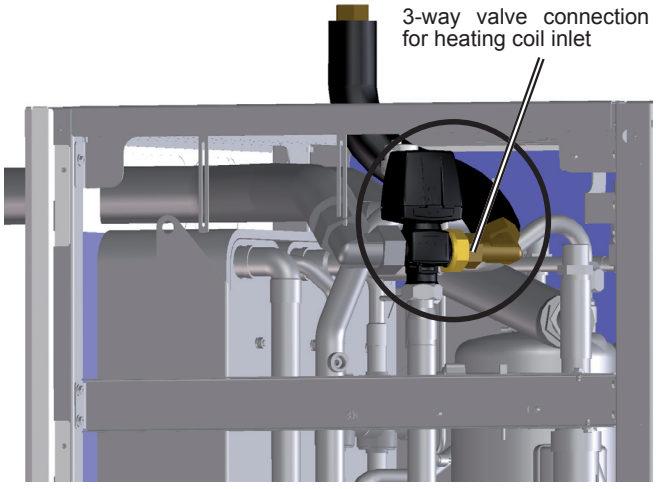
4 Connect the heating coil inlet pipe (short pipe 365 mm tube length) (3/4”) by its elbow end to the 3-way valve connection for heating coil inlet.

4.1)



4.2)

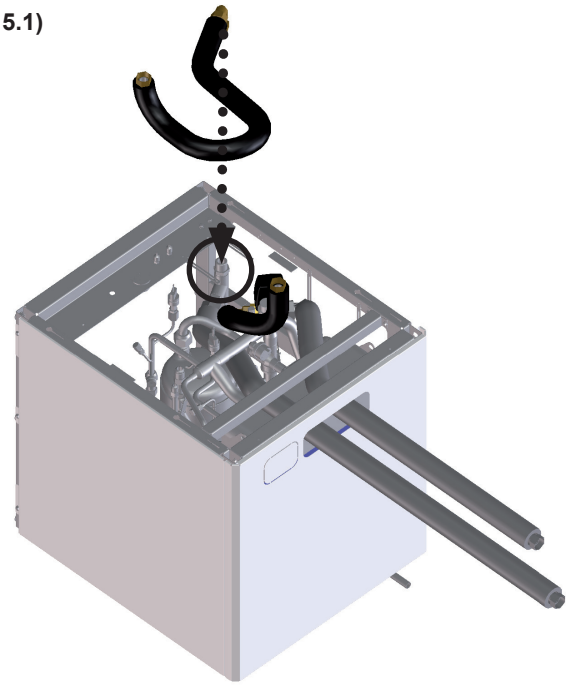




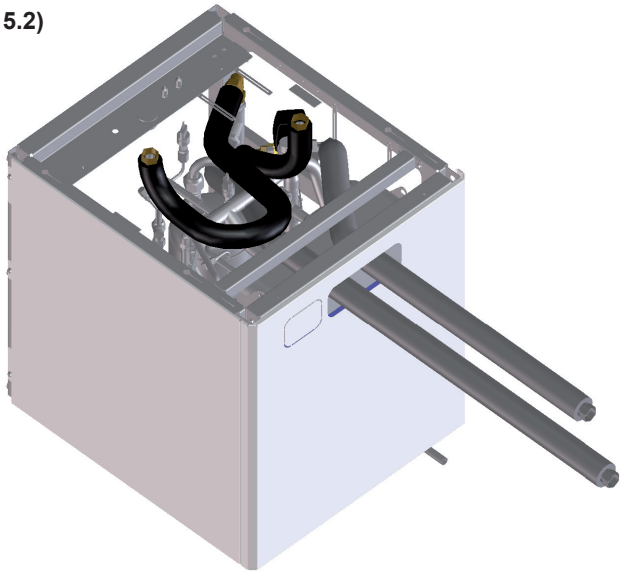
(Left side view)

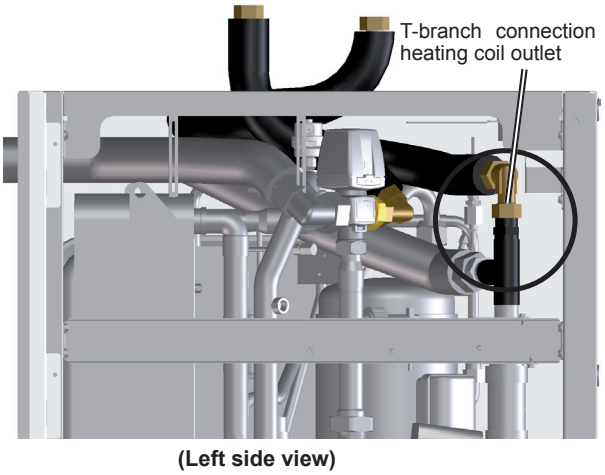
5 Connect the heating coil outlet pipe (long pipe 960 mm tube length) (3/4”) by its elbow end to the T-branch connection for heating coil outlet.

5.1)



5.2)

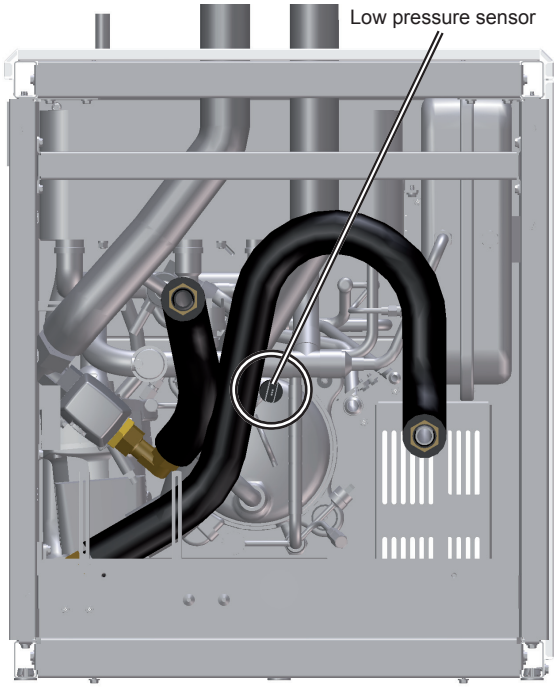




(Left side view)

NOTE

- ***Be careful with the low pressure sensor on the suction pipe when connecting the flexible water pipes.***



- ***Keep the flexible water pipes connected inside the indoor unit without overpassing the highest surface of it by the help of its internal elements until the DHW tank will be integrated on the indoor unit.***

6 Reconnect the 3-way valve motor.
7 Reassembly the indoor unit cover's protection.

2.3.4.4 Refrigerant piping connection and indoor unit's placing

Follow the same procedure explained in *Installation of indoor unit alone (without tank)* in section *2.2 Installation of indoor unit.*

2.3.4.5 Water pipes connection to the space heating (Space heating pipes)

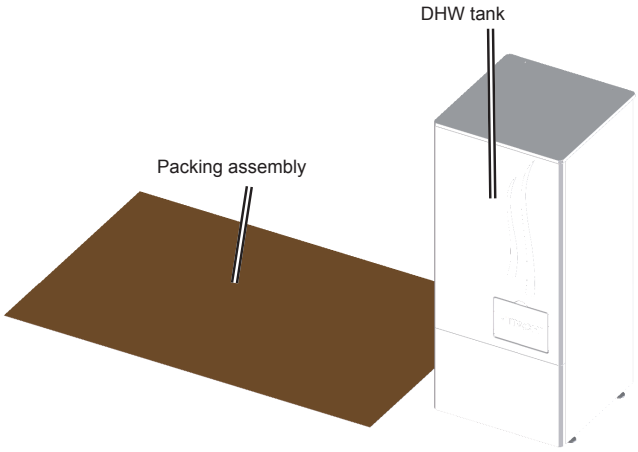
Connect the space heating pipes (one end already connected to the indoor unit) to the shut off valves of the space heating inlet and outlet (field supplied).

2.3.4.6 Water pipes connection to the tank (DHW pipes)

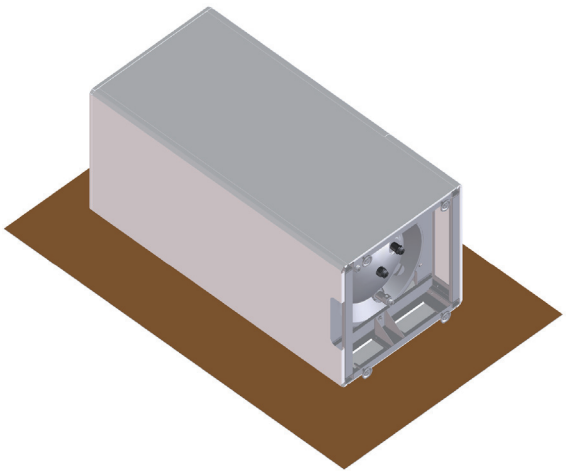
Perform the flexible water pipes connection to the tank (pipes from tank to DHW installation) as follows:

◆ **Connection procedure**

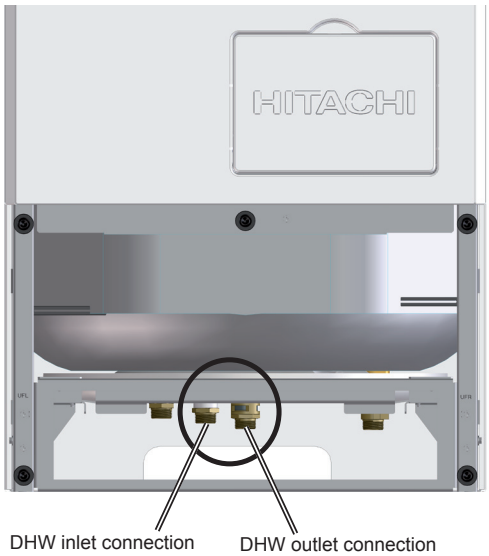
1 Place the DHW tank into the assembly area and put beside it on the floor the packing material (carton casing and plastic bag), which will protect the tank when overturning it to proceed with the piping connections.



2 Overturn the DHW tank by one lateral side (left or right) protecting it with the packing material.



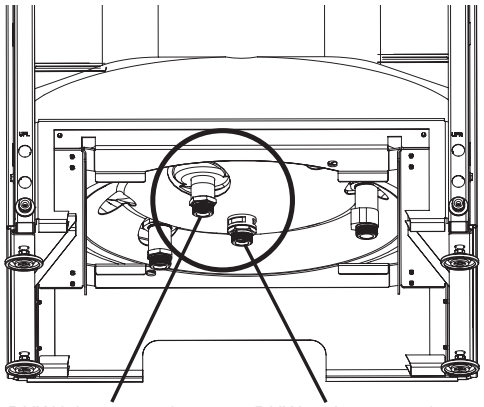
3 Connect the DHW outlet pipe (960 mm tube length) (3/4") by its elbow end to the DHW outlet connection (hot water from the tank). Take out the other end by the tank's hole at the back side.



DHW inlet connection (cold water to the tank)

DHW outlet connection (Hot water from the tank)

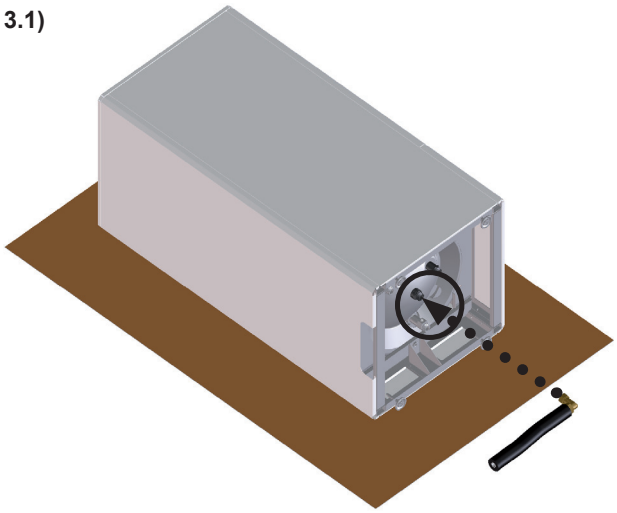
(Front bottom view)



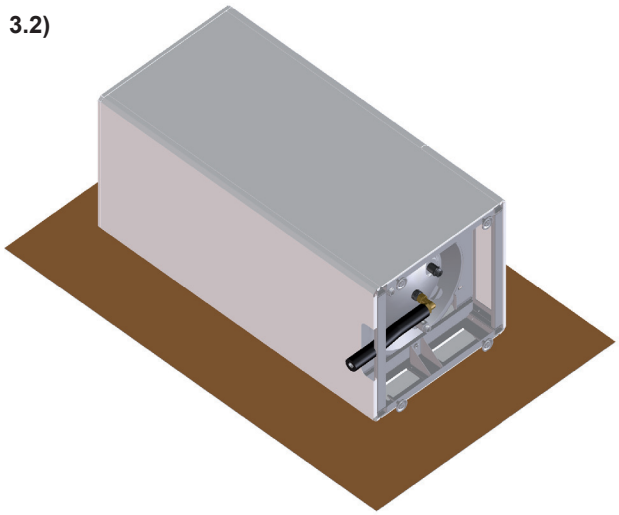
DHW inlet connection (cold water to the tank)

DHW outlet connection (hot water from the tank)

3.1)

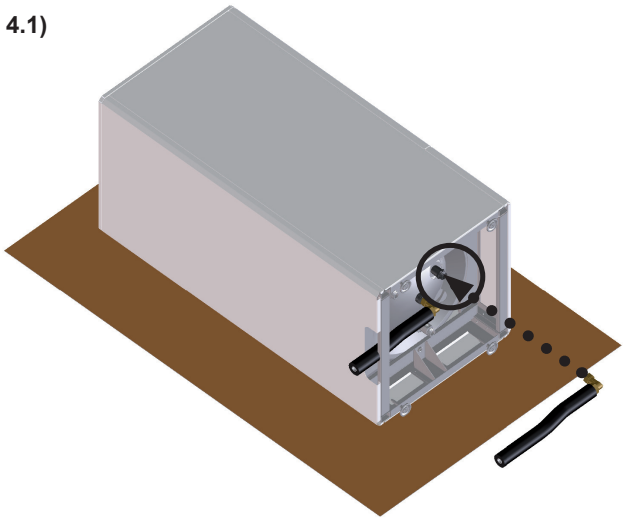


3.2)

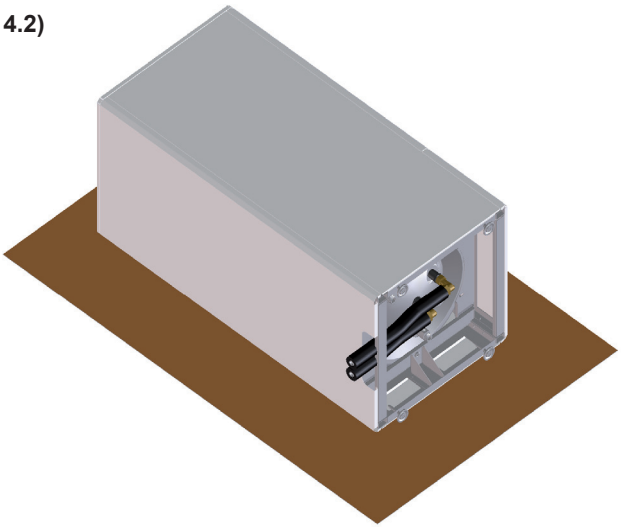


4 Connect the DHW inlet pipe (1045 mm tube length) (3/4") by its elbow end to the DHW outlet connection (cold water to the tank). Take out the other end by the tank's hole at the back side.

4.1)

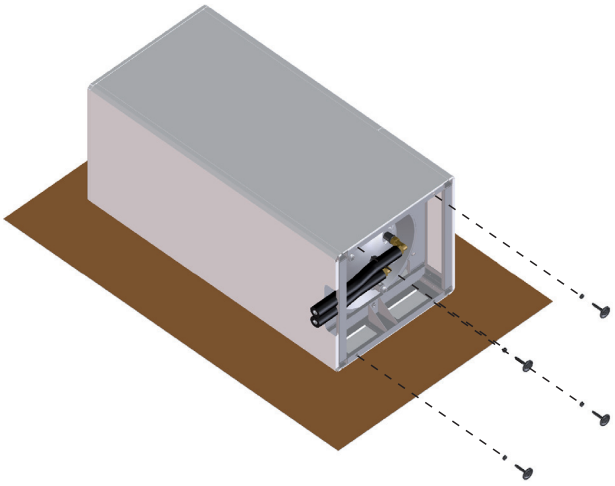


4.2)



2.3.4.7 Removing the mounting foot

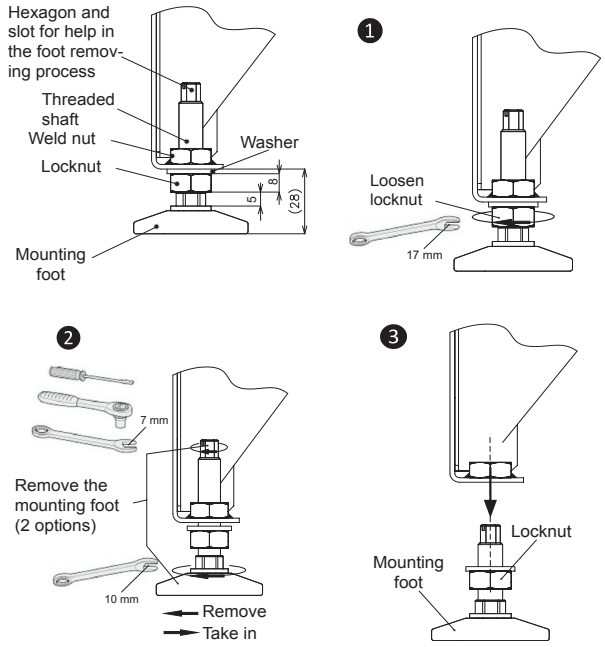
Unscrew the 4 mounting foot.



CAUTION

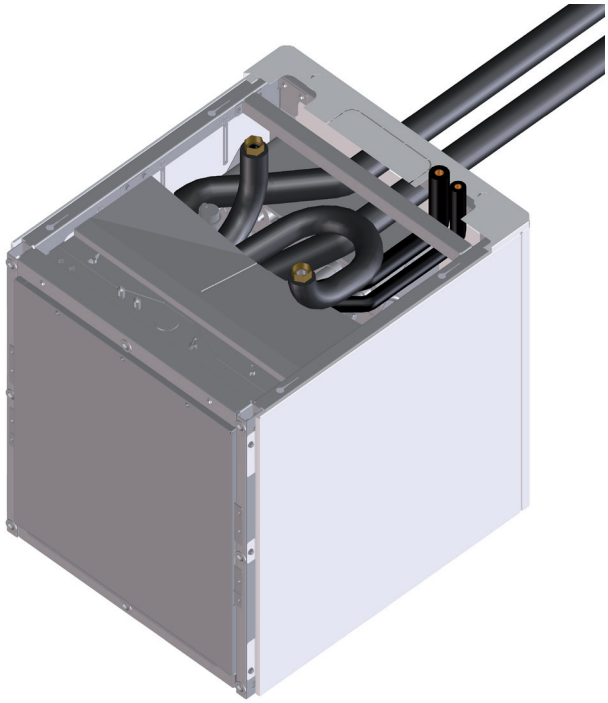
To remove the mounting foot, follow these instructions:

1 *Loosen the locknut of the mounting foot (using a wrench).*
2 *Turn the mounting foot up to removing it (use the hexagon or slot designed for this purpose in the shaft end). Two options are possible: by the shaft base (preferable) and by the shaft end.*
3 *Remove the mounting foot. The locknut will be also removed jointly with the mounting foot.*



2.3.4.8 Tank over the indoor unit assembly

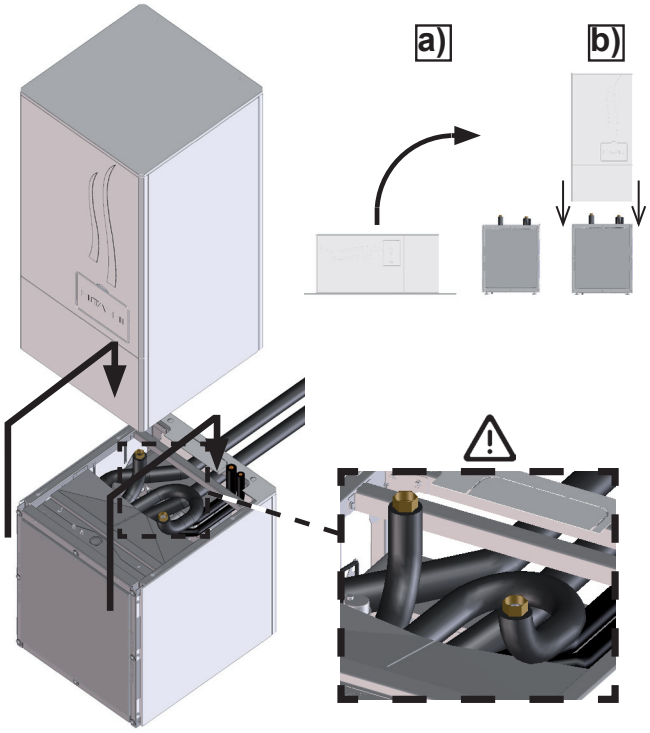
1 Remove the indoor unit front and upper covers.



NOTE

If necessary, remove also the indoor unit right and left covers to ease the installation work, but not forget reassembling when the installation procedure is finished.

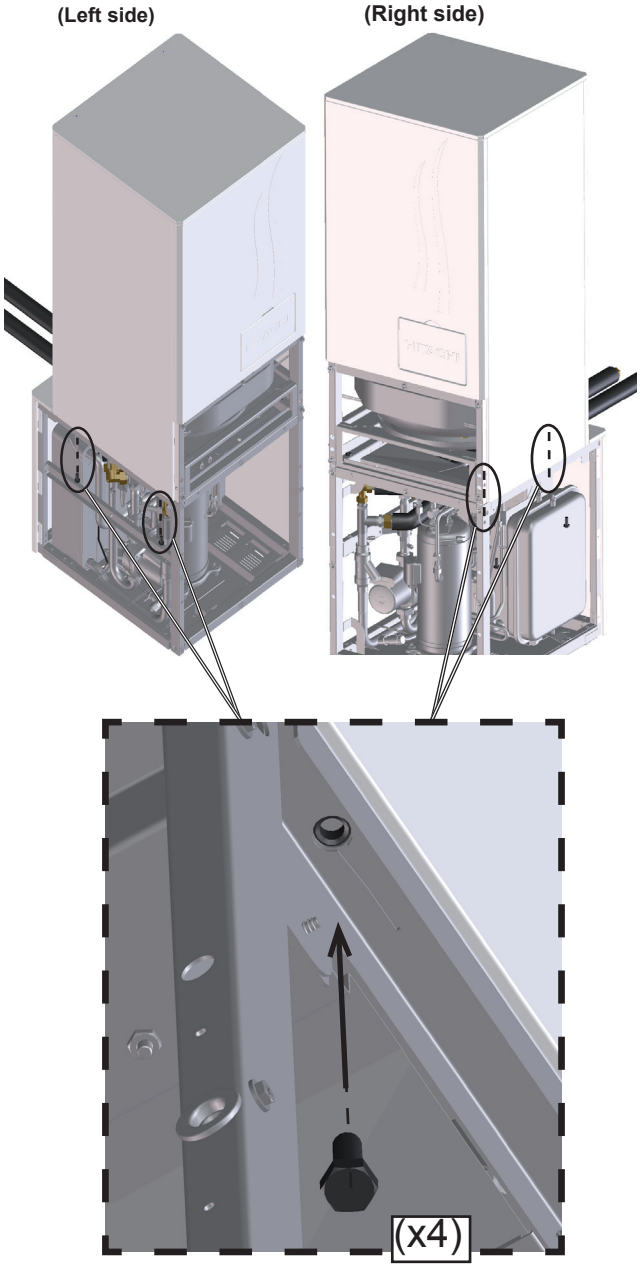
2 Lift up the tank and place it exactly above the indoor unit.



CAUTION

- ***Bear in mind that the tank is very heavy; therefore use at least two people when lifting it.***
- ***Take care with the connected flexible water pipes (both indoor unit and tank connections) when placing the tank over the unit.***

3 Fix the 4 bolts (factory supplied) between the indoor unit and tank (2 screws accessing from left side and the other 2 accessing from right side).



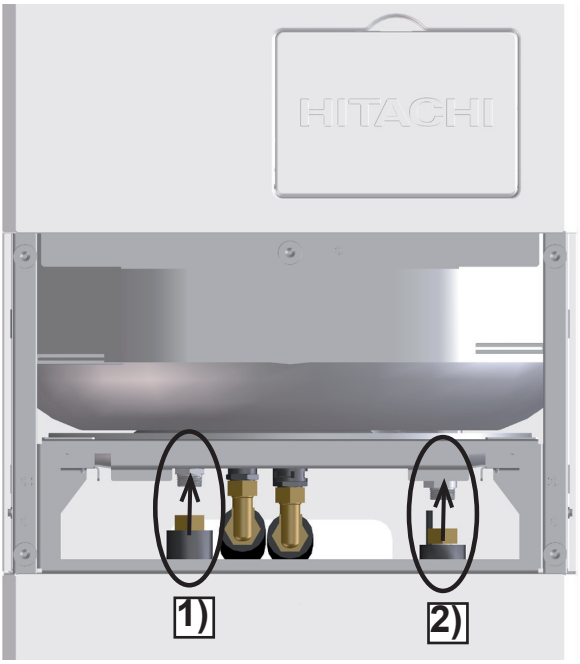
2.3.4.9 Water pipes connection to the tank (heating coil pipes)

Perform the flexible water pipes connection between indoor unit and domestic hot water tank (Tank connections) as follows:

◆ **Connection procedure**

The two heating coil pipes which had been connected to the indoor unit must be connected to the tank:

1 The pipe connected to the 3-way valve must be connected to the heating coil inlet connection of the tank.
2 The pipe connected to the T-branch must be connected to the heating coil outlet connection of the tank.



2.3.4.10 Water pipes connection to the DHW installation (DHW pipes)

The two flexible water pipes which had been connected to the tank (DHW inlet and outlet connections) must be connected to the DHW installation.

IMPORTANT NOTE

- ***Do not forget installing the pressure and temperature relief valve accessory (DHWT-SWG-01) at the DHW inlet connection of the tank (as close as possible to the tank) to provide the following functions.***

- *Pressure protection*	- *Filling*
- *Non-return function*	- *Draining*
- *Shut-off valve*	

If not, an specific device for each function should be installed.

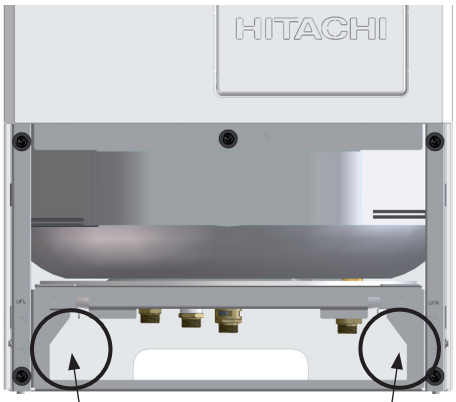
- ***Install also a shut-off valve (field supplied) in the DHW outlet connection, in order to make easier any maintenance work.***
- ***For more details, refer to the section*** *DHW hydraulic circuit* ***in chapter*** *3 Piping work and refrigerant charge.*

2.3.4.11 Power wiring connection

Follow the same procedure explained in *Installation of indoor unit alone (without tank)* in section *2.2 Installation of indoor unit.*

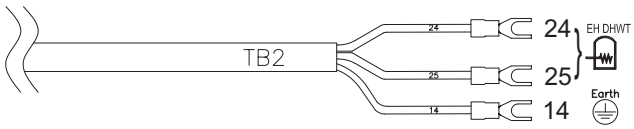
2.3.4.12 Tank wiring connection

The three electrical wires are already connected to the DHW tank. They will be located at the bottom front side of the tank fastened with clamps. The LCD electrical cable at the right and the electric heater and thermistor cables at left.

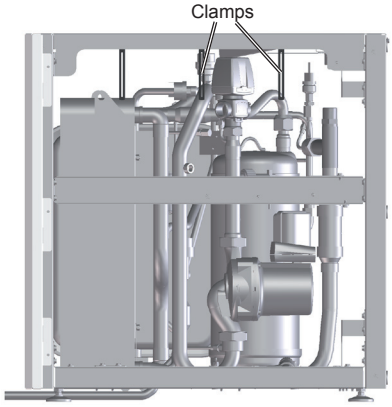


◆ Electric heater of the tank

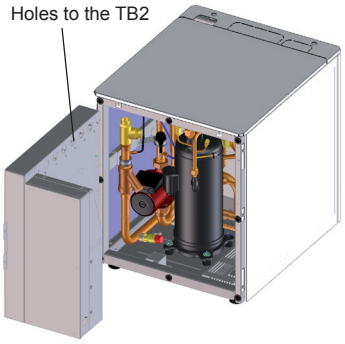
The Electrical heater cable is the labelled one with the TB2 and 24/25/14 connectors legend.



1 Take this electrical cable, pass it behind the partition plate and wire the cable to the two clamps located at the left side and upper part of the indoor unit.

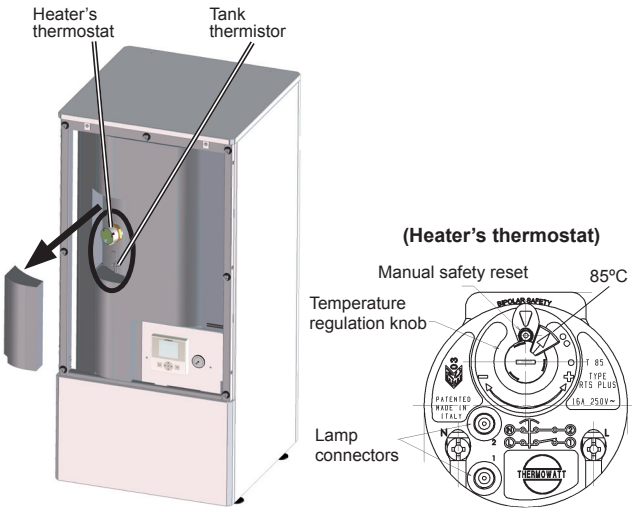


2 Take the cable to the Electrical Box 1 and pass it through one of the upper holes. Connect the earth wire to the 14th terminal and the other two wires to the 24 and 25 connections of the Terminal Board 2.



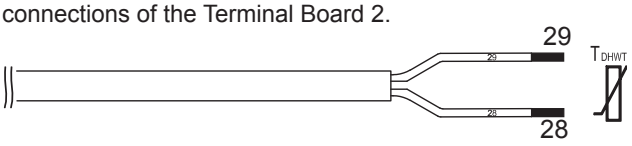
NOTE

- ***Do not touch the Manual safety reset of the electrical heater.***
- ***Do not touch the temperature regulator unless the tank is working in emergency mode due to indoor unit or outdoor unit malfunction. In this case, refer to the section*** *DHW tank troubleshooting* ***in chapter*** *12 Troubleshooting.*

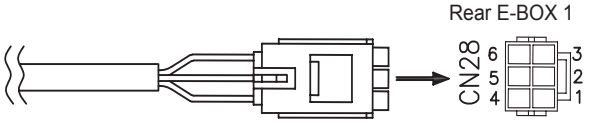


◆ Tank thermistor

Follow the same procedure as for the electrical heater wire but connecting the Tank thermistor wires to the 28 and 29 connections of the Terminal Board 2.



◆ LCD controller

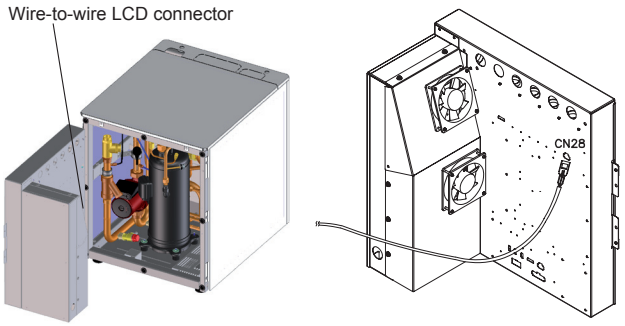


1 Take the LCD electrical cable, pass it behind the partition plate and wire it to the two clamps located at the right side and upper part of the indoor unit.

2 Connect the connector cable to the wire-to-wire connector in the Electrical Box 1 back side as shown in the figure.

CAUTION

Do not cut or extend the LCD electrical cable.



◆ **Levelling procedure**

Follow the same procedure explained in *Installation of indoor unit alone (without tank)* in section *2.2 Installation of indoor unit.*

2.3.4.13 Tank's fixation to the wall

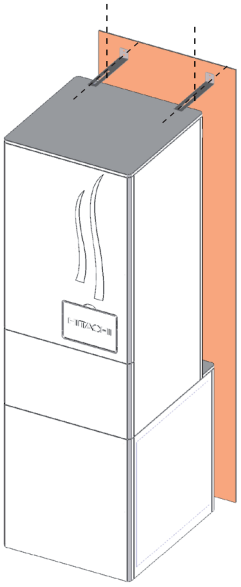
In case of indoor unit with integrated tank it is mandatory when there is not upper restriction fixing the domestic hot water tank to the wall in order to provide a higher stability (use the factory supplied accessory intended for this purpose).

1 Fix the accessory to the DHW tank on the upper cover through the holes with the bundled factory supplied screws.

NOTE

Use the accessory slotted hole to fix the DHW tank to the wall at the desired distance.

2 Fix the accessory to the wall with field supplied screws.



NOTE

Check that the set (indoor unit with integrated DHW tank) is totally vertical installed.

2.3.4.14 Test and check

Before assembling the covers, test and check the following items:

- Water leakage
- Refrigerant leakage
- Electrical connection
- ...

NOTE

The following documents must be referred:

- ***Refer in this document to the chapter** 3 Piping work and refrigerant charge **for water filling of the tank and the indoor unit and for refrigerant charge of the indoor unit and chapter** 8 Commissioning **for the commissioning procedure of the tank and the indoor unit.***
- ***For the specific details about refrigerant charge tasks refer the** Outdoor unit Installation and Operation manual **if necessary.***

DANGER

DO NOT CONNECT THE POWER SUPPLY TO THE INDOOR UNIT AND DHW TANK PRIOR FILLING OF WATER BOTH CIRCUITS AND CHECKING WATER PRESSURE AND THE TOTAL ABSENCE OF ANY WATER LEAK.

2.3.4.15 Cover's assembly

Finally, reassembly all the cover's removed performing the procedure in reverse.

2.3.5 Installation of Indoor unit with HITACHI tank (Tank beside the indoor unit)

NOTE

Please, try to perform all this procedure following all the steps in the exact order which they are presented below.

Installation procedure

1 Water pipes connection to the indoor unit (Space heating pipes).
2 Drain pipes connection.
3 Water pipes connection to the indoor unit (Flexible water pipes kit (ATW-FWP-01)).
4 Refrigerant piping connection and indoor unit's placing.
5 Water pipes connection to the space heating (Space heating pipes).
6 Water pipes connection to the tank (DHW pipes).
7 Water pipes connection to the tank (heating coil pipes).
8 Tank's placing.
9 Connection between the flexible water pipes kit (ATW-FWP-01) and the heating coil pipes.
10 Water pipes connection to the DHW installation (DHW pipes).
11 Power wiring connection.
12 Tank wiring connection.
13 Levelling procedure.
14 Tank's fixation to the wall.
15 Test and check.
16 Cover's assembly.

2.3.5.1 Water pipes connection to the indoor unit (Space heating pipes)

Follow the same procedure explained in *Installation of indoor unit alone (without tank)* in section *2.2 Installation of indoor unit.*

2.3.5.2 Drain pipes connection

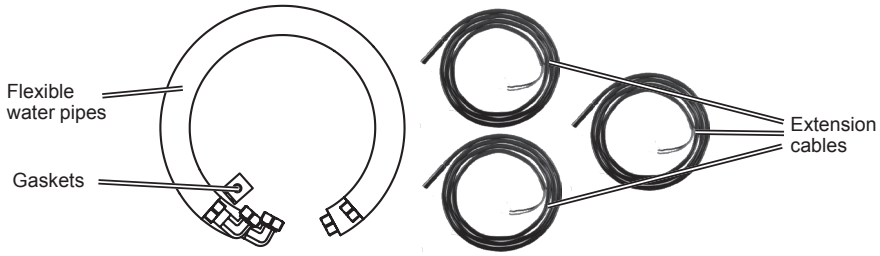
Follow the same procedure explained in *Installation of indoor unit alone (without tank)* in section *2.2 Installation of indoor unit.*

2.3.5.3 Water pipes connection to the indoor unit (Flexible water pipes kit (ATW-FWP-01))

◆ **Flexible water pipes identification**

For installing the tank beside the indoor unit (both left or right side) the dedicated kit for installation with tank beside the indoor unit (ATW-FWP-01) is required. This kit is provided with the following items:

- 2 flexible water pipes
- 5 gaskets (4 gaskets for each flexible water pipe end and 1 spare gasket)
- 3 extension cables (1 for the tank's electric heater, 1 for the tank's thermistor and 1 for the LCD controller).

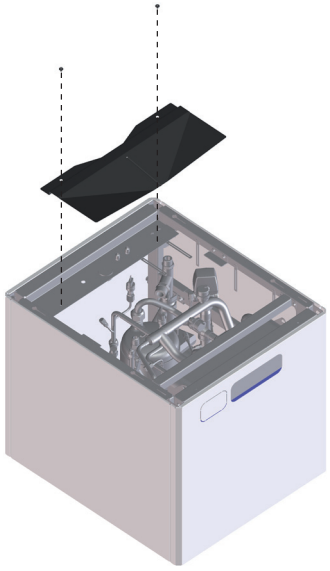


It is necessary to identify the function of each water pipe.

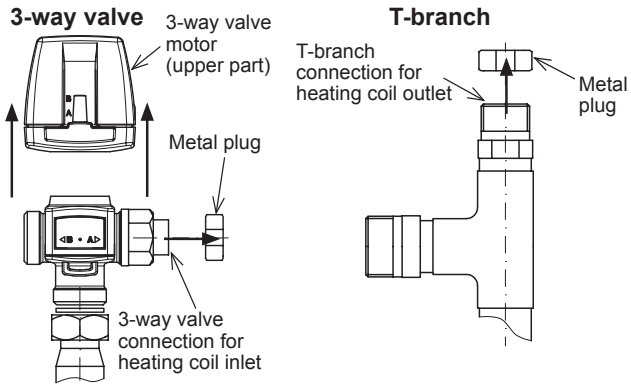
Flexible water pipes of the kit	
Item	Connection
	Kit pipe for heating coil inlet For the connection between the 3-way valve heating coil inlet connection and the free end of the heating coil inlet pipe.
	Kit pipe for heating coil outlet For the connection between the T-branch heating coil outlet connection and the free end of the heating coil outlet pipe.

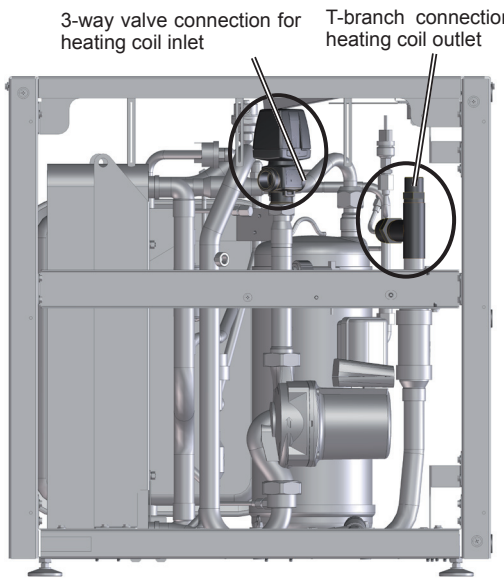
◆ Connection procedure

1 Remove the indoor unit cover's protection to facilitate the connection procedure.



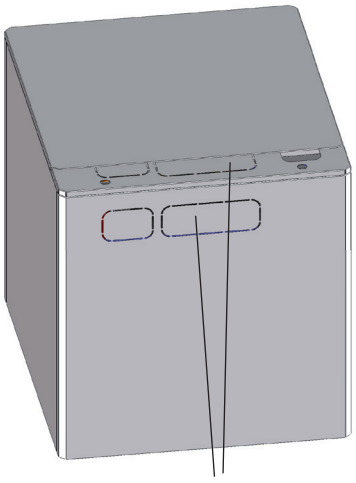
2 Remove the metal plugs (Heating coil connections) from the 3-way valve and the T-branch. If necessary, disconnect the 3-way valve motor (upper part) to ease the installation procedure.





(Left side view)

3 Select the preferable outlet position for the flexible water pipes.

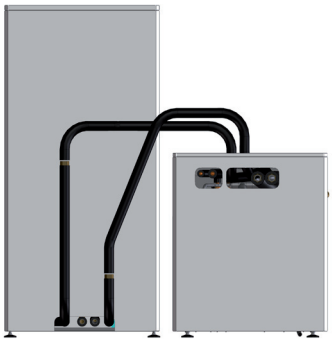


Holes for flexible water piping

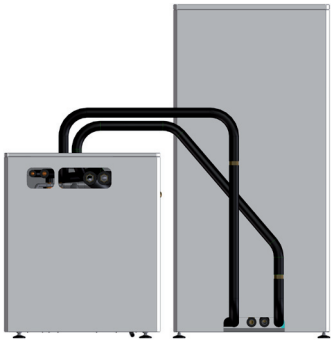
NOTE

- ***Depending on the selected outlet hole (upper side or rear side) the distance between the indoor unit and the tank may be different. This value may vary between 0 and 200mm, approximately.***
- ***Refer to the next step*** *Connection between the flexible water pipes kit (ATW-FWP-01) and the heating coil pipes* ***for a good understanding.***

Tank at the right side of the indoor unit (Recommended)

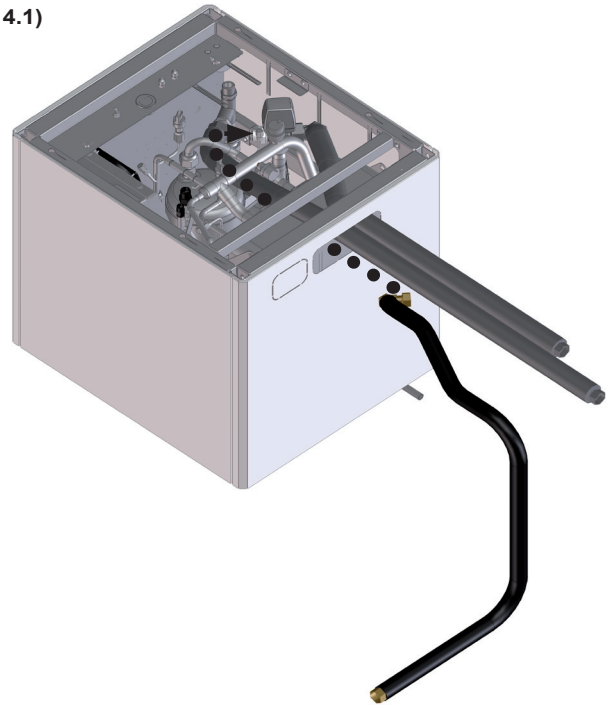
Back outlet	Upper outlet
	

Tank at the left side of the indoor unit

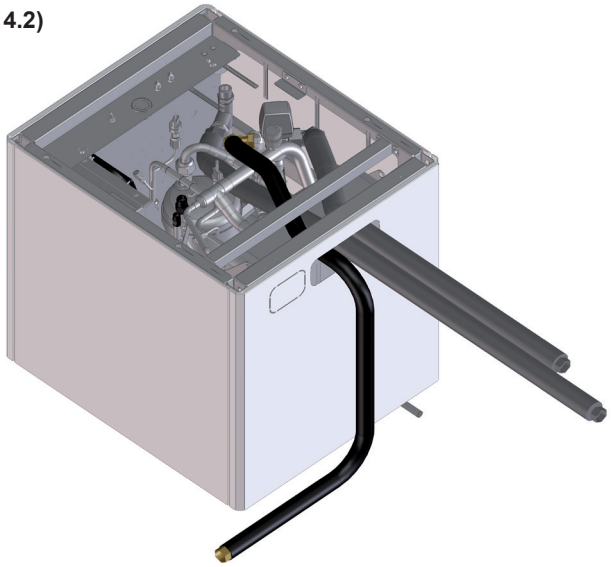
Back outlet	Upper outlet
	

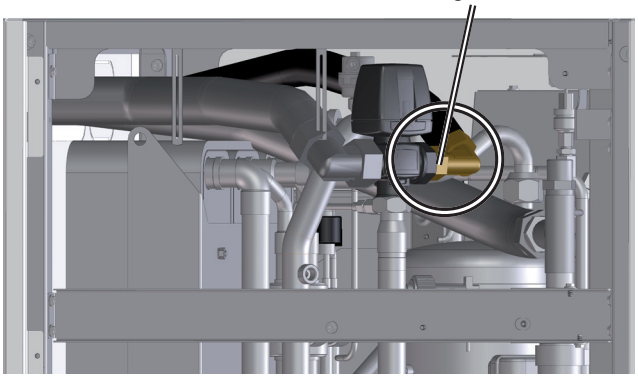
4 Introduce from outside of the unit the kit pipe for heating coil inlet (1600 mm tube length) (3/4”) through the preferable outlet cover hole and connect the elbow end to the 3-way valve connection for heating coil inlet.

4.1)



4.2)

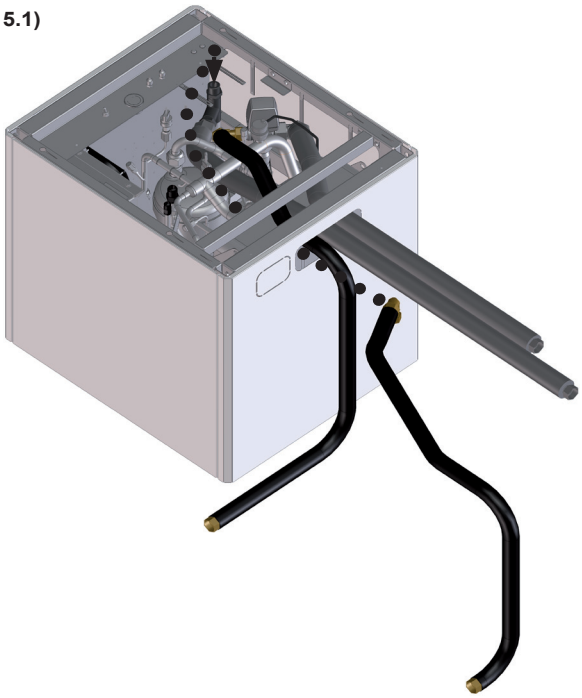




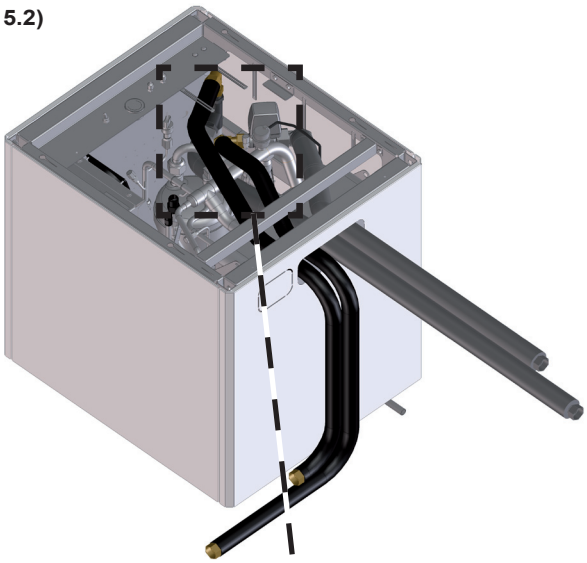
(Left side view)

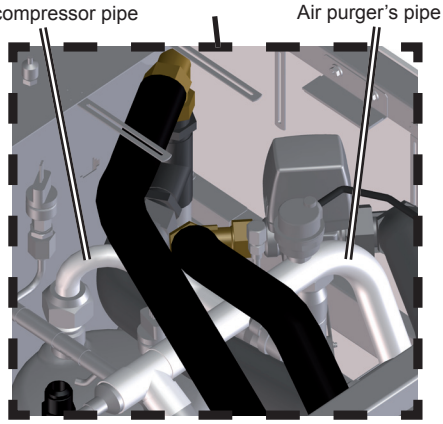
5 Introduce from outside of the unit the kit pipe for heating coil outlet (1400 mm tube length) (3/4”) through the preferable outlet cover hole connect the elbow end to the T-branch connection for heating coil outlet passing it over the suction compressor and air purger’s pipes.

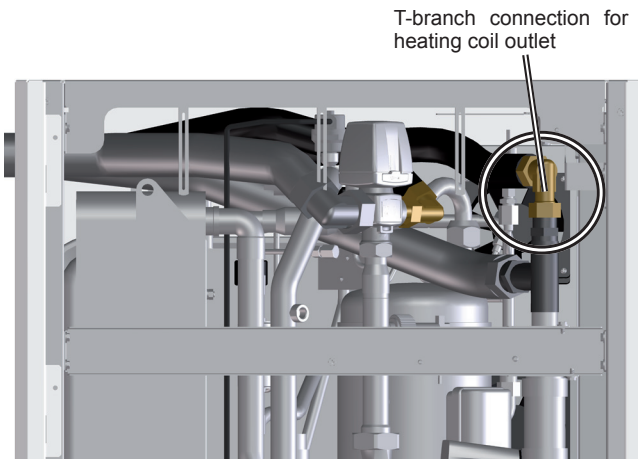
5.1)



5.2)



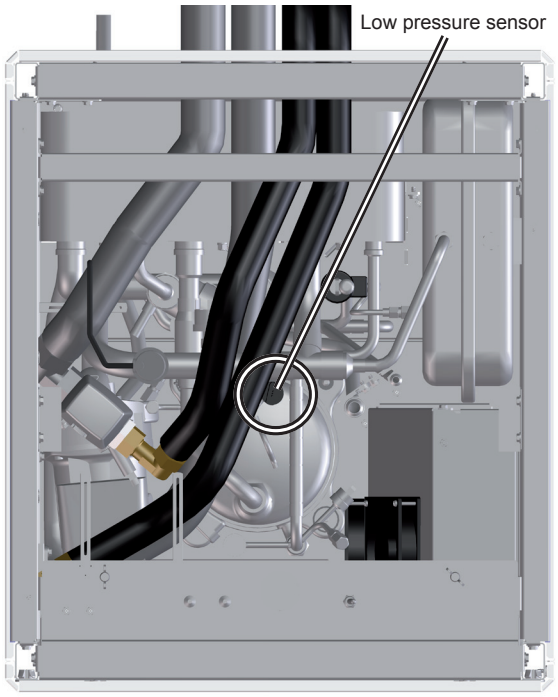




(Left side view)

NOTE

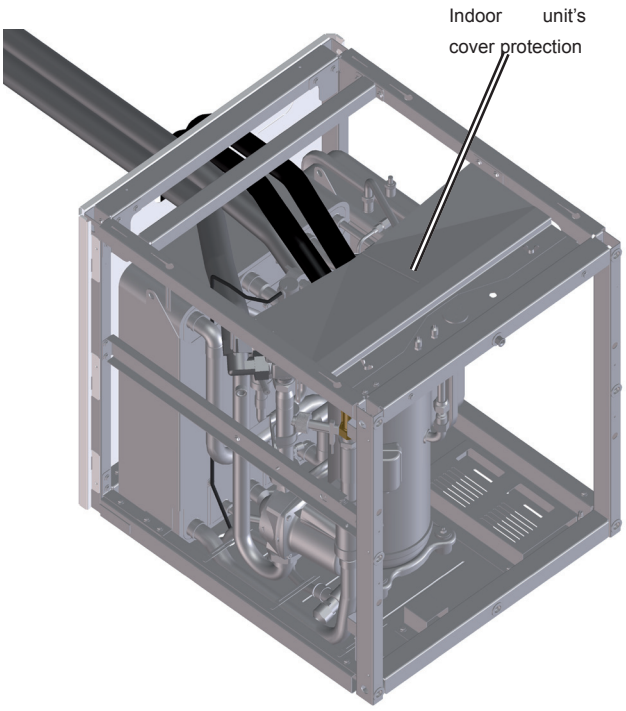
Be careful with the low pressure sensor on the suction pipe when connecting the flexible water pipes.



(Top view)

6 Reconnect the 3-way valve motor.

7 Reassembly the indoor unit cover's protection.



2.3.5.4 Refrigerant piping connection and indoor unit's placing

Follow the same procedure explained in *Installation of indoor unit alone (without tank)* in section *2.2 Installation of indoor unit.*

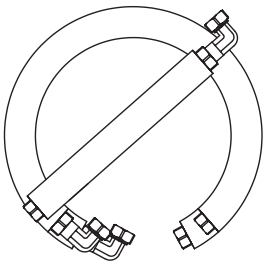
2.3.5.5 Water pipes connection to the space heating (Space heating pipes)

Connect the space heating pipes (one end already connected to the indoor unit) to the shut off valves of the space heating inlet and outlet (field supplied).

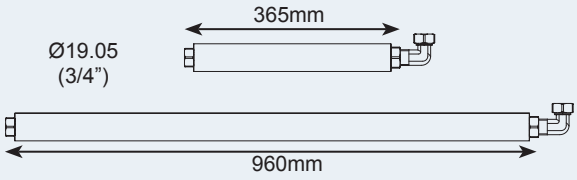
2.3.5.6 Water pipes connection to the tank (DHW pipes)

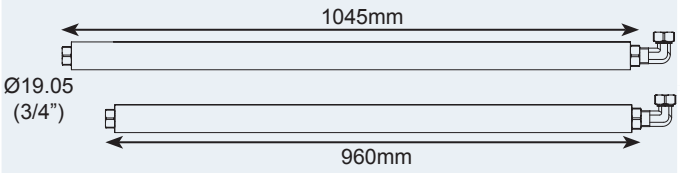
◆ Flexible water pipes identification

The DHW tank is factory supplied with four water pipes. In case of installation of the tank beside the indoor unit, the function of some pipes will be different than if the tank is installed integrated over the indoor unit. It is necessary to identify what is the function of each water pipe.



Factory-supplied
with the indoor unit

Heating coil pipes	
Item	**Connection**
	Heating coil inlet pipe For the connection between the heating coil inlet and one pipe of the flexible water pipes kit (ATW-FWP-01).
	Heating coil outlet pipe For the connection between the heating coil outlet and the other pipe of the flexible water pipes kit (ATW-FWP-01).

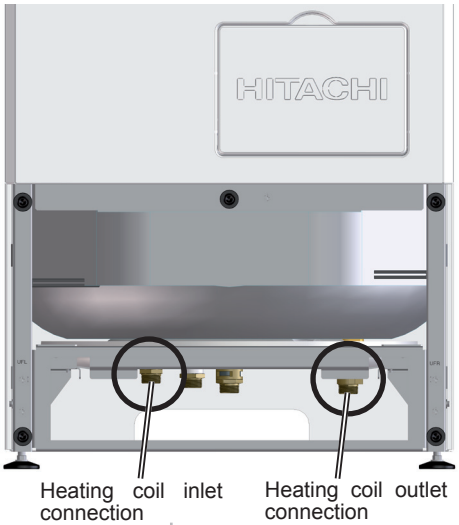
DHW pipes	
Item	**Connection**
	DHW inlet pipe For the connection between the DHW inlet connection (cold water to the tank) and the DHW installation.
	DHW outlet pipe For the connection between the DHW outlet connection (hot water from the tank) and the DHW installation.

◆ Connection procedure

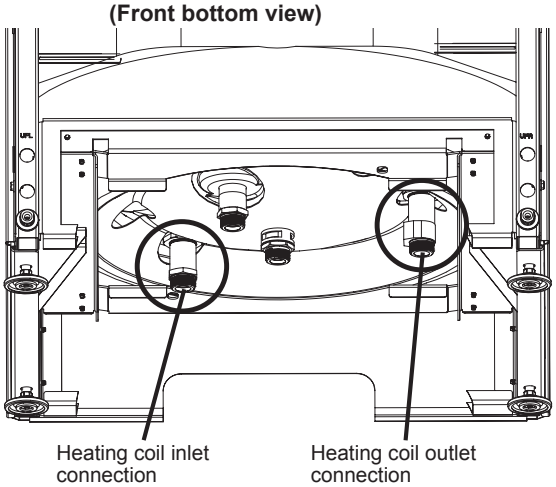
Follow the same procedure explained in the same step *"Water pipes connection to the tank (DHW pipes)"* in section *Installation of indoor unit with HITACHI tank (tank integrated over the indoor unit).*

2.3.5.7 Water pipes connection to the tank (heating coil pipes)

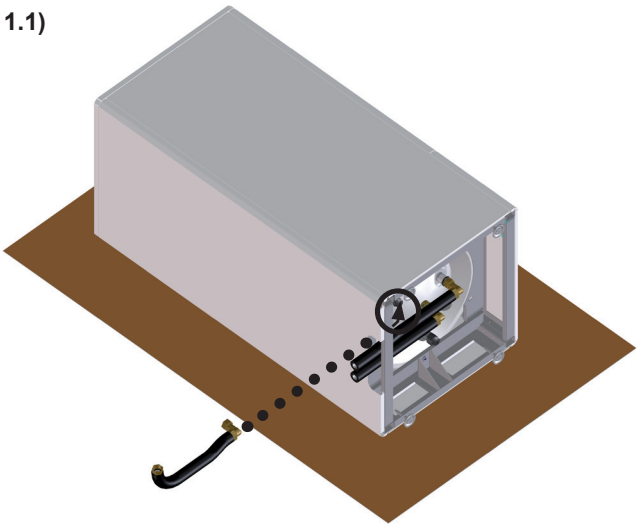
1 Introduce the heating coil inlet pipe (short pipe 365 mm tube length) (3/4") from outside of the tank (through the rear hole of the tank) and connect the elbow end to the heating coil inlet connection.



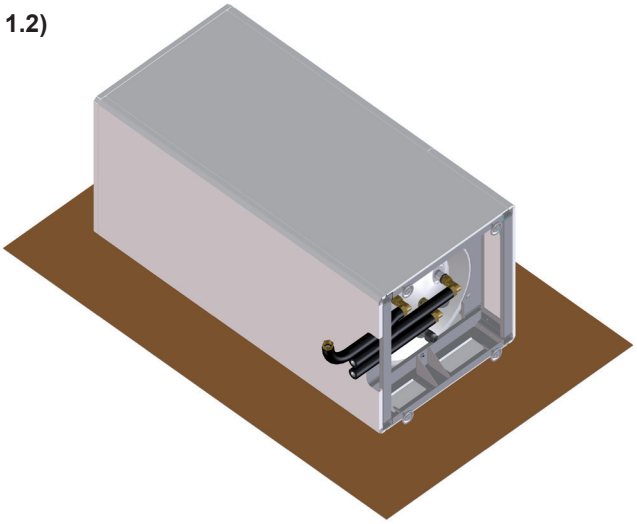
(Front bottom view)



1.1)

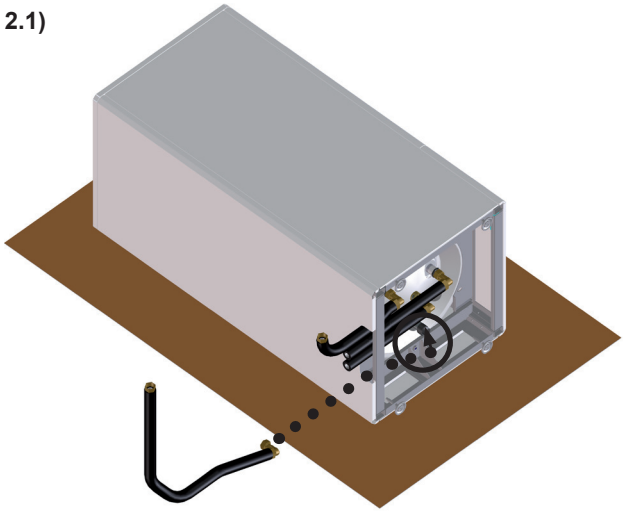


1.2)

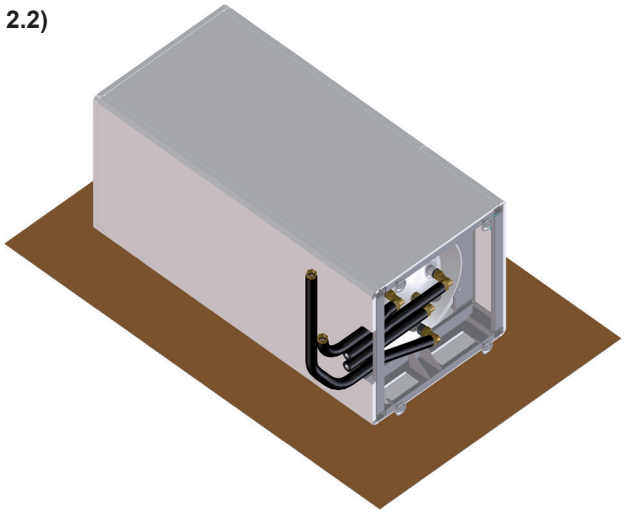


2 Introduce the heating coil outlet pipe (960 mm tube length) (3/4”) from outside of the tank (through the rear hole of the tank) and connect the elbow end to the heating coil outlet connection.

2.1)



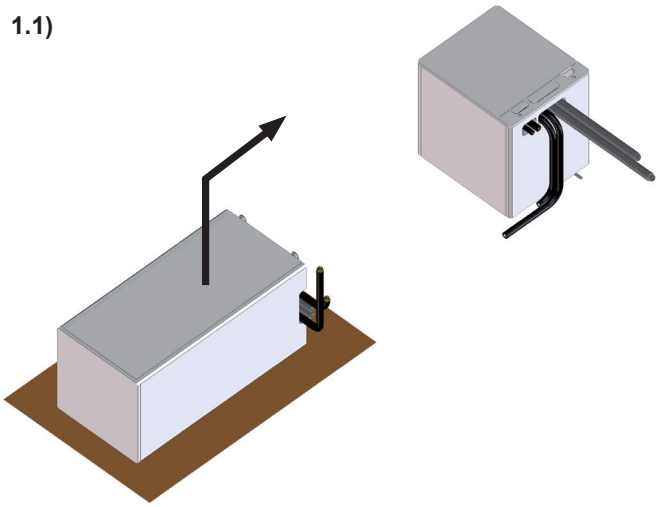
2.2)



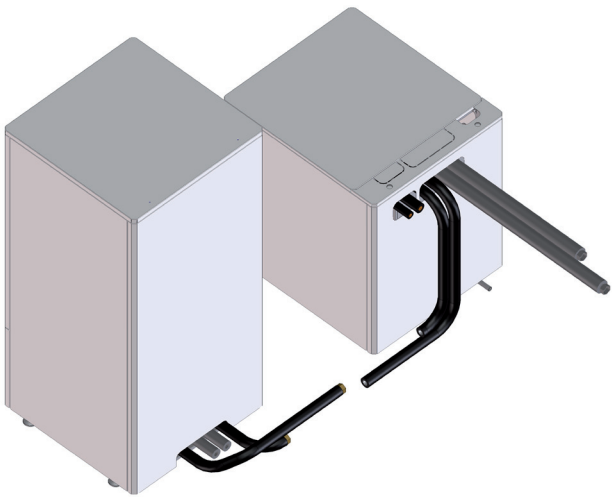
2.3.5.8 DHW tank’s placing

1 Lift up the tank and place it again in vertical position just beside the indoor unit (at its right or left side).

1.1)



1.2)



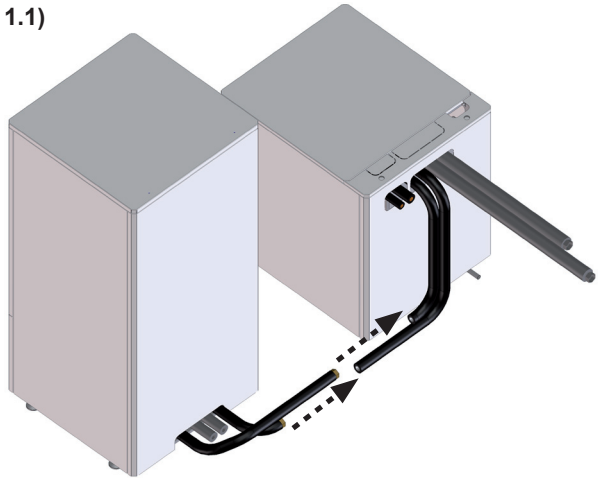
CAUTION

- ***It is recommended to place the tank at indoor unit's right side in order to keep a certain space at the indoor unit's left side (looking from the front) for easy servicing. Refer to the Service space section for more information.***
- ***Bear in mind that the tank is very heavy; therefore use at least two people when lifting it.***
- ***Take care with the connected flexible water pipes and with the tank cutting parts.***

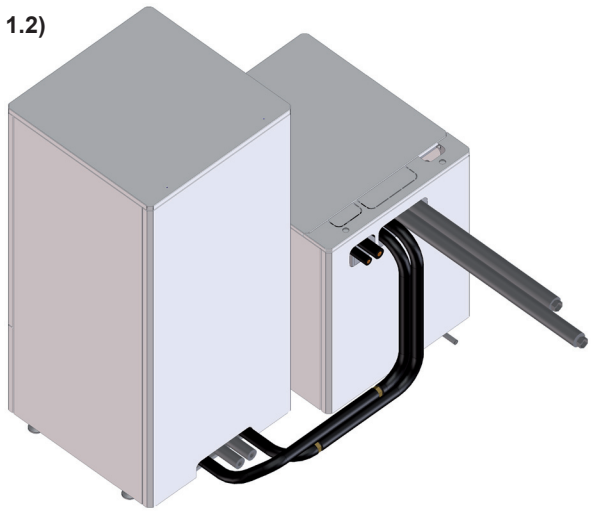
2.3.5.9 Connection between the flexible water pipes kit (ATW-FWP-01) and the heating coil pipes

1 Connect the flexible water pipes of the kit (connected to the heating coil inlet and outlet of the tank) with the heating coil pipes (connected to the 3-way valve and T-branch in the indoor unit).

1.1)



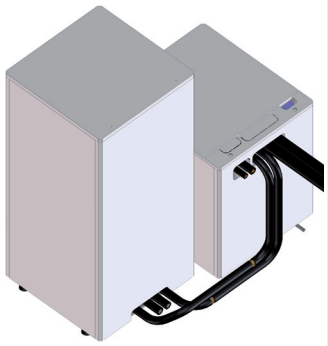
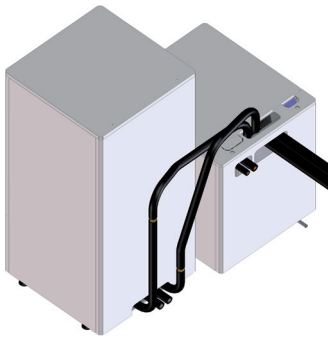
1.2)

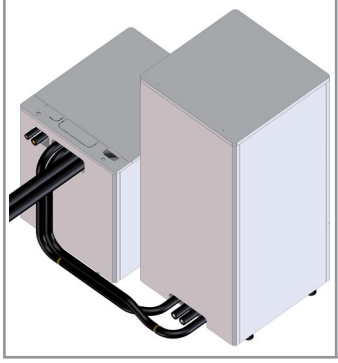
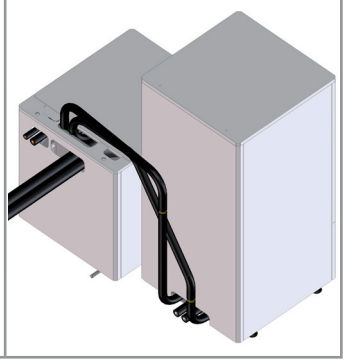


NOTE

For more distance between the indoor unit and the DHW tank, it is necessary to provide extra flexible water pipes (field supplied). In this case, take into account the maximum electrical wiring length. If electrical wiring length needs to be increased consult your HITACHI dealer.

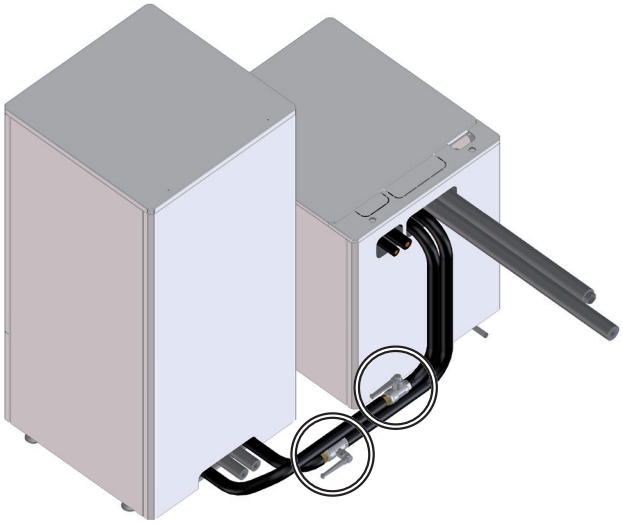
These are examples of the piping connection position depending on the tank's position and the selected outlet hole for the flexible water piping.

Tank at the right side of the indoor unit	
Back outlet	Upper outlet
	

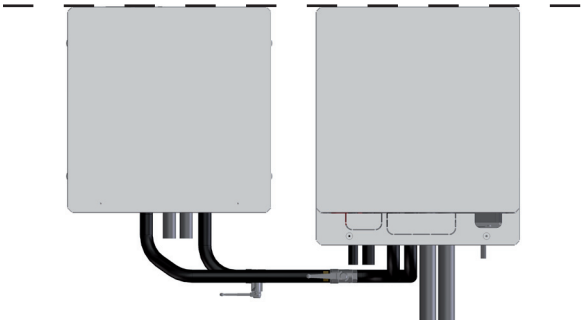
Tank at the left side of the indoor unit	
Back outlet	Upper outlet
	

IMPORTANT NOTE

It is recommended to install two shut-off valves with a drain valve between the flexible water pipes of the kit and the heating coil pipes, in order to make easier the service works and draining procedure.



2 Align the front side of the tank with the front side of the indoor unit.



(Top view)

2.3.5.10 Water pipes connection to the DHW installation (DHW pipes)

The two flexible water pipes which had been connected to the tank (DHW inlet and outlet connections) must be connected to the DHW installation.

IMPORTANT NOTE

- ***Do not forget installing the pressure and temperature relief valve accessory (DHWT-SWG-01) at the DHW inlet connection of the tank (as close as possible to the tank) to provide the following functions.***
  - *Pressure protection*
  - *Non-return function*
  - *Shut-off valve*
  - *Filling*
  - *Draining*

  If not, an specific device for each function should be installed.
- ***Install also a shut-off valve (field supplied) in the DHW outlet connection, in order to make easier any maintenance work.***

***For more details, refer to the section** DHW hydraulic circuit **in chapter** 3 Piping work and refrigerant charge.*

2.3.5.11 Power wiring connection

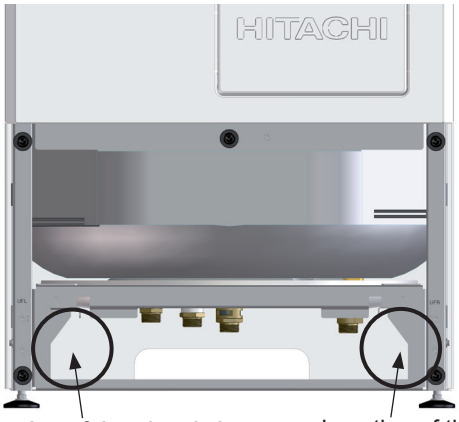
Follow the same procedure explained in *Installation of indoor unit alone (without tank)* in section *2.2 Installation of indoor unit.*

2.3.5.12 Tank wiring connections

◆ Cables identification

Factory supplied cables

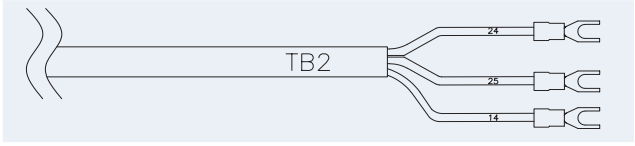
The three electrical wires are already connected to the DHW tank. They will be located at the bottom front side of the tank fastened with clamps. The LCD electrical cable at the right and the electric heater and thermistor cables at left.



Location of the electric heater and thermistor cables

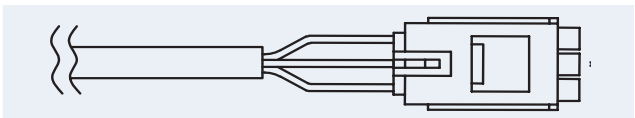
Location of the LCD cable

Electric heater cable



Thermistor cable

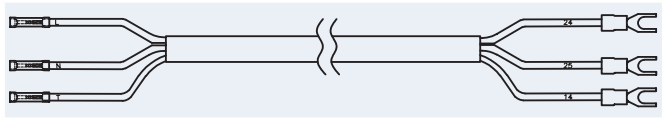
LCD controller cable



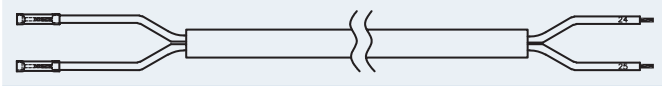
Extension cables (supplied with the ATW-FWP-01 accessory)

When the domestic hot water tank is installed beside the indoor unit, it is needed to extend the cables up to the terminal board 2 (TB2) of the indoor unit, which is place at certain distance from the tank. These cables are the following:

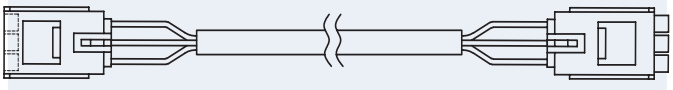
Extension cable for the electric heater



Extension cable for the thermistor



Extension cable for the LCD controller

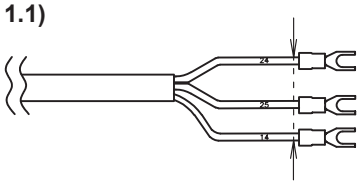


◆ Cables connection

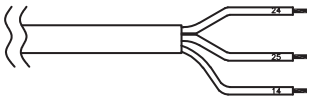
Electric heater of the tank

1 Cut and strip the free end of the 3 wires of the factory supplied electric heater cable.

1.1)

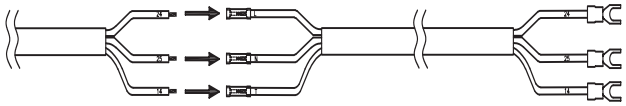


1.2)



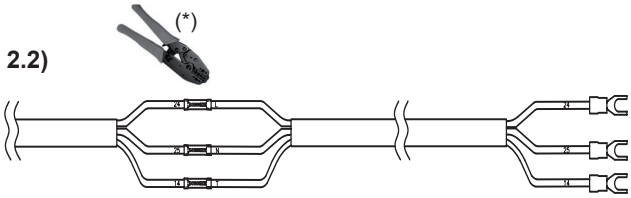
2 Connect the extension cable to the factory supplied cable.

2.1)



(Factory supplied cable) **(Extension cable)**

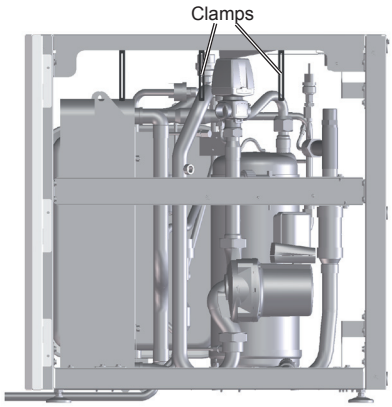
2.2)



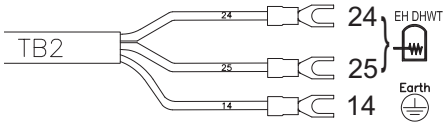
(Factory supplied cable) **(Extension cable)**

(*): Use a crimping tool to crimp the cables.

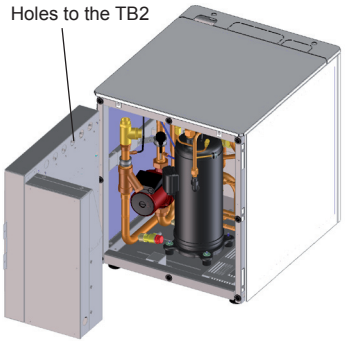
3 Take this extension cable, pass it behind the partition plate and wire the cable to the two clamps located at the left side and upper part of the indoor unit.



4 Take the extension cable to the Electrical Box 1 and pass it through one of the upper holes. Connect the earth wire to the 14th terminal and the other two wires to the 24 and 25 connections of the Terminal Board 2.

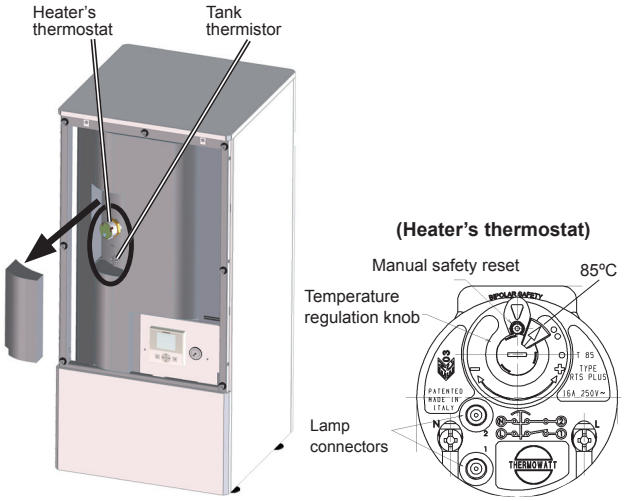


(Extension cable)



NOTE

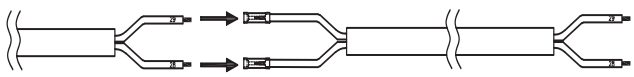
- ***Do not touch the Manual safety reset of the electrical heater.***
- ***Do not touch the temperature regulator unless the tank is working in emergency mode due to indoor unit or outdoor unit malfunction. In this case, refer to the section*** *DHW tank troubleshooting* ***in chapter*** *12 Troubleshooting.*



Tank thermistor

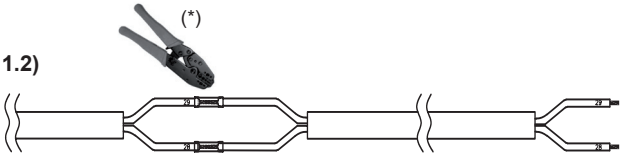
1 Connect the extension cable to the factory supplied cable.

1.1)



(Factory supplied cable) **(Extension cable)**

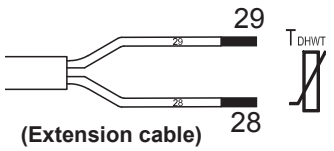
1.2)



(Factory supplied cable) **(Extension cable)**

(*): Use a crimping tool to crimp the cables.

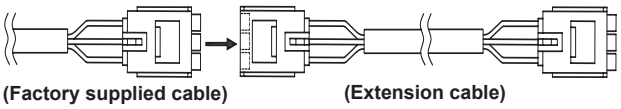
2 Follow the same procedure as for the electrical heater wire but connecting the Tank thermistor wires to the 28 and 29 connections of the Terminal Board 2.



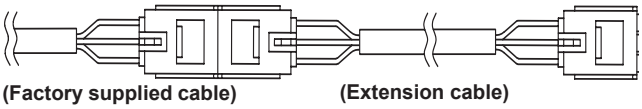
LCD controller

1 Connect the extension cable to the factory supplied cable.

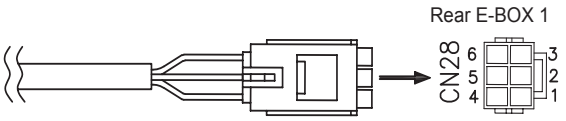
1.1)

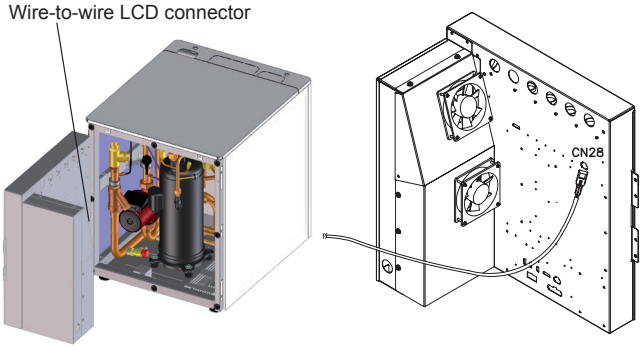


1.2)



2 Follow the same procedure as for the electrical heater wire but connecting the extension cable to the wire-to-wire connector in the Electrical Box 1 back side as shown in the figure.





2.3.5.13 Levelling procedure

◆ Indoor unit

Follow the same procedure explained in *Installation of indoor unit alone (without tank)* in section *2.2 Installation of indoor unit.*

◆ Domestic hot water tank

If it is necessary, adjust the height of the mounting foot as follows:

NOTE

- All the procedure must be done before filling the water tank.
- Adjust only the necessary mounting foot of the DHW tank with the foot locknuts and when the tank is in the final position (moving the DHWT after levelling can make it uneven again).
- Start with all four feet screwed in as far as possible (factory supplied position).
- Use two or more people for levelling procedure.

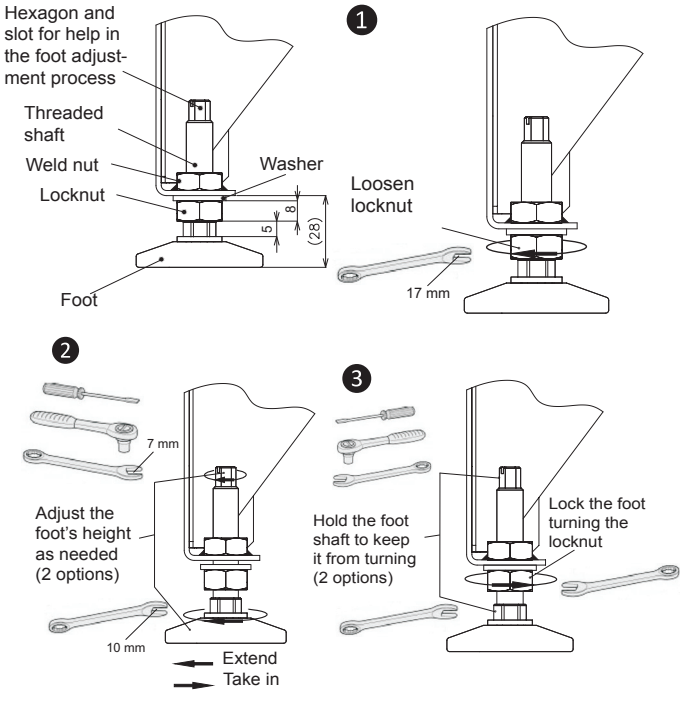
Follow the process:

1 Loosen the locknut of the mounting feet which needs to be extended (using a wrench).

2 Turn the mounting foot to extend the height (use the hexagon or slot designed for this purpose in the shaft end).

3 When the mounting foot is in his end position, lock the locknut. It may be necessary holding the foot to keep it from turning while tightening the locknut. Use for this purpose the hexagon or slot in the shaft end.

If it is needed to proceed with the levelling procedure with a second foot (process 1 to 3), never work over one foot at same time. When finish, all 4 locknut must be tightened firmly.



2.3.5.14 DHW tank fixation to the wall

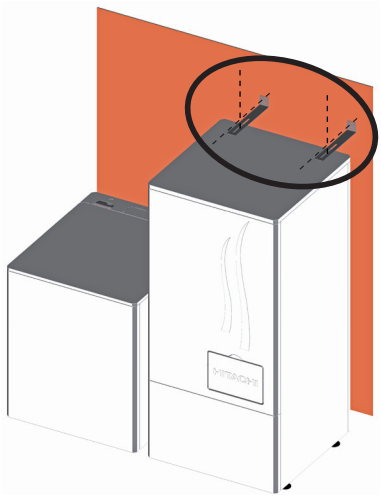
Fix the domestic hot water tank to the wall in order to provide a higher stability (use the factory supplied accessory intended for this purpose).

1 Fix the accessory to the DHW tank on the upper cover through the hoses with the bundled factory supplied screws.

NOTE

Use the accessory slotted hole to fix the DHW tank to the wall at the desired distance.

2 Fix the accessory to the wall with field supplied screws.



NOTE

Check that the tank is installed totally vertical.

2.3.5.15 Test and check

Before assembling the covers, test and check the following items:

- Water leakage
- Refrigerant leakage
- Electrical connection
- ...

NOTE

The following documents must be referred:

- ***Refer in this document to the chapter*** *3 Piping work and refrigerant charge* ***for water filling of the tank and the indoor unit and for refrigerant charge of the indoor unit and chapter*** *8 Commissioning* ***for the commissioning procedure of the tank and the indoor unit.***
- ***For the specific details about refrigerant charge tasks refer the*** *Outdoor unit Installation and Operation manual* ***if necessary.***

DANGER

DO NOT CONNECT THE POWER SUPPLY TO THE INDOOR UNIT AND DHW TANK PRIOR FILLING OF WATER BOTH CIRCUITS AND CHECKING WATER PRESSURE AND THE TOTAL ABSENCE OF ANY WATER LEAK.

2.3.5.16 Cover's assembly

Finally, reassembly all the cover's removed.

3. Piping work and refrigerant charge

Index

3.1 General notes before performing pipe work

3.1.1 General notes

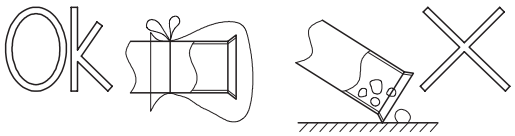
1 Prepare locally-supplied copper pipes.
2 Select the piping size with the correct thickness and correct material able to withstand sufficient pressure.
3 Select clean copper pipes. Make sure that there is no dust or moisture inside the pipes. Blow the inside of the pipes with oxygen free nitrogen to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

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.*

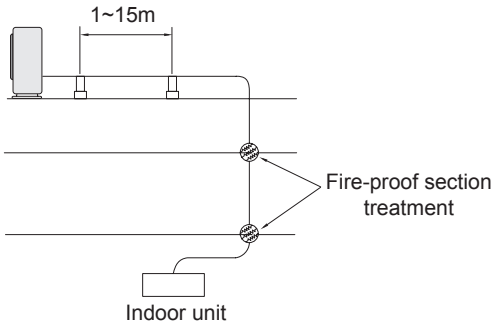


- ***If piping installation is not completed until next day or over a longer period of time, braze off the ends of the piping and charge with oxygen free nitrogen through a Schrader valve type access fitting to prevent moisture and particle contamination.***
- ***Do not use insulation material that contains NH3, as it can damage copper pipe material and become a source of future leakage.***
- ***Insulate the unions and flare-nuts at the piping connection part completely.***
- ***Completely insulate both refrigerant gas and liquid piping between the indoor unit and the outdoor unit to avoid a decrease of performance; if not, dew will occur 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

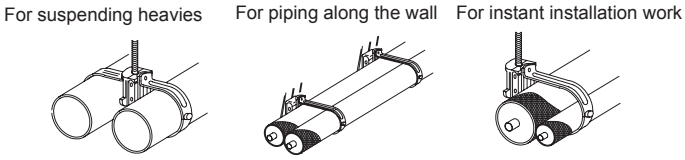
Suspend the refrigerant and water piping at certain points and prevent the refrigerant and water piping from being in direct contact with the building: walls, ceilings, etc..

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 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.***

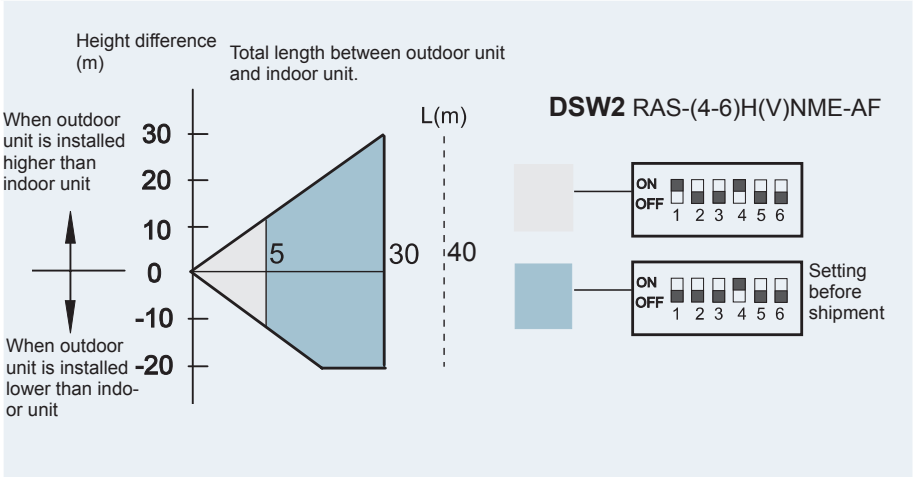
3.2 Refrigerant circuit

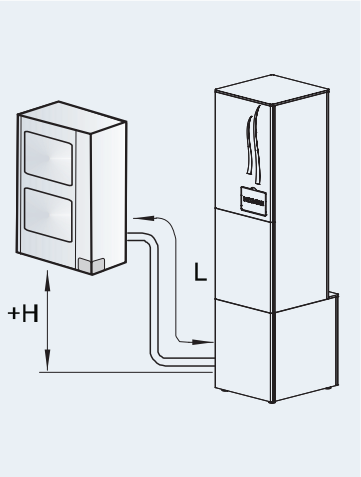
3.2.1 Refrigerant piping

◆ Refrigerant piping length between indoor unit and outdoor unit

The refrigerant piping length between indoor unit and 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		(4-6)HP
Maximum piping length between outdoor unit and indoor unit (Lmax)	Actual piping length	30 m
	Equivalent piping length	40 m
Minimum piping length between outdoor unit and indoor unit (Lmin)	Actual piping length	3 m
Maximum height difference between indoor and outdoor unit (H)	Outdoor unit higher than indoor unit	30 m
	Indoor unit higher than outdoor unit	20 m

◆ 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-4H(V)RNME-AF	Ø 15.88 (5/8”)	Ø 9.53 (3/8”)	RWH-4.0FS(V)NFE	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”)	RWH-5.0FS(V)NFE	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”)	RWH-6.0FS(V)NFE	Ø 15.88 (5/8”)	Ø 9.53 (3/8”)

NOTE

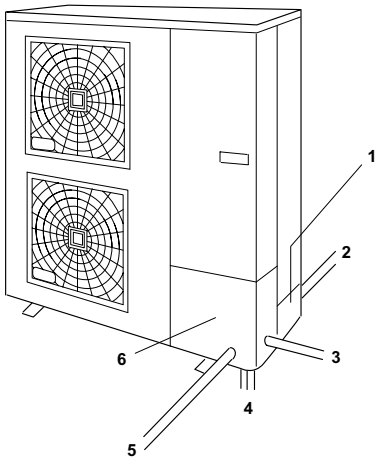
(*) Refigerant liquid / gas piping accessory is factory supplied.

3.2.2 Piping connections

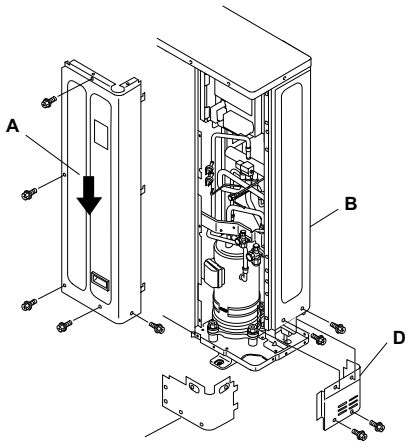
◆ Outdoor unit

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

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



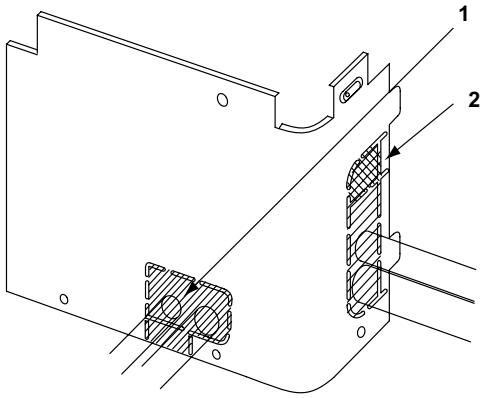
Make holes in the piping cover or cabinet for taking the pipes out. Take the piping cover away from the unit, and make holes by cutting along the guideline at the rear of the cover or punching it with a driver. Remove the burr with a cutter.

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



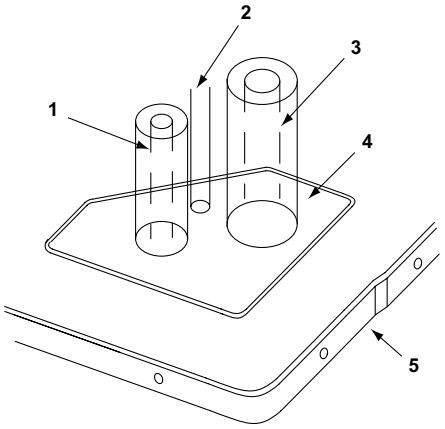
To use racking or conduit tubes, check the size and remove the stiped parts, following the slit.

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

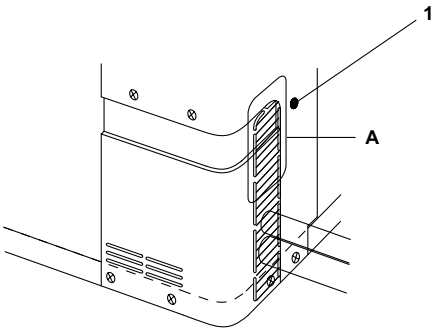


NOTE

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.

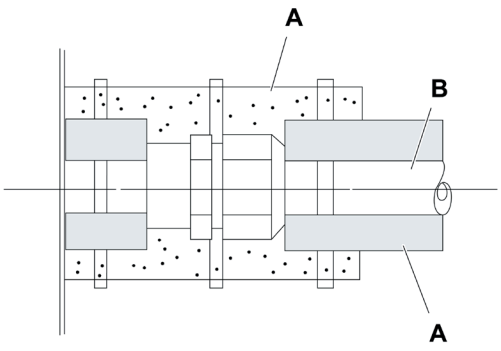
5 Connect the field supplied refrigerant pipes to the indoor unit and outdoor unit. Apply the oil thinly at the seat flare nut and pipe before tightening.

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



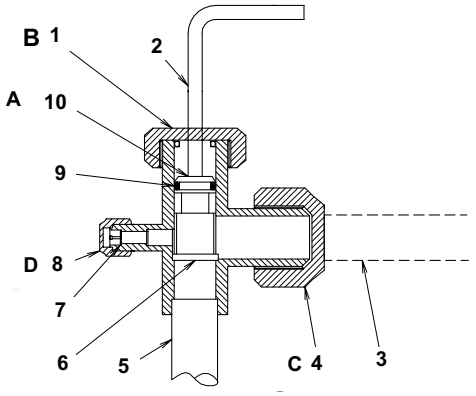
NOTE

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

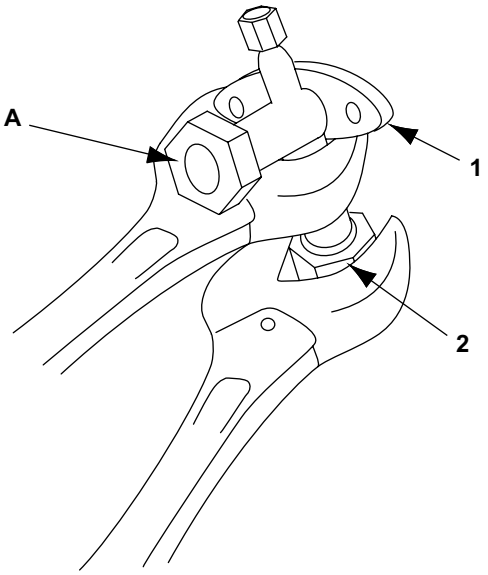
Closed before shipment



Tighten torque (Nm)				
Valve type	A	B	C	D
Liquid valve	7-9	34-42	34-42	14-18
Gas valve	9-11	34-42	68-82	14-18

- **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



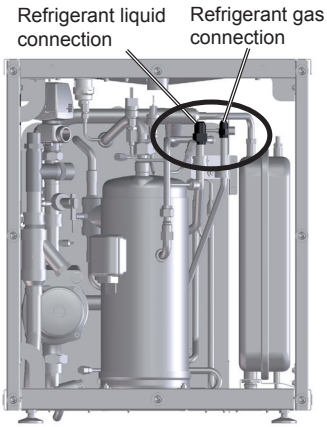
CAUTION

- ***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.***

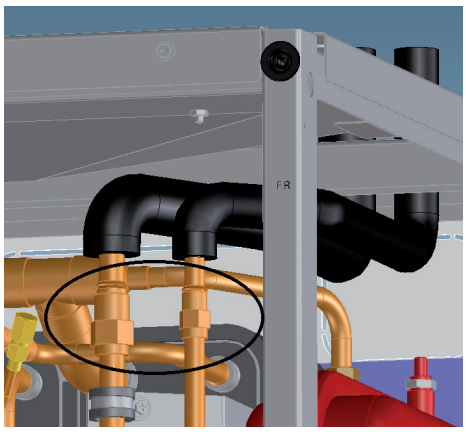
◆ Indoor unit

Refrigerant gas and liquid pipe indoor unit connection

Refrigerant gas/liquid connection (R410A) of indoor unit are located where it is visible in the following images:



Front view



NOTE

The refrigerant gas/liquid connection (R410A) of indoor unit is a flare nut connection but after installing the piping accessories the connection is done by brazing.

Refrigerant liquid/gas piping connection accessories

It is provided an accessory for the connection between the field refrigerant pipes (outdoor unit) and the indoor unit.

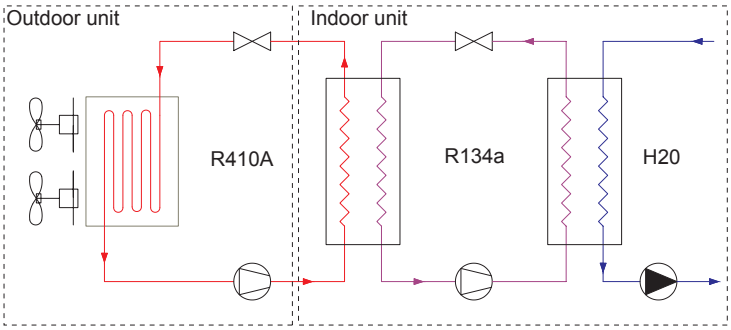
NOTE

Refer to section** Installation of indoor unit alone (without tank) **in chapter** 2 Unit installation **for the accessory installation.

3.2.3 Refrigerant charge

The YUTAKI S80 has two refrigerant circuits. The R410A circuit (1st cycle) works with this refrigerant while the indoor circuit (2nd cycle) works with R134a refrigerant. Piping connections must be performed in the R410A cycle between the outdoor unit and the indoor unit.

◆ Refrigerant charge amount



- The 1st cycle (R410A) is factory charged with a refrigerant charge amount for 30m of piping length. The maximum refrigerant piping length is 30m so it is not required an additional refrigerant charge.
- The 2nd cycle (R134a) connections are factory installed and refrigerant charged so no piping work or refrigerant charge is needed.

Refrigerant charge before shipment (W_0 (kg))

Unit type	Unit model	W_0 (kg) R410A	W_0 (kg) R134a
Outdoor unit	RAS-4H(V)RNME-AF	3.9	-
	RAS-(5/6)H(V)RNME-AF	4.0	-
Indoor unit	RWH-(4-6)FS(V)NFE	-	2.5

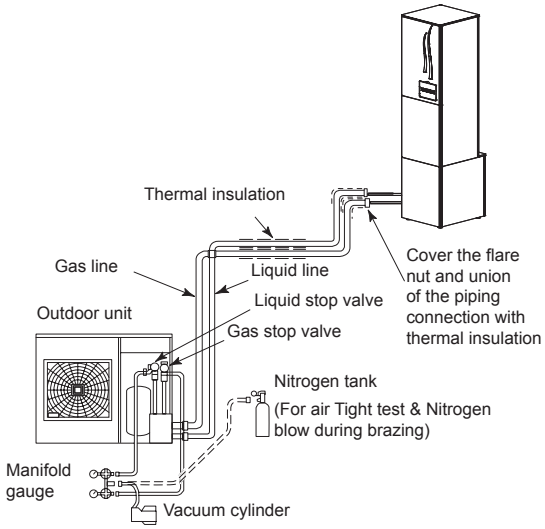
◆ R410A refrigerant charge and vacuum procedure

⚠ CAUTION

- ***Do not charge OXYGEN, ACETYLENE, or other flammable and poisonous gases into the refrigerant, as an explosion could occur. It is recommended that oxygen free nitrogen be charged for these types of test cycles when performing a leakage test or an airtight test. These types of gases are extremely dangerous.***
- ***Insulate the unions and flare-nuts at the piping connection part completely.***
- ***Insulate the liquid piping completely to avoid a decreased performance; if not, it will cause sweating on the surface of the pipe.***
- ***Charge refrigerant correctly following the procedures of the manuals. Overcharging or insufficient charging could cause a compressor failure.***

Follow the next procedure to charge the R410A refrigerant inside the indoor unit:

1. Connect the gauge manifold using charging hoses with a nitrogen cylinder to the outdoor unit check joints of the liquid line and the gas line stop valves.
2. Supply power to the indoor unit and switch the DSW1-2 ON of its PCB1. Thereby, solenoid valves SV1 and SV2 of the indoor unit will open to allow the operation of vacuum and refrigerant charge inside the indoor unit. It is very important to remind to switch the DSW1-2 OFF when finishing the whole procedure.
3. Check for any gas leakage at the flare nut connection by using nitrogen gas inside of the field-supplied piping to increase the pressure at 4.15 MPa.
4. Connect the vacuum pump to the gauge manifold and operate it for 1 to 2 hours until the pressure decreases lower than a pressure of 756 mmHg in vacuum.
5. Fully open the outdoor unit gas and liquid stop valves.
6. Operate the outdoor unit in cooling operation for more than 10 minutes to circulate the refrigerant through the whole circuit.



NOTE

In case the installer should fill the refrigerant circuit with more refrigerant due to its loss, follow the next procedure after doing vacuum to the installation:

1. After 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.
2. Charge the proper quantity of refrigerant according to the piping length (Calculate the quantity of the refrigerant charge).
3. Fully open the gas line stop valve, and slightly open the liquid line stop valve.
4. Charge refrigerant by opening the gauge manifold valve.
5. Charge the required refrigerant within the difference range of ±0.5kg by operating the system in cooling.
6. Fully open the liquid line stop valve after completing refrigerant charge.
7. Continue cooling operation for more than 10 minutes to circulate the refrigerant.
8. Remind to switch the indoor unit PCB1 DSW1-2 OFF when finishing the whole procedure.

3.2.4 Precautions in the event of gas refrigerant leaks

The installers and those responsible for drafting the specifications are obliged to comply with local safety codes and regulations in the case of refrigerant leakage.

⚠ CAUTION

- ***Check for refrigerant leakage in detail. If a large refrigerant leakage occurred, it would cause difficulty with breathing or harmful gases would occur if a fire were in the room.***
- ***If the flare nut is tightened too hard, it may crack over time and cause refrigerant leakage.***

◆ Maximum permitted concentration of HFCs

The refrigerant R410A, charged in the outdoor unit, and the refrigerant R134a, charged in the indoor unit, are incombustible and non-toxic gases. However, if leakage occurs and gas fills a room, it may cause suffocation.

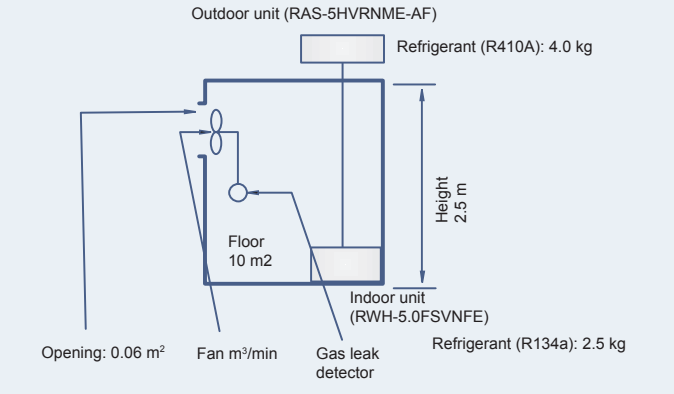
The maximum permissible concentration of HFC gas according to EN378-1 is:

Refrigerant	Maximum permissible concentration (kg/m³)
R410A	0.44
R134a	0.25

The minimum volume of a closed room where the indoor unit is installed to avoid suffocation in case of leakage is:

Minimum volume	**V > 10 m³**

If the room volume is below the minimum value, some effective measure must be taken account after installing to prevent suffocation in case of leakage.



Countermeasure in the event of possible refrigerant leakage

The room must have the following features to prevent suffocation in case a refrigerant leakage occurs:

1 Provide a shutterless opening which will allow fresh air to circulate into the room.
2 Provide a doorless opening of 0.15% or more size to the floor area.
3 There must be a ventilator fan connected to a gas leak detector, with a ventilator capacity of 0.4 m³/min or higher per Japanese refrigeration ton (= compressor displacement volume / (5.7 m³/h (R410A) or 14.4 m³/h (R134a)) of the air conditioning system using the refrigerant.

R410A	
Outdoor unit model	Tonnes
RAS-4H(V)RNME-AF	1.35
RAS-(5/6)H(V)RNME-AF	1.84

R134a	
Indoor unit model	Tonnes
RWH-(4.0-6.0)FS(V)NFE	1.61

NOTE

Always take the maximum value between the R410A and R134a.

4 Pay special attention to the place, such as a basement, etc., where the refrigerant can stay, since refrigerant is heavier than air.

3.2.5 Pump down of refrigerant

◆ 1st cycle (R410A)

When the refrigerant should be collected into the outdoor unit due to indoor/outdoor unit relocation, collect the refrigerant as follows:

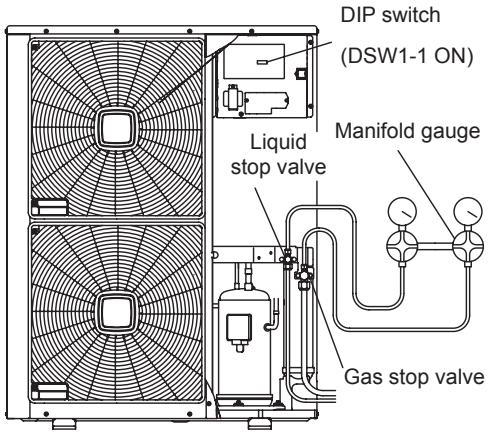
1 Attach the manifold gauge to the gas and the liquid stop valves.
2 Turn ON the outdoor unit and the indoor unit power sources.
3 Set the DSW1-1 pin of the outdoor unit PCB at the “ON” side for pump down operation (test run cooling). Close the liquid stop valve to retain all the refrigerant inside the outdoor unit.
4 When the pressure at lower pressure side (gas stop valve) indicates -0.01 MPa (-100 mmHg), perform the following procedures immediately.

   a. Close the gas stop valve.

   b. Set the outdoor unit DSW1-1 pin at the “OFF” side (To stop the unit operation).
5 Turn OFF the outdoor unit power source.

⚠ CAUTION

- ***Be careful that refrigerant and oil do not splash to the electrical parts at removing the charge hoses.***
- ***Measure the low pressure by the pressure gauge and keep it not to decrease than -0.01 MPa. If the pressure is lower than -0.01 MPa, the compressor may be faulty.***



IMPORTANT NOTE

In case outdoor unit test run failure (compressor failure, etc.), switch the DSW1-2 ON of indoor unit PCB1. Thereby, solenoid valves SV1 and SV2 of the indoor unit will open to allow the operation of vacuum and refrigerant charge inside the indoor unit. It is very important to remind to switch the DSW1-2 OFF when finishing the whole procedure.

◆ 2nd cycle (R134a)

The 2nd cycle (R134a) connections are factory installed and refrigerant charged so no vacuum or pumping down work is needed.

But, in case of replacing refrigerant parts, R134a refrigerant should be collected into a refrigerant charging cylinder as follows:

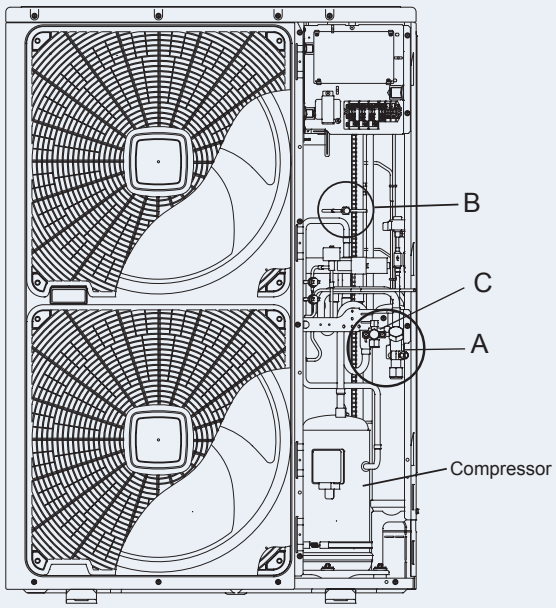
1 Use a refrigerant recovery system machine to pump down the R134a refrigerant attaching the manifold gauge to the check joint for piping “B” (see *Refrigerant check joints* next section).
2 Connect the refrigerant recovery system machine to the desirable field supplied deposit to collect the refrigerant.
3 Turn ON the refrigerant recovery system machine.
4 Follow the machine instructions to correctly perform the procedure.
5 Turn OFF the refrigerant recovery system machine when finishing recovering.

⚠ CAUTION

Measure the refrigerant pressure through the check joints “A” and “C” (see *Refrigerant check joints* next section).

3.2.6 Refrigerant check joints

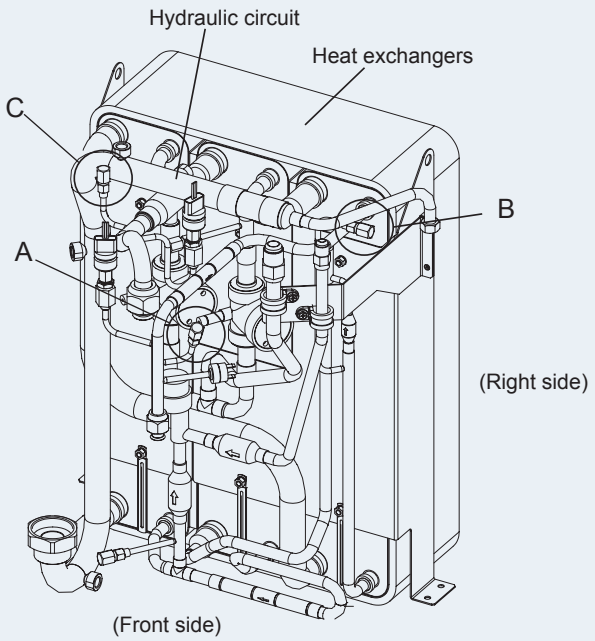
1st cycle (R410A) Outdoor unit



(Front view)

Part name	Function
Check joint for gas stop valve “A”	High pressure
Check joint for piping “B”	Exclusive for vacuum and pump down refrigerant
Check joint for liquid stop valve “C”	Low pressure

2nd cycle (R134a) Indoor unit



(Front side)

(Right side)

Part name	Function
Check joint for piping “A”	High pressure or vacuum
Check joint for piping “B”	Vacuum and pump down refrigerant
Check joint for piping “C”	Low pressure or vacuum

⚠ CAUTION

Be careful that refrigerant and oil do not splash to the electrical parts at removing the charge hoses.

3.3 Drain discharging boss of the outdoor unit

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-26	RAS-(4-6)H(V)RNME-AF

3.3.1 Connection procedure

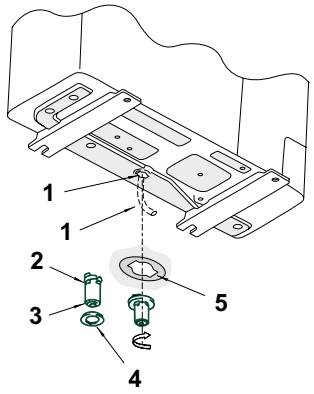
1 Insert the rubber cap into the drain boss up to the extruded portions.
2 Insert the boss into the unit base and turn approximately 40 degree counterclockwise.
3 The outer diameter section of the drain boss is 32 mm.
4 A drain pipe should be field-supplied.

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.***

Bottom base view

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



3.4 Space heating hydraulic circuit

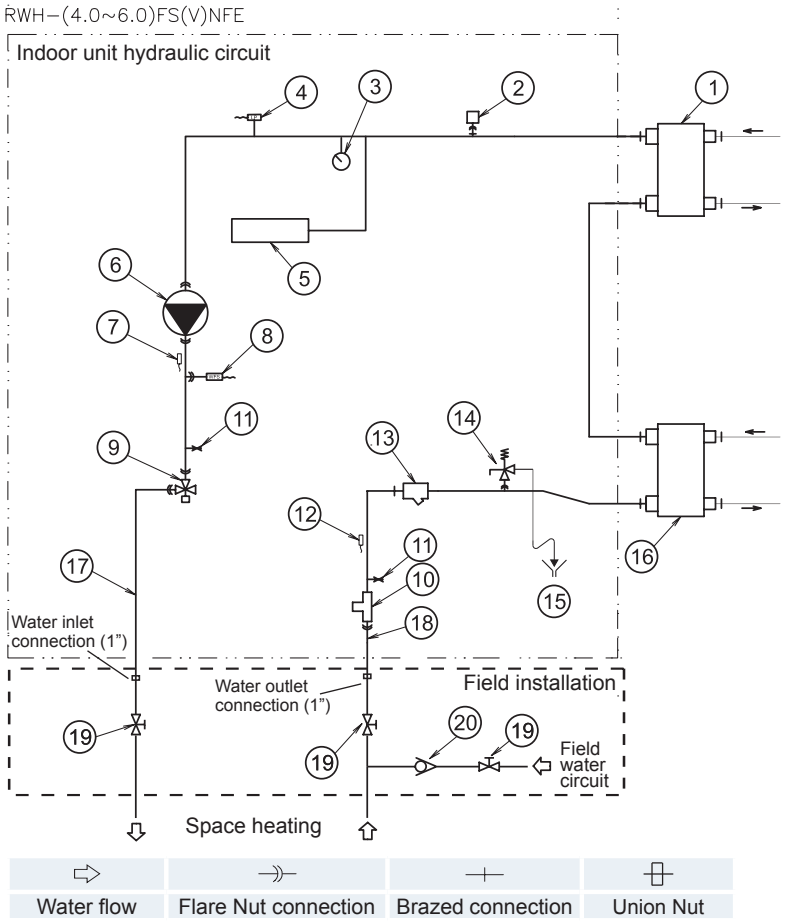
DANGER

Do not connect the power supply to the indoor unit and DHW tank prior filling of water both circuits and checking water pressure and the total absence of any water leak.

NOTE

- ***Proper Water pipe inspection should be performed after piping work to assure there is no water leakage in the circuit.***
- ***The Indoor Unit is equipped with an air purger (factory supplied) at the highest location of the Indoor Unit. 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 (field supplied) should be installed to ensure no air enters the water circuit.***
- ***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 Optional functions chapter).***
- ***The maximum piping length depends on the maximum pressure availability in the water outlet pipe. Please check the pressure charts.***

3.4.1 Hydraulic circuit



Nature	No.	Part name
Factory supplied	1	Plate heat exchanger (R134a-H2O)
	2	Air purger
	3	Indoor unit manometer
	4	Water pressure switch
	5	Expansion vessel
	6	Water pump
	7	Water outlet thermistor
	8	Water flow switch
	9	3-way valve
	10	T-branch
	11	Water pressure port (G 3/8")
	12	Water inlet thermistor
	13	Water strainer
	14	Safety valve
	15	Draining
	16	Plate heat exchanger (R410A-H2O)
	17	Space heating inlet water pipe (1") (accessory)
	18	Space heating outlet water pipe (1") (accessory)
Field supplied	19	Shut-off valve (field supplied)
Accessory	20	Water check valve (ATW-WCV-01 accessory)

◆ Additional hydraulic necessary elements

The following hydraulic elements are necessary to correctly perform the space heating water circuit:

- 2 shut-off valves (field supplied) must be installed in the indoor unit. One at the water inlet connection and the other at the water outlet connection in order to make easier any maintenance work.
- 1 water check valve (ATW-WCV-01 accessory) with 1 shut-off valve (field supplied) must be connected to the water filling point when filling the indoor unit. The Check valve acts as a safety device to protect the installation against back pressure, back flow and back syphon of non-potable water into drinking water supply net.

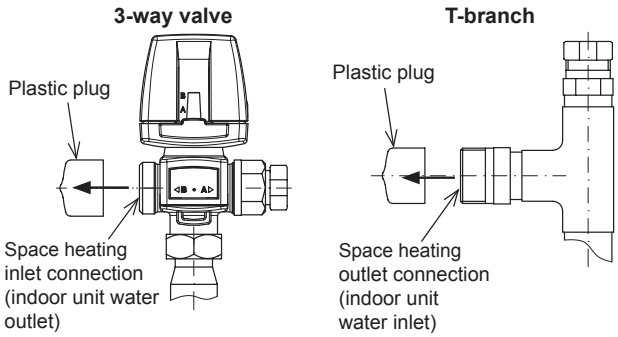
NOTE

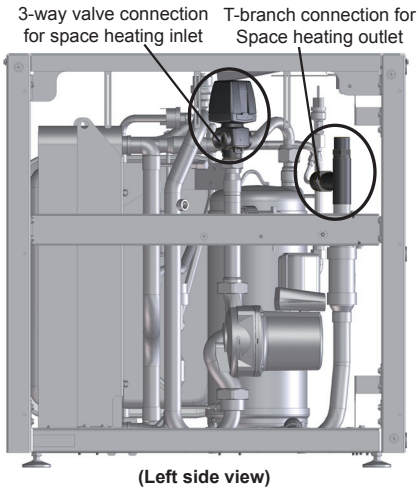
An additional special water filter is highly recommended to be installed on the space heating (field installation), in order to remove possible particles remaining from brazing which cannot be removed by the indoor unit water strainer.

3.4.2 Water piping

◆ Water pipes connection

Space heating water connection of indoor unit are located where it is visible in the following images:





(Left side view)

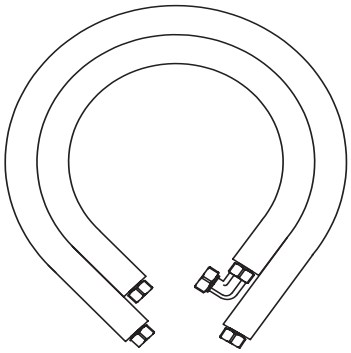
Piping size

(mm (inches))

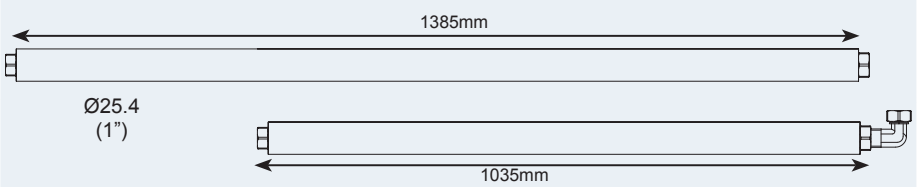
	Space heating	
	3-way valve connection	T-branch connection
RWH-(4.0-6.0)FS(V)NFE	Ø25.4 (1”)	Ø25.4 (1”)

◆ Space heating pipes (factory supplied)

Indoor unit is provided with two flexible water pipes (space heating pipes) for connection between the space heating and the indoor unit (to the T-branch and to the 3-way valve).



Indoor unit
factory supplied

Item	Connection
	Space heating outlet pipe (Without elbow) For the connection between the T-branch water inlet and the space heating outlet. Space heating inlet pipe (With elbow) For the connection between the 3-way valve water outlet and the space heating inlet.

3.4.3 Water quality

⚠ CAUTION

- ***Water quality must be according to EU council directive 98/83 EC.***
- ***Water should be subjected to filtration or to a softening treatment with chemicals before application as treated water.***
- ***It is also necessary to analyse the quality of water by checking pH, electrical conductivity, ammonia ion content, sulphur content, and others. Should the results of the analysis be not good, the use of industrial water would be recommended.***
- ***It is mandatory to do not add any kind of antifreeze product to the water circuit.***
- ***To avoid deposits of scale on the heat exchangers surface it is mandatory to ensure a high water quality with low levels of $CaCO_3$.***

3.4.4 Water filling

1. Check that a water check valve (ATW-WCV-01 accessory) with a shut-off valve (field supplied) is connected to the water filling point for filling the space heating hydraulic circuit (see *Hydraulic circuit*).
2. Make sure all the valves are open.
3. Check that the drain pipes connected to the safety valve and to the air purger are driven to the base hole near the heat exchanger. In case of the drain pipe for safety valve, place it as far as possible from the indoor unit (see installation procedure of the indoor unit in *Unit installation* chapter). The excessive water will be expelled by it.
4. Fill the space heating circuit with water. Stop filling when the pressure reaches approximately 1.8 bar.
5. Remove all the air inside the water circuit as possible through the indoor air purger and other air purgers from the installation (fan coils, radiators...). Additional water should be filled after removing air until it reaches approximately 1.8 bar.

NOTE

- ***During filling, the air in the circuit may not be able to be removed. Additional air purger in the installation should be installed at all high points of the circuit. They should be located at points which are easily accessible for servicing.***
- ***The maximum water pressure is 3 bar (Safety Valve nominal opening pressure).***
- ***For heating floor system, the air should be purged by means of an external pump and an open circuit to avoid air bags.***
- ***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.***
- ***The internal Air Pressure of the Expansion Vessel tank will be addapted to the water Volume of the final installation (factory supplied with 0.8 bar. of internal Air Pressure).***

3.4.5 Water flow adjustment

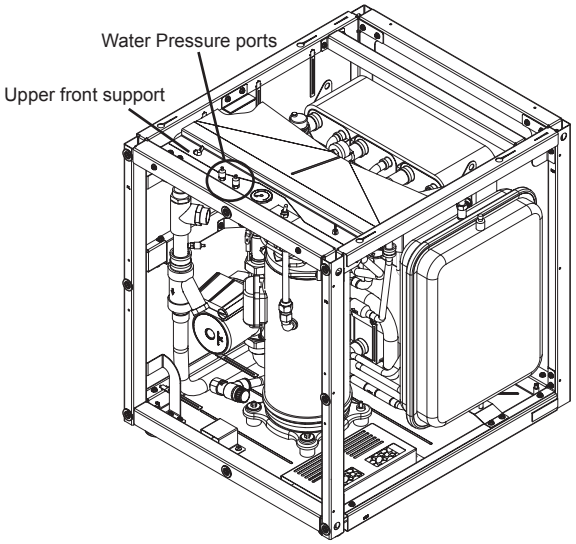
In every installation the Circuit's water flow must be adjusted according to its particular internal Water pressure lost. In addition to this, the circuit should be set according to the Space heating (Heating Floor, Radiators, Fan Coils) and its corresponding water outlet temperature. The procedure for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

1. Pressure lost calculation
2. Check the Pump Performance Curves
3. Selection of the Pump Speed
4. Water flow adjustment

Procedure:

1 Pressure lost calculation

The indoor unit is factory supplied with two Water Pressure Ports placed in the Upper front support. The object of these Water 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

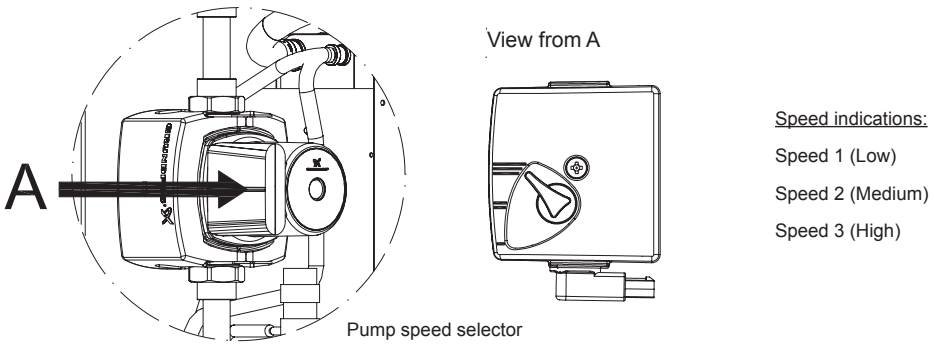
(1*) If there is no having a Differential Manometer, it is possible to do this operation with just one std. Manometer (it is advisable to use the same Manometer in order to avoid reading mistakes from different devices because of different tolerances or adjustment).

2 Check the pump performance curves

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

3 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.



NOTE

The Pumps are factory supplied on speed 3 (High)

4 Water flow adjustment

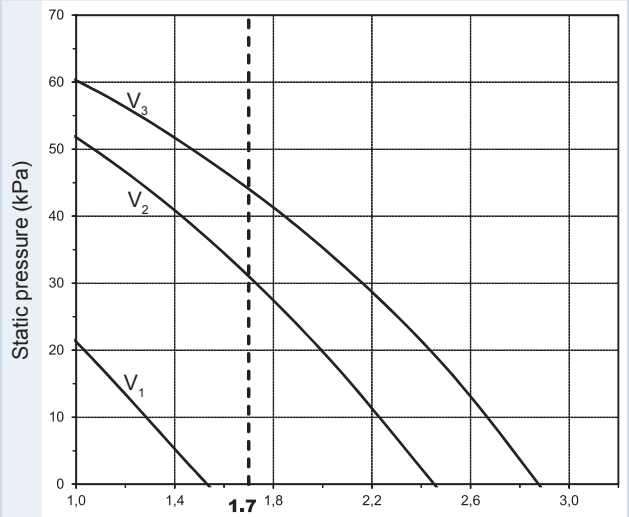
The Water Flow should be adjusted by closing one of the main Shut-off Valves (field supplied) of the Space heating installation until the pressure matches the Pump Performance Curves.

Finally, the differential Manometer should be removed once the Water Pressure Ports are closed.

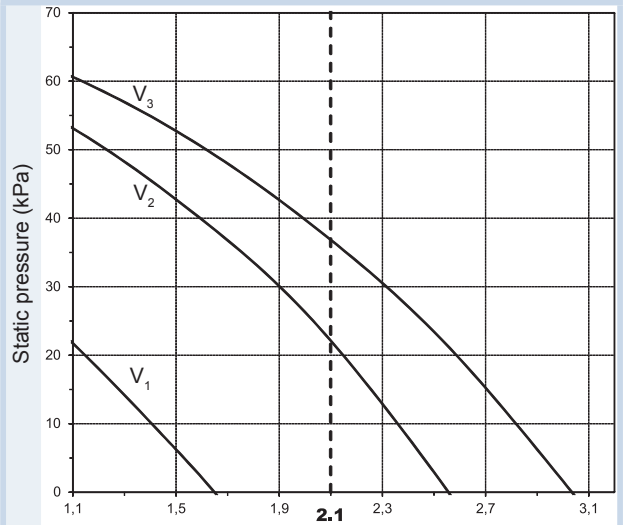
3.4.6 Pressure charts

◆ **RWH-(4.0-6.0)FS(V)NFE**

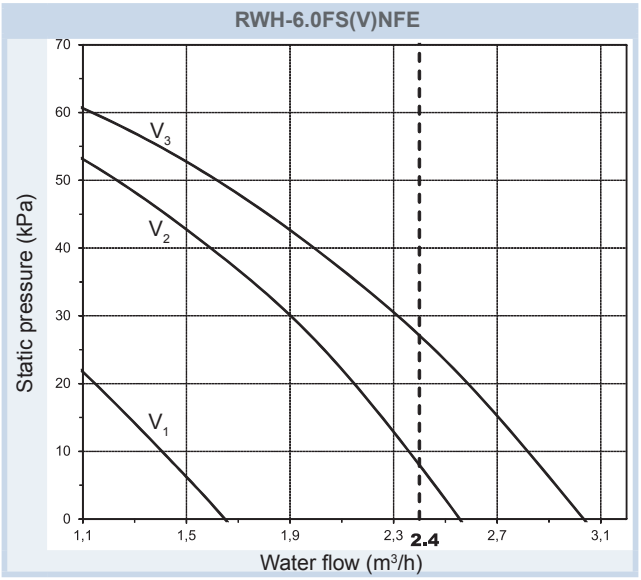
RWH-4.0FS(V)NFE



RWH-5.0FS(V)NFE



RWH-6.0FS(V)NFE



NOTE

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

3.5 DHW hydraulic circuit (Optional)

DANGER

Do not connect the power supply to the indoor unit and DHW tank prior filling of water both circuits and checking water pressure and the total absence of any water leak.

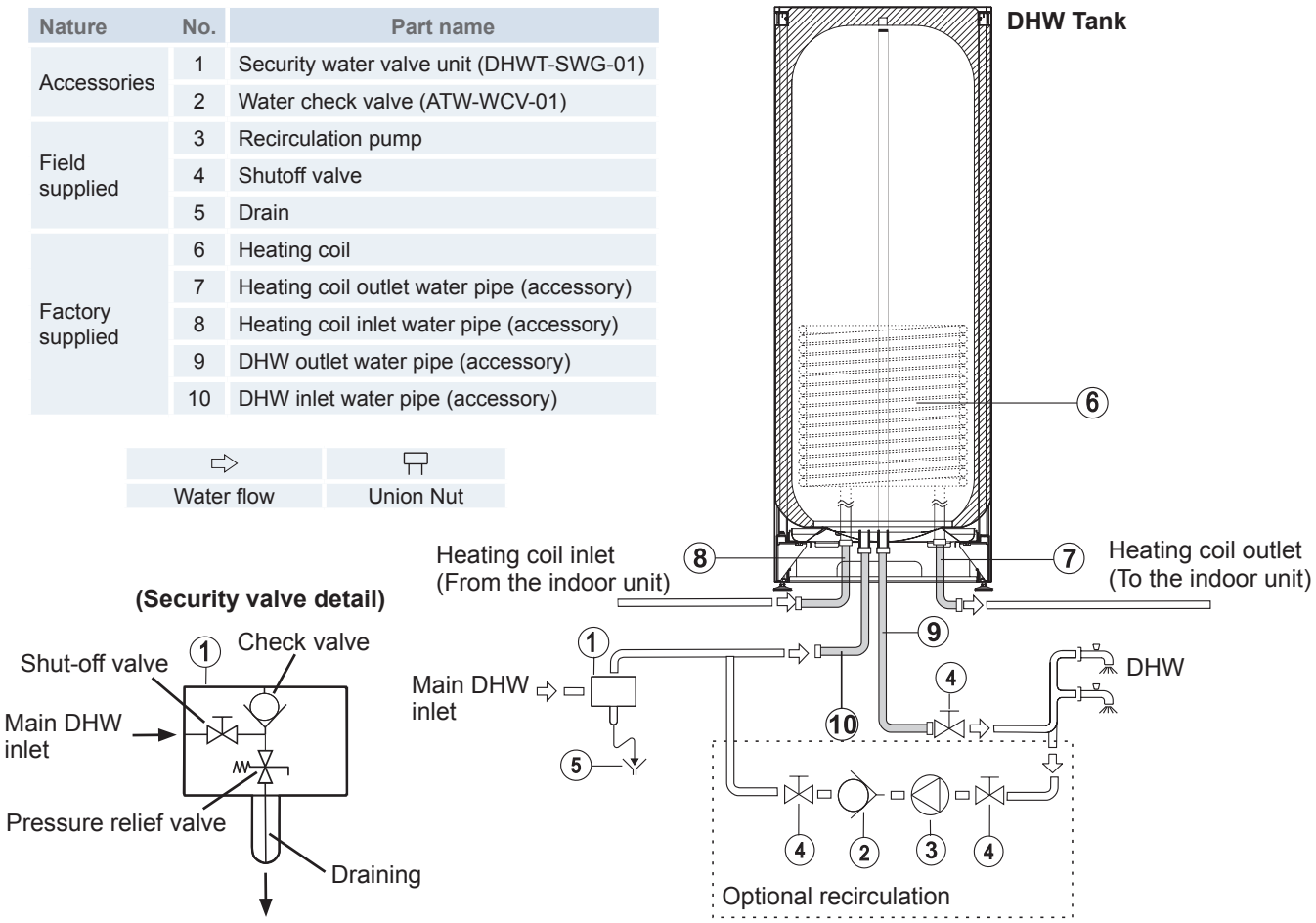
NOTE

- Connect all pipes as close as possible to the unit, so that disconnection can be easily performed when required.
- It is recommended to use flexible joints for the water piping inlet and outlet in order to avoid vibration transmission.
- 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.
- Proper water pipe inspection should be performed after piping work to assure there is no water leakage in the circuit by completely opening the DHW inlet and outlet shut-off valves.
- The heating coil of the tank is placed in a highest position than the indoor unit air purger. Then, to totally purge the space heating circuit, it is very important that the heating coil of the tank will be fully air purged.
- The Indoor Unit is equipped with an air purger (factory supplied) at the highest location of the Indoor Unit. 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 (field supplied) should be installed to ensure no air enters the water circuit.
- 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 *Optional functions* chapter).
- Fresh water must circulate inside the DHW tank water circuit at least one time per day during the first days after the installation has been performed.
- The storage capacity of the tank has to meet with the daily consumption in order to avoid stagnation of water.
- Try to avoid long runs of water piping between the tank and the DHW installation in order to decrease possible temperature losses.
- Insure that the installation, testing and applied materials comply with applicable legislation.

3.5.1 Hydraulic circuit

Nature	No.	Part name
Accessories	1	Security water valve unit (DHWT-SWG-01)
	2	Water check valve (ATW-WCV-01)
Field supplied	3	Recirculation pump
	4	Shutoff valve
	5	Drain
Factory supplied	6	Heating coil
	7	Heating coil outlet water pipe (accessory)
	8	Heating coil inlet water pipe (accessory)
	9	DHW outlet water pipe (accessory)
	10	DHW inlet water pipe (accessory)

Water flow	Union Nut

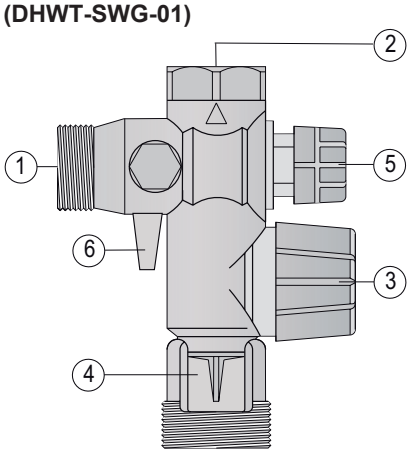


◆ Hydraulic necessary elements

The next hydraulic elements are necessary to correctly perform the domestic hot water circuit:

- **1 Security water valve (DHWT-SWG-01 accessory):** this Hitachi accessory (1) is a pressure and temperature relief valve that must be installed as near as possible at the DHW inlet connection before the DHW inlet water pipe factory supplied (10) (pressure setting 7 bar; temperature setting 90ºC). The security water valve provides:
  - Pressure protection
  - Non-return function
  - Shut-off valve
  - Filling
  - Draining

Security water valve (DHWT-SWG-01)



Ref.	Name
①	Main inlet water (DHW inlet)
②	Connection to the DHW inlet water pipe
③	Pressure relief valve and manual empty
④	Emptying connection (drain pipe)
⑤	Water check valve (non return)
⑥	Shut-off valve

NOTE

The discharge pipe should be always open to the atmosphere, free of frost and in continuous slope to the down side in case water leakage exists.

- **1 Shut-off valve (field supplied):** one (4) must be connected after the DHW outlet water pipe factory supplied (9) in order to make easier any maintenance work.

◆ Hydraulic optional elements

In case of a recirculation circuit for the DHW circuit:

- 1 Recirculation pump (field supplied): this pump (3) will help to correctly recirculate the hot water to the DHW inlet.
- 1 Water check valve (ATW-WCV-01 accessory): this Hitachi accessory (2) is connected after the pump (3) in order to ensure the non-return of water.
- 2 Shut-off valves (field supplied): one (4) before the pump (3) and one (4) after the check valve (2) in Shut-off valve (field supplied).

NOTE

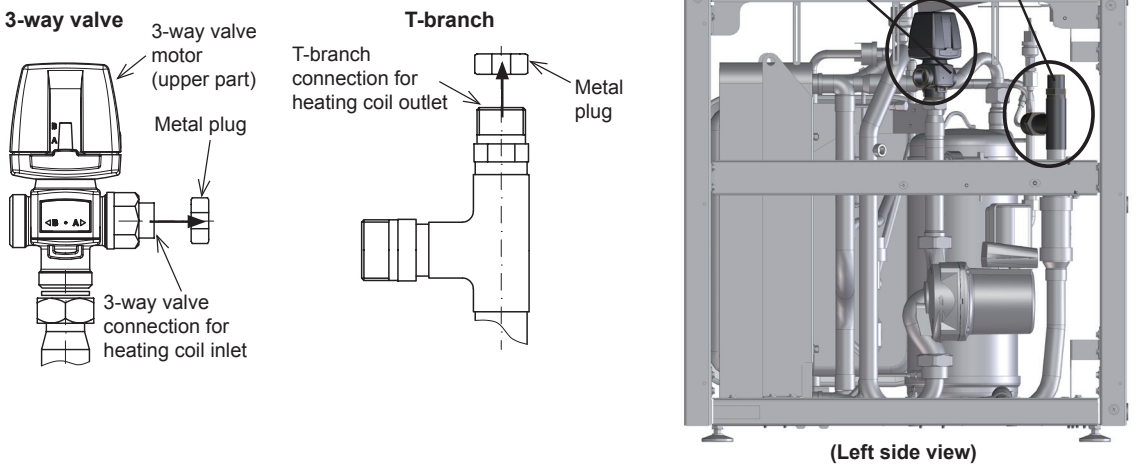
If the domestic cold water entry pressure is higher than the equipment's design pressure (6 bar), a pressure reducer must be fitted with a nominal value of 7 bar.

3.5.2 Water piping

◆ Water pipes connection

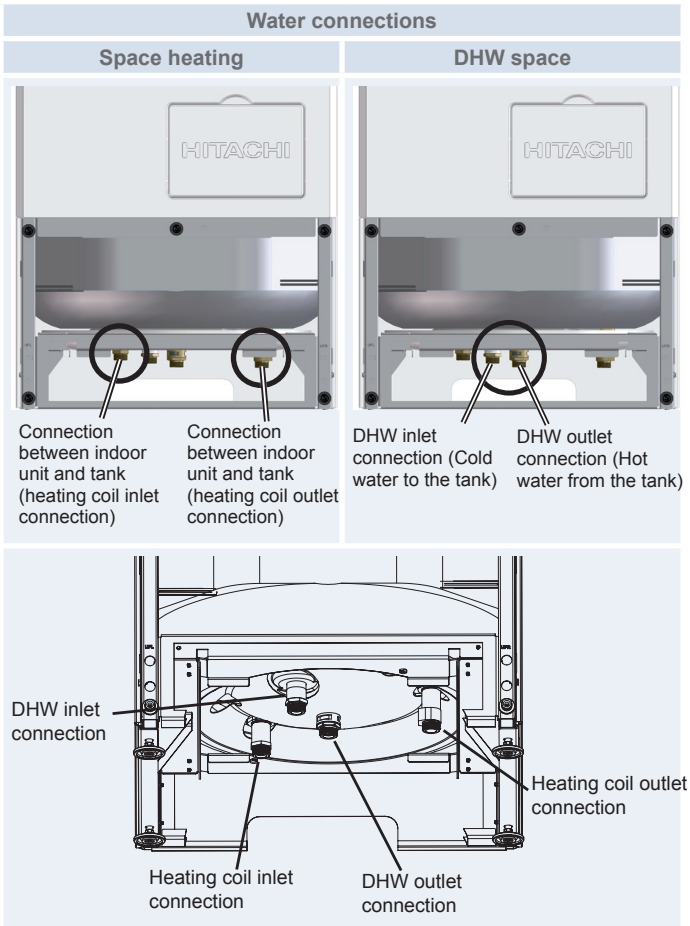
Indoor unit connections

The domestic hot water connections of indoor unit are located where it is visible in the following images:



Tank connections

The domestic hot water connections of the tank are located where it is visible in the following images:



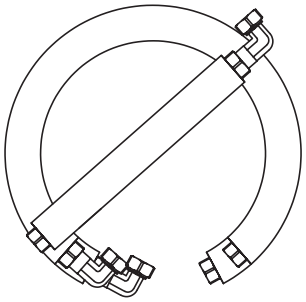
Piping size

(mm (inches))

	Heating coil		DHW	
	From indoor unit	To indoor unit	From DHW installation	To DHW installation
DHWS-(195/260)S-2.0H1E	Ø19.05 (3/4")	Ø19.05 (3/4")	Ø19.05 (3/4")	Ø19.05 (3/4")

◆ Heating coil and DHW pipes (factory supplied)

The DHW tank is factory supplied with two water pipes (heating coil pipes) to connect with the indoor unit (to the T-branch and to the 3-way valve) and other two (DHW pipes) for connection with the DHW installation.



Factory-supplied with the indoor unit

Heating coil pipes		
Item	Configuration	Connection
Ø19.05 (3/4") 365mm	Tank integrated over the indoor unit	Heating coil inlet pipe For the connection between the 3-way valve water outlet and the heating coil inlet.
	Tank beside the indoor unit	Heating coil inlet pipe For the connection between the heating coil inlet and one pipe of the flexible water pipes kit (ATW-FWP-01).
Ø19.05 (3/4") 960mm	Tank integrated over the indoor unit	Heating coil outlet pipe For the connection between the T-branch water inlet and the heating coil outlet.
	Tank beside the indoor unit	Heating coil outlet pipe For the connection between the heating coil outlet and the other pipe of the flexible water pipes kit (ATW-FWP-01).

NOTE

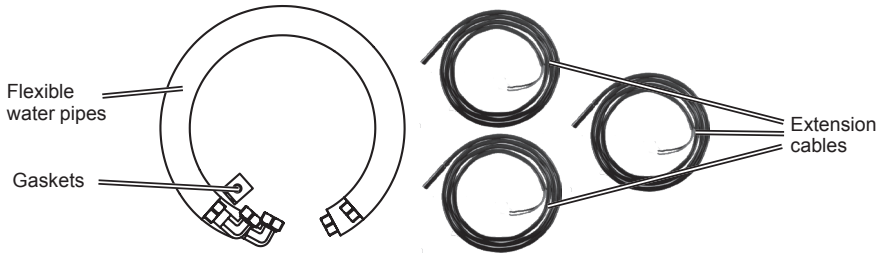
For the Flexible water pipes kit ATW-FWP-01 identification, please refer to the next page.

DHW pipes	
Item	Connection
Ø19.05 (3/4") 1045mm 960mm	DHW inlet pipe For the connection between the DHW inlet connection (cold water to the tank) and the DHW installation. DHW outlet pipe For the connection between the DHW outlet connection (hot water from the tank) and the DHW installation.

◆ Flexible water pipes kit ATW-FWP-01 (for installation of indoor unit beside HITACHI tank)

For installing the tank beside the indoor unit (both left or right side) the dedicated kit for installation with tank beside the indoor unit (ATW-FWP-01) is required. This kit is provided with the following items:

- 2 flexible water pipes
- 5 gaskets (4 gaskets for each flexible water pipe end and 1 spare gasket)
- 3 extension cables (1 for the tank's electric heater, 1 for the tank's thermistor and 1 for the LCD controller).



It is necessary to identify the function of each water pipe.

Flexible water pipes of the kit	
Item	**Connection**
	Kit pipe for heating coil inlet For the connection between the 3-way valve heating coil inlet connection and the free end of the heating coil inlet pipe.
	Kit pipe for heating coil outlet For the connection between the T-branch heating coil outlet connection and the free end of the heating coil outlet pipe.

NOTE

For the Flexible water pipes kit ATW-FWP-01 installation, please refer to the section *Installation of Indoor unit with HITACHI tank (tank beside the indoor unit)* ***in chapter*** *Unit installation****.***

3.5.3 Water quality

CAUTION

- ***Water quality must be according to EU council directive 98/83 EC.***
- ***Water should be subjected to filtration or to a softening treatment with chemicals before application as treated water.***
- ***It is also necessary to analyse the quality of water by checking pH, electrical conductivity, ammonia ion content, sulphur content, and others. Should the results of the analysis be not good, the use of industrial water would be recommended for the heating coil circuit.***
- ***It is mandatory to do not add any kind of antifreeze product to the water circuit.***
- ***To avoid deposits of scale on the heating coil surface it is mandatory to ensure a high water quality with low levels of $CaCO_3$.***

The following is the recommended standard water quality.

Item	DHW space	Tendency (1)	
	Water supplied (3)	Corrosion	Deposits of scales
Electrical Conductivity (mS/m) (25°C) {µS/cm} (25 °C) (2)	100~2000	●	●
Chlorine Ion (mg Cl^-/l)	max. 250	●	
Sulphate (mg/l)	max. 250	●	
Combination of chloride and sulphate (mg/l)	max. 300	●	●
Total Hardness (mg $CaCO_3$ /l)	60~150		●

NOTE

- *(1): The mark "●" in the table means the factor concerned with the tendency of corrosion or deposits of scales.*
- *(2): The value showed in "{}" are for reference only according to the former unit.*
- ***(3): Water range will be according s/UNE 112076:2004 IN.***

3.5.4 Water filling

◆ Heating coil circuit

Fill the DHW tank heating coil from the space heating circuit filling in point. Follow the instructions explained in the *Space heating hydraulic circuit* chapter to correctly perform the operation.

CAUTION

- ***Check that the heating coil pipes are correctly connected between indoor unit and tank before filling the tank's heating coil.***
- ***Ensure the correct water quality of the indoor unit water circuit.***

◆ Domestic hot water tank and circuit

1. Open all the outlet water taps of the DHW installation to eject all the air inside the water circuit.
2. Open the main DHW inlet valve (shut-off valve of the security water valve accessory DHWT-SWG-01) to fill of water the tank.
3. When water begins to leave by the outlet water taps of the DHW installation, close all these taps.
4. Finally, close the main DHW inlet valve when the pressure reaches approximately 6 bars.

CAUTION

- ***Check carefully for leaks in the water circuit, connections and circuit elements.***
- ***Check that the water pressure in the circuit is lower than 7 bars.***
- ***Make sure that all field supplied components installed in the piping circuit can withstand the water pressure.***
- ***Check that water flows free through the discharge pipe of the security water valve accessory (pressure relief valve) (DHWT-SWG-01).***

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-4HVRNME-AF	0.41
RAS-5HVRNME-AF	0.32
RAS-6HVRNME-AF	0.32
RAS-4HRNME-AF	-
RAS-5HRNME-AF	-
RAS-6HRNME-AF	-

Model	Z_{max} (Ω)	Z_{max} (Ω)
	Indoor unit alone (Without tank)	Indoor unit with HITACHI tank
RAS-4HVRNME-AF	0.31	0.19
RAS-5HVRNME-AF	0.27	0.19
RAS-6HVRNME-AF	0.24	0.19
RAS-4HRNME-AF	-	0.37
RAS-5HRNME-AF	-	0.37
RAS-6HRNME-AF	-	0.37

NOTE

(*) In case of outdoor 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-4HRNME-AF RAS-5HRNME-AF RAS-6HRNME-AF RWH-4.0FSVNFE RWH-5.0FSVNFE RWH-6.0FSVNFE	-
Equipment complying with IEC 61000-3-12	RAS-4HVRNME-AF RAS-5HVRNME-AF RAS-6HVRNME-AF RWH-4.0FSNFE RWH-5.0FSNFE RWH-6.0FSNFE	-

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 capacity of power supply is enough. If not, the compressor will be not able to operate because of abnormal voltage drop at starting.

7 Check to ensure that the ground wire is connected.

8 Connect a fuse of specified capacity.

DANGER

- ***Do not connect the power supply to the indoor unit and DHW tank prior filling of water both circuits and checking water pressure and the total absence of any water leak.***
- ***Do not connect or 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.***
- ***Be sure to use a dedicated power circuit for the indoor unit. Never use a power circuit shared by another appliance (Outdoor unit).***

CAUTION

- ***Check to ensure that screws for terminal block are tightly tightened.***
- ***Check to ensure that the indoor fan (inverter box) and the outdoor fan have stopped before electrical wiring work or periodical check is performed.***
- ***Protect the indoor unit against the entry of small animals (like rats) which could making contact with the wires, the drain pipe, electrical parts and may damage unprotected parts, and at the worst, a fire will occur.***
- ***Avoid the wiring from touching the refrigerant pipes, water pipes, plate edges and electrical parts inside the unit. If not do, the wires will be damaged and at worst, a fire will occur.***
- ***In the indoor unit, lead the cables to the knockout hole (power, control and LCD cables) through the clamps placed in the upper part of the indoor unit, trying to keep the maximum possible distance between the control and LCD cables with the power cables.***
- ***In the outdoor 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.***

NOTE

Check and test to ensure that if there is more than one source of power supply, that all are turned OFF.

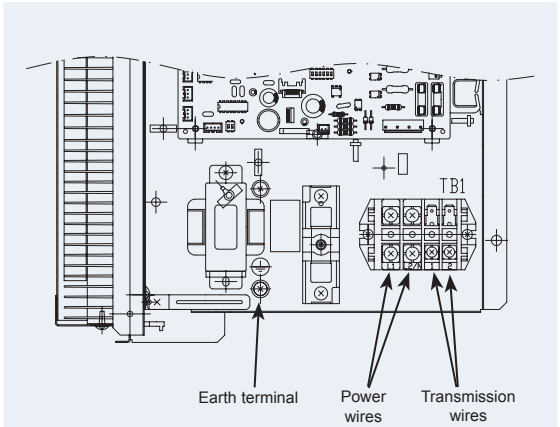
4.2 Electrical wiring connection

4.2.1 Electrical wiring for outdoor unit

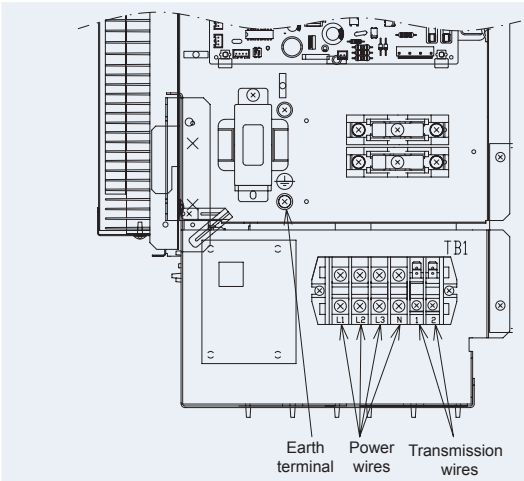
The correct electrical wiring connection for the outdoor unit is shown below:

1 Using the appropriate cable, connect the power circuit to the appropiate terminals as shown on the wiring label and the illustration below. Connect the power supply cables L1 and N (for 230V 50Hz) or L1, L2, L3 and N (for 400V 50Hz) to the terminal board, and the earth conductor to the earthing screw in the electrical box base plate.

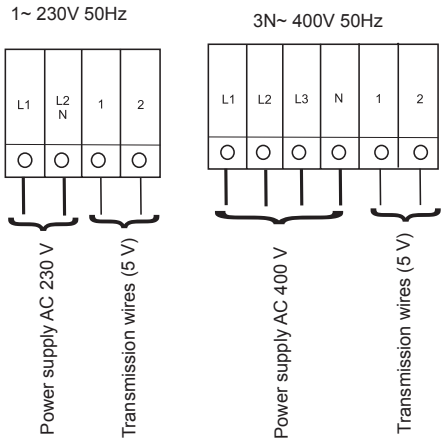
RAS-(4-6)HVRNME-AF



RAS-(4-6)HRNME-AF

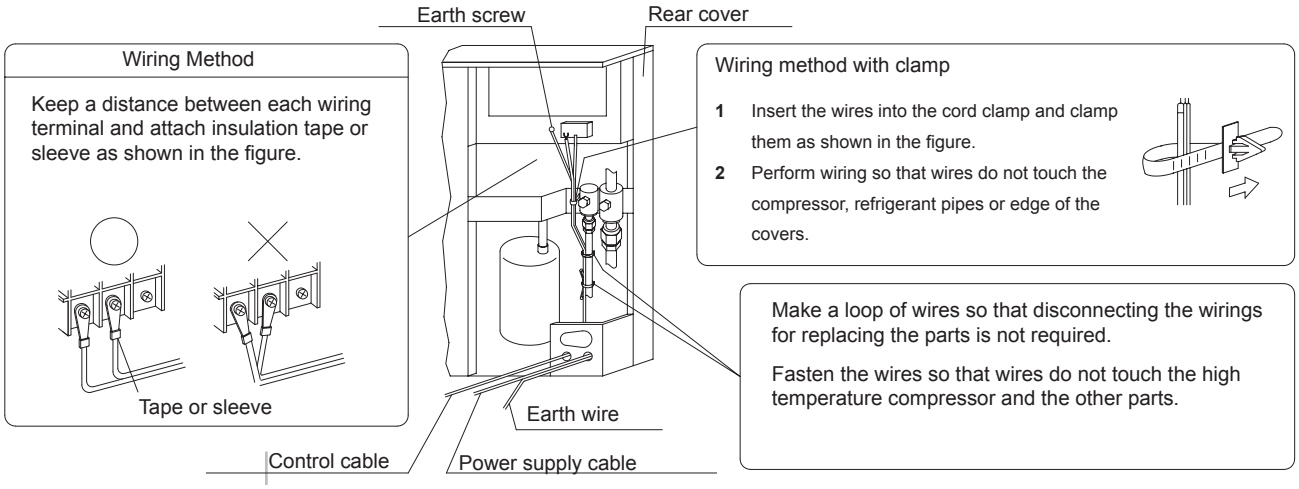


2 Connect the transmission wires between the outdoor unit and the indoor unit to the terminals 1 and 2 on the terminal board.



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

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



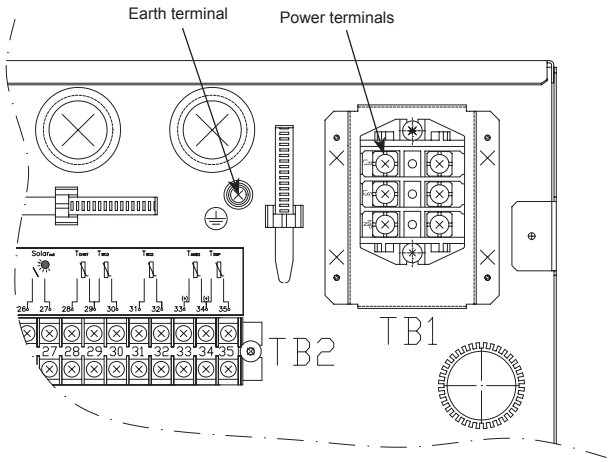
4.2.2 Electrical connection of indoor unit

◆ Power and transmission wiring connection

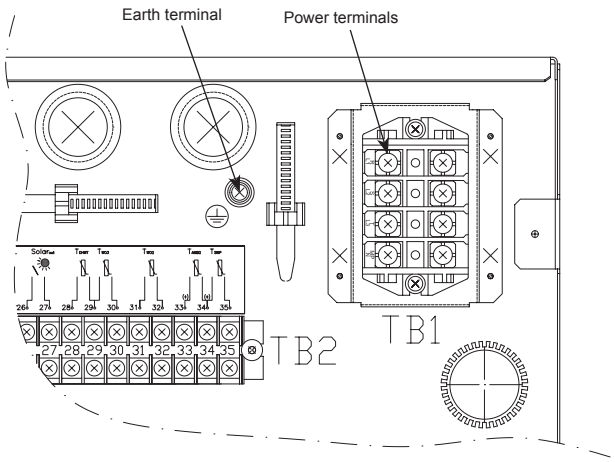
1 Using the appropriate cable, connect the power circuit to the appropriate terminals as shown on the wiring label and the illustration below. Connect the power supply cables L1 and N (for 230V 50Hz) or L1, L2, L3 and N (for 400V 50Hz) to the terminal board (TB1), and the earth conductor to the earth screw in the electrical box base plate.

TERMINAL BOARD 1 (TB1)

1~ 230V 50Hz

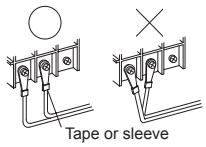


3N~ 400V 50Hz



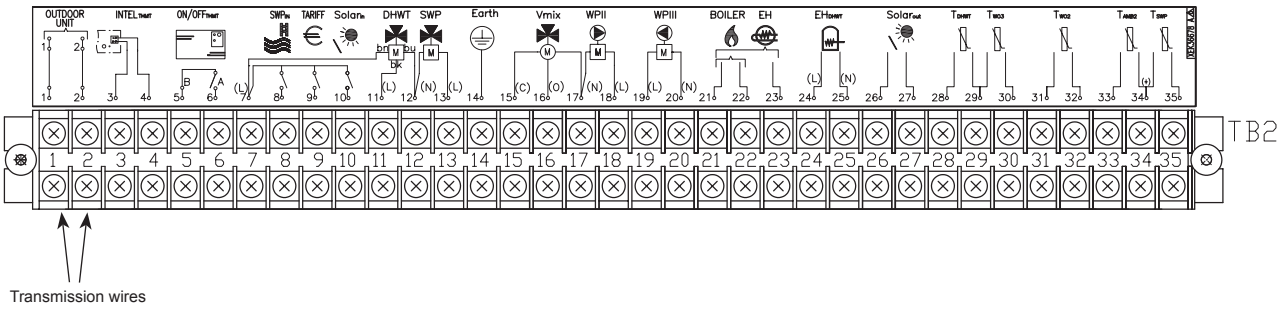
CAUTION

- ***Be sure to use a dedicated power circuit for the indoor unit. Never use a power circuit shared by another appliance (Outdoor unit).***
- ***Keep a distance between each wiring terminal and attach insulation tape or sleeve as shown in the figure.***

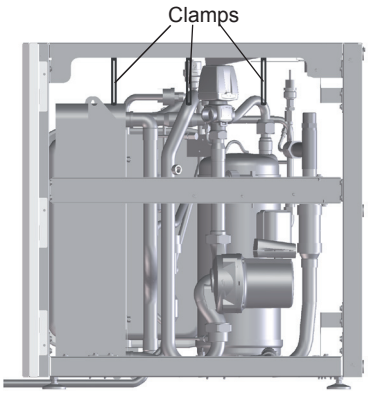


2 Connect the transmission wires between the outdoor unit and the indoor unit to the terminals 1 and 2 on the terminal board 2 (TB2).

TERMINAL BOARD 2 (TB2)



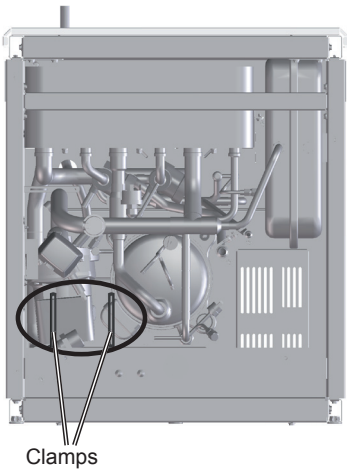
3 Pass the electrical wiring through the clamps placed in the upper part of the indoor unit.



NOTE

Try to keep the maximum possible distance between the control cables and the power cables.

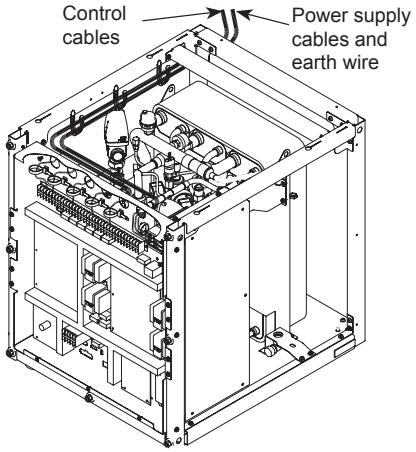
4 Perform a looping in the wiring through the clamps placed below the indoor unit cover's protection.



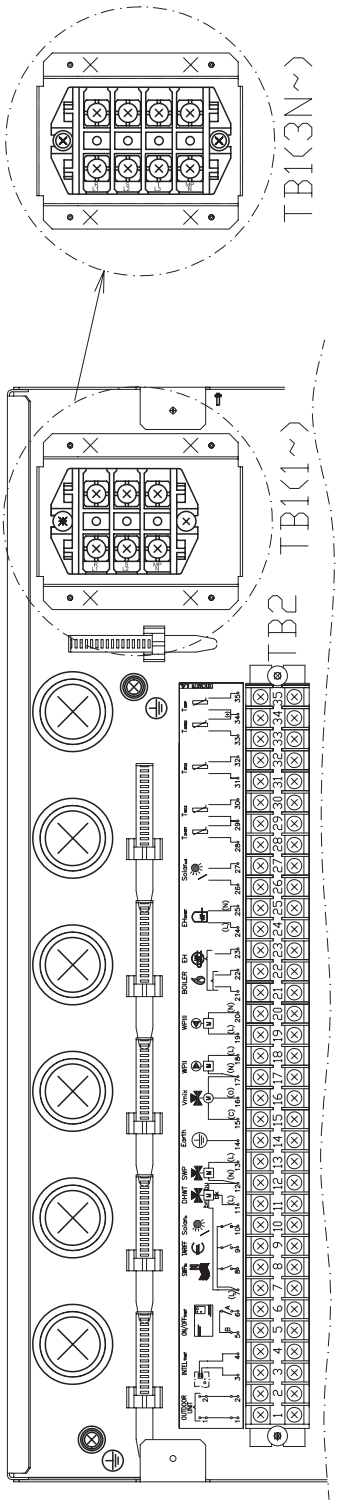
NOTE

This is done in order to ensure the electrical box removing without problems with the power wiring. In this case, undo the wiring looping before removing the electrical box.

5 Take out the electrical wiring by the hole for wiring connection placed on the back side of the unit.



◆ Terminal board connections



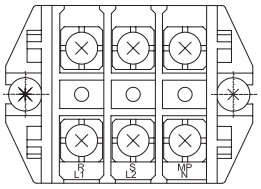
Mark	Part name		Description
TERMINAL BOARD 1 (TB1)			
N	1~ 230V 50Hz	3N~ 400V 50Hz	
L1			
L2	-		
L3			
TERMINAL BOARD 2 (TB2)			
1	Indoor/Outdoor commutation cables		The H-LINK transmission between outdoor unit and indoor unit is wired to terminals 1-2.
2			
3	Opentherm communication cables		Only for 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 is 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.
6			
7	L Common		Terminal Line common for swimming pool, tariff switch, solar input and DHW Valve accessory.
8	Swimming pool input		Only for swimming pool installations: It is necessary to connect an external input to the 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 used 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 the 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	Common boiler/water electric heater		Terminal line common for combination with boiler or water electric heater.
22	Boiler/Water electric heater step 1 output		The boiler can be used to alternate with the heat pump when the heat pump cannot achieve the required temperature by itself.
23	Water electric heater step 2 output		A water electric heater (as accessory) can be used to provide the additional heating required on the coldest days of the year.
24	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.
25			
26	Solar output		Output for solar combination with Domestic Hot Water Tank.
27			
28	DHW thermistor		The DHW sensor is used to control the domestic hot water storage tank.
29	Common thermistor		Common terminal for thermistor.
30	Water outlet boiler thermistor (THMwo3)		Water sensor for boiler combination.
31	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.
32			
33	Second ambient thermistor		The sensor is used for the second ambient temperature control and should be positioned outside.
34(+)	Common thermistor		Common therminal for second ambient and swimming pool thermistor (+12Vcc).
35	Swimming pool thermistor		The sensor is used for the swiming pool temperature control and should be positioned inside plate HEX of swimming pool.

◆ Terminal board detailed connection

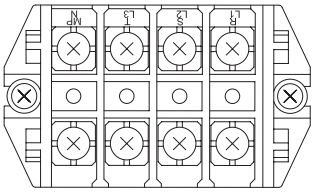
Main power supply (TB1)

The mains power connection is wired to Terminal Board 1 (TB1).

Power supply: 1~ 230V 50Hz



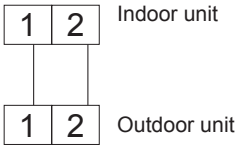
Power supply: 3N~ 400V 50Hz



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 the indoor unit and the outdoor unit.



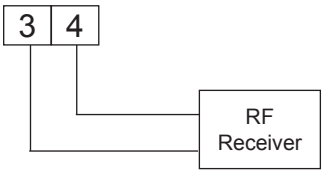
Room thermostat configuration

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.

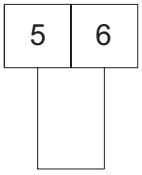
The Room Unit and RF Receiver are already configured to communicate with each other. If the Room Unit or RF Receiver is replaced or added additional second temperature circuit thermostat, it is necessary to use the RF binding procedure.



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

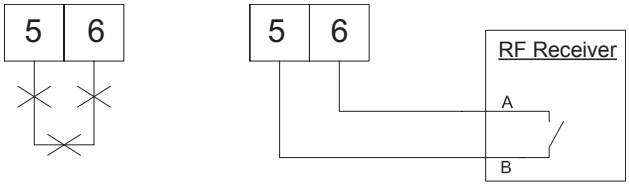
The heat pump system has been designed to allow the connection of a remote ON/OFF thermostat to effectively control your home's temperature. Depending on the room temperature, the thermostat will turn the unit system ON or OFF.

- If no thermostat is installed: Terminals 5 and 6 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:

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.

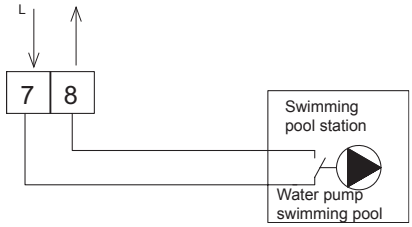
NOTE

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

4

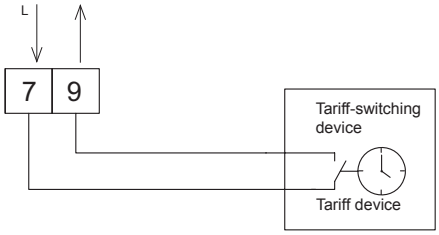
Swimming pool input (TB2)

It is necessary to connect an external input to the heat pump to provide a signal when swimming pool's water pump is ON.



Tariff switch input (TB2)

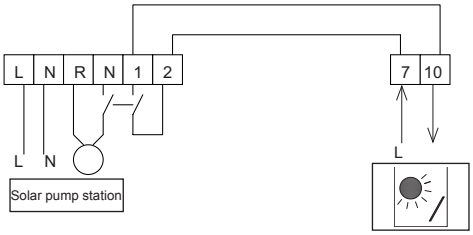
If a tariff-switching device (load shedding management) is provided by the electricity utility, it can be used to prevent the heat pump switching ON.



Solar input (TB2)

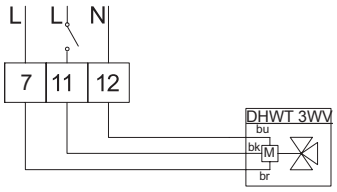
The solar pump station will have an auxiliary contact that closes when the solar pump station's pump contact is operated.

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 supplied 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

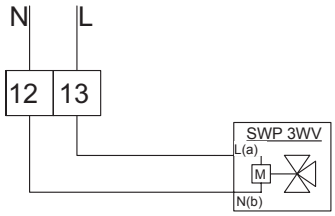
CAUTION

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 supplied 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:

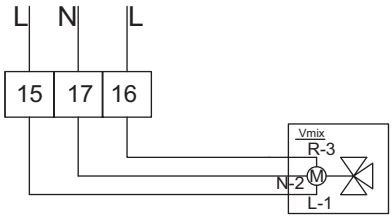
- ***Spring return 2-wire type 3-way valve: the 3-way valve should be fitted when normally working (not power into the valve).***
- ***If using SPST 3-wire valve, HITACHI is not responsible for its operation.***

Earth connection (TB2)

An extra terminal is provided in the terminal board (TB2) for earth connection of the accessories (Terminal 14).

Mixing valve for 2nd circuit control (TB2)

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



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

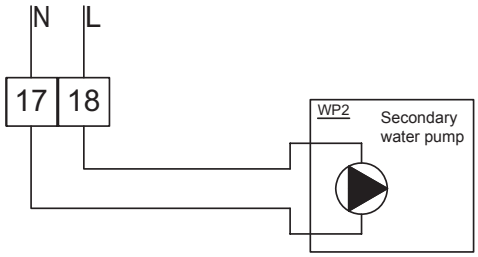
Using the appropriate cable, connect valve cable as shown in previous diagram.

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.



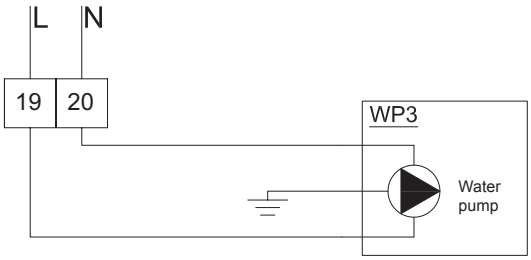
Using the appropriate cable, connect pump cable as shown in previous diagram.

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 or Water electric heater output (TB2)

NOTE

For the coldest days of the year the YUTAKI S80 can combine with water electric heater or boiler, but not with both simultaneously.

- **For water electric heater combination**

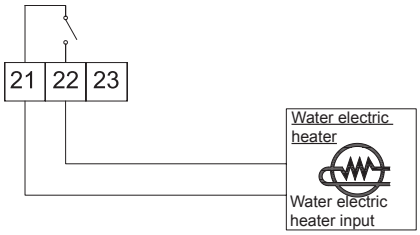
The desired heating supplied can be more exactly provided by means of the 3 steps electric heater control. When a contactor receives the signal and close it, an electrical resistance is activated, resulting in one step heater power.

The following table shows the state of each step:

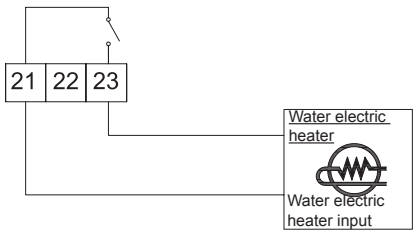
Step	Total input power (kW)
	RWH-(4.0-6.0)FS(V)NFE
1	2.0 (*)
2	4.0 (*)
3	6.0 (*)

Perform the following connections depending on the desired input power:

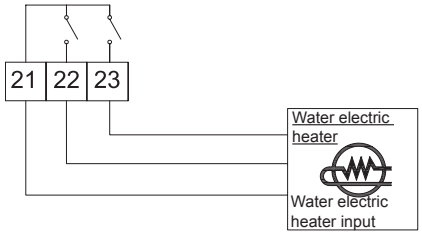
Water electric heater step 1 output (2.0 kW) (*)



Water electric heater step 2 output (4.0 kW) (*)



Water electric heater step 3 output (6.0 kW) (*)

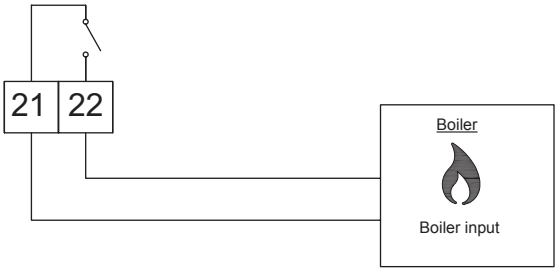


NOTE

(*): The input power values shown previously are explained as example for water electric heater supplied for HITACHI as accessory (WEH-6E), with a total input power of 6.0 kW. For water electric heaters of other total input power, the input power for each step will be different.

- **For boiler combination**

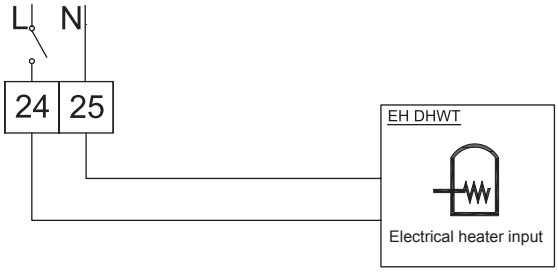
The boiler output is activated when boiler demands it, in order to provide the required heating capacity when YUTAKI S80 is not able to provide by itself. Perform the connection as follows:



Electrical heater DHW output (TB2)

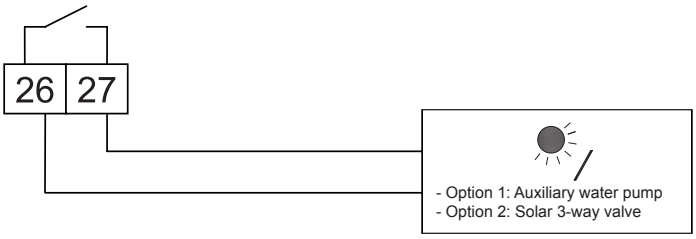
The air to water heat pump can enable the DHW tank's heater if the heat pump cannot achieve the required DHW temperature itself.

Don not forget connecting also the earth wire to the terminal 14.



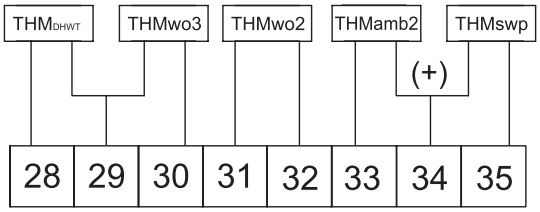
Solar output (TB2)

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_{DHWT}) 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.



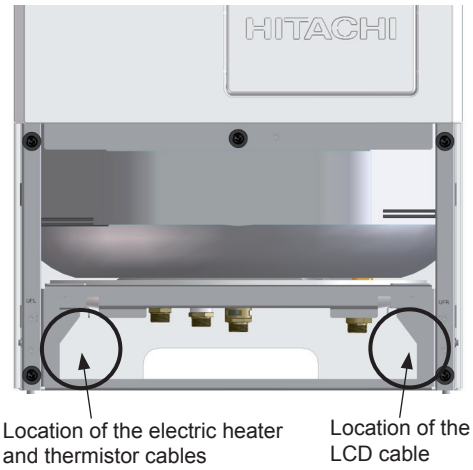
NOTE

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.

4.2.3 Electrical connection of the HITACHI tank

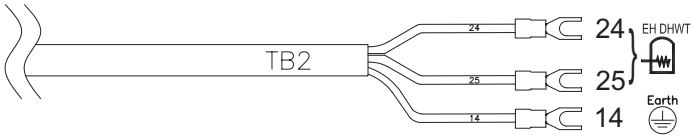
◆ Tank integrated over the indoor unit

The three electrical wires are already connected to the DHW tank. They will be located at the bottom front side of the tank fastened with clamps. The LCD electrical cable at the right and the electric heater and thermistor cables at left.

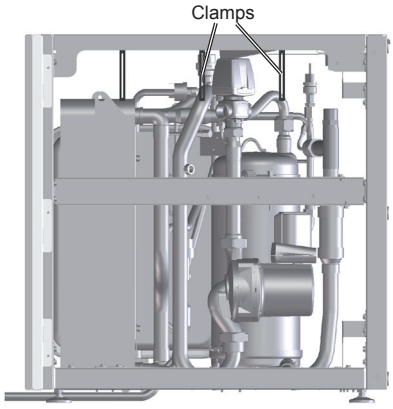


Electric heater of the tank

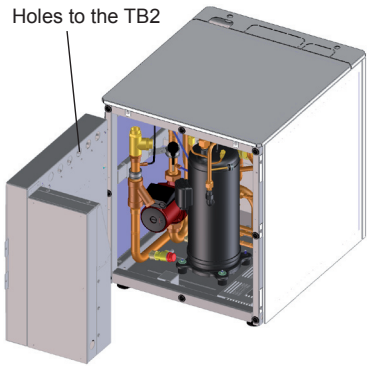
The Electrical heater cable is the labelled one with the TB2 and 24/25/14 connectors legend.



1 Take this electrical cable, pass it behind the partition plate and wire the cable to the two clamps located at the left side and upper part of the indoor unit.

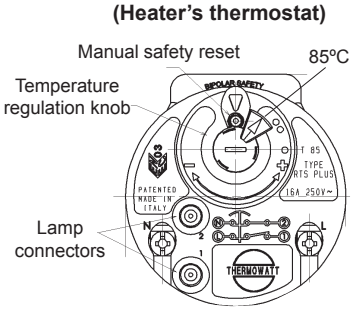


2 Take the cable to the Electrical Box 1 and pass it through one of the upper holes. Connect the earth wire to the 14th terminal and the other two wires to the 24 and 25 connections of the Terminal Board 2.



NOTE

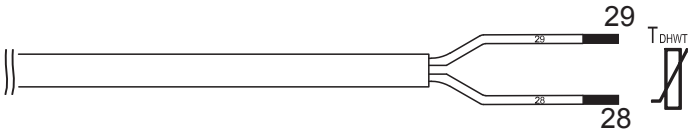
- ***Do not touch the Manual safety reset of the electrical heater.***
- ***Do not touch the temperature regulator unless the tank is working in emergency mode due to indoor unit or outdoor unit malfunction. In this case, refer to the section DHW tank troubleshooting in chapter 12 Troubleshooting.***



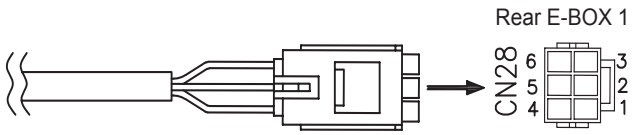
4

Tank thermistor

Follow the same procedure as for the electrical heater wire but connecting the Tank thermistor wires to the 28 and 29 connections of the Terminal Board 2.



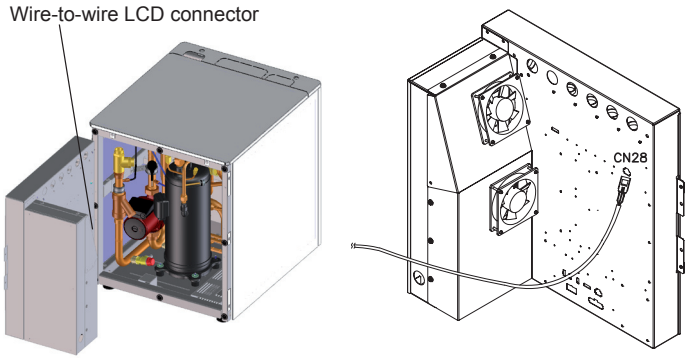
LCD controller



1 Take the LCD electrical cable, pass it behind the partition plate and wire it to the two clamps located at the right side and upper part of the indoor unit.
2 Connect the connector cable to the wire-to-wire connector in the Electrical Box 1 back side as shown in the figure.

CAUTION

Do not cut or extend the LCD electrical cable.

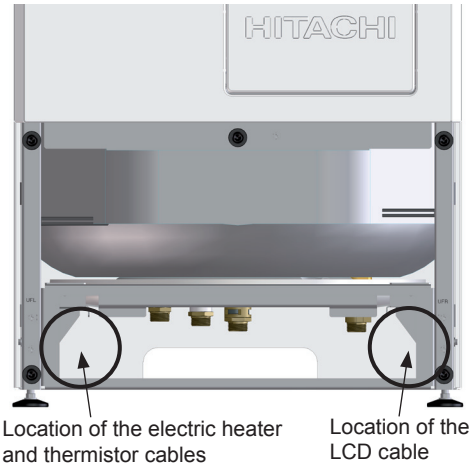


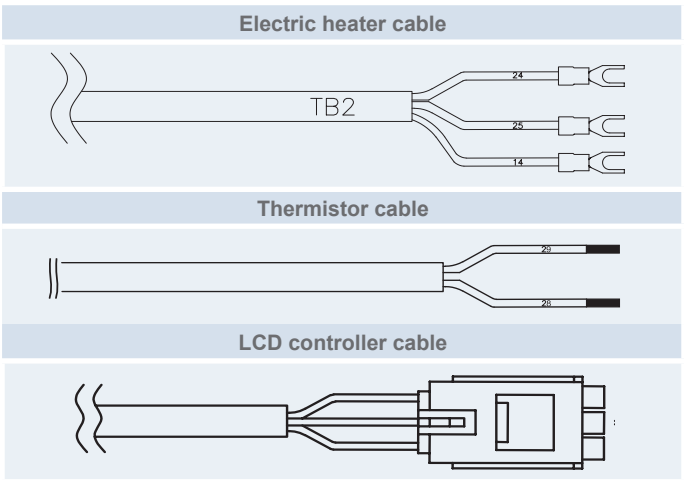
◆ Tank beside the indoor unit

Cables identification

- Factory supplied cables

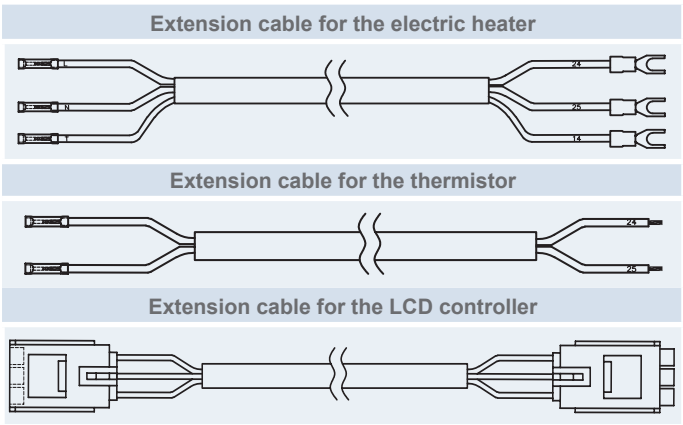
The three electrical wires are already connected to the DHW tank. They will be located at the bottom front side of the tank fastened with clamps. The LCD electrical cable at the right and the electric heater and thermistor cables at left.





- Extension cables (supplied with the ATW-FWP-01 accessory)

When the domestic hot water tank is installed beside the indoor unit, it is needed to extend the cables up to the terminal board 2 (TB2) of the indoor unit, which is place at certain distance from the tank. These cables are the following:

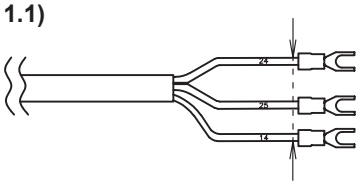


Cables connection

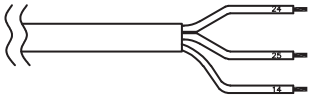
- Electric heater of the tank

1 Cut and strip the free end of the 3 wires of the factory supplied electric heater cable.

1.1)

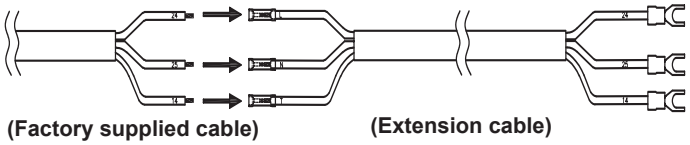


1.2)



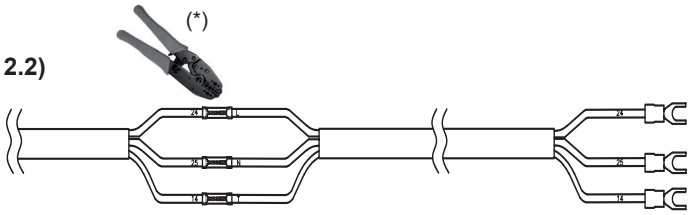
2 Connect the extension cable to the factory supplied cable.

2.1)



(Factory supplied cable) **(Extension cable)**

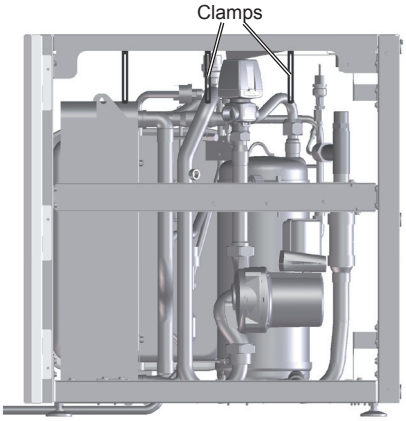
2.2)



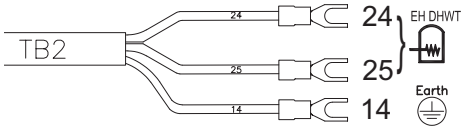
(Factory supplied cable) **(Extension cable)**

(*): Use a crimping tool to crimp the cables.

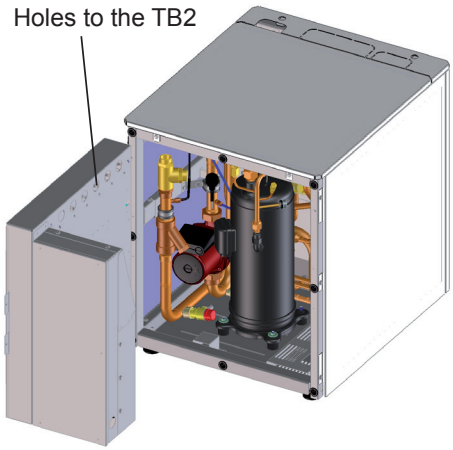
3 Take this extension cable, pass it behind the partition plate and wire the cable to the two clamps located at the left side and upper part of the indoor unit.



4 Take the extension cable to the Electrical Box 1 and pass it through one of the upper holes. Connect the earth wire to the 14th terminal and the other two wires to the 24 and 25 connections of the Terminal Board 2.

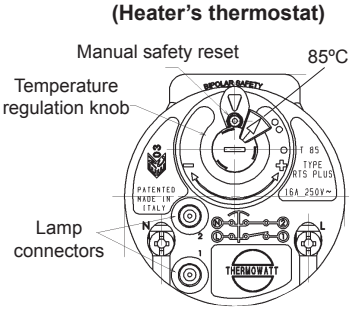


(Extension cable)



NOTE

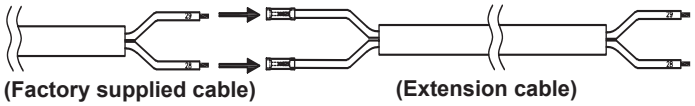
- ***Do not touch the Manual safety reset of the electrical heater.***
- ***Do not touch the temperature regulator unless the tank is working in emergency mode due to indoor unit or outdoor unit malfunction. In this case, refer to the section*** *DHW tank troubleshooting* ***in chapter*** *12 Troubleshooting.*



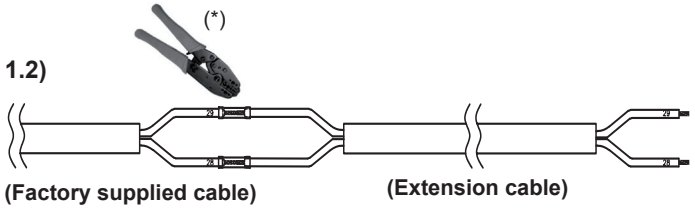
- Tank thermistor

1 Connect the extension cable to the factory supplied cable.

1.1)

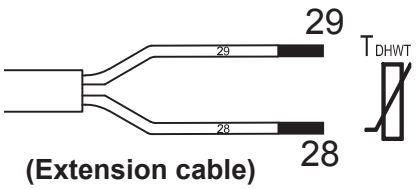


1.2)



(*): Use a crimping tool to crimp the cables.

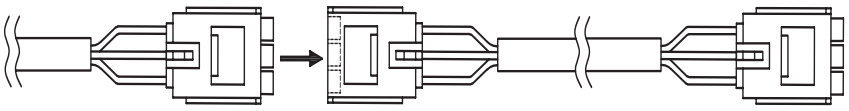
2 Follow the same procedure as for the electrical heater wire but connecting the Tank thermistor wires to the 28 and 29 connections of the Terminal Board 2.



- LCD controller

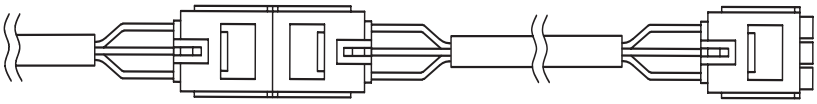
1 Connect the extension cable to the factory supplied cable.

1.1)



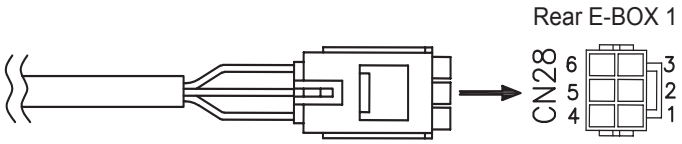
(Factory supplied cable) **(Extension cable)**

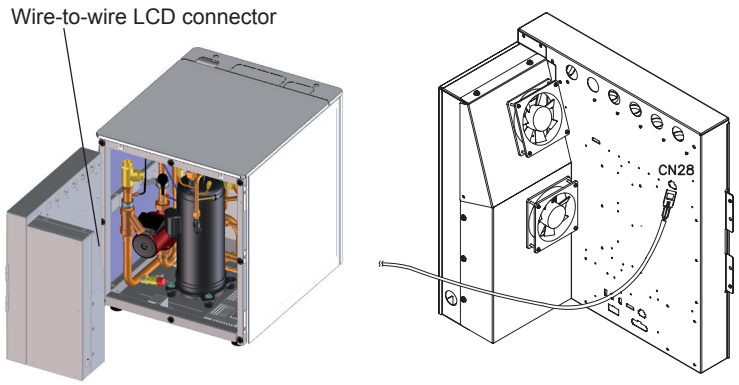
1.2)



(Factory supplied cable) **(Extension cable)**

2 Follow the same procedure as for the electrical heater wire but connecting the extension cable to the wire-to-wire connector in the Electrical Box 1 back side as shown in the figure.

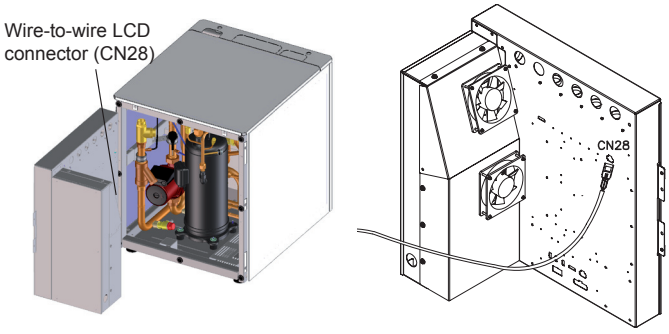




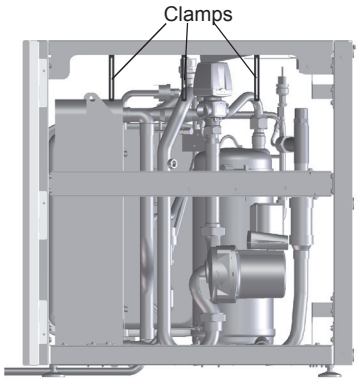
4.2.4 Electrical connection of the LCD (indoor unit alone)

For indoor unit alone (without tank), it must be used the HITACHI LCD user's interface (PC-S80TE) supplied as accessory with a connector cable. The installation must be as follows:

1 Connect the LCD connector cable (supplied with PC-S80TE) to the wire-to-wire connector in the electrical box back side (CN28).



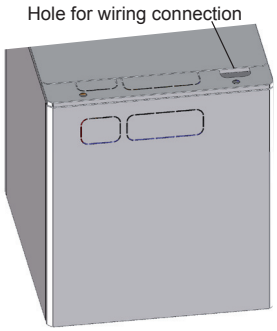
2 Pass the connector cable through the clamps placed in the upper part of the indoor unit.



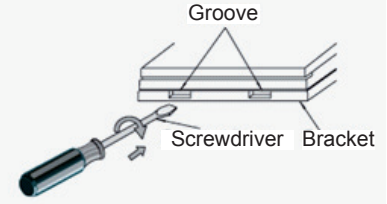
NOTE

Try to keep the maximum possible distance between the LCD connector and the power cables.

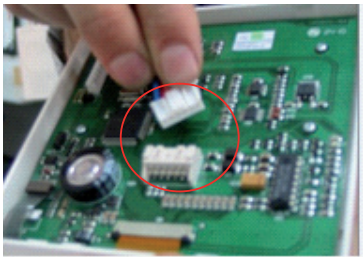
3 Take out the connector cable by the hole for wiring connection placed on the back side of the unit.



4 Using a flat-head screwdriver, separate the control unit bracket from the front section as indicated.



5 Connect the free end of the LCD connector cable (whose other end had been connected before to the electrical box) to the PCB of the LCD controller. Then, reassembly the LCD covers.



CAUTION

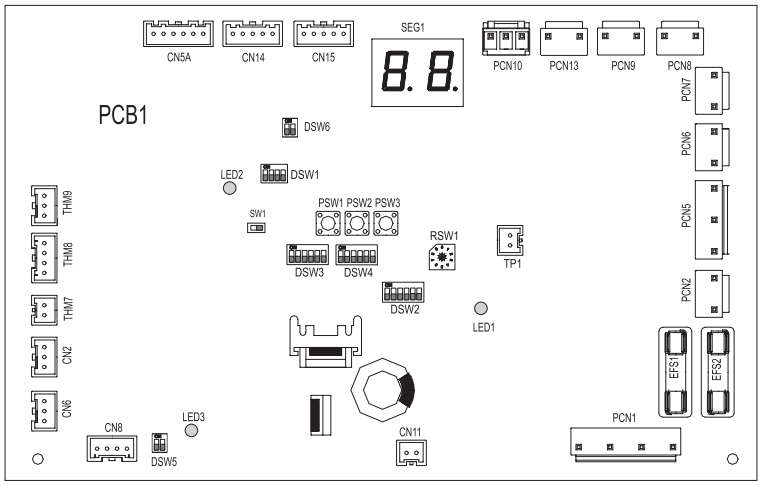
Do not touch the micro and other components on LCD controller PCB. It is the malfunction protection by static electricity.

6 Finally, close the LCD covers and fix the LCD controller to the wall at an optimum height.

4.3 Printed circuit board (PCB)

4.3.1 Outdoor unit

◆ RAS-(4-6)H(V)RNME-AF



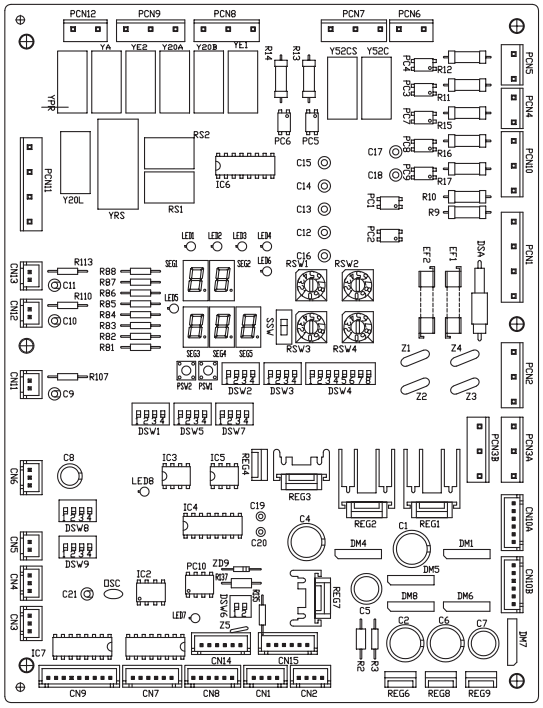
Connector indication	
PCN1	Fuse
PCN2	PCB1 connection from outdoor to indoor unit
PCN5	Crankcase heater of compressor (oil)
PCN6	Output optional function
PCN7	Output optional function
PCN8	Pressure switch protection
PCN9	Compressor contactor
PCN13	Pressure switch control
THM7	Outdoor air temperature thermistor
THM8	Pipe evaporation temperature thermistor
THM9	Compressor discharge 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

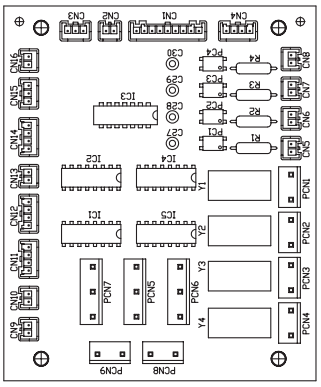
LED indication		
LED1	Red	This LED indicates the transmission status between the indoor unit and the RCS
LED2	Yellow	This LED indicates the transmission status between the indoor unit and the outdoor unit
LED3	Green	Power source for the PCB

4.3.2 Indoor unit

PCB1



PCB2



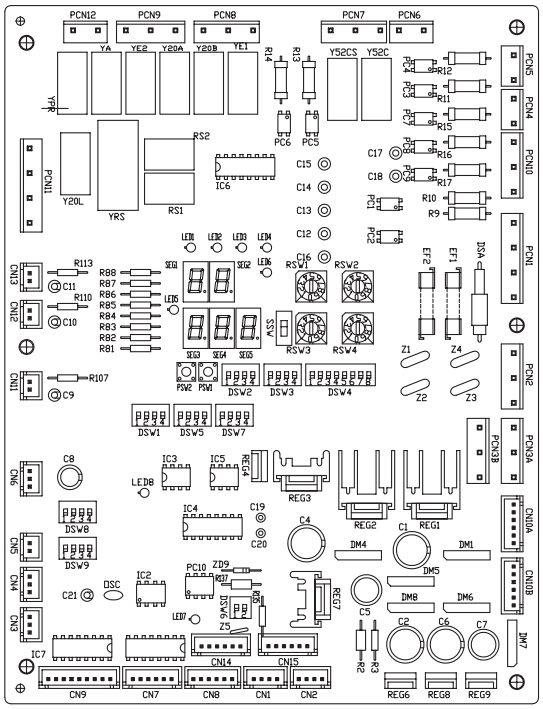
PCB1	Switch indication	
	Name	Connector No.
Operation / Display	Additional setting	DSW1
	Capacity Setting	DSW2
	Optional functions	DSW3
	Optional functions	DSW4
	Additional setting	DSW5
	H-link (transmission)	DSW6
	Not used	DSW7
	Not used	DSW8
		DSW9
	Refrigerant unit address	RSW1
		RSW2
	Indoor unit 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
	Heat pump operation (compressor 1)	LED4
	Power supply in the unit	LED5
	Alarm (Flickering with 1 sec interval)	LED6
	Not used	LED7
	H-Link transmission	LED8

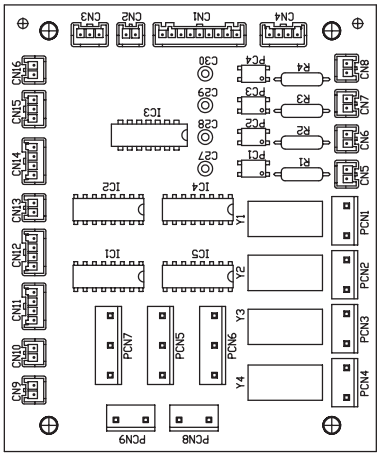
PCB1	Connector Indications	
	Name	Connector Nº
Power	Power supply	PCN1
	Devices power supply	PCN2
	Input transformer power supply (230v)	PCN3A,B
	Ouput transformer power supply (24v)	CN10A,B
	LCD Power supply	CN15
Protection Device	Low Water Pressure & Water Flow control	PCN10-1
Transmis-sion	H-Link communication	CN1
	PCB1-PCB2 communication	CN2,5,6,9
External Input / Output	THMswp (Swimming pool temperature)	CN3
	THMamb2 (2nd ambient temperature)	CN4
	Indoor expansion valve (EVI)	CN7a
	THMswp/amb2 power supply	CN14
	Room thermostat (ON/OFF)	PCN6-1
	Water pump 1	PCN7-5
	3-way valve swimming pool output	PCN8-1
	3-way valve DHW output	PCN8-3
	Mixing valve second temperature left	PCN9-5
	Secondary pump output (WP2)	PCN9-3
	Secondary pump output (WP3)	PCN9-1
	Swimming pool input	PCN10-5
	Electrical Tariff input	PCN10-3
	Solar input	PCN7-1
	Mixing valve second temperature right	PCN12-3

PCB2	Connector Indications	
	Name	Connector Nº
Actuator	Boiler signal / Heater signal	PCN1
	Boiler signal / Heater signal	PCN2
	DHWT heater signal	PCN3
	Solar signal	PCN4
Transmis-sion	PCB1-PCB2 communication	CN1,2,3,4
A/D Input	Water inlet Thermistor (THMwi)	CN9
	Water sanitary tank thermistor (THM_{DHW})	CN10
	Liquid 410A Thermistor (THMl)	CN11
	Gas 410A Thermistor (THMg)	CN12
	Water outlet Thermistor (THMwo)	CN13
	Boiler / heater Thermistor (THMwo3)	CN14
	Circuit 2 Thermistor (THMwo2)	CN16

PCB3



PCB4



PCB3	Switch indication	
	Name	Connector No.
Operation / Display	Not used	DSW1
	Capacity Setting	DSW2
	Not used	DSW3
	Additional setting	DSW4
	Power source setting	DSW5
	H-link (transmission)	DSW6
	Unit control configuration	DSW7
	Pressure device setting 1	DSW8
	Pressure device setting 2	DSW9
	Not used	RSW1
		RSW2
		RSW3
		RSW4
	Checking Mode (Forward)	PSW1
	Checking Mode (Back)	PSW2

PCB3	LED indication	
	Name	Connector No.
LEDS	7-segment	SEG1,2,3,4,5
	Power supply indication	LED1
	Not used	LED2
	Not used	LED3
	Heat pump operation (compressor 2)	LED4
	Alarm (flickering with 1 sec interval)	LED5
	Not used	LED6
	Not used	LED7
	H-Link transmission	LED8

PCB3	Connector Indications	
	Name	Connector Nº
Power	Power supply	PCN1
	Devices power supply	PCN2
	Input transformer power supply (230v)	PCN3A,B
	Output transformer power supply (24v)	CN10A,B
Pro-tection Device	High pressure protection (t-out)	PCN5
Trans-mission	H-Link communication	CN1
	PCB1-PCB2 communication	CN2,5,6,9
	Inverter communication	CN8
External Input / Output	Pressure sensor (discharge) (R134a)	CN3
	Pressure sensor (suction) (R134a)	CN4
	R134a expansion valve (MV2)	CN7a
	Inverter communication	CN8
	CMC Compressor (52C)	PCN7-3
	Solenoid valve 1 (SV1)	PCN9-5
	Solenoid valve 2 (SV2)	PCN9-3
	Cranksheater (CHn)	PCN12-3

PCB4	Connector Indications	
	Name	Connector Nº
Trans-mission	PCB3-PCB4 communication	CN1,2,3,4
A/D Input	R134a Suction Thermistor (THMs)	CN11
	R134a Evaporation heating Thermistor (THMeh)	CN12
	Inverrter EBOX ambient temperature Ther-mistor (THinv)	CN10
	R134a Evaporation cooling Thermistor (THMec)	CN14
	R134a Discharge Thermistor (THMd)	CN15

4.4 Setting of DIP switches and RSW switches

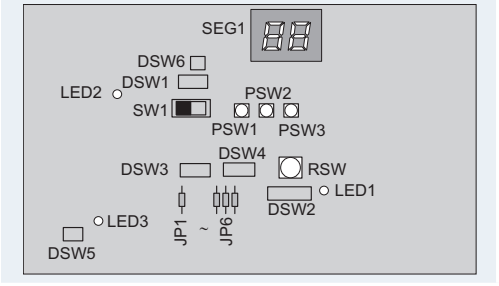
4.4.1 Outdoor unit

◆ Location of DIP switches and RSW switches

The PCB in the outdoor unit is operated with different dip switches, rotary switches and push switches.

Position switches at the PCB:

RAS-(4-6)H(V)RNME-AF



◆ Function of the of DIP switches and RSW switches

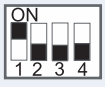
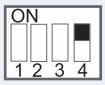
NOTE

- ***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.

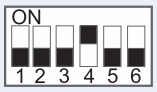
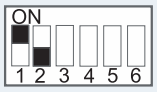
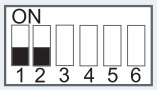
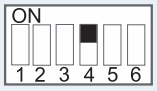
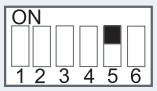
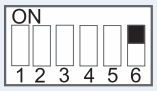
DSW1: Test run

Function	Setting position
Setting before shipment	
Test run for pumping down	
Test run for heating	
Forced stop of compressor *The compressor is OFF during this operation.*	

NOTE

- ***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

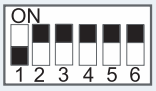
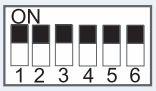
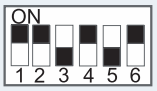
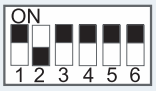
Function		Setting position
Setting before shipment		
Piping length	5 m < Lt	
	5 m < Lt < 30 m	
Cancellation of outdoor hot start control. (Not recommended, only available for special testing cases)		
Cancellation of outdoor air temperature control. (No change)		
Optional function selection setting (set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

4

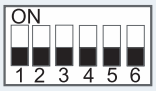
CAUTION

It is possible to select the cancellation of the outdoor hot start control by pushing both PSW1 & PSW3 simultaneously during 3 seconds. 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 voided.

DSW3: Capacity setting

Unit	Setting position	Unit	Setting position
RAS-4HVRNME -AF		RAS-4HRNME-AF	
RAS-5HVRNME -AF		RAS-5HRNME -AF	
RAS-6HVRNME-AF		RAS-6HRNME -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

Function	Setting position
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

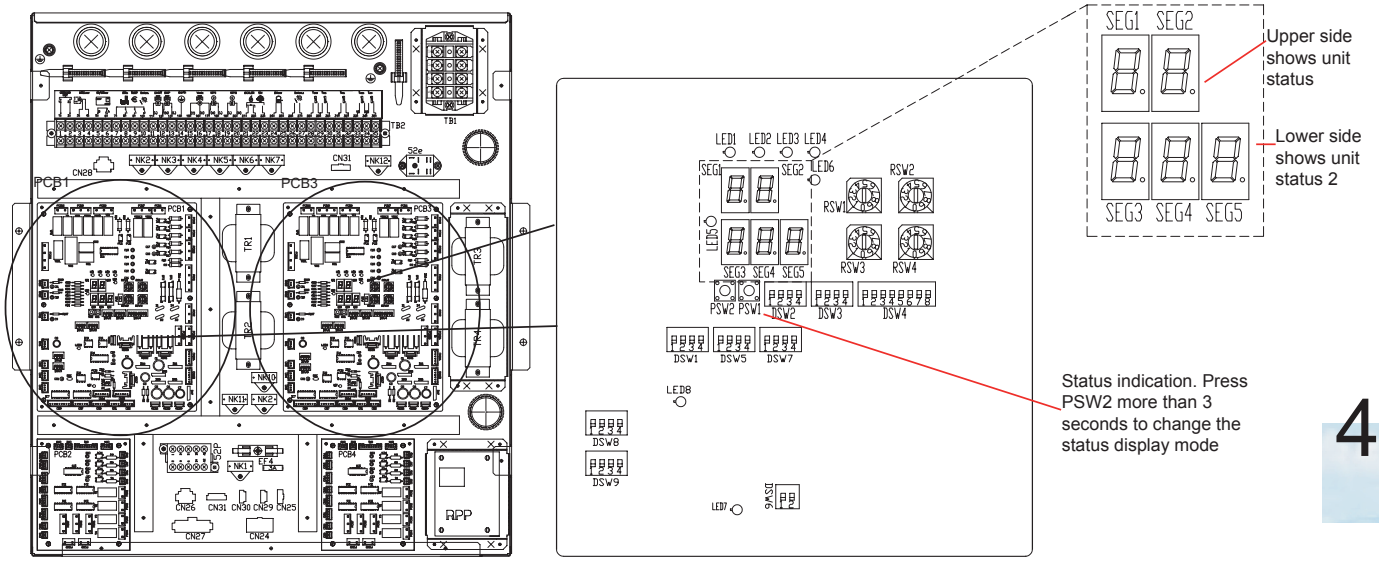
◆ LED's indication

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

4.4.2 Indoor unit

◆ Location of DIP switches and RSW switches

Below are the dip switch positions:



◆ Functions of dip switches and rotary switches

NOTE

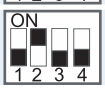
- ***The mark "■" indicates the dip switches positions.***
- ***No mark "■" indicates pin position is not affected.***
- ***The figures show the settings before shipment or after selection.***
- ***"Not used" means that the pin must not be changed. A malfunction might occur if changed.***

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.

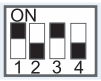
PCB1

◆ DSW1: Additional setting 1

Factory setting	
Open SV1/2 for vacuum and refrigerant R410A recover function	

◆ DSW2: Capacity setting

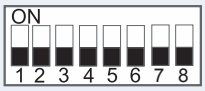
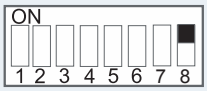
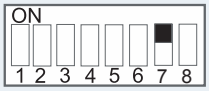
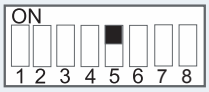
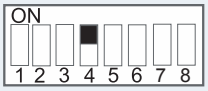
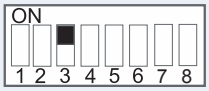
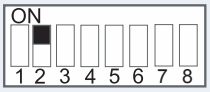
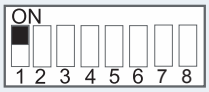
No setting is required.

RWH-4.0FS(V)NFE	
RWH-5.0FS(V)NFE	
RWH-6.0FS(V)NFE	

◆ DSW3: Optional functions 1

Factory setting	
1 step heater for 3 phase unit	

◆ DSW4: Optional functions 2

Factory setting	
Optional functions enabled	
Heater Forced OFF	
Unit and installation pipes antifreeze protection	
Standard / ECO water pump operation	
Emergency operation heater / boiler	
Outdoor unit refrigerant R410A recovery	
Outdoor sensor accessory	
DHW tank's heater enabled operation	

CAUTION

- ***Never turn all DSW4 dip switch pins ON. If this happens, the software of the unit will be removed.***
- ***Never activate Heater Forced OFF and Emergency operation heater at the same time.***

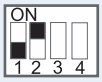
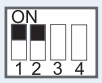
◆ DSW5: Additional setting 2

In the cases where the outdoor unit is installed into a location where its own outdoor ambient temperature sensor can not give a suitable temperature measurement to the system, it is available the 2nd outdoor ambient temperature sensor as accessory.

By means of DSW setting, it can be selected the preferable sensor for each circuit.

NOTE

Switch ON the DSW4-2 to enable this additional setting.

Factory setting	
Outdoor unit sensor for circuits 1 and 2.	
Outdoor unit sensor for circuit 1; Auxiliary sensor for circuit 2.	
Auxiliary sensor for circuit 1; Outdoor unit sensor for circuit 2.	
Auxiliary sensor instead of outdoor unit sensor for both circuits.	
Universal sensor enabled	
Use Two3 (boiler / heater thermistor) instead Two (water outlet thermistor) for water control	

◆ DSW6: Not used

Factory setting (Not change)	

◆ DSW7: Not used

Factory setting (Not change)	

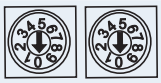
◆ DSW8: Not used

◆ DSW9: Not used

◆ RSW1 & RSW2: Refrigerant system setting

RSW1: Ten digits RSW2: Unit digits	

◆ RSW3 & RSW4: Indoor unit address setting

RSW3: Ten digits RSW4: Unit digits	

PCB3

◆ DSW1: Not used

Factory setting (Not change)	

◆ DSW2: Capacity setting

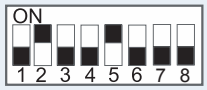
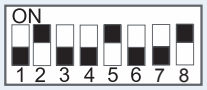
No setting is required.

RWH-4.0FS(V)NFE	
RWH-5.0FS(V)NFE	
RWH-6.0FS(V)NFE	

◆ DSW3: Not used

Factory setting (Not change)	

◆ DSW4: Additional setting

	Single phase (1~ 230V 50Hz)	Three phase (3N~ 400V 50Hz)
Factory setting (Not change)		

◆ DSW5: Power source setting

	Single phase (1~ 230V 50Hz)	Three phase (3N~ 400V 50Hz)
Factory setting		

◆ DSW6: Not used

Factory setting (Not change)	

◆ DSW7: Unit control configuration

	Single phase (1~ 230V 50Hz)	Three phase (3N~ 400V 50Hz)
Factory setting		

◆ DSW8: Pressure device setting 1

Factory setting (Not change)	

◆ DSW9: Pressure device setting 2

Factory setting (Not change)	

◆ RSW1 & RSW2: Not used

◆ RSW3 & RSW4: Not used

4

◆ Led indications

PCB1

Name	Color	Indication
LED1	Green	Pump operation
LED2	Green	System heater or boiler operation
LED3	Green	DHW tank's heater operation
LED4	Red	Heat pump operation (thermo ON/OFF)
LED5	Yellow	Operation: indicates power supply to the unit
LED6	Red	Alarm (flickering with 1 sec interval)
LED7	-	Not used
LED8	Yellow	H-link indication transmission

PCB3

Name	Color	Indication
LED1	Green	Power supply indication
LED2	-	Not used
LED3	-	Not used
LED4	Red	Heat pump operation (compressor 2)
LED5	Yellow	Alarm (flickering with 1 sec interval)
LED6	-	Not used
LED7	-	Not used
LED8	Yellow	H-link indication transmission

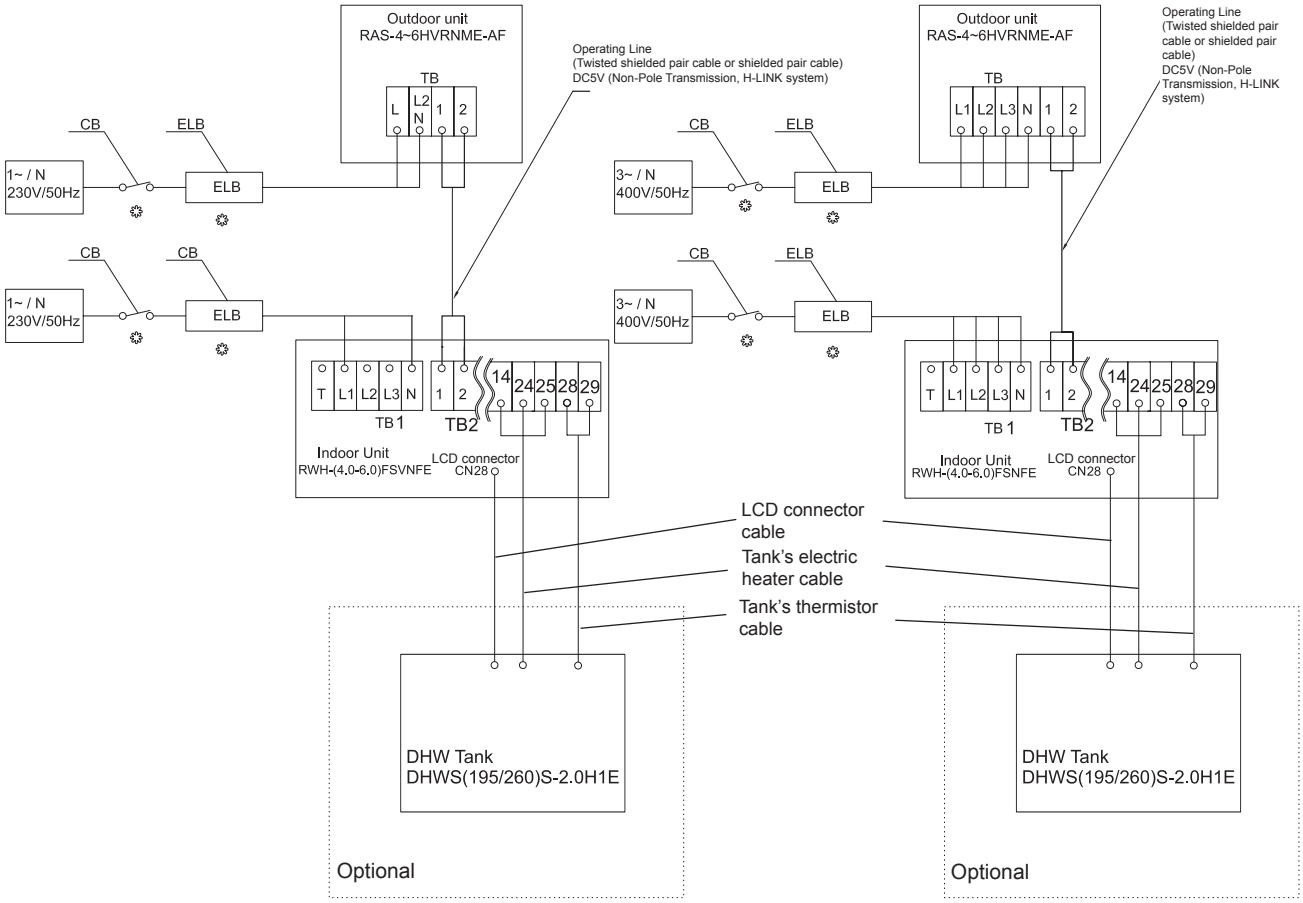
4.5 Common wiring

4.5.1 Electrical wiring between indoor and outdoor unit of the air to water heat pump system

- Connect the electrical wires between the indoor unit and the outdoor unit, as shown in the next diagram.
- 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 at length of less than 300m and size 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.

CAUTION

- ***Be sure to use a dedicated power circuit for the indoor unit. Never use a power circuit shared by another appliance (Outdoor unit).***
- ***Pay attention to the connection of the operating line. Incorrect connection may cause PCB failure.***
- ***All the field wiring and equipment must comply with local and international codes.***



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

◆ Recommended minimum sizes for field provided wires

NOTE

- ***Follow local codes and regulations when selecting field wires, circuit breakers and earth leakage breakers.***
- ***Use the wires which are not lighter than the ordinary polychloroprene sheathed flexible cord (code designation H05RN-F).***
- ***(*1): The DHW tank heater is intended to be used in case of indoor and/or outdoor unit malfunction. If the DHW tank heater is enabled during the indoor unit operation, CB and ELB could switch off. If it is desired to enable the DHW tank heater operation during normal indoor unit operation, adjust the DSW4 pin 1 of the PCB1 to the ON position and consider the protections as indicated in "Indoor unit + DHW tank heater combination" on the table.***

Outdoor unit

Model	Power supply	Max. Current (A)	Power supply cables	Transmiting cables	Actuator cables
			EN60335-1	EN60335-1	EN60335-1
RAS-4HVRNME-AF	1~ 230V 50Hz	18.0	2 x 4.0 mm² + GND	2 x 0.75 mm² (*Shielded cable)	2 x 0.75 mm² + GND
RAS-5HVRNME-AF		23.0	2 x 6.0 mm² + GND		
RAS-6HVRNME-AF		23.0	2 x 6.0 mm² + GND		
RAS-4HRNME-AF	3N~400V 50 Hz	7.0	4 x 2.5 mm² + GND		
RAS-5HRNME-AF		11.0	4 x 4.0 mm² + GND		
RAS-6HRNME-AF		13.0	4 x 4.0 mm² + GND		

Indoor unit alone

Model	Power supply	Max. current (A)	Power supply cables	Transmiting cables	Actuator cables
			EN60335-1	EN60335-1	EN60335-1
RWH-4.0FSVNFE	1~ 230V 50Hz	24.0	2 x 6.0mm² + GND	2 x 0.75mm² (*Shielded cable)	2 x 0.75mm² + GND
RWH-5.0FSVNFE		28.0			
RWH-6.0FSVNFE		31.0			
RWH-4.0FSNFE	3N~ 400V 50Hz	15.0	4 x 2.5mm² + GND		
RWH-5.0FSNFE		15.0			
RWH-6.0FSNFE		15.0			

Indoor unit with DHW tank

Model	Indoor Unit Model	Operation mode (*1)	Power supply	Max. current (A)	Power supply cables	Transmiting cables	Actuator cables
					EN60335-1	EN60335-1	EN60335-1
RWH-(4.0-6.0)FSVNFE + DHWS-(195/260)S-2.0H1E	RWH-4.0FSVNFE	Standard operation (By default)	1~ 230V 50Hz	24.0	2 x 6.0mm² + GND	2 x 0.75mm² (*Shielded cable)	2 x 0.75mm² + GND
	RWH-5.0FSVNFE			28.0			
	RWH-6.0FSVNFE			31.0			
	RWH-4.0FSVNFE	Indoor unit + DHW tank heater combination		33.0	2 x 10.0mm² + GND		
	RWH-5.0FSVNFE			37.0			
	RWH-6.0FSVNFE			40.0			
RWH-(4.0-6.0)FSNFE + DHWS-(195/260)S-2.0H1E	RWH-4.0FSNFE	Standard operation (By default)	3N~ 400V 50Hz	15.0	4 x 2.5mm² + GND		
	RWH-5.0FSNFE			15.0			
	RWH-6.0FSNFE			15.0			
	RWH-4.0FSNFE	Indoor unit + DHW tank heater combination		25.0	4 x 4.0mm² + GND		
	RWH-5.0FSNFE			25.0			
	RWH-6.0FSNFE			25.0			

◆ Main switch protection

Outdoor unit

Model	Power supply	Applicable voltage		Max. Current (A)	CB (A)	ELB (no. of poles/A/mA)
		U max. (V)	U min. (V)			
RAS-4HVRNME-AF	1~230V 50Hz	253	207	18.0	20	2/40/30
RAS-5HVRNME-AF				23.0	25	
RAS-6HVRNME-AF				23.0	25	
RAS-4HRNME-AF	3N~400V 50 Hz	440	360	7.0	15	4/40/30
RAS-5HRNME-AF				11.0	20	
RAS-6HRNME-AF				13.0	20	

MC: Maximum current; CB: Circuit breaker; ELB: Earth leakage breaker

Indoor unit alone

Model	Power supply	Applicable voltage		MC (A)	CB (A)	ELB (nº poles/A/mA)
		U max. (V)	U min. (V)			
RWH-4.0FSVNFE	1~ 230V 50Hz	253	207	24.0	32	2/40/30
RWH-5.0FSVNFE				28.0	32	
RWH-6.0FSVNFE				31.0	32	
RWH-4.0FSNFE	3N~ 400V 50Hz	440	360	15.0	15	4/40/30
RWH-5.0FSNFE				15.0	15	
RWH-6.0FSNFE				15.0	15	

MC: Maximum current; CB: Circuit breaker; ELB: Earth leakage breaker

Indoor unit with DHW tank

Model	Indoor Unit Model	Operation mode (*1)	Power supply	Applicable voltage		MC (A)	CB (A)	ELB (nº poles/A/mA)
				U max. (V)	U min. (V)			
RWH-(4.0-6.0)FSVNFE + DHWS-(195/260)S-2.0H1E	RWH-4.0FSVNFE	Standard operation (By default)	1~ 230V 50Hz	253	207	24.0	32	2/40/30
	RWH-5.0FSVNFE					28.0	32	
	RWH-6.0FSVNFE					31.0	32	
	RWH-4.0FSVNFE	Indoor unit + DHW tank heater combination				33.0	40	2/63/30
	RWH-5.0FSVNFE					37.0	40	
	RWH-6.0FSVNFE					40.0	40	
RWH-(4.0-6.0)FSNFE + DHWS-(195/260)S-2.0H1E	RWH-4.0FSNFE	Standard operation (By default)	3N~ 400V 50Hz	440	360	15.0	15	4/40/30
	RWH-5.0FSNFE					15.0	15	
	RWH-6.0FSNFE					15.0	15	
	RWH-4.0FSNFE	Indoor unit + DHW tank heater combination				25.0	25	4/40/30
	RWH-5.0FSNFE					25.0	25	
	RWH-6.0FSNFE					25.0	25	

MC: Maximum current; CB: Circuit breaker; ELB: Earth leakage breaker

4.5.2 Electrical wiring between indoor unit and DHW tank

◆ Factory supplied wire sizes

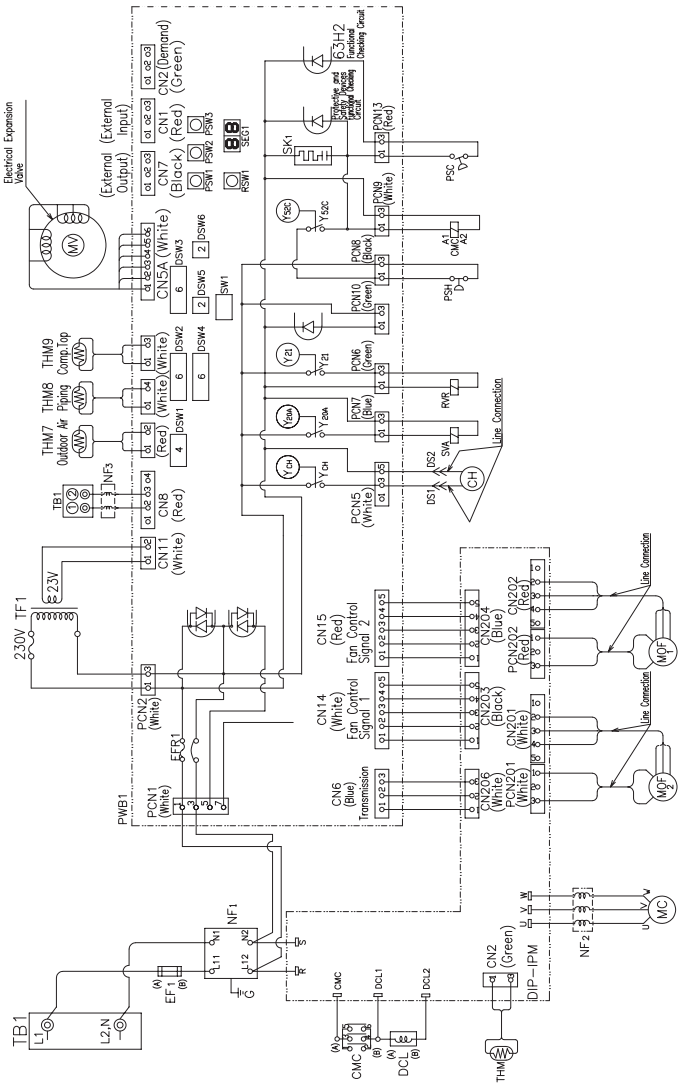
Model	Power supply	Maximum Current (A)	LCD connection cable size	Electric heater connection cable size	Thermistor connection cable size
			EN60335-1	EN60335-1	EN60335-1
DHWS195S-2.0H1E	1~ 230V 50Hz	8.7	6 x 0.3 mm²	3 x 1.0 mm²	2 x 0.75 mm²
DHWS260S-2.0H1E					

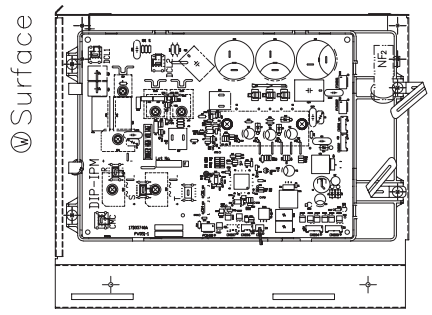
4.6 Electrical Wiring Diagrams

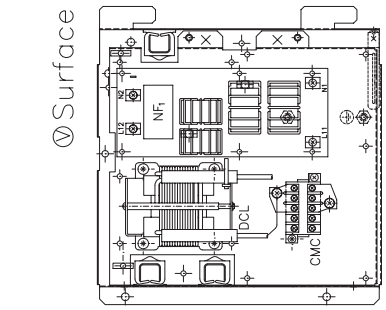
4.6.1 Electrical wiring diagram for outdoor unit

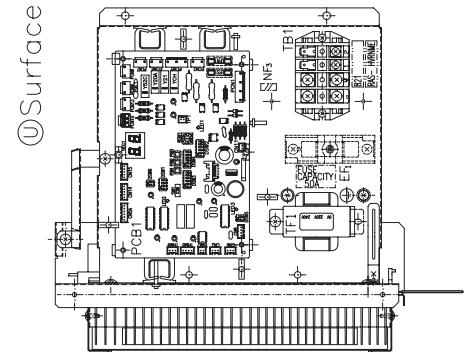
◆ RAS-(4-6)HVRNME-AF (1~ 230V 50Hz)

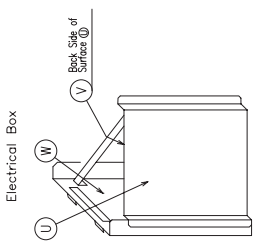
Mark	Name of Parts	Remarks
MC	Motor (for Compressor)	
MOF1,2	Motor (for Fan)	
EF1	Power Fuse	
CMC	Magnetic Contactor (for Compressor)	
RVR	Magnetic 4 Way Valve	
SVA	Solenoid Valve	
MV	Electrical Expansion Valve	
TB1	Terminal Board	
TF1	Transformer	
PCB1	Printed Circuit Board	
EFR1	Fuse	
Y_{52C}	Aux.Relay (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	Inserting Type Connector	
G	Ground	
CH	Crankcase Heater	





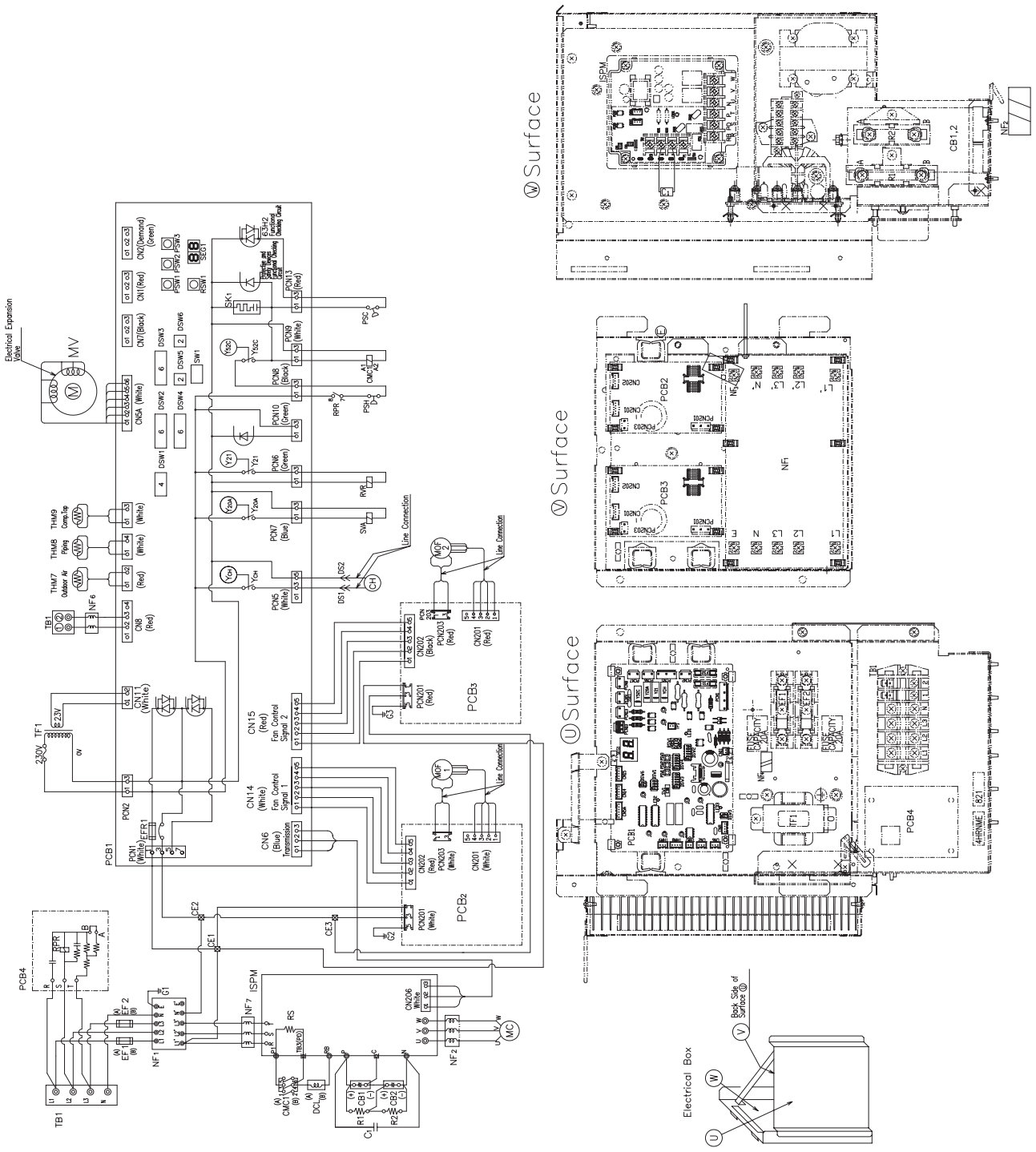






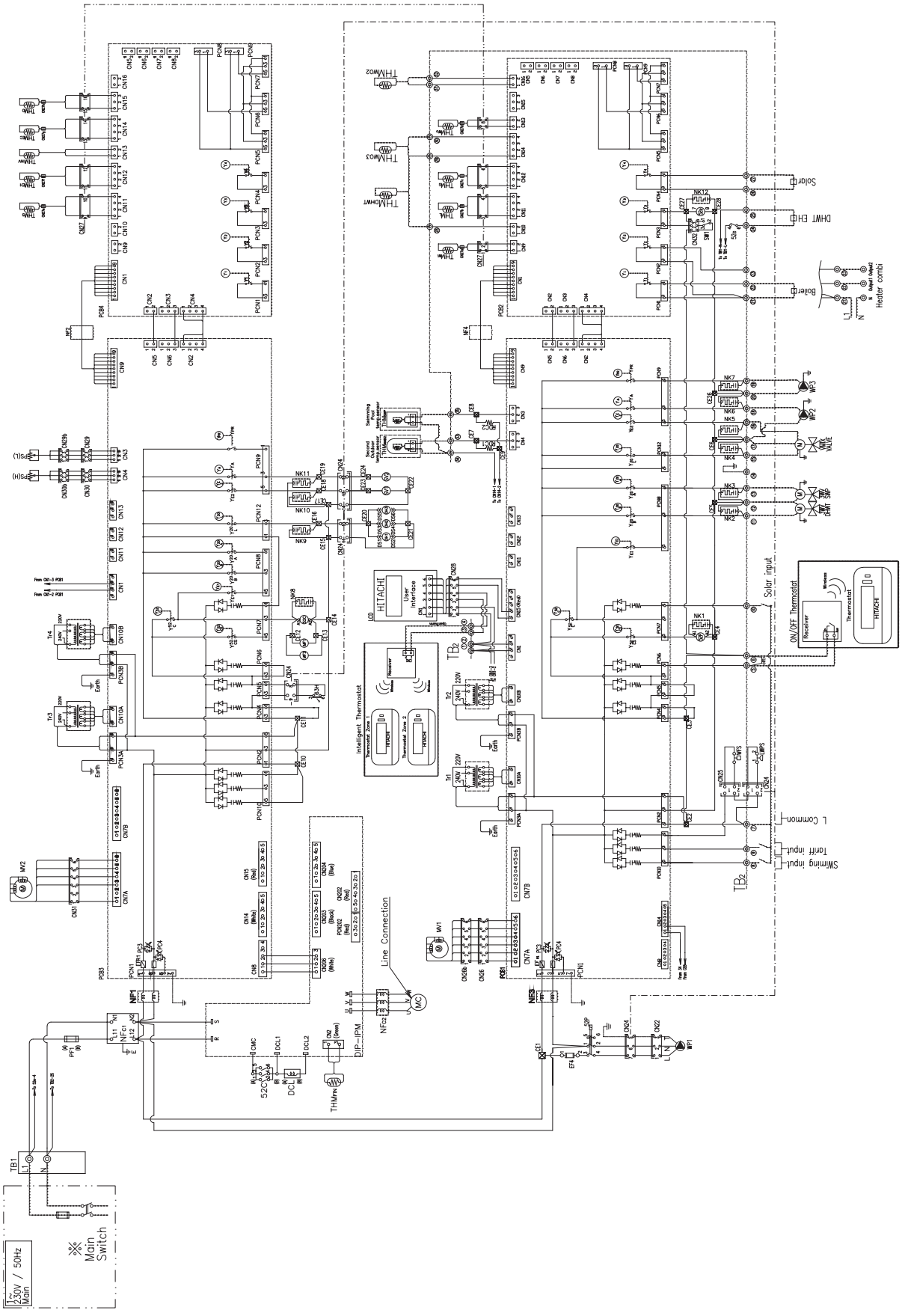
◆ RAS-(4-6)HRNME-AF (3N~ 400V 50Hz)

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	
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	
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
C_1	Capacitor	
R1,2	Resistance (For Starting)	
RPR	Reverse Protection Relay	
CH	Crankcase Heater	



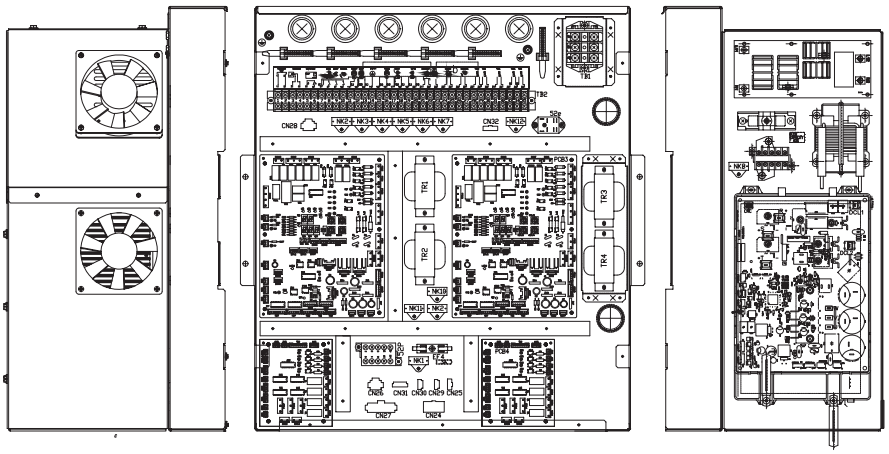
4.6.2 Electrical wiring diagram for indoor unit

◆ RWH-(4.0-6.0)FSVNFE (1~ 230V 50Hz)



Look at next page for Mark table.

Arrangement of Electric Parts in Electrical Control Box

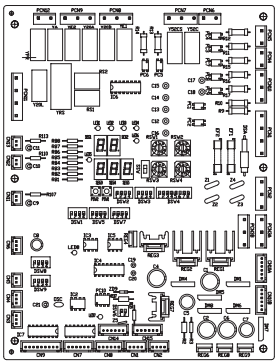


Mark Table

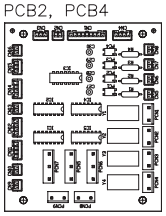
Mark	Part Name
TB_1	Terminal Board (for Power Supply)
TB_2	Terminal Board (for Control Circuit)
PCB1	Printed Wiring Board (for Main Control 1cycle)
PCB2	Printed Wiring Board (for I/O 1cycle)
PCB3	Printed Wiring Board (for Main Control 2cycle)
PCB4	Printed Wiring Board (for I/O 2cycle)
PF_1	Power Fuse for Compressor
NF_{C1}	Noise Filter
$NF_{1\sim4,C2}$	Ring Core
DIP-IPM	Inverter Module
52C	Contactor (for Compressor)
DCL	Reactor
MC	Motor (for Compressor)
$CE_{1\sim28}$	Connector (Terminating Connector)
$CN_{26b,29b,30b}$	Connector
$CN_{24\sim31,22}$	Connector
MV_{1-2}	Electrical Expansion Valve
$Tr_{1\sim4}$	Transformers
PS (H)	High Pressure Sensor
PS (L)	Low Pressure Sensor
THM_S	Thermistor (for Suction Gas Temperature)
THM_{FH}	Thermistor (for Evaporating Gas Temperature)
THM_{INV}	Thermistor (for ambient E.BOX Inv. temperature)
THM_{EC}	Thermistor (for Liquid refrigerant Temperature)
THM_D	Thermistor (for Discharge Gas Temperature)
THM_{wi}	Thermistor (for Inlet Water Temperature)
THM_L	Thermistor (for liquid pipe temperature)
THM_G	Thermistor (for Gas pipe temperature)
THM_{wo}	Thermistor (for Outlet Water Temperature)
THM_{FIN}	Thermistor (for Inverter FIN Temperature)
$NK_{1\sim12}$	Noise Killer
$OH_{1,2,3}$	Oil Heater
$SV_{1,2}$	Solenoid Valve
$MF_{1,2}$	Fan inverter E.BOX
63H	High Pressure Switch
LCD	User interface LCD
RDC_{1-2}	Resistance
WFS	Water flow switch
LWPS	Low water pressure switch
WP	Water Pump
EF4	Fuse Pump
52P	Relay (for Pump)
52e	Relay (for Domestic Hot Water Heater)
E	Earth
SW1	Switch 1 (for DHWT Heaer manual operation)
DSW_n	Dip-switch setting
EFR_1	Fuse
EFS_1	Fuse
RSW 1-2	Refrigerant Cycle n°
RSW 3-4	Indoor Unit no. Settings
SEG 1~5	Sevent segments indication
$Y52_{CS}$	Relay for Water Pump (WP)
Y_{20B}	Relay for 3 way valve DHWT
Y_{20A}	Relay for 3 way valve SWP
Y_{20L}	Relay for Mixing valve left
Y_{E2}	Relay for Mixing valve right
Y_A	Relay for Water Pump 2
Y_{PR}	Relay for Water Pump 3
Y_1	Relay for Boiler/Heater combination
Y_2	Relay for Heater combination
Y_3	Relay for DHWT Electrical Heater
Y_4	Relay for Solar combination
$Y52_C$	Relay for Inverter 2 cycle
Y_{20L}	Relay for Oil Heater
Y_{E2}	Relay for Solenoid Valve 1
Y_A	Relay for Solenoid Valve 1
◎	Terminals
-⊠-	Close-end Connector
※	Field Supplied
----------	Field Wiring
———	Earth Wiring
———	Factory Wiring

PCBs Sockets location

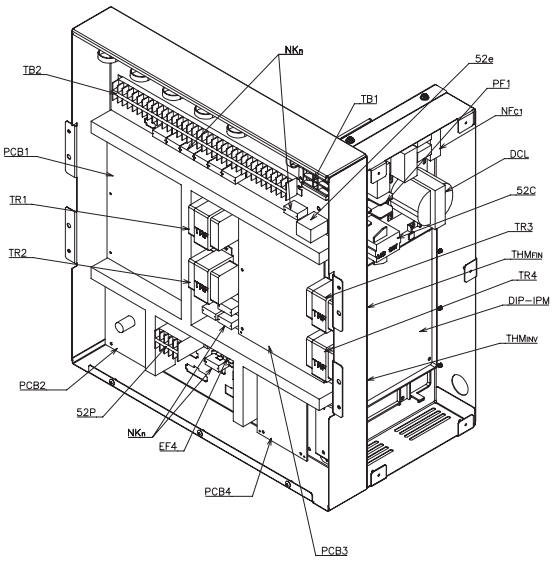
PCB1, PCB3



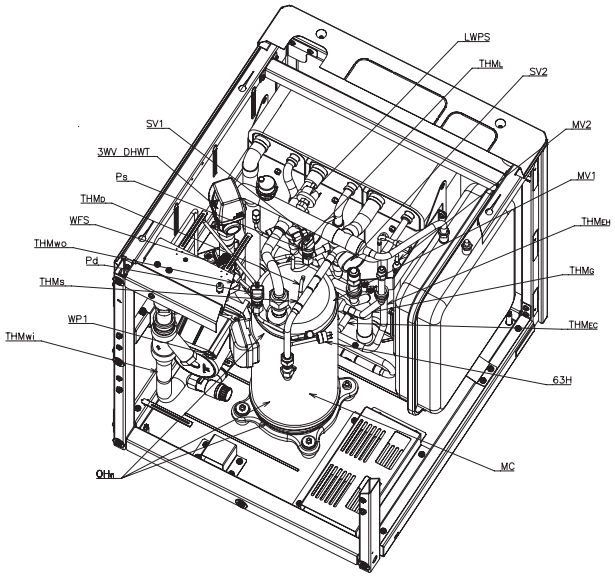
PCB2, PCB4



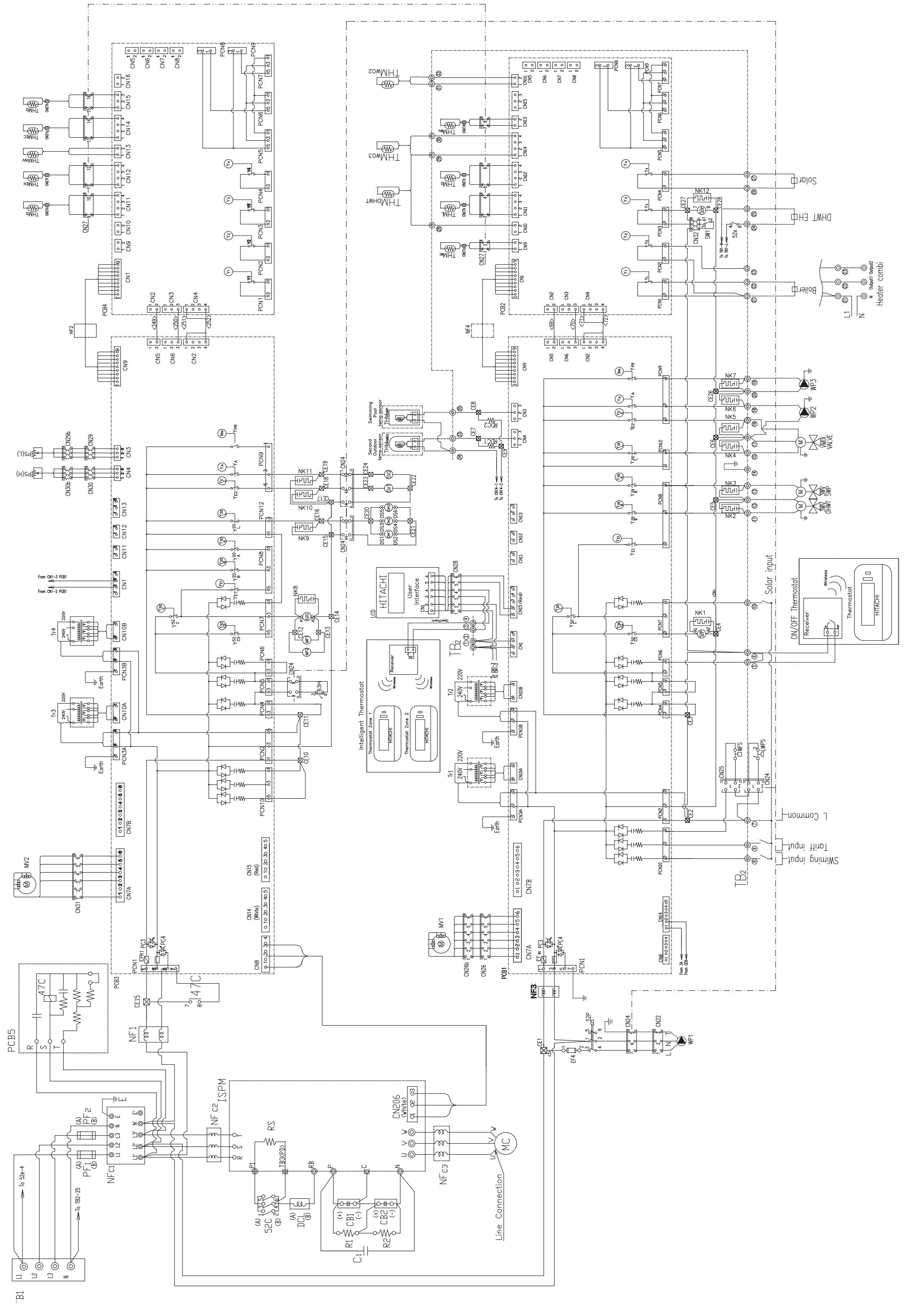
Location of main parts of electrical box



Location of main parts

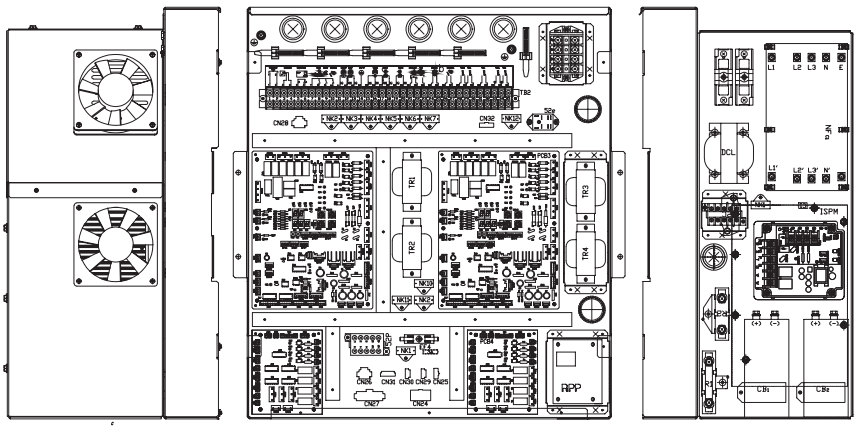


◆ RWH-(4.0-6.0)FSNFE (3N~ 400V 50Hz)

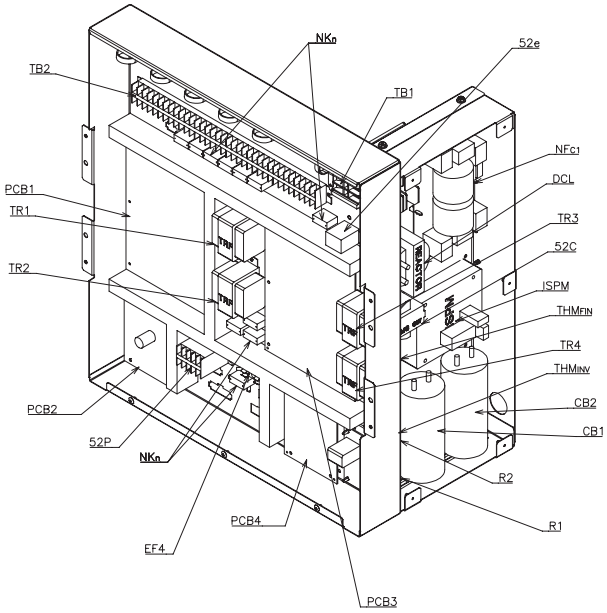


Look at next page for Mark table.

Arrangement of Electric Parts in Electrical Control Box

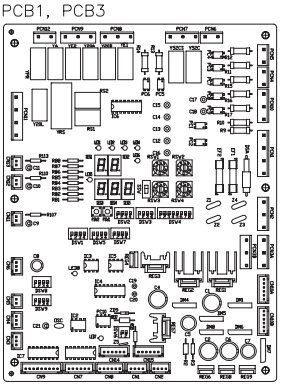


Location of main parts of electrical box

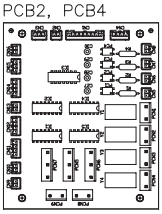


PCBs Sockets location

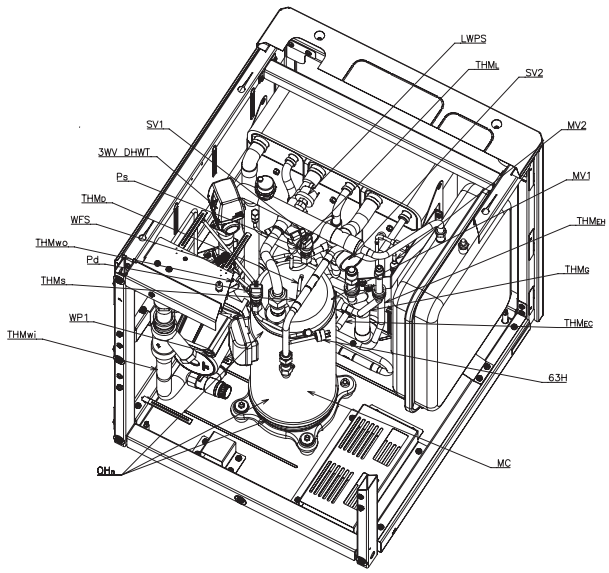
PCB1, PCB3



PCB2, PCB4



Location of main parts



Mark Table

Mark	Part Name
TB_1	Terminal Board (for Power Supply)
TB_2	Terminal Board (for Control Circuit)
PCB1	Printed Wiring Board (for Main Control 1cycle)
PCB2	Printed Wiring Board (for I/O 1cycle)
PCB3	Printed Wiring Board (for Main Control 2cycle)
PCB4	Printed Wiring Board (for I/O 2cycle)
PF_1	Power Fuse for Compressor
NF_{C1}	Noise Filter
$NF_{1\sim4,C2}$	Ring Core
DIP-IPM	Inverter Module
52C	Contactor (for Compressor)
DCL	Reactor
MC	Motor (for Compressor)
$CE_{1\sim28}$	Connector (Terminating Connector)
$CN_{26b,29b,30b}$	Connector
$CN_{24\sim31,22}$	Connector
$MV_{1\sim2}$	Electrical Expansion Valve
$Tr_{1\sim4}$	Transformers
PS (H)	High Pressure Sensor
PS (L)	Low Pressure Sensor
THM_S	Thermistor (for Suction Gas Temperature)
THM_{EH}	Thermistor (for Evaporating Gas Temperature)
THM_{INV}	Thermistor (for ambient E.BOX Inv. temperature)
THM_{EC}	Thermistor (for Liquid refrigerant Temperature)
THM_D	Thermistor (for Discharge Gas Temperature)
THM_{wi}	Thermistor (for Inlet Water Temperature)
THM_L	Thermistor (for liquid pipe temperature)
THM_G	Thermistor (for Gas pipe temperature)
THM_{wo}	Thermistor (for Outlet Water Temperature)
THM_{FIN}	Thermistor (for Inverter FIN Temperature)
$NK_{1\sim12}$	Noise Killer
$OH_{1,\ 2,\ 3}$	Oil Heater
SV1,2	Solenoid Valve
MF1,2	Fan inverter E.BOX
63H	High Pressure Switch
LCD	User interface LCD
$RDC_{1\sim2}$	Resistance
WFS	Water flow switch
LWPS	Low water pressure switch
WP	Water Pump
EF4	Fuse Pump
52P	Relay (for Pump)
52e	Relay (for Domestic Hot Water Heater)
E	Earth
SW1	Switch 1 (for DHWT Heaer manual operation)
DSW_n	Dip-switch setting
EFR_1	Fuse
EFS_1	Fuse
$RSW_{1\sim2}$	Refrigerant Cycle n°
$RSW_{3\sim4}$	Indoor Unit no. Settings
$SEG_{1\sim5}$	Sevent segments indication
$Y52_{CS}$	Relay for Water Pump (WP)
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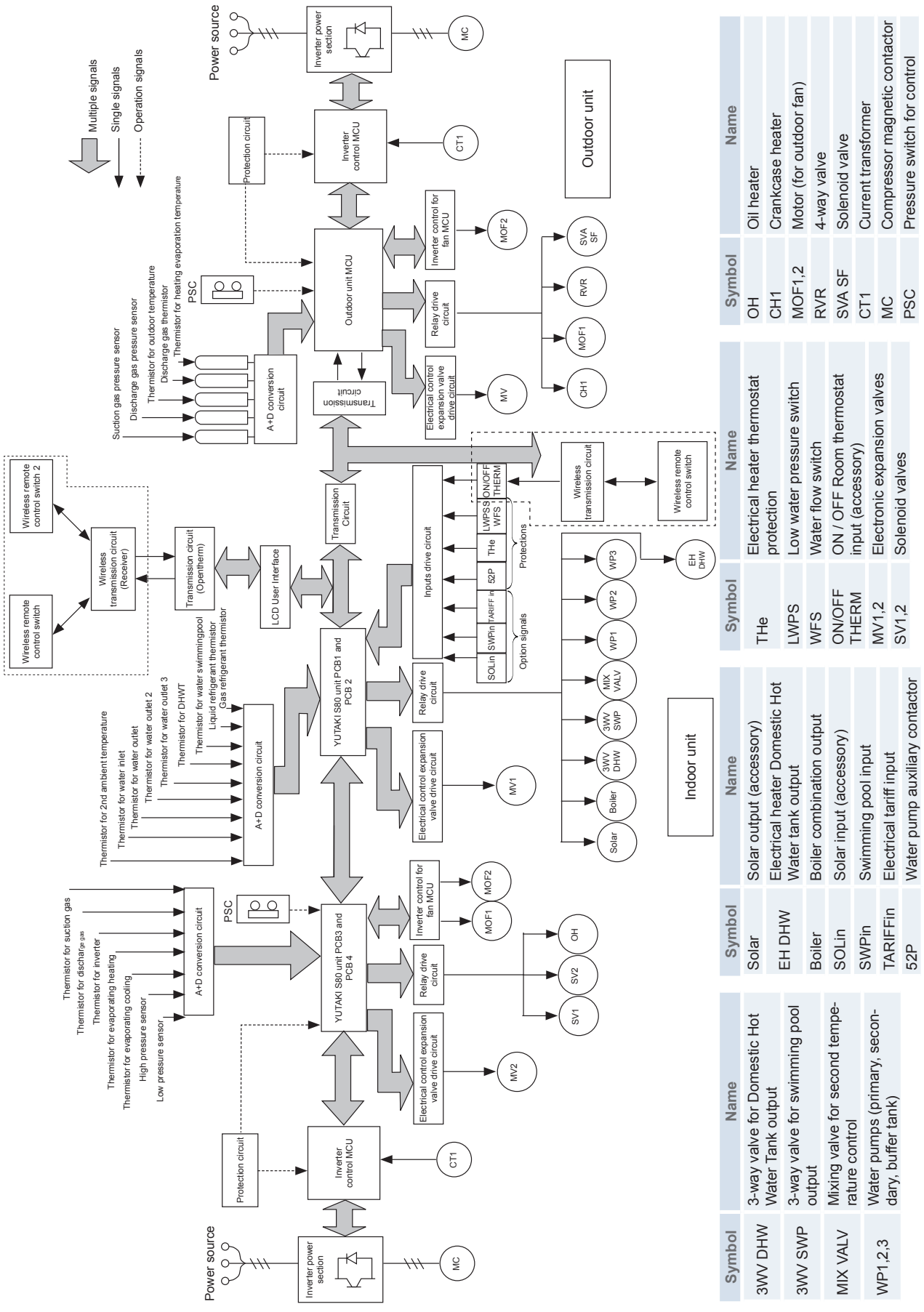
Y_{PR}	Relay for Water Pump 3
Y_1	Relay for Boiler/Heater combination
Y_2	Relay for Heater combination
Y_3	Relay for DHWT Electrical Heater
Y_4	Relay for Solar combination
$Y52_C$	Relay for Inverter 2 cycle
Y_{20L}	Relay for Oil Heater
Y_{E2}	Relay for Solenoid Valve 1
Y_A	Relay for Solenoid Valve 1
◎	Terminals
—⊠—	Close-end Connector
※	Field Supplied
----------	Field Wiring
———	Earth Wiring
———	Factory Wiring

5. Control system

Index

5.1 Device control system

The figure below shows the outline of the control system.



Symbol	Name
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)

Symbol	Name
Solar	Solar output (accessory)
EH DHW	Electrical heater Domestic Hot Water tank output
Boiler	Boiler combination output
SOLin	Solar input (accessory)
SWPin	Swimming pool input
TARIFFin	Electrical tariff input
52P	Water pump auxiliary contactor

Symbol	Name
THe	Electrical heater thermostat protection
LWPS	Low water pressure switch
WFS	Water flow switch
ON/OFF THERM	ON / OFF Room thermostat input (accessory)
MV1,2	Electronic expansion valves
SV1,2	Solenoid valves

Symbol	Name
OH	Oil heater
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 Safety protection and control device

5.2.1 Indoor unit

MODEL			RWH-(4.0-6.0)FS(V)NFE
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)
For refrigerant temperature			
	Freeze temperature protection		TI<-20ºC (for 30 seconds)
For the control circuit			
	Fuse capacity		5A (Inside PCB)
For the water pump			
	Fuse capacity		3.15A

5.2.2 Outdoor unit

MODEL				RAS-4H(V)RNME-AF	RAS-(5/6)H(V)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	40	50
		3N~ 400V 50Hz		2x20	2x20
	CCP timer setting time		min	Non adjustable	
For condenser fan motor				3	
Internal thermostat				Automatic reset, non-adjustable (each one for each motor)	
	DC	Cut-out	ºC	-	-
	AC	Cut-out		-	-
		Cut-in		-	-
For control circuit Fuse capacity on PCB			A		

5

5.3 Installation configurations

NOTE

- ***The following installation examples show typical configurations. In case of variations of them, the responsability of correct system functioning will be of the installer.***
- ***The configuration examples given below are only for illustration purposes.***

Type	Description	Space heating		DHW Tank (accessory)	Thermostat (optional)	Heating complement		Solar Kit (field supplied)	Swimming pool
		Radiator/ Fan coil	Floor			Electric heater (accessory)	Boiler		
Main configurations									
1	**One space heating only** Space heating installation by radiators or fan coils application, with a room thermostat as an option	○	✕	✕	○	✕	✕	✕	✕
2	**One space heating only and DHW tank** Space heating installation (by radiators or fan coils application) + DHW tank, with a room thermostat as an option.	○	✕	○	○	✕	✕	✕	✕
3	**Two space heating only** Two space heating applications (high & low water temperature), with a room thermostat as an option.	○	○	✕	○	✕	✕	✕	✕
4	**Two space heating only and DHW tank** Two space heating applications (high & low water temperature) + DHW tank, with a room thermostat as an option.	○	○	○	○	✕	✕	✕	✕
Additional combinations The next configurations are combinable with the main configurations (1 or 2 space heating, with/without tank)									
5	**Electric heater complement** Two possible space heating applications (high & low water temperature) + Electric heater (accessory) + optional DHW tank, with a room thermostat as an option.	○	○	○	○	○	✕	✕	✕
6	**Boiler complement** Two possible space heating applications (high & low water temperature) + Boiler complement + optional DHW tank, with a room thermostat as an option.	○	○	○	○	✕	○	✕	✕
7	**Solar complement** Two possible space heating applications (high & low water temperature) + Solar combination + optional DHW tank + optional Heating complement, with a room thermostat as an option.	○	○	○	○	○ ✕	✕ ○	○	✕
8	**Swimming pool combination** Two possible space heating applications (high & low water temperature) + Swimming pool combination + optional DHW tank + optional Heating complement + optional Solar combination, with a room thermostat as an option.	○	○	○	○	○ ✕	✕ ○	○	○

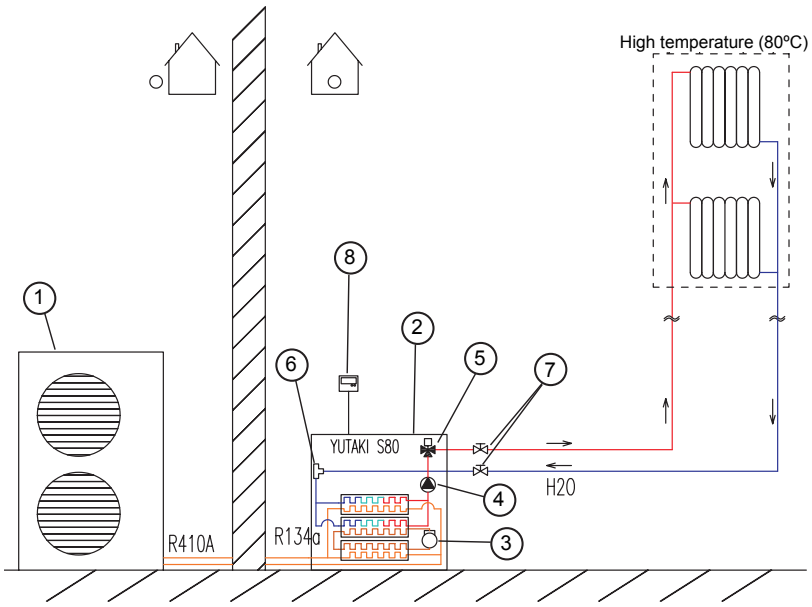
NOTE

Only one heating complement (or boiler or electric heater) can be installed at the same installation.

5.3.1 Main configurations

◆ One space heating only (Installation example 1)

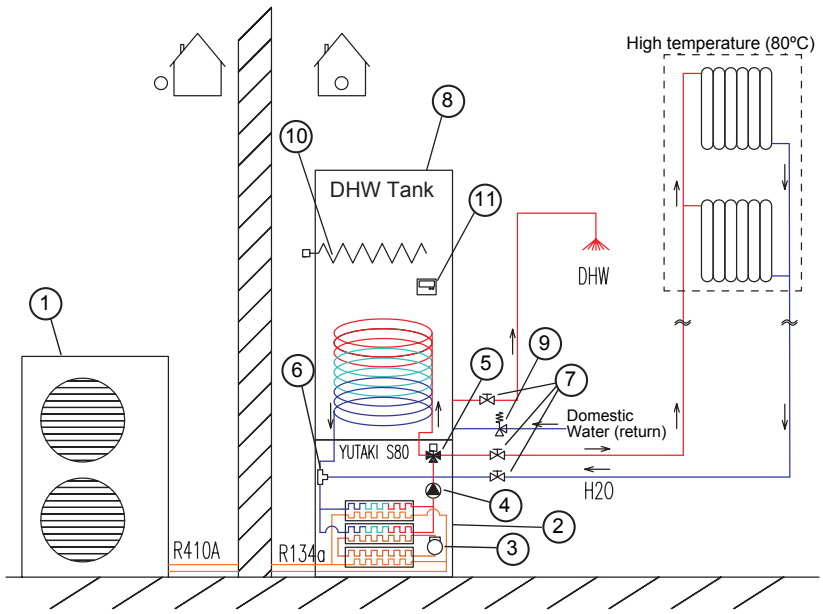
One space heating only: Space heating using radiators or fan coils with an optional room thermostat. The necessary LCD controller is supplied as accessory.



Item	Description
1	Outdoor unit
2	Indoor unit
3	R134a compressor
4	Water pump
5	3-way valve
6	T-branch
7	Shut-off valves (field supplied)
8	LCD controller (accessory)

◆ One space heating and DHW Tank (Installation example 2)

One space heating and DHW Tank: Space heating using radiators or fan coils with an optional room thermostat. Domestic Hot Water Tank is heated by Heat Pump. The LCD is integrated with the DHW Tank.



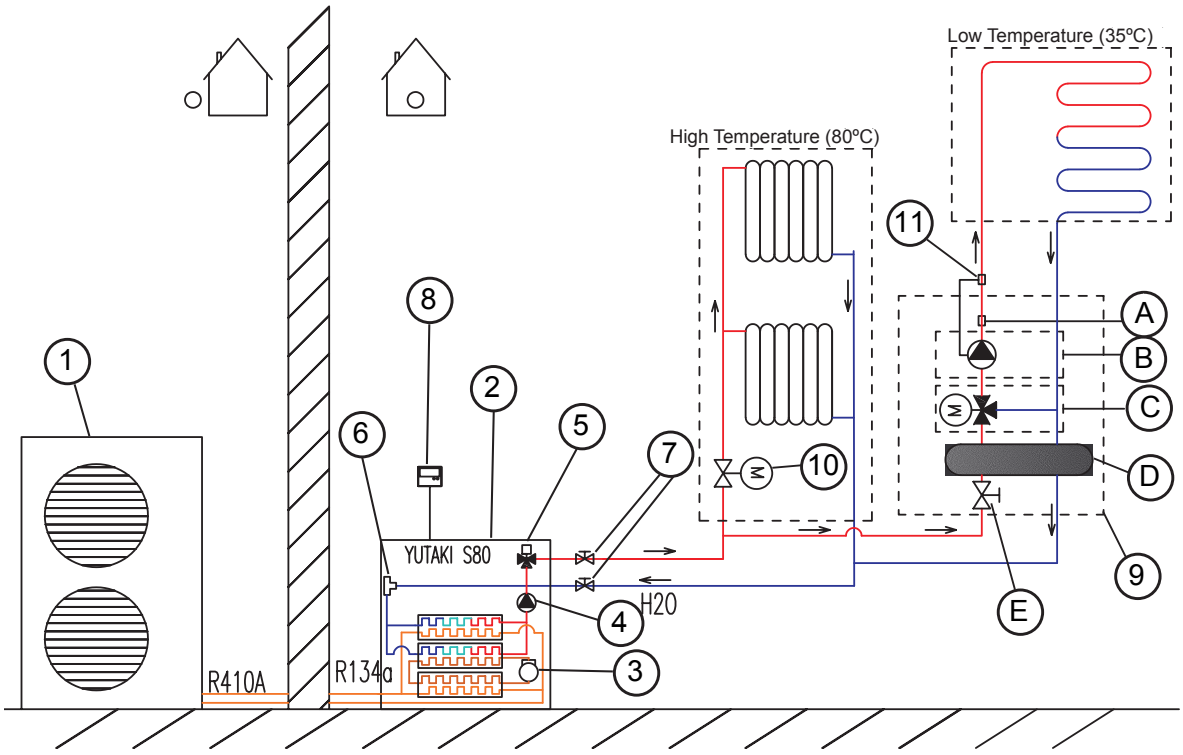
Item	Description
1	Outdoor unit
2	Indoor unit
3	R134a compressor
4	Water pump
5	3-way valve
6	T-branch
7	Shut-off valves (field supplied)
8	Domestic hot water tank
9	Security valve (DHWT-SWG-01 accessory)
10	DHWT heater (integrated with DHWT)
11	LCD controller (integrated with DHWT)

◆ Two space heating (High & Low water temperature) (Installation example 3)

Two space heating (High & Low water temperature): When the split air to water heat pump 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 motor (low temperature for floor heating operation). Additionally, a motorized valve must be added in order to close the direct circuit when it is not in use. In order to get these two water temperature levels (high and low), a mixing station is required. This mixing station is controlled using the indoor unit by means of an additional mixing valve motor and additional water sensor. Optional Room Thermostat. The necessary LCD controller is supplied as accessory.

NOTE

- ***When YUTAKI S80 is working with two space heating applications (High & Low water temperature), it is necessary to install the 2nd temperature kit accessory (ATW-2KT-01) and the following accessories:***
  - ***Water temperature sensor for second temperature control (ATW-WTS-02)***
  - ***Mixing valve motor (ATW-MVM-01)***
  - ***Aquastat for heating floor protection (ATW-AQT-01)***
- ***Additionally, the Auxilliary output signal box accessory (ATW-AOS-01) is available to control the field supplied Motorized valve for the direct circuit.***



Item	Description
1	Outdoor unit
2	Indoor unit
3	R134a compressor
4	Water pump
5	3-way valve
6	T-branch
7	Shut-off valves (field supplied)

Item	Description
8	LCD controller (accessory)
9	Second temperature kit (ATW-2KT-01 accessory)
10	Motorized valve (field supplied)
11	Aquastat (ATW-AQT-01 accessory)

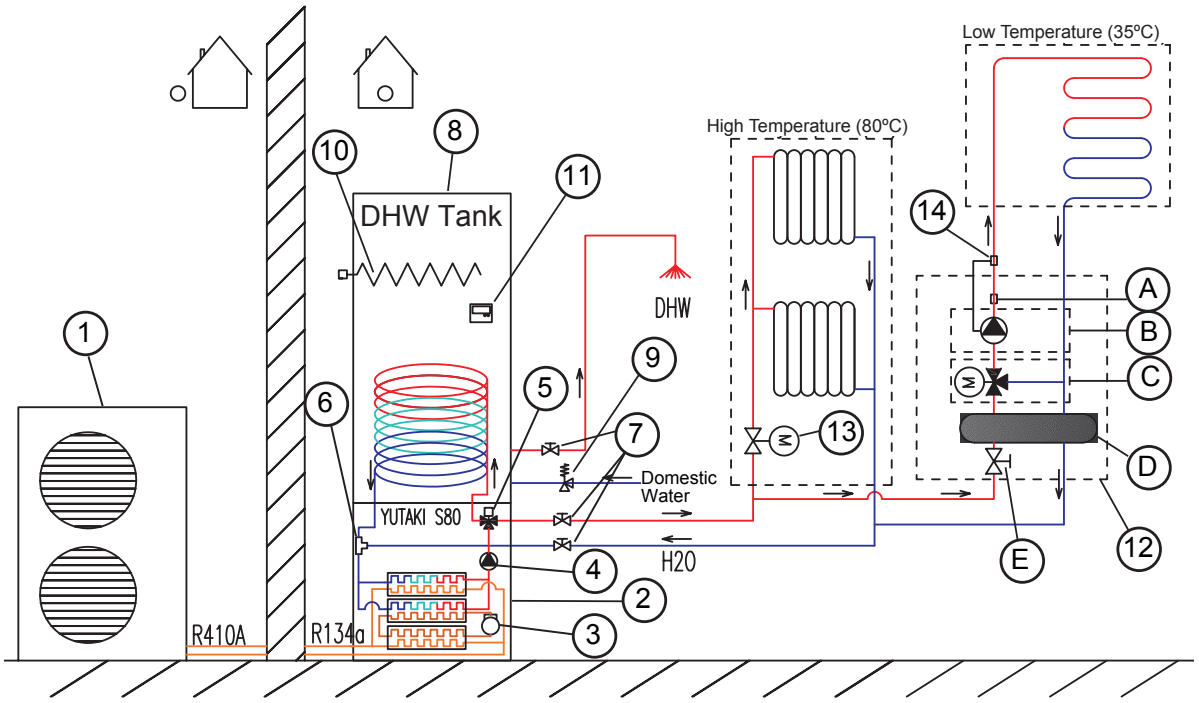
Item	Description
A	2nd Water Temperature sensor (ATW-WTS-02 accessory)
B	Secondary water pump
C	Mixing valve motor (ATW-MVM-01 accessory)
D	Hydraulic separator
E	Shut-off valve

◆ Two space heating (High & Low water temperature) and DHW Tank (Installation example 4)

Two space heating applications (High & Low water temperature) and DHW Tank: When the split air to water heat pump 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 motor (low temperature for floor heating operation). Additionally, a motorized valve must be added in order to close direct circuit when not in use. In order to get these two water temperature levels (high and low), a mixing station is required. This mixing station is controlled using the indoor unit by means of an additional mixing valve motor and additional water sensor. Domestic Hot Water Tank is heated by Heat Pump. The space heating and domestic hot water tank operation is alternated (or heating or DHW tank). Optional room thermostat. The LCD is integrated with the DHW Tank.

NOTE

- ***When YUTAKI S80 is working with two space heating applications (High & Low water temperature), it is necessary to install the 2nd temperature kit accessory (ATW-2KT-01) and the following accessories:***
  - ***Water temperature sensor for second temperature control (ATW-WTS-02)***
  - ***Mixing valve motor (ATW-MVM-01)***
  - ***Aquastat for heating floor protection (ATW-AQT-01)***
- ***Additionally, the Auxilliary output signal box accessory (ATW-AOS-01) is available to control the field supplied Motorized valve for the direct circuit.***



Item	Description
1	Outdoor unit
2	Indoor unit
3	R134a compressor
4	Water pump
5	3-way valve
6	T-branch
7	Shut-off valves (field supplied)
8	Domestic hot water tank

Item	Description
9	Security valve (DHWT-SWG-01 accessory)
10	DHWT heater (integrated with DHWT)
11	LCD controller (integrated with DHWT)
12	Second temperature kit (ATW-2KT-01 accessory)
13	Motorized valve (field supplied)

Item	Description
14	Aquastat (ATW-AQT-01 accessory)
A	2nd Water Temperature sensor (ATW-WTS-02 accessory)
B	Secondary water pump
C	Mixing valve motor (ATW-MVM-01 accessory)
D	Hydraulic separator
E	Shut-off valve

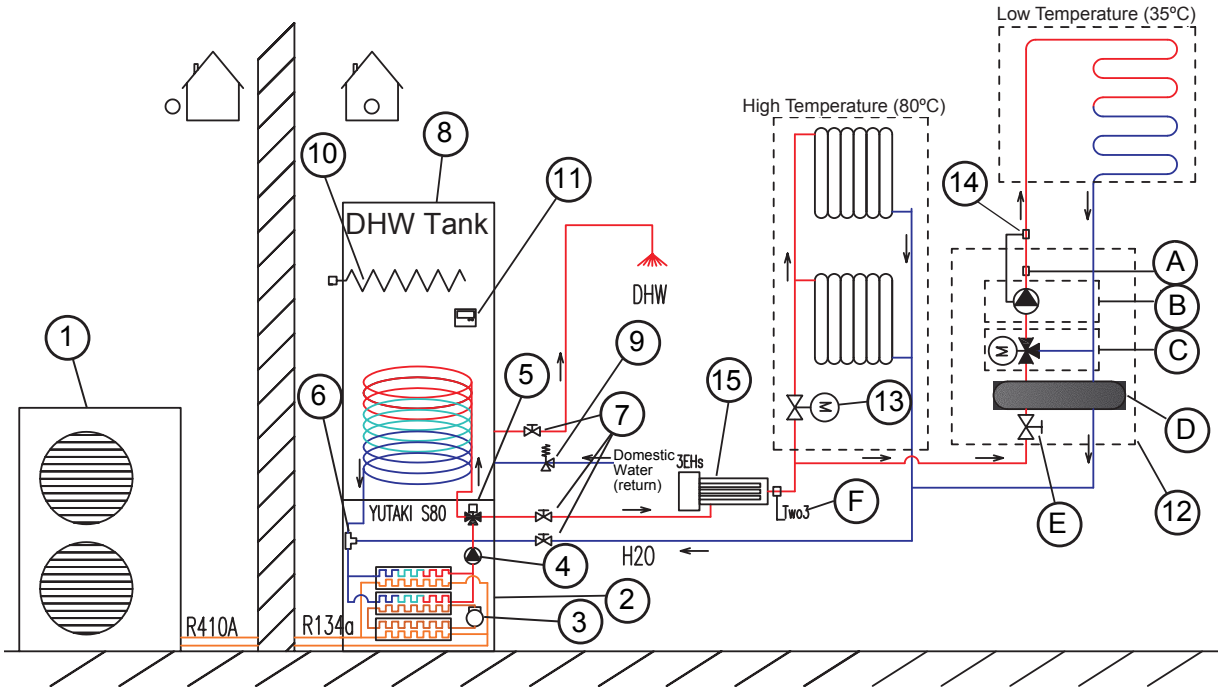
5.3.2 Additional combinations

◆ Electric heater complement (Installation example 5)

Two space heating applications (High & Low water temperature) + Combination with Electric heater + optional Domestic Hot Water Tank: Two space heating application with a Room Thermostat as an option heated by Heat Pump and supplemented by 3-stage electrical heater (as accessory) to provide additional heating capacity to the system (mono-energetic system). Optional Domestic Hot Water Tank is heated by Heat Pump. The LCD is integrated with the DHW Tank or supplied as necessary accessory if indoor unit is alone.

NOTE

When YUTAKI S80 is working in Mono-energetic system (with electric heater) the electric heater accessory is available (WEH-6E). Additional water sensor (Two3) is also necessary. Use the ATW-WTS-02Y universal water sensor accessory if needed.



Item	Description
1	Outdoor unit
2	Indoor unit
3	R134a compressor
4	Water pump
5	3-way valve
6	T-branch
7	Shut-off valves (field supplied)
8	Domestic hot water tank
9	Security valve (DHWT-SWG-01 accessory)

Item	Description
10	DHWT heater (integrated with DHWT)
11	LCD controller (integrated with DHWT)
12	Second temperature kit (ATW-2KT-01 accessory)
13	Motorized valve (field supplied)
14	Aquastat (ATW-AQT-01 accessory)
15	Electric heater (WEH-6E accessory)

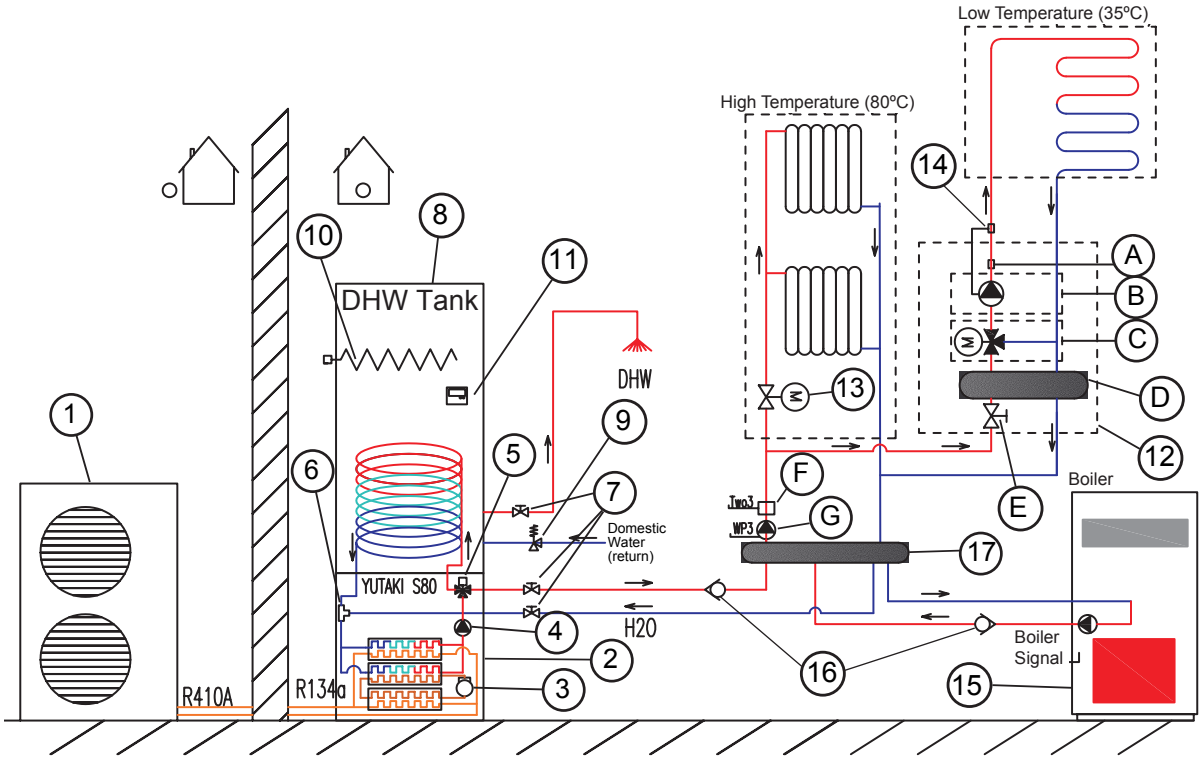
Item	Description
A	2nd Water Temperature sensor (ATW-WTS-02 accessory)
B	Secondary water pump
C	Mixing valve motor (ATW-MVM-01 accessory)
D	Hydraulic separator
E	Shut-off valve
F	Universal water sensor (Two3) (ATW-WTS-02Y accessory)

◆ Boiler complement (Installation example 6)

Two space heating applications (High & Low water temperature) + Boiler combination + optional Domestic Hot Water Tank: Two space heating application with optional Room Thermostat heated by alternating Heat Pump and boiler. Optional Domestic Hot Water Tank is heated by Heat Pump. The LCD is integrated with the DHW Tank or supplied as accessory if indoor unit is alone.

NOTE

- ***When YUTAKI S80 is working in Alternating Bi-valent system (with boiler), a hydraulic separator or buffer tank has to be used to ensure proper hydraulic balancing. Use the ATW-HSK-01 accessory if needed. Additional Water pump (WP3) and water sensor (Two3) (ATW-WTS-02Y accessory) are also necessary.***
- ***When YUTAKI S80 is working in Alternating Bi-valent system (with boiler) install 2 water check valves (non-return) at the water inlet of the indoor unit and boiler. Use the ATW-WCV-01 accessory if needed.***



Item	Description
1	Outdoor unit
2	Indoor unit
3	R134a compressor
4	Water pump
5	3-way valve
6	T-branch
7	Shut-off valves (field supplied)
8	Domestic hot water tank
9	Security valve (DHWT-SWG-01 accessory)
10	DHWT heater (integrated with DHWT)

Item	Description
11	LCD controller (integrated with DHWT)
12	Second temperature kit (ATW-2KT-01 accessory)
13	Motorized valve (field supplied)
14	Aquastat (ATW-AQT-01 accessory)
15	Boiler (field supplied)
16	Water check valve (ATW-WCV-01 accessory)
17	Hydraulic separator (ATW-HSK-01 accessory)

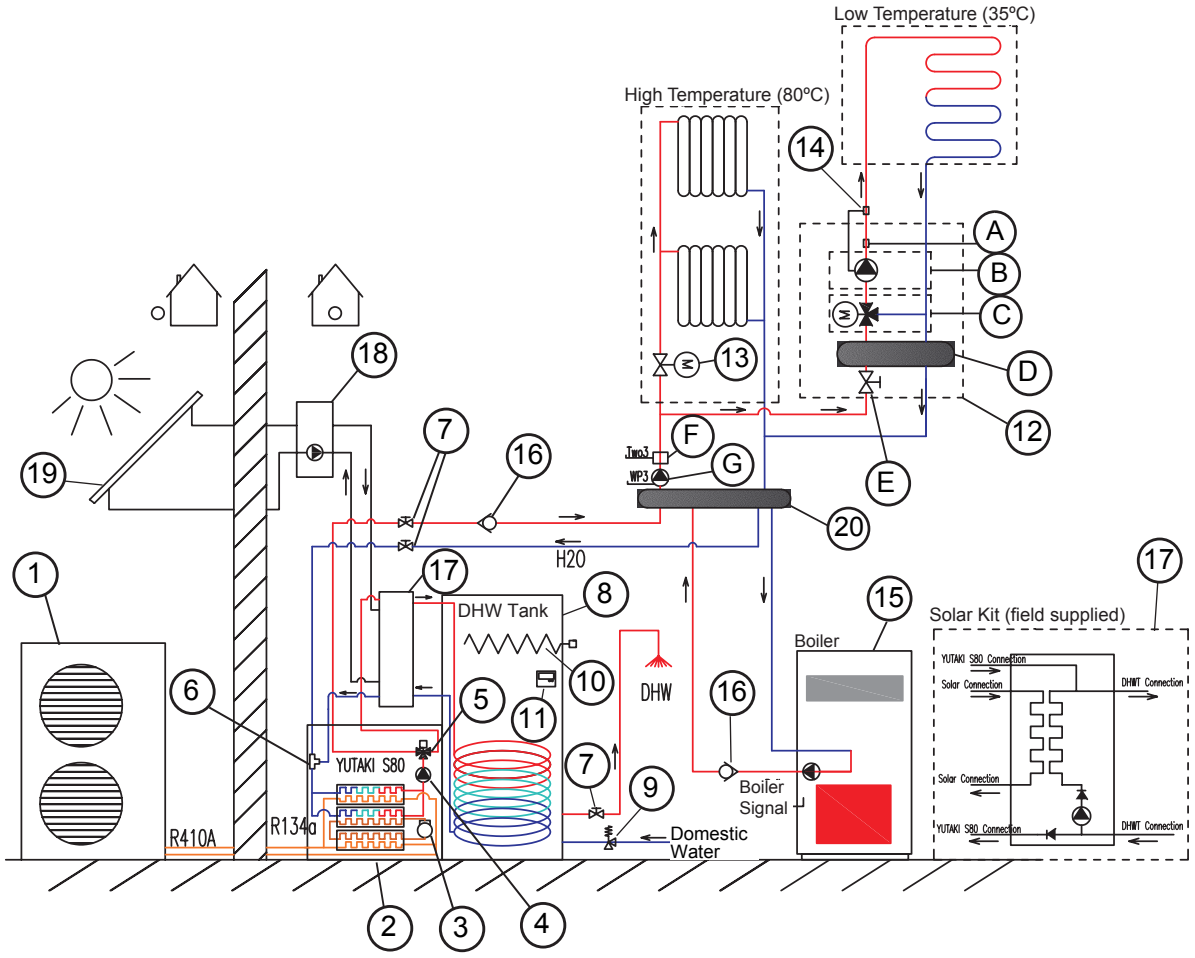
Item	Description
A	2nd Water Temperature sensor (ATW-WTS-02 accessory)
B	Secondary water pump
C	Mixing valve motor (ATW-MVM-01 accessory)
D	Hydraulic separator
E	Shut-off valve
F	Universal water sensor (Two3) (ATW-WTS-02Y accessory)
G	Water pump 3 (WP3) (field supplied)

◆ Solar combination (Installation example 7)

NOTE

Solar combination is not available when the HITACHI domestic hot water tank is integrated over the indoor unit.

Two space heating applications (High & Low water temperature) + Domestic Hot Water Tank + Solar combination + Heating complement (Boiler or Electric heater combination): Two space heating application with a Room Thermostat as an option heated by Heat Pump and alternating boiler or supplemented by 3-stage electrical heater. Domestic Hot Water Tank is heated by Heat Pump and also by free energy of the sun by means of a field supplied Solar panel and field supplied Solar Kit. The LCD is integrated with the DHW Tank.



Item	Description
1	Outdoor unit
2	Indoor unit
3	R134a compressor
4	Water pump
5	3-way valve
6	T-branch
7	Shut-off valves (field supplied)
8	Domestic hot water tank
9	Security valve (DHWT-SWG-01 accessory)
10	DHWT heater (integrated with DHWT)

Item	Description
11	LCD controller (integrated with DHWT)
12	Second temperature kit (ATW-2KT-01 accessory)
13	Motorized valve (field supplied)
14	Aquastat (ATW-AQT-01 accessory)
15	Boiler (field supplied)
16	Water check valve (ATW-WCV-01 accessory)
17	Solar Kit (field supplied)
18	Solar pump & control (field supplied)

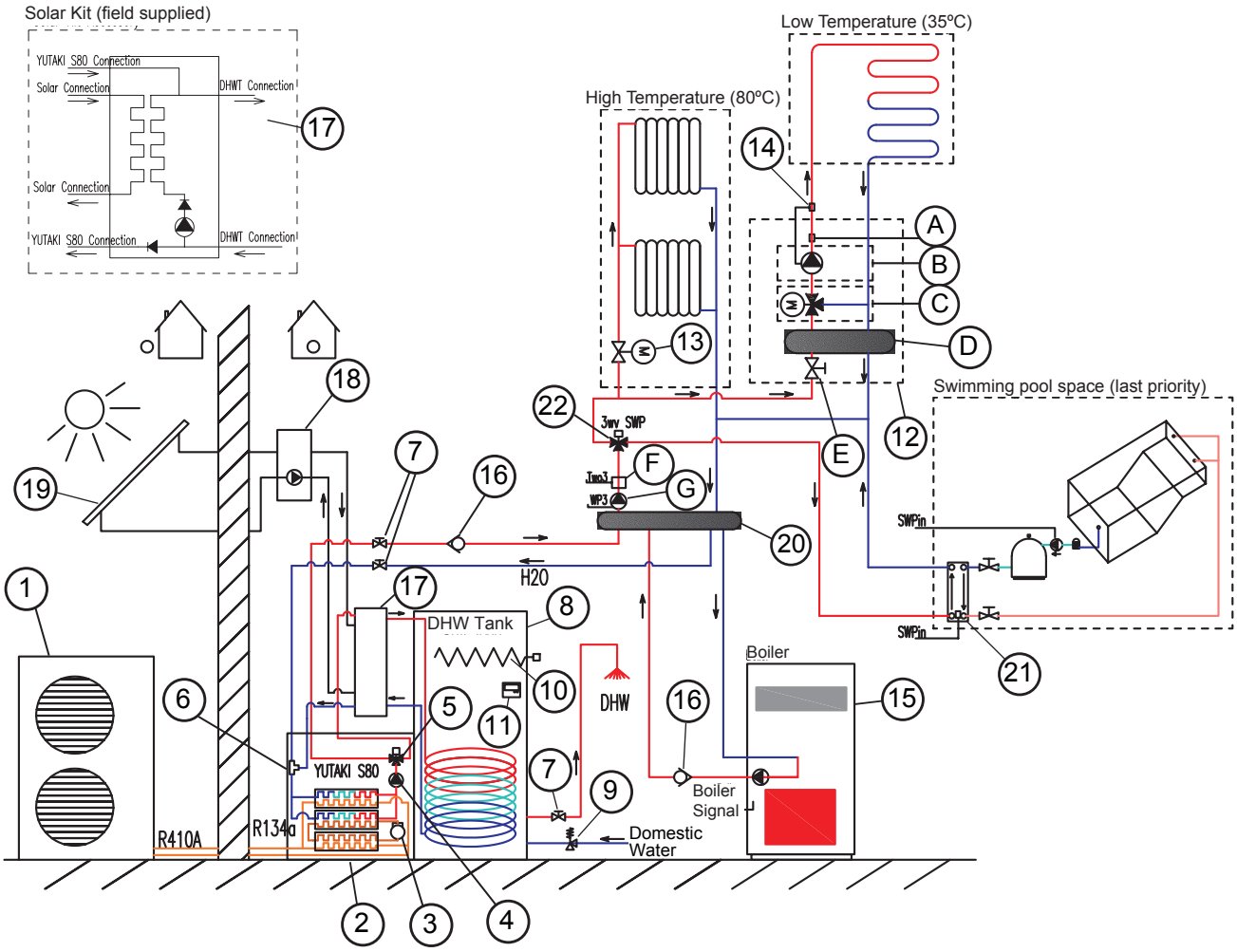
Item	Description
19	Solar panel (field supplied)
20	Hydraulic separator (ATW-HSK-01 accessory)
A	2nd Water Temperature sensor (ATW-WTS-02 accessory)
B	Secondary water pump
C	Mixing valve motor (ATW-MVM-01 accessory)
D	Hydraulic separator
E	Shut-off valve
F	Universal water sensor (Two3) (ATW-WTS-02Y accessory)
G	Water pump 3 (WP3) (field supplied)

◆ Swimming pool combination (Installation example 8)

Two space heating applications (High & Low water temperature) + optional Domestic Hot Water Tank + Swimmping pool combination + Heating complement (Boiler or Electric heater combination): Two space heating application with a Room Thermostat as an option and swimming pool space heated by Heat Pump and alternating boiler or supplemented by 3-stage electrical heater. Swimming pool is connected to the main circuit through a 3-way valve (ATW-3WV-01/02 accessory) and a heat exchanger (field supplied). Domestic Hot Water Tank is heated by Heat Pump. The LCD is integrated with the DHW Tank or supplied as necessary accessory if indoor unit is alone.

NOTE

When YUTAKI S80 is working with a swimming pool the 3-way valve accessory is needed (ATW-3WV-01 or ATW-3WV-02).



Item	Description
1	Outdoor unit
2	Indoor unit
3	R134a compressor
4	Water pump
5	3-way valve
6	T-branch
7	Shut-off valves (field supplied)
8	Domestic hot water tank
9	Security valve (DHWT-SWG-01 accessory)
10	DHWT heater (integrated with DHWT)
11	LCD controller (integrated with DHWT)

Item	Description
12	Second temperature kit (ATW-2KT-01 accessory)
13	Motorized valve (field supplied)
14	Aquastat (ATW-AQT-01 accessory)
15	Boiler (field supplied)
16	Water check valve (ATW-WCV-01 accessory)
17	Solar Kit (field supplied)
18	Solar pump & control (field supplied)
19	Solar panel (field supplied)
20	Hydraulic separator (ATW-HSK-01 accessory)

Item	Description
21	Swimming pool heat exchanger (field supplied)
22	3-way valve (ATW-3WV-01/02 accessory)
A	2nd Water Temperature sensor (ATW-WTS-02 accessory)
B	Secondary water pump
C	Mixing valve motor (ATW-MVM-01 accessory)
D	Hydraulic separator
E	Shut-off valve
F	Universal water sensor (Two3) (ATW-WTS-02Y accessory)
G	Water pump 3 (WP3) (field supplied)

5.4 Standard control functions

5.4.1 Space heating

◆ Selecting space heating configuration

Available system configuration will be set using water type for space heating operation. There are two available circuits, one direct circuit and one mixed circuit.

NOTE

Please refer to** Installation configurations **section for detailed information about the two circuits.

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

NOTE

As default, YUTAKI S80 is set for one circuit only (Direct circuit) and OTC gradient.

For information on how to create settings, refer to *LCD user's interface* chapter.

Water temperature set-point

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

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.

◆ Space heating activation conditions

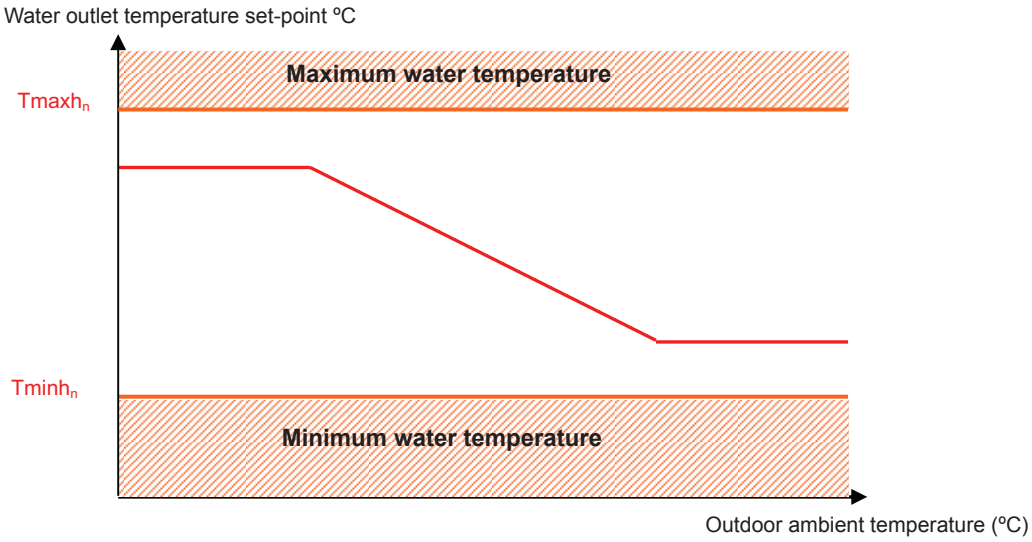
- Space heating mode is activated by any of following events:
  - Space Heating mode selected by user (LCD controller RUN/STOP button) or by remote action.
  - Space Heating mode Demand ON by external thermostat signal (ATW-RTU-01) (Option 1) or
  - Space Heating mode Demand ON by intelligent thermostat (ATW-RTU-02) (Option 2) or
  - Space Heating mode Demand ON by LCD Timer
- 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).
  - Tariff function or LCD Timer blocked.
  - Alarm.

NOTE

When Space Heating is not active then unit will not request compressor frequency for Space Heating and, if there are no other modes in operation, Outdoor Unit will receive Thermo OFF situation.

◆ 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:

REF	Description	Default Value	Range	Steps	Units
CIRCUIT 1 (Direct circuit)					
Tmaxh$_1$	Maximum supply Tº	80	35 ~ 80	1	ºC
Tminh$_1$	Minimum supply Tº	20	20 ~ 34	1	ºC
CIRCUIT 2 (Mixed circuit)					
Tmaxh$_2$	Maximum supply Tº	55	35 ~ 80	1	ºC
Tminh$_2$	Minimum supply Tº	20	20 ~ 34	1	ºC

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.

◆ 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.

YUTAKI S80 can use the two outdoor temperature sensors (Outdoor unit ambient temperature and Auxiliar ambient temperature (4-20mA) for the two space heating circuits.

- DSW setting

This function requires that DSW4#2 is set to ON to enable the use of auxiliary ambient temperature.

Source temperature for average calculation is selectable by DSW4#2 & DSW5#1,2 at start up with the following values:

DSW5		ACTION	
Pin 1	Pin 2	Circuit 1	Circuit 2
OFF	OFF	Outdoor Sensor Average	Outdoor Sensor Average
OFF	ON	Outdoor Sensor Average	Auxiliar Ambient Sensor Average
ON	OFF	Auxiliar Ambient Sensor Average	Outdoor Sensor Average
ON	ON	Auxiliar Ambient Sensor Average	Auxiliar Ambient Sensor Average

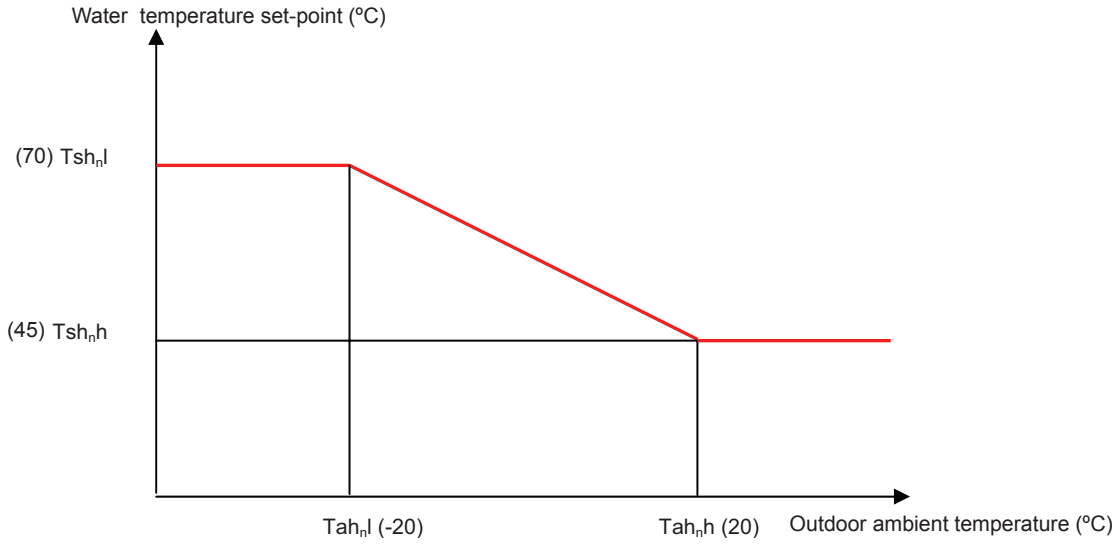
NOTE

- ***Not average during first 30 seconds after switch ON (power ON).***
- ***After 30 seconds starts outdoor ambient temperature average.***

◆ 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)

REF	Description	Default Value	Range	Steps	Units
CIRCUIT 1 (Direct circuit)					
Tah$_1$l	Low ambient T° C1	-20	-20~6	1	ºC
Tah$_1$h	High ambient T° C1	20	7~25	1	ºC
Tsh$_1$l	Set-point at low ambient T° C1	70	Tmaxh$_1$~Tminh$_1$	1	ºC
Tsh$_1$h	Set-point at high ambient T° C1	45	Tmaxh$_1$~Tminh$_1$	1	ºC
CIRCUIT 2 (Mixed circuit)					
Tah$_2$l	Low ambient T° C2	-20	-20~6	1	ºC
Tah$_2$h	High ambient T° C2	20	7~25	1	ºC
Tsh$_2$l	Set-point at low ambient T° C2	44	Tmaxh$_2$~Tminh$_2$	1	ºC
Tsh$_2$h	Set-point at high ambient T° C2	20	Tmaxh$_2$~Tminh$_2$	1	ºC

NOTES

Parameters (Tmaxh$_{(1/2)}$~Tminh$_{(1/2)}$) are defined by Maximum and Minimum water outlet temperatures selected by installer.

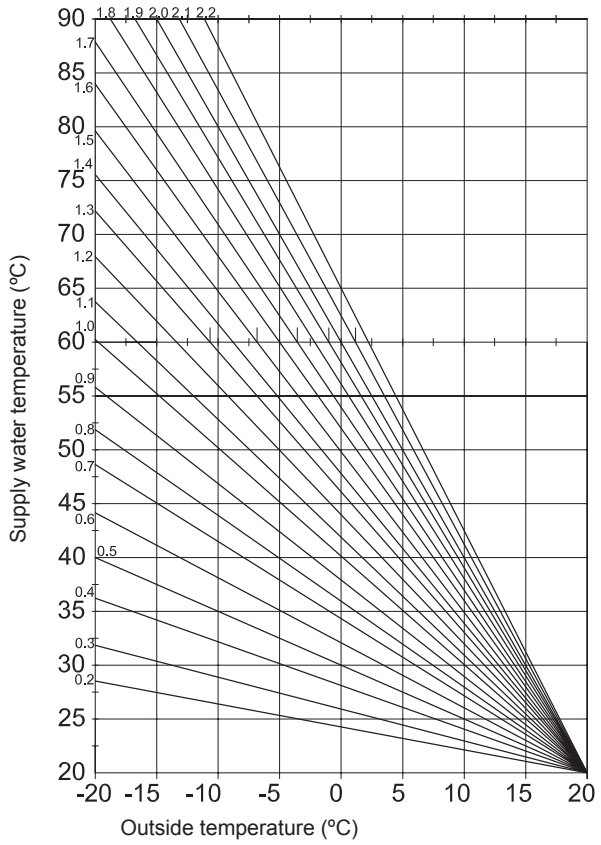
CAUTION

- ***It is 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

REF	Description	Default Value	Range	Steps	Units
CIRCUIT 1 (Direct circuit)					
OTCh1	Gradient C1	1.4	0.2~2.2	0.1	-
CIRCUIT 2 (Mixed circuit)					
OTCh2	Gradient C2	0.6	0.2~2.2	0.1	-

NOTES

- ***Default value of Circuit 1 corresponds to Water Rule = 1.4 (High temperature heating).***
- ***Default value of Circuit 2 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.***

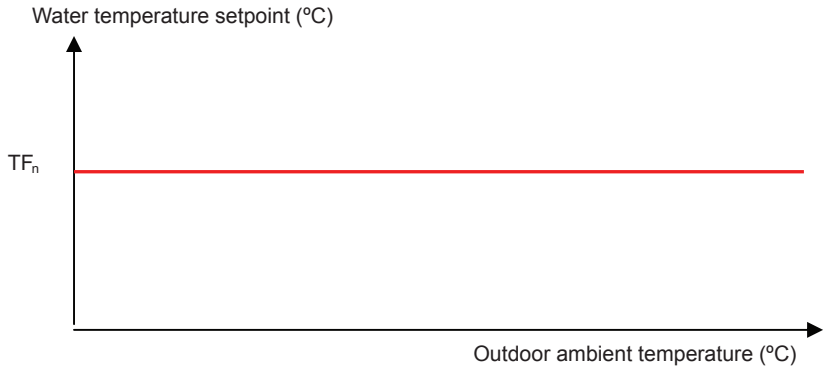
Example:

(OTCh1) = ***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)

REF	Description	Default Value	Range	Steps	Units
CIRCUIT 1 (Direct circuit)					
TF1	Fixed Tº C1	70	Tmaxh$_1$~Tminh$_1$	1	ºC
CIRCUIT 2 (Mixed circuit)					
TF2	Fixed Tº C2	40	Tmaxh$_2$~Tminh$_2$	1	ºC

NOTE

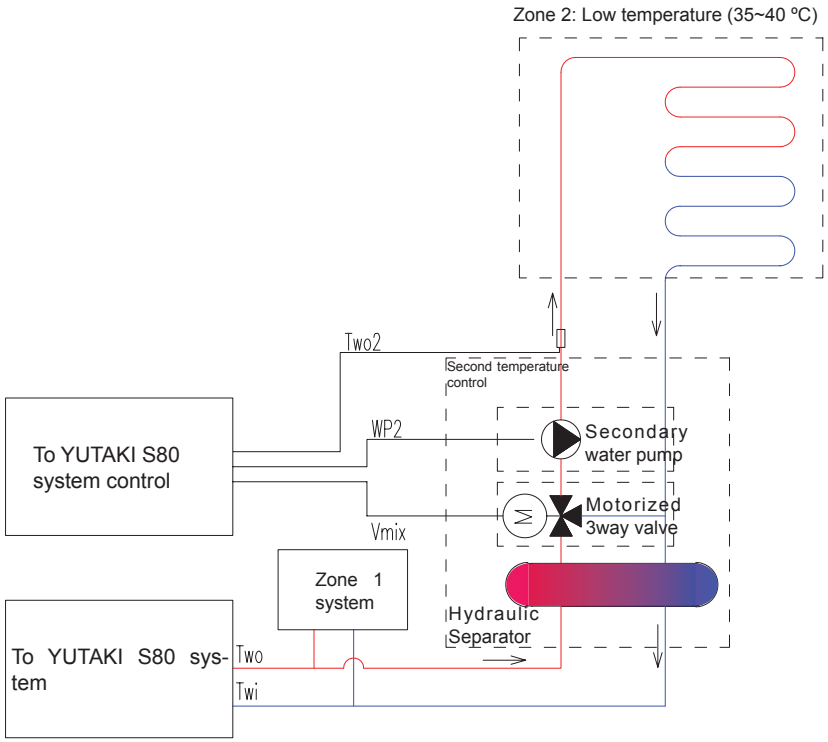
- ***Parameters (Tmaxh$_{(1/2)}$~Tminh$_{(1/2)}$) are defined by Maximum and Minimum water outlet temperatures selected by installer.***
- ***Water outlet temperature will depend on unit's operational range.***

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 (mixing valves 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 decides how much to open or close the mixing valve to achieve the desired position for the valve. This depends on the running time of the actuator used on the valve. The running time is defined as the time it takes to drive the valve from the fully closed to the fully open position. Typically this can be between 1 and 4 minutes.

REF	Description	Default Value	Range	Steps	Units
PB	Proportional band of mixing valve	6.0	0.0~20	0.2	K
IRF	Integral reset factor of mixing valve	2.5	0.0~20	0.1	%
RTM	Running time factor of mixing valve	140	10~500	10	sec

◆ Water set point priority

When system is in direct and mixed mode and both are active the resultant set-point will be always the circuit 1 water set-point (direct mode).

NOTE

- ***In theory it should be done as the bigger of the two but in the case of circuit 2 (mixed) being higher than circuit 1 (direct) there would be problems in the last one. This situation can only by caused by a bad configuration from installer and it must be avoided.***
- ***In case of not demand in one of the two circuits the water target of the circuit with demand has priority and water target will be calculated for this circuit.***
- ***In case of 2 circuits installation and not demand in direct circuit, main water target (for the compressor) will be by water calculation type for mixing circuit and mixing valve will be 100% opened.***

◆ Spoace heating timer

User can create up to 7 scenes with entire unit configuration available. These scenes can be assigned to different parts of the day creating a daily pattern, after that, user can assign to each day of the week the desired daily pattern.

NOTE

Please refer to** LCD user's interface **chapter for more information about the space heating timer

5.4.2 Room Thermostat control

YUTAKI S80 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)

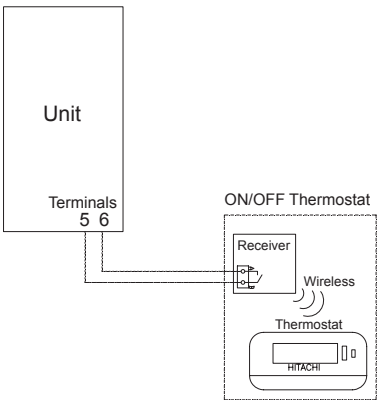
Thermostat Type is selected using the parameter list on LCD user interface:

REF	Description	Default Value
Room thermostat type		
RTT	Thermostat (Installed / Not installed)	Not installed

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

When the ON 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.

When the OFF Room Thermostat temperature setting is lower than room ambient temperature, Room Thermostat communicates with RF Receiver in order to close relay signal and Thermo OFF 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, refer to** Circuit water pumps **section.

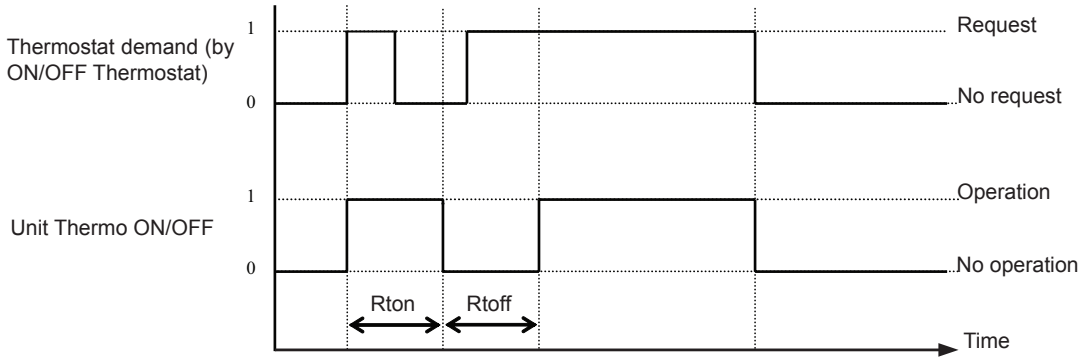
Minimum on time and ON/OFF time cycle

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

These two functions are:

1 Minimum ON Time: When Thermostat demands, a minimum ON time will be applied (including when demand is OFF).
2 Minimum OFF Time: This function determines the minimum OFF time after no demand of Room Thermostat input.

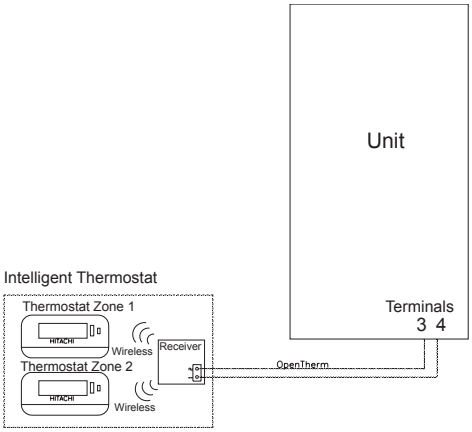
REF	Description	Default Value	Range	Steps	Units
Rton	Minimum ON Time	6	0~15	1	min
Roff	Minimum OFF Time	6	0~15	1	min



◆ 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 influence

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 up or 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.

If a Room Unit is not bounded (RF binding) to heating circuit 1, the room set point used is equal to the room set point of heating circuit 2. If a Room Unit is also not bounded to heating circuit 2 (or not circuit 2), then a default value of 20°C is used.

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*

Ta (outside temperature) = ***0ºC***

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

RS = ***18ºC***

RD: Better condition 20ºC.

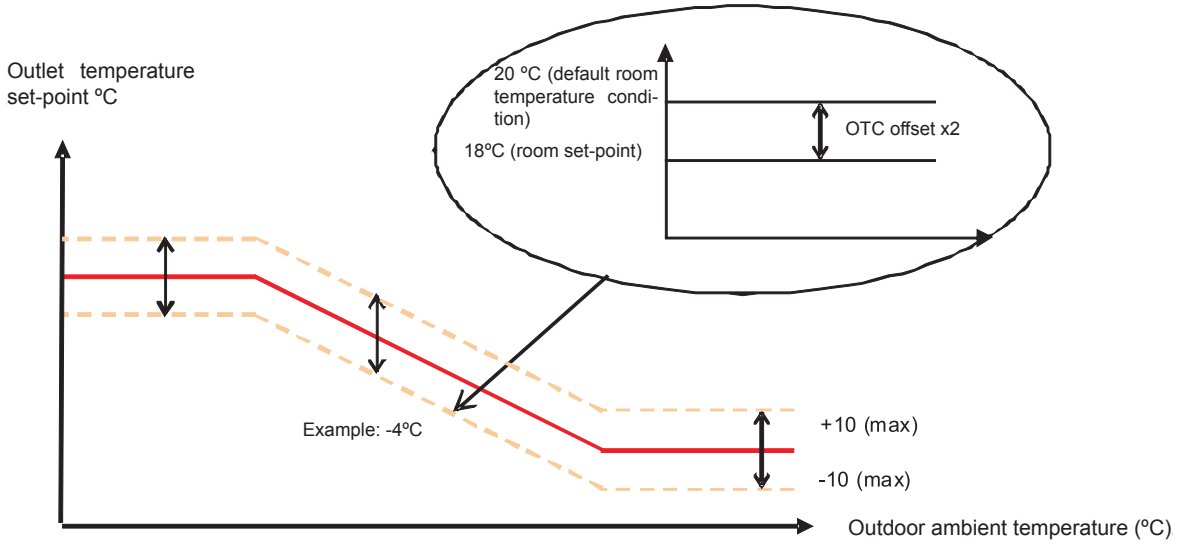
Ttwo = function (OTC + (Room temperature set-point offset) x2)

Ttwo = function (OTC + (Room set-point (RS) - Room default temperature condition (RD) (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.***
- ***In case of ΔTroom > 10ºC → ΔTroom = 10ºC and ΔTroom < -10ºC → ΔTroom = -10ºC***
- ***Room set point influence has no effect during the first 10 minutes after power on due to slow time transmission between Opentherm and LCD control.***

5

Room temperature compensation (configuration in LCD user inteface)

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 that 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.

REF	Description	Default Value	Range	Steps	Units
CIRCUIT 1 (Direct circuit)					
$Rfact_1$	Compensation factor C1	2	0~5	1	-
CIRCUIT 2 (Mixed circuit)					
$Rfact_2$	Compensation factor C2	2	0~5	1	-

NOTE:

To disable room compensation function, set $Rfact_1$ or $Rfact_2$ 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*

Ta(outside temperature) = ***0ºC***

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

RS = 20ºC

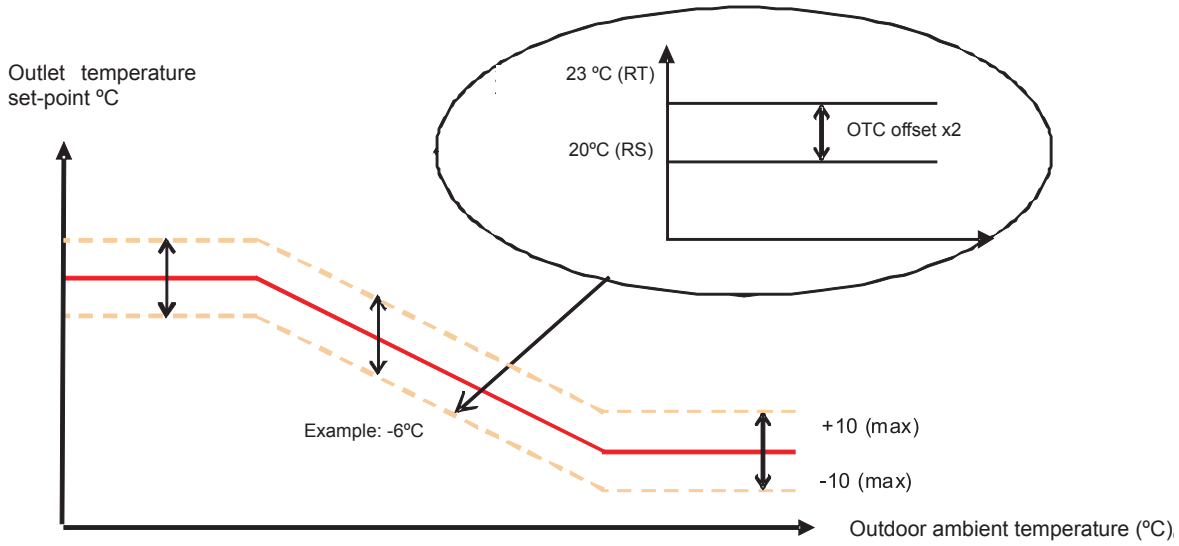
RT = 23ºC

$RFact_n$= 2 (Default value)

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

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.***
- ***Room set point influence has no effect during the first 10 minutes after power on due to slow time transmission between Opentherm and LCD control.***

Thermo OFF condition by intelligent room thermostat

If Room Temperature is an offset (Roff) bigger than Room Temperature set-point, it must be a THERMO OFF Condition (Compressor 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 condition by Indoor temperature

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

NOTE

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

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

Unit OFF status by room thermostat (only intelligent thermostat)

If Room Temperature setting (RTS option) is 5ºC or 10ºC. (by pressing OFF button (5ºC) or Holidays button (10ºC) on User Thermostat), the heating space selected will be turned OFF. In case of two User Thermostats, Unit OFF Condition will be set for the global heating space.

NOTE

This condition will be transmitted to LCD user control and seven segments PCB.

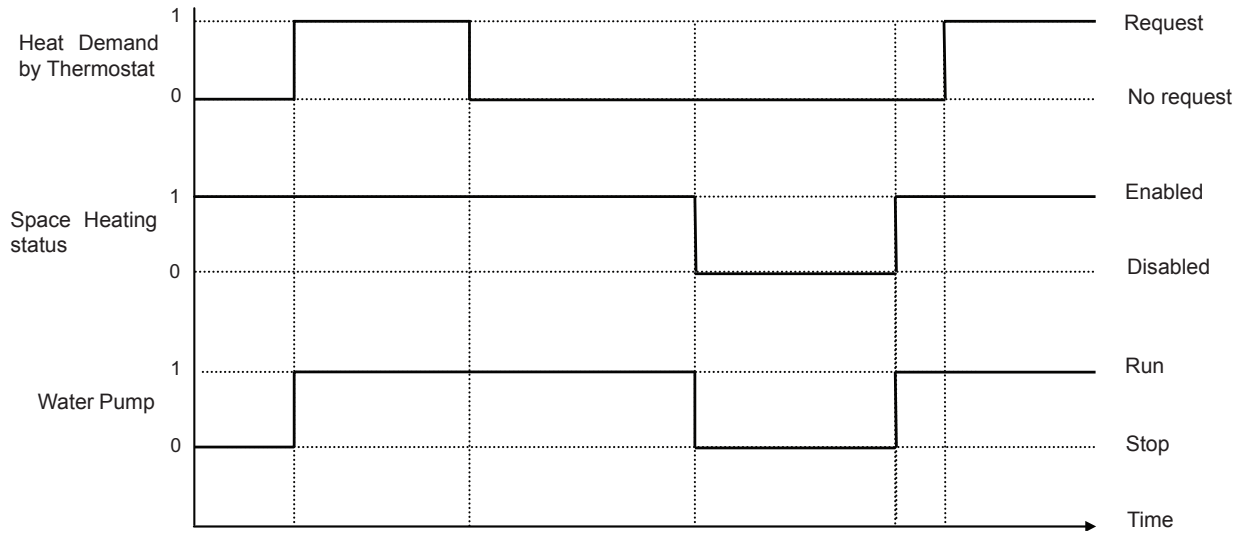
5.4.3 Circuit water pumps

◆ Main water pump for heating circuit application

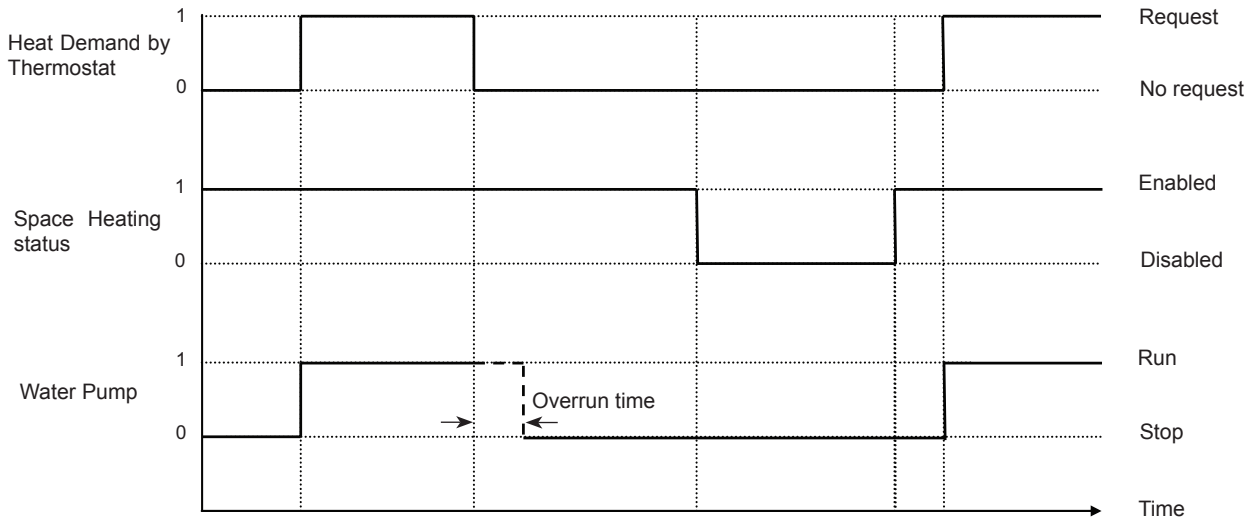
Pump configuration (Standard & Economy function)

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 will always be in operation when space heating is enabled, but when it 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.

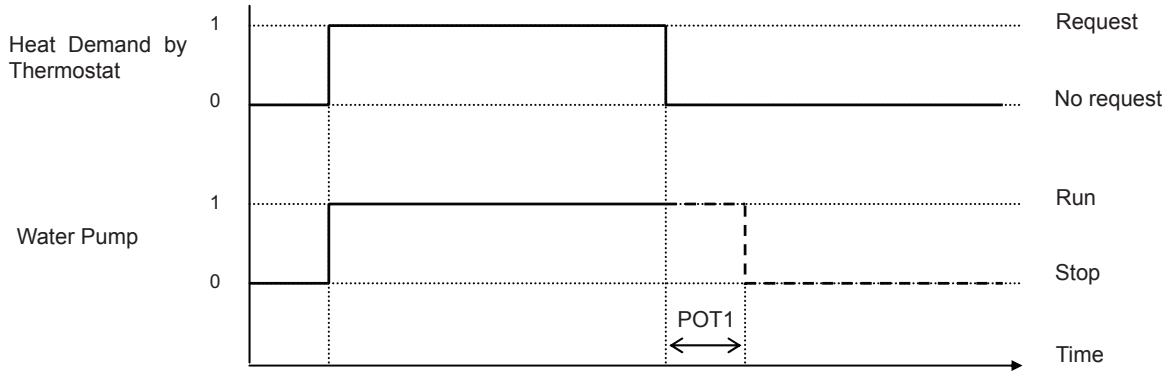


When pin is ON, pump will be in ECONOMY operation. Economy operation allows pump to stop when system is stopped by demand OFF in room thermostat.



◆ Overrun pump delay

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

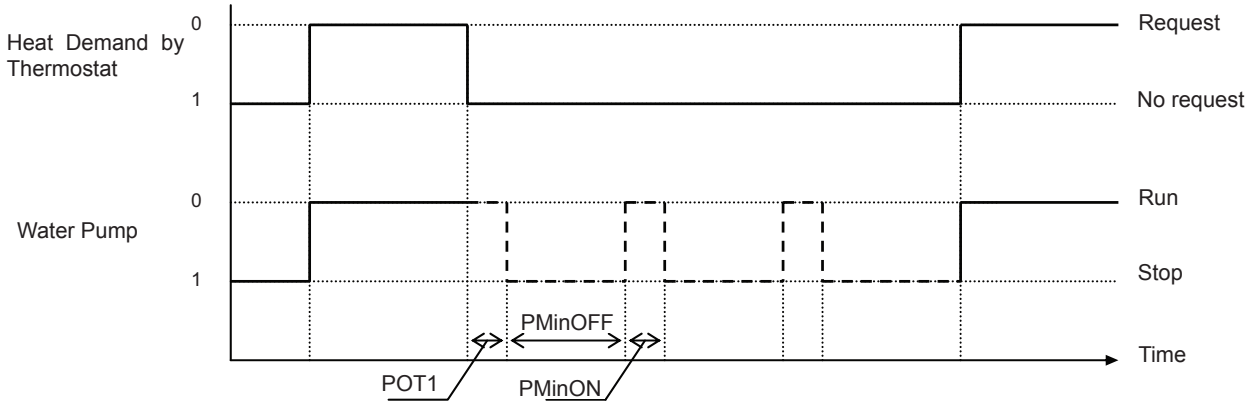


REF	Description	Default Value	Range	Steps	Units
POT1	Pump 1 overrun time	10	0~120	5	min

◆ 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.

Each PMinOFF minutes pump will be operated during PMinON minutes. Timer is independent for main and sub pumps.



REF	Description	Default Value	Range	Steps	Units
PMinOFF	Min time OFF	40	10~120	5	min
PMinON	Min time ON	10	10~120	5	min

NOTE

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

◆ Radiant Floor Overheat Protection

Over temperature protection for Radiant Floor avoids over heating in zone 2.

Alarm is activated when:

- Two2 > Ttwo2(max) ($Tmaxh_n$) + RFTTMAX

When alarm is active WP2 is stopped and mixing valve is set to 0.

User Variable:

REF	Description	Default Value	Range	Steps	Units
RFTTMAX	Over Temperature Offset C2	5	1~10	1	ºC

NOTE

Put 0 to disable the protection OTO for radiant floor.

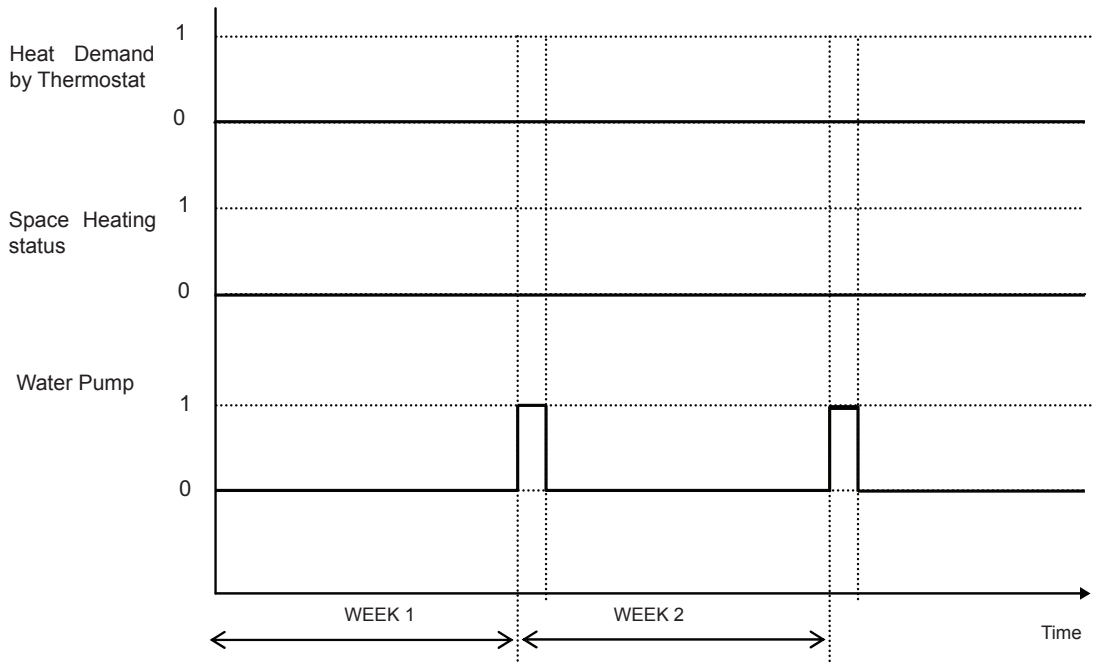
◆ Pump seizure protection

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.

The following 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.



REF	Description	Default Value	Range	Steps	Units
SeizPr	Seizure Protection Status	Off	Off / On		-
OpInt	Operation Day	Mon	Mon~Sun	-	Day
StTim	Start Time (00~24)	01:00	(00:00~23:59)	00:01	Time

5.4.4 Domestic Hot Water (DHW)

An optional domestic hot water tank can be connected to the YUTAKI S80 Indoor unit. The domestic hot water tank is available in two models: 195 or 260.

Refer to the DHW Tank and YUTAKI S80 installation and operation manuals for more details.

◆ Status

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

REF	Description	Default Value
DHWs	DHW status (Disabled; Enabled)	Disabled

NOTE

- ***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.***
- ***If DHW is set to Disabled, new sanitary water operation is forbidden until it is changed to Enabled.***

◆ Priority

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

The following constraints apply:

- When DHW requires Heat Pump operation, no other modes can require heat pump operation.
- If DHW does not require Heat Pump operation, it is stopped; 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 (economical) Mode:** The domestic hot water tank will start heating when water temperature in tank is low enough for Heat Pump to be started. DHW is always heated by Heat Pump.
- **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.

DHW Modes will be selected using LCD User interface:

REF	Description	Default Value
DHWm	DHW Mode (Standard; High Demand)	Standard

◆ Domestic hot water temperature setting (T_{DHWS})

DHW operation (both Water tank heater and Heat Pump) will be stopped when:

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

  Where:

  Tdhw: Domestic Hot water temperature (ºC)

  Tdhws: Domestic Hot water setting temperature (ºC)

CODE	REF	Description	Default Value	Range	Steps	Units
3-022	T_{DHWS}	DHW Tº set-point	60	30 ~ T_{DHWMAX}	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.

REF	Description	Default Value	Range	Steps	Units
T_{DHWMAX}	DHW maximum set-point Tº	65	40~75	1	ºC

◆ High demand mode differential (T_{DHWON}) (only high demand mode)

DHW Heater will start when following conditions are met:

- System is set to HIGH DEMAND Mode
- $T_{DHW} < (T_{DHWS} - T_{DHWON})$
- $T_{DHW} > (T_{DHWS} - T_{HPON})$

Where:

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

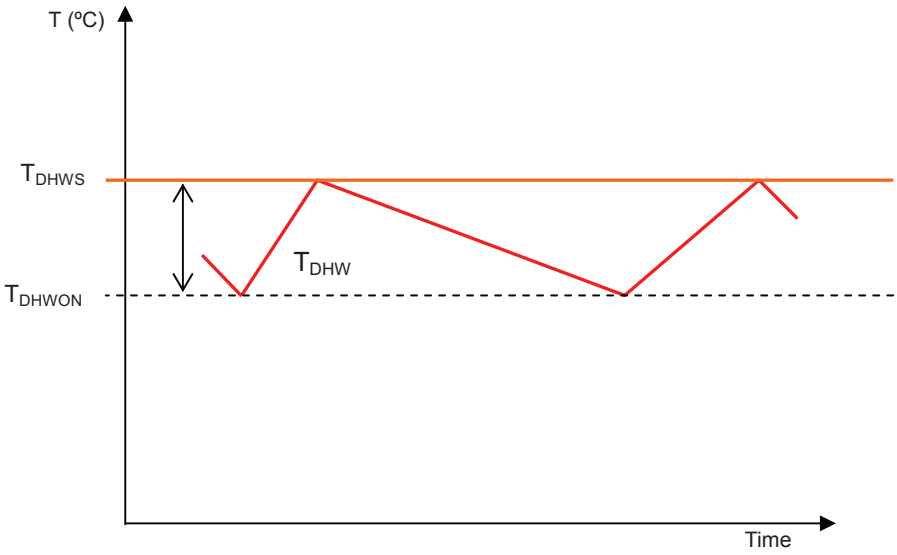
T_{DHWS}: Water temperature setting in DHW (ºC)

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

T_{HPON}: Heat pump operation ON Tº differential

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

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



If $T_{DHW} > T_{HPON}$ → Heating is performed by Electrical Heater Tank (if Heater enabled by dip-switch)

If $T_{DHW} < T_{HPON}$ → Heating is performed by Heat Pump and/or Electrical Heater Tank (if Heater enabled by dip-switch)

◆ Heat pump operation for DHW (T_{HPON})

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

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

During Heat Pump operation for DHW, water outlet target will be set to T_{HPWTS}. Additionally T_{HPWTS} cannot be higher than maximum temperature for the heat pump.

T_{HPWTS} is calculated as:

- $T_{HPWTS} = T_{DHW} + 15ºC$

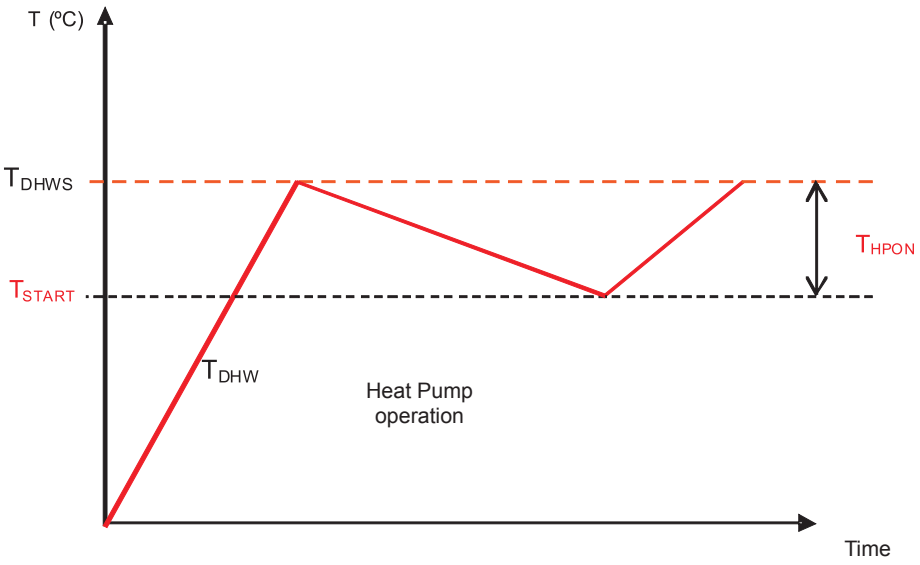
NOTE

T_{HPWTS} range is between 55ºC and 80ºC

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

Heat pump operation for DHW stops when T_{DHW} is greater than T_{DHWS}.

$T_{HPSTART}$ is always T_{DHWS} - T_{HPON}



The offset T_{HPON} follows the next variable:

REF	Description	Default Value	Range	Steps	Units
T_{HPON}	HP ON Tº differential	20	10~40	1	ºC

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

This function controls the minimum and maximum times that DHW 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}

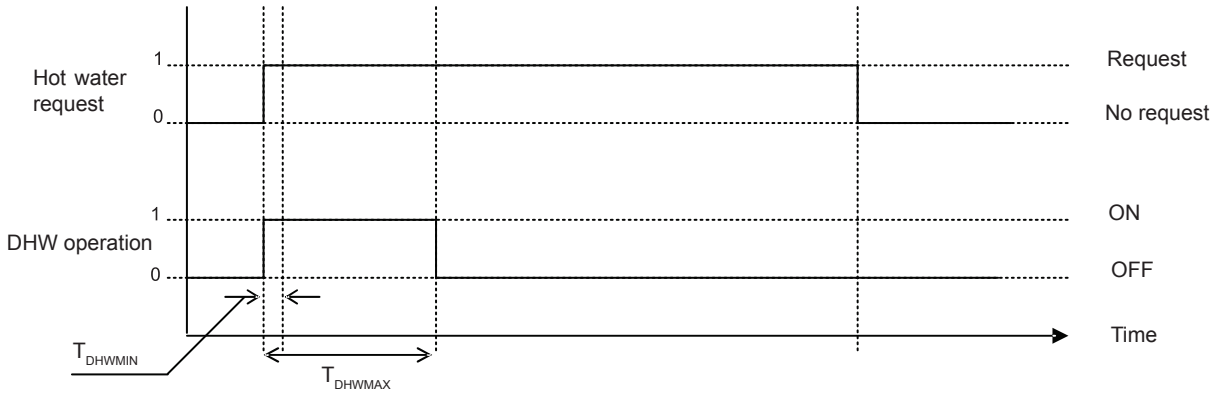
Stoppage by T_{DHWS} (Domestic Hot Water Temperature Setting) has priority over this timer, so it may stop the system regardless of Heat Pump Operation Time.

Heat pump will stop when:

- Heat Pump Operation Time > T_{DHWMAX}

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

REF	Description	Default Value	Range	Steps	Units
T_{DHWMIN}	DHW minimum time	10	0~15	1	min
T_{DHWMAX}	DHW maximum time	60	20~150	1	min



NOTE

Manual stop has priority above Minimum operation time.

◆ DHW second cycle wait time (only standard mode)

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

DHW will not start if:

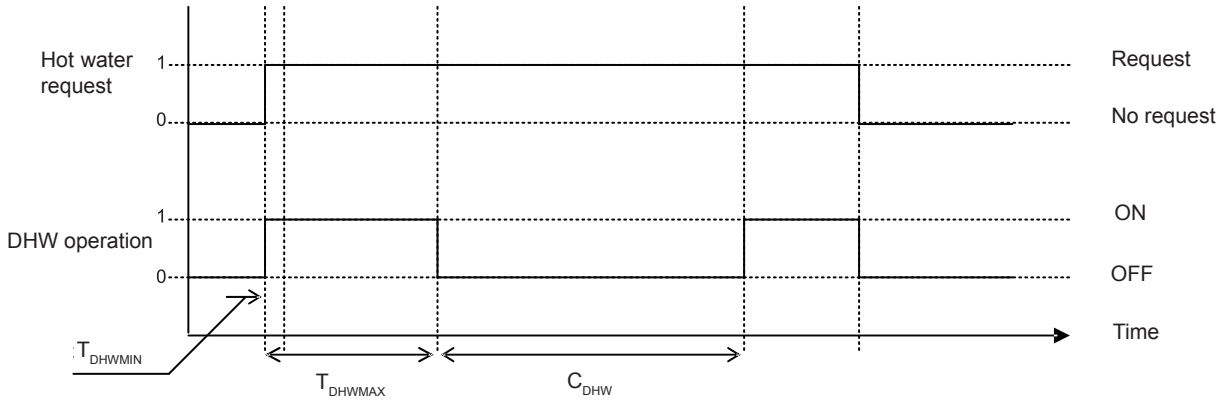
- DHW Off Time < C_{DHW}

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

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

DHW Off Time starts being counted after last DHW Heat Pump operation.

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



NOTE

If only DHW is operating (No heating space demand), waiting time has no meaning because it is done in order to ensure space heating operation.

◆ DHW electric heater

Electric Heater DHWT control will be disabled as default.

Automatic control can be enabled by dip-switch setting:

- DSW4-1: OFF (Default): DHWT Electric Heater control disabled
- DSW4-1: ON: Electric Heater control enabled

NOTE

Electric heater has additional manual operation by using SW1 located in indoor unit cover's protection, beside the manometer. Refer to *DHWT electrical heater for emergency operation* ***section for more information.***

◆ DHW electric heater wait time (only standard mode)

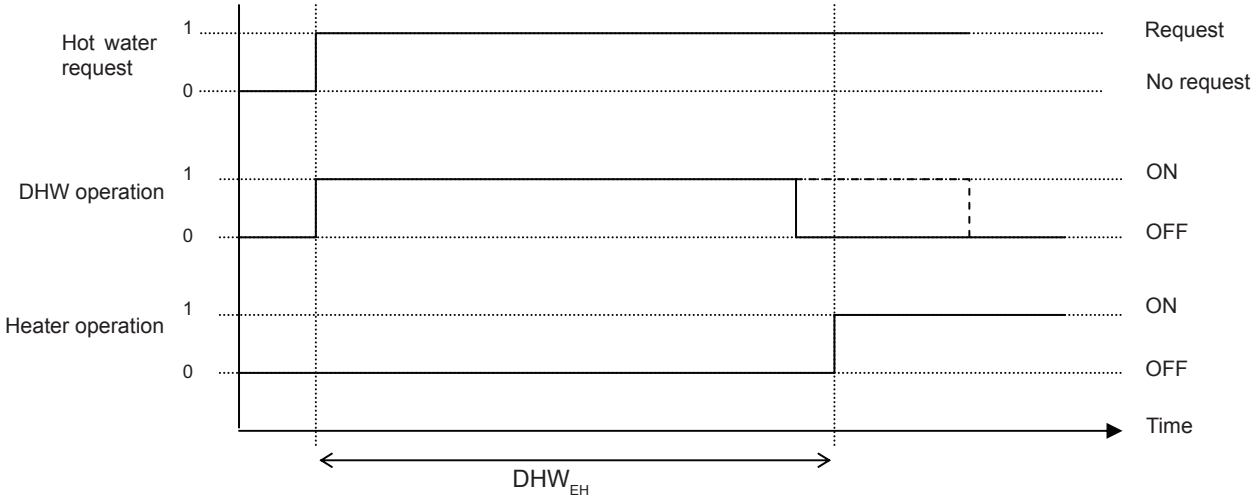
If Heat Pump cannot offer sufficient capacity it will be necessary to start Heater in order to supply additional capacity.

Heater will start if:

- DHWT Heater enabled (DSW4-1:ON)
- Heat Pump DHW Operation Time > DHW_{EH}

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

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



NOTE

- ***If DHW_{EH} is set to 0, then it will be considered the default value of 45 minutes.***
- ***Electric Heater waiting time has no effect if $T_{DHW} \geq T_{HPSTOP}$.***

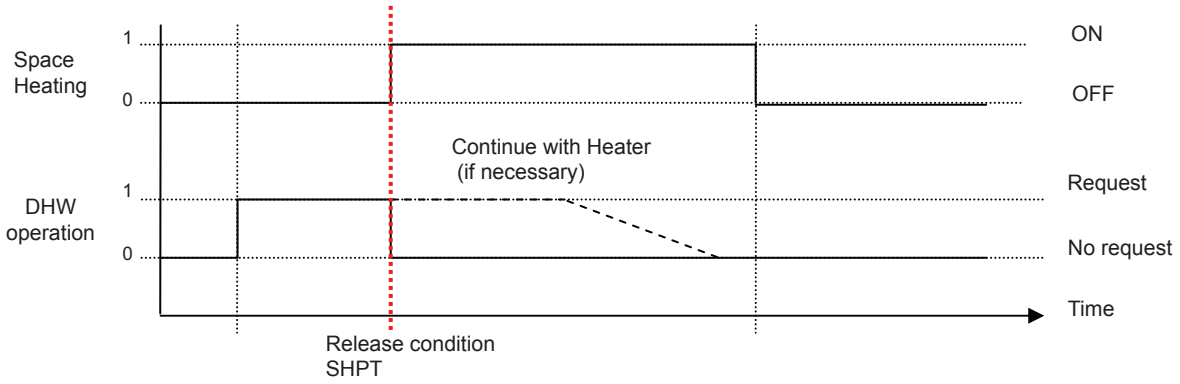
◆ Space heating priority temperature (only standard mode)

If Space Heating Priority function and DHWT Heater control are enabled (by Dip-Switch), Heat Pump operation by DHW mode will stop (and continue with heater if necessary) if:

- DSW4-1: ON: Electric Heater control enabled
- Text (ambient temperature) < SHPT

In this situation, if $T_{DHW} < T_{HPSTART}$, tank's electric heater will start (even if DHW_{EH} is not passed) and DHW mode with heat pump will not stop until $T_{DHW} > T_{DHWS}$

REF	Description	Default Value	Range	Steps	Units
SHPTs	Space priority	OFF	OFF/ON	1	-
SHPT	Space priority T°	-5	-20~0	1	°C



NOTE

- ***DHW Heater will continue if heating tank is necessary.***
- ***In case DSW4-1: OFF, the unit needs to restart.***
- ***In case of DHWT cycle time=0h, no function is applied.***

◆ DHWT electrical heater for emergency operation

In case of outdoor unit or indoor unit malfunction the DHWT can be heated by an internal electric heater.

The DHWT electrical heater needs to be enabled by SW1 manual operation placed beside indoor unit manometer.

The Control of DHWT is not performed by the unit but by Thermostat in the tank.

NOTE

For more information please refer to** Domestic Hot Water Tank troubleshooting **section in** Troubleshooting **chapter.

◆ DHW heating by timer

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

The user can create up to 7 scenes with the entire unit configuration available. These scenes can be assigned to different parts of the day creating a daily pattern. After that, user could assign to each day of the week the desired daily pattern.

NOTE

For more information, refer to** LCD user's interface **chapter.

5.4.5 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 (PCN10-5 input).

◆ Swimming pool target temperature

Swimming Pool will start if:

- Swimming Pool Temperature < SWP_S -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.

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

◆ Swimming pool Offset temperature

When swimming pool status is enabled, indoor unit needs to work an offset of temperature higher than swimming pool Tº setpoint due to the heat exchanger between the two circuits.

User Variable:

REF	Description	Default Value	Range	Steps	Units
SWOff	Swimming pool Offset Tº	15	10~31	1	ºC

NOTE

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

◆ Swimming pool timer

User can create up to 7 scenes with entire unit configuration available. These scenes can be assigned to different parts of the day creating a daily pattern, after that, user can assign to each day of the week the desired daily pattern.

NOTE

Please refer to** LCD user's interface **chapter for more information about the space heating timer

5.4.6 Auxiliary electric heater accessory for space heating

The electric heater accessory for additional heating capacity may be used during very cold outdoor temperatures. It can also be used for emergency operation in case of outdoor unit malfunction. The electrical heater supplied by HITACHI as accessory has 6 kW capacity.

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

Electric Heater will only operate when Heating Accessory is set to HP + Heater.

System protection will always have priority against heater operation whenever it is stated.

Model	Heater Capacity	Heater steps
WEH-6E (*)	6kW	3 steps (2/4/6kW)

NOTE

(*): The input power values are explained as example for the water electric heater supplied by HITACHI as accessory (WEH-6E), with a total input power of 6.0 kW. For other water electric heaters, the input power for each step will be different.

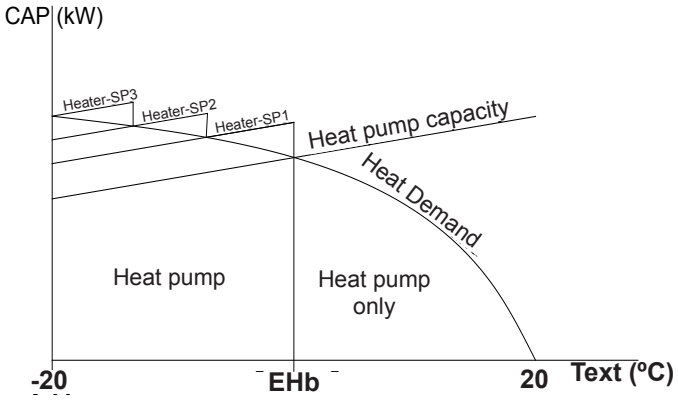
User Variable:

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

◆ Heater bivalent point

Heater will only be enabled when:

- Outdoor Ambient Temperature < Electrical heater Bivalent Point



User Variable:

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

◆ Target temperature

Heater operation will be controlled by heater set point (HTset).

HTset is calculated as follows:

- If Water set point (Ttwo) ≤ Maximum Heat Pump operation (Tmax):
  - HTset = Ttwo – ksco (Suppy set point control offset)
- When system is in Emergency Mode (heat pump cannot be operated) HTset will always be:
  - HTset = Ttwo

User Variable:

REF	Description	Default Value	Range	Steps	Units
ksco	Supply Setpoint Offset	4.0	0~10	1	K

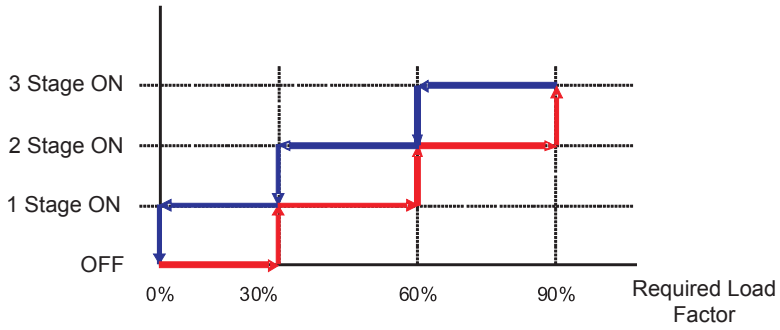
NOTE

The maximum heat pump operation is defined by its working range. Please refer to the Technical Catalogue for more information.

◆ Heater step control

Actual heater output is given using a 3 step output (only heater 1 on, only heater 2 on and both heater on).

Steps	Power (*)
	(4-6) HP
1	2kW
2	4kW
3	6kW



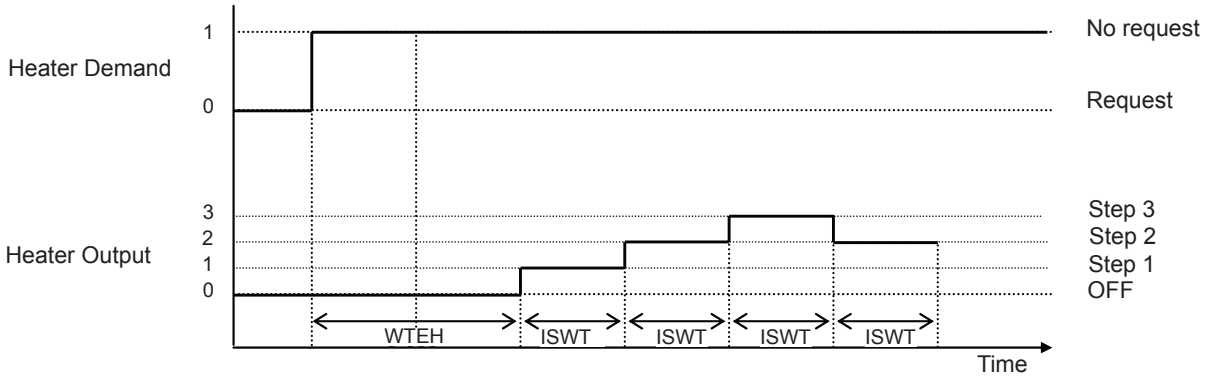
NOTE

(*): The input power values are explained as example for the water electric heater supplied by HITACHI as accessory (WEH-6E), with a total input power of 6.0 kW. For other water electric heaters, the input power for each step will be different.

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:

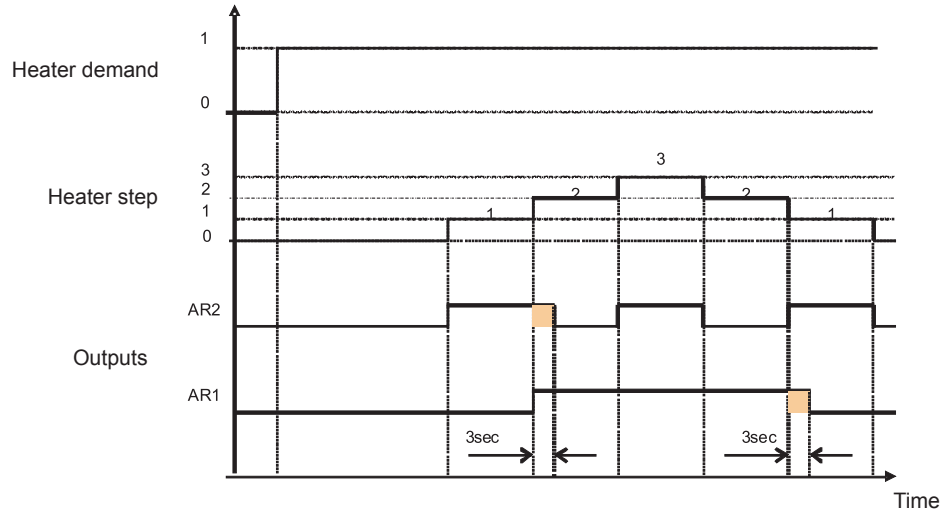
- Electric Heater is forbidden by Waiting Time (see WT variable explanation)
- Electric heater is forbidden by ambient temperature (see bivalent point explanation)
- Electrical heater is disabled by user
- There is alarm related to heater



User variables:

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

In order to minimize a possible rattle contactor between steps it is added additional function as shown bellow:



◆ 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.

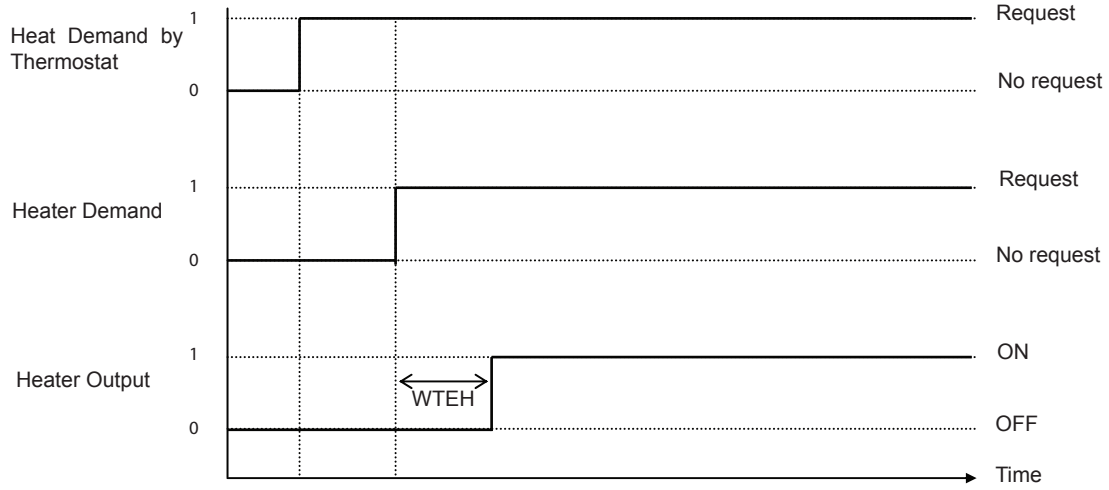
NOTE

For more information refer to chapter *Optional functions.*

◆ 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 (WTEH) has passed since Heat Pump was started (switch on or thermo on) and Heater demand.

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:

REF	Description	Default Value	Range	Steps	Units
WTEH	Wait time for electric heater	30	1 ~ 90	1	min

NOTE

- ***Electrical Heater for Emergency operation has no effect.***
- ***Electrical Heater for starting at low water condition has no effect.***

◆ Heater for emergency mode

When user allows emergency mode (DSW4-4 ON), heater may operate in this mode. This configuration allows also DHW emergency operation.

NOTE

For more information refer to chapter *Optional functions.*

◆ Heater forced OFF

When user/installer allows heater forced OFF by DSW4-7 ON, all uses of the Heater are forbidden, the configuration by LCD has no effect and heater protections (heat at low water temperatures, emergency operation heater…) has no effect.

5.4.7 Auxiliary Boiler combination for space heating

◆ Boiler operation

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

NOTE

The procedures in this chapter apply both to space heating and sanitary water unless otherwise stated.

Boiler will only operate when Heating Accessory is set to HP + Boiler. Boiler and Heater can never work at the same time.

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

User Variables:

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

CAUTION

The boiler is configured as alternating with the heat pump. An 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:

REF	Description	Default Value
hsb	Hydraulic Separator = (Disabled, Enabled)	Disabled

NOTE

This variable is automatically enabled when boiler complementary heating is selected.

CAUTION

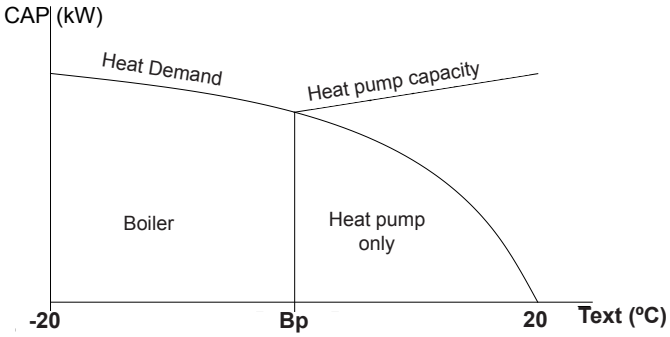
- ***Be sure that the boiler and the integration of the boiler with the YUTAKI S80 system is in accordance with relevant European and national regulations.***
- ***HITACHI can not be held responsible for incorrect or unsafe situations in the boiler system.***
- ***Make sure that the non-return valves (field supplied) are correctly installed in the system as shown in the installation configuration.***

◆ 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 very low.

Boiler will only be enabled when:

Outdoor Ambient Temperature < Bivalent outdoor temperature for boiler (Bp)



User Variable:

REF	Description	Default Value	Range	Steps	Units
Bp	Bivalent outdoor temperature for Boiler	-5	-20~10	1	ºC

◆ Target temperature

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.

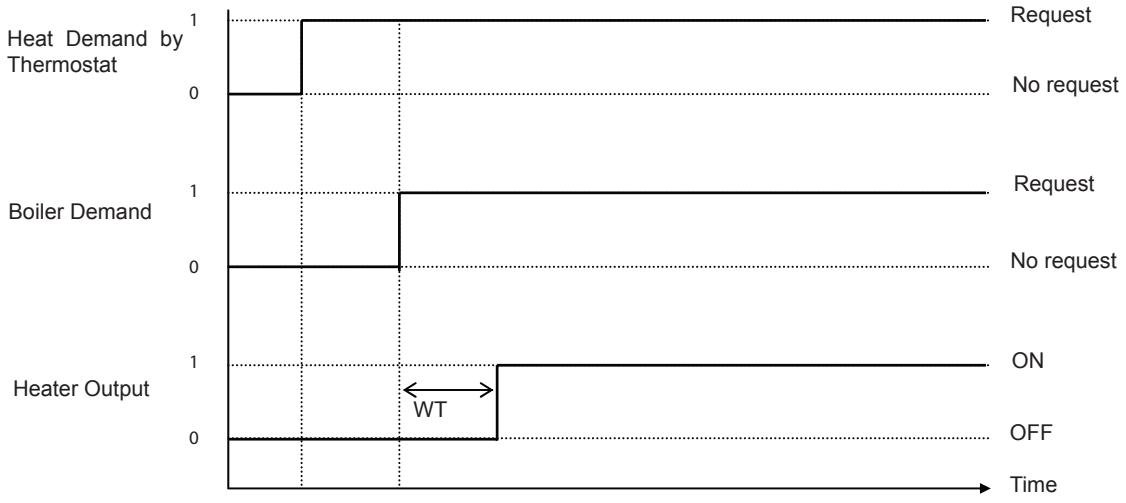
Water set point is Ttwo when Boiler Thermo ON.

◆ 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)
2 Boiler selected
3 Ambient temperature < Boiler Bivalent point (Bp) (-5ºC Default) more than WT (Waiting time for boiler WT)
4 Water temperature (Two3) ≤ Water Temperature target (Ttwo) - Supply set point control offset (4ºC default) (Kscob)



User Variable:

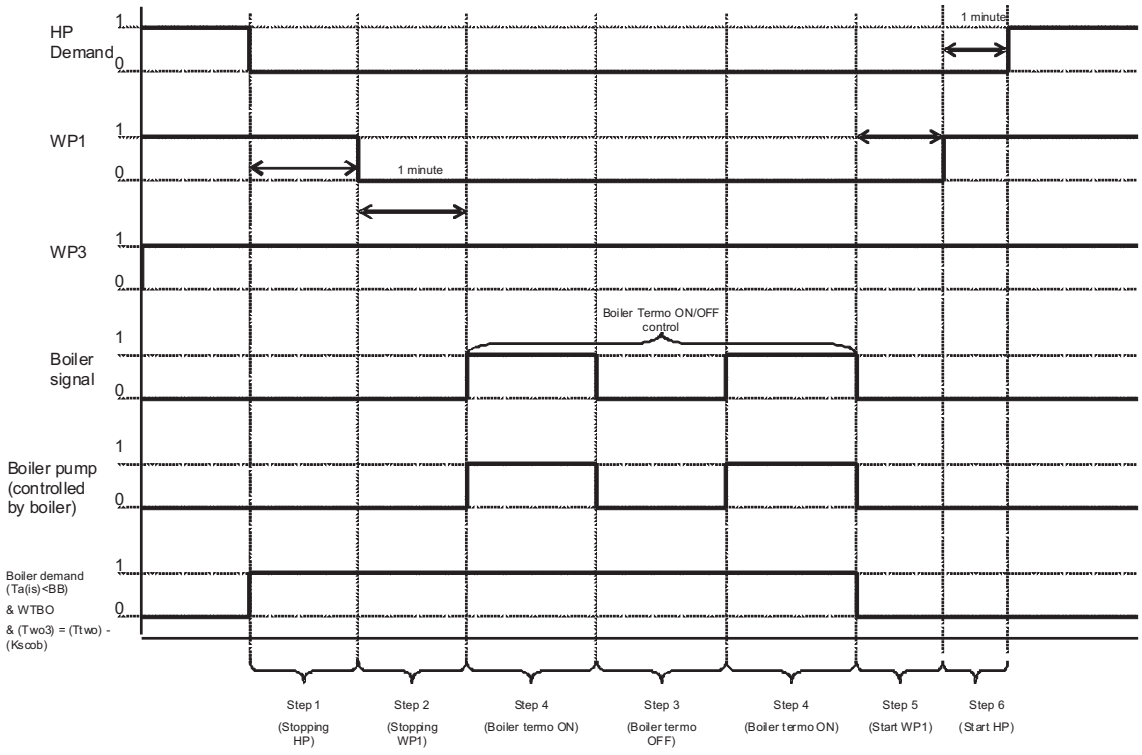
REF	Description	Default Value	Range	Steps	Units
WT	Waiting Time for Boiler	30	1 ~90	1	min

Conditions for Disabling

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

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

◆ Boiler time chart



◆ 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) (Kscob)
2 Room thermostat demand

User Variable:

REF	Description	Default Value	Range	Steps	Units
Kscob	Boiler Offset Tº	4	0 ~10	1	ºC

- Conditions for Thermo OFF:

When Boiler is enabled, water calculation is based in the difference between water outlet 3 (Two3) and water target (Ttwo)

It will occurs, when any of Conditions a, b, c or d are fulfilled.

a. Measured outlet temp value (Two3) ≥ Water temperature target + 5ºC.
b. Outlet water temp (Two3) = Max water range temp by installer ($Tmaxh_1$&$Tmaxh_2$) + 2ºC.
c. Thermo OFF by Room Thermostat or DHWT demand OFF.
d. Ambient temperature (instant) > Boiler Bivalent point (Bp) more than 10 minutes.

NOTE

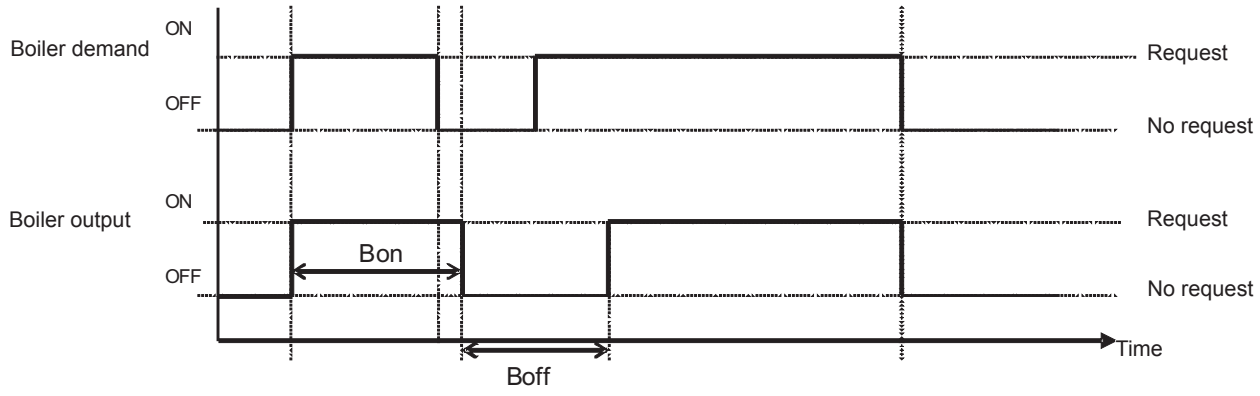
Complementary disabling functions for the boiler itself:
In any of the following conditions step will be forced to 0 (boiler off):

- ***Boiler is disabled by user or thermo OFF by itselfs (waiting time).***
- ***There is an alarm related to boiler***

◆ Boiler minimum and maximum times

Boiler can only be stopped after minimum ON time has passed (Bon).

Boiler can only be started after minimum OFF time has passed (Boff).



User Variables:

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

NOTE

Maximum water temperature limit ($Tmaxh_1$) selected by installer has priority infront of Boiler minimum ON Time.

◆ Emergency mode

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

NOTE

For more information refer to** Optional functions **chapter.

5.4.8 Solar combination

◆ Concept

YUTAKI S80 allows the combination with solar panels for the Domestic Hot Water operation. The air to water heat pump will provide a part of the required heating, and the rest of required heating will be provided by the solar panels.

The solar kit is designed to transfer the heat from the solar panels to the domestic hot water tank's heat exchanger. It is necessary to install the Solar kit accessory to exchange the heat between the solar circuit and the DHW tank to indoor circuit.

The solar panels gather heat from the sun, resulting in an environment friendly system. 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.

NOTE

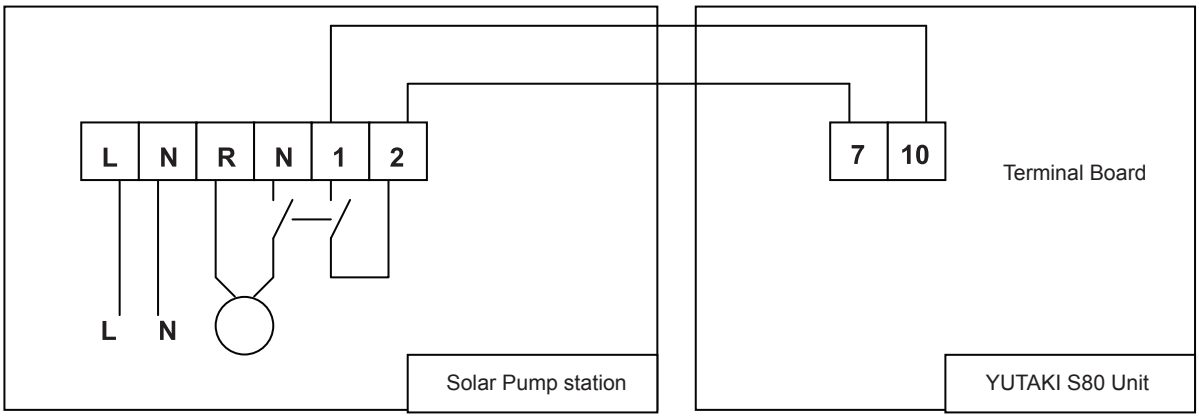
Solar combination is not available when the domestic hot water tank is integrated over the indoor unit.

◆ Solar installation requirements

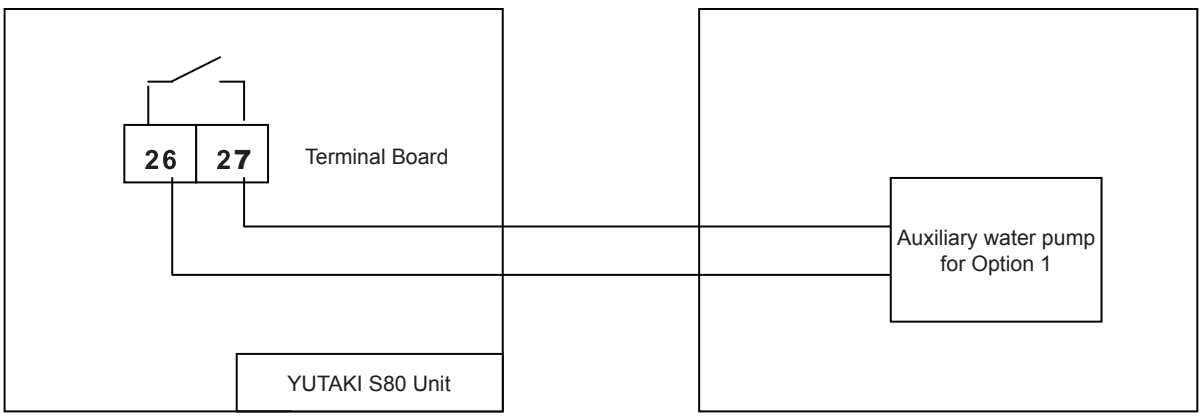
- Electrical connection

The solar pump station has an auxiliary contact that closes when the contact for the pump of the solar pump station is operated.

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



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 26/27).



◆ Setting the solar status

Simultaneous water heating by the sun and water heating by the heat pump is not possible.

By default, heating of the tank by the heat pump has priority over heating by the sun.

This means that, whenever there is a request of the domestic hot water and domestic water heating is enabled (by the schedule timer or enabled by user), heating will be done by the heat pump. In case solar heating is busy, solar heating will be stopped.

This is to avoid shortage of domestic hot water in case the solar radiation is very weak, or solar radiation only became high shortly before domestic hot water demand is expected (e.g. on a cloudy day).

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.

REF	Description	Default Value	Range	Steps	Units
Ssta	Solar status (Disabled, Enabled)	00: Disabled	00: Disabled/ 01: Enabled	1	-

◆ 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.

◆ Solar enabling/disabling conditions

- Solar start conditions

When all of Conditions a, b, c 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 60ºC)
- T_{DHWON} = Domestic hot water differential ºC (temperature drop that starts DHW) (Default 6ºC)
- T_{DHWMAX} = Domestic Hot Water tank maximum supply temperature (ºC) (Default 65 ºC)

If conditions are fulfilled, heating DHW by Heat Pump will be switched OFF, and heating will be done by solar station through YUTAKI S80's auxiliary output signal. If $T_{DHW} > T_{DHWMAX}$ solar station cannot heat DHW by tank at maximum allowed temperature and YUTAKI S80's auxiliary output will be switched OFF.

- Solar stop conditions

When any of Conditions d, e, f, g 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 DHW can operate using Solar power alone. Heater operation is not affected by it.

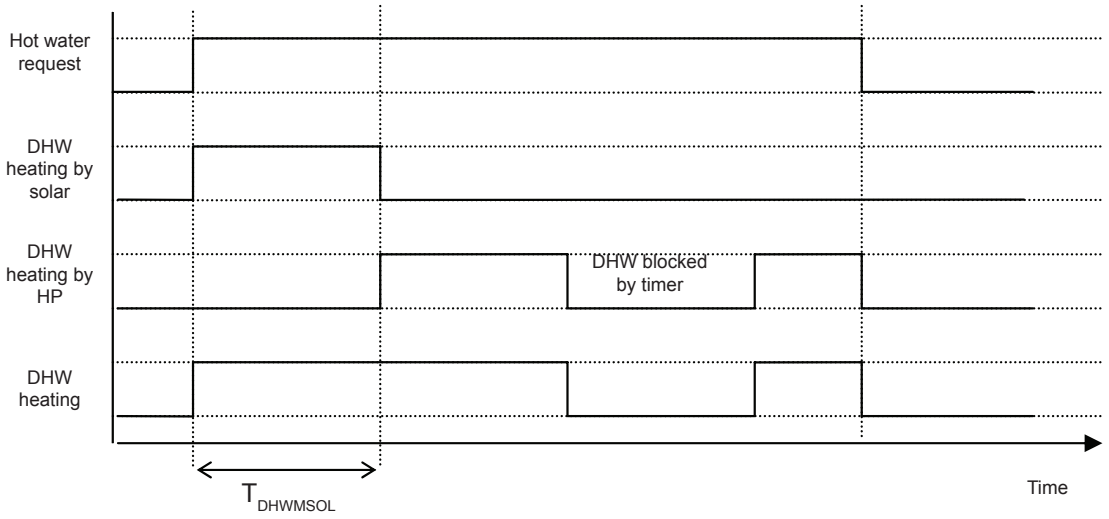
Solar power will be stopped when:

- Solar Operation Time > $T_{DHWMSOL}$

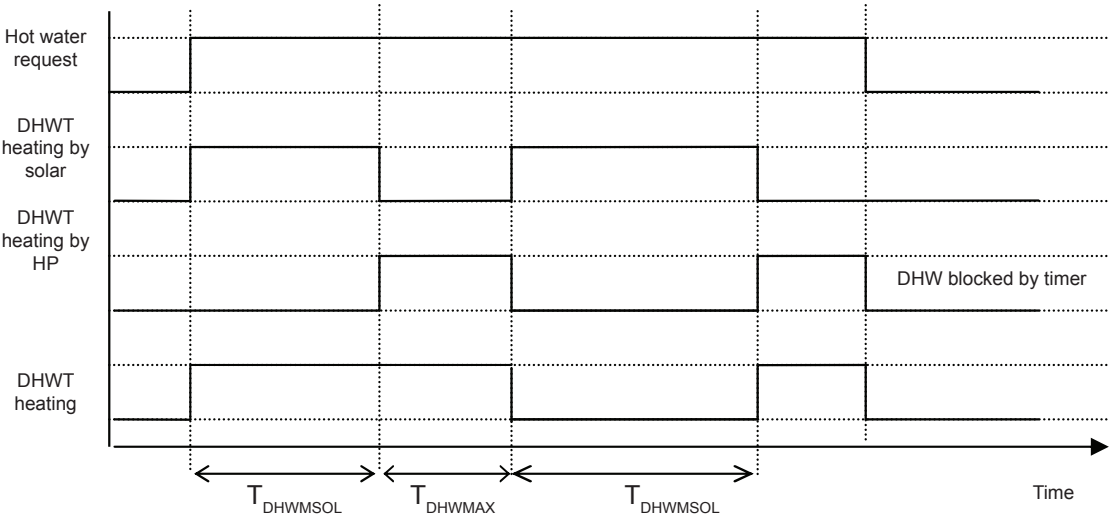
When Solar is stopped by this function, DHW will continue working by Heat Pump or heater (depending on water condition).

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

Description	Default Value	Range	Steps	Units
DHW SOLAR maximum time	60	30~240	1	min



After $T_{DHWTMSOL}$, it must pass the Maximum DHW Time (defeault 45 min) from *Maximum / Minimum DHW Loading Time (T_{DHWMAX} / T_{DHWMIN})* water control section, for next solar mode.



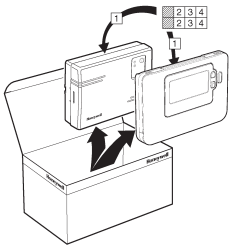
5.5 Room thermostat (accessory)

5.5.1 Room Thermostat Unit installation and configuration (as accessory)

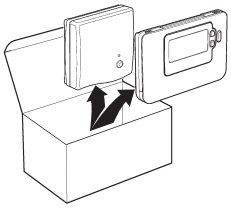
◆ Description

The Room Unit communicates with the RF Receiver on an 868MHz Radio Frequency (RF) band to control the YUTAKI S80 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.***

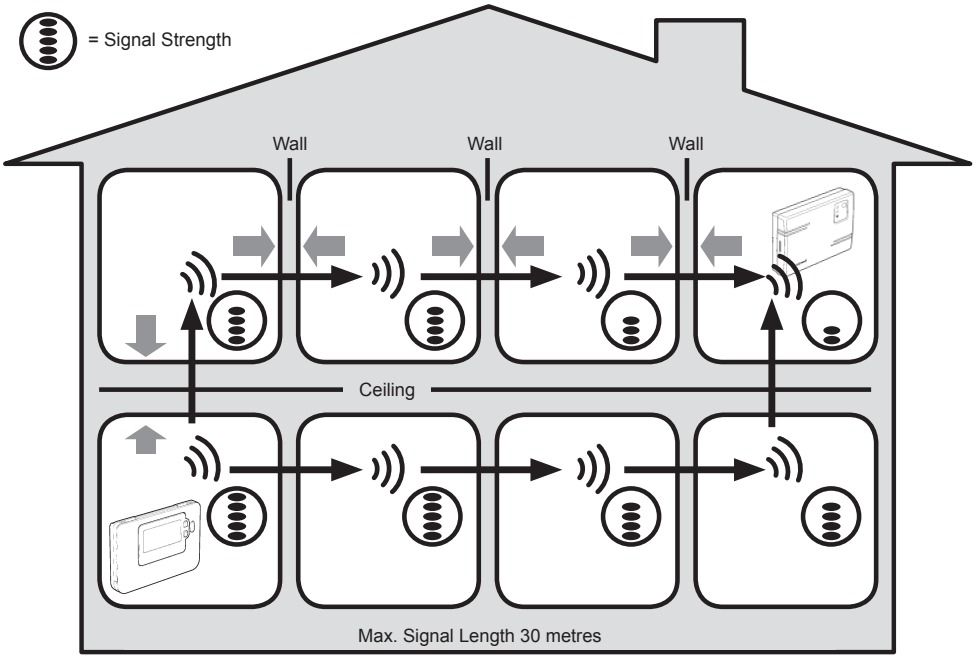
5

◆ 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

5.5.2 Installing the Programmable thermostat

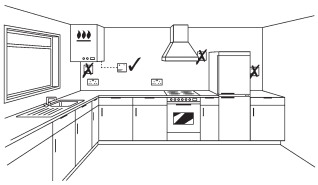
Please follow the illustrations and information below in sequence to install the RF Receiver and Room Unit correctly. To enable special features and see what other system options are available refer to section *Installer Mode*.

◆ 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.

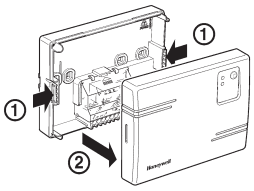
Do not mount on metal wall boxes.



❷

NOTE

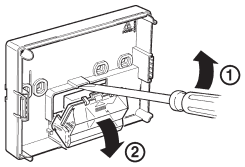
The receiver box contains no user serviceable parts. It should be opened and installed by qualified installer only.



❸

CAUTION

Electrostatic sensitive device! Do not touch the circuit board.



❹

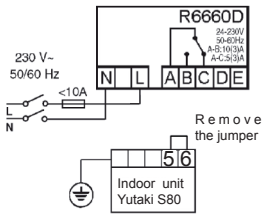
NOTE

All wiring must be in accordance with IEE regulations.

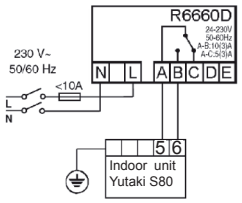
CAUTION

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

Step 1: Remove the jumper

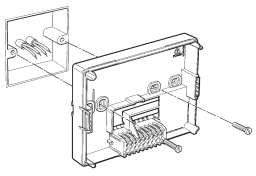


Step 2: YUTAKI S80 Wiring

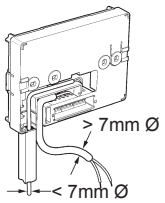


❺

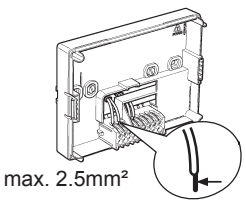
a.



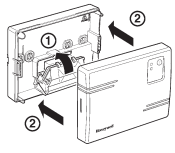
b.



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*.

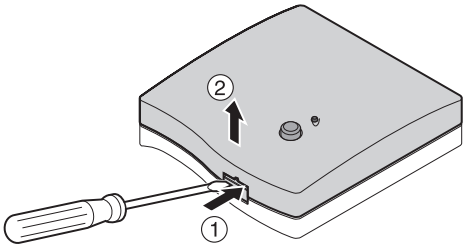
NOTE

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

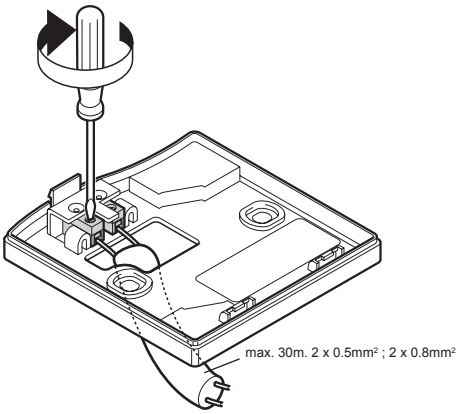
CAUTION

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

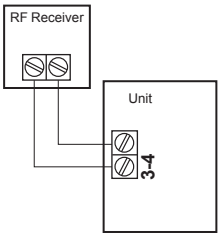
❶



❷

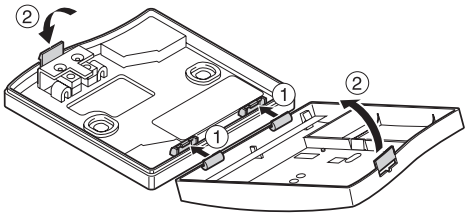


❸



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:

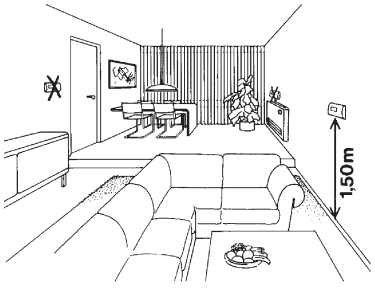
1 Find a suitable location where the signal transmission is reliable. Reliable transmission is indicated when the RF Receiver is flashing the green LED every 5 seconds.

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

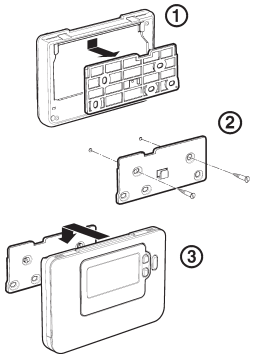
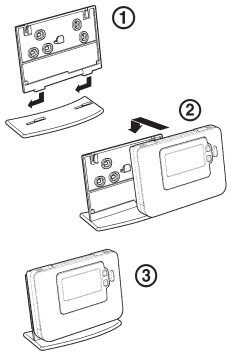


Table stand



- 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:

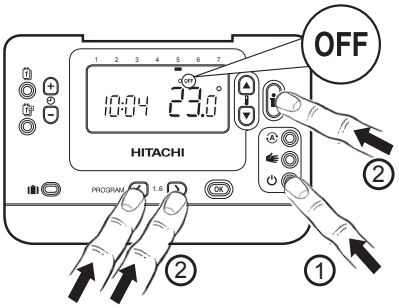
- Category 1 parameters – Room Unit Setup
- Category 2 parameters – System Setup

These are all listed in section *Installer Parameters Table*.

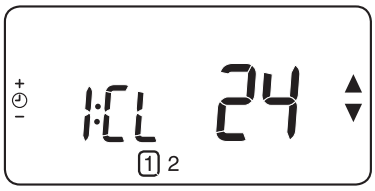
- Entering Installer Mode

1. Press the ⏻ button.

   Press and hold the ℹ button and the **PROGRAM** ‹ & › buttons together.



2. The unit will display the first parameter of installer parameter group **category 1** (from Parameter n.1 to n.19) as shown

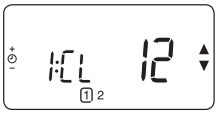


3. Press the ▲ or ▼ to change factory setting.

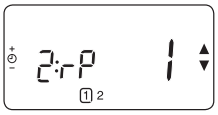
   The display will flash indicating that a change has been made.

4. Press the green OK button to confirm the change.

   The display will stop flashing.



5. Press ⏲ button to go to the next parameter.



6. Press the › button to go to Installer parameter group **category 2** (2) (from Parameter n.4 to n.14).
7. To exit the installer mode press the A **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)

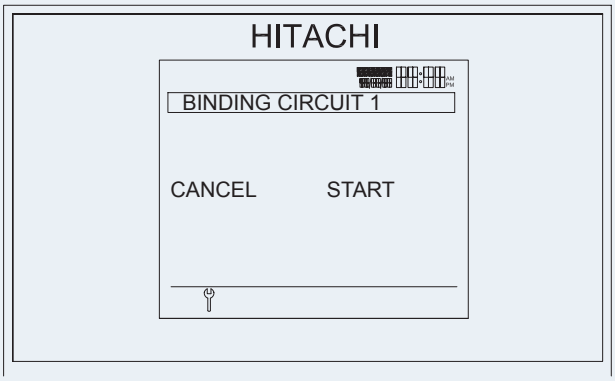
Binding is a necessary process in order to link the room thermostat with the wireless receiver and assign them to the corresponding circuit on the YUTAKI S80 controller.

Make sure the room thermostats are shut down before starting the binding process. They must be in the Off position.

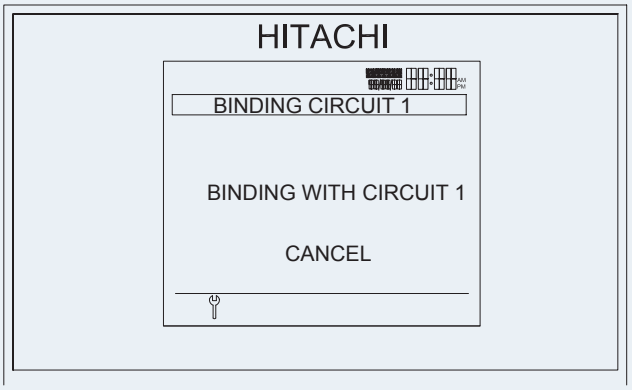
First, reset the wireless receiver by holding down the button for 15 seconds. This will erase the receiver's current configuration.

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.

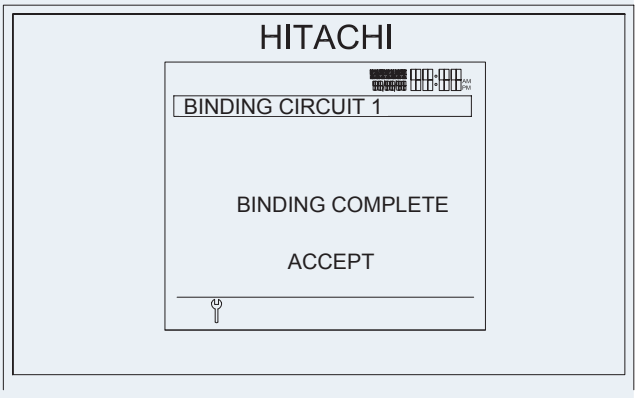


Pressing start will begin the binding mode in the room unit. It will blink each second during the specified binding time. When binding is finished a success message will appear.



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 S80 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.

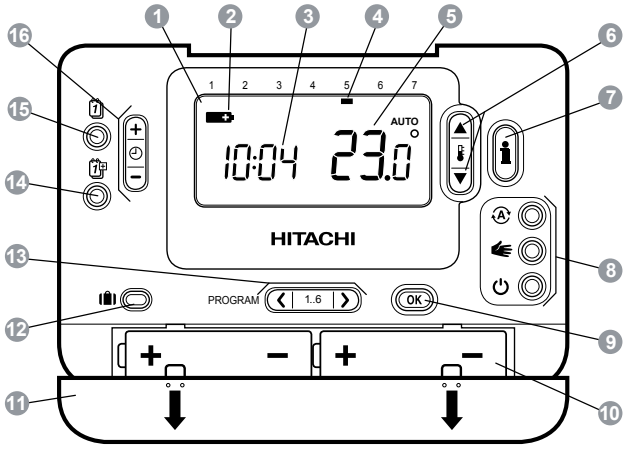
◆ Room Unit

- 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)

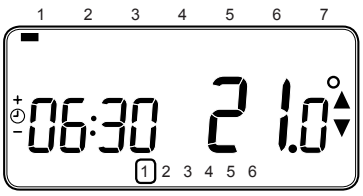
Period	1	2	3	4	5	6
Time	8:00	10:00	12:00	14:00	18:00	23:00
Temperature	21°C	21°C	21°C	21°C	21°C	18°C

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 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 1 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 1 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.

◆ 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.

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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. It has been designed to be supplied as accessory for indoor unit alone (without tank) and integrated into the DHW tank for indoor unit with HITACHI tank (Tank integrated over the indoor unit). This controller allows the remote control of the air to water heat pump by using the "Intelligent" Thermostat (as accessory).

6.1.1 Button definitions

The control's operating mode is very simple, with 7 user-friendly buttons.

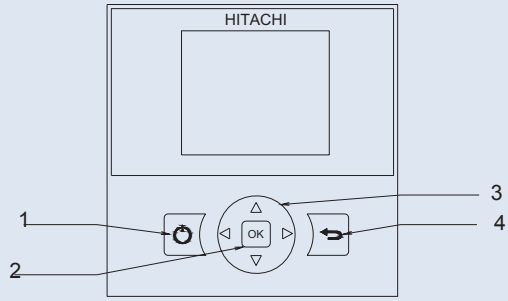
Button descriptions:

1 RUN/STOP: From the comprehensive view, it will be switched RUN/STOP the selected area or all the unit if there is no zone selected.

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 distibuted in 4 zones (Circuit I, Circuit II, Domestic Hot Water and swimming pool) throught the screen, separating the different working concepts allowing checking the status of each circuit.

Move through this view using the arrow buttons.

"Time & Date", "Alarm indication" and "Unit Status signals" are displayed on all screens.

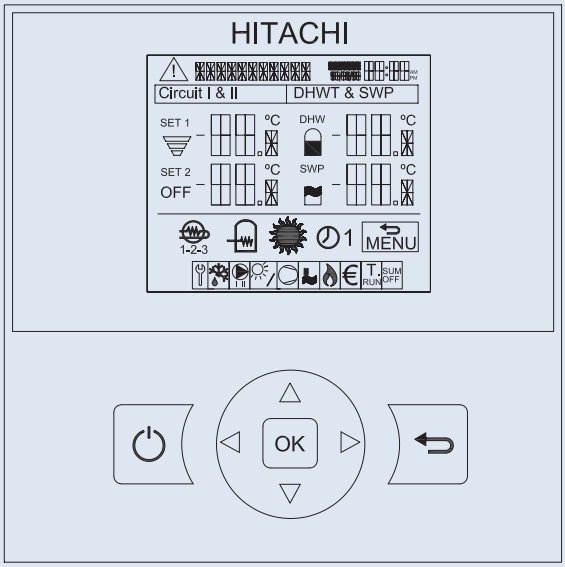
Only the following parameters can be modified on the "comprehensive view" screen:

- DHW temperature
- Swimming Pool temperature
- RUN/STOP circuits, DHW, swimming pool or the entire unit.

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 "RUN/STOP" button switches the "RUN/STOP" status for all areas (if they are available).

To change the "status" of a single area, select the desired area and press the "RUN/STOP" 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 RUN/STOP 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 DHW 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 RUN/STOP button over the DHW area will switch it RUN or STOP.
If anti-legionella is working, an ANTL text will appear, and the setting configured on the anti-legionella menu will be displayed.

❺ 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 RUN/STOP button over the Swimming pool area will switch it RUN or STOP.

❻ Unit mode (Heating)
❼ DHW heater operation (If it is necessary)

❽ Heater steps

- 1- Step 1
- 2- Step 2
- 3- Step 3

Electrical Heater DHWT control:

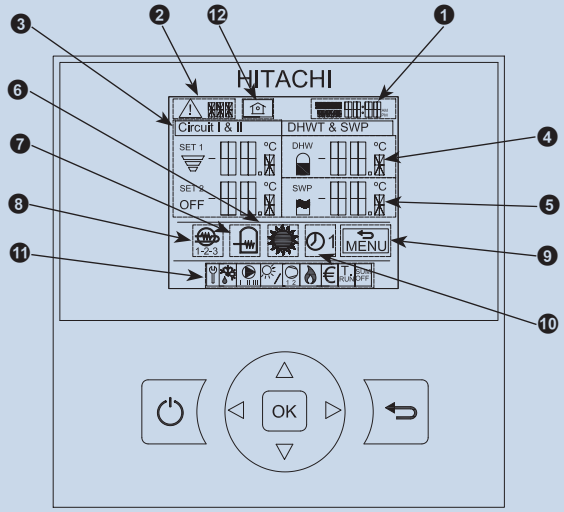
- ON
- Disabled by timer

Unit (Status)

- Heating unit

Timer enabled

- Test run
- Auto summer switch-off



❾ Configuration Menu

- Unit Configuration
- Controller Configuration
- Return to global view (Logout for installer)

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.

❿ Timer indication
When Unit timer is set, it will appear the timer indication icon with its setting number.

⓫ 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
- Boiler working
- Tariff input
- Test tun
- Summer Switch-OFF

⓬ Central control indication
It can be selected local or central mode.

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 between 0 < X ≤ 33% of the desired temperature
			Circuit I or II is working between 33 < X ≤ 66% of the desired temperature
			Circuit I or II is working between 66 < X ≤ 100% of the desired temperature
OFF	DHW status	OFF	DHW is on Demand-OFF.
ANTL		ANTL	If Anti-legionella option is working it will appear the text ANTL.
			DHW is on Thermo-OFF
			DHW is working between 0 < X ≤ 33% of the desired temperature
			DHW is working between 33 < X ≤ 66% of the desired temperature
			DHW is working between 66 < X ≤ 100% of the desired temperature
OFF	Swimming pool statuts	OFF	Swimming pool is on Demand-OFF
			SWP is on Thermo OFF
			SWP is working between 0 < X< 33% of the desired temperature
			SWP is working between 33 < X≤ 66% of the desired temperature
			SWP is working between 66 < X≤ 100% of the desired temperature
888	Setting temperatures	Value	Displays the temperature setting of the circuit or DHW
		OFF	Circuit 1, Circuit 2, DHW or Swimming Pool are stopped
	Ban		Ban icon is displayed when a timer bans the unit. This means that there is a timer assigned for the current day, but the current time is outside the permitted period
	Mode		Heating
1 2 3	Pump	1 2 3	This icon informs about pump operation. There are three available pumps on the system. Each one is numbered, and its co-rresponding number is displayed below to the pump icon when it is operating
1-2-3	Circuit I and II step	1-2-3	Indicates which of the 3 possible heater steps is applied on space heating circuit
	DHWT Heater		Informs about DHWT Heater operation. (If it is enabled)
	Installer mode		Informs that LCD is logged on the installer mode which has special privileges
	Swimming pool		Swimming pool is enabled
	Solar		Auxiliary Solar system is working
1 2	Compressor	1 2	Compressors enabled (1:R410A / 2:R134a)
	Alarm		Existing alarm. This icon will appear with the alarm code
	Boiler		Boiler system is working

Icon	Name	Values	Explanation
	Tariff		When tariff signal is received, the operation restriction is applied
	Timer		When the timer is configured and enabled, the number of timer set at the current day (1 to 7) will be shown together with the clock icon
	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 Circuits 1 & 2 are OFF because Summer Switch-Off is activated. Auto summer Switch-OFF is calculated on the controller. When daily average will be over Auto summer Switch-OFF temperature, Auto summer Switch-OFF will be 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
	Central		Central mode icon could be Local and central, each one will have his own icon

6.4 Menu description

6.4.1 Selecting the configuration mode

6.4.1.1 User mode

◆ **Menu contents (for user mode)**

Menu contents				
Level 1	Level 2	Level 3	Level 4	Level 5
Unit Configuration				
	Operation Display Parameters			
		System Operation		
		Unit Status		
		Actual Temperatures		
		Set Point		
		Alarm History		
	General Parameters			
		Central Operation Options		
	System Configuration			
		Space Heating		
			Water Calculation T° C1	
				None/Point/Gradient/Fix
			Water Calculation T° C2	
				None/Point/Gradient/Fix
		DHW		
			DHW Status	
			DHW Mode	
			DHW T° Setpoint	
			DHW T° Differential	
		Swimming Pool		
			Swimming P. Status T°	
			Swimming P. Setpoint T°	
		Unit Timer		
		Optional Functions		
			Summer Switch-OFF	
			Tariff Function	
Controller Configuration				
	Time And Date			
	Language Selection			
	LCD Energy Saving			
	Screen Contrast			
	About Controller			
Return to global view				

6.4.1.2 Installer mode

◆ 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.

◆ Menu contents (for installer mode)

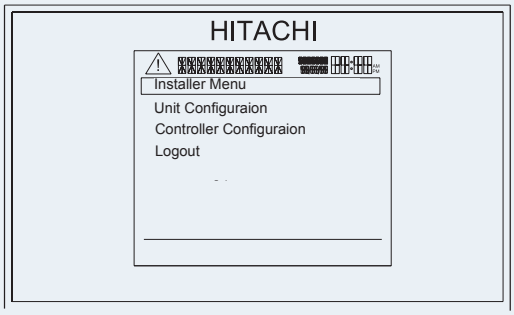
Menu contents					Remarks
Level 1	Level 2	Level 3	Level 4	Level 5	
Unit Configuration					
	Operation Display Parameters				
		System Operation			
		Unit Status			
		Actual Temperatures			
		Set Point			
		Alarm History			
	General Parameters				Only for installer
		Room Thermostat Options			Only for installer
		Central Operation Options			
		Refrigerant Cycle Adress			Only for installer
		Indoor Unit Adress			Only for installer
	System Configuration				
		User Privileges			Only for installer
		Space Heating			
			Water Calculation Tº C1		
				None/Point/Gradient/Fix	
			Water Calculation Tº C2		

Menu contents					Remarks
Level 1	Level 2	Level 3	Level 4	Level 5	
				None/Point/Gradient/Fix	
			C1 Tº Range		Only for installer
			C2 Tº Range		Only for installer
		DHW			
			DHW Status		
			DHW Mode		
			DHW Tº Setpoint		
			DHW Max Setpoint		Only for installer
			DHW Tº Differential		
			HP ON Tº Differential		Only for installer
			DHW Min. Time (min)		Only for installer
			DHW Max. Time (min)		Only for installer
			Cyc DHW Time (hours)		Only for installer
			EH Waiting Time (min)		Only for installer
			Space Priority Status		Only for installer
			Space Priority Tº		Only for installer
			Anti Legionella		Only for installer
		Swimming Pool			
			Swimming P. Status Tº		
			Swimming P. Setpoint Tº		
			Swimming P. offset Tº		Only for installer
		Unit Timer			
		Complementary Heating			Only for installer
			Heating Source		Only for installer
			Solar Configuration		Only for installer
		Mixing Valves			Only for installer
		Water Pump			Only for installer
		Optional Functions			
			Summer Switch-OFF		
			Seizure Protection		Only for installer
			Tariff Function		
			Hydraulic Sep. Status		Only for installer
		Test Run			Only for installer
		Screed Drying			Only for installer
		Reset Default settings			Only for installer
Controller Configuration					
	Time And Date				
	Language Selection				
	LCD Energy Saving				
	Screen Contrast				
	About Controller				
Logout					

6.5 Menu navigation

Inside Installer Menu there are:

- Unit Configuration
- Controller Configuration
- Logout (for installer)

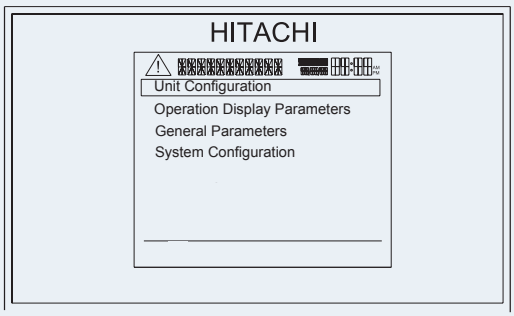


6.5.1 Unit Configuration

The following chapters explain all the items contained on the Unit configuration menu for the user.

Inside Unit Configuration there are:

- Operation Display Parameters
- General Parameters
- System configuration
  - Space heating
  - DHW
  - Swimming pool
  - Unit timer
  - Complementary Heating



6

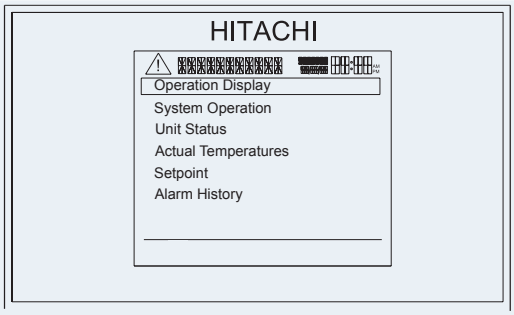
NOTE

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.

6.5.1.1 Operation Display Parameters

Inside Operation Display Parameters user may find the next features to display:

- System Operation
- Unit Status
- Actual Temperatures
- Setpoint
- Alarm History



The next list shows the operation parameters that can be consulted on the display. 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 and the 2nd cycle.

NOTE

All the operation parameters are able to be displayed by the installer but normal user can only display the basic ones.

REF	Access mode	Description	Default Value	Range	Steps	Units
System Operation						
OPST		Operation Status	OFF	OFF Heat D-OFF Heat T-OFF Heat ON DHW OFF DHW ON SWP OFF SWP ON Alarm XXX (XXX= Code number)	-	-
Unit Status						
EVI	🔧	Indoor expansion valve opening (%)	-	Variable value	-	%
E2	🔧	Indoor expansion valve 2 opening (%)	-	Variable value	-	%
EO	🔧	Outdoor expansion valve opening (%)	-	Variable value	-	%
H4	🔧	Inverter operation frequency (Hz)	-	Variable value	-	Hz
H2	🔧	Inverter frequency Cy2 (Hz)	-	Variable value	-	Hz
DEF	🔧	Defrosting	-	Variable value	-	-
DI		Cause of stoppage C1	-	Variable value	-	-
D2		Cause of stoppage C2	-	Variable value	-	-
P1	🔧	Compressor 1 current (A)	-	Variable value	-	A
P2	🔧	Compressor 2 current (A)	-	Variable value	-	A
ROM1		PCB1 Firmware	-	Variable value	-	-
ROM2		PCB2 Firmware	-	Variable value	-	-
CD		Product spec code	-	Variable value	-	-
MVP		Mixing valve C2 position (%)	-	Variable value	-	%
Pd	🔧	Discharge pressure R134a (MPa)	-	Variable value	-	MPa
Ps	🔧	Suction pressure R134a (MPa)	-	Variable value	-	MPa
Actual Temperature						
In		Water inlet temperature	-	Variable value	-	ºC
Out		Water outlet temperature	-	Variable value	-	ºC
Ob		Water outlet temperature Boiler/EH (3)	-	Variable value	-	ºC
OC2		Water outlet temperature C2 (5)	-	Variable value	-	ºC
OH		DH water temperature (6)	-	Variable value	-	ºC
OS		Swimming pool temperature (7)	-	Variable value	-	ºC
Ta		Outdoor ambient temperature	-	Variable value	-	ºC
Ta.		Second ambient temperature	-	Variable value	-	ºC
Ta2		Outdoor ambient average temperature	-	Variable value	-	ºC
Ta3		Second ambient average temperature	-	Variable value	-	ºC
TaSum		Summer Sw-Off average	-	Variable value	-	ºC
RT1		Room temperature C1 (8)	-	Variable value	-	ºC
RT2		Room temperature C2 (9)	-	Variable value	-	ºC
Td1	🔧	Discharge gas temperature (R410A)	-	Variable value	-	ºC
Td2	🔧	Discharge gas temperature (R134a)	-	Variable value	-	ºC
Tg1	🔧	Gas temperature (R410A)	-	Variable value	-	ºC
Tg2	🔧	Suction temperature (R134a)	-	Variable value	-	ºC
Tl1	🔧	Liquid temperature (R410A)	-	Variable value	-	ºC
Tl2	🔧	Liquid temperature (R134a)	-	Variable value	-	ºC
Ts	🔧	Evaporating gas temperature (R410A)	-	Variable value	-	ºC
Ts2	🔧	Evaporating gas temperature (R134a)	-	Variable value	-	ºC
Set Point						
OTCS1		OTC Supply set point C1	-	Variable value	-	ºC
OTCS2		OTC Supply set point C2	-	Variable value	-	ºC
TC		Water temperature setting	-	Variable value	-	ºC
RTS1		Room temperature set point C1	-	Variable value	-	ºC
RTS2		Room temperature set point C2	-	Variable value	-	ºC
T_{DHWS}		DHW temperature set point	-	Variable value	-	ºC
T_{SWP}		SWP temperature set point	-	Variable value	-	ºC
Alarm History						

🔧: Available only for installer.

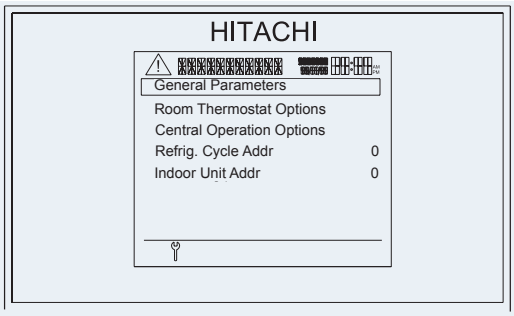
NOTE

- ***Summer Sw-Off average (TaSum) will be shown as "- -" if Summer Switch-OFF Status is disabled (AutoST = Disabled).***
- ***(3) Water outlet Tº Boiler/EH (Ob) will be only showed when Heating Source (HS)= HP+HEATER or HP+BOILER.***
- ***(5) Water outlet temperature C2 (OC2) will be only showed when Circuit 2 is enabled.***
- ***(6) DH Water Tº (OH) will be only showed when DHW status (DHWs) = ENABLED***
- ***(7) Swimming pool Tº (OS) will be only showed when Swimming pool status (SWP) = ENABLED***
- ***(10) Supply set point C1 (TCS1) will be always showed.***
- ***(11) Supply set point C2 (TCS2) will be only showed when Water Calculation Heating C2 (WT2) are not none.***
- ***(14) DHW Tº set point (T_{DHWS}) will be only showed when DHW status (DHWs) = ENABLED.***
- ***(15) SWP Tº set point (SWPs) will be only showed when Swimming pool status (SWP) = ENABLED.***

6.5.1.2 General Parameters

Inside General Parameters user may find the next features to display:

- Room Thermostat Options
- Central Operation Options
- Refrigerant Cycle Address
- Indoor Unit Adress



General parameters allow for the configuration of the general system variables.

REF	Description	Default Value	Range	Steps	Units
RTO	Room Thermostat Options	-	-	-	-
COO	Central Operation Options	-	-	-	-
OUa	Refrigerant Cycle Address	0	0~63	1	-
IUa	Indoor Unit Address	0	0~63	1	-

The installer may configure the system address here so as to allow for proper configuration.

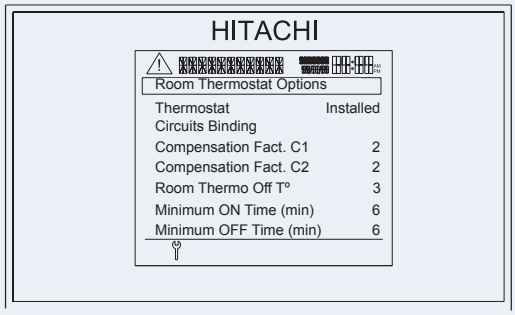
CAUTION

OU and IU must be at the same setting as that on the unit PCB address.

◆ Room Thermostat Options

Inside Room Thermostat Options user may find the next features to display:

- Thermostat
- Circuits Binding (activated when Thermostat is "Installed")
- Compensation Factor C1 (activated when Thermostat is "Installed")
- Compensation Factor C2 (activated when Thermostat is "Installed")
- Room Thermo Off T° (activated when Thermostat is "Installed")
- Minimum ON Time (min)
- Minimum OFF Time (min)



The Room Thermostat Options submenu will display the following variables.

REF	Description	Default Value	Range	Steps	Units
	Room Thermostat Options				
RTT	Thermostat	Not Installed	Not Installed / Installed	1	-
BIN	Circuits Binding	-	-	-	-
$Rfact_1$	Compensation Factor C1	2	0~5	1	-
$Rfact_2$	Compensation Factor C2	2	0~5	1	-
Roff	Room Thermo Off T°	3	0~5	1	°C
Rton	Minimum ON Time (min)	6	0~15	1	Min
Rtoff	Minimum OFF Time (min)	6	0~15	1	Min

Circuits Binding

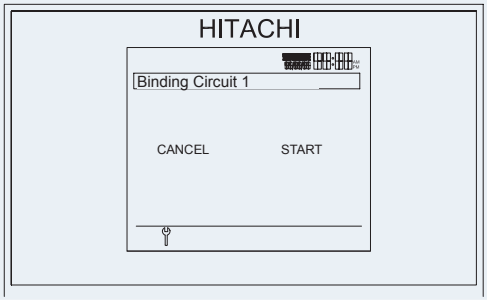
Binding is a necessary process in order to link the room thermostat with the wireless receiver and assign them to the corresponding circuit on the controller.

Make sure the room thermostats are shut down before starting the binding process. They must be in the Off position.

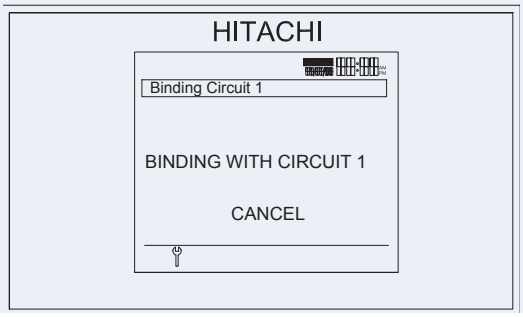
First, reset the wireless receiver by holding down the button for 15 seconds. This will erase the receiver's current configuration.

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.

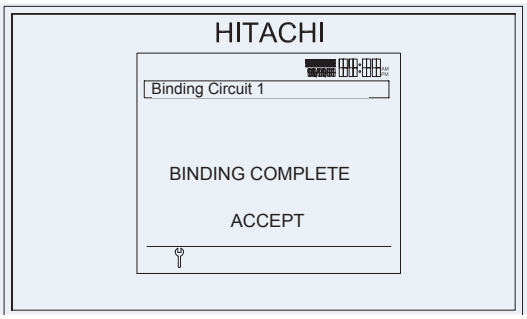


Pressing start will begin the binding mode in the room unit. It will blink each second during the specified binding time. When binding is finished a success message will appear.



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.

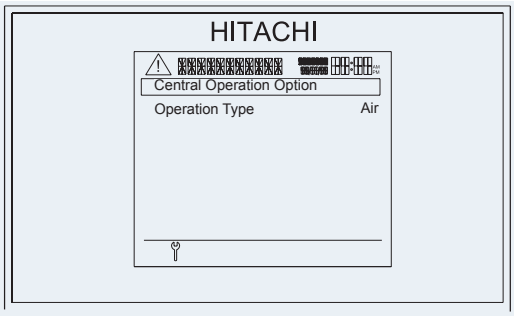
NOTE

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 sent until the setting value is changed. If it has never been read any value, it will send the OpenTherm default temperature of 20ºC.

◆ Central Operation Options

Inside Central Operation Options user may find the next features to display:

- Operation Type



The Central Operations submenu will display the following variables.

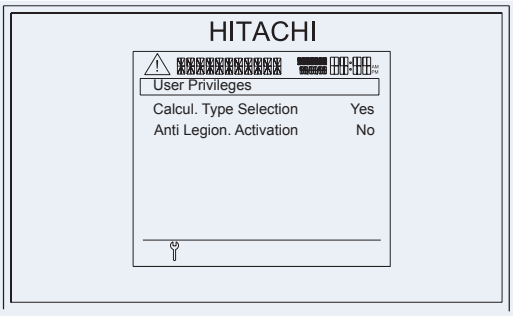
REF	Description	Default Value	Range	Steps	Units
Central Operation Options					
COT	Operation Type	Air	Local/ Air / Water/ Full	-	-

6.5.1.3 System Configuration

◆ User Privileges

Inside User Privileges user may find the next features to display:

- Calculation Type Selection
- Antilegionella Activation



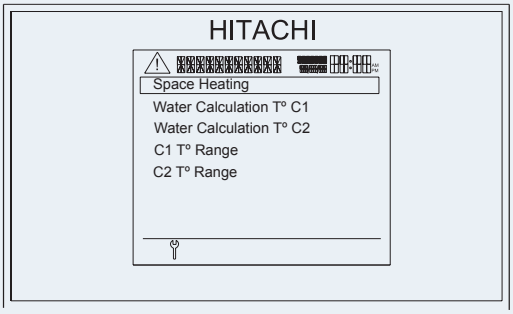
This will define what the user may or may not do. For example, the Installer can decide whether or not the user may switch between different water calculation types, or whether or not the user may enable or disable the anti-legionella function.

REF	Description	Default Value	Range	Steps	Units
Water calculation privilege					
WTP	Calculation Type Selection	Yes	No / Yes		-
ALP	Anti-legionella Activation	No	No / Yes	1	-

◆ Space Heating configuration

Inside Space Heating there are:

- Water Calculation Tº C1
- Water Calculation Tº C2
- C1 Tº Range
- C1 Tº Range



Water Calculation Tº C1 and C2

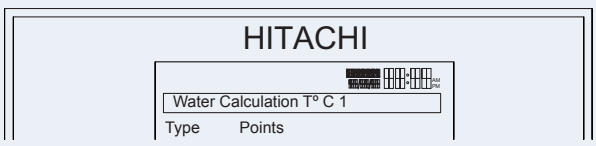
The main thing to configure for space heating is the water calculation.

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.

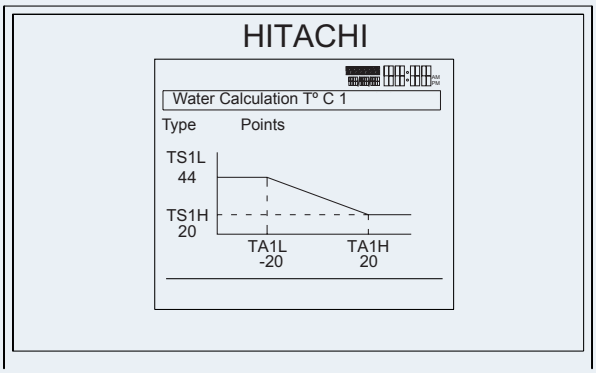


NOTE

- ***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.

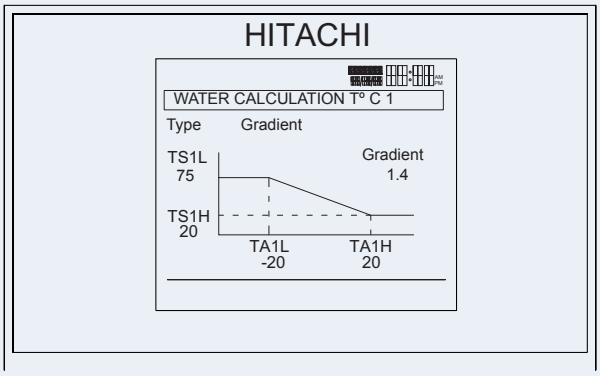


- Gradient

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.

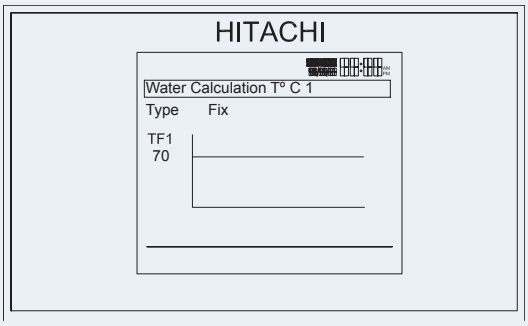
NOTE

The unique editable variable on that view is gradient.



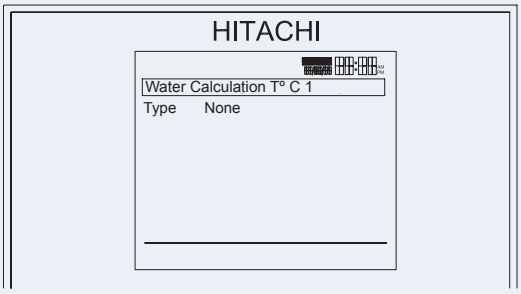
- Fix

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 used in these views are displayed in the following table.

REF	Description	Default Value	Range	Steps	Units
Water calculation Type					
WT1	Water calculation temperature C1	OTC gradient	None Points Gradient Fix	1	-
WT2	Water calculation temperature C2	None	None Points Gradient Fix	1	-
Heating OTC points Control C1					
TA1L	Low ambient temperature C1	-20	-20~6	1	ºC
TA1H	High ambient temperature C1	20	7~25	1	ºC
TS1L	Set point at low ambient temperature C1	70	$Tmax_1$~$Tmin_1$ *	1	ºC
TS1H	Set point at high ambient temperature C1	45	$Tmax_1$~$Tmin_1$ *	1	ºC
Heating OTC points Control C2					
TA2L	Low ambient temperature C2	-20	-20~6	1	ºC
TA2H	High ambient temperature C2	20	7~25	1	ºC
TS2L	Set point at low ambient temperature C2	44	$Tmax_2$~$Tmin_2$ *	1	ºC
TS2H	Set point at high ambient temperature C2	20	$Tmax_2$~$Tmin_2$ *	1	ºC
Heating OTC Gradient Control C1					
OTC1	Gradient C1	1.4	0.2~2.2	0.1	-
Heating OTC Gradient Control C2					
OTC2	Gradient C2	0.6	0.2~2.2	0.1	-
Heating Fixed Temperature C1					
TF1	Fixed temperature C1	70	$Tmax_1$~$Tmin_1$ *	1	ºC
Heating Fixed Temperature C2					
TF2	Fixed temperature C2	40	$Tmax_2$~$Tmin_2$ *	1	ºC

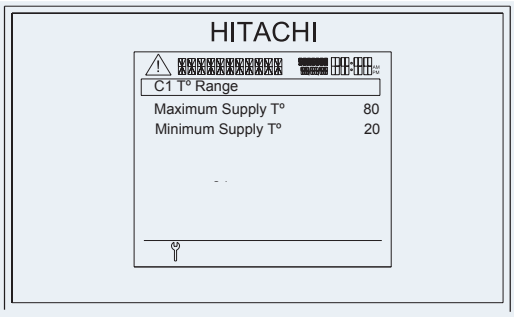
NOTE

**** Values ($Tmax_{1/2}$~$Tmin_{1/2}$) are set by installer.***

C1 and C2 Tº Range

Inside C1 or C2 Tº Range there are:

- Maximum Supply Tº
- Minimum Supply Tº



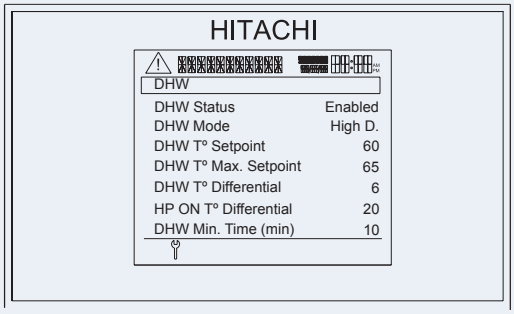
Variables used in these views are displayed in the following table.

REF	Description	Default Value	Range	Steps	Units
C1 Tº Range					
$Tmax_1$	Maximum Supply Tº	80	35~80	1	ºC
$Tmin_1$	Minimum Supply Tº	20	20~34	1	ºC
C2 Tº Range					
$Tmax_2$	Maximum Supply Tº	55	35~80	1	ºC
$Tmin_2$	Minimum Supply Tº	20	20~34	1	ºC

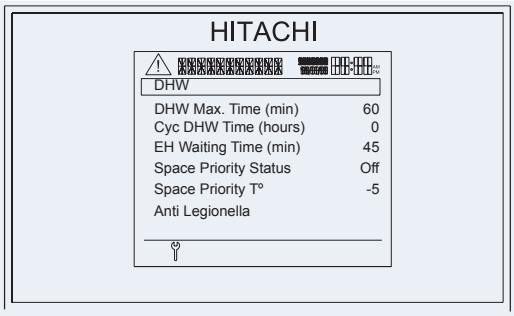
◆ DHW configuration

Inside DHW user may find the next features to display:

- DHW Status
- DHW Mode
- DHW Tº Setpoint (*1)
- DHW Tº Maximum Setpoint
- DHW Tº Differential (activated with "High Demand" in DHW Mode (DHWm))
- HP ON Tº Differential
- DHW Minimum Time (min)



- DHW Maximum Time (min)
- Cycle DHW Time (hours)
- EH Waiting Time (min)
- Space Priority Status
- Space Priority T
- Anti Legionella



DHW tank has its own configurable variables, displayed in the following table.

REF	Description	Default Value	Range	Steps	Units
DHWs	DHW Status	Disabled	Disabled Enabled	1	-
DHWm	DHW Mode	Standard	Standard High demand	1	-
T_{DHWS}	DHW Tº Setpoint (*1)	60	30 ~ (T_{DHWmax}) (*2)	1	ºC
T_{DHWmax}	DHW Tº Maximum Setpoint	65	40~75	1	ºC
T_{DHWON}	DHW Tº Differential	6	2~15	1	ºC
T_{HPON}	HP ON Tº Differential	20	10~40	1	ºC
T_{DHWMIN}	DHW Minimum Time (min)	10	0~15	1	Min
T_{DHWMX}	DHW Maximum Time (min)	60	20~150	1	Min
C_{DHW}	Cycle DHW Time (hours)	1	0~24	1	Hour
DHW_{EH}	EH Waiting Time (min)	45	0~60	1	Min
$SHPT_s$	Space Priority Status	OFF	OFF/ON	-	-
SHPT	Space Priority Tº	-5	-20~0	1	ºC
LEG	Anti Legionella	-	-	-	-

NOTE

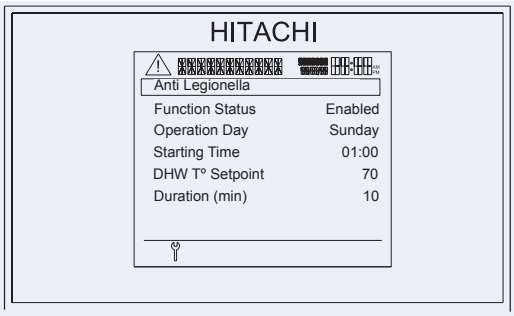
- ***(*1) Only when DHW Mode is in High demand.***
- ***(*2) Value (T_{DHWmax}) is set by installer.***

Anti Legionella

This is a configuration view designed to set the water desinfection method.

Inside Anti Legionella user may find the next features to display:

- Function Status
- Operation Day
- Starting Time
- DHW Tº Setpoint
- Duration (min)



The user can only activate or de-activate the anti-legionella function (DesFun), while the Installer will have access to all configuration parameters.

REF	Description	Default Value	Range	Steps	Units
DesFun	Function status	Disabled	Disabled Enabled	-	-
OpInt	Operation Day	Sunday	Daily / Mon ~ Sun	-	Day
StTim	Starting Time	01:00	(00~24)	-	Time
DHWSP	DHW Tº Set Point	70	50~75	-	ºC
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).

In the comprehensive view, the text "ANTL" will appear in the tank area.

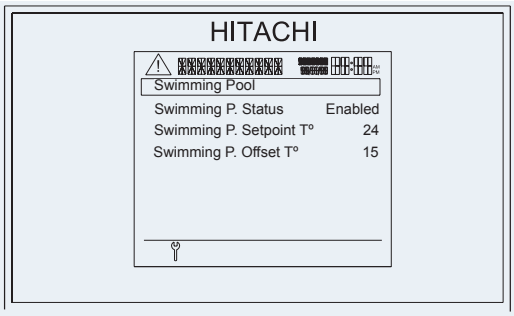
CAUTION

- ***Anti-legionella function is hidden by default. The Installer can choose to reveal it by activating the ALP function (Anti Legionella Activation) in the User Privileges display.***
- ***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.***

◆ Swimming pool configuraion

Inside Swimming Pool user may find the next features to display:

- Swimming Pool Status
- Swimming Pool Setpoint Tº
- Swimming Pool Offset Tº



Swimming pool configuration parameters are displayed in the following table.

REF	Description	Default Value	Range	Steps	Units
Swimming Pool Configuration					
SWP	Swimming Pool Status	Disabled	Disabled Enabled	-	-
SWPs	Swimming Pool Setpoint Tº	24	24~33	1	ºC
SWoff	Swimming Pool Offset Tº	15	10~30	1	ºC

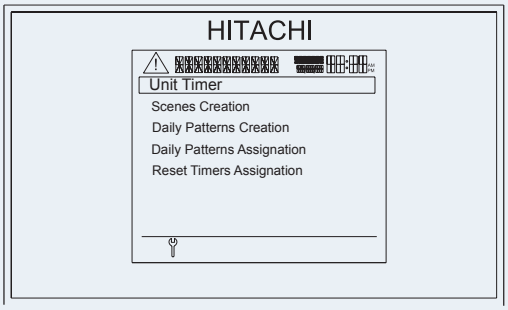
◆ Unit timer

User can create up to 7 scenes with entire unit configuration available. These scenes can be assigned to different parts of the day creating a daily pattern, after that, user can assign to each day of the week the desired daily pattern.

Selecting configure value of the Unit timer menu will show the next window:

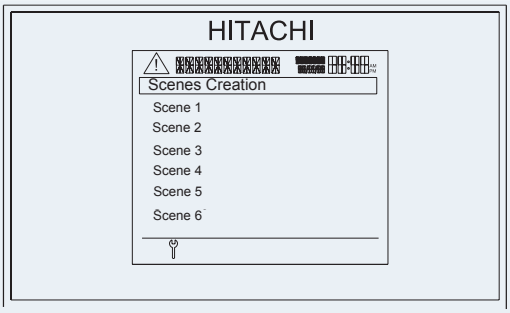
The next options will be displayed inside the menu:

- "Scenes Creation": will be used to set the different unit configuration
- "Daily Patterns Creation": will be used to set the scenes to different moments on a day
- "Daily Patterns Assignation": will be used to set different daily patterns to each day of the week
- "Reset Timers Assignation": will ask to the user for set all days with disabled timer.

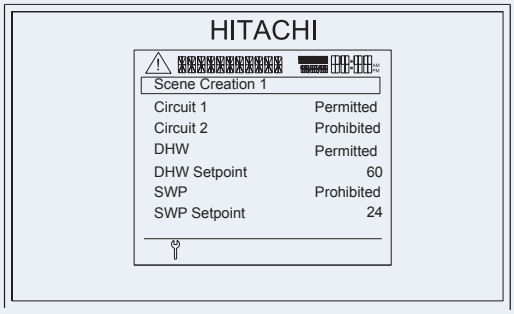


Scenes Creation

The user will select between 7 Scenes in the Scene creation menu.



After select one scene it will appear the configuration of that scene.



The editable things on that screen and for each scene will be:

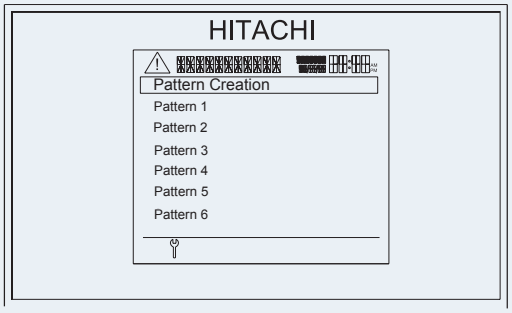
Variable	Default value	Range	Steps	Units	When appears?
Circuit 1	0: Permitted	0:Permitted ~ 1:Prohibited	-	-	Always
Circuit 1 Setting Tº	70	$Tmax_1$~$Tmin_1$ (*)	1	ºC	If WT1 = 2 (Fix)
Circuit 2	0: Permitted	0:Permitted~ 1: Prohibited	-	-	If C2 Enabled
Circuit 2 Setting Tº	40	$Tmax_2$~$Tmin_2$ (*)	1	ºC	If WT2 = 2 (Fix)
DHW	0: Permitted	0:Permitted~ 1: Prohibited	-	-	DHWs = 1 (Enabled)
DHW Setting Tº	60	30 ~ (T_{DHWmax}) (*)	1	ºC	DHWs = 1 (Enabled)
SWP	0: Permitted	0:Permitted~ 1: Prohibited	-	-	If SWP = 1 (Enabled)
SWP Setting Tº	24	24~33	1	ºC	If SWP = 1 (Enabled)

NOTE

- ***(*) Values ($Tmax_{1/2}$~$Tmin_{1/2}$) and (T_{DHWmax}) are set by installer.***
- ***If C1, C2, DHW, or SWP are OFF, it will be shown the ban icon on its setting temperature place on the main window. If they are ON, but they are banned on that timer instant, its setting temperature will be replaced on the global view by the ban icon, and the banned item will not work, it will stay as OFF.***
- ***Note that if 3-001 is not a fix configuration but timer is created and after that is set to fix, the value configured on that timer instance will be the current one on the setting.***

Daily Patterns Creation

Inside of Daily Patterns Creation menu user will select between 6 daily patterns

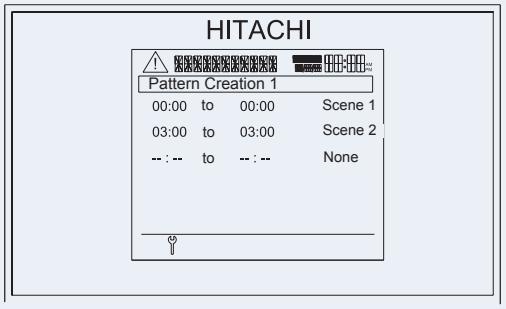


Each one of those daily patterns could be configured setting one of the scenes being applied between 2 instances of time.

Right column indicates the Scene selected or none if it is no scene selected. User could edit the different hours existing on the table.

It is a lineal creation of pattern. That means that each row must have a period of time higher than the one before.

It will be up to 7 lines. But they will appear one by one when user will configure a line, that means, that each time that user configure the right time and left of one line, it will appear the following line, including if the scene selection still being at 0.

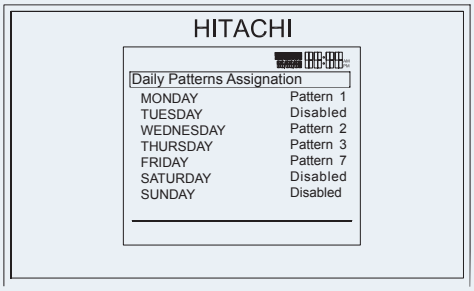


NOTE

- ***Time left column must be lower than the right one. For example, if user edits right one to 07:00 and left one was 07:00, the one of the left must be moved to 06:59. The same but adding 1 minute to the right one.***
- ***The non-configured time will be shown as "--:--". To help the edition the time default value of a line will be the ending one of the previous line. In case of line 0, it will be "00:00".***
- ***The ending time of one line cannot be higher than the stating one of the next line. For example, if user edits the right one to 07:30 and the left one of the following line is 07:00, this one must be moved to 07:30 too. The right one will be also affected.***
- ***If user do not set the left and right time on one line both at the same time, the data will not be stored and will be returned to the value "--:--".***
- ***When daily pattern will not be assigned for a day, time will be on a "None" period or we will be out of the specified time, it will allow to work to the unit as it is configured before start the timer.***
- ***Minimum time is 00:00 and maximum 24:00. That means that if one daily pattern ends at 24:00 and the other one starts at 00:00 it will not restart the cycle time between operations if the item is allowed on both scenes.***

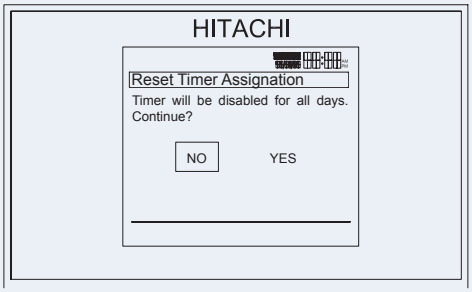
Daily Patterns Assignation

On the Daily Patterns Assignation it can be configured the daily pattern that will be executed each day, or disabled if there is no pattern applied on that day.



Reset Timers Assignation

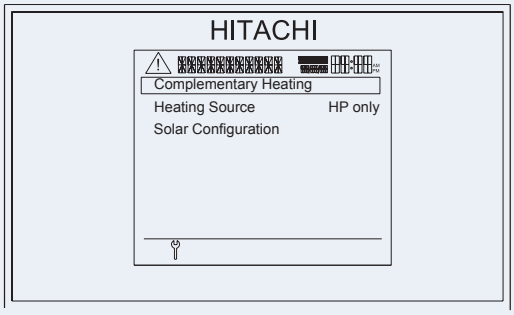
Pressing "Reset Timers Assignation" it will ask for a confirmation. Pressing yes, it will set all the days on the timer assignation to the disabled value.



◆ Complementary heating

Inside Complementary Heating user may find the next features to display:

- Heating Source
- Boiler Configuration (activating HP+Boiler at Heating Source (HS) function)
- Electrical Heater Configuration (activating HP+Heater at Heating Source (HS) function)
- Solar Configuration



It will display the same parameters, with the addition of the those listed below.

REF	Description	Default Value	Range	Steps	Units
HS	Heating source	HP only	HP only / HP+Heater / HP+Boiler	-	-
Electrical Heater Configuration					
MOT	Bivalent Point for EH	0	-20~20	1	ºC
ksco	Supply Set Point Offset	4	0 ~10	1	K
PB	Proportional Band (ºC/100%)	6.0	0~20	0.2	ºC/100%
IRF	Reset Factor (%/ºCmin)	2.5	0~20	0.1	%/ºC Min
ISWT	Inter-Stage Waiting Time (min)	5	0~10	1	Min
WTEH	Waiting Time for EH (min)	30	1~90	1	Min
Boiler Configuration					
BB	Bivalent Point for Boiler	-5	-20~20	1	ºC
Bon	Minimum ON Time (min)	2	1~30	1	Min
Boff	Minimum OFF Time (min)	5	1~30	1	Min
WTBO	Waiting Time (min)	30	1~90	1	Min
Kscob	Boiler Offset Tº	4	0~10	1	ºC
BWTt	Waiting Time for DHW (min)	45	0~120	5	ºC
Solar Configuration					
Sprior	Status	Disabled	Disabled / Enabled	-	-
$T_{DHWMSOL}$	DHW SOLAR Max Time (min)	60	30~240	1	Min

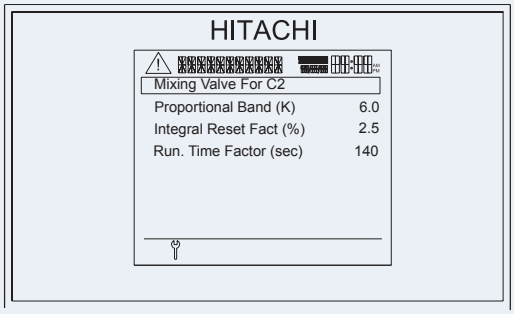
NOTE

In case of the Heating + Boiler configuration (HS), Bivalent point for boiler (BB) will have a range of –20~20 and the controller must ensure that: BB < 5ºC + MOT.

◆ Mixing valves

Inside Mixing Valves user may find the next features to display:

- Proportional Band
- Integral Reset Factor
- Running Time Factor



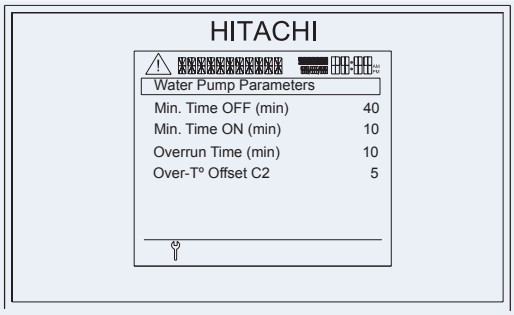
The following table lists the settings that may be edited to control circuit 2's mixing valve.

REF	Description	Default Value	Range	Steps	Units
PBMV	Proportional Band (K)	6.0	0~20	0.2	K
IRFMV	Integral Reset Factor (%)	2.5	0.0~20	0.1	%
RTMV	Running Time Factor (sec)	140	10~500	10	Sec

◆ Water Pump

Inside Water Pump user may find the next features to display:

- Minimum Time OFF
- Minimum Time ON
- Pump Overrun Time
- Over-Tº Offset C2



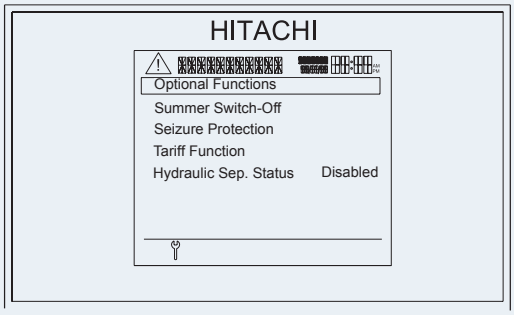
The following table lists the variables that may be configured to manage the water pump.

REF	Description	Default Value	Range	Steps	Units
PMinOff	Minimum Time OFF (min)	40	0~120	10	Min
PMinOn	Minimum Time ON (min)	10	0~120	10	Min
POT1	Pump Overrun Time (min)	10	0~120	5	Min
OTO	Over-Tº Offset C2	5	1~10	1	ºC

◆ Optional functions

Inside Optionals Functions user may find the next features to display:

- Summer Switch-OFF
- Seizure Protection
- Tariff Function
- Hydraulic Separator Status



This menu will display optional functions to the user.

REF	Description	Default Value	Range	Steps	Units
SumSwOff	Summer Switch-Off	-	-	-	-
SP	Seizure Protection	-	-	-	-
Tf	Tariff function	-	-	-	-
hsb	Hydraulic Separator Status	Disabled	Disabled / Enabled	-	-

Summer Switch-Off

This summer switch-off function can be configured to auto mode.

REF	Description	Default Value	Range	Steps	Units
AutoST	Switch-Off Status	Disabled	Disabled / Enabled	-	-
AutoT	Switch-Off T°	22	10~25	1	°C
AutoDiff	Switch On differential T°	0.5	0~3	0.5	°C

Seizure Protection

This view includes the following variables.

REF	Description	Default Value	Range	Steps	Units
SeizPr	Seizure Protection Status	Off	On / Off	-	-
OpInt	Operation Day	Monday	Monday ~ Sunday	-	Day
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.

Tariff function

The user may set variables to Tariff function on this menu.

REF	Description	Default Value	Range	Steps	Units
TarSt	Tariff Function Status	Disabled	Disabled / Enabled	-	-
TarAct	Tariff action	HP blocked NC	HP Block NC / HP Block NO / DHW Block NC / DHW Block NO	-	-
B-TARIFF	Boiler when TARIFF	Disabled	Disabled / Enabled	-	-

NOTE

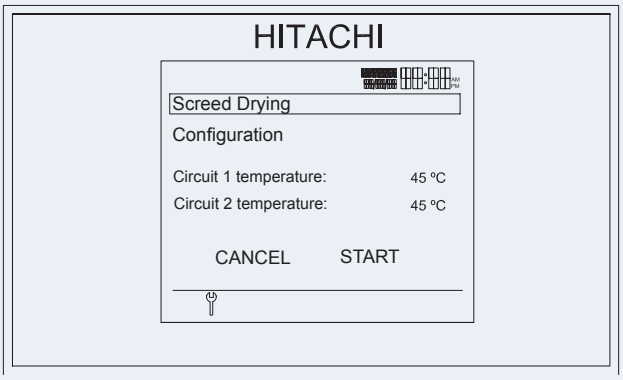
Boiler Tariff (B-TARIFF) only used when Tariff action (TarAct) selected is HP blocked (NC/NO).

◆ 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 Commissioning chapter, only with the Installer mode icon on the notifications bar.

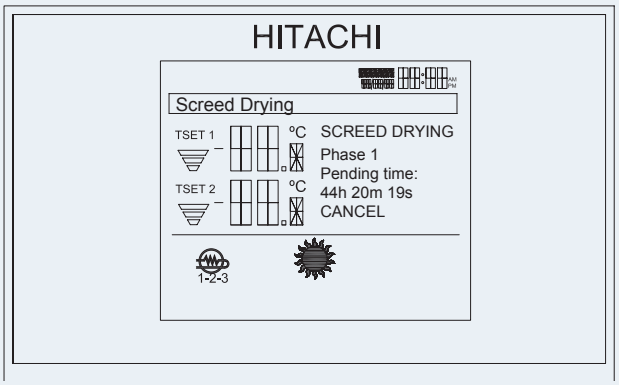
◆ Screed drying

It takes 7 days, and the Installer must configure target temperatures for the available circuits in order for it to work properly.



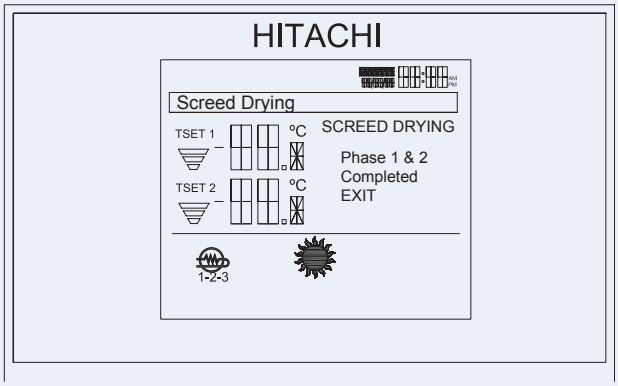
It is advisable to exit the Installer mode by pressing the Start button, as the operation takes 7 days to carry out.

The Screed Drying display allows user to keep track of or cancel the screed drying process.



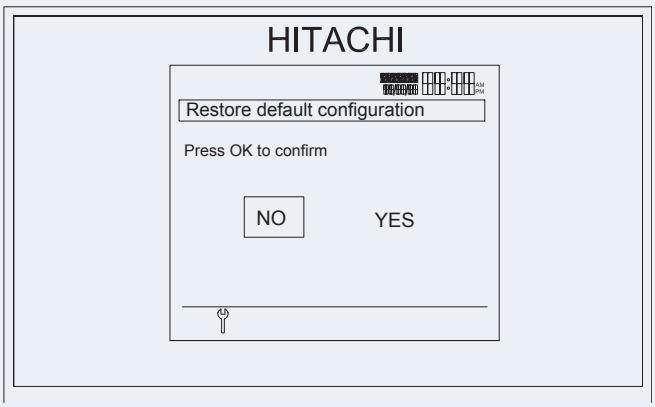
Phase 1 takes three days and phase 2 takes four. During these phases it will attempt to reach target temperatures using different drying procedures.

When the process is completed the following screen will appear.



◆ Restore Default Settings

When "Restore Default Settings" is selected, the unit control will ask the user to confirm.



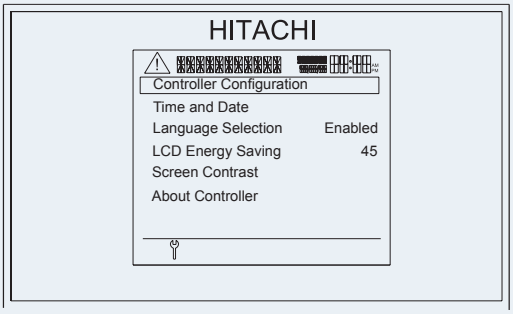
The "No" option is selected by default. Pressing "Yes" will reset the factory settings.

6.5.2 Controller Configuration

Control configuration contains different configuration options for the control. Those options are explained in the following items.

Inside Controller Configuration user may find the next features to display:

- Time and Date
- Language Selection
- LCD Energy Saving
- Screen Contrast
- About Controller



6.5.2.1 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:

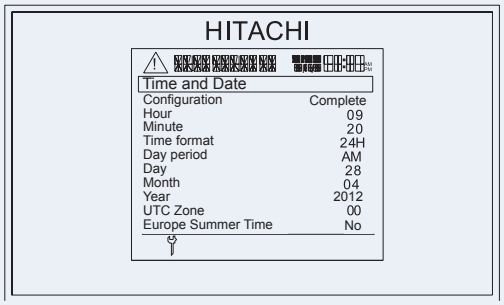
- 24 Hours
- 12 Hours

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".***



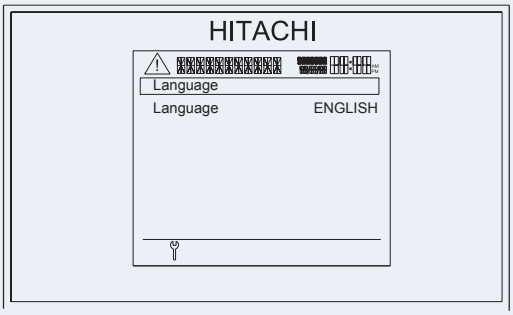
6.5.2.2 Language selection

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.



6.5.2.3 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.

6.5.2.4 Screen Contrast

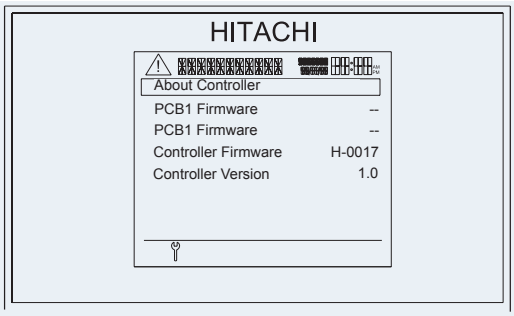
User may specify screen contrast. This is modified in the same manner as a normal variable. Changing the variable will also change the contrast. Pressing left or right arrows for 10 seconds will set the contrast to the default value.

6.5.2.5 About Controller

About controller gives information about PCB and Controller firmware and the version number for the YUTAKI S80.

Inside About Controller user may find the next features to display:

- PCB1 Firmware
- PCB3 Firmware
- Controller Firmware
- Controller Version



HITACHI
Inspire the Next

7. Optional functions

Index

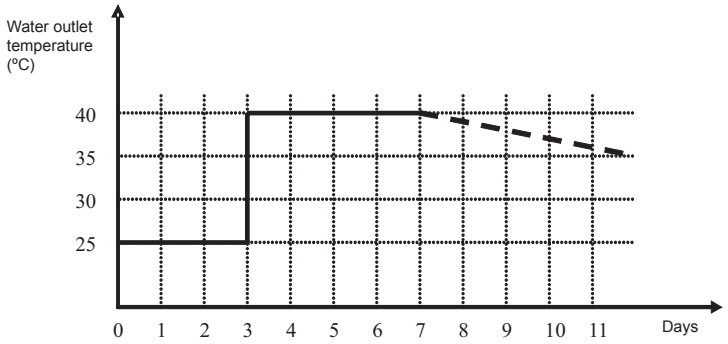
7.1 Indoor unit

Yutaki S80 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 (only circuit 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 (TtwC2) follows a predetermined schedule:



1. Water set-point is kept constant at 25ºC (*) for 3 days.
2. Water set-point is set to the water set-point selected in user interface screed drying function parameters 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.

REF	Description	Default Value
SDF	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 S80 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:

REF	Description	Default Value	Range	Steps	Units
AutoST	Summer Switch-OFF	00: Disable	00: Disable/ 01: Enabled	-	-
AutoT	Summer Switch-Off Tº	22	10~25	1	ºC
AutoDiff	Switch 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.***
- ***When changing Summer Switch-Off Tº or switching On differential or Run/Stop any circuit (1 or 2) the average calculation will restart.***

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

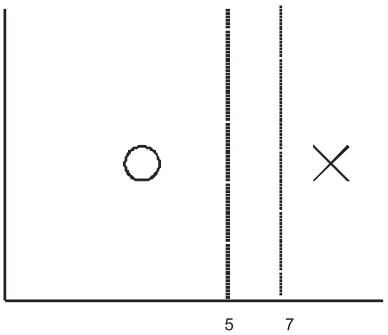
NOTE

- ***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.***

If circuits are forced OFF, a notification icon will appear on the LCD.

7.1.3 Antifreeze Control (winter operation)

When heating operation in winter if the outlet water temperature is 5ºC or lower and unit remains in Thermo OFF Operation (and water pump OFF), the water pump operates to protect the unit and pipes installation from freezing. This control is released when the water outlet temperature becomes 7ºC or higher.



O --- Continuous Pump operation
X --- Pump stop

When user allows anti freeze control mode (DSW4-6 ON), pump may operate when conditions are fulfilled

7.1.4 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

REF	Description	Default Value	Range	Steps	Units
SeizPr	Seizure protection (00:OFF, 01: ON)	OFF	-	-	-
OpInt	Operation Day	Mon	Mon~Sun	-	Day
StTim	Start Time (00~24)	01:00	(00~24)	-	Time

7.1.5 DHW anti-legionella protection function

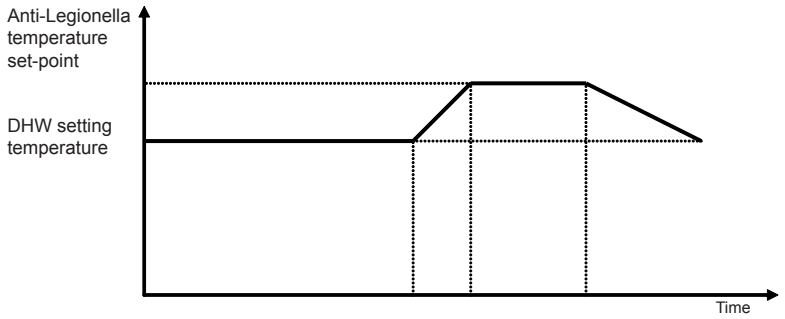
In order to help protect against Legionella in the domestic hot water system, the DHW set-point can be raised to a higher temperature than normal one. The Legionella protection consists on a DHW electric heater that raises the DHW temperature to this high temperature.

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.



REF	Description	Default Value	Range	Steps	Units
DesFu	Disinfection function status	Disabled	Disabled / Enabled	-	-
OpInt	Operation Interval (Mon~Sun)	Sunday	Daily / Mon ~Sun	-	day
StTim	Start Time (00~24)	01:00	(00~24)	-	Time
SHWTSP	DHW set-point	70	50~70	-	ºC
KeepP	Keeping period	10	10~60	-	min

NOTE

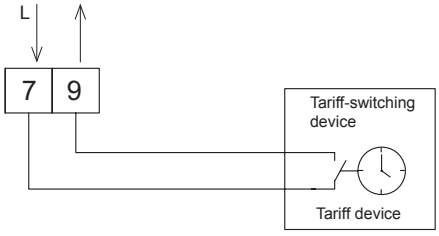
- ***Tariff or DHW timer has no effect.***
- ***When antillegionella function, it is shown in LCD (by ANTL sentence).***
- ***In case DHWT Operation is OFF, Antilegionela is not enabled.***

7.1.6 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.



REF	Description	Default Value	Range
TarSt	Tariff function enabled/disabled	Disabled	Disabled / Enabled
TarAct	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.
B-TARIFF	Use boiler instead of heat pump when TARIFF Mode is ON	Disabled	Disabled / Enabled

NOTE

- ***Use boiler o DHW Heater instead heat pump when Tariff Mode ON (B-TARIFF) only has effect when tariff action selected is heat pump blocked (NC or NO) (00 or 01).***
- ***Variable B-TARIFF only operate when Tariff Action is 00 or 01. Blocking DHW has priority against these variables.***
- ***When tariff action ON is it shown in LCD and seven segments.***

7.1.7 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,e is fulfilled.

a. Measured outlet temp value (Two3) ≥ Ttwo + 5ºC

b. Outlet water temp (Two3) ≥ Max water range temp by installer ($Tmaxh_1$&$Tmaxh_2$) + 1ºC

c. Thermo OFF by Room Thermostat

d. d. Recover of outdoor unit alarm.

e. 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 function:

- Step will be forced to 0 (heater and boiler OFF) if DSW4-4:OFF. This change will occur regardless of minimum ON time:

NOTE

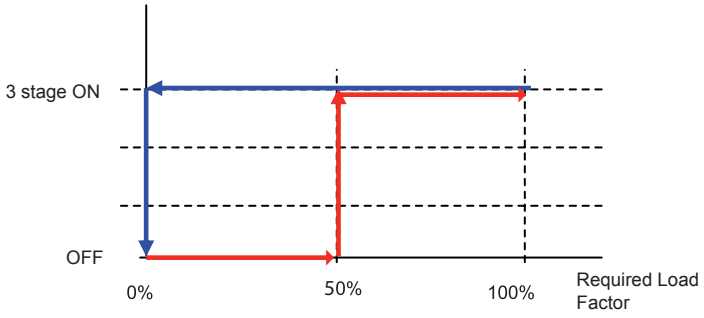
When emergency operation, the signal from outdoor units has no learned, the ambient temperature is considered at 10ºC (fixed) and water calculation (in case of Point or gradient) has calculated at 10ºC Outdoor temperature. It's recommended to change to fixed water calculation when emergency mode.

7.1.8 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.



7.1.9 Hydraulic separator combination

In some facilities, the YUTAKI S80 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:

REF	Description	Default Value
hsb	Hydraulic Separator (Disabled, Enabled)	Disabled

NOTE

If universal sensor enabled and Complementary heater is set to 02 (Heat Pump + Boiler) or 03 (Heat Pump + Heater + Boiler) or hydraulic separator enabled, THMwo3 should be used instead of Two

7.1.10 Secondary outdoor sensor accessory

An optional 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.

Yutaki S80 can use the two outdoor temperature sensors (Outdoor unit ambient temperature and Auxiliary ambient temperature (4-20mA) for the two heating space circuits.

Source temperature for average calculation is selectable by DSW4#2 & DSW5-1#2 at start up with following values:

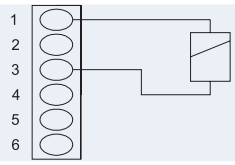
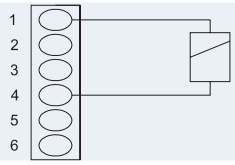
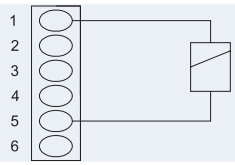
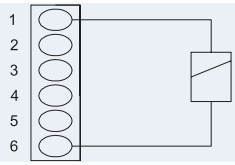
- DSW4#2 ON & DSW5-1#2 OFF,OFF: Use Auxiliary Ambient Temperature sensor (4~20mA transducer).
- DSW4#2 ON & DSW5-1#2 ON,OFF: DSW4#2 ON & DSW5-1#2 ON, OFF: Use Outdoor Unit Ambient Temperature for C1 and Auxiliary ambient temperature sensor (4~20mA transducer) for C2
- DSW4#2 ON & DSW5-1#2 OFF,ON: Use Outdoor Unit Ambient Temperature for C2 and Auxiliary ambient temperature sensor (4~20mA transducer) for C1

7.1.11 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 that 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

NOTE

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.

The unit has the following described optional signals:

Code	Name	Description	Port
o1	Operation signal	This signal allows control of the machine 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 the compressor 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 and circuit 2 in Thermo ON. The signal will be enabled when Demand OFF in circuit 1 and circuit 2 in Thermo ON.	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	

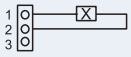
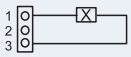
7.2 Outdoor unit

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.

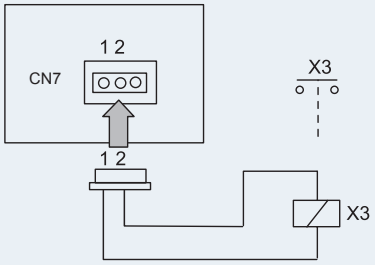
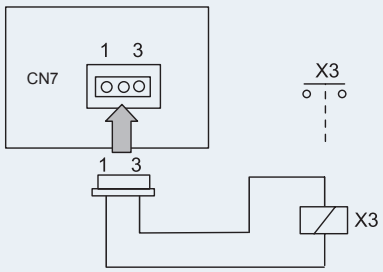
7.2.1 Available ports

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

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
00	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

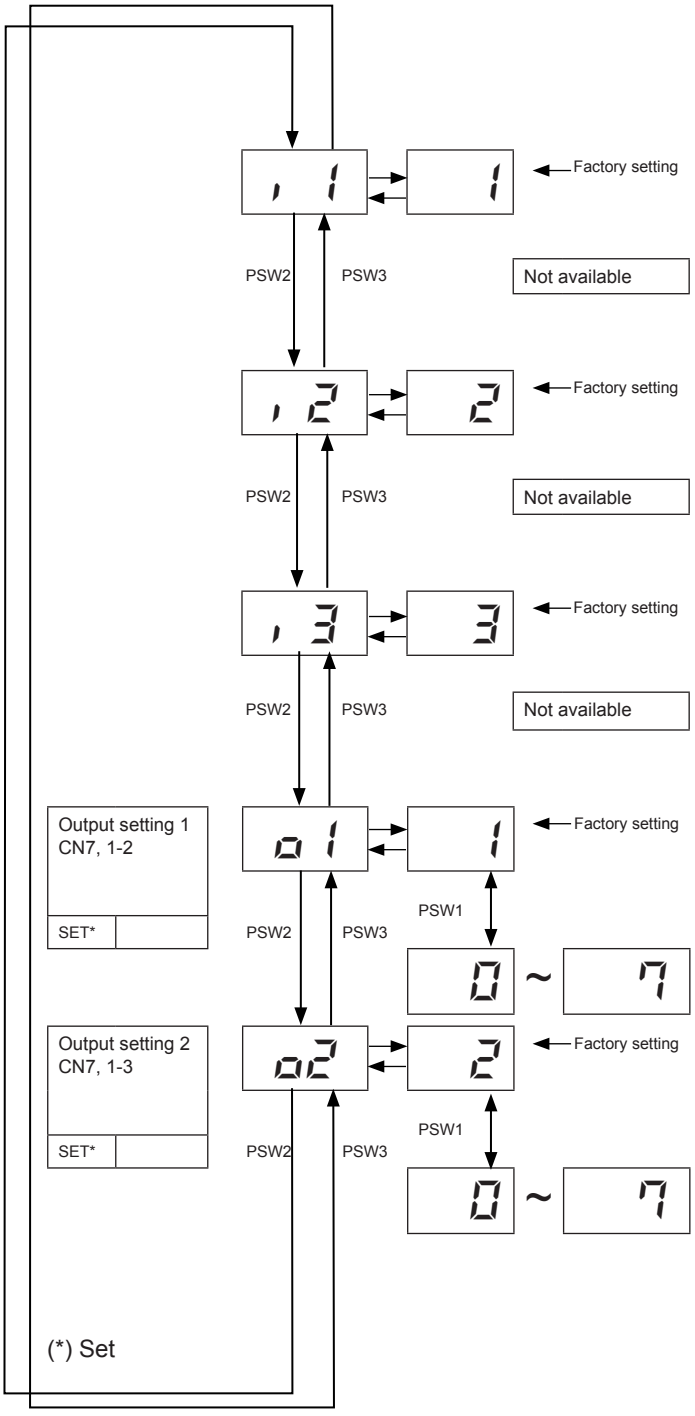
Do not set same function (01~04) to multiple input port.

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 correctly connected.

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 *Service space* in outdoor and indoor manual).
- Check that the units have been correctly installed and that the indoor unit four mounting foot are correctly adjusted.

8.1.2 Hydraulic circuit checking (space heating circuit and DHWT)

- Check that the circuit has been properly flushed and filled with water and that the installation has been drained: the pressure of the space heating and heating coil circuits must be 1.8 bar (at least 1.5 bar).
- Check that the water tank heating coil is completely filled.
- Check for any leakage in water cycle.
- Make sure the system's internal water volume is correct.
- Make sure the DHW tank internal water volume is correct.
- Check that the hydraulic circuit stop valves are open.

⚠ CAUTION

- *Operating the system with closed valves will damage the unit.*
- *Check to see that air purge valve is open and that the hydraulic circuit is air purged. The installer is responsible of completely air purging the installation.*
- *Check that the water pump of the space heating and heating coil circuits work within the pump operating range and that the water flow is over the pump's minimum. If the water flow is under 12 liters/minute (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.*

8.1.3 Electrical checking

⚠ CAUTION

Do not operate the system until all the check points have been cleared:

- *Power on once water leak tests have succeed.*
- *Check to ensure that the electrical resistance is more than 1MΩ, 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 and sensors).*
- *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 corresponding chapter.*
- *Check to ensure the external wiring is correctly fixed to avoid problems with vibrations, noises and cut out wires with the plates.*

8.1.4 Checking the refrigerant circuit

- Check to ensure that the stop valves on the outdoor unit 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 the heating operation mode in the LCD controller.
- 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.

⚠ CAUTION

- ***Heating at lower water temperatures (approximately 10ºC to 15ºC) and lower outdoor ambient temperatures (<10ºC) can be damaging to the heat pump when defrosting.***
- ***It is recommended start the unit (first power ON) with heater forced OFF (DSW4-7: ON) and compressor forced OFF. In order to circulate water by water pump and remove possible air into the unit.***

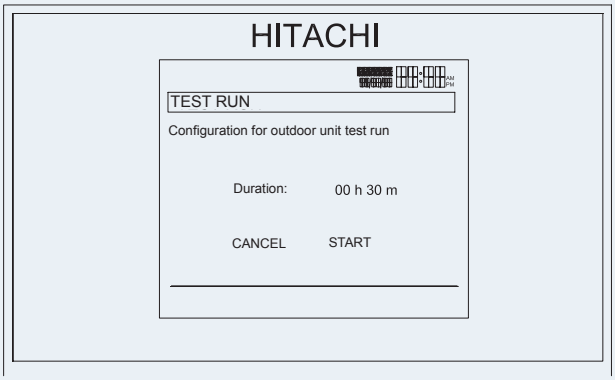
8.3 Indoor unit test run

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.

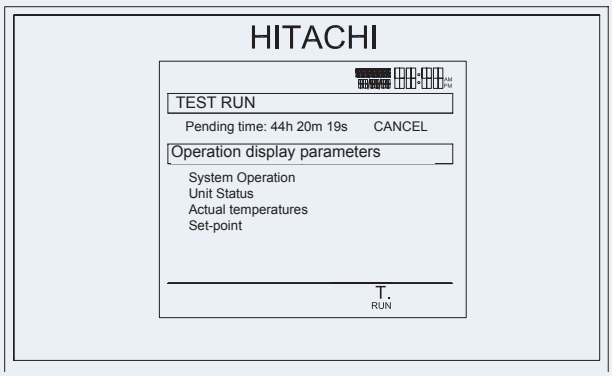
Note that test run mode will be the same than unit mode selected on the global view.

Select unit mode, heating or cooling, before starting test run.



The duration will be between 00:30 and 12:00 hours.

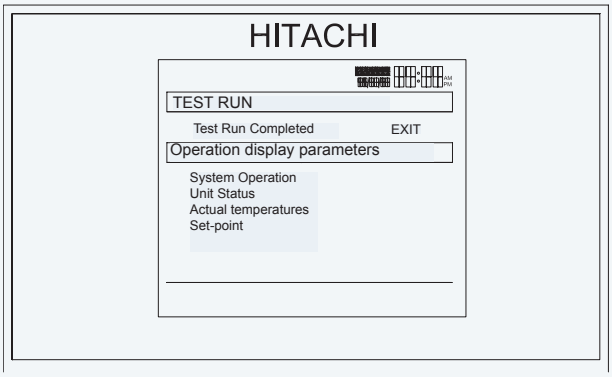
After pressing start, Outdoor unit will begin the test run. During the execution of this test, the following screen will be displayed.



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.



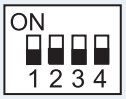
NOTE

- ***Disable Heater and Boiler operation for all the test run operation.***
- ***Set operation to main zone only. Zone 1 has preference.***
- ***Set Setting temperature for operation to Tmax for Heating and Tmin for cooling to avoid unwanted Thermo OFF.***
- ***If Two > Tmax for heating or Two < Tmin for cooling, test run must be stopped and finish operation. When temperature Two < Tmax (heating) or Two > Tmin (cooling), test run will start until finishing time.***
- ***If Pump is stopped at any moment during Test Run, Test Run must be ended. Pump order will always be ON due to Heat Pump operation.***
- ***Stop by protection has priority over Test Run.***

8.4 Outdoor unit test run

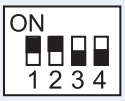
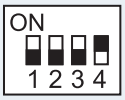
The test run procedure from the outdoor unit side is shown below. You can set this DIP switch while the power source is ON.

◆ 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	• 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.
	(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 		
Manual OFF of compressor	2. Forced stoppage of compressor: Set DSW1-4 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

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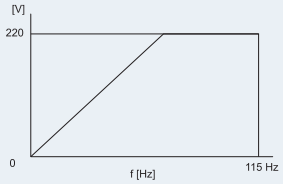
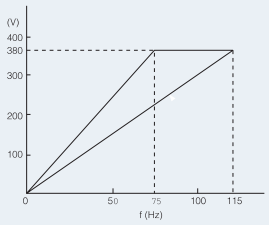
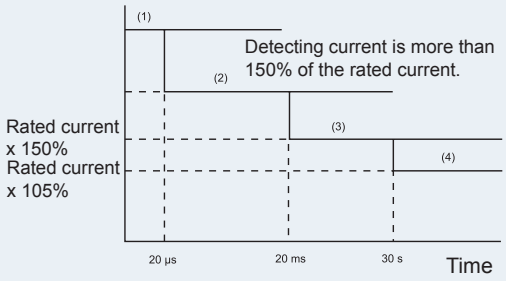
9. Electrical checks of the main parts

Index

9.1 Inverter

◆ Specifications of inverter

Aplicable model	RAS-(4-6)HVRNME-AF / RWH-(4-6)FSVNFE	RAS-(4-6)HRNME-AF / RWH-(4-6)FSNFE
Aplicable power source	1~ 230V+10% 50Hz	3N~ 400V±10% 50Hz
Input current	15-30A	6-25A
Control method	Vector control	
Range output frequency	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	0.125, 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 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	

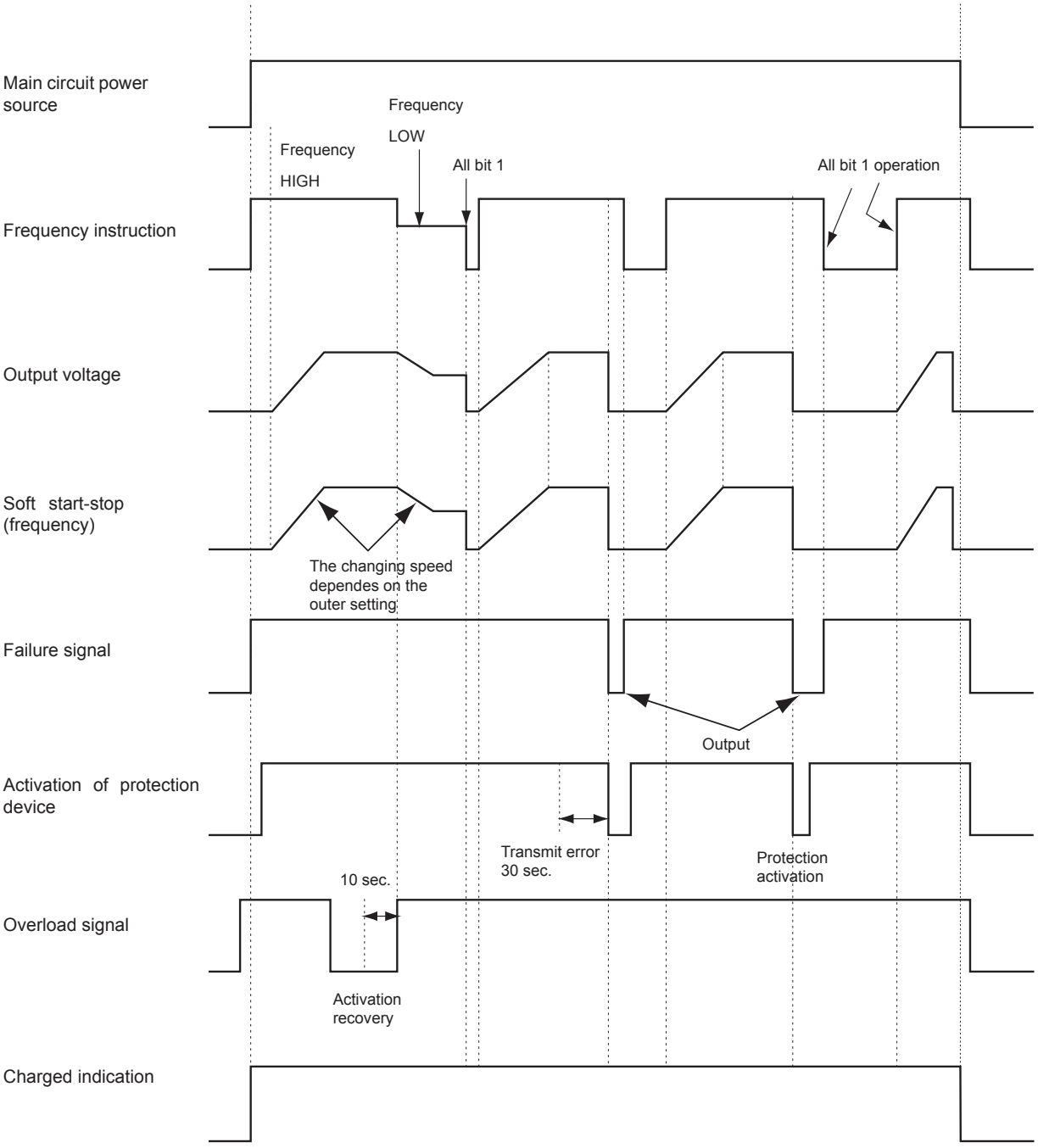
<table>
<tr><th>Protection function</th><th>RAS-(4-6)HVRNME-AF /
RWH-(4-6)FSVNFE</th><th>RAS-(4-6)HRNME-AF /
RWH-(4-6)FSNFE</th></tr>
<tr><td rowspan="2">Overcurrent protection for inverter</td><td colspan="2"> 
</td></tr>
<tr><td colspan="2">*) Internal protection IPM

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="2">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="2">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="2">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="2">The unit is stopped when the compressor is earthing.</td></tr>
</table>

◆ Inverter time chart



◆ 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

Function

When abnormalities are detected, the inverter compressor is stopped and transmit the signal code of stoppage cause to PCB1 (case outdoor unit) and PCB3 (case indoor unit).

b. 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.

Function

When abnormalities are detected, the inverter compressor is stopped, and transmit the signal code of stoppage cause to PCB1 (case outdoor unit) and PCB3 (case indoor unit).

b. 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)

Function

When abnormalities are detected, the inverter compressor is stopped and transmit the signal code of stoppage cause to PCB1 (case outdoor unit) and PCB3 (case indoor unit).

b. 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.

Function
When abnormalities are detected, the inverter compressor is stopped and the signal code of stoppage cause is transmitted to PCB1 (case outdoor unit) and PCB3 (case indoor unit).

b. 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.

Function
When abnormalities are detected, the inverter compressor is stopped and the signal code of stoppage cause is transmitted to PCB1 (case outdoor unit) and PCB3 (case indoor unit).

b. 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.

Function
When abnormalities are detected, the inverter compressor is stopped and the signal code of stoppage cause is transmitted to PCB1 (case outdoor unit) and PCB3 (case indoor unit).

b. 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.

◆ Overload control

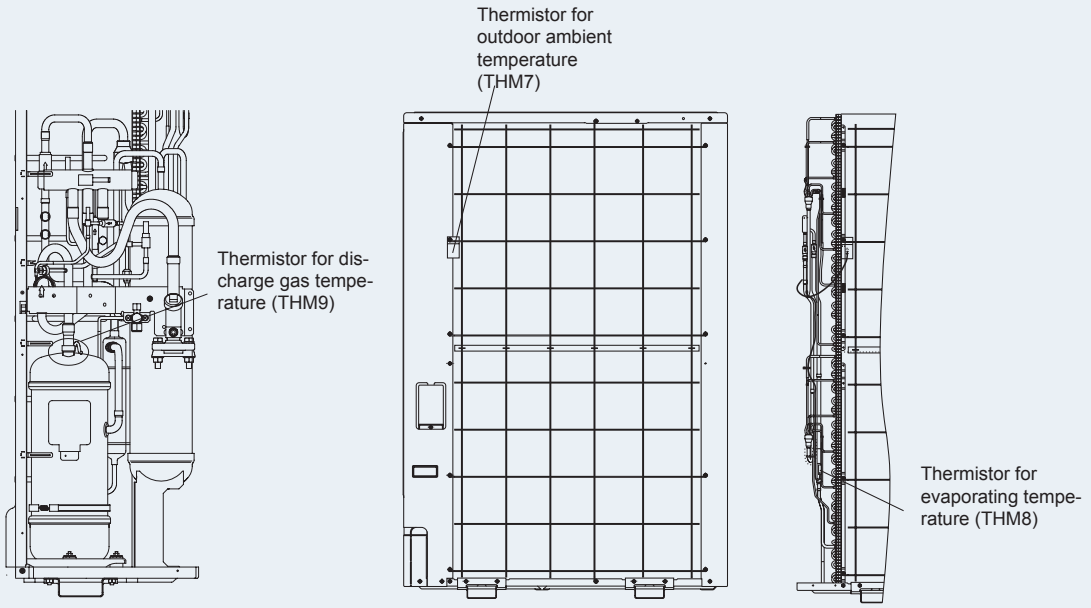
a. Level of detection
When the output current exceeds 105% of the maximum output current, an abnormality is detected.

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.

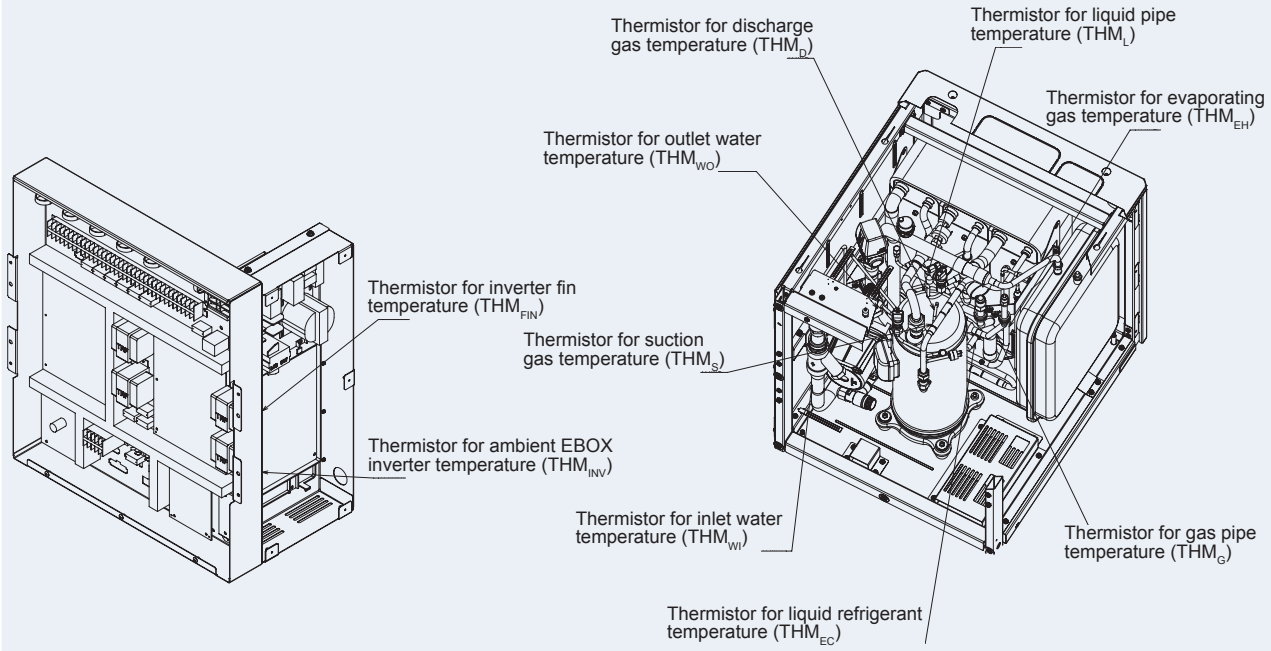
c. Cancellation of protection function
After the operation described in the above item b. is performed for 10 seconds, this control is canceled.

9.2 Thermistor

Thermistors for the outdoor unit



Thermistors for the indoor unit



◆ Thermistor for upper part temperature (discharge) of R410A compressor (outdoor unit) and R134a compressor (indoor unit)

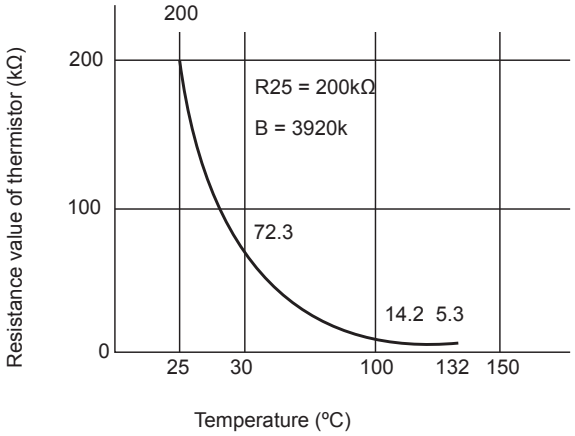
(For prevention of discharge gas overheating)

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

- The electronic expansion valve of the unit is opened to return the liquid refrigerant to the compressor (through the accumulator for outdoor unit), decreasing compressor temperature.
- If the compressor upper part temperature increases exceeding 127ºC (for outdoor unit) or 120ºC (for indoor unit) even if the electronic expansion valve opens, the compressor is stopped, in order to protect the compressor.
- In pump down operation, the above function is also available.



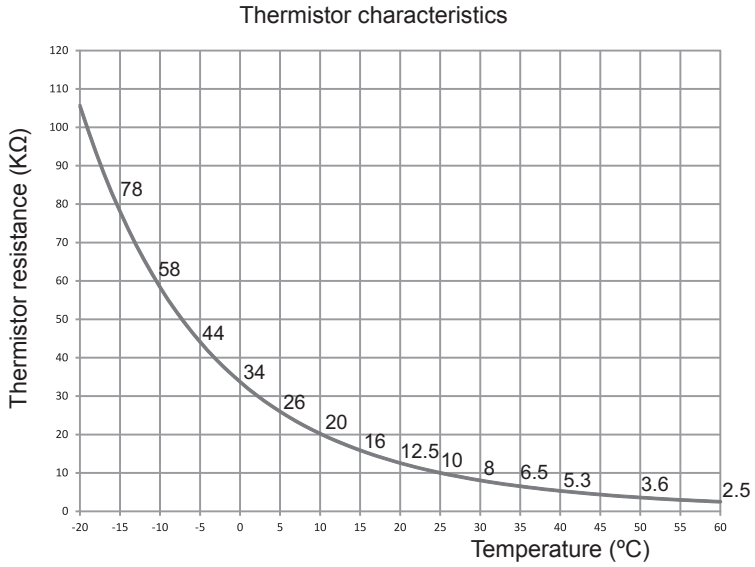
Resistance characteristics of thermistor for discharge gas overheating protection

d. If compressor upper part temperature increases excessively, the protection control is activated and the compressor is stopped according to the following method.

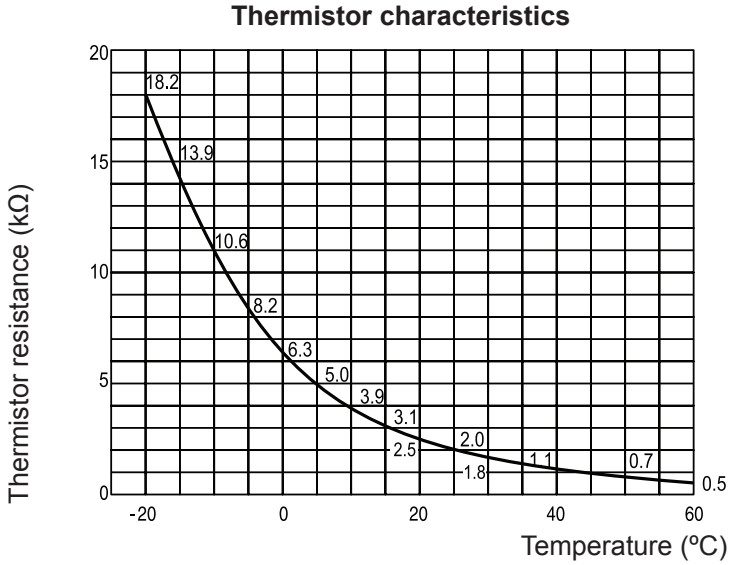
Operation	Upper part temperature of compressor		Defecting period
	Outdoor unit	Indoor unit	
Heating	Over 127ºC	Over 120ºC	10 minutes (continuously)
	Over 140ºC		5 seconds (continuously)
Defrosting	Over 127ºC	Over 120ºC	5 seconds (continuously)

◆ Thermistor for outdoor ambient and evaporating temperatures of outdoor unit and liquid / gas pipe, compressor suction, inverter fin and evaporating heating / cooling temperatures od indoor unit.

The thermistor resistance characteristics are shown in the next figure.

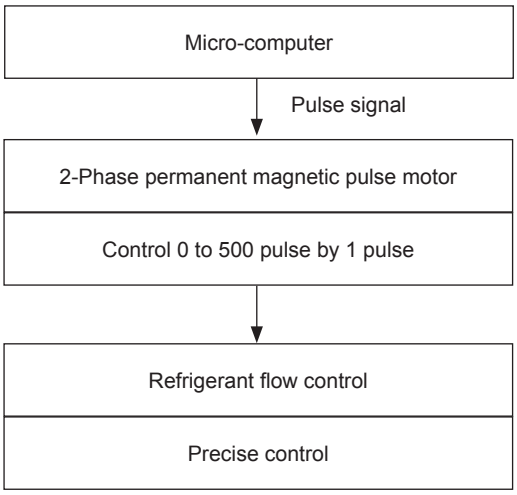


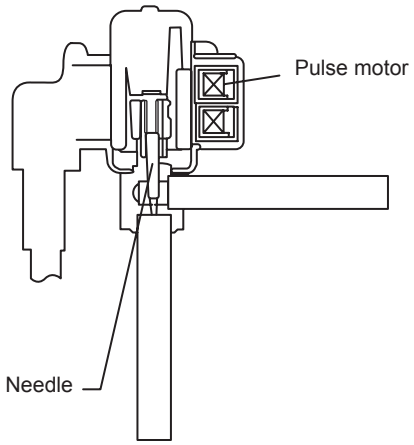
◆ Thermistor for water inlet and outlet temperatures of hydraulic circuit.

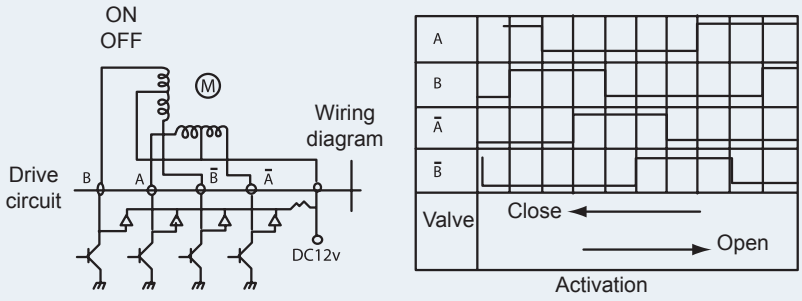


9.3 Electronic expansion valve

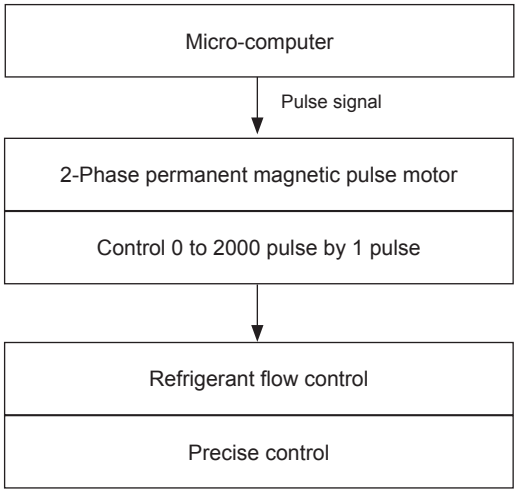
◆ Electronic expansion valve for the outdoor unit and the 2nd cycle from indoor unit

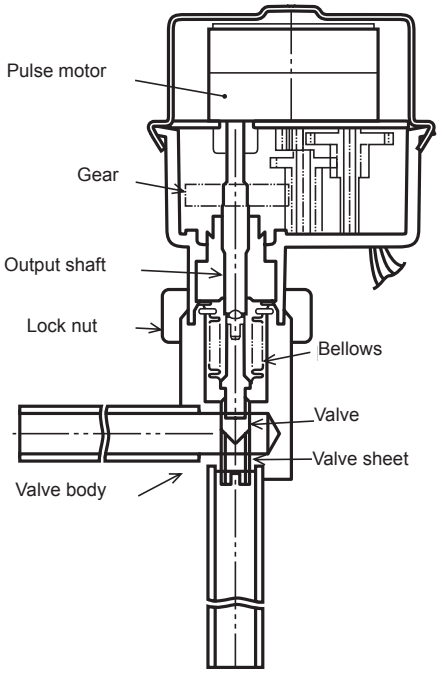


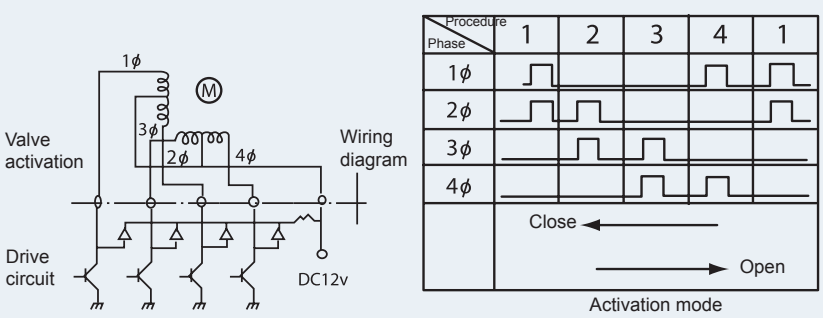


Items	Specifications
Applicable to the models	For the main cycle of: RAS-(4-6)H(V)RNME-AF / RWH-(4-6)FS(V)NFE
Type	UKV(10.0 USRT) series/UKV (5.0USRT) series for MVB
Refrigerant	R410A (Outdoor unit) / R134a (2nd cycle - Indoor unit)
Working temperature range	-30°C ~ 65°C (operation time of the coil: 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	

◆ Electronic expansion valve for the 1s cycle from 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	

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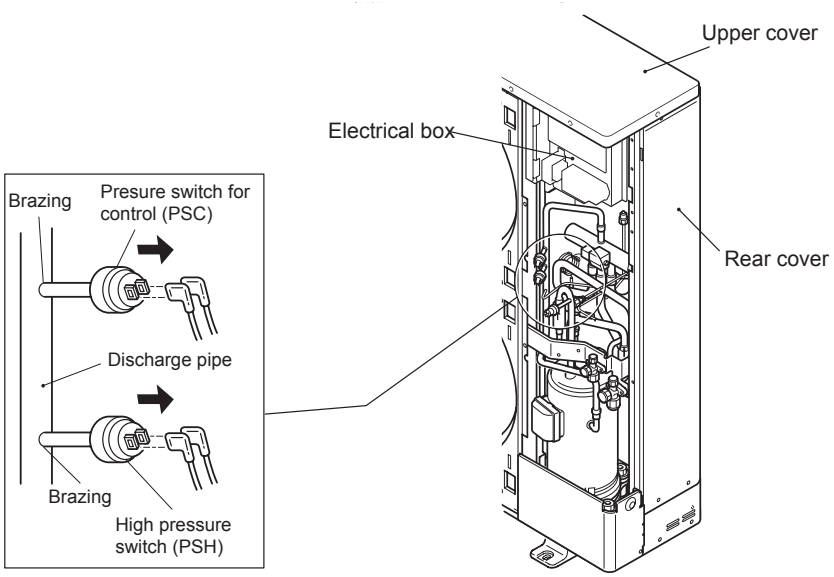
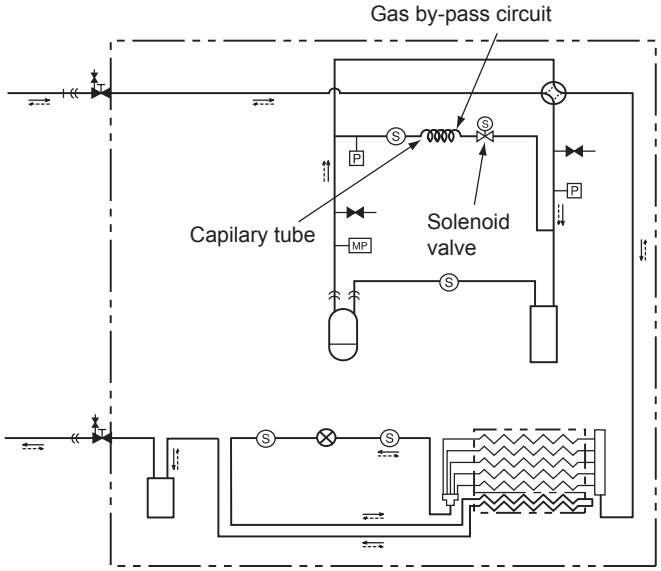
9.4 High pressure protection device for outdoor unit

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.



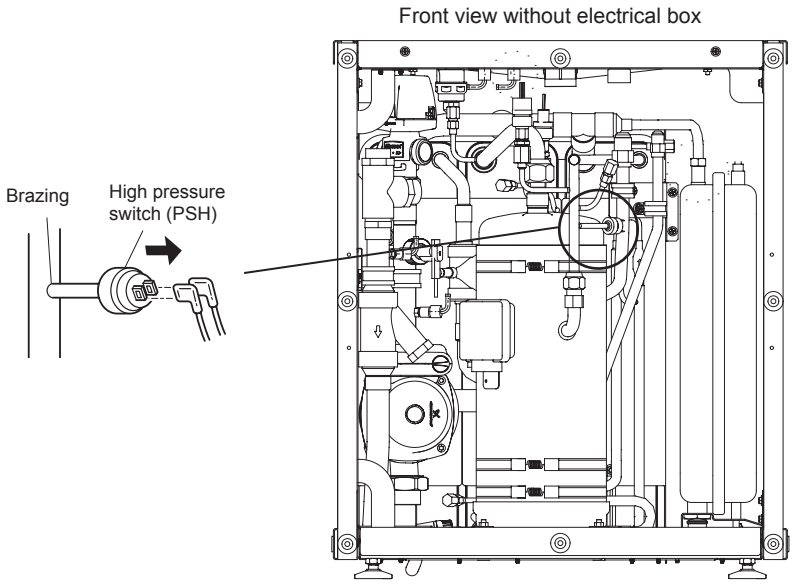
1 For controlling the high pressure not to increase excessively during heating operation, the gas by-pass circuit and the air volume of the outdoor fan is controlled automatically.

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.

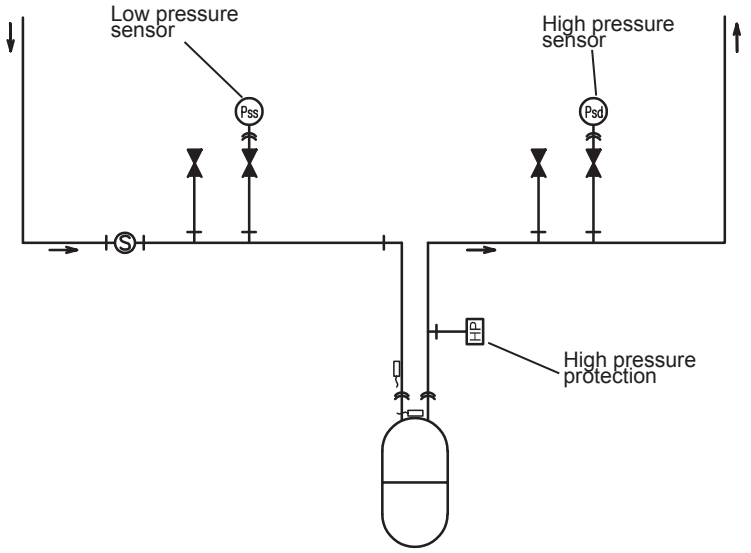


9.5 High pressure protection device for 2nd cycle indoor unit

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 3MPa (R134a), the protection control is activated and the compressor is stopped.



The pressure at the 2nd cycle of the indoor unit is controlled by the Low and High pressure sensors.

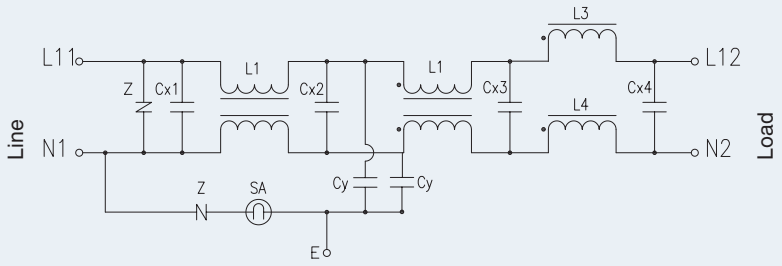


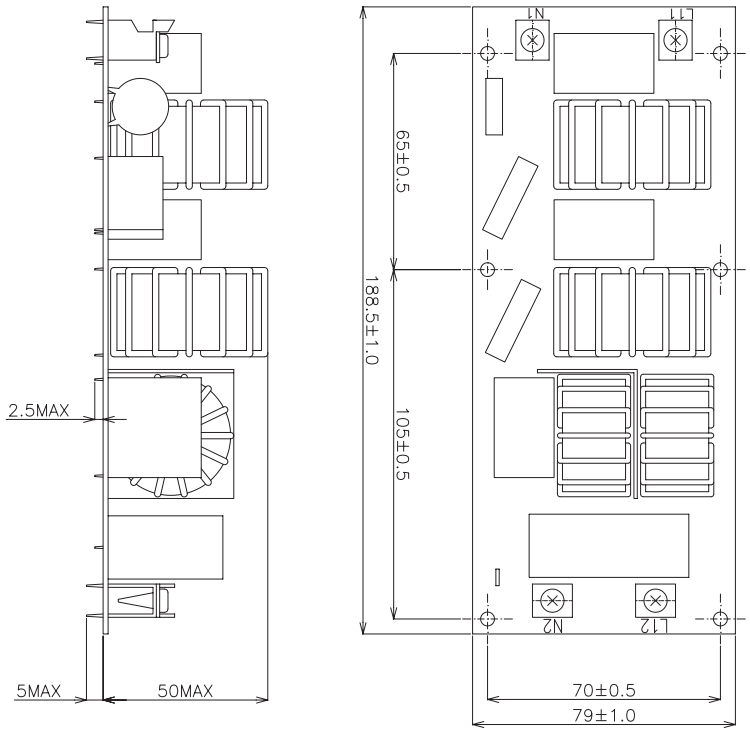
9.6 Noise filter (NF)

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.

◆ Noise filter for 1~

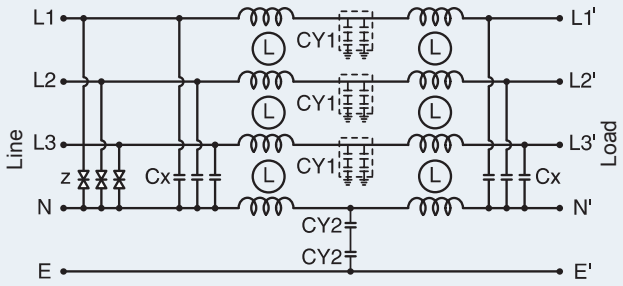
RAS-(4-6)HVRNME-AF / RWH-(4-6)FSVNFE (2nd cycle) (230V 50Hz)

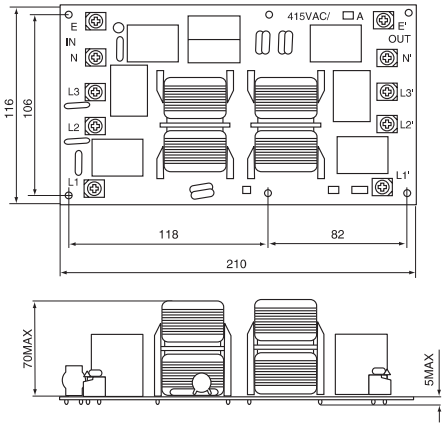
Items	Specifications
Model	LFB-14930-3M
Rated current	AC230V 30 A
Permissible temperature range.	-25 ºC to 85 ºC
Circuit diagram	



◆ Noise filter for 3N~

RAS-(4-6)HRNME-AF / RWH-(4-6)FSNFE (2nd cycle) (400V 50Hz)

Items	Specifications
Model	4LFB-16830-2FA
Rated current	AC415V 27A
Permissible temperature range	-25ºC to 85ºC
Circuit diagram HRNM(E)	

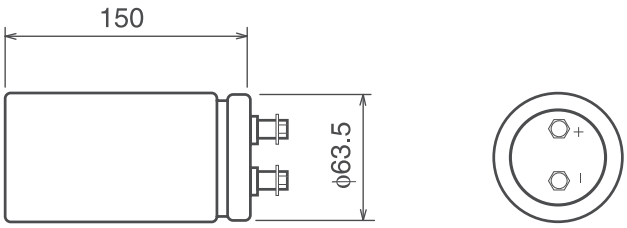


9.7 Capacitor (CB1, CB2)

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 / RWH-(4-6)FSVNFE (2nd cycle) (400V/50Hz)

Items	Specifications
Models	LNX2G472MSEAHE
Capacity of static electricity	4700μF
Rated voltage	400 VDC
Permissible temperature range	-25ºC to 95ºC



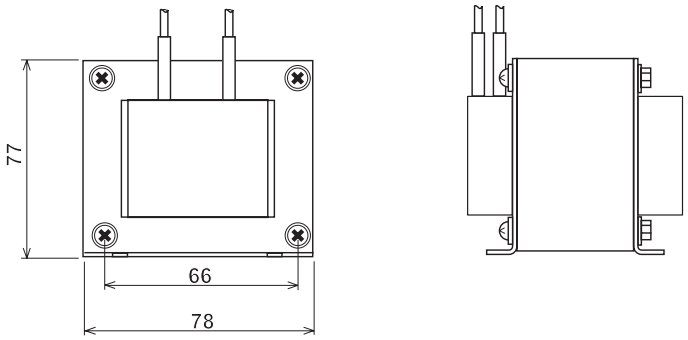
9.8 Reactor (DCL)

This part is used for changing the alternative current to the direct current for the inverter.

◆ Reactor (DCL) for 1~

RAS-(4-6)HVRNME-AF / RWH-(4-6)FSVNFE (2nd cycle) (230V 50Hz)

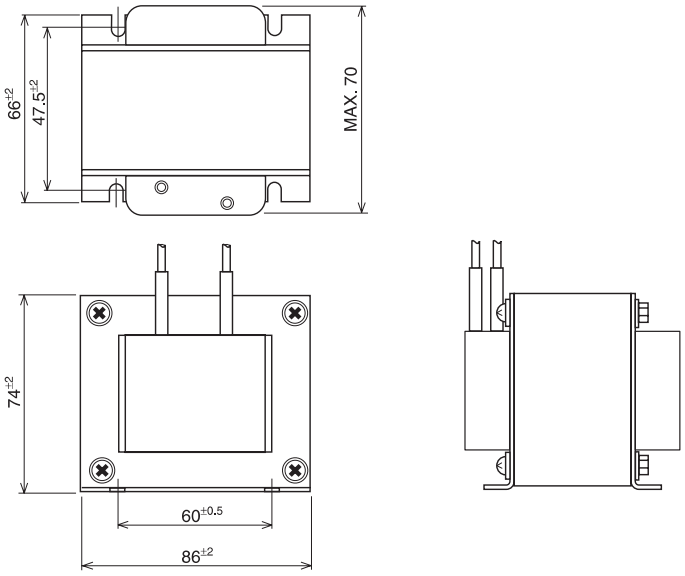
Items	Specifications
Character	0.59 mH±15 (at 1 kHz)
Rated current	30 A
DC Resistance	26 mΩ (at 20 °C)
Permissible temperature range	-20ºC to 60ºC



◆ Reactor (DCL) for 3N~

RAS-(4-6)HRNME-AF / RWH-(4-6)FSVNFE (2nd cycle) (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



9.9 R410A (outdoor unit) and R134a (indoor unit) 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.

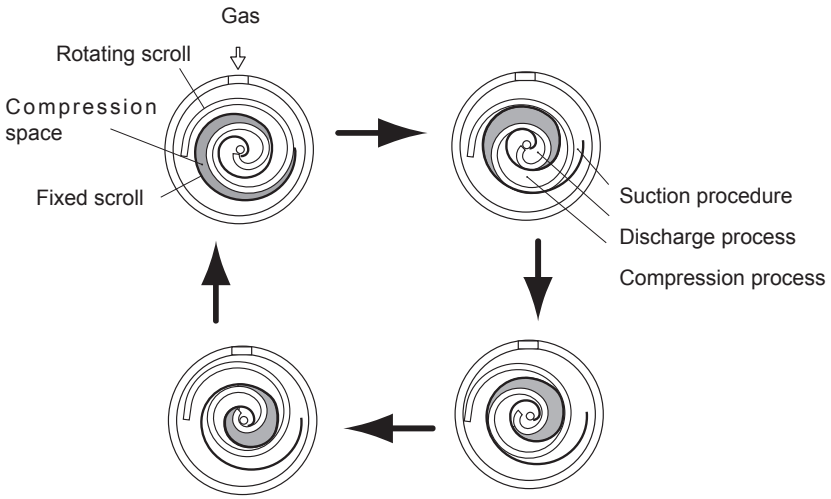
◆ Principle of compression

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.



HITACHI
Inspire the Next

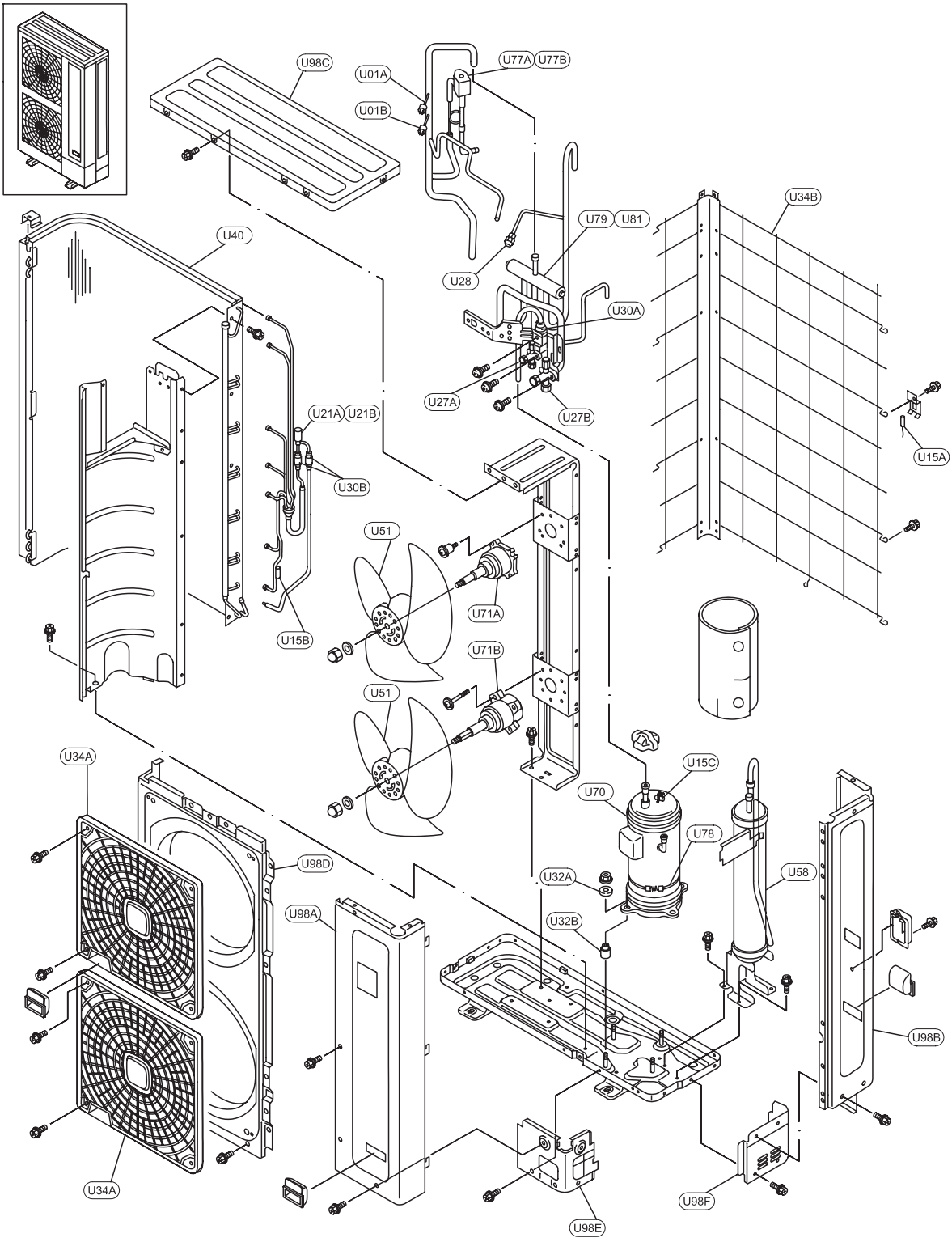
10. Spare parts

Index

10.1 Outdoor unit

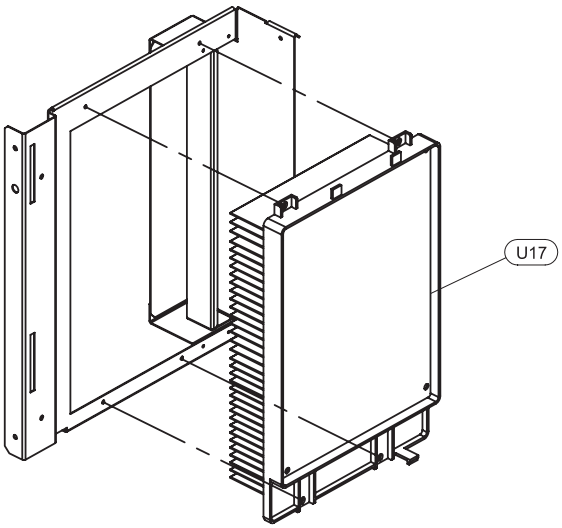
10.1.1 RAS-(4-6)HVRNME-AF

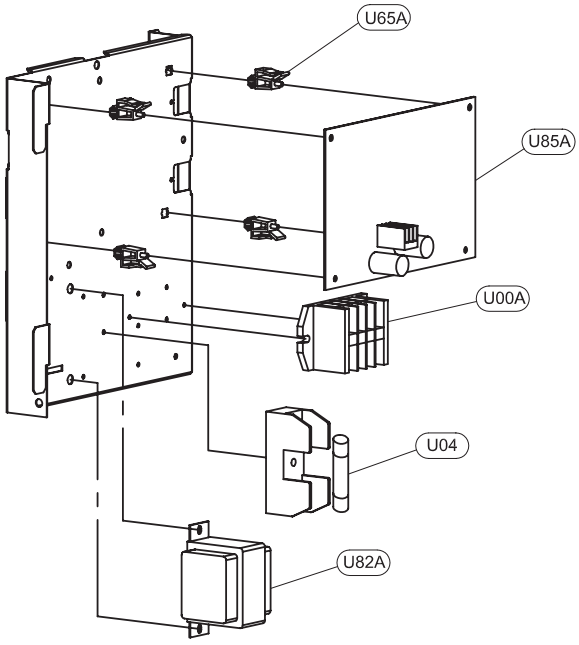
◆ Cycle and structural parts

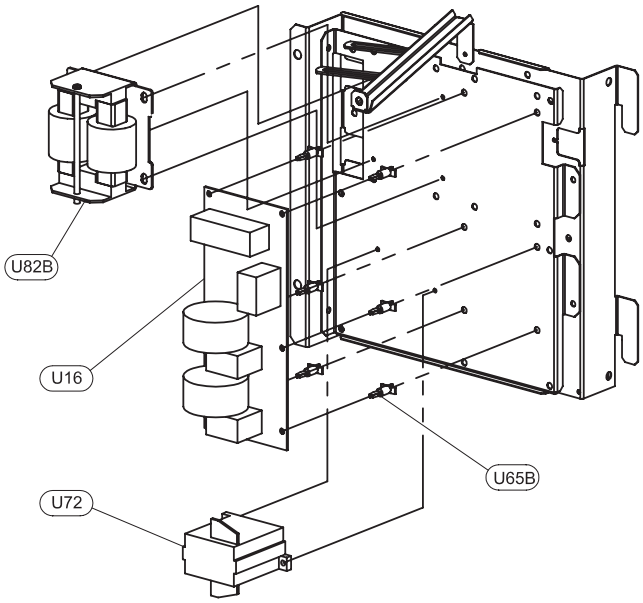


Spare Parts Document: EPN-201005

◆ Electrical parts







Spare Parts Document: EPN-201005

Cycle and structural parts

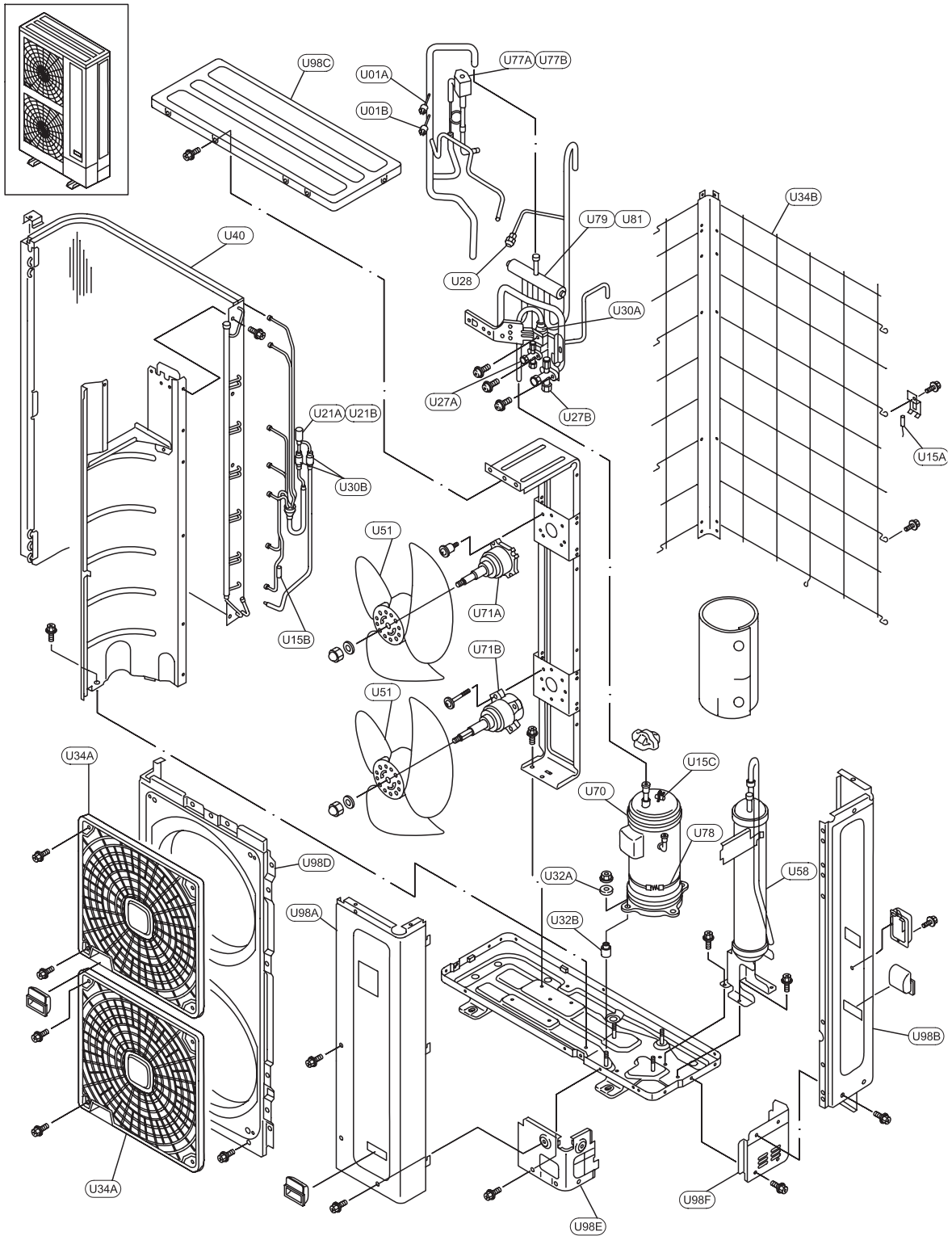
No.	Part name	Remarks
U00A	Terminal board	
U01A	Pressure SW	Protection
U01B	Pressure Sw	Control
U04	Fuse	40A, 5/6 HP 50A
U15A	Thermistor	Air
U15B	Thermistor	Piping
U15C	Thermistor	Compressor
U16	Noise filter	30A
U17	Inverter fin assy	DIP-IPM (17A) 576 (25A)
U21A	Expansion valve	
U21B	EXPV Coil	
U27A	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	

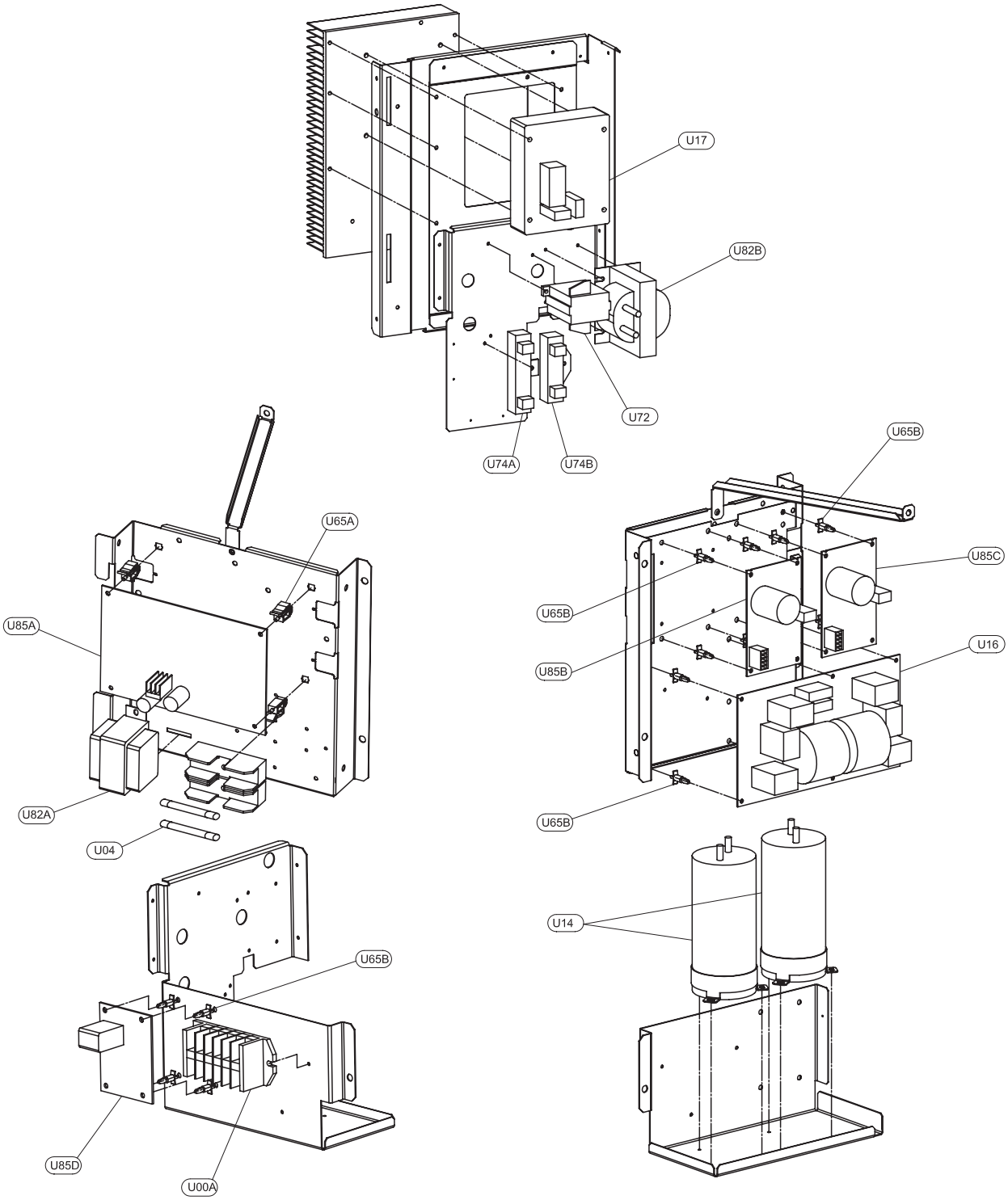
10.1.2 RAS-(4-6)HRNME-AF

◆ **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	

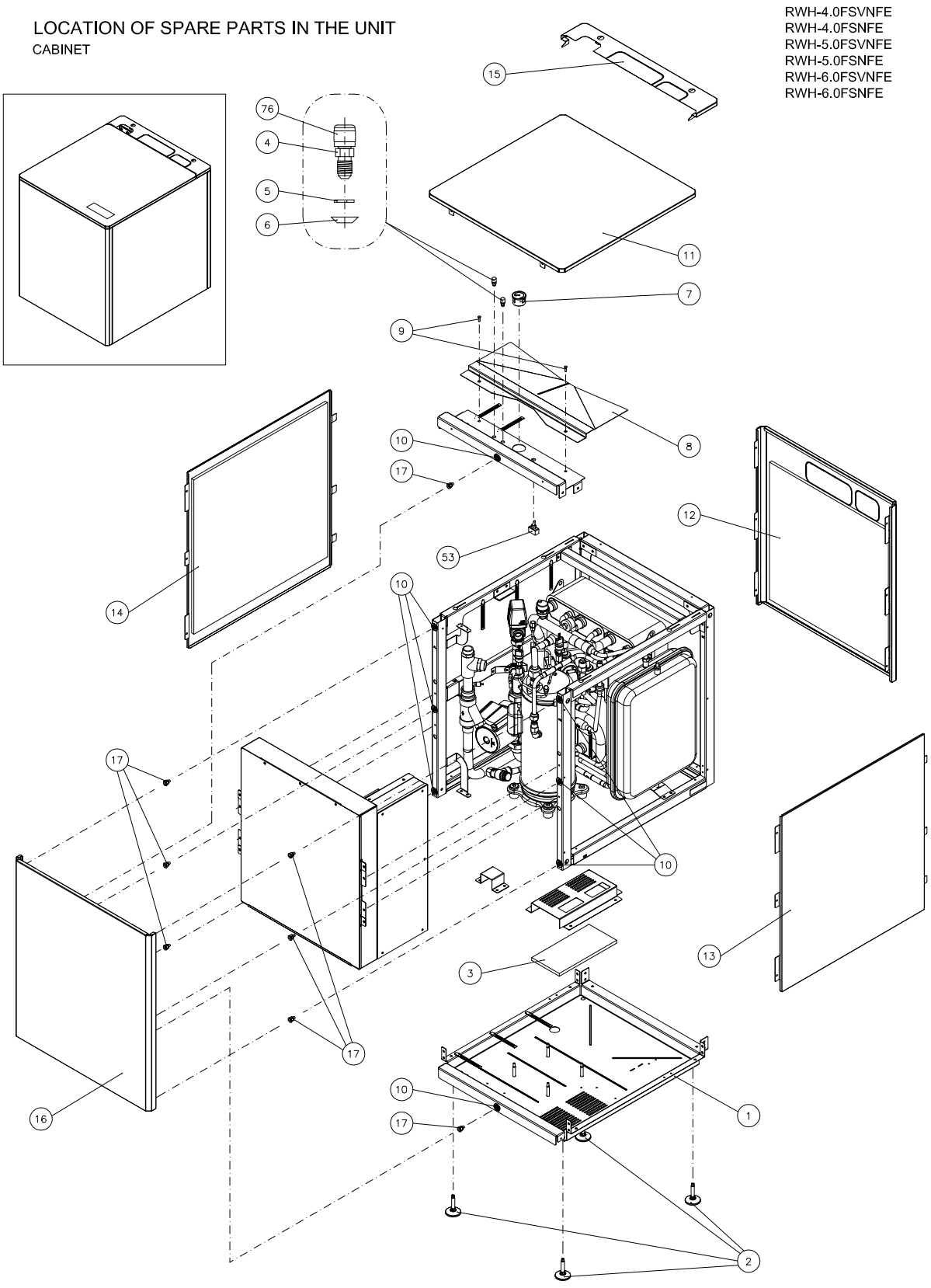
Electrical parts

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	

10.2 Indoor unit

10.2.1 RWH-(4.0-6.0)FS(V)NFE

◆ Structural parts

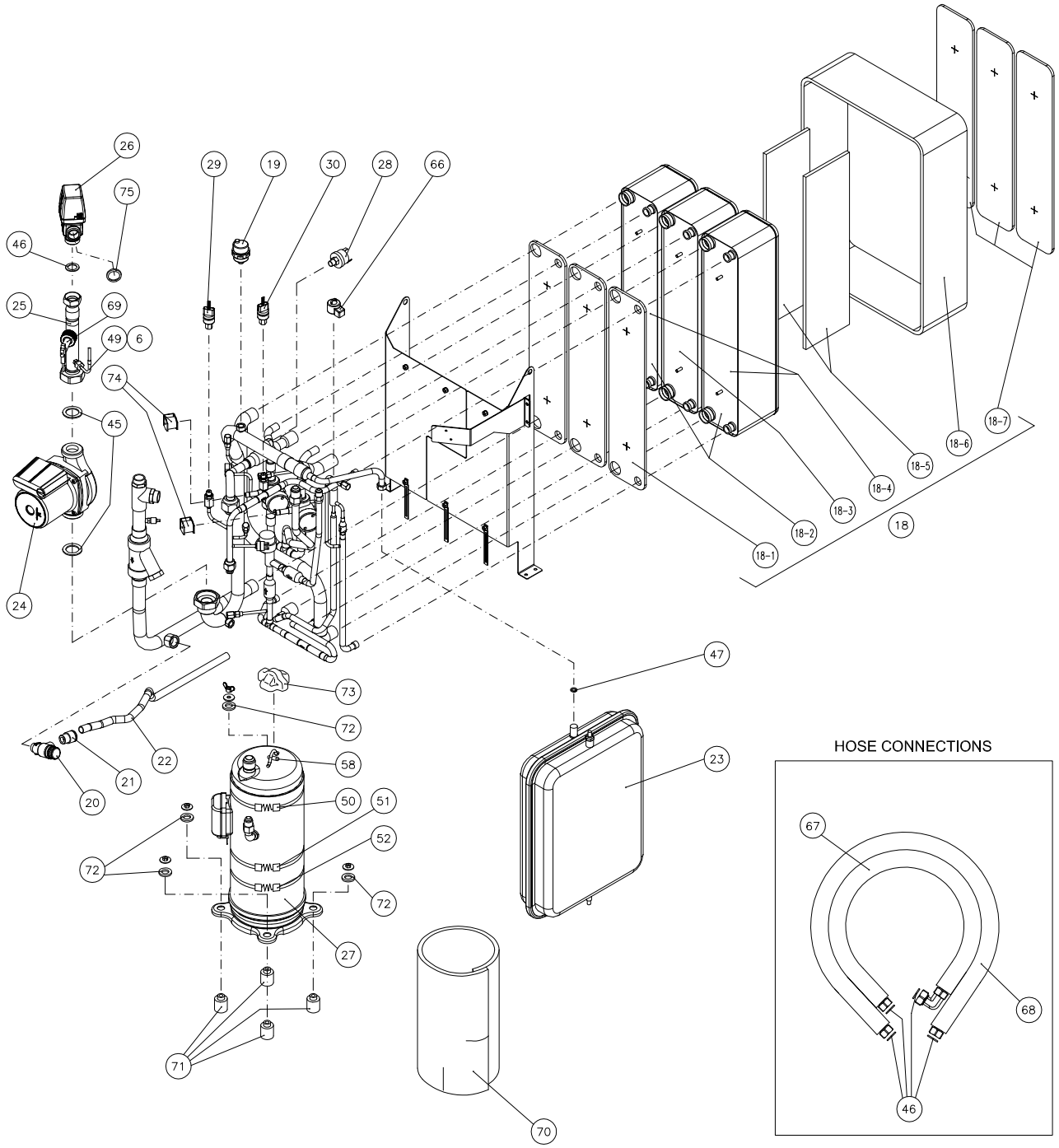


Spare Part Document: EPN-201207A

◆ Cycle

LOCATION OF SPARE PARTS IN THE UNIT
CYCLE

RWH-4.0FSVNFE
RWH-4.0FSNFE
RWH-5.0FSVNFE
RWH-5.0FSNFE
RWH-6.0FSVNFE
RWH-6.0FSNFE



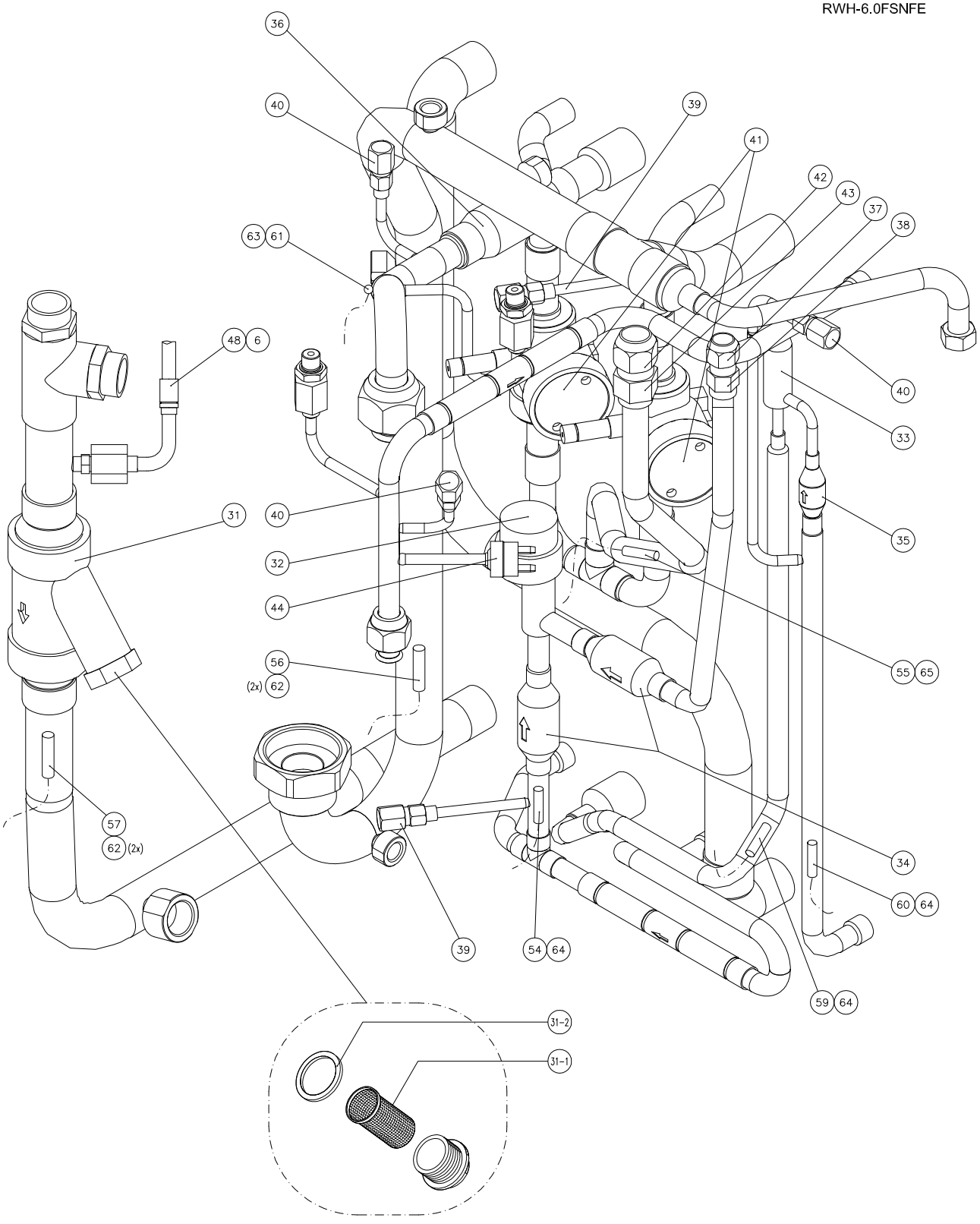
HOSE CONNECTIONS

Spare Part Document: EPN-201207A

◆ Pipe assy

LOCATION OF SPARE PARTS IN THE UNIT
PIPE ASSY

RWH-4.0FSVNFE
RWH-4.0FSNFE
RWH-5.0FSVNFE
RWH-5.0FSNFE
RWH-6.0FSVNFE
RWH-6.0FSNFE

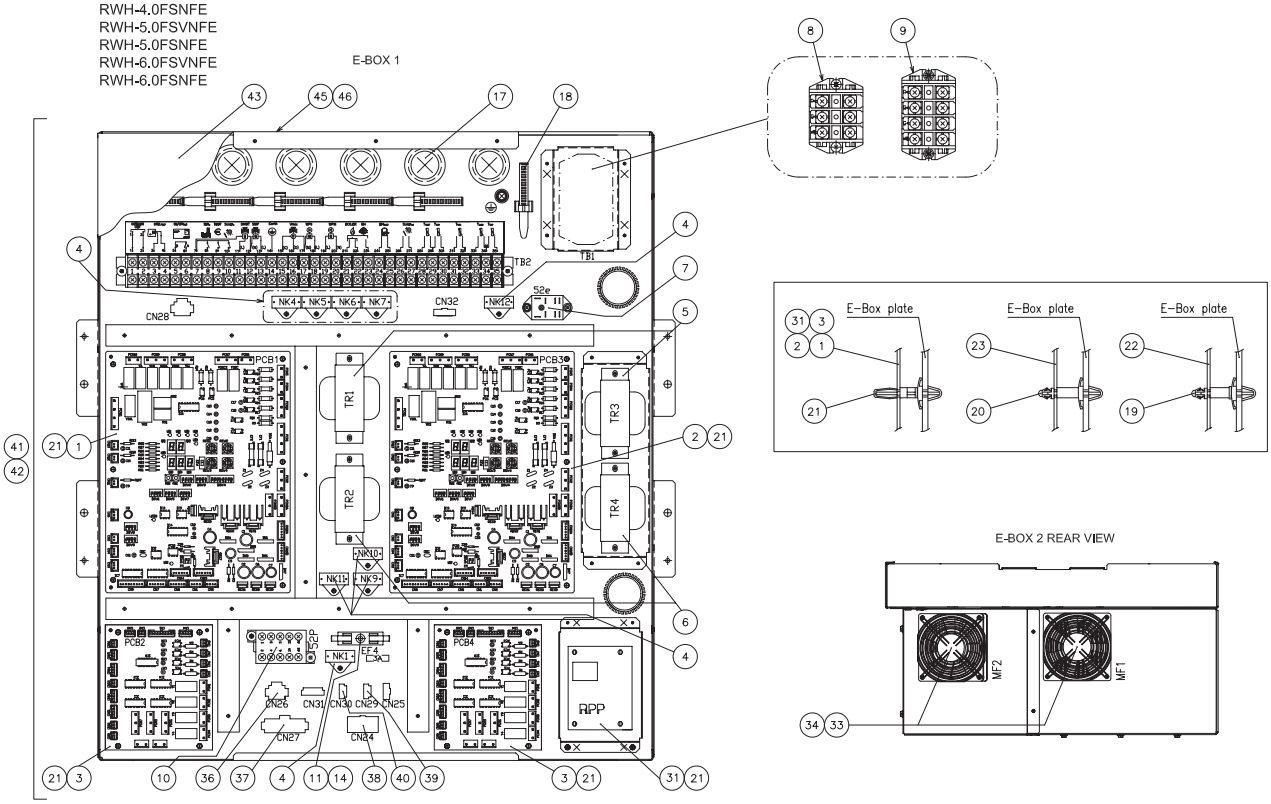


Spare Part Document: EPN-201207A

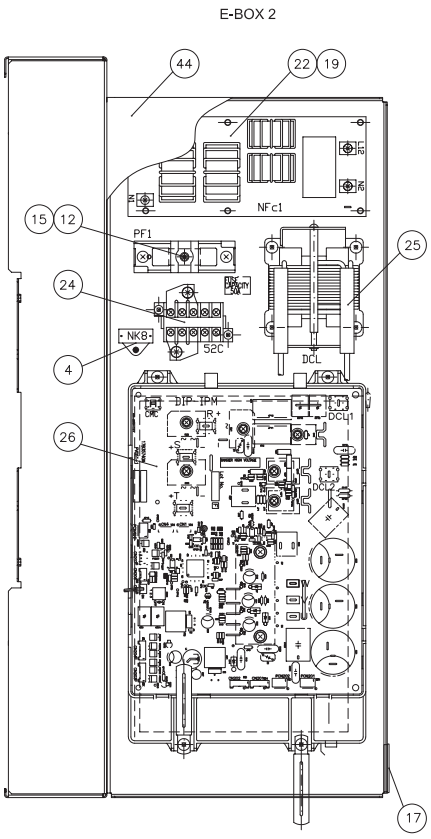
◆ Electrical parts

RWH-(4.0-6.0)FS(V)NFE

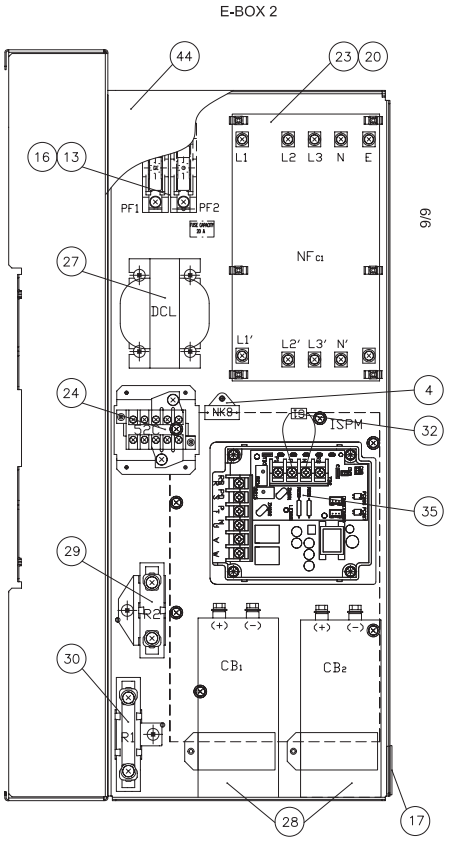
RWH-4.0FSVNFE
RWH-4.0FSNFE
RWH-5.0FSVNFE
RWH-5.0FSNFE
RWH-6.0FSVNFE
RWH-6.0FSNFE



RWH-(4.0-6.0)FSVNFE



RWH-(4.0-6.0)FSNFE



Spare Part Document: EPN-201207A

Cycle and structural parts

No.	Description	Remarks
1	B-Base	
2	Foot	
3	Filter	
4	Pressure Port	
5	NUT	
6	GASKETCU	
7	Manometer	
8	Partition Plate	
9	M5SUS Screw	
10	COUPLING	
11	Upper Cover L Assy	Insulation Included.
12	Rear Cover Down Assy	Insulation Included.
13	Side Cover R Assy	Insulation Included.
14	Side Cover L Assy	Insulation Included.
15	Upper Cover S	
16	Front Cover Down	
17	Pin	
18	PHEX Unit	Assembly from (18-1 ~ 18-7).
18	PHEX Unit	Assembly from (18-1 ~ 18-7).
18−1	Insulation	
18−2	Plate HEX	
18−3	Plate HEX	
18−4	Plate HEX	
18−5	Insulation	
18−6	Insulation	
18−7	Insulation	
19	Air Purge	
20	Security Valve	
21	Union	
22	Drain Pipe	
23	Expansion Vessel 12L	Gasket 47 not included.
24	Pump	Gaskets 45 not included.
25	Pipe 1 Assy	
26	3 Way Valve	Gaskets 46 and 75 not included.
27	COMP H405DHD-64A1	
27	COMP H405DHD-64D1	
28	Pressure Switch	
29	P-Sensor	Pd
30	P-Sensor	Ps
31	Water Strainer Additional Work	
31−1	Mesh	
31−2	Gasket	

No.	Description	Remarks
32	Expansion Valve	1st Cycle.
33	Expansion Valve	2nd Cycle.
34	Strainer	
35	Strainer	
36	Strainer	
37	Flare Nut	Liquid Connection.
38	Union	Liquid Connection.
39	Check Ja	R410A
40	Check Ja	R134a
41	Body	
42	Flare Nut	Gas Connection.
43	Union	Gas Connection.
44	Pressure Switch	
45	Gasket	For Pump connections.
46	Gasket	(4x) Hose connections, (1x) 3 Way Valve and (1x) Extra.
47	Gasket	For Expansion Vessel connection.
48	Pressure port Hose	Water.
49	Pressure port Hose	Water.
50	Heater Harness	
51	Heater Harness	
52	Heater Harness	
53	HRN DHWT Switch	Switch for emergency operation.
54	Thermistor Assy	THML (Liquid).
55	Thermistor Assy	THMG (Gas).
56	Thermistor Assy	THMWO (Water Out).
57	Thermistor Assy	THMWI (Water In).
58	Thermistor Assy	THMD (Compressor Discharge).
59	Thermistor Assy	THMEH (Evaporating Heating).
60	Thermistor Assy	THMEC (Evaporating Cooling).
61	Thermistor Assy	THMS (Compressor Suction).
62	P-Spring	
63	P-Spring	
64	P-Spring	
65	P-Spring	
66	EXPV COIL	
67	HOSE W OUT	
68	HOSE W IN	
69	Flow Switch	
70	Acoustical Cover 46	For Compressor.
71	V-P-Rubber 1	
72	V-P-Rubber 2	
73	Rubber Cap	
74	Coil 20	
75	Special Gasket	For 3 Way Valve reduction union.
76	Pressure Port Cap	Water.

Electrical parts

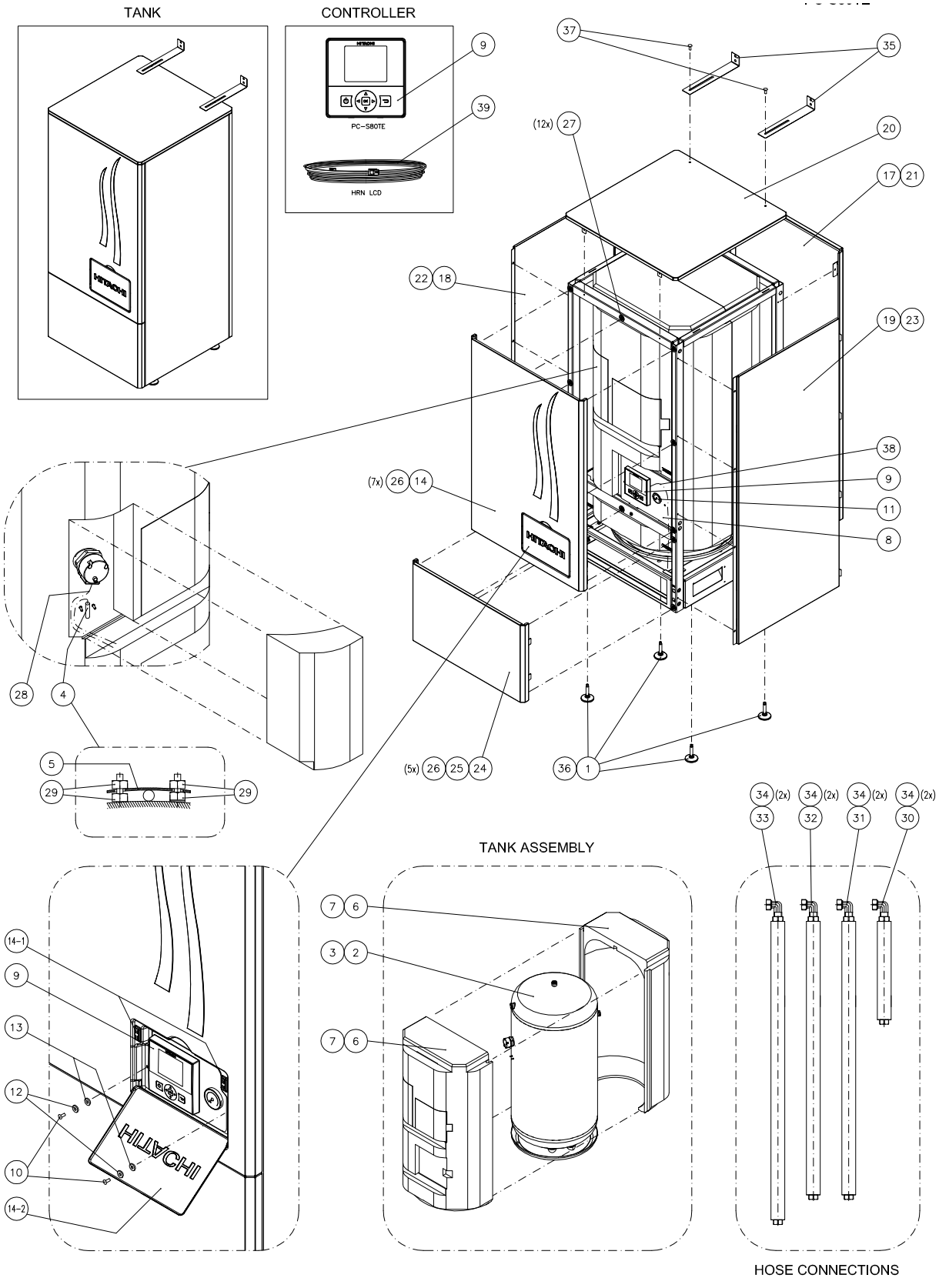
No.	Part Name	Remarks
1	PCB 1	
2	PCB 3	
3	PCB 2/4	
4	Spark Killer	
5	Transformer	
6	Transformer	
7	Relay	15 A
8	Terminal Board	
9	Terminal Board	
10	Magnetic Contactor	16 A
11	Fuse	3,15 A
12	Fuse	50 A
13	Fuse	20 A
14	Fuse Holder	
15	Fuse Holder	
16	Fuse Holder	
17	Rubber Bush	
18	Clamp	
19	Spacer	
20	Spacer	
21	Spacer	
22	Noise Filter	
23	Noise Filter	
24	MG SW	

No.	Part Name	Remarks
25	Reactor Unit	
26	Inv. Fin Assy	
27	DCL Reactor	
28	Capacitor	
29	Resistor	
30	Resistor	
31	RPP Relay	
32	Capacitor	
33	Fan	
34	Guard Grille	
35	Inv Module	
36	Harness CN26	Wire to wire cable
37	Harness CN27	Harness with sensors included
38	Harness CN24	Harness with valves included
39	Harness PS Sensor	Wire to wire cable
40	Harness PS Sensor	Wire to wire cable
41	Electrical Wiring Diagram	Assembly (Components + Harness)
42	Electrical Wiring Diagram	Assembly (Components + Harness)
43	E-Box Cover Assy	(Plate+Labels)
44	Inv E-Box Cover Assy	(Plate+Labels)
45	E-Box Subassy	Only plate (without components)
46	E-Box Subassy	Only plate (without components)

10.3 Domestic hot water tank

10.3.1 DHWS(195/260)S-2.0H1E

◆ Structural parts



Spare Part Document: EPN-201210A

Structural parts

No.	Part Name	Remarks
1	Foot	For floor standing Tank.
2	DHW TANK	
3	DHW TANK	
4	WATER TEMPERA-TURE SENSOR	
5	Attaching Plate	
6	Tank Insulation	
7	Tank Insulation	
8	Control Support	
9	LCD Control	
10	Screw	
11	Manometer	
12	Washer	
13	Nylon Washer	
14	Front Cover Up Assy	
14-1	Magnet	
14-2	LCD Cover	
17	Rear Cover Up S	
18	Side Cover L-S	
19	Side Cover R-S	
20	Upper Cover L	
21	Rear Cover Up L	
22	Side Cover L-L	
23	Side Cover R-L	
24	Front Cover Down S	
25	Front Cover Down L	
26	PIN	
27	COUPLING	
28	HRN DHWT Heater	
29	Nut	
30	HOSE COIL IN	
31	HOSE COIL OUT	
32	HOSE TANK	
33	HOSE TANK	
34	Gasket	(8x) Hose connections, (1x) Extra.
35	Wall Support	
36	Bolt	To fix with indoor unit.
37	M5SUS Screw	To fix wall support.
38	HRN LCD	(1600mm)
39	HRN LCD	(4000mm)

11. Servicing

Índice

11.1 Outdoor unit

11.1.1 Removing covers

11.1.1.1 Removing service cover

Remove the main parts according to the following procedures.

NOTE

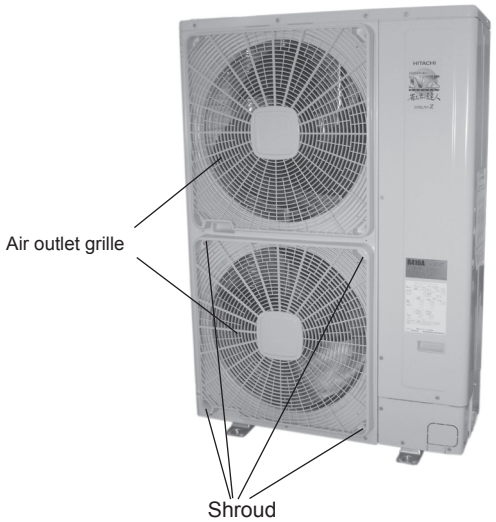
- ***To reassemble perform the procedures in reverse.***
- ***To prevent contamination of the refrigerant with water or foreign particles, do not expose open to atmosphere for long periods.***
- ***If necessary, seal pipe ends using caps or tape.***

1 Remove the four (4) fixing screws.
2 Slide the service cover downward and remove it.

Pay attention of not falling off the service cover.

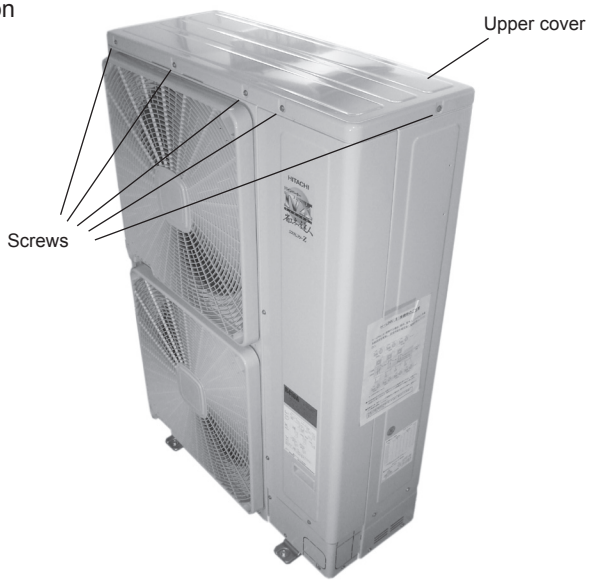
11.1.1.2 Removing air outlet grille

1 Remove the eight (8) fixing screws.
2 Lift the air outlet grille holding the lower parts.
3 Release the extruded hook of the air outlet grille from the shroud.



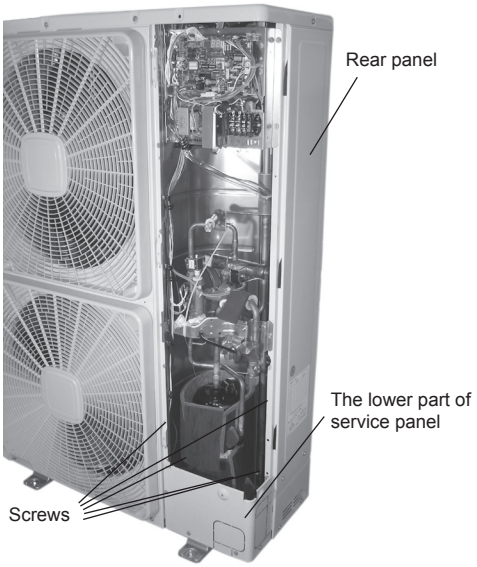
11.1.1.3 Removing upper cover

1 Remove all the screws fixing the upper cover, both on the front and back of the machine.
2 Lift the upper cover upwards.



11.1.1.4 Removing the lower part of service panel and rear panel

1 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.



2 Remove the upper cover according to section *Removing upper cover* in this chapter.

NOTE

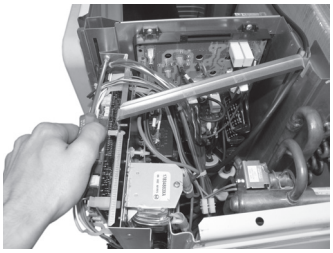
The length of fixing scews for the outdoor temperature thermistor is different than all other screws in the machine, as an assembly poka-yoke.

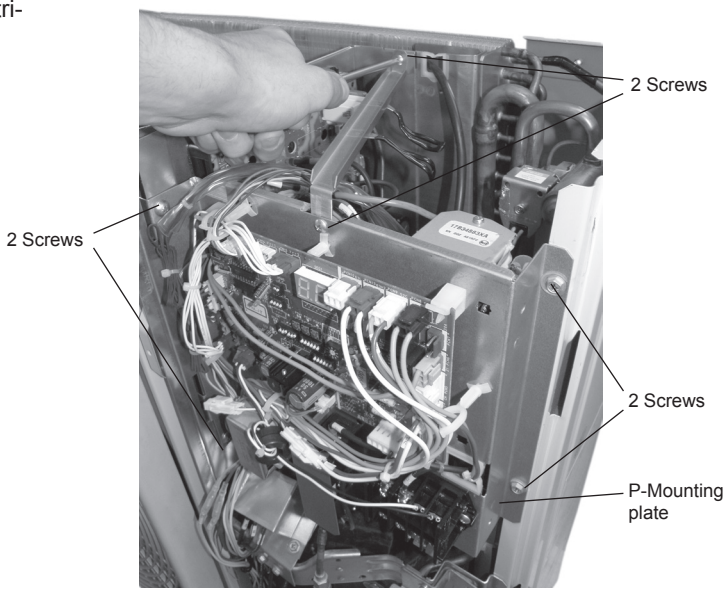
11.1.2 Removing electrical components

11.1.2.1 Opening electrical box (P-mounting plate)

1 Remove the service cover according to the section *Removing the service cover* in this chapter.

2 Remove the six (6) screws fixing the electrical box.

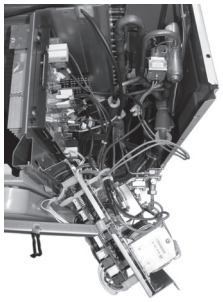




DANGER

- ***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.***

3 Open the P-mounting plate by rotating it 90 degrees to the left.



11.1.2.2 Removing electrical box components

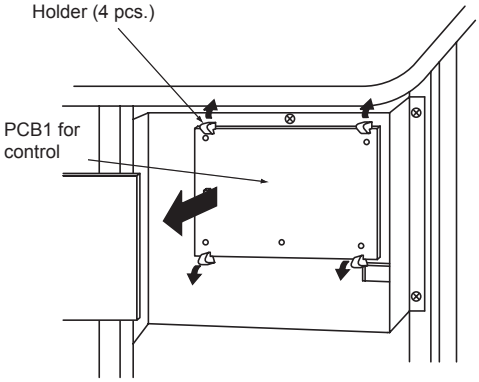
DANGER

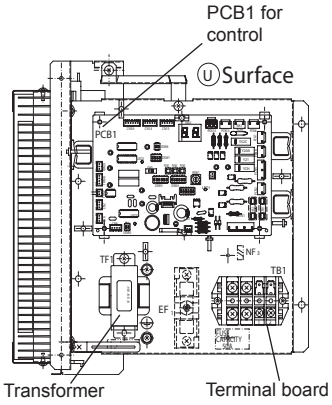
- ***Do not touch the electrical components of the PCB directly.***
- ***When handling the PCB, take care of components. Do not apply excesive force to them, in order to avoid damaging the motherboard and failures***

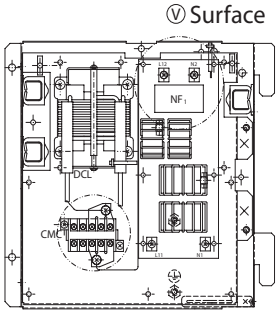
1 Remove the service cover according to section *Removing service cover* in this chapter.
2 Disconnect all the connectors in the PCB.

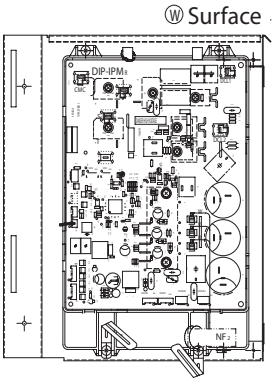
3 Remove the PCB by sliding four (4) holders in the arrow direction.

4 Remove the PCB for power distribution of the compressor and the motor.



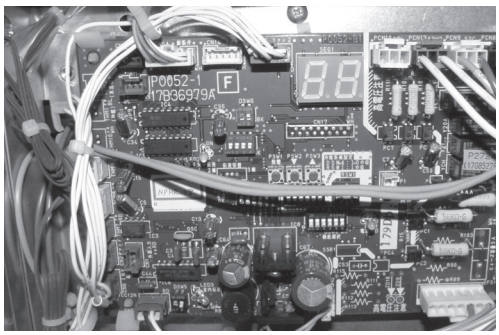


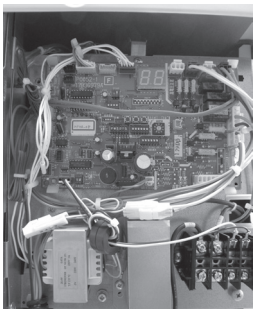




5 Removing the relay PCB

- Remove the service cover according to the section *Removing Service Cover* in this chapter.
- Disconnect all the wires connected to the relay PCB.





11.1.2.3 Removing “W” electrical components surface

1 Remove the service cover according to the section *Removing service cover* in this chapter.
2 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.

DANGER

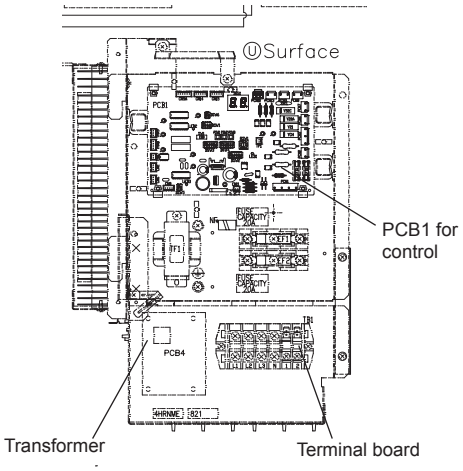
- ***Check that the LED201 (red) located on the “W” surface PCB is OFF when opening the P-mounting plate.***
- ***Do not touch the electrical components when LED201 (Red) located on the “W” surface PCB is ON in order to avoid an electrical shock.***
- ***Identify the terminal numbers with mark band. 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.***

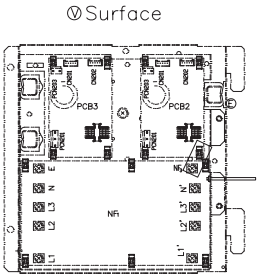
3 Use a screw driver to push and release the plastic holders retaining the “W” electrical components surface.

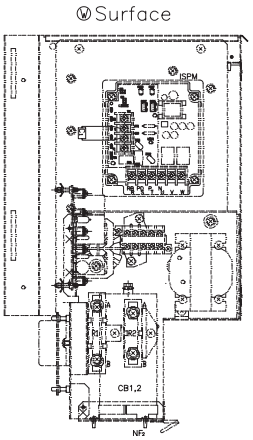
NOTE

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.

RAS-(4-6)HRNME-AF







11

11.1.2.4 Removing other electrical components

1 Remove the service cover according to the section *Removing service cover* in this chapter.
2 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.
3 Check to ensure the LED201 (Red) of the inverter PCB is OFF when opening P-mounting plate.
4 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.***

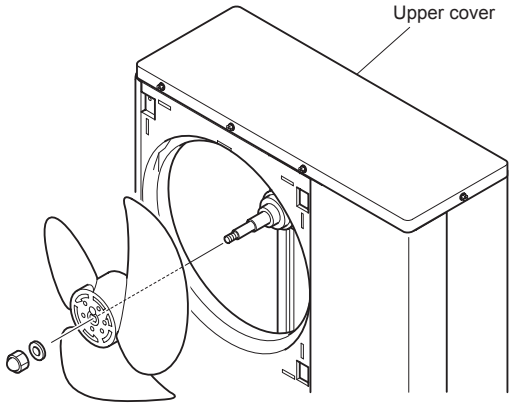
5 Disconnect all the wires connected with the smoothing capacitor (CB, CB1, CB2, CA).
6 The wire has polar characters. Identify the wire mark band and the indication on the smoothing capacitor when wire connecting.
7 Remove the two (2) screws fixing the smoothing capacitor and remove the smoothing capacitor.
8 Disconnect all the wires connecting with the magnetic contactor (CMC1).
9 Remove the two (2) screws fixing the magnetic contactor and remove the magnetic contactor.
10 Remove the four (4) screws fixing the reactor and remove the reactor (DCL).
11 Disconnect all the wires connected with the noise filter (NF1).
12 Remove the noise filter by clamping the top of the holder (6 portions) with a pincher.

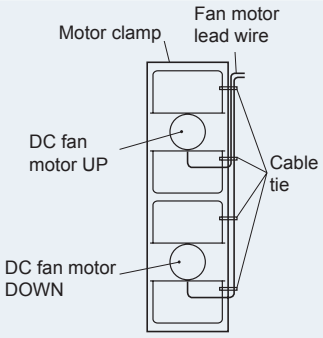
11.1.2.5 Removing outdoor fan motor

1 Remove the service cover according to the section *Removing service cover* in this chapter.
2 Remove the air outlet grille according to the section *Removing air outlet grille* in this chapter.
3 Remove the upper cover according to the section *Removing upper cover* in this chapter.

4 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.

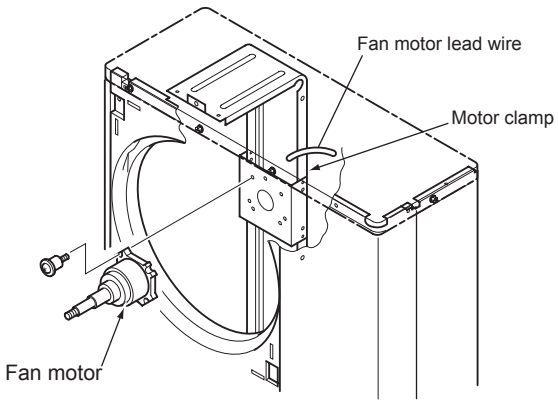


Fan components and technical features		
Power supply		1~ 230V 50Hz 3N~ 400V 50Hz
Fan motor	DC fan motor UP	DIP IPM PCN202 CN202
	DC fan motor DOWN	DIP IPM PCN201 CN201
Screw for motor fixing	DC Fan Motor UP	M4 Screw with spacer x 4
	DC Fan Motor DOWN	M4 Screw with spacer x 4
Motor clamp and wiring fixing position		

5 Remove the fan motor connector from the PCN202 and PCN203 at the electrical box.

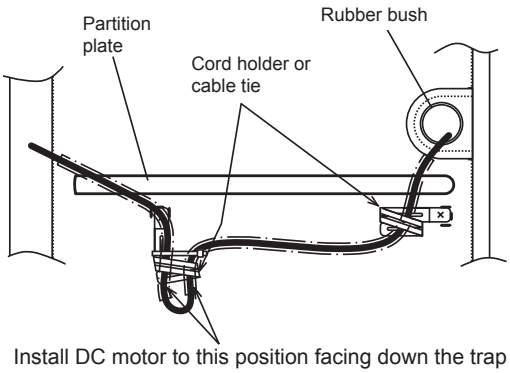
a. Cut off the cable tie that fixes the lead wire of the fan motor.

b. Remove the four (4) screws that fix the motor to the motor clamp.



6 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.



Install DC motor to this position facing down the trap

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.***

11.1.2.6 Removing expansion valve coil

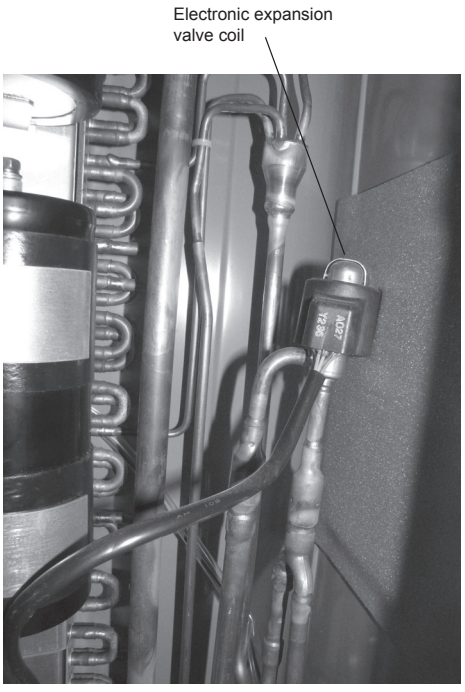
1 Remove the service cover according to the section *Removing service cover*.
2 Open the P-mounting plate according to the section *Opening electrical box (P-Mounting Plate)* in this chapter.

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.***

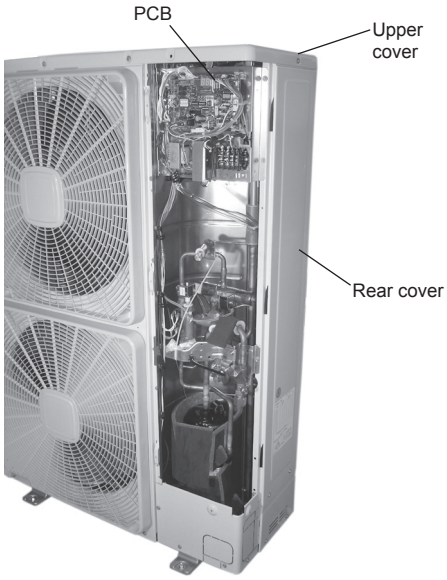
3 Remove the CN5A connector on the control PCB of the electrical box.

4 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.

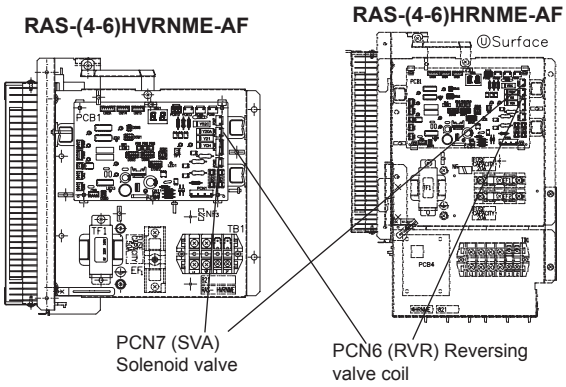


11.1.2.7 Removing the coils for the reversing and solenoid valves (SVA1, SVA2 and SVF)

1 Remove the service cover according to the section *Removing service cover* in this chapter.
2 Open the P-mounting plate according to the section *Opening electrical box (P-Mounting Plate)* in this chapter.



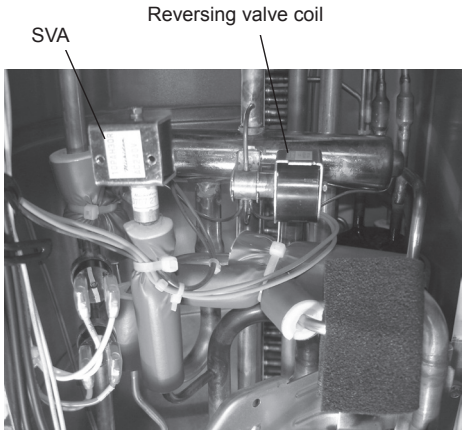
3 Remove the connectors on the control PCB of the electrical box.



NOTE

Do not touch the electrical components when the LED201 (Red), located on surface "W" PCB is ON in order to avoid electrical shock.

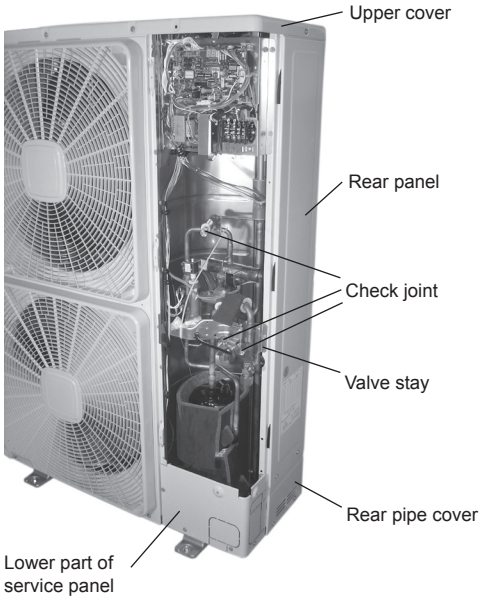
4 Remove the reversing valve coil by removing the screw fixing the coil.



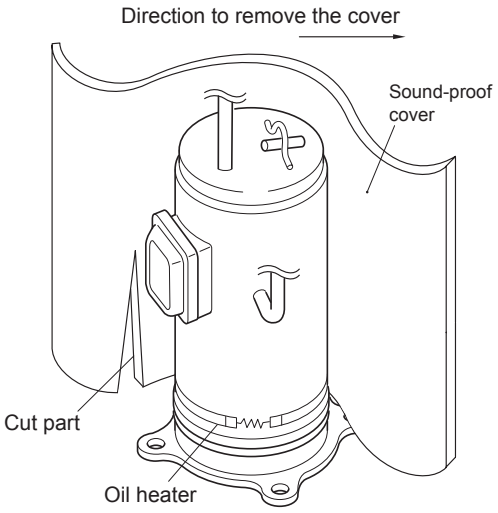
11.1.3 Removing refrigerant parts

11.1.3.1 Removing the compressor

1 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.
2 Collect the refrigerant from the liquid stop valve, the gas stop valve and the check joint at the piping.



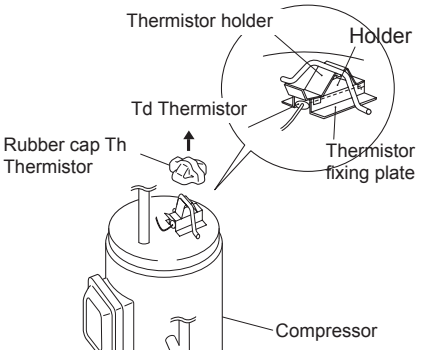
3 Open the sound insulation cover wrapped around the compressor and remove the terminal box cover at the compressor fixed by one (1) screw. Disconnect the compressor wires in the terminal box and remove the sound insulation cover.

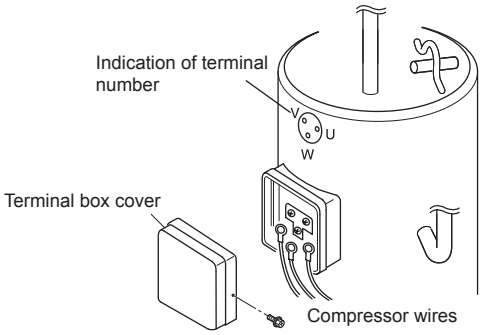


NOTE

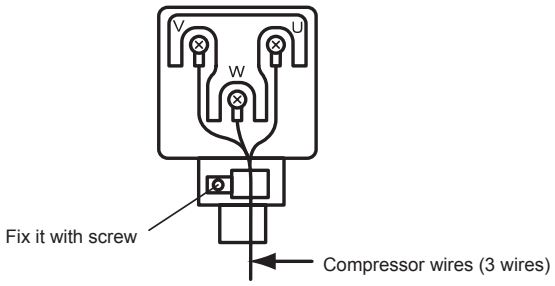
Check and take note of each terminal number and indications for its correct connection at the reasembling process. If wires are connected in incorrect order, it will lead to a compressor failure.

4 Remove the rubber cap and the thermistor on the top of the compressor.
5 Remove the crankcase heater.(Oil heater on the lower case).





Details for compressor terminals



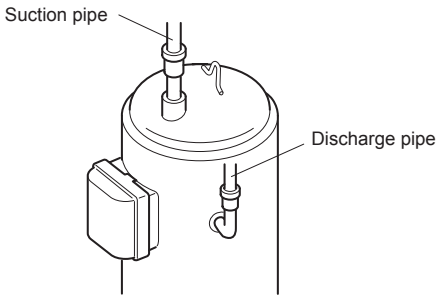
NOTE

- ***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

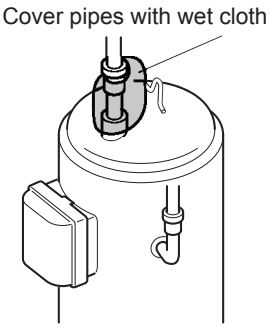
All compressor pipes must be brazed to be connected to the refrigerant circuit. Ensure that all the sourrounding is free of flammable objects and liquids when performing piping brazing work.

6 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.



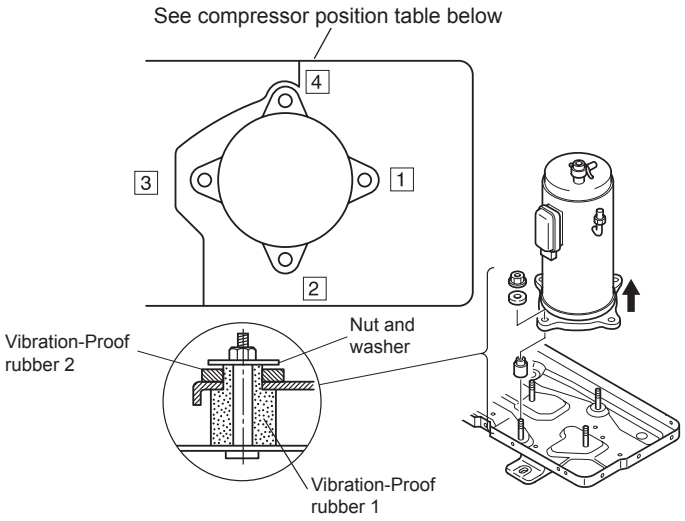
For brazing the compressor connection pipes:

- First cool down the compresor piping side covering it with wet cloth.
- 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	○	○	–	–

7 Remove the two (2) nuts fixing the compressor and remove the compressor from the unit by lifting it. Slightly incline it forward and lift.



8 Reassemble the parts in the reverse order of the indicated removing procedures.

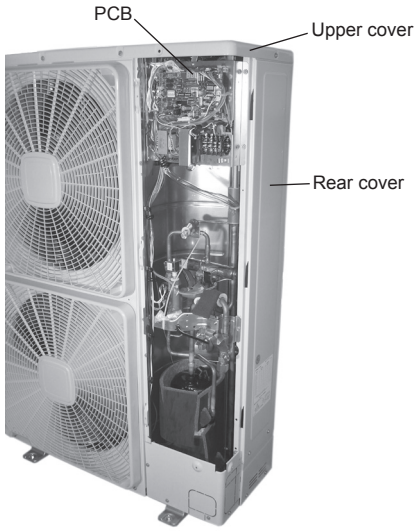
- Tighten the screws (U, V and W) for compressor wires with 2.5 N.m.
- Fix the lead wire firmly.
- Attach the oil heater firmly to the compressor and fix it with the spring.

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.

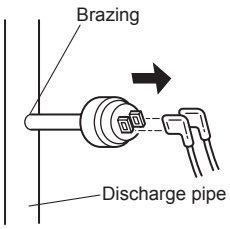
11.1.3.2 Removing high pressure switch and control pressure switch

1 Remove the service cover according to the section *Removing service cover* in this chapter.
2 Collect the refrigerant from the check joint according to the section *Removing the compressor* in this chapter.



3 Disconnect the fasten terminals from the pressure switches.

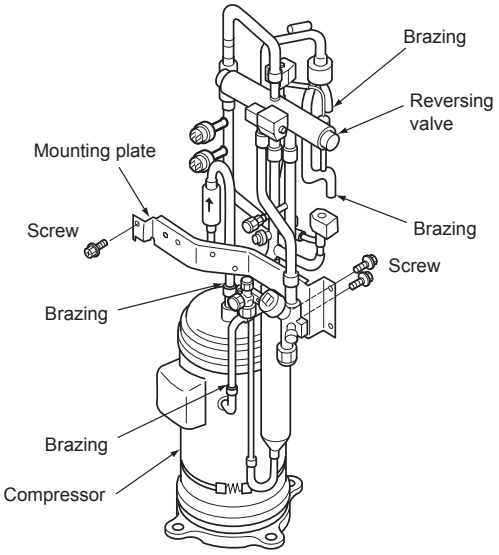
- Cut the high pressure switch and control pressure switch from the brazing neck using a burner.

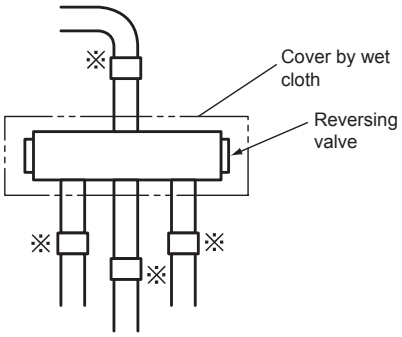


11.1.3.3 Removing reversing valve

1 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.
2 Collect the refrigerant from the check joint according to the section *Removing compressor*.
3 Remove the reversing valve coil according to the section *Removing reversing valve coil*.

4 Remove one (1) fixing screw for the valve-mounting plate.
5 Remove the stop valve at the gas side from the valve-mounting plate by removing the two (2) screws.
6 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.
7 Remove the reversing valves from its assemblies 4 brazed parts.
8 Perform the brazing with a blowtorch to remove and reassemble the reversing valve by cooling the pipes first with wet cloth in order to avoid brazing material entering the reversing valve.





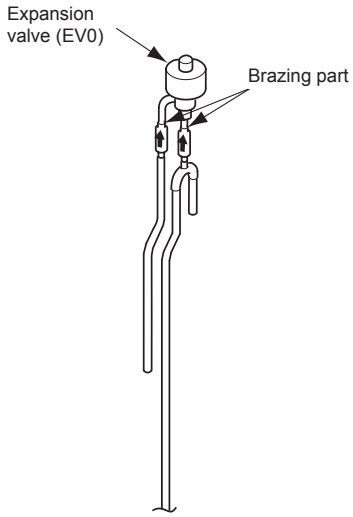
9 Reassemble the parts in the reverse order of removing procedures contained in this chapter. When SFV is removed, fix it according to the section *Removing the Reversing Valve and the Solenoid Valve* contained in this chapter.

11.1.3.4 Removing expansion valve

1 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*.
2 Collect the refrigerant from the check joint according to the section *Removing Compressor*.
3 Remove the coils according to the section *Removing Electronic Expansion Valve Coil*.

4 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.



5 Reassemble the parts in the reverse order of removing procedures.

11.1.3.5 Removing solenoid valve

1 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.
2 Collect the refrigerant from the check joint according to the section *Removing compressor* in this chapter.
3 Remove the solenoid valve coil according to the section *Removing coils for reversing valve and solenoid valve* in this chapter.
4 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.
5 Perform the brazing to remove and reassemble the solenoid valve.
6 Protect the connecting wires and pipe insulation from the brazing flame.
7 Remove the flare nuts with two spanners to avoid twisting.
8 Reassemble the parts in the reverse order of removing procedures.

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.***

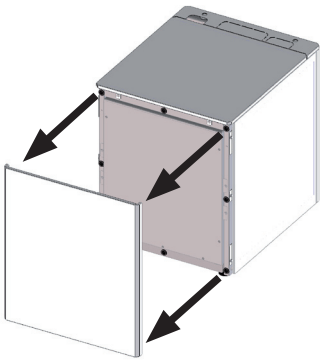
11.2.1 Removing service covers

NOTE

- ***Front cover needs to be removed for any task inside the indoor unit.***
- ***Back cover no needs to be removed.***

11.2.1.1 Removing the indoor unit front cover

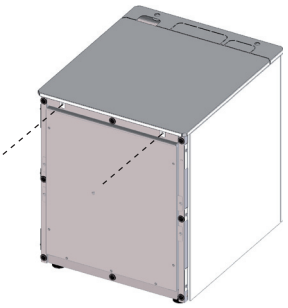
1 Remove the indoor unit front cover by pulling it, preferably by lower part of the front cover.



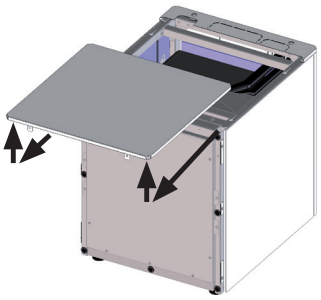
11.2.1.2 Removing the indoor unit upper cover

1 Remove the indoor unit front cover

2 Unscrew the 2 front fixing screws.

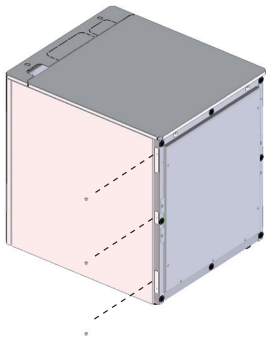


3 Pull the indoor unit upper cover forward and then remove it.

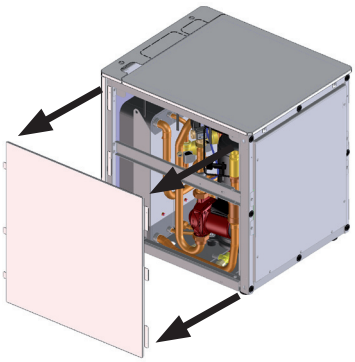


11.2.1.3 Removing the indoor unit left cover

1 Remove the indoor unit front cover.
2 Unscrew the 3 screws.

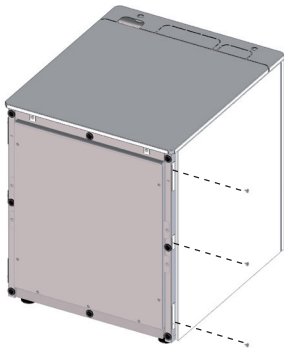


3 Remove the indoor unit left cover.

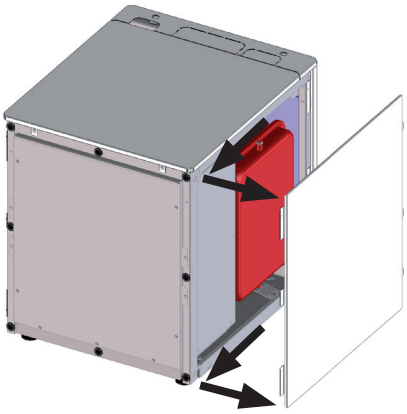


11.2.1.4 Removing the indoor unit right cover

1 Remove the indoor unit front cover.
2 Unscrew the 3 screws.



3 Remove the indoor unit right cover.



NOTE

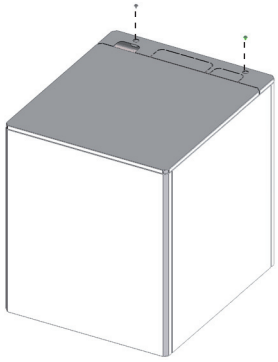
When reassembling, take into account that right and left covers are not symmetric. Upper and lower hooks are not at the same distance from the central hook.

11.2.1.5 Removing the auxiliary indoor unit covers

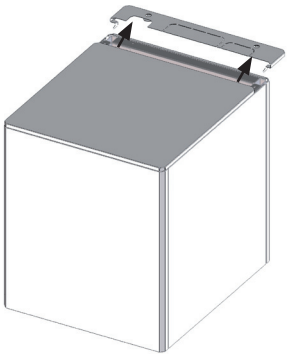
There are other indoor unit covers which its removing can ease the service work.

◆ Removing the indoor unit cover for upper piping outlet

1 Unscrew the 2 upper side fixing screws.

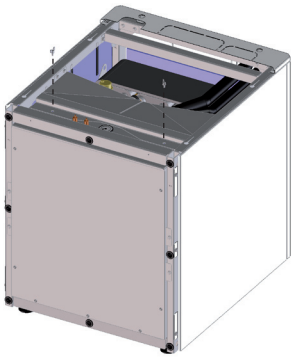


2 Pull the indoor unit cover for upper piping outlet backward and remove it.

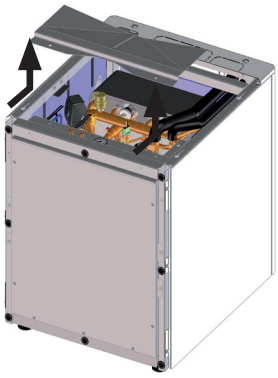


◆ Removing the indoor unit cover's protection for the draining of the tank

1 Remove the indoor unit front cover.
2 Remove the indoor unit upper cover.
3 Unscrew the 2 wing screws.



4 Remove the indoor unit cover's protection.



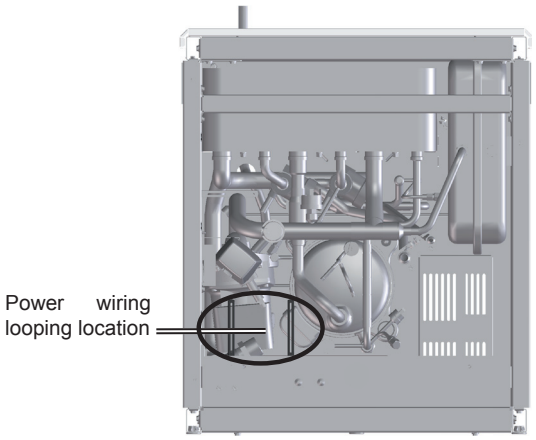
11.2.2 Removing indoor unit electrical box

DANGER

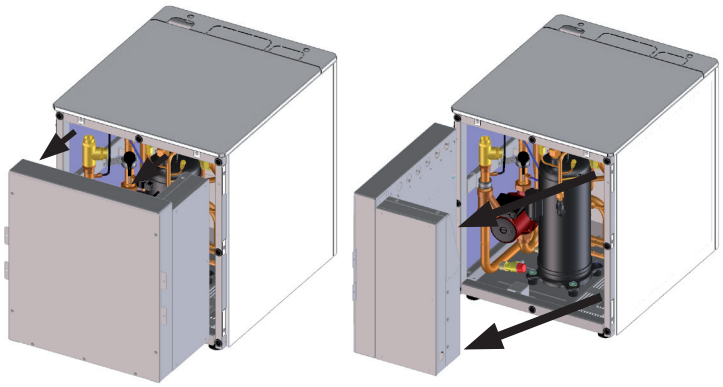
Disconnect the unit from the power supply before touching any of the parts in order to avoid an electrical shock.

11.2.2.1 Remove the electrical box

1 Remove the indoor unit front cover.
2 Unscrew the 4 front screws of the electrical box.
3 Undo the power wiring looping that must be done in the installation procedure before rotating/removing the electrical box.



4 Take out the electrical box from the indoor unit until it has passed the edge. Choose one of the following steps:
   a. Electrical box can be rotated 90º approximately, making easy the indoor unit component's accessibility, without the necessity to remove all the electrical box.
   b. If it is needed, the electrical box can be completely extracted by only disconnecting the wire-to-wire connections.



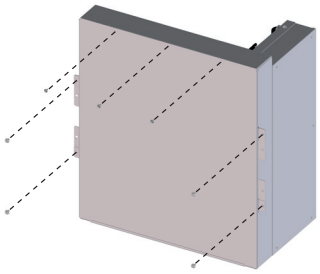
11.2.2.2 Remove the internal electrical box covers

CAUTION

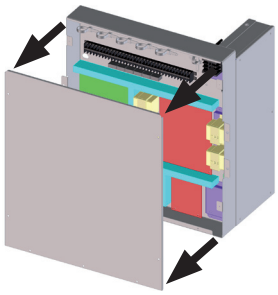
When handling the internal electrical or inverter box, take care of components in order to avoid damaging it.

◆ Internal electrical box cover (Front cover)

1 Unscrew the 7 screws of the internal electrical box cover.

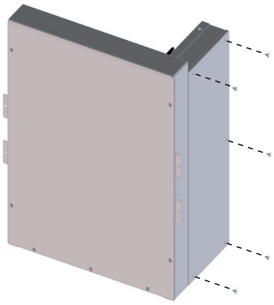


2 Remove the internal electrical box cover.

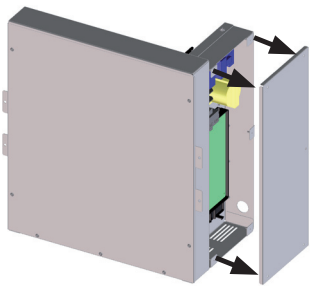


◆ Internal inverter box cover (Right cover)

1 Unscrew the 5 screws of the internal inverter box cover.



2 Remove the internal inverter box cover.



11.2.3 Replacing electrical components

DANGER

- ***Disconnect the YUTAKI S80 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.***
- ***Electrical hazard. Risk of electrical shock. Do not touch the electrical components when the LED201 (Red) located on the inverter module is ON in order to avoid electrical shock.***

NOTE

To properly disconnect components from the Electrical box, see the Electrical wiring diagram chapter of this manual.

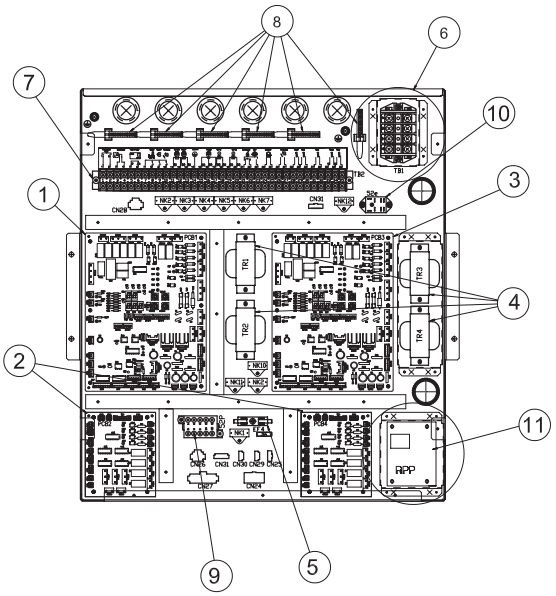
11.2.3.1 Removing electrical box components

1 Remove the indoor unit front cover and remove the electrical box cover for accessing to the electrical components following the removing procedure explained in *Removing service covers* and *Removing indoor unit electrical box* section:

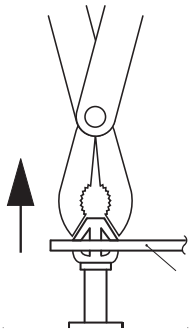
- Internal electrical box cover: (x7 screws).
- Internal inverter box cover: (x5 screws).

◆ **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/PCB4)	Secondary printed circuit board for additional control signals.
3	Printed Circuit Board (PCB3)	Main printed circuit board for control of the 2nd cycle.
4	Transformers (TR1/TR2/ TR3/TR4)	Current transformer.
5	Fuse	Fuses for electrical heater protection.
6	Terminal Board (TB1)	Terminal board for power supply.
7	Terminal Board (TB2)	Terminal board for indoor/outdoor communication and Intelligent room thermostat and accessory devices..
8	Clamp	For wire tightening
9	Relay power	Power relay
10	Relay	Domestic hot water tank relay
11	Reverse Phase Protection Relay	Only for 3-phases machine



◆ **Extraction of the fixing holders**



11.2.3.2 Replace electrical box

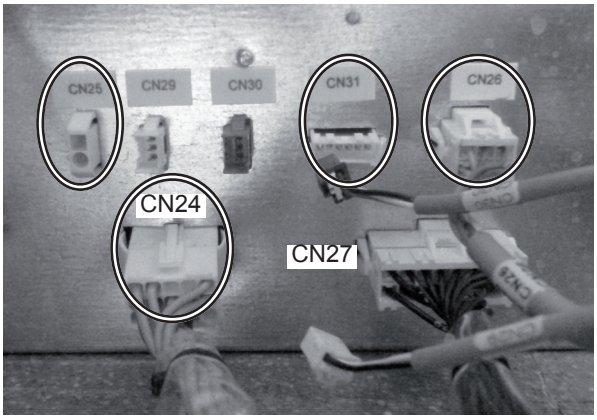
1 Remove the indoor unit front cover, remove the electrical box for accessing to its rear connectors and remove its covers for accessing to the electrical components following the removing procedure explained in *Removing service covers* and *Removing indoor unit electrical box* section:

- Internal electrical box cover: (x7 screws).
- Internal inverter box cover: (x5 screws).

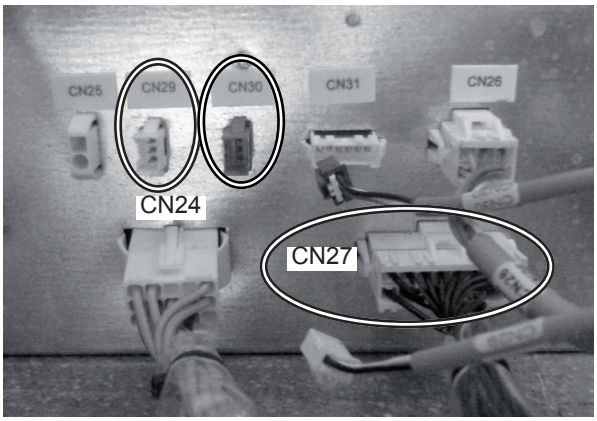
2 Removing Electrical box:

- Step 1: Disconnect all power supply from Terminal Board 1.
- Step 2: Disconnect all external devices from Terminal Board 2.
- Step 3: Disconnect all internal unit devices by the rear electrical box connectors:
  - Step 3a (Indoor unit devices)
    - Water flow switch wire (CN25)
    - Water pressure switch, water pump, solenoid valves and oil heater wire (CN24)
    - Expansion valve R410A wire (CN26)

      Expansion valve R134a wire (CN31)



  - Step 3b (Indoor unit sensors)
    - Water inlet sensor (THM_{WI}) (CN27)
    - Water outlet sensor (THM_{WO})(CN27)
    - Refrigerant liquid sensor (THM_{L})(CN27)
    - Refrigerant gas sensor (THM_{G})(CN27)
    - R134a suction sensor (THM_{S}) (CN27)
    - Evaporation heating sensor (THM_{EH})(CN27)
    - Evaporation cooling sensor (THM_{EC})(CN27)
    - R134a discharge sensor (THM_{D})(CN27)
    - R134a high pressure sensor (PSH) (CN30)
    - R134a low pressure sensor (PSL)(CN29)

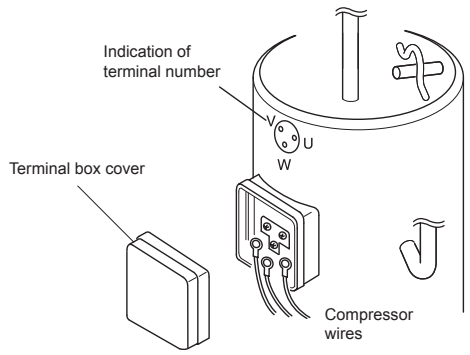


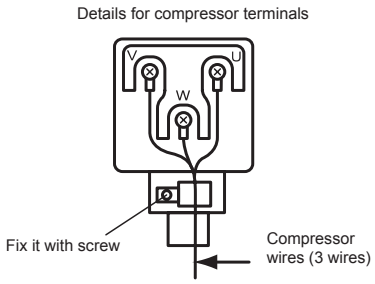
  - Step 3c (Switch 1 and LCD Controller)
    - Switch for DHWT heater manual operation wire (CN32)
    - LCD Controller wire (CN28) (*)

NOTE

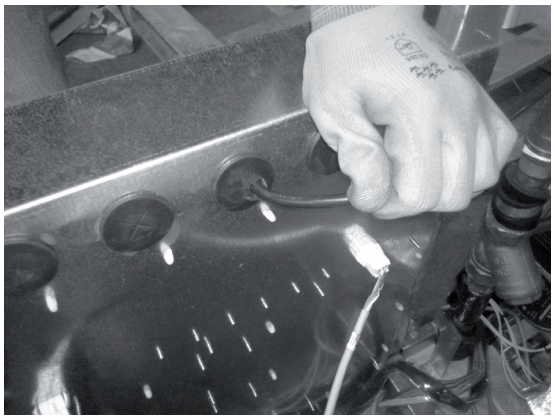
(*): Check Replace LCD controller instruction.

- Step 4: Disconnect the inverter wires of the terminals +, -, U, V, W placed in compressor:





- Step 5: After disconnecting all internal devices from the electrical box, remove electrical box as shown:
  - Step 5a (Remove wires)
    - Remove all cables from the packing glands from the electrical box rear side.



  - Step 5b (Handle)
    - After disconnecting the electrical wires, handle with care the electrical box to avoid damaging other components because of its shape and weight.

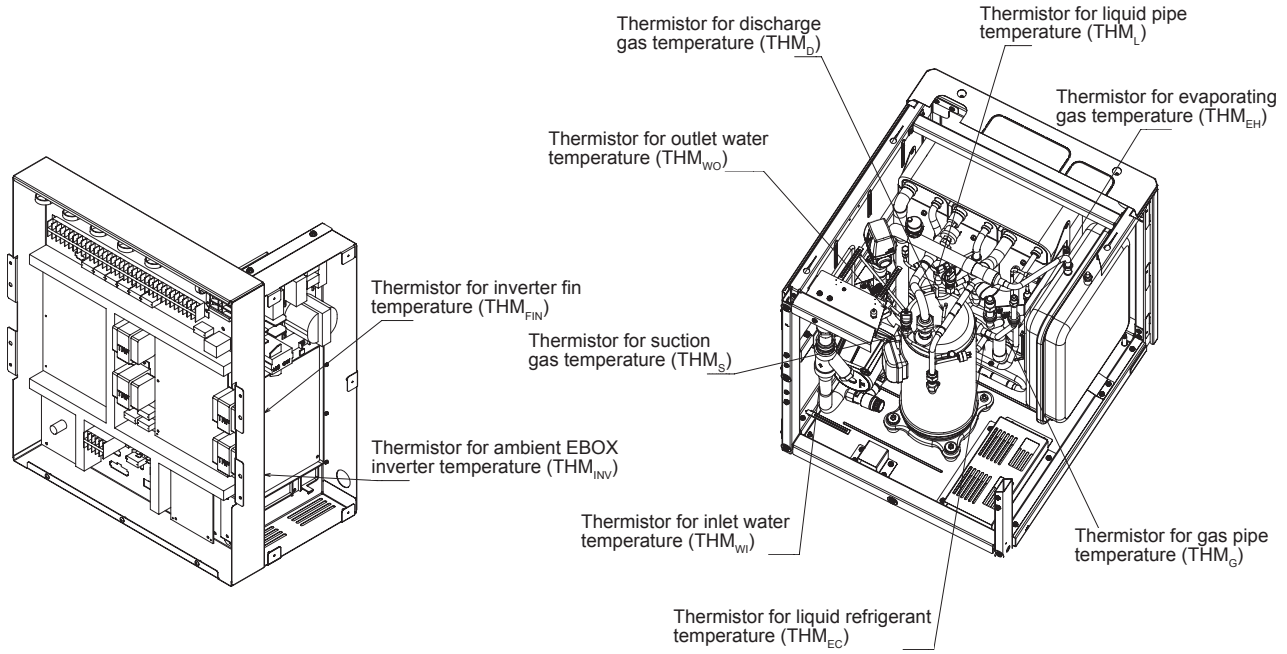
3 Assembly the new electrical box by performing the procedure above in reverse way.

11.2.3.3 Replacing thermistors

DANGER

- ***Disconnect the YUTAKI S80 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.***
- ***Electrical hazard. Risk of electrical shock. Do not touch the electrical components when the LED201 (Red) located on the inverter module is ON in order to avoid electrical shock.***
- ***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 covers.
2 Remove the electrical box cover.



3 Disconnect these components properly from the corresponding connector of PCB1, 2 or 4:

Item	Connection	PCB1
THM$_{SWP}$	TB2	CN3
THM$_{AMB2}$	TB2	CN4

Item	Connection	PCB2
THM$_{WO}$	CN27	CN13
THM$_{WI}$	CN27	CN9
THM$_L$	CN27	CN11
THM$_G$	CN27	CN12
THM$_{DHW}$	TB2	CN10
THM$_{WO2}$	TB2	CN16
THM$_{WO3}$	TB2	CN14

Item	Connection	PCB4
THM$_S$	CN27	CN11
THM$_{EH}$	CN27	CN12
THM$_{EC}$	CN27	CN14
THM$_D$	CN27	CN15
THM$_{INV}$	TB2	CN10

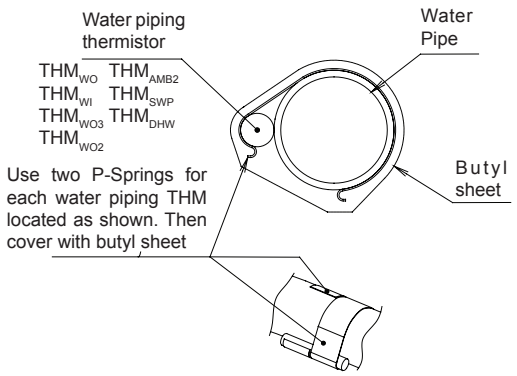
4 Remove the wire sensor from the rear side and the Terminal Board 2 of the electrical box.
5 Remove the pipe insulation of thermistor.
6 Remove special clamp that is attached with copper pipe and sensor.

CAUTION

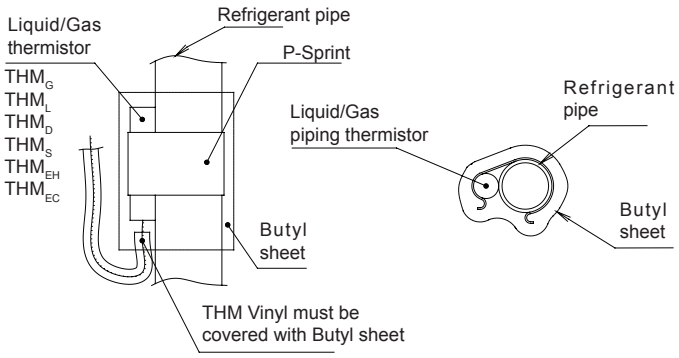
In case of P-Spring deforming, it needs to be replaced.

7 Install new thermistor using P-Spring and Butyl Sheet as shown in the following drawing:

Replacing water thermistor



Replacing refrigerant thermistor



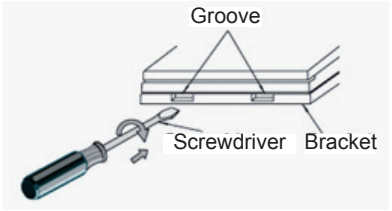
8 Install thermistor wire by perform the process in reverse.

11.2.3.4 Replacing LCD controller

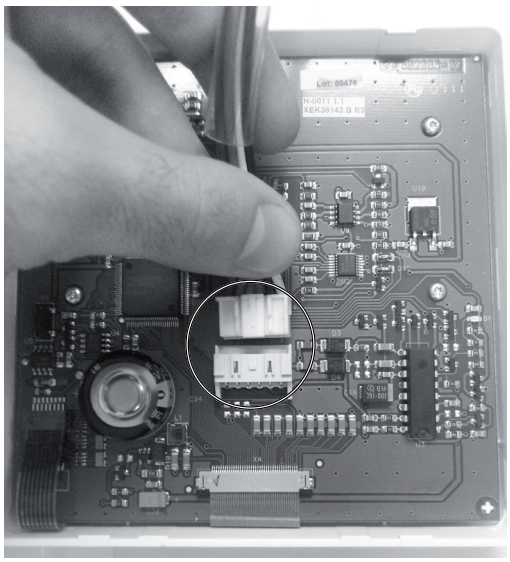
CAUTION

- ***Pay attention to do not touch the micro and other components on LCD controller PCB. (This is malfunction protection by static electricity).***
- ***Pay attention to 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 LCD's connector CN1



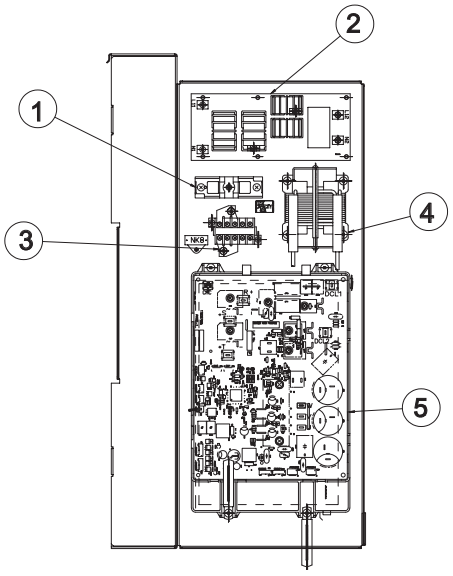
3 Replace LCD controller by a new one.

11.2.3.5 Replacing the DIP-IPM (Inverter module - 1~ 230V 50Hz)

DANGER

- ***Disconnect the YUTAKI S80 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.***
- ***Electrical hazard. Risk of electrical shock. Do not touch the electrical components when the LED201 (Red) located on the inverter module is ON in order to avoid electrical shock.***

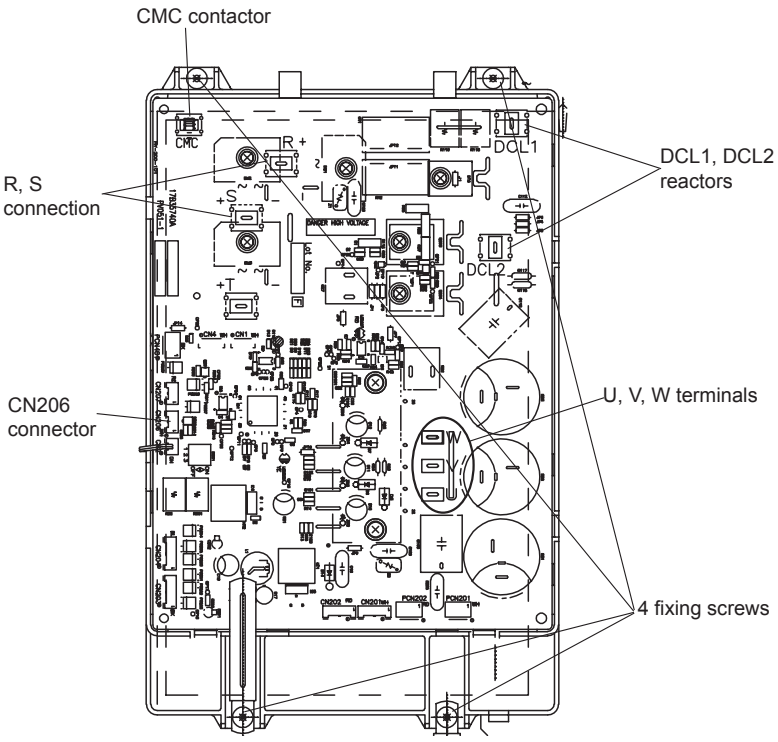
1 Remove indoor unit front cover.
2 Remove the electrical box.
3 Remove the inverter electrical box cover (x5 screws).



Item	Part name
1	Fuse
2	Noise filter
3	Magnetic switch
4	Reactor unit
5	Inverter fin assy

4 Disconnect all the wirings connected to the module:
- Disconnect the wirinigs of the terminals +, -, U, V, W
- Disconnect the wirinigs of connector CN206
- Disconnect the wirinigs of the terminals +, -, R, S
- Disconnect the wirinigs of reactor DCL1 and DCL2
- Disconnect the wirinigs of connector CMC

5 Remove the four fixing screws on the DIP-IPM.

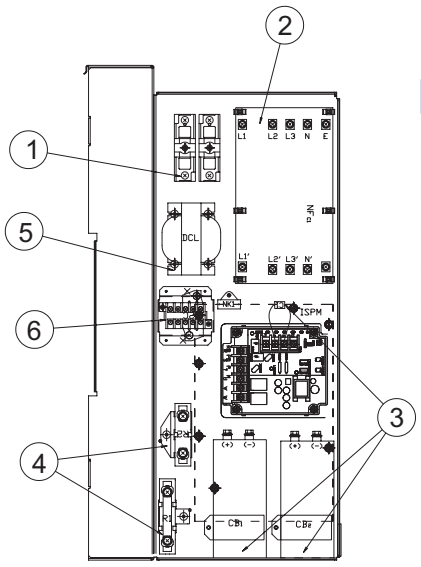


11.2.3.6 Replacing the ISPM (Inverter module - 3N~ 400V 50Hz)

DANGER

- ***Disconnect the YUTAKI S80 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.***
- ***Electrical hazard. Risk of electrical shock. Do not touch the electrical components when the LED201 (Red) located on the inverter module is ON in order to avoid electrical shock.***

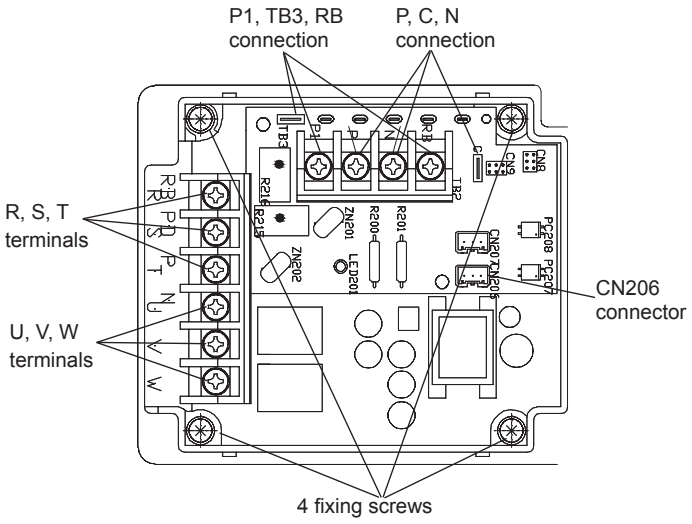
1 Remove indoor unit front cover.
2 Remove the electrical box.
3 Remove the inverter electrical box cover (x5 screws).



Item	Part name
1	Fuse
2	Noise filter
3	Capacitor
4	Resistor
5	Magnetic switch
6	Reactor unit

4 Disconnect all the wirings connected to the module:
- Disconnect the wirinigs of the terminals +, -, U, V, W
- Disconnect the wirinigs of connector CN206
- Disconnect the wirinigs of the terminals +, -, R, S, T
- Disconnect the wirinigs of P1, TB3, RB
- Disconnect the wirinigs of P, C ,N

5 Remove the four fixing screws on the DIP-IPM.

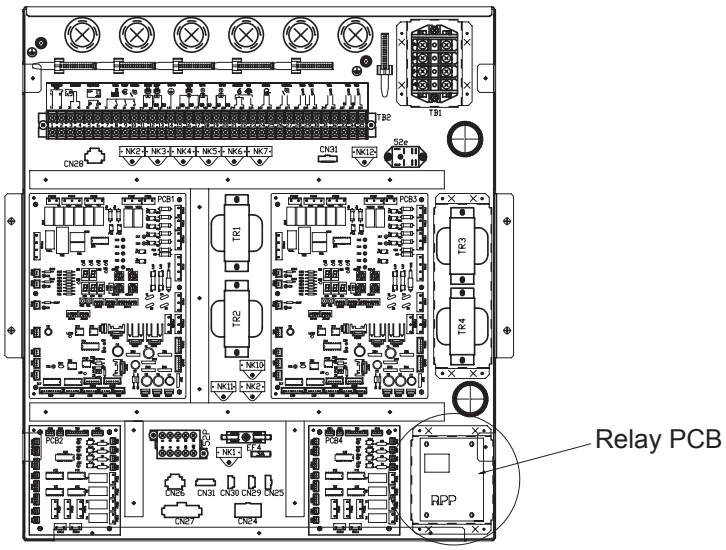


11.2.3.7 Replacing the Relay PCB (only for 3N~ 400V 50Hz)

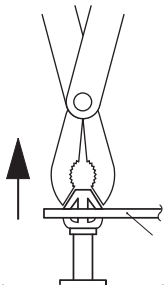
DANGER

- ***Disconnect the YUTAKI S80 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.***
- ***Electrical hazard. Risk of electrical shock. Do not touch the electrical components when the LED201 (Red) located on the inverter module is ON in order to avoid electrical shock.***

1 Remove indoor unit front cover.
2 Remove the electrical box.
3 Remove the internal electrical box cover: (x7 screws).



4 Remove holders from the Relay PCB. When reassembling the components, pass those holders again through the holes of the inverter module.



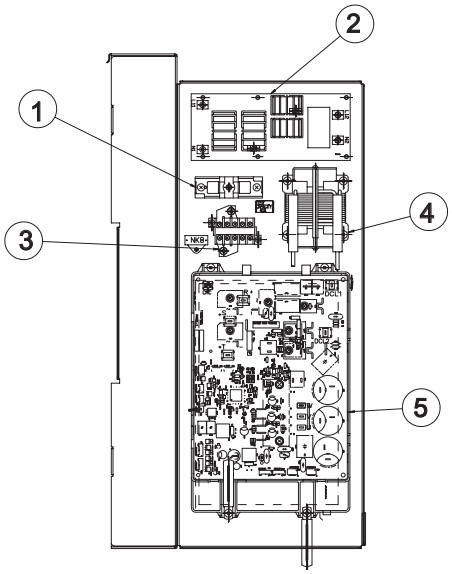
Extraction of the holders

11.2.3.8 Replacing the noise filter (Inverter module - 1~ 230V 50Hz)

DANGER

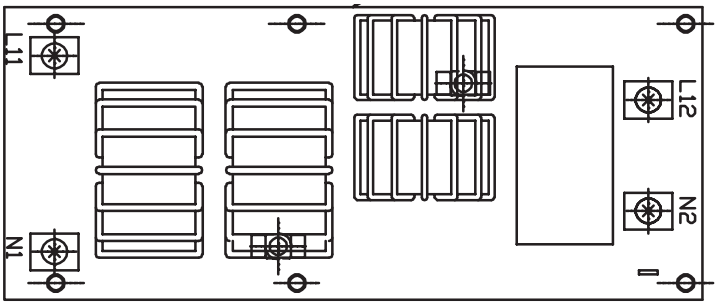
- ***Disconnect the YUTAKI S80 from the power supply before touching any of the parts. Do not touch the electrical box before disconnecting it in order to avoid an electrical shock.***
- ***When handling the electrical box, take care of components. Do not apply excessive force to them, in order to avoid damaging the electrical components and failures.***
- ***Electrical hazard. Risk of electrical shock. Do not touch the electrical components when the LED201 (Red) located on the inverter module is ON in order to avoid electrical shock.***

1 Remove indoor unit front cover.
2 Remove the electrical box.
3 Remove the inverter electrical box cover (x5 screws).



Item	Part name
1	Fuse
2	Noise filter
3	Magnetic switch
4	Reactor unit
5	Inverter fin assy

4 Disconnect all the wirings (9) connected to the electrical noise filter:
5 Remove the six holders from the inverter module. When reassembling the components, pass those holders again through the holes of the inverter module.

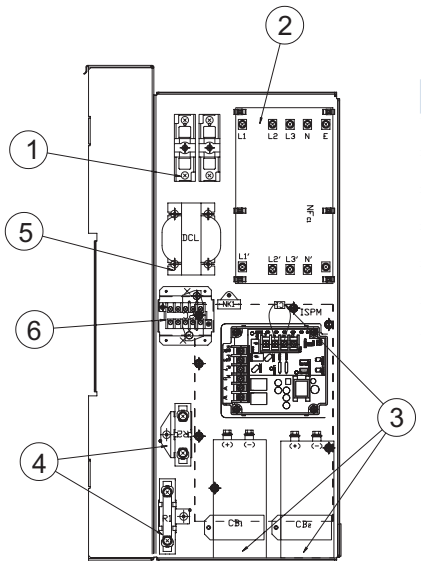


11.2.3.9 Replacing the noise filter (Inverter module - 3N~ 400V 50Hz)

DANGER

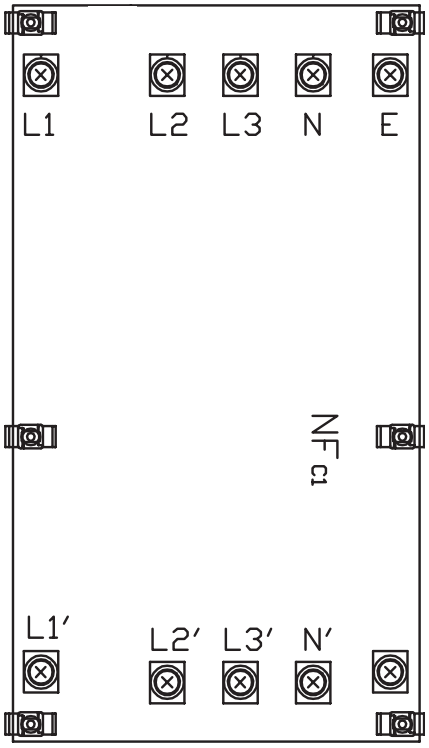
- ***Disconnect the YUTAKI S80 from the power supply before touching any of the parts. Do not touch the electrical box before disconnecting it in order to avoid an electrical shock.***
- ***When handling the electrical box, take care of components. Do not apply excessive force to them, in order to avoid damaging the electrical components and failures.***
- ***Electrical hazard. Risk of electrical shock. Do not touch the electrical components when the LED201 (Red) located on the inverter module is ON in order to avoid electrical shock.***

1 Remove indoor unit front cover.
2 Remove the electrical box.
3 Remove the inverter electrical box cover (x5 screws).



Item	Part name
1	Fuse
2	Noise filter
3	Capacitor
4	Resistor
5	Magnetic switch
6	Reactor unit

4 Disconnect all the wirings (15) connected to the electrical noise filter:
5 Remove the six holders from the inverter module. When reassembling the components, pass those holders again through the holes of the inverter module.



11.2.4 Replacing hydraulic components

DANGER

- ***Disconnect the YUTAKI S80 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.***

NOTE

To properly disconnect components from the Electrical box, see the Electrical wiring diagram chapter of this manual.

IMPORTANT NOTE

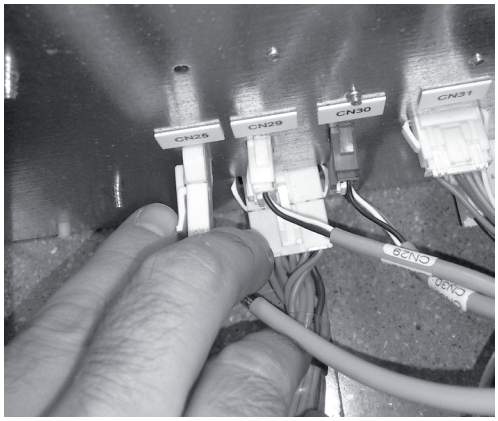
All the hydraulic components can be replaced by the front side. For this purpose, remove the indoor unit service cover and the electrical box.

11.2.4.1 Replace water flow switch (WFS)

1 Remove the indoor unit front service cover.

2 Remove the electrical box.

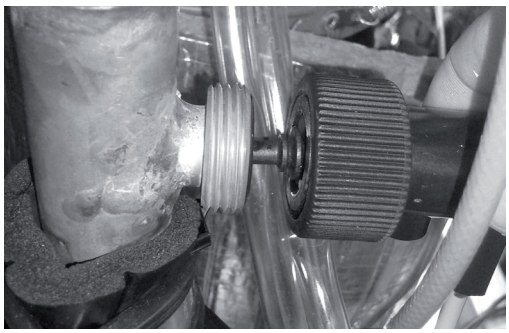
3 Disconnect the water flow switch (WFS) from electrical box rear side by disconnecting CN25 connector.



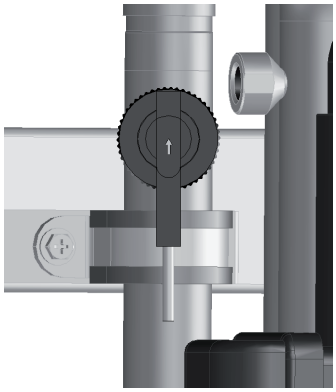
CAUTION

Electrical hazard. Risk of electrical shock. Do not touch the electrical components when the LED201 (Red) located on the inverter module is ON in order to avoid electrical shock.

4 Unscrew the flow switch nut.



5 Install the new one by performing the procedures above in reverse way.



NOTE

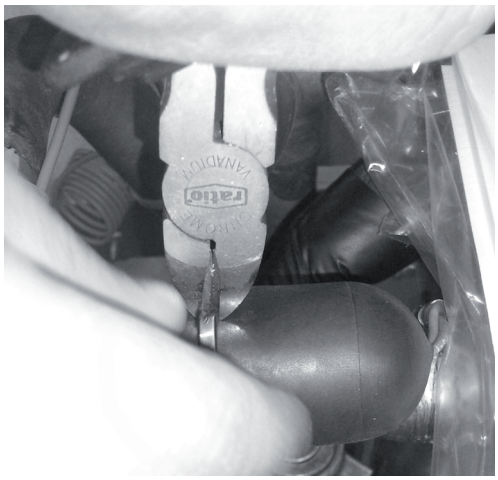
- ***Be sure of the position of the flow switch. The arrow has to look down to indicate the correct flow direction.***
- ***Be careful, do not lose the gasket of the Water Flow.***
- ***Check the gasket. If it is defective, replace by a new one.***

11.2.4.2 Replace low water pressure switch (LWPS)

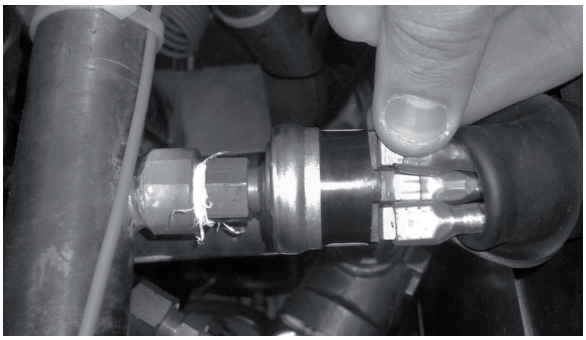
IMPORTANT NOTE

Low water pressure switch can be replaced by the front side. For this purpose, remove the indoor unit service cover and the electrical box. But, if possible, do the procedure by the upper or left sides to ease it and to avoid removing the electrical box.

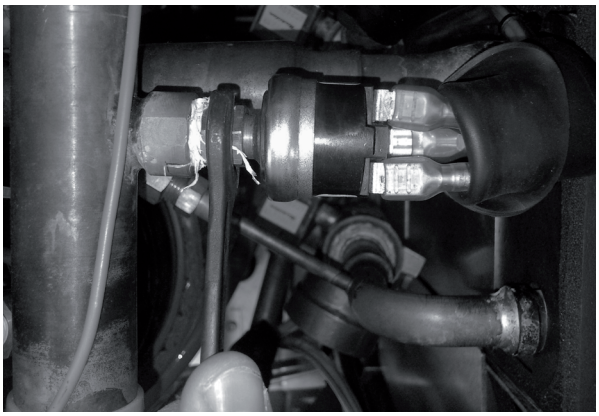
1 Remove the clamp and the plastic protector of the low water pressure switch.



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

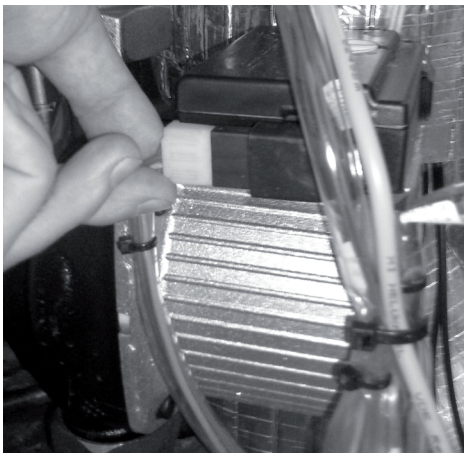
- ***Be sure the faston connections of low water pressure switch (LWPS).***
- ***Connect low water pressure wires into 1-2 sockets.***
- ***Cover free socked by using an empty faston.***
- ***Apply Teflon to the thread of Union before assembling.***

11.2.4.3 Replace water pump (WP1)

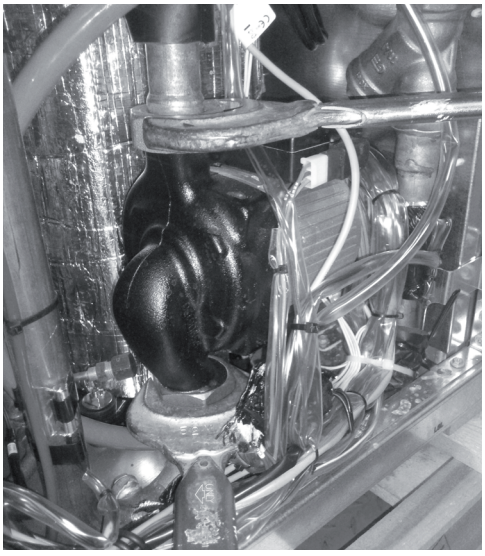
IMPORTANT NOTE

Water pump can be replaced by the front side. For this purpose, remove the indoor unit service cover and the electrical box. But, if possible, do the procedure by the left side to ease it and to avoid removing the electrical box.

1 Disconnect the water pump 1 by pulling upwards the faston connection (CN22 connector).

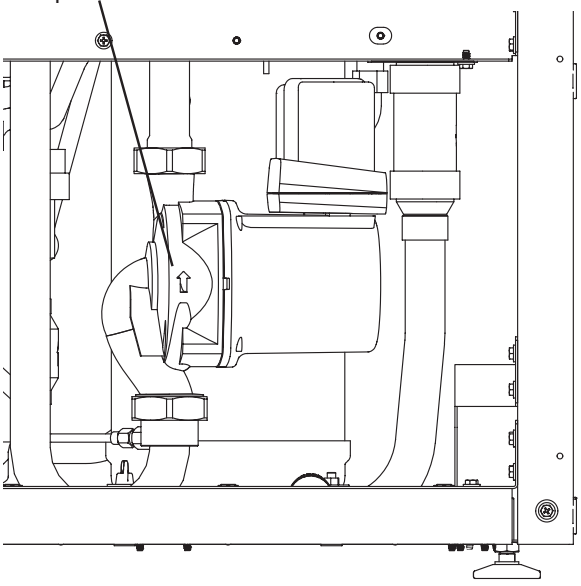


2 Unscrew the both water piping nuts that fix the water pump. Prepare two spanners. Hold one nut with one spanner and loosen the other nut with another spanner by turning the lock nut.



3 Install the new one by performing the procedures above in reverse way.

Pump direction



Left view

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.***

11.2.4.4 Replace manometer

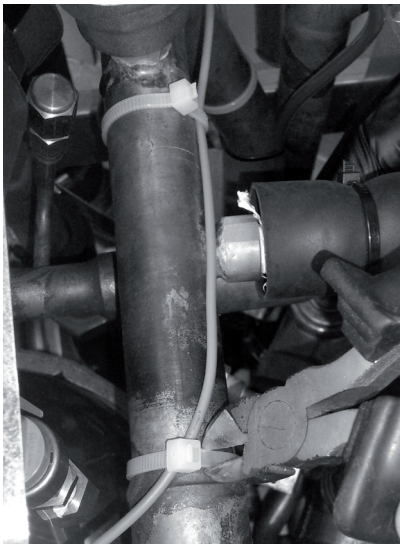
1 Remove the indoor unit front service cover.

2 Remove the electrical box.

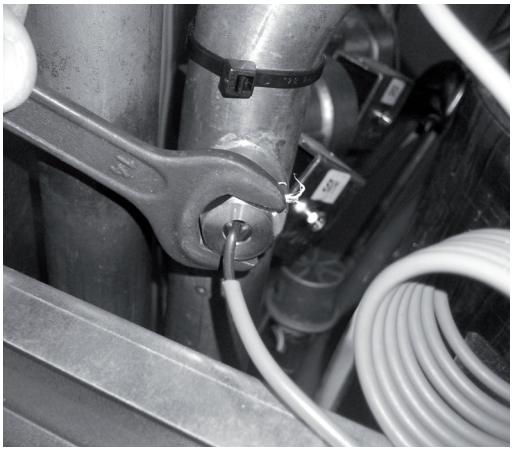
NOTE

If possible, remove the upper or left service covers to ease the procedure.

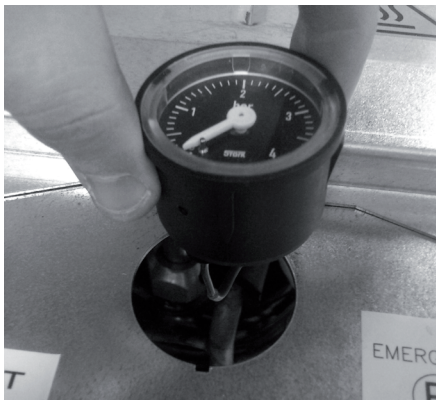
3 Remove the three clamps which attach the Manometer capillary pipe with the water pipe.



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 steel support.



6 Install the new one by performing the procedures above in reverse way.

NOTE

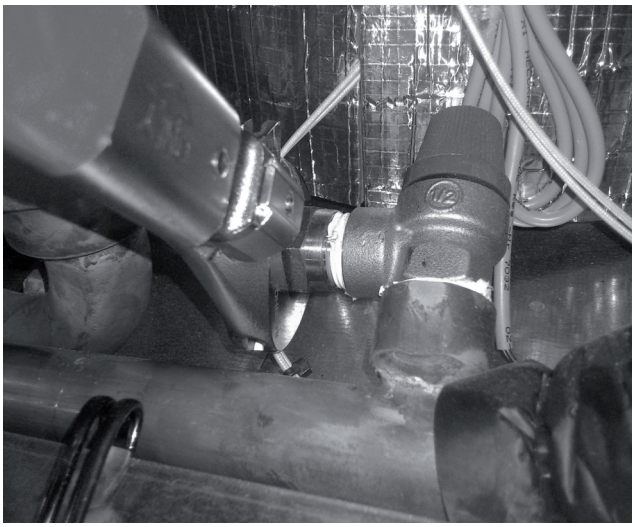
- ***Be sure of the position of the manometer.***
- ***Apply teflon to the thread of union before assembling.***

11.2.4.5 Replace safety valve

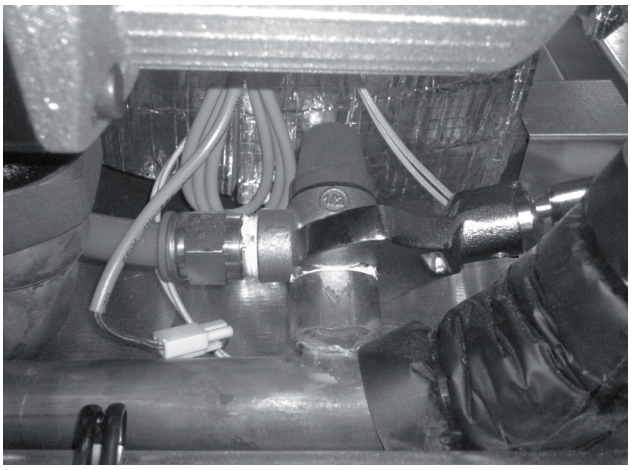
IMPORTANT NOTE

Safety valve can be replaced by the front side. For this purpose, remove the indoor unit service cover and the electrical box. But, if possible, do the procedure by the left side to ease it and to avoid removing the electrical box.

1 Unscrew the safety valve's drain pipe from the safety valve and remove it from the drain hole.



2 Unscrew safety valve from the water pipe.



3 Install the new one by performing the procedures above in reverse way.

NOTE

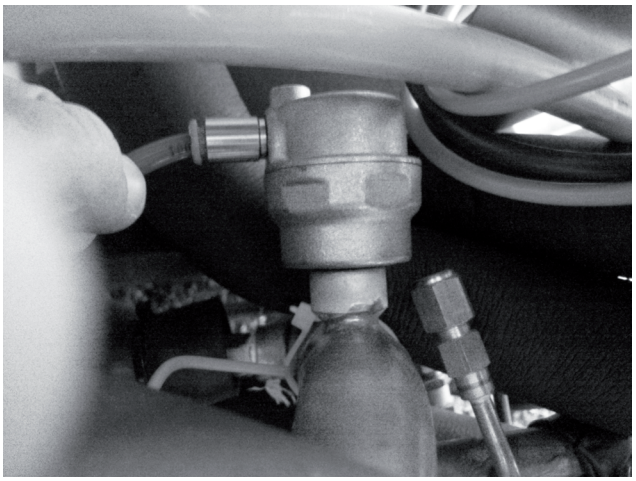
- ***Be sure of the position of the safety valve and its drain pipe.***
- ***Apply teflon to the thread of unions before assembling.***

11.2.4.6 Replace air purger

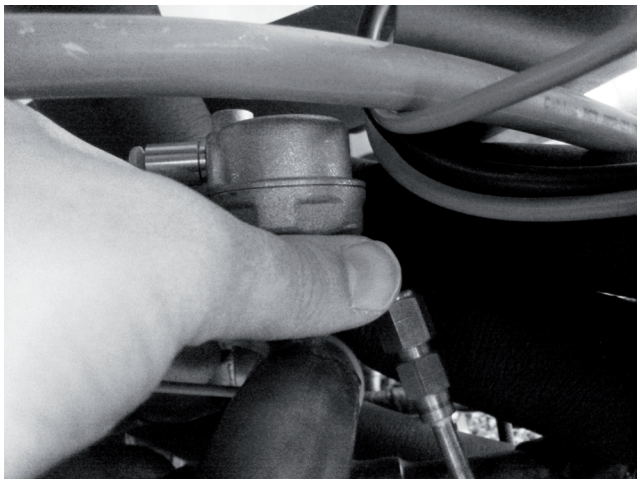
IMPORTANT NOTE

Air purger can be replaced by the front side. For this purpose, remove the indoor unit service cover and the electrical box. But, if possible, do the procedure by the upper or left sides to ease it and to avoid removing the electrical box.

1 Disconnect drain hose of the air purger as shown in the picture:



2 Unscrew the air purger from the top of the water pipe



3 Install the new one by performing the procedures above in reverse way.

NOTE

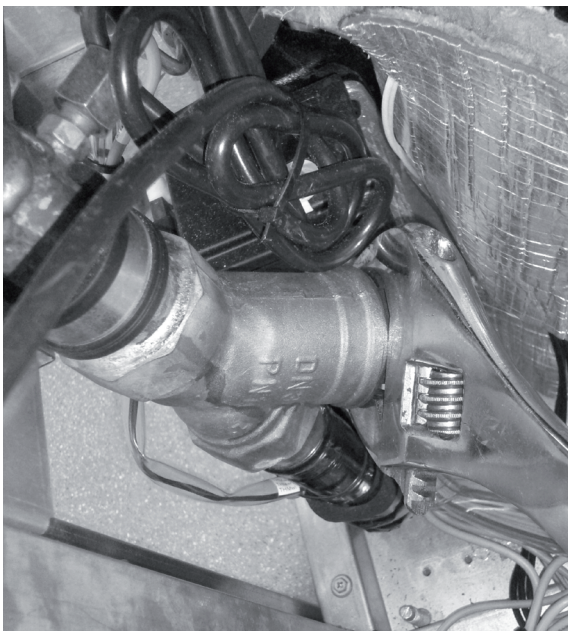
Be sure of the position of the air purger and of its drain hose:

11.2.4.7 Replace water strainer

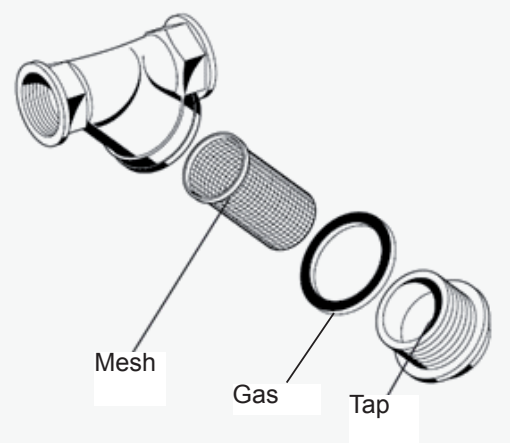
In case of maintenance (cleaning) or replacing mesh:

The water strainer mesh should be cleaned or replaced depending on its work state.

1 Remove indoor unit front service cover.
2 Remove the electrical box.
3 Unscrew the water strainer as shown.



4 Replace or clean the mesh.



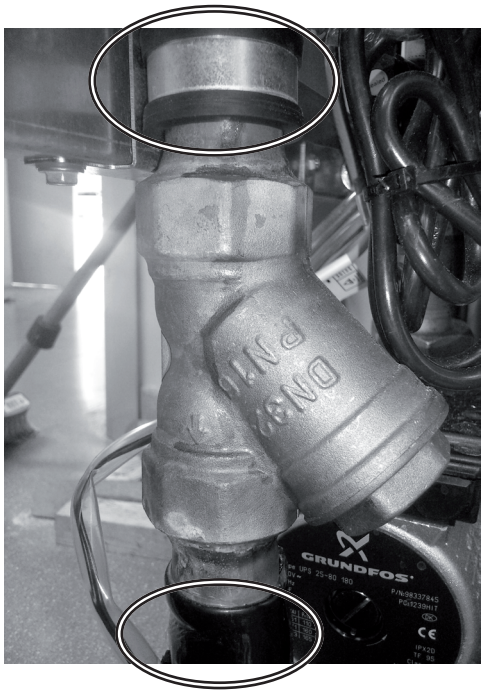
5 Install new mesh if necessary by performing the procedures above in reverse way.

NOTE

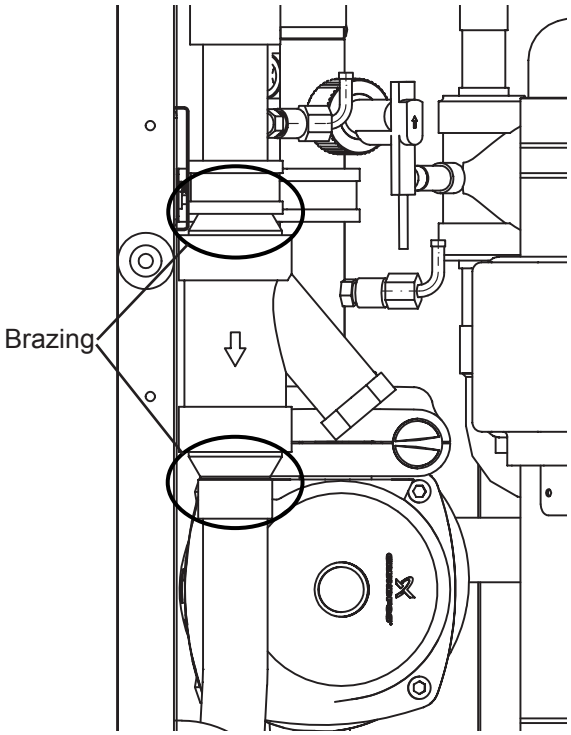
Check the gasket, it is recommended to replace by a new one.

In case of replacing the entire water strainer.

1 Remove indoor unit front service cover.
2 Remove the electrical box.
3 Remove insulation of water strainer pipes.



4 Remove brazing from the two places, and then remove water strainer.



Front view

5 Install water strainer by performing the procedures above in reverse way.

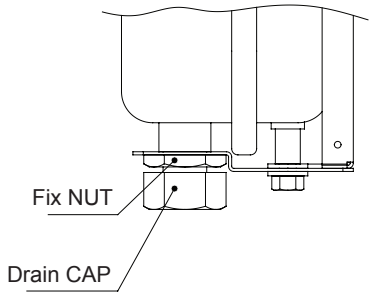
11.2.4.8 Replace expansion vessel

IMPORTANT NOTE

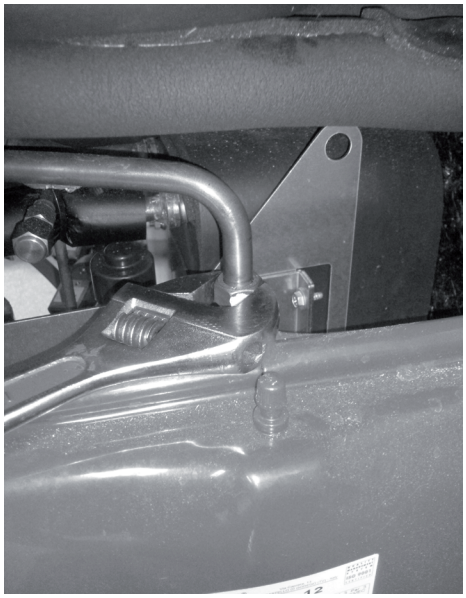
Water pump can be replaced by the front side. For this purpose, remove the indoor unit service cover and the electrical box. But, if possible, do the procedure by the right side to ease it and to avoid removing the electrical box.

1 Close the shut off valves.

Drain water from the bottom side of the expansion vessel by unscrewing the drain cap.



2 Unscrew the copper pipe connected to the pressure gage from expansion vessel.



3 Unscrew the expansion vessel as shown in the picture. If the right service cover is not removed, remove the screws with a little spanner or a torque wrench.

NOTE

Be sure that the expansion vessel is being subjected all the time.

4 Remove the expansion vessel with the metal plate by pulling it up in order to remove the hook from the structure.

NOTE

Be sure that the expansion vessel is being subjected all the time.

5 Install new one by performing the procedures above in reverse way.

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.***

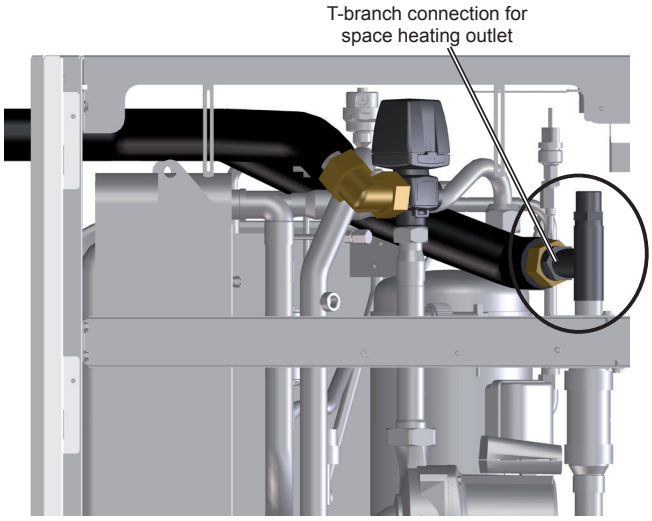
11.2.4.9 Replace the space heating pipes

1 Remove indoor unit front service cover.
2 Remove the electrical box.

NOTE

If possible, remove the indoor unit upper and left service covers to ease the removing procedure.

3 If necessary, disconnect the 3-way valve motor (upper part) to ease the removing procedure.
4 Disconnect the space heating pipes from the space heating.
5 Disconnect the space heating outlet pipe (without elbow) (1") from the T-branch connection for space heating outlet.

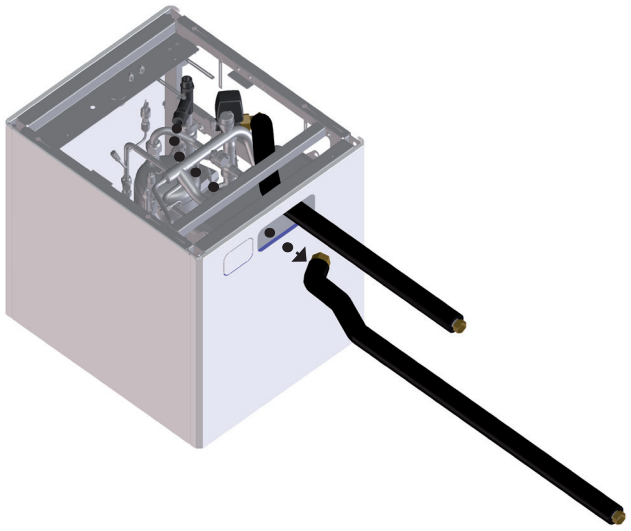


(Left side view)

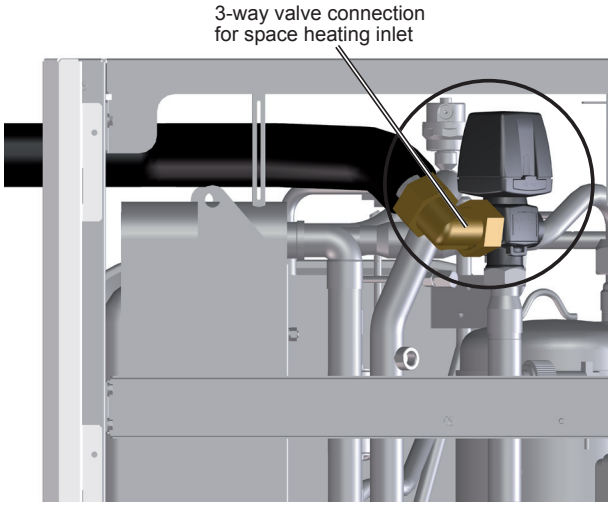
6 Remove the space heating outlet pipe passing it under the suction compressor and air purger's pipes.

NOTE

Be careful with the low pressure sensor on the suction pipe when disconnecting the flexible water pipes.

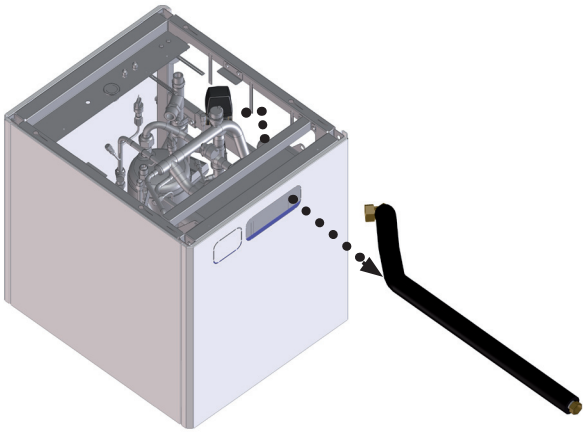


7 Disconnect the space heating inlet pipe (with elbow) (1”) from the elbow end to the 3-way valve connection for space heating inlet.



(Left side view)

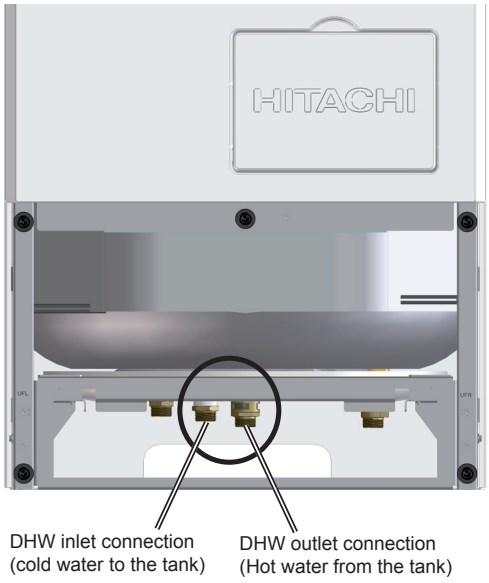
8 Remove the space heating inlet pipe from the indoor unit.



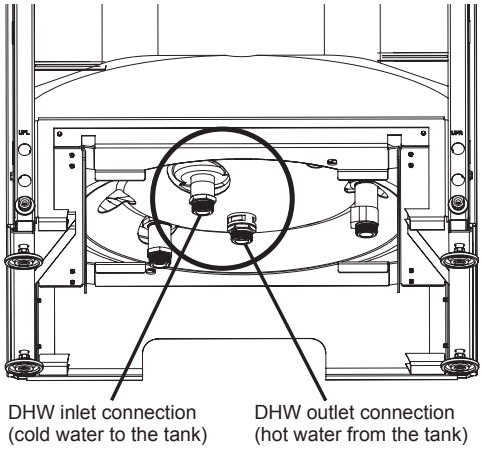
9 Install new ones by performing the procedures above in reverse way.

11.2.4.10 Replace the DHW pipes

1 Remove tank lower front service cover.
2 Drain the DHW tank according to its Draining procedure explained in *Maintenance notes* chapter.
3 Disconnect the DHW pipes from the space heating.
4 Disconnect the DHW pipes from DHW outlet and inlet connections of the tank.



(Front bottom view)



5 Install new ones by performing the procedures above in reverse way.

11.2.4.11 Replace the heating coil pipes (DHW tank over the indoor unit)

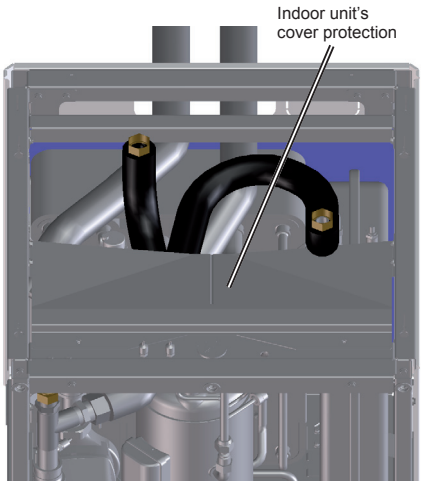
1 Remove the indoor unit front service cover.
2 Remove the electrical box.

NOTE

If possible, remove the indoor unit left service cover to ease the removing procedure.

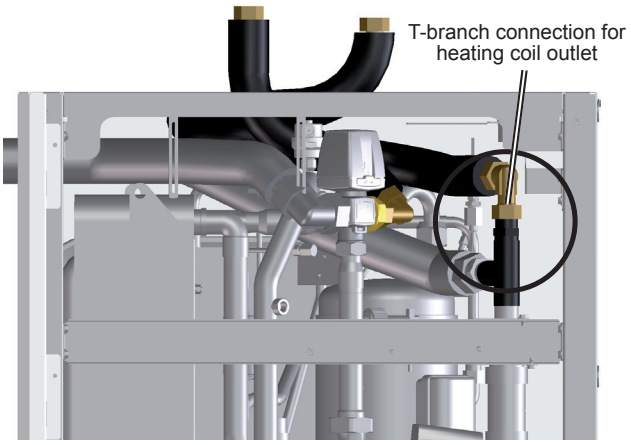
3 Remove the tank lower front service cover.
4 Drain the heating coil according to its Draining procedure explained in *Maintenance notes* chapter.
5 Disconnect the heating coil pipes from the heating coil inlet and outlet connections of the tank.

6 Remove the indoor unit cover's protection



7 If necessary, disconnect the 3-way valve motor (upper part) to ease the removing procedure.

8 Disconnect the heating coil outlet pipe (long pipe 960 mm tube length) (3/4”) by its elbow end from the T-branch connection for heating coil outlet.

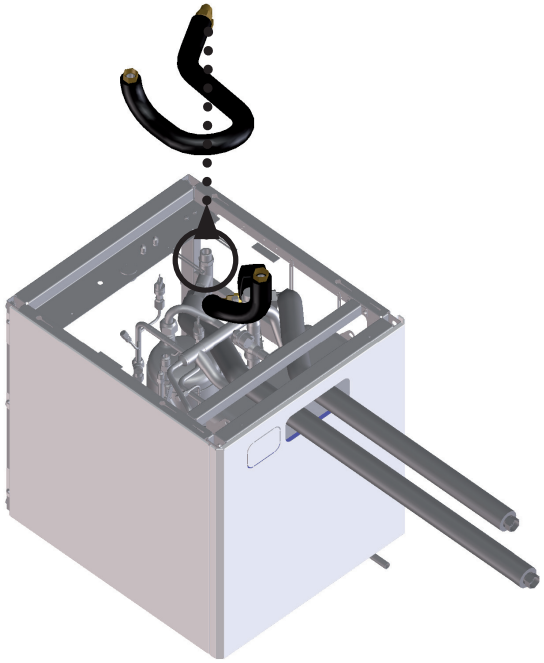


(Left side view)

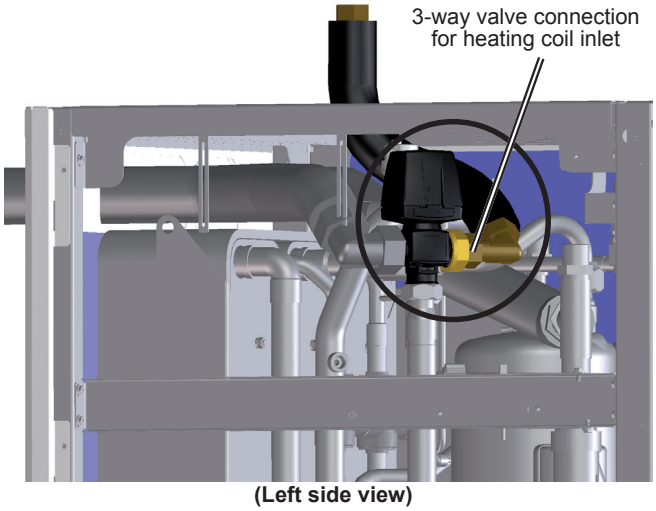
NOTE

Be careful with the low pressure sensor on the suction pipe when disconnecting the flexible water pipes.

9 Remove the heating coil outlet pipe from the indoor unit.

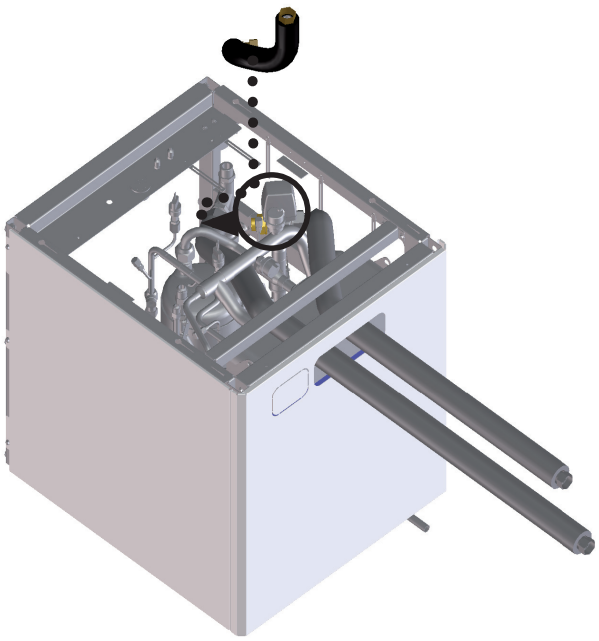


10 Disconnect the heating coil inlet pipe (short pipe 365 mm tube length) (3/4”) by its elbow end from the 3-way valve connection for heating coil outlet.



(Left side view)

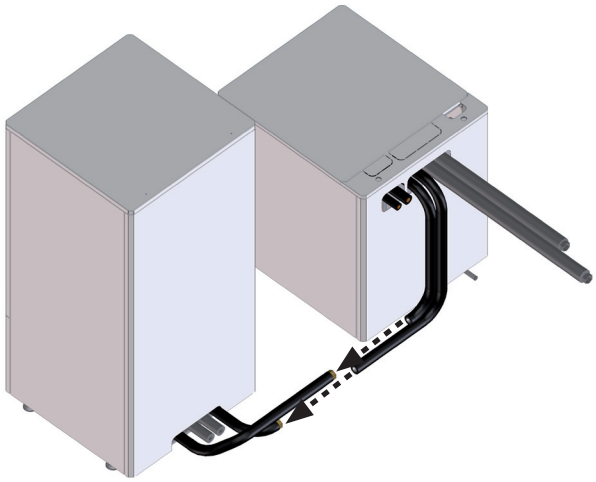
11 Remove the heating coil intlet pipe from the indoor unit.



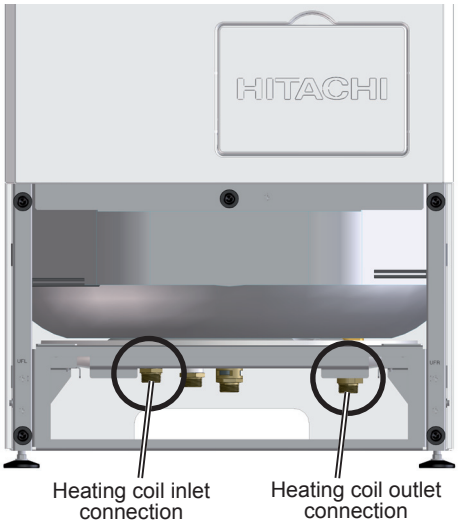
12 Install new ones by performing the procedures above in reverse way.

11.2.4.12 Replace the heating coil pipes (DHW tank beside the indoor unit)

1 Remove the tank lower front service cover.
2 Drain the heating coil according to its Draining procedure explained in *Maintenance notes* chapter.
3 Separate the indoor DHW tank from the indoor unit to ease access to the heating coil pipes.
4 Disconnect the the heating coil pipes (connected to the heating coil inlet and outlet of the tank) from the flexible water pipes of the kit ATW-FWP-01 (connected to the 3-way valve and T-branch in the indoor unit)



5 Disconnect the heating coil pipes from the heating coil inlet and outlet connections of the tank.



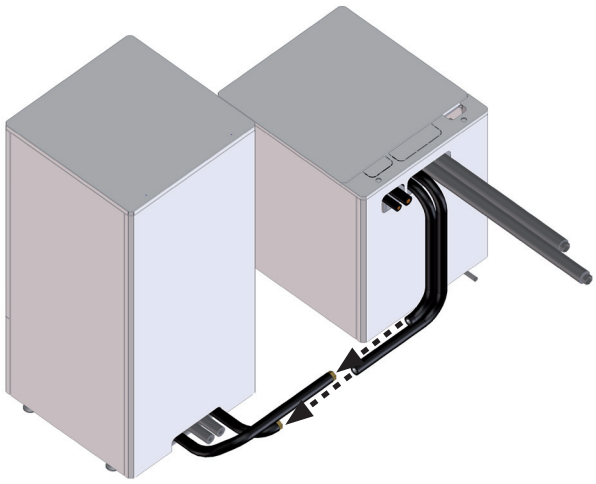
11.2.4.13 Replace the flexible water pipes kit (ATW-FWP-01)

1 Remove indoor unit front service cover.
2 Remove the electrical box.

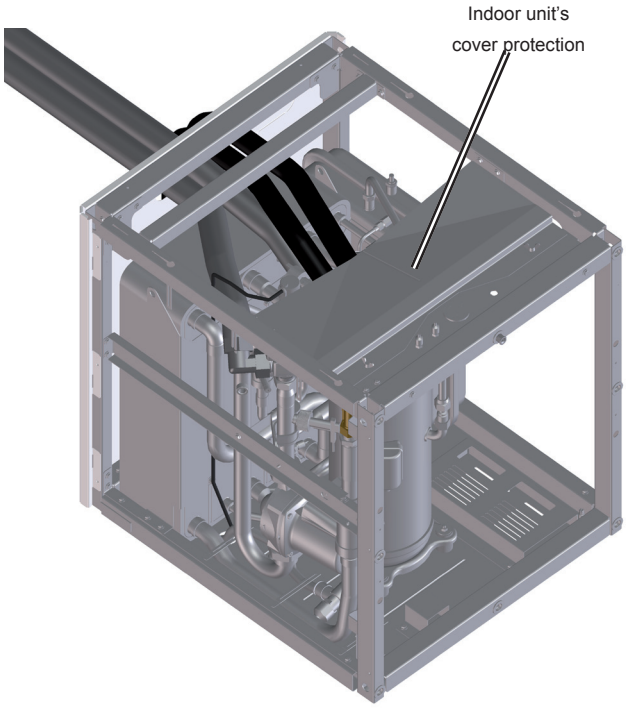
NOTE

If possible, remove the indoor unit upper and left or right service covers to ease the removing procedure.

3 Drain the heating coil according to its Draining procedure explained in *Maintenance notes* chapter.
4 Separate the indoor DHW tank from the indoor unit to ease access to the heating coil pipes.
5 Disconnect the the heating coil pipes (connected to the heating coil inlet and outlet of the tank) from the flexible water pipes of the kit ATW-FWP-01 (connected to the 3-way valve and T-branch in the indoor unit)

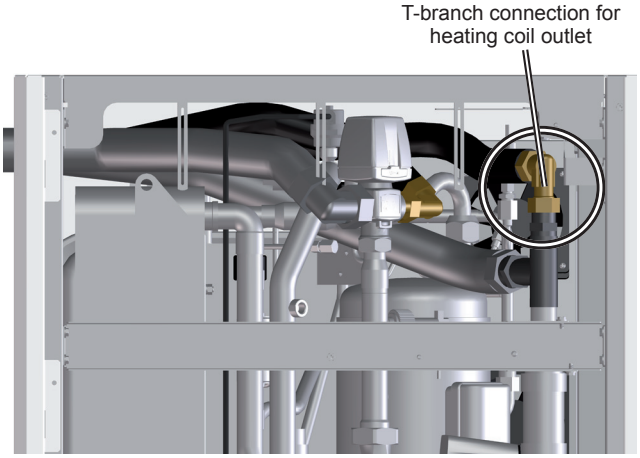


6 Remove the indoor unit cover's protection



7 If necessary, disconnect the 3-way valve motor (upper part) to ease the removing procedure.

8 Disconnect the kit pipe for heating coil outlet (1400 mm tube length) (3/4”) by its elbow end from the T-branch connection for heating coil outlet.

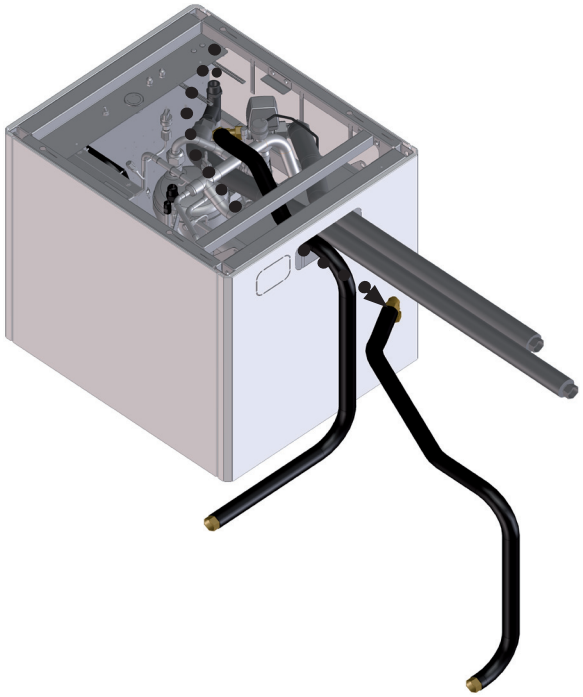


(Left side view)

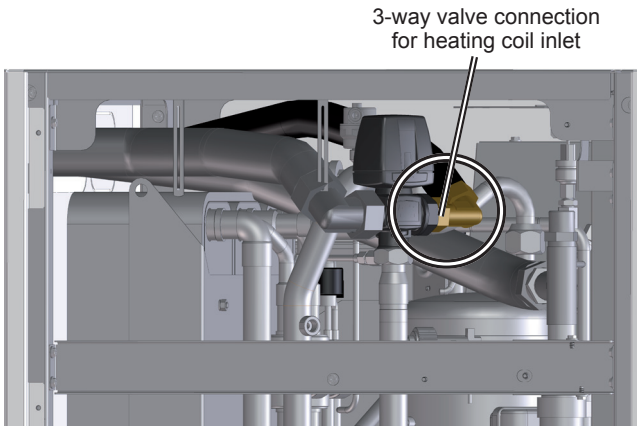
NOTE

Be careful with the low pressure sensor on the suction pipe when disconnecting the flexible water pipes.

9 Remove the kit pipe for heating coil outlet from the indoor unit.

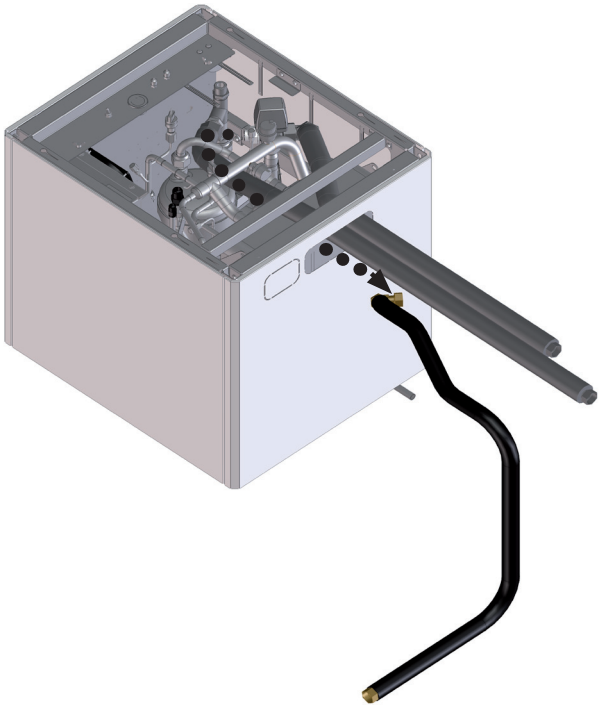


10 Disconnect the kit pipe for heating coil inlet (1600 mm tube length) (3/4”) by its elbow end from the 3-way valve connection for heating coil outlet.



(Left side view)

11 Remove the kit pipe for heating coil inlet from the indoor unit.



12 Install new ones by performing the procedures above in reverse way.

11.2.5 Replacing refrigerant parts

DANGER

- ***Disconnect the YUTAKI S80 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

- ***To properly disconnect components from the Electrical box, see the Electrical wiring diagram chapter of this manual.***
- ***In case of replacing Refrigerant parts, in some cases it is needed to drain water from the unit. Close the shutoff valves and open the drain valves.***
- ***In case of replacing refrigerant parts, collect if necessary R410A and R134a refrigerant according to the pump down procedures explained in Piping work and refrigerant charge chapter.***
- ***Most of 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 cycles 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.***

11.2.5.1 Replace the R134a compressor

1 Remove the front service cover.
2 Remove the electrical box.

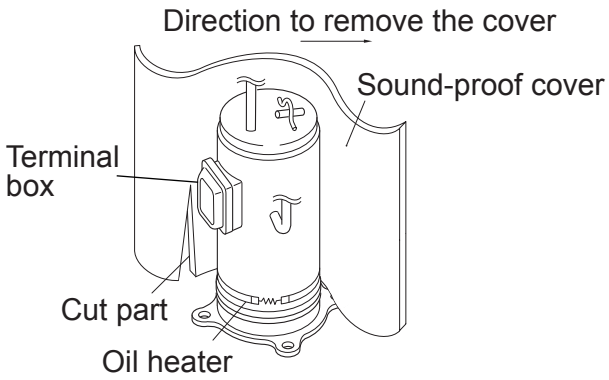
NOTE

If possible, remove the indoor unit upper service cover to ease the removing procedure.

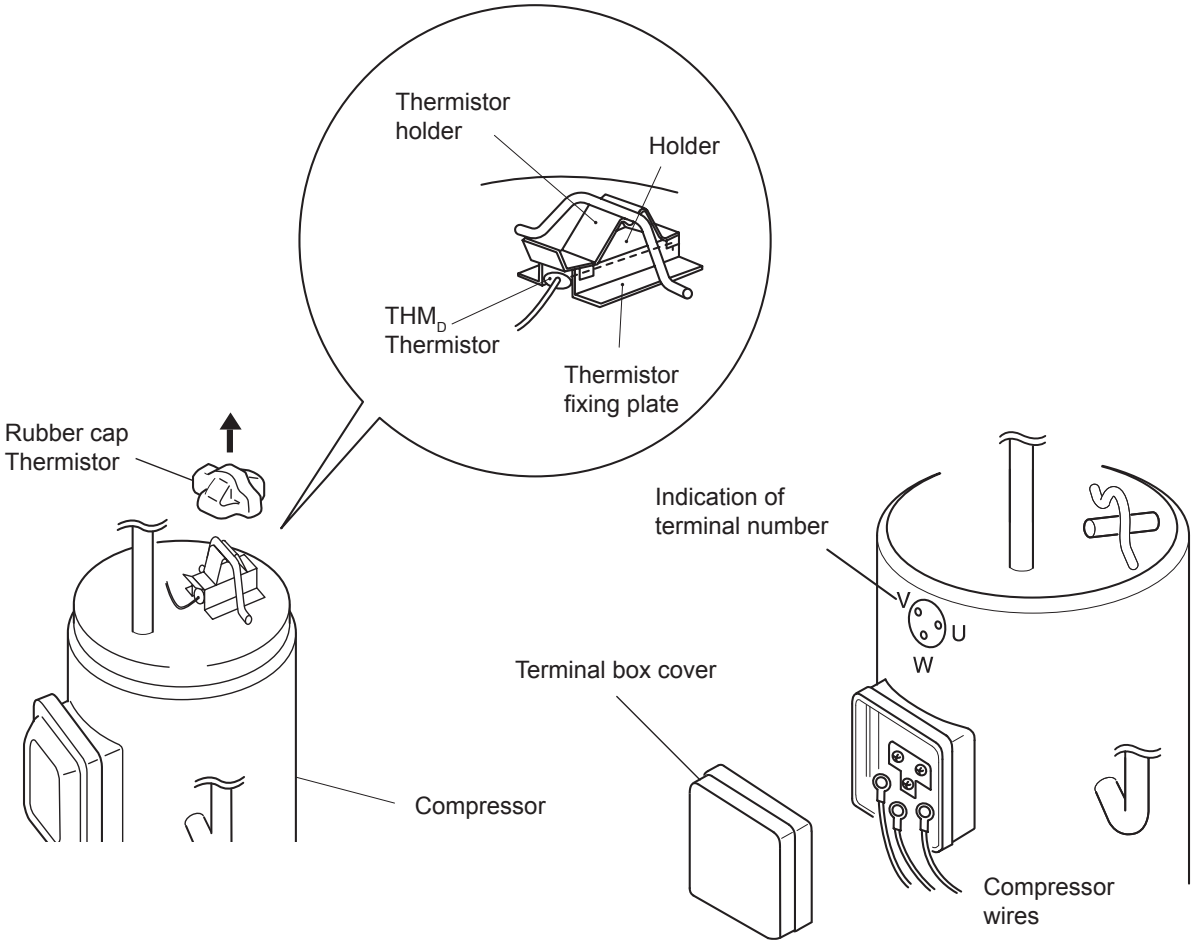
3 Collect the R134a refrigerant.
4 Open the sound insulation cover wrapped around the compressor. Remove the terminal box cover of the compressor. Disconnect the compressor wires connected to the terminal box and remove the sound insulation cover.

NOTE

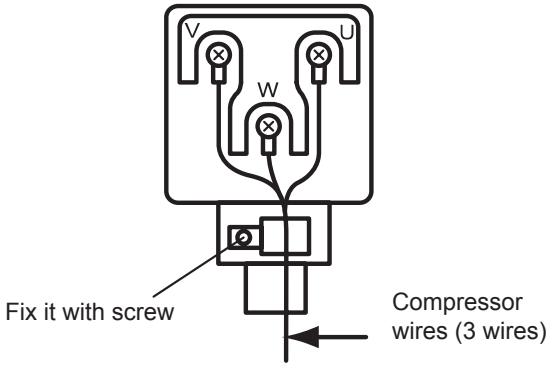
Check and take note of each terminal number and indications for its correct connection at the reassembling process. If wires are connected in incorrect order, it will lead to a compressor failure.



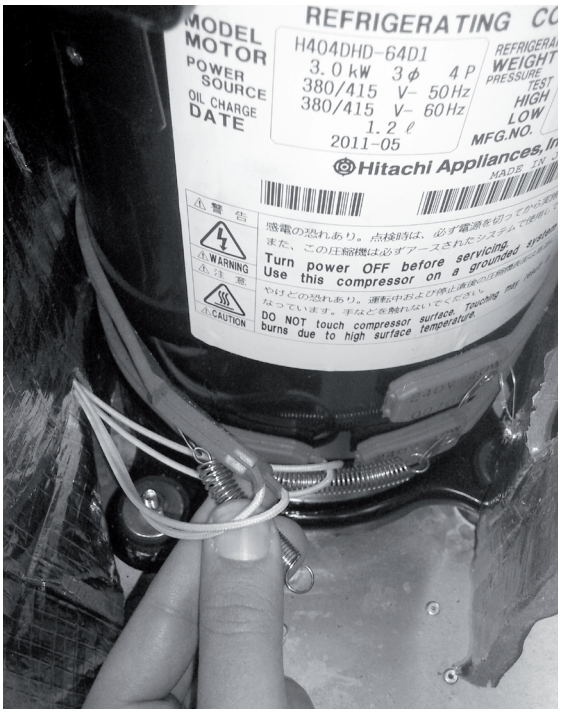
5 Remove the rubber cap and the thermistor on the top of the compressor (THM_D).



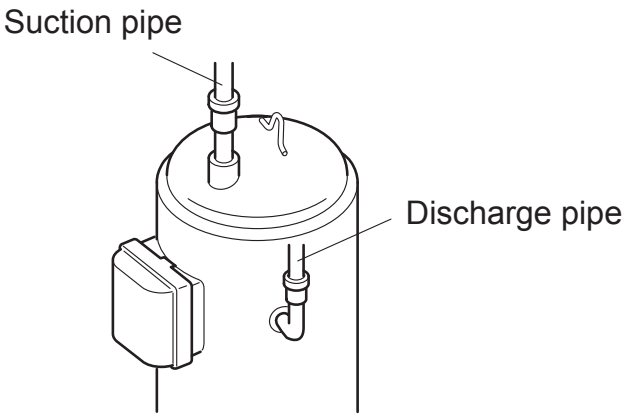
Details for compressor terminals



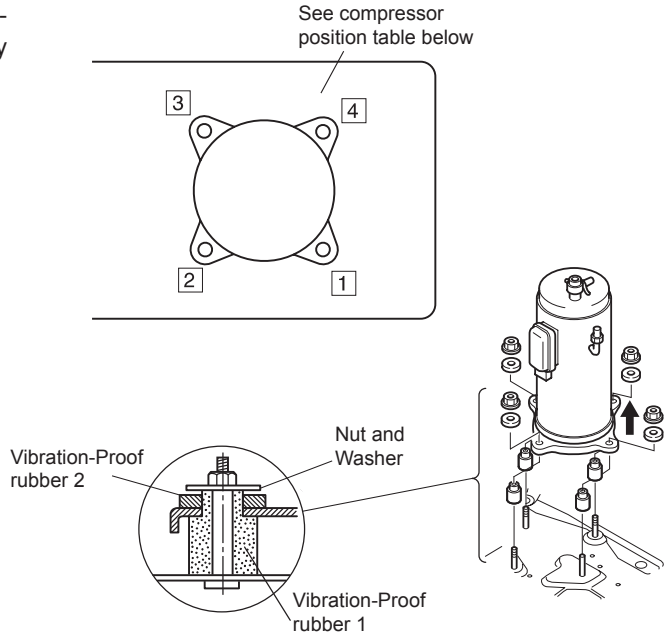
6 Remove the three (3) crankcase heaters (oil heater on the compressor housing). There are two on the lower part and one on the upper.



7 Unscrew the suction pipe and the discharge pipe from the compressor.



8 Remove the four (4) nuts fixing the compressor and remove the compressor from the unit by lifting it. Slightly incline it forward and lift.



Fixation of the compressor to the bottom plate				
Compressor position	**1**	**2**	**3**	**4**
Vibration-proof rubber 1	○	○	○	○
Vibration-proof rubber 2	○	○	○	○
Nut	○	○	–	○
Wind Nut	–	–	○	–

9 Reassemble the parts in the reverse order of the indicated removing procedures.

- Tighten the screws (U, V and W) for compressor wires with 2.5Nm.
- Fix the lead wire firmly.

NOTE

Fix the lead wire for the compressor firmly using a cable tie to avoid the contact between the metal sheet sharp edges and the high temperature piping.

11.2.5.2 Replace R134a high pressure switch (PHS)

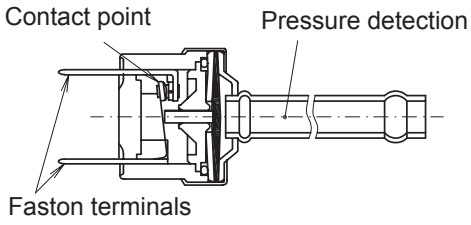
IMPORTANT NOTE

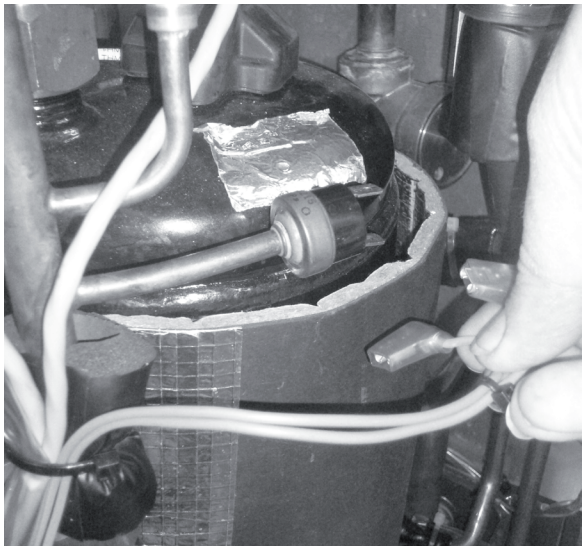
R134a high pressure switch can be replaced by the front side. For this purpose, remove the indoor unit service cover and the electrical box. But, if possible, do the procedure by the upper side to ease it and to avoid removing the electrical box.

1 Collect the R134a refrigerant.

2 Disconnect the faston terminals from the pressure switch.

High pressure switch structure





3 Cut the high pressure switch from the brazing neck using a burner.

CAUTION

Protect the connecting wires and pipe insulation from the brazing flame.

4 Install new one by performing the procedures above in reverse way.

CAUTION

- ***Do not change the high pressure switch locally or change the high pressure cut-out set value locally. If changed, it will cause serious injury or death due to explosion by high pressure.***
- ***Do not attempt to turn service valve rod beyond its stop.***

11.2.5.3 Replace the R134a pressure sensors

1 Remove the front service cover.
2 Remove the electrical box.

NOTE

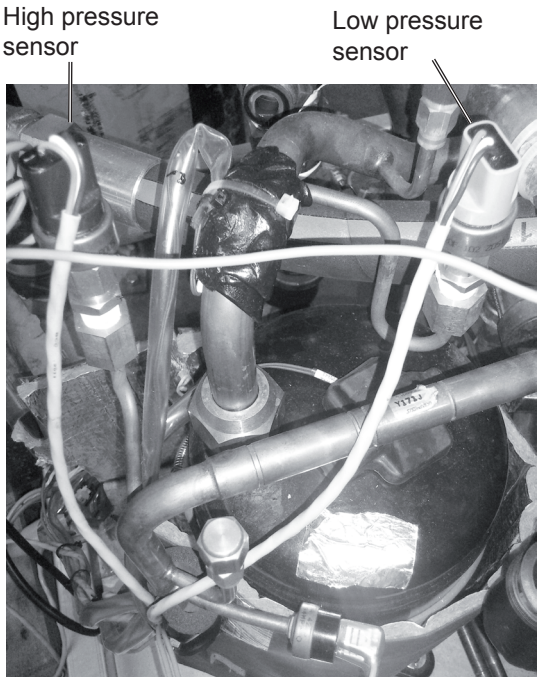
If possible, remove the indoor unit upper service cover to ease the removing procedure.

3 Remove the vibration protection from both pressure sensors:

- One green (low pressure)
- One black (high pressure)

4 Remove the pressure sensors:

Prepare two spanners. Hold the fitting with one spanner and loosen the lock nut with another spanner by turning it.

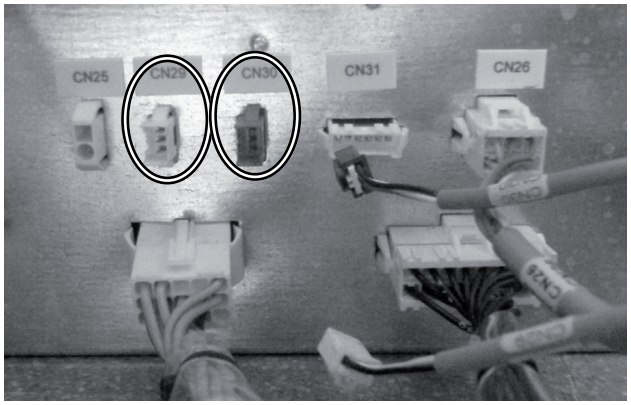


5 Remove the connectors on the rear side of the electrical box:

- High pressure sensor: CN30
- Low pressure sensor: CN29

CAUTION

Electrical hazard. Risk of electrical shock. Do not touch the electrical components when the LED201 (Red) located on the inverter module is ON in order to avoid electrical shock.



6 Install new ones by performing the procedures above in reverse way.

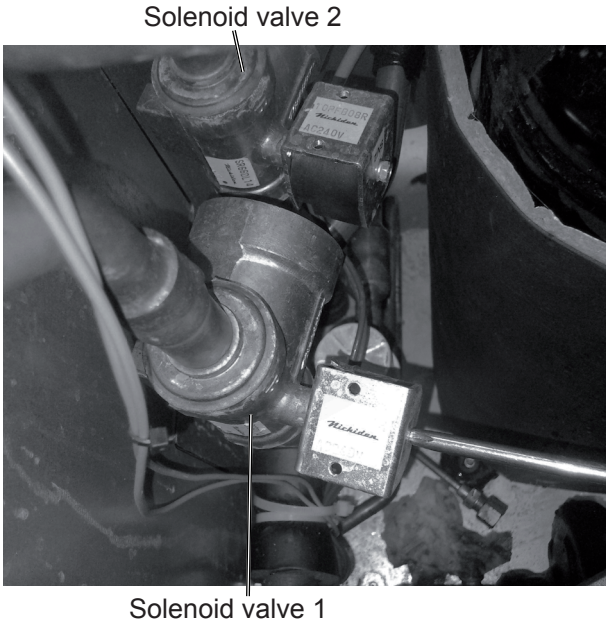
11.2.5.4 Replace the coils for R410A solenoid valves

1 Remove the front service cover.
2 Remove the electrical box.

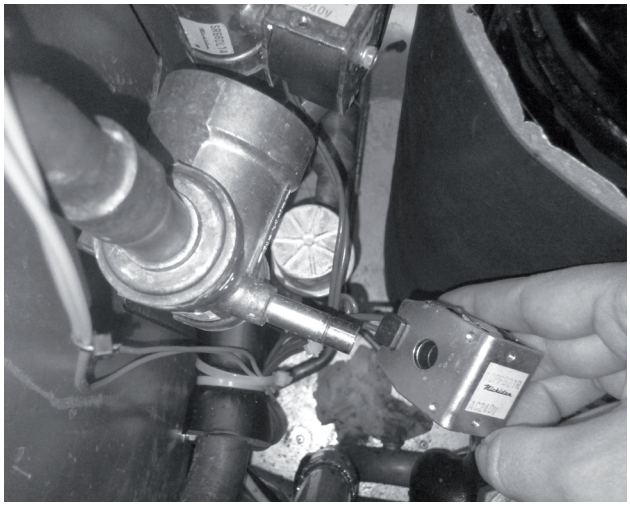
NOTE

If possible, remove the indoor unit upper or left service covers to ease the removing procedure.

3 Remove the screw fixing the coils to the solenoid valves.



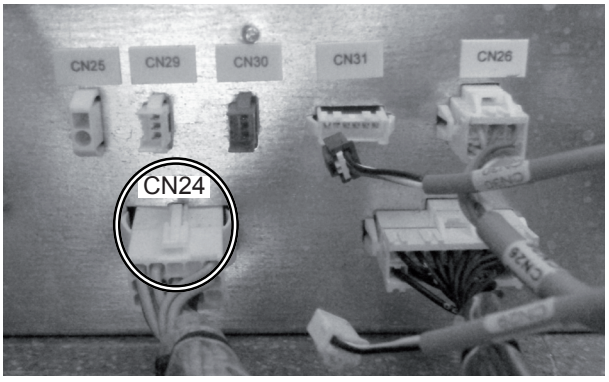
4 Remove the solenoid valve coils by pulling them from the solenoid valves.



5 Remove the connector CN24 on the rear side of the electrical box and remove the specific wires for the solenoid valves.

CAUTION

Electrical hazard. Risk of electrical shock. Do not touch the electrical components when the LED201 (Red) located on the inverter module is ON in order to avoid electrical shock.



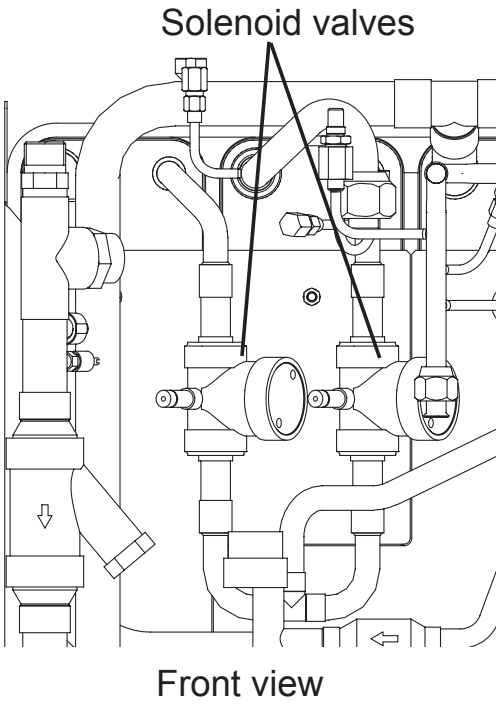
6 Install new ones by performing the procedures above in reverse way.

11.2.5.5 Replace the R410A solenoid valves

1 Remove indoor unit left service cover.
2 Collect the R410A refrigerant.
3 Remove the solenoid valve coils according to the procedure *Replace the coils for R410A solenoid valves*.
4 Remove the brazing as shown in the figure using a blowtorch and previously cooling the pipe side with wet cloth in order to avoid brazing material entering the solenoid valve.

CAUTION

Protect the connecting wires and pipe insulation from the brazing flame.



5 Install new ones by performing the procedures above in reverse way.

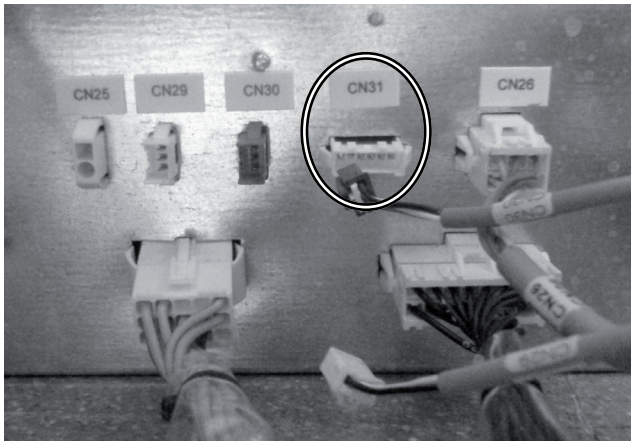
11.2.5.6 Replace R134a electronic expansion valve coil

1 Remove the front service cover.
2 Remove the electrical box.

NOTE

If possible, remove the indoor unit upper or right service covers to ease the removing procedure.

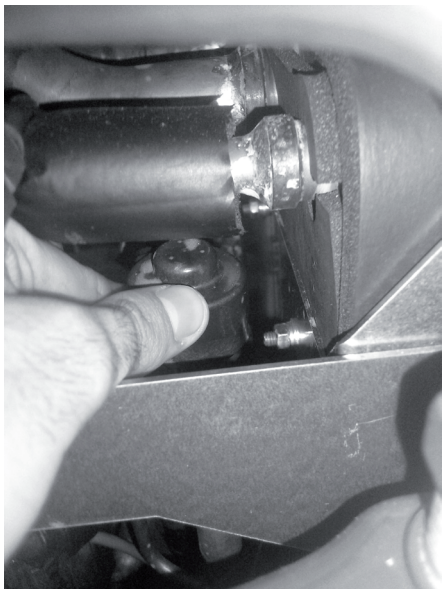
3 Remove the connector on the control PCB on the rear side of the electrical box:
- R134a expansion valve (EV2): CN31



CAUTION

Electrical hazard. Risk of electrical shock. Do not touch the electrical components when the LED201 (Red) located on the inverter module is ON in order to avoid electrical shock.

4 Hold the electronic expansion valve coil and remove it by pulling it up.



5 Install new one by performing the procedures above in reverse way.

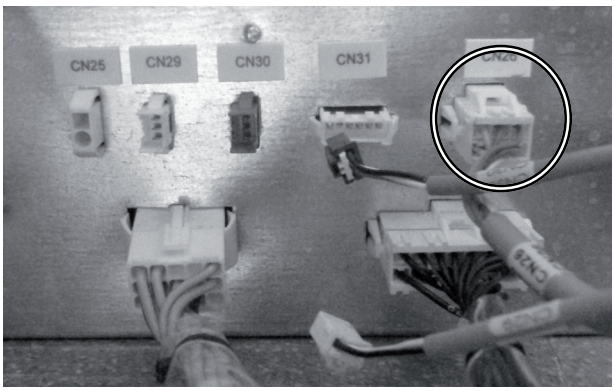
11.2.5.7 Replace R410A electronic expansion valve coil

1 Remove the front service cover.
2 Remove the electrical box.

NOTE

If possible, remove the indoor unit upper or left service covers to ease the removing procedure.

3 Remove the connector on the control PCB on the rear side of the electrical box:
   - R410A expansion valve (EV1): CN26



CAUTION

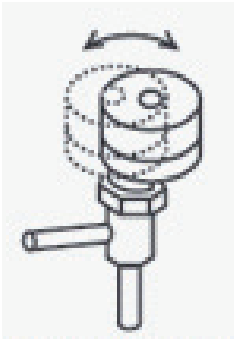
Electrical hazard. Risk of electrical shock. Do not touch the electrical components when the LED201 (Red) located on the inverter module is ON in order to avoid electrical shock.

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.



Direction of drive part

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 Nm – 15 Nm.

NOTE

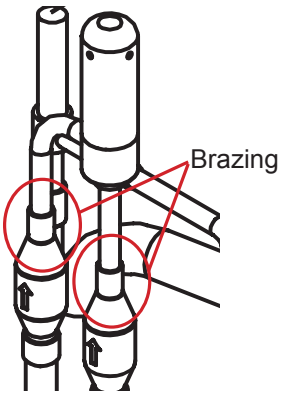
Do not apply great forces, such as the rotating torque and the bending load, to the motor by holding the motor by hand when you are tightening the lock nut. Although the direction of the eccentric part of the motor is assembled with the eccentric part of the motor directed toward the counter direction of the fittings for piping at the valve body, the alteration of this direction does not affect the open/close function of the valve.

11.2.5.8 Replace R134a expansion valve

1 Remove the front service cover.
2 Remove the electrical box.
3 Collect the R134a refrigerant.
4 Remove the R134a expansion valve coil according to the procedure *Replace R134a expansion valve coil*.
5 Remove the brazing as shown in the figure using a blowtorch and previously cooling the pipe side with wet cloth in order to avoid brazing material entering the expansion valve.

CAUTION

Protect the connecting wires and pipe insulation from the brazing flame.



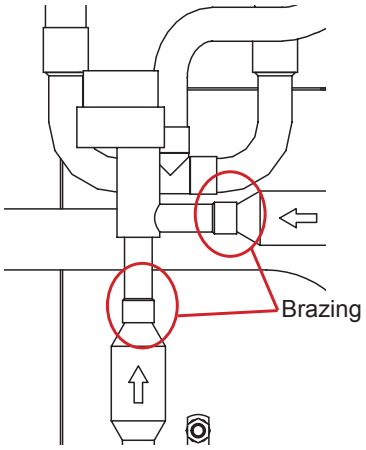
6 Install new one by performing the procedures above in reverse way.

11.2.5.9 Replace R410A expansion valve

1 Remove indoor unit left service cover.
2 Collect the R410A refrigerant.
3 Remove the R410A expansion valve coil according to the procedure *Replace R410A expansion valve coil*.
4 Remove the brazing as shown in the figure using a blowtorch and previously cooling the pipe side with wet cloth in order to avoid brazing material entering the expansion valve.

CAUTION

Protect the connecting wires and pipe insulation from the brazing flame.

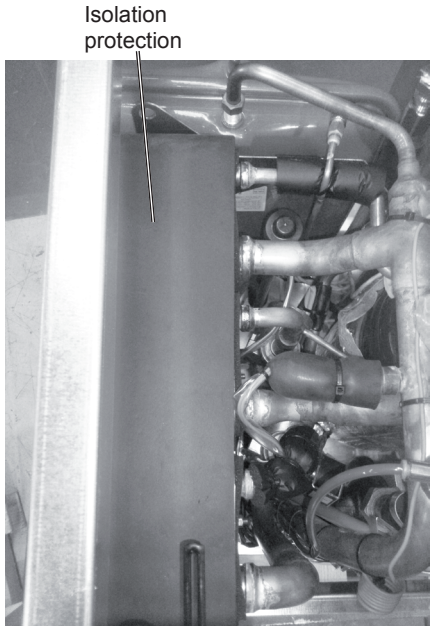


5 Install new one by performing the procedures above in reverse way.

11.2.5.10 Replace R410A-R134a plate heat exchanger

In case removing plate heat exchanger and components.

1 Remove indoor unit rear, left, right and upper service covers.
2 Collect the R134a and R410A refrigerants.
3 Remove the expansion vessel according to the procedure *Replace expansion vessel*.
4 Remove refrigerant liquid thermistor (THM_L) from pipe by perform procedure *Replacing thermistors*.
5 Remove refrigerant gas thermistor (THM_G) from pipe by perform procedure *Replacing thermistors*.
6 Remove the affected wires from the clamps.
7 Remove the isolation protection affecting the heat exchanger to remove. Cut it and remove the adhesive.

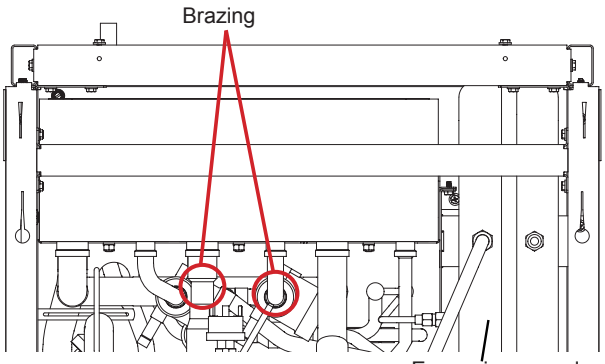


Upper view

8 Remove the brazing as shown in the figure using a blowtorch and previously cooling the pipe side with wet cloth in order to avoid brazing material entering the expansion valve.

CAUTION

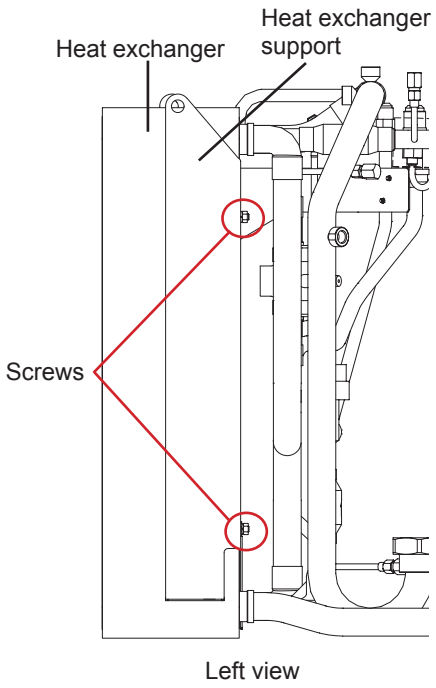
Protect the connecting wires and pipe insulation from the brazing flame. Remove pipe insulation if necessary.



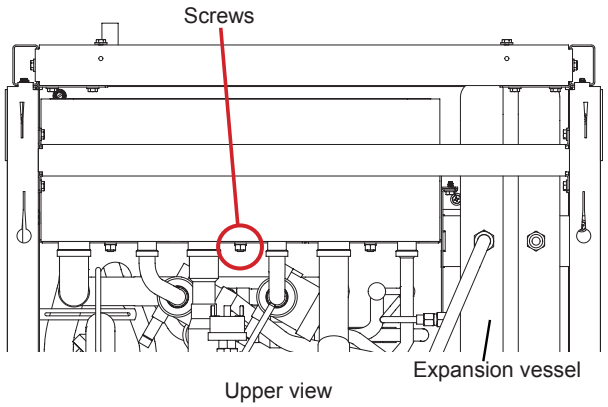
Upper view

9 Remove the two screws fixing the heat exchanger to the heat exchanger support:

- 1 screw at upper side.
- 1 screw at bottom side.



Left view



Upper view

10 Remove plate heat exchanger.

11 Install new one by performing the procedures above in reverse way.

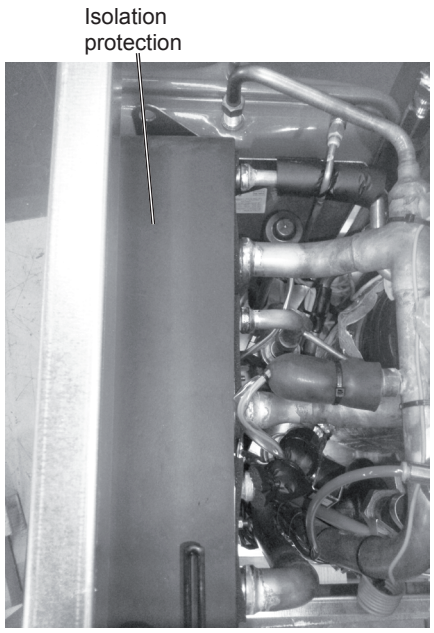
NOTE

Be careful when removing the heat exchanger because of its shape and weight.

11.2.5.11 Replace R134a-water plate heat exchanger

In case removing plate heat exchanger and components.

1 Remove indoor unit rear, left, right and upper service covers.
2 Collect the R134a refrigerant.
3 Remove refrigerant evaporation heating thermistor (THM_{EH}) from pipe by perform procedure *Replacing thermistors*.
4 Remove refrigerant evaporation cooling thermistor (THM_{EC}) from pipe by perform procedure *Replacing thermistors*.
5 Remove water inlet thermistor (THM_{WI}) from pipe by perform procedure *Replacing thermistors*.
6 Remove water outlet plate heat exchanger thermistor (THM_{WO}) from pipe by perform procedure *Replacing thermistors*.
7 Remove the affected wires from the clamps.
8 Remove the insulation protection affecting the heat exchanger to remove. Cut it and remove the adhesive.

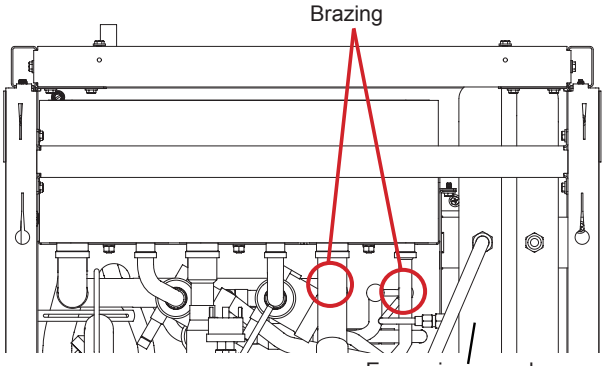


Upper view

9 Remove the brazing as shown in the figure using a blowtorch and previously cooling the pipe side with wet cloth in order to avoid brazing material entering the expansion valve.

CAUTION

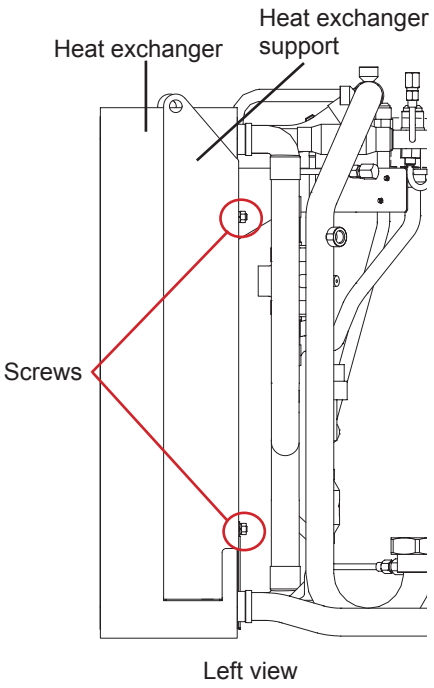
Protect the connecting wires and pipe insulation from the brazing flame. Remove pipe insulation if necessary.



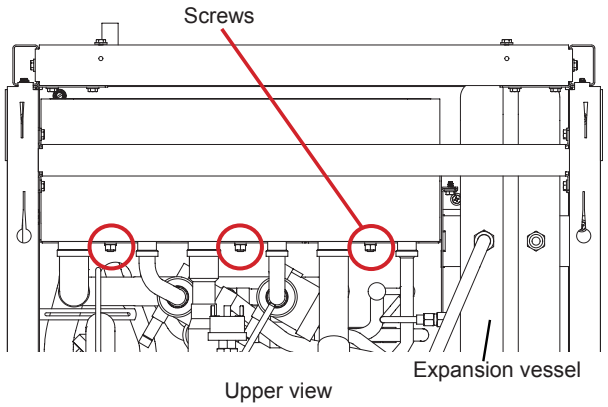
Upper view

10 Remove the two screws fixing the heat exchanger to the heat exchanger support:

- 1 screw at upper side.
- 1 screw at bottom side.



Left view



Upper view

11 Remove plate heat exchanger.

12 Install new one by performing the procedures above in reverse way.

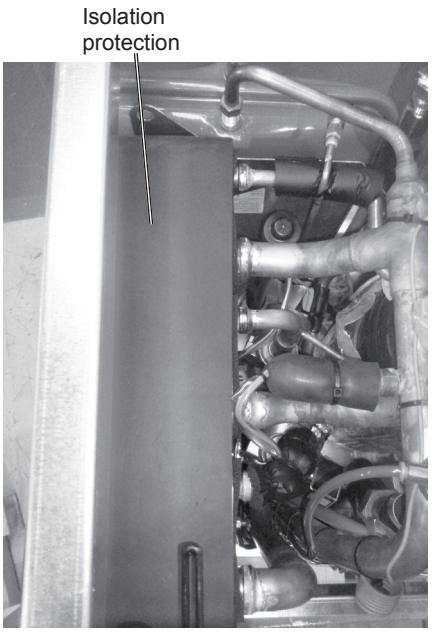
NOTE

Be careful when removing the heat exchanger because of its shape and weight.

11.2.5.12 Replace R410A-water plate heat exchanger

In case removing plate heat exchanger and components.

1 Remove indoor unit rear, left, right and upper service covers.
2 Collect the R134a refrigerant.
3 Remove refrigerant liquid thermistor (THM_L) from pipe by perform procedure *Replacing thermistors*.
4 Remove refrigerant gas thermistor (THM_G) from pipe by perform procedure *Replacing thermistors*.
5 Remove water inlet thermistor (THM_{WI}) from pipe by perform procedure *Replacing thermistors*.
6 Remove water outlet plate heat exchanger thermistor (THM_{WO}) from pipe by perform procedure *Replacing thermistors*.
7 Remove the affected wires from the clamps.
8 Remove the insulation protection affecting the heat exchanger to remove. Cut it and remove the adhesive.

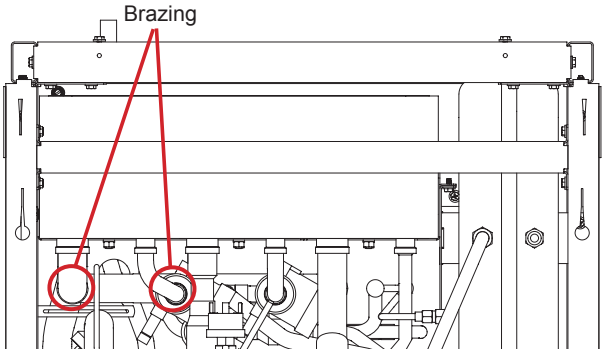


Upper view

9 Remove the brazing as shown in the figure using a blowtorch and previously cooling the pipe side with wet cloth in order to avoid brazing material entering the expansion valve.

CAUTION

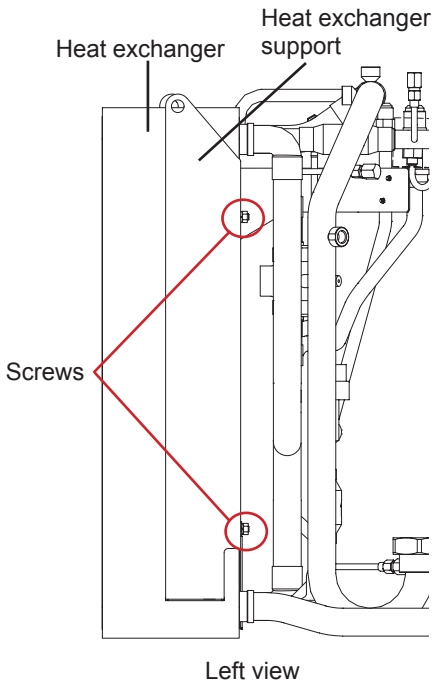
Protect the connecting wires and pipe insulation from the brazing flame. Remove pipe insulation if necessary.



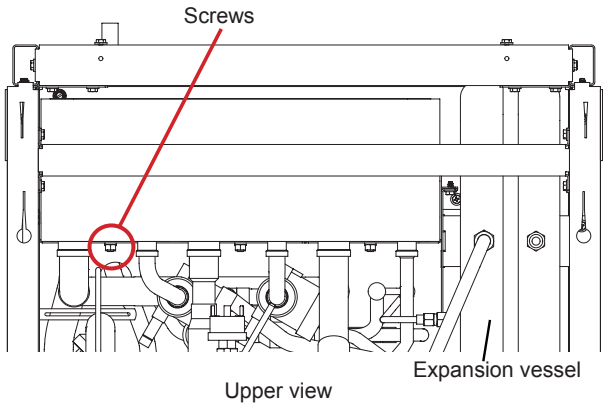
Upper view

10 Remove the two screws fixing the heat exchanger to the heat exchanger support:

- 1 screw at upper side.
- 1 screw at bottom side.



Left view



Upper view

11 Remove plate heat exchanger.

12 Install new one by performing the procedures above in reverse way.

NOTE

Be careful when removing the heat exchanger because of its shape and weight.

11.3 DHW Tank

CAUTION

- ***Before performing any of the service operations described in this chapter, turn all the indoor unit 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.***

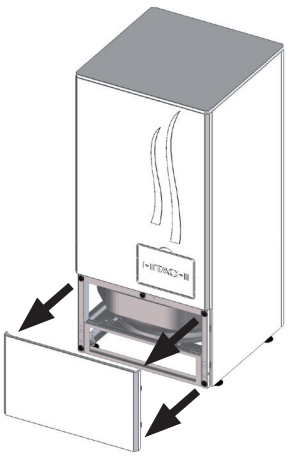
11.3.1 Removing service covers

NOTE

- ***Front cover needs to be removed for any task inside the tank.***
- ***Back cover, left cover, right cover and upper cover do not need to be removed unless tank's insulation is wanted to be removed.***

11.3.1.1 Removing the tank lower front cover

1 Remove the tank lower front cover only by pulling it out.

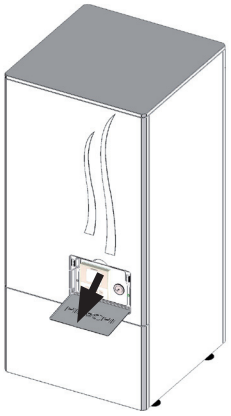


NOTE

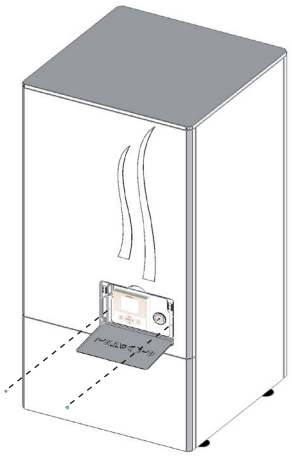
When reassembling, take into account that this cover is not symmetric. Upper and lower hooks are not at the same distance from the upper and lower cover edges.

11.3.1.2 Removing the tank upper front cover

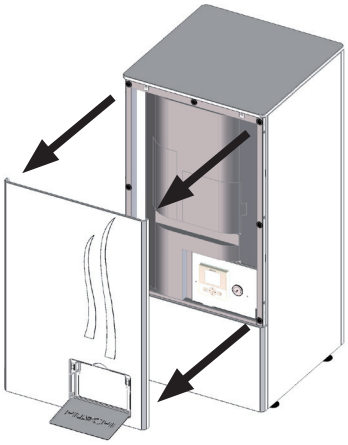
1 Open the LCD user's interface service cover.



2 Unscrew the 2 screws with the nylon washers between the screw and the cover.



3 Remove the tank lower front cover only by pulling it out.



NOTE

Take care, do not damage the LCD when removing the service cover.

11.3.1.3 Removing the tank insulation protecting the thermostat

1 Open the tank insulation protecting the thermostat placed near the LCD with the hand.

11.3.2 Replacing electrical components

DANGER

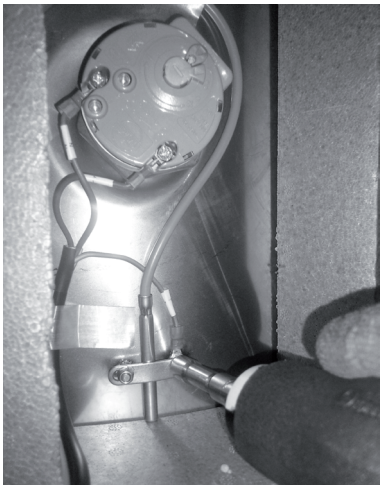
Disconnect the YUTAKI S80 from the power supply before touching any of the parts.

NOTE

To properly disconnect components from the Electrical box, see the Electrical wiring diagram chapter of this manual.

11.3.2.1 Replace thermistor

1 Remove indoor unit front service cover.
2 Remove electrical box.
3 Remove the tank upper front service cover.
4 Properly disconnect the Tank thermistor THM_{DHWT} wires from the 28 and 29 connections of the Terminal Board 2 of the electrical box.
5 Remove the two screws of the clamp attaching the thermistor to the tank surface

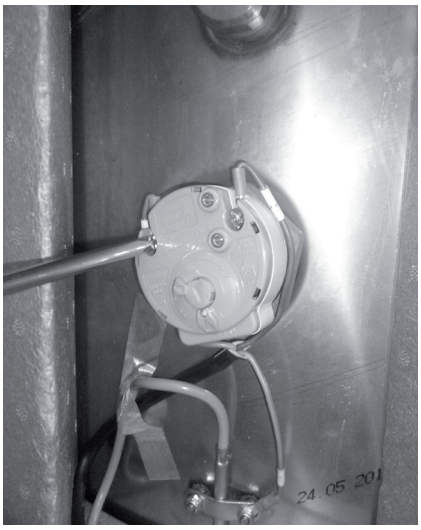


6 Remove the thermistor by hand and remove the wire sensor from the tank.

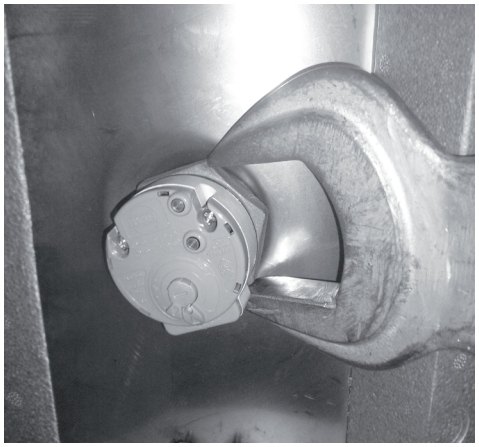
7 Install new one by performing the procedures above in reverse way.

11.3.2.2 Replace electric heater

1 Remove indoor unit front service cover.
2 Remove electrical box.
3 Remove the tank upper front service cover.
4 Disconnect the electric wires (N and L) by unscrewing them from the thermostat.



5 Unscrew the electric heater from the tank and remove it.



6 Install new one by performing the procedures above in reverse way.

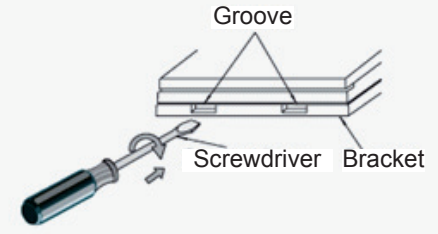
11.3.2.3 Replacing LCD controller

CAUTION

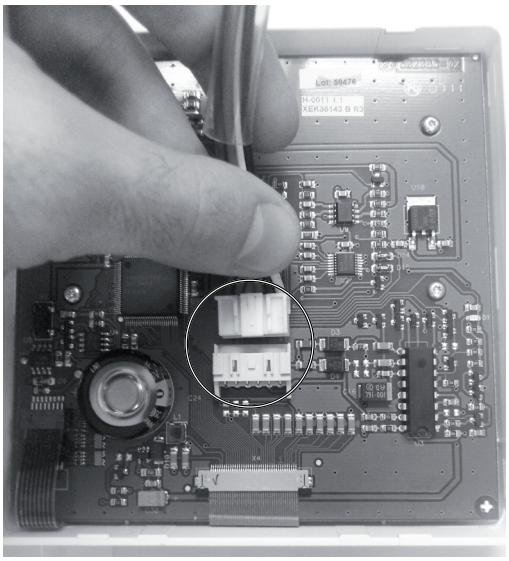
- ***Pay attention to do not touch the micro and other components on LCD controller PCB. (This is malfunction protection by static electricity).***
- ***Pay attention to do not disconnect the flat cable between LCD Buttons and LCD PCB.***

1 Remove the tank upper front service cover.

2 Using a flat-head screwdriver, separate the control unit bracket from the front section as indicated.



3 Disconnect LCD's connector CN1



4 Replace LCD controller by a new one.

12. Troubleshooting

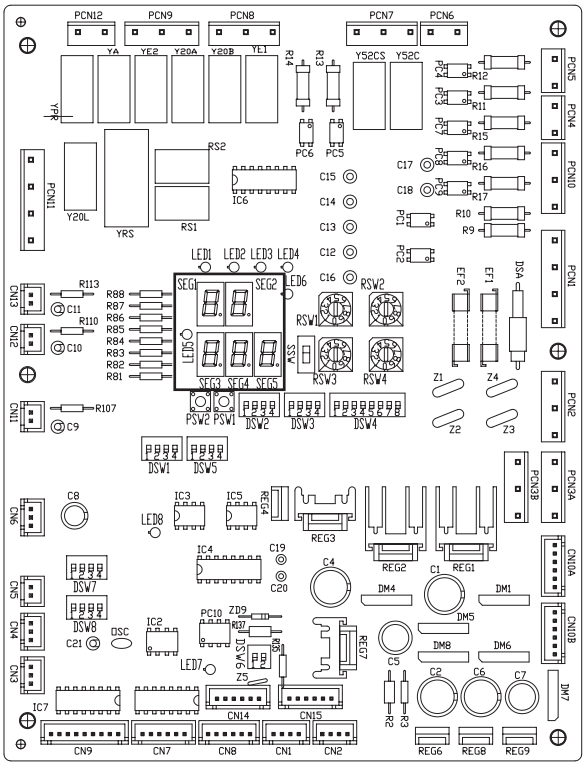
Índice

12.1 Normal operation

12.1.1 Normal operation display on PCB1

◆ Seven Segment display

	Segment Display	
	Upper (2 char)	Lower (3 char)
Proceeding initialization (Prduct software XXX)	RH	
Waiting for pump feedback (during unit operation)	PU	
Unit OFF	oF	
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	th	---
Test Run Cooling (Refrigerant recovery function)	tc	---
Tariff function enabled	HE	tAr

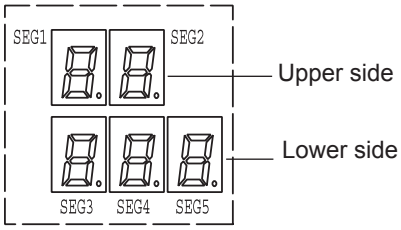


◆ LED indication

Name	Colour	Indication
LED 1	Green	Pump operation
LED 2	Green	System heater or boiler operation
LED 3	Green	HSW heater operation
LED 4	Red	Heat pump operation (Thermo ON/OFF)
LED 5	Yellow	Operation: Indicates power supply to the unit
LED 6	Red	Alarm (Flickering with 1 sec interval)
LED 8	Yellow	H-Link indication transmission

12.1.2 Normal operation display on PCB3

◆ Seven Segment display



General Indication	Content
88	Proceeding Initialization
88	Power ON (During unit stoppage)
oF	Stoppage by Thermo-OFF
HE	Heating operation (Normal operation)
HE↔P0	Heating operation (Activation of forced compressor frequency control due to low pressure difference:forced up)
HE↔P1	Heating operation (Activation of forced compressor frequency control due to high pressure difference:forced down)
HE↔P2	Heating operation (Activation of forced compressor frequency control due to excessively high discharge pressure: forced down)
HE↔P3	Heating operation (Activation of forced compressor frequency control due to excessively high current :forced down)
HE↔P4	Heating operation (Activation of forced compressor frequency control due to excessively high inverter fin temperature: forced down)
HE↔P6	Activation of forced compressor frequency control due to low pressure
P-↔06	Retry operation (by alarm 02-91, t1 on 7segments)
P-↔11	Retry operation (by alarm 02-E1 on 7segments)
P-↔12	Retry operation (by alarm 02-h1 on 7segments)
P-↔17	Retry operation (by alarm 51, 52, 53, 54 on 7segments)
P-↔18	Retry operation (by alarm 04, 06 on 7segments)
E0(Flickering)	Initializing electronic expansion valve

◆ LED indication

Name	Colour	Indication
LED 1	Green	Power supply indication
LED 2	-	Not used
LED 3	-	Not used
LED 4	Red	Operation status indication (2nd cycle)
LED 5	Yellow	Alarm indication
LED 6	-	Not used
LED 8	Yellow	H-Link indication transmission

12.1.3 Normal operation display on LCD

The LCD display is an interactive interface that shows all the operation status at real time.

NOTE

Please, refer to chapter** LCD user's interface**.

12.2 Initial troubleshooting

12.2.1 Unit and System controller - Power Supply failure

If the fuses are blown out or a circuit breaker is activated, investigate the cause of the overcurrent and take the necessary action.

Observed failure	Cause		Check item	Action (Turn OFF the main switch)
Power failure or power is not ON			Measure the voltage using a voltmeter	Supply the power
Blown out fuse or activation of the breaker at the power source	Accidental grounding for live cables		Measure the insulation resistance	Remove the cause of the short circuit and replace the fuse
	Failure of compressor motor		Measure the interphase resistance, insulation resistance	Replace compressor and fuse
	Failure of fan motor			Replace fan motor and fuse
Blown out fuse at the control circuit	Live cables short circuit		Check for any un-insulated part of the wires	Remove the cause of the short circuit and replace the fuse
	Short circuit of the control circuit to earth		Measure the insulation resistance	Remove the cause of the short circuit and replace the fuse
	Failure of the magnetothermic switch for the compressor	Insufficient contact	Check for magnetothermic switch to activate correctly	Replace magnetothermic switch and fuse
		Coil failure	Measure coil resistance	
	Failure of the magnetothermic switch for the pump	Insufficient contact	Check for magnetothermic switch to activate correctly	Replace magnetothermic switch and fuse
		Coil failure	Measure coil resistance	
	Failure of auxiliary relay	Insufficient contact	Check for magnetothermic switch to activate correctly	Replace auxiliary relay and fuse
		Coil failure	Measure coil resistance	
	Failure of solenoid valve coil	Coil failure	Measure coil resistance	Replace coil and fuse
	Short circuit in PCB		Check for the existance of any conductive contaminants	Remove the particles and replace fuse
	Oil heater failure		Meassure resistance	Replace heater and fuse
	Failure of freeze protection heater for water piping		Meassure resistance	Replace heater and fuse
Failure of the transformer			Check the transformer voltage output	Replace the transformer

Observed failure	Cause	Check item	Action (Turn OFF the main switch)
System controller cable disconnected		Connect the cable	Replace the cable or repair the cable
One (or several) phase failure, or inverted phase order ("05" alarm). Only in three phase unit.		Check the connection of R,S and T phase.	Reorder the phases
Failure of remote/local switch or remote/local switch set at “local”		Check remote/local switch	Turn the switch to “remote” or replace switch
Deficient contact at terminal controller connectors	Insufficient connection or incorrect connection of the PCB	Check the connectors and terminals	Remove rust, dust or any contaminants, check the correct tightening of the terminals
	Insufficient connection or incorrect connection of the terminal in remote controller		
Failure of the system controller		Refer to “Troubleshooting of system controller”	
Undefined PCB failure	Unconnected wires to PCB	Check the connectors	Correctly connect the wires
	Failure of PCB	Check PCB through its self-diagnostic mode	Replace PCB if it failed
Incorrect wiring connection		Take action according to the procedure that is displayed in "TEST RUN"	

12.2.2 Abnormal operation of the devices

Observed failure	Cause		Check item	Action (Turn OFF the main switch)
Blown out fuse at the pump suction	Pump block		Check water freezing or clogging	Removes the clogging
	Over current of the pump		Check pump current	Replace the pump
Freeze protection control activated	Insufficient water flow		Check inlet and outlet water temperature difference	Increase the water flow
	Pump reverse rotation		Check pump running direction	Connect correctly the pump wiring
	Air mixed in the water		Check air purger	Empty the air contained
	Water inlet and outlet temperature themistor failure		Measure the thermistor resistance	Replace the thermistor
	Pump reverse rotation		Check the rotation direction	Change rotation direction
	Water outlet temperature excessively low		Check that water outlet temperature is not out of working range	Check correct installation
	Clogging of the water strainer		Check the water strainer	Remove the clogging
	Clogging of the water side heat exchanger		Check the water side heat exchanger	Chemical cleannig
	Malfunction of the low pressure sensor		Sensor wiring - Check the sensor characteristics	Fix wire. Replace low pressure sensor
	Gas leakage or low quantity of refrigerant		Check leakage and super-heat	Charge correctly the refrigerant quantity
Unit stopped in heating operation	High cut caused by Pd (high pressure) surpassing	Insufficient water flow	Check the water temperature difference between inlet and outlet	Increase the water flow
		Too much refrigerant	Check clogging of discharge side pipe	Remove the clogging
		Clogging of the expansion valve	Check clogging of discharge side pipe	Remove the clogging
		Clogging strainer (not water)	Check the temperature difference before/after strainer	Replace or cleaning strainer
		Clogging of the 3-way valve	Check the clogging	Remove the clogging or replace the 3-way valve
		Water scale attaching inside the water side heat exchanger	Check the water side exchanger	Chemical cleaning
		Excessively high water outlet temperature	Check water temperature	Check the installation

Observed failure	Cause		Check item	Action (Turn OFF the main switch)
Unit stopped in heating operation	Excessively high discharge gas temperature (too much super-heat)	Malfunction of the 3-way valve and also internal leakage	Check gas leakage or shortage of refrigerant	Replace the 3-way valve
			Malfunction of check valve	Replace check valve
			Clogging of the expansion valve	Remove the clogging
			Clogging of the refrigerant side strainer	Replace or clean the strainer
		Failure discharge gas temperature thermistor	Measure the resistance of thermistor	Replace the thermistor
		Failure liquid bypass solenoid valve	Check solenoid valve	Replace the solenoid valve
		Clogging of the solenoid liquid solenoid bypass capilary	Clogging of capilary	Replace capilary
	Over current compressor	Excesive current consumption	Voltage supply too high/ low	Check the limits in "working range". (I-III phase)
			Check the interface impedance or power supply	Measure each interface voltage & contact the electrical coMPany
			Excessively high pressure in the high pressure sensor	Check the cause
		Single or double phase operation (only 3 phase model)	Check the main fuse	Replace the fuse
			Check the loose of the screw power supply terminal	Tighten the screw
			Check contact point or magnetic contact for compressor	Replace magnetic contact
	Over current compressor	Failure compressor bearing	Check bearing seal state	Replace the compressor
		Failure in the compressor motor insulation	Check insulation resistance	Replace the compressor (option "replace the insulation")
		Failure current sensor for compressor	Check the connector	Repair the wiring connection or replace the current sensor
	Blown out fuse at the pump circuit	Blocked pump	Check if there exist any solid particle, or iced water	Chemical cleaning of the foreign particle
		Failure of the magnetic contact of the pump	Check the magnetic contact	replace the magnetic contact
A lot of ice is attached on the airside (heating mode heat exchanger)	Automatic defrost is de-activated	Failure of the thermistor	Measure the resistance of the thermistor	Replace the thermistor
		Failure of the 3-way valve	Check the activation 3-way valve	Replace the 3-way valve
	Short circuited		Check obstacles around the unit	Remove the obstacles
	Failure of the low pressure sensor		Check the display pressure and actual pressure	Remove the low pressure sensor
	Unit is in ice condition		-	Perform manual defrosting
Unit is stopped by highcut in defrost operation	Failure of high pressure sensor		Check the pressure & actual value of the high pressure sensor	Replace high pressure sensor

Observed failure	Cause		Check item	Action (Turn OFF the main switch)
Insufficient heating process	Heating load is higher than heating capacity		Check the heating load	Install an adequate size unit
	Excessively low suction pressure	Gas leakage	Check gas leakage & super-heat	Charge correctly the quantity of refrigerant
	Clogging of the expansion valve		Check the clogging of expansion valve	Remove clogging
	Clogging of the strainer		Check temperature difference before/after strainer	Clean or replace the strainer
	Clogging of side low pressure pipe		Check the temperature difference of each pipe	Remove the clogging
	Malfunction of the check valve		Check the difference temperature before/after check valve	Replace the check valve
	Shortage air flow in the air side heat exchanger		Excessively dust in airside heat exchanger	Remove it
			Clogging of the inlet/ outlet at the air side heat exchanger is clock	
			Shortage the service space for Yutake unit	Secure service space
			Device rotation fan motor	Correct wiring of the fan motor
	Air temperature through heat exchanger air flow		Check the air short circuit	Repair short circuit
	Defrosting it is not enough		Check the evaporating thermistor	Replace the thermistor
			Check the 3-way valve	Replay 3-way valve
	Excessively high discharge pressure	Shortage of waterflow	Check the difference of temperature between inelet/outlet of the unit	Increase the water flow
		Pump reverse rotation	Check the rotation direction	Correct the direction
		Air mixing in the water	Check air purger	Empty the air contained
		Excessively high hot water temperature	Check the water thermistor of the unit	Replace the water thermistor or PCB
		Refrigerant excessively discharged	Check refrigerant cycle temperature	Charge the correct quantity

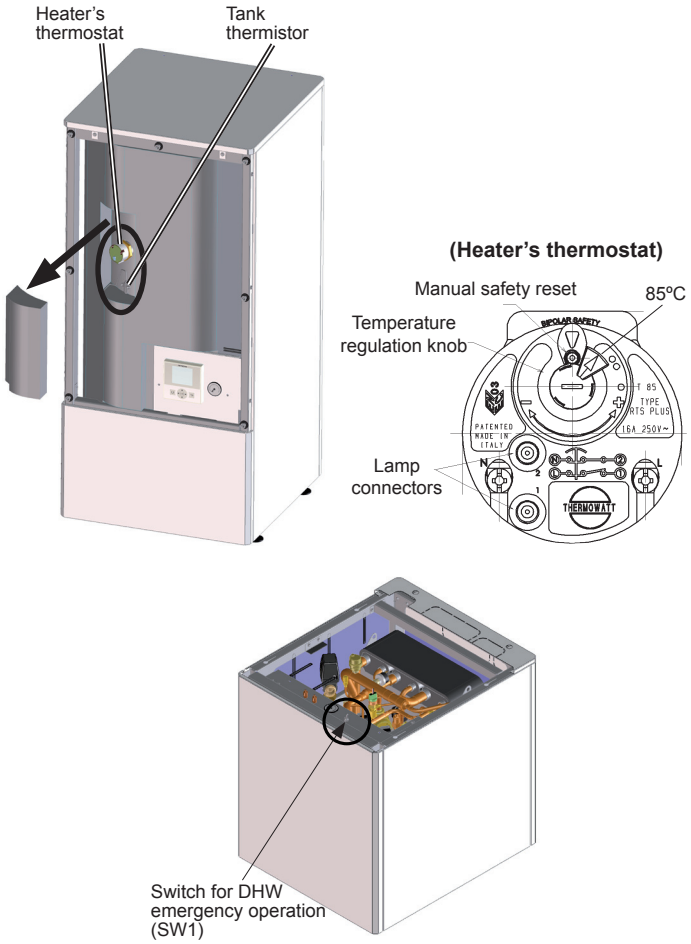
Observed failure	Cause		Check item	Action (Turn OFF the main switch)
Insufficient heating process	Excessively high discharge pressure	Non-condensable gas in the refrigerant cycle	Turn off the unit & check the relation between temperature and pressure	Evacuate and charge refrigerant again
		Clogging of the high pressure pipe	Check the clogging	Remove ghe clogging
		Clogging of the expansion valve	Check the clogging	Remove the clogging
		Clogging of the strainer	Check the difference temperature before/after strainer	Replace the strainer
		Water scale is attached in the water side heat exchanger	Check the heat exchanger	Chemical cleaning
		Malfunction or internal leakage of the 3-way valve	Check the difference temp. between inlet & outlet of the 3-way valve	Replace the 3-way valve
		Wiring failure of the 3-way valve	Check the electrical continuity at the termilnals	Repair wiring or replace 3-way valve
		Failure compressor	Check pressure cycle temperature & running current	Replace the compressor
Unit is running but does not make any sound	Unit propeller fan is hitting the shroud		Visually inspect it	Adjust the position of the propeller fan
	Abnormal sound form the compressor	Faulty installation	Check that each part is tightly fixed	Tightly fix each part
		Liquid ref. compression	Adjust the suction gas temperature and pressure	Ensure super-heat
		Wear or breakage of the internal compressor parts	Abnormal sound from the inside of the compressor	Replace the compressor
		No heat by the oil heater	Check the resistance of the oil heater and it´s fuse	Replace the oil heater and the fuse
	Humming sound from the magnetic conductor		Check the surface of the contacts	Replace the magnetothermic switch
	Abnormal vibration of the cabinets		Check each fixing screw	Tightly fix each screw

12.2.3 Domestic Hot Water Tank troubleshooting

Observed failure	Cause	Check item	Action
Problems in Water Circuit due to low Water Pressure or no Water in Water Circuit	Water Pressure < 0,1 MPa	Check Water Pressure (must be >0,1MPa)	Fill Water Circuit with enough pressure (< 0.1MPa)
		Check if Water Circuit is locked	Check Security and Check Valves and Water Circuit to ensure water circulation
		Check if there is Water leaks	Check Water circuit, Flexible pipes and pipe connections and repair leaks if exist
Problems in Water Circuit due to excesive Water Temperature in Water Circuit	Thermostat Cut-Out activated (Excesive water temperature higher than 90ºC)	Check connection between Indoor TB2 and DHWT	Terminals 28&29 from TB2 connected to DHWT Thermistor connection
		Check Water Temperature and Thermostat state	Push reset button for thermostat re-start
		Check Set Temperature	Set it at the correct temperature

◆ DHWT electric heater emergency operation

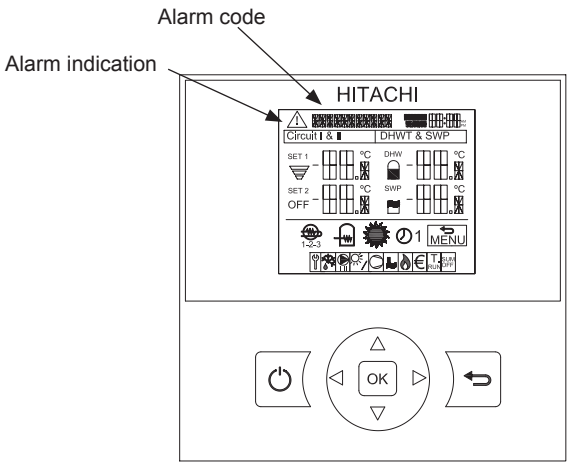
In case of outdoor unit or indoor unit malfunction, the domestic hot water tank can be heated by an internal heater activating an specific switch (SW1) located beside the indoor unit manometer. In this case, the temperature setting should be performed by the heater's thermostat. Select the temperature by means of the temperature regulator located at the front side of the tank (maximum position is 85ºC).



12.3 Troubleshooting procedure by alarm code

12.3.1 Alarm display

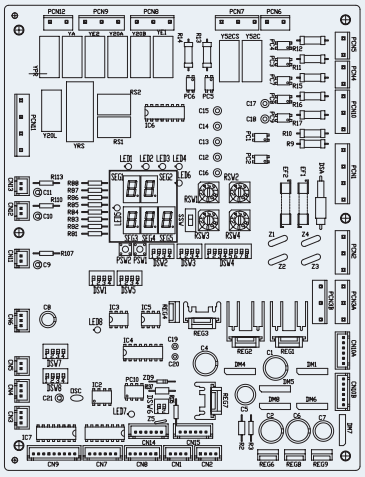
◆ Alarm code indication on LCD controller



◆ Alarm code indication on 7 segment

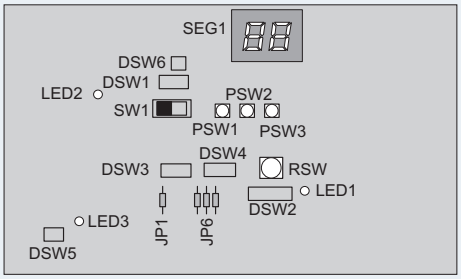
Indoor unit

Position of the 7 segment at the indoor PCB1&3:

RWH-(4-6)FS(V)NFE	
• The 7 segment at the indoor PCB1 will show the alarms from the outdoor unit, the hydraulic circuit and the 1st cycle • The 7 segment at the indoor PCB3 will show the alarms from the 2nd cycle	

Oudoor unit

Position of the 7 segment at the outdoor PCB:

RAS-(4-6)H(V)RNME-AF	
• The 7 segment at the outdoor PCB will show the alarms from the outdoor unit	

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12.3.2 Alarm codes

LCD display	7 segment display	Origin	Detail of abnormality	Main factors
02	02	Outdoor	Activation of outdoor unit protection device (Except for alarm code 42)	High pressure interrupting device activated
03	03	Outdoor - 1st cycle	Transmission error	Outdoor fuse meltdown, Indoor/outdoor connection wiring (breaking, wiring error, etc.)
04	04	Outdoor	Inverter transmission abnormality	Control PCB – Inverter PCB connection wiring (breaking, wiring error, etc.)
05	05	Outdoor	Power phase detection abnormality	Power source wiring open phase in indoor units
06	06	Outdoor	Undervoltage, overvoltage	Outdoor PCB abnormality, inverter PCB abnormality, DM, CB abnormality
07	07	Outdoor	Abnormal decrease of discharge gas superheat degree	Excessive refrigerant, expansion valve open-locked, fan motor locked
08	08	Outdoor	Compressor-Top temperature over-increase	Shortage or leakage of refrigerant, piping clogging, fan motor lock
11	11	Hydraulic	Water inlet thermistor abnormally (THM_{WI})	Loose, disconnected, broken or short-circuited connector
12	12	Hydraulic	Water outlet thermistor abnormally (THM_{WO})	Loose, disconnected, broken or short-circuited connector
13	13	1st cycle	Indoor liquid pipe temperature thermistor abnormality (THM_{L})	Loose, disconnected, broken or short-circuited connector
14	14	1st cycle	Indoor gas pipe temperature thermistor abnormality (THM_{G})	Loose, disconnected, broken or short-circuited connector
15	15	1st cycle	Water outlet C2 thermistor abnormally (THM_{WO2})	Loose, disconnected, broken or short-circuited connector
16	16	1st cycle	Water DHWT thermistor abnormally (THM_{DHWT})	Loose, disconnected, broken or short-circuited connector
17	17	1st cycle	Water swimming pool thermistor abnormally (THM_{SWP})	Loose, disconnected, broken or short-circuited connector
18	18	1st cycle	Water outlet 3 thermistor abnormally (THM_{WO3})	Loose, disconnected, broken or short-circuited connector
20	20	Outdoor	Compressor-Top temperature thermistor abnormality (THM9)	Loose, disconnected, broken or short-circuited connector
21	21	1st cycle	2nd ambient thermistor abnormally (THM_{AMB2})	Loose, disconnected, broken or short-circuited connector
22	22	Outdoor	Outdoor temperature thermistor abnormality (THM7)	Loose, disconnected, broken or short-circuited connector
24	24	Outdoor	Outdoor heat exchanger liquid pipe thermistor abnormality (THM8)	Loose, disconnected, broken or short-circuited connector
31	31	Outdoor	Indoor/Outdoor combination setting error	Outdoor/Indoor unit capacity setting error, indoor total capacity excessively large/small
35	35	Outdoor	Indoor unit number setting error	Indoor units with the same number exist in a refrigerant piping system
38	38	Outdoor	Outdoor protection detection circuit abnormality	Outdoor PCB abnormality, error in wiring to outdoor PCB
41	41	Outdoor	Pump down overload	Outdoor heat exchanger clogging/short circuit, broken outdoor fan
42	42	Outdoor	Heating overload	Outdoor heat exchanger clogging/short circuit, expansion valve close-locked
47	47	Outdoor	Suction pressure decrease prevention activated	Shortage or leakage of refrigerant, piping clogging, expansion valve close-locked, fan motor locked
48	48	Outdoor	Overload operation protection activation	Cycle abnormality, Inverter PCB abnormality, DM abnormality, heat exchanger clogging, etc.
51	51	Outdoor	Inverter current sensor abnormality	Error in CT wiring, outdoor PCB abnormality, Inverter PCB abnormality
53	53	Outdoor	Inverter module error	Compressor, ISPM abnormality, heat exchanger clogging, etc.
54	54	Outdoor	Inverter fin temperature abnormality	Fin thermistor abnormality, heat exchanger clogging, fan motor abnormality
55	55	Outdoor	Inverter non-operation	Inverter not operating or broken

LCD display	7 segment display	Origin	Detail of abnormality	Main factors
57	57	Outdoor	Abnormality of fan motor protection (DC fan motor)	
59	59	Outdoor	Inverter fin temperature thermistor abnormality	Loose, disconnected, broken or short-circuited connector
63	63	Comuni-cation	Transmission error between central and indoor communication	Indoor fuse meltdown, indoor/central connection wiring (breaking, wiring error, etc.)
EE (100)	EE	Outdoor	Compressor factor alarm	Alarm to notify damage to compressor occurs 3 times within 6 hours
70	70	1st cycle	Hydraulic alarm	Water pressure or water flow is not detected in the hydraulic cycle
71	71	1st cycle	Water pump feedback	
73	73	1st cycle	Mixing over-temperature limit protection for mixed circuit	Circuit 2 supply temperature > Target temperature + offset
74	74	1st cycle	Unit over-temperature limit protection	Water supply temperature (Two) is 5ºC more than maximum water circuit temperature for 20 sec.
75	75	Hydraulic	Freeze protection by cold water inlet temperature detection	The inlet water temperature is lower than 2 ºC.
76	76	Hydraulic	Freeze protection stop by indoor liquid refrigerant temperature thermistor	
77	77	1st cycle	Opentherm communication failure	No Opentherm communication for a continuous period of 1 minute
78	78	1st cycle	RF communication failure	There is no communication for 1 hour with one or two RF receivers which are bound to the RF-Bridge.
79	79	1st cycle - outdoor	Unit capacity setting error	There is no concordance between indoor outdoor unit capacity
80	80	1st cycle - 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.)
101	02↔H1	2nd cycle	Activation of high pressure switch	The high pressure (Pd) is higher than 3 MPa.
102	02↔h1	2nd cycle	Activation of protection control for excessively high pressure	The high pressure (Pd) is higher than 2.78 MPa during 10 seconds.
103	02↔L1	2nd cycle	Activation of protection control for excessively low pressure	The suction pressure (Ps) is lower than 0.15 MPa during 1.5 minutes.
104	02↔ı1	2nd cycle	Activation of low pressure control	The suction pressure (Ps) is lower than 0.1 MPa during 3 seconds.
105	02↔E1	2nd cycle	Excessively low pressure difference	The pressure ratio calculated from high pressure (Pd) and low pressure (Ps) is lower than 1.8 MPa during 3 minutes.
106	02↔61	2nd cycle	Excessively high discharge gas temperature	The discharge gas temperature is increased to 120 ºC during 10 minutes or is higher than 140 ºC at least 5 seconds.
124	21	2nd cycle	Failure of refrigerant liquid temperature thermistor	The refrigerant liquid temperature thermistor is short-circuited or cut.
125	22	2nd cycle	Failure of inverter ebox ambient temperature thermistor	The ambient temperature thermistor is short-circuited or cut.
126	23	2nd cycle	Failure of discharge gas temperature thermistor	The discharge gas temperature thermistor is short-circuited or cut.
127	24	2nd cycle	Failure of refrigerant evaporation temperature thermistor	The refrigerant evaporation temperature thermistor is short-circuited or cut.
128	26	2nd cycle	Failure of suction gas temperature thermistor	The suction gas temperature thermistor is short-circuited or cut.
129	27	2nd cycle	Failure of discharge gas pressure sensor	The high pressure sensor is short-circuited or cut.
130	28	2nd cycle	Failure of suction gas pressure sensor	The low pressure sensor is short-circuited or cut.
132	04	2nd cycle	Abnormal transmission between Inverter PCB and Main PCB	The communication between Main PCB (PCB1) and Inverter (DIP - IPM/ISPM) is not performed correctly during 30 seconds.
134	05	2nd cycle	Abnormality of Power Supply Phase	The power source phases are reversely connected or one phase is not connected.

LCD display	7 segment display	Origin	Detail of abnormality	Main factors
135	30	2nd cycle	Incorrect PCB Setting	Wrong settings are performed in DIP switches on PCB.
136	40	2nd cycle	Incorrect operation	Wrong settings are performed in DIP switch on PCB or prohibited operation is performed.
151	06	2nd cycle	Excessively low voltage or excessively high voltage for the inverter	The voltage between terminal “P” and “N” of ISPM is insufficient.
152	51	2nd cycle	Abnormal operation of the current sensor	The compressor frequency is maintained at 15 - 18 Hz after the compressor’s start up, one of the absolute values of the running current at each phase U+, U-, V+ and V- is lower than 1.5 A.
153	52	2nd cycle	Activation of protection for inverter instantaneous over current	The compressor current is higher than the set value.
154	53	2nd cycle	Transistor module protection activation	The transistor module detects an abnormality 3 times in 30 minutes.
155	54	2nd cycle	Increase in the inverter fin temperature	The temperature of the thermistor for inverter fin exceeds 100 ºC.

◆ Cause of compressor stop

When the compressor stops due any of the factors below, Stop Reason Code (d1 Code) is sent to Indoor Unit.

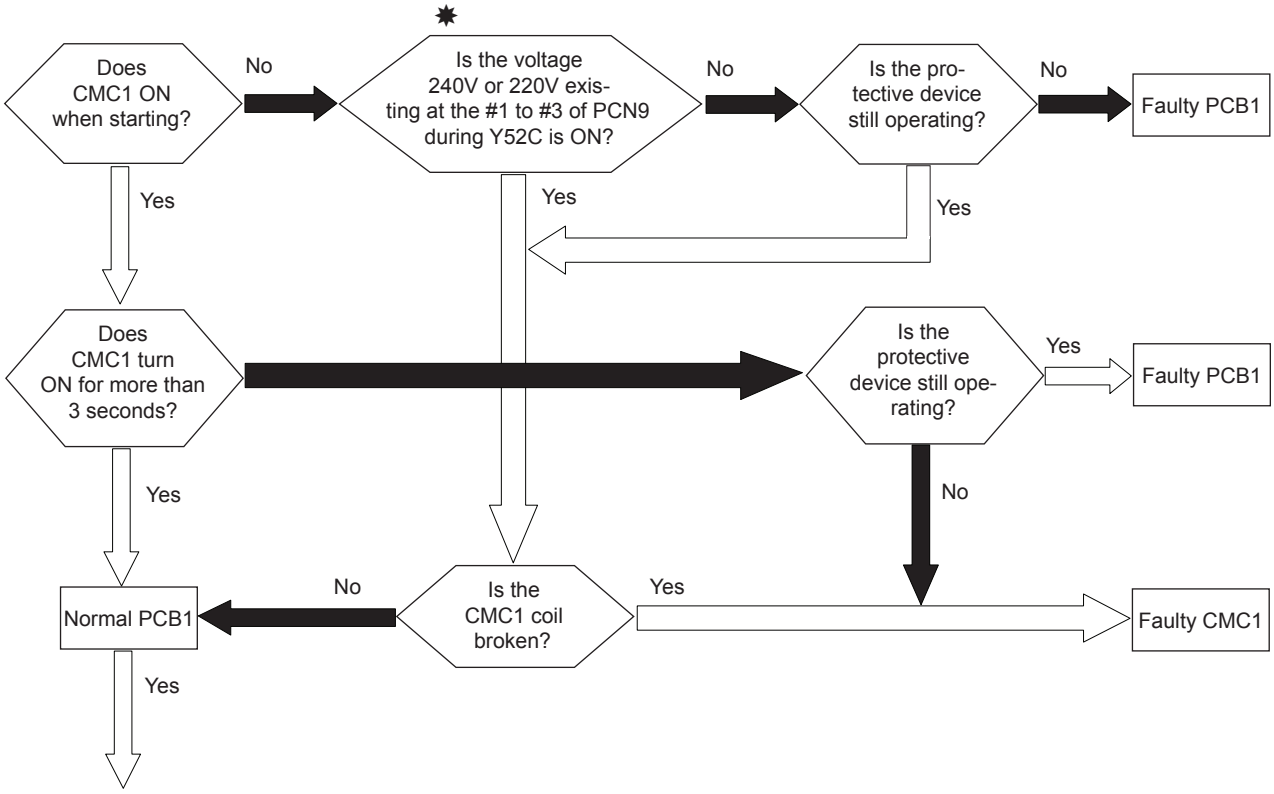
The Code will be overridden when another Code is sent before it.

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 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 heating	ON
	Discharge pressure increase prevention for 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

12.3.3 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

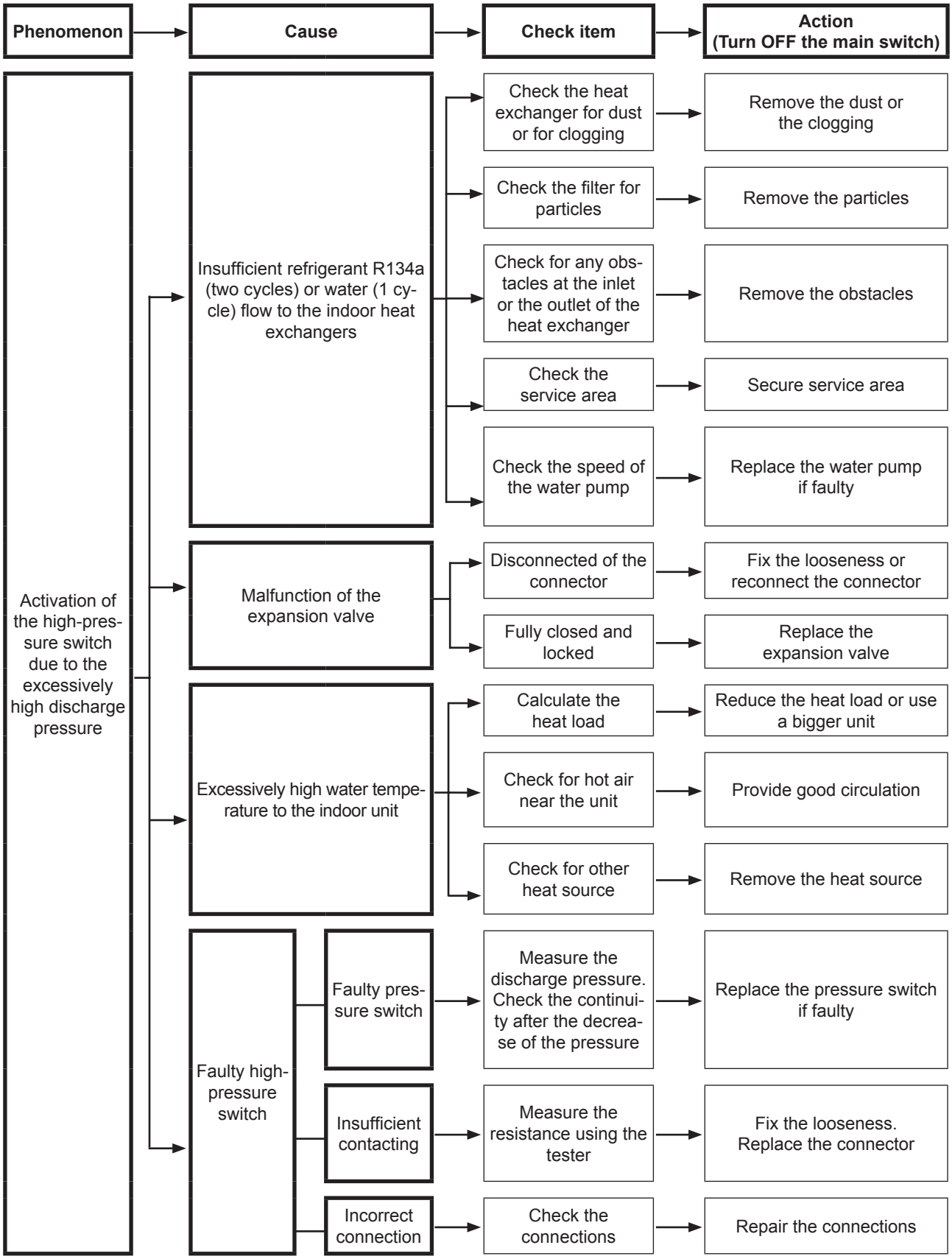
(PSH: 4.15MPa (41.5 kgf/cm²G))

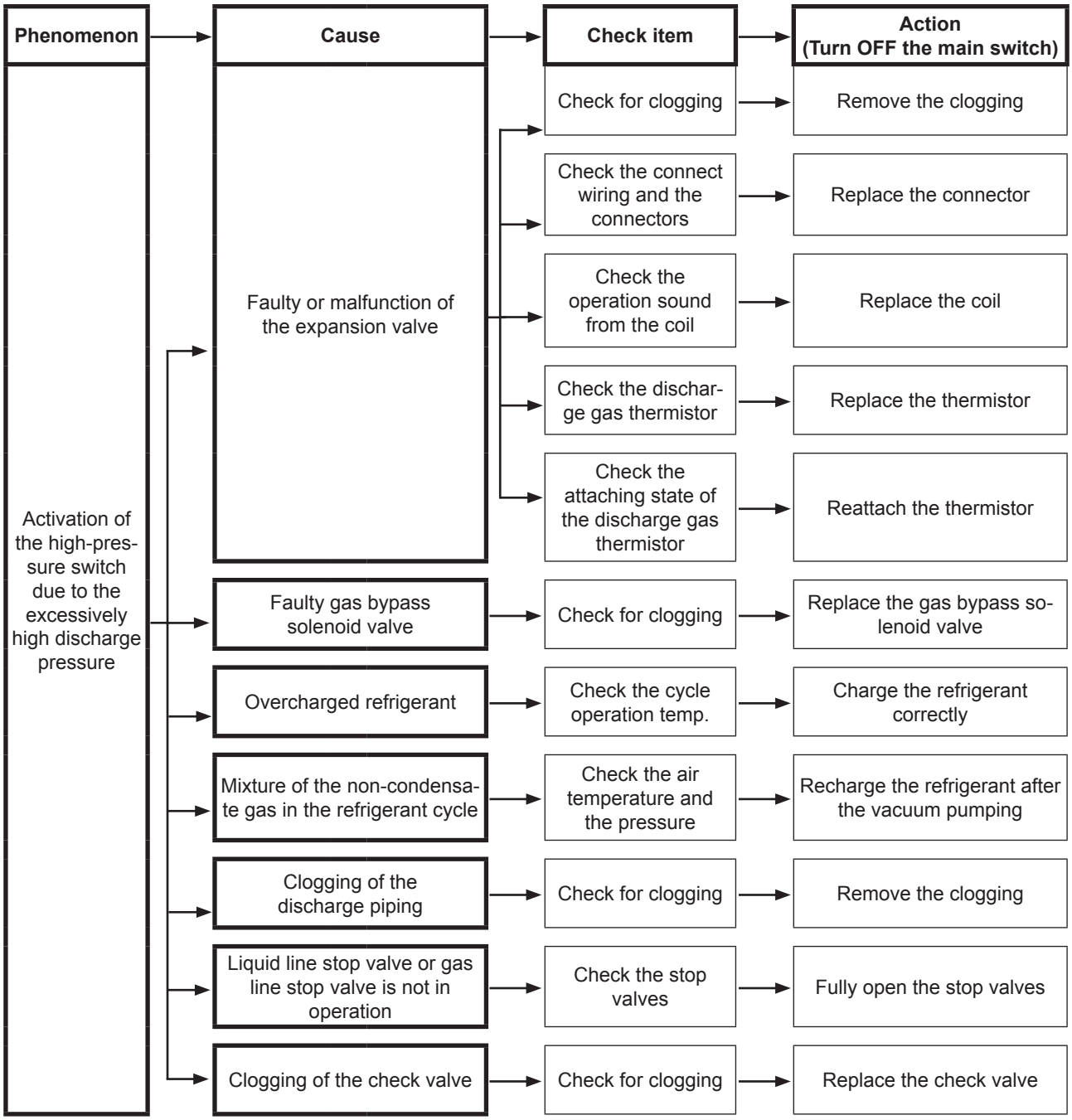
(2) Is the power source line reverse phase or open phase?

If the wiring is incorrect, perform the wiring correctly again.

✸ Check item

Connector No.	Pin No.
PCN9	#1 to #3

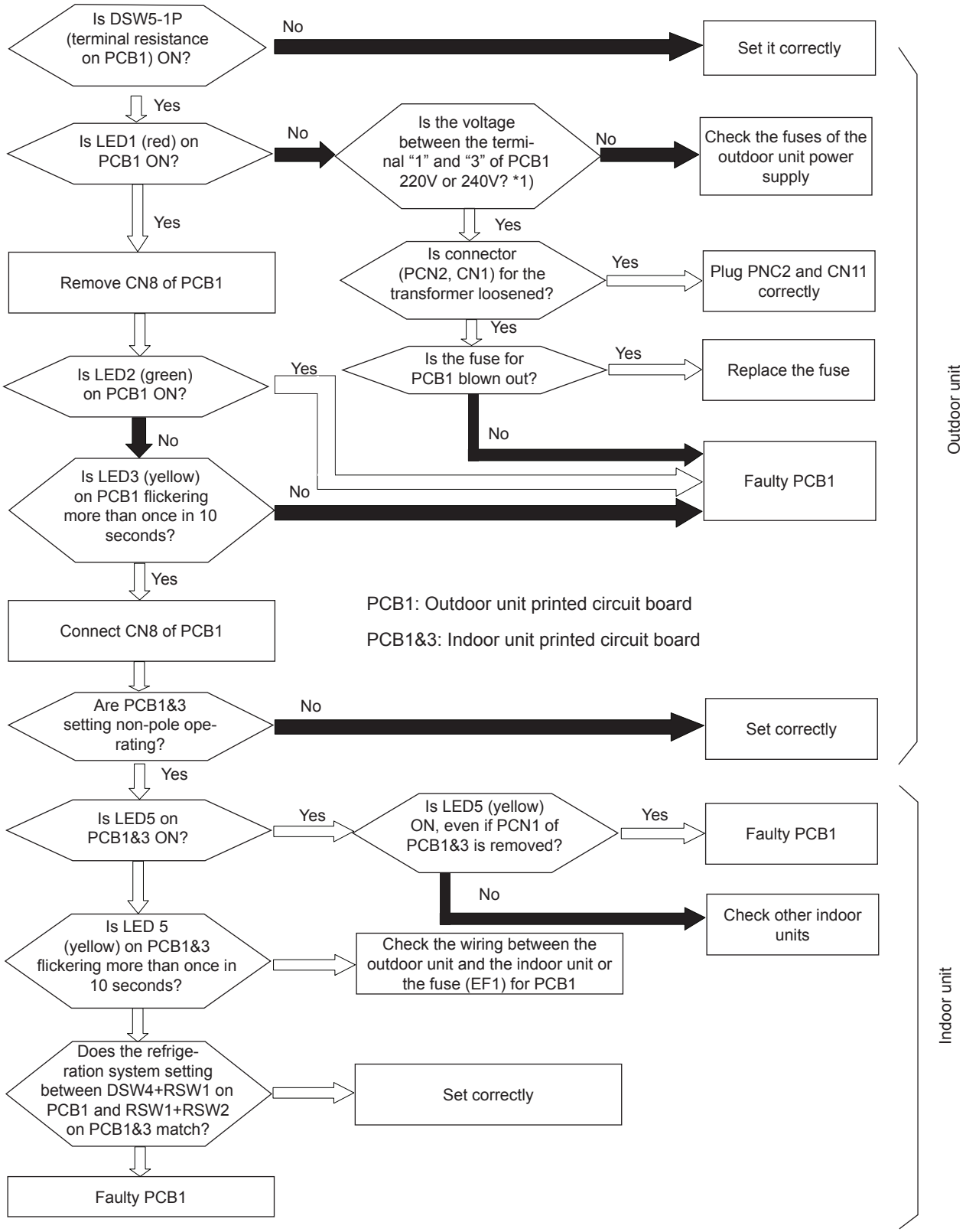

Phenomenon
Cause
Check item
Action (Turn OFF the main switch)
Activation of the high-pressure switch due to the excessively high discharge pressure
Insufficient refrigerant R134a (two cycles) or water (1 cycle) flow to the indoor heat exchangers
Check the heat exchanger for dust or for clogging
Remove the dust or the clogging
Check the filter for particles
Remove the particles
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 of the water pump
Replace the water pump 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 water temperature to the indoor unit
Calculate the heat load
Reduce the heat load or use a bigger unit
Check for hot air near the unit
Provide good circulation
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	03	Abnormal transmission between the indoor unit 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 unit 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) Check item

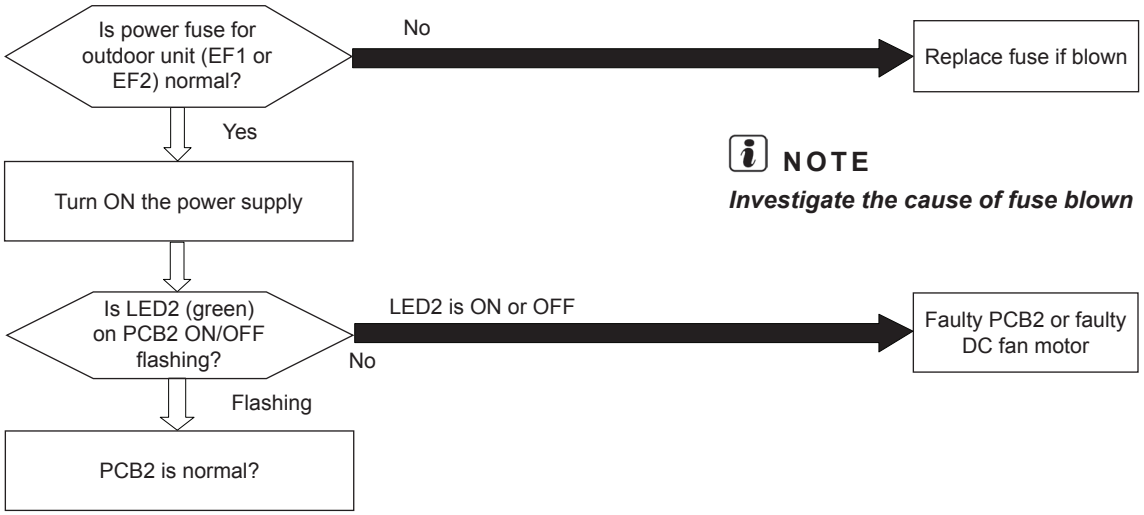
Power supply	Faston terminal
1~ 230V 50Hz 3N~ 400V 50Hz	Between 1 and 3 of PCN1 on PCB

*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 indoor unit inverter PCB2 and outdoor PCB1

- 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.



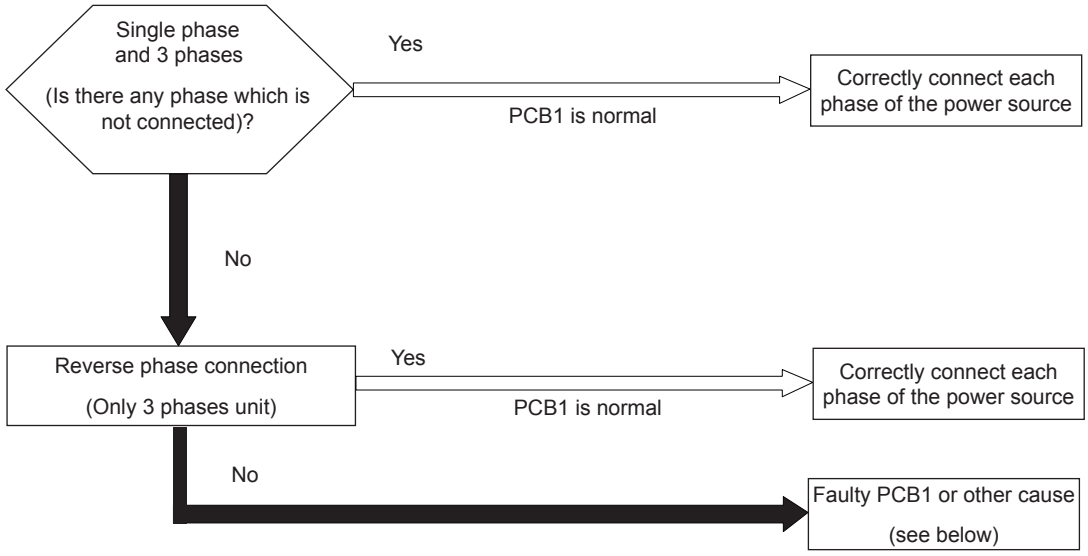
PCB1: Inverter PCB

- Inverter DIP IPM RAS-(4-6)HVRNME-AF
- Inverter ISPM RAS-(4-6)HRNME-AF

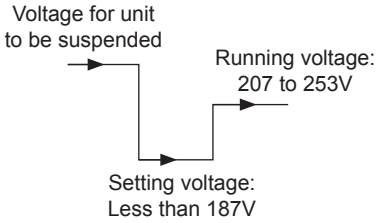
Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Disconnected wires, insufficient contacting or incorrect connection	Between control PCB1, PCB2 and FANM	Check the continuity of wires. Check for looseness of the connection screws. Check the connection No.	Replacing wires, repairing, tightening screws and incorrect wiring
	Power source wiring for the outdoor unit		
Faulty PCB (PCB1 for the control, PCB2 for the inverter)	Disconnected wires to PCB	Check the connections	Repair the wiring connections
	Faulty PCB	-	Replace PCB if faulty
Incorrect wiring	Disconnected wires; insufficient contacting	Check the continuity. Check for looseness of connection screws	Replacing wires, repairing, tightening screws
	Incorrect wiring	Check the connection nos.	Correctly connect the wires

Alarm code	05	Code abnormal operation of picking up phase signal

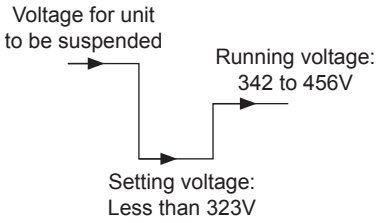
- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - This alarm is displayed when the main power source phase is reversely connected or one phase is not connected.



RAS-(4-6)HVRNME-AF



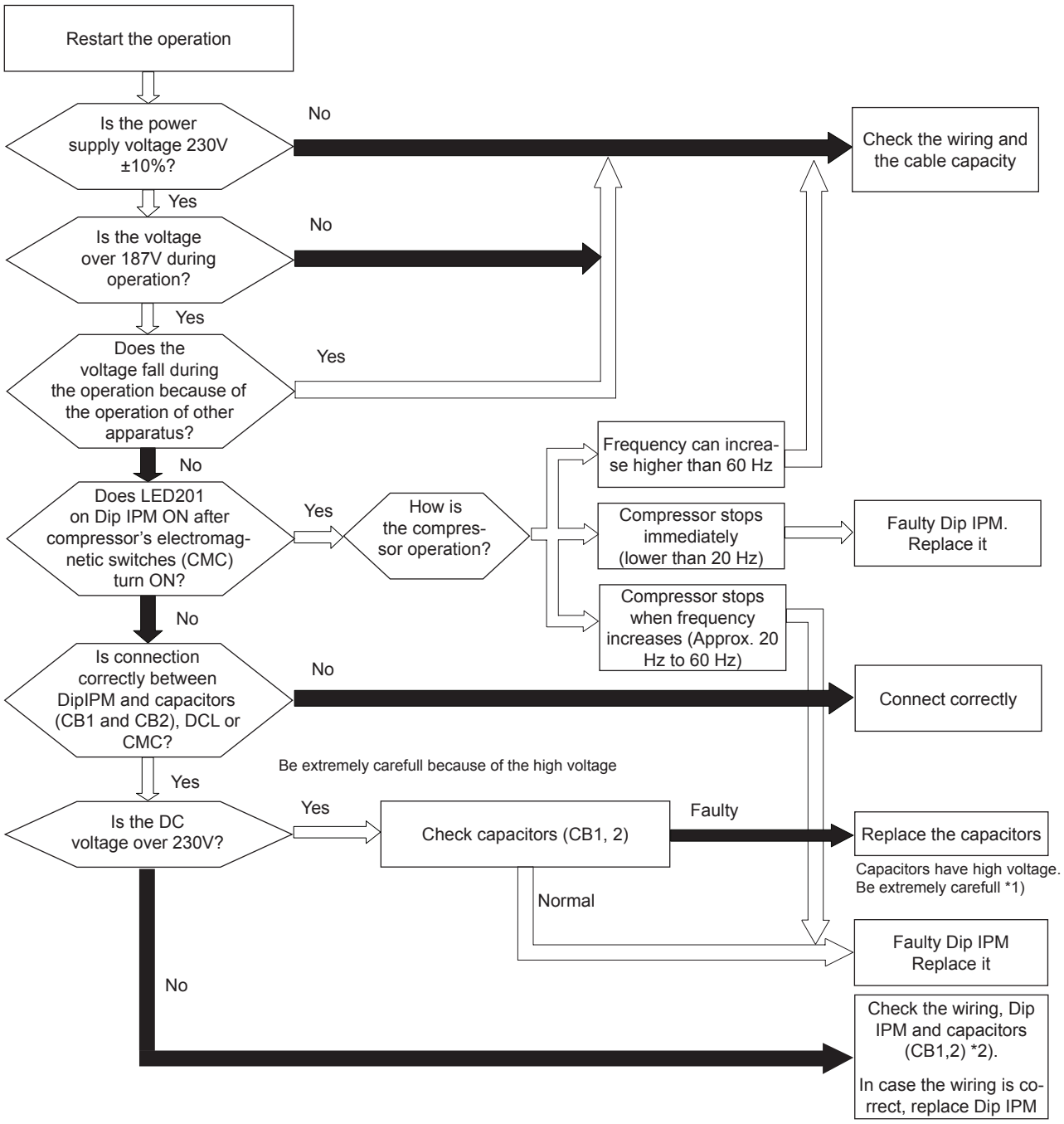
RAS-(4-6)HRNME-AF



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-(4-6)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.

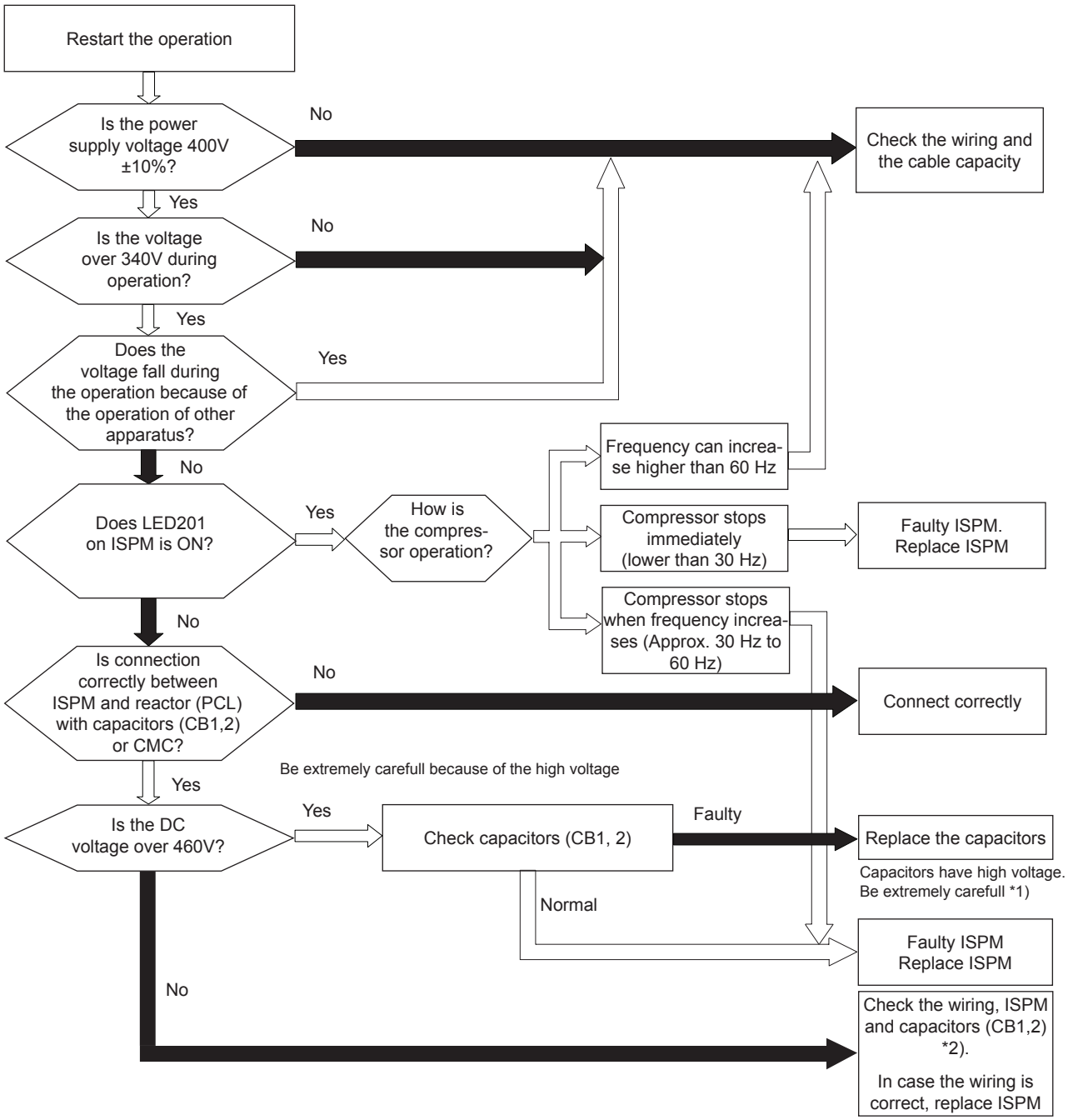


*1) If the capacitor has a high voltage, perform the high-voltage discharge procedure. Refer to *Procedure of checking other main parts*.

*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.

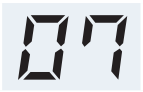


*1) If the capacitor has a high voltage, perform the high-voltage discharge procedure. Refer to *Procedure of checking other main parts*.

*2) Checking procedures of the diode module are displayed in item *Procedure of checking other main parts*.

*3) DC voltage measuring position:

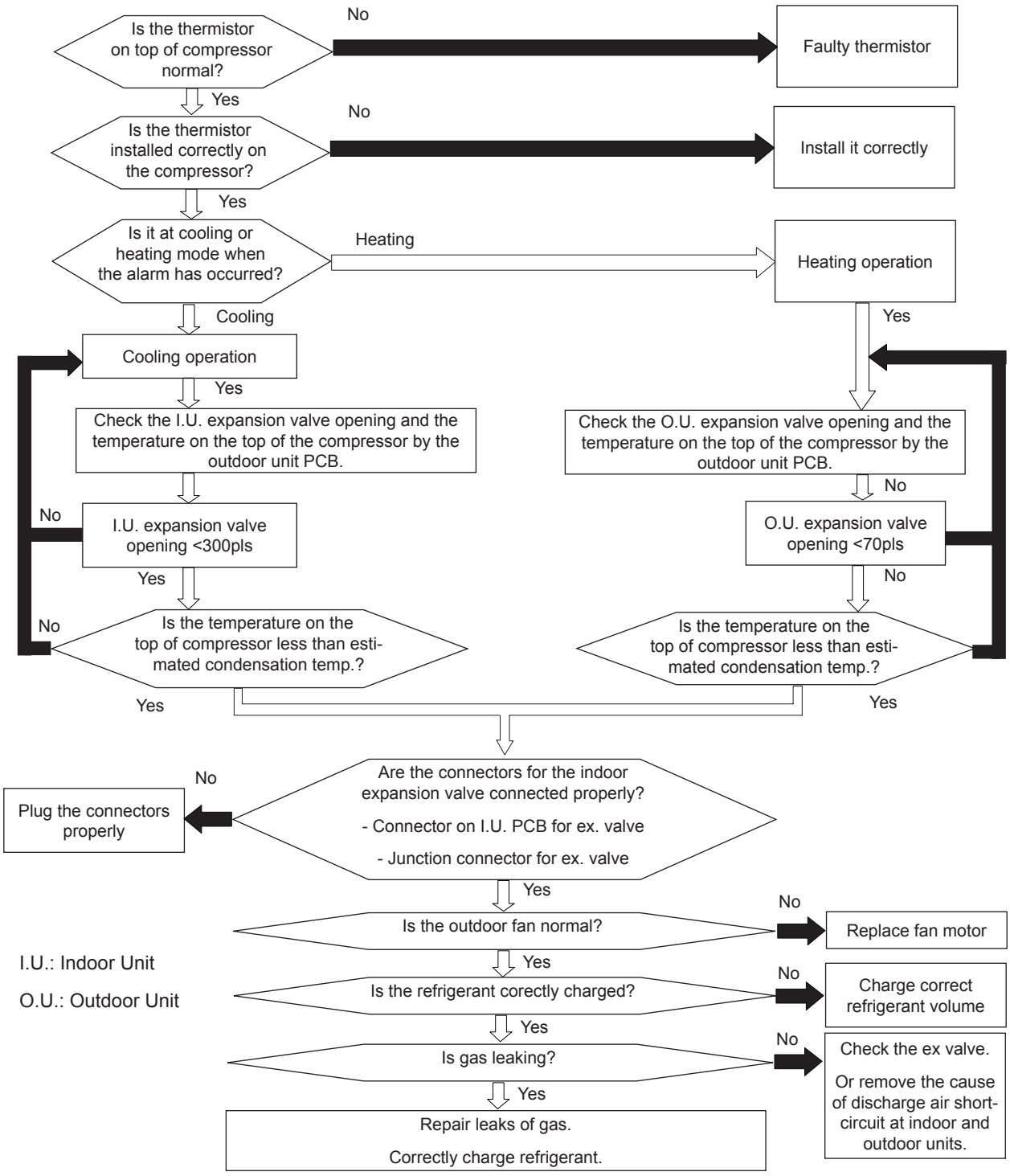
ISPM “P” terminal to “+” terminal of tester, “N” terminal to “–” terminal of tester measuring position: DC 1000V.

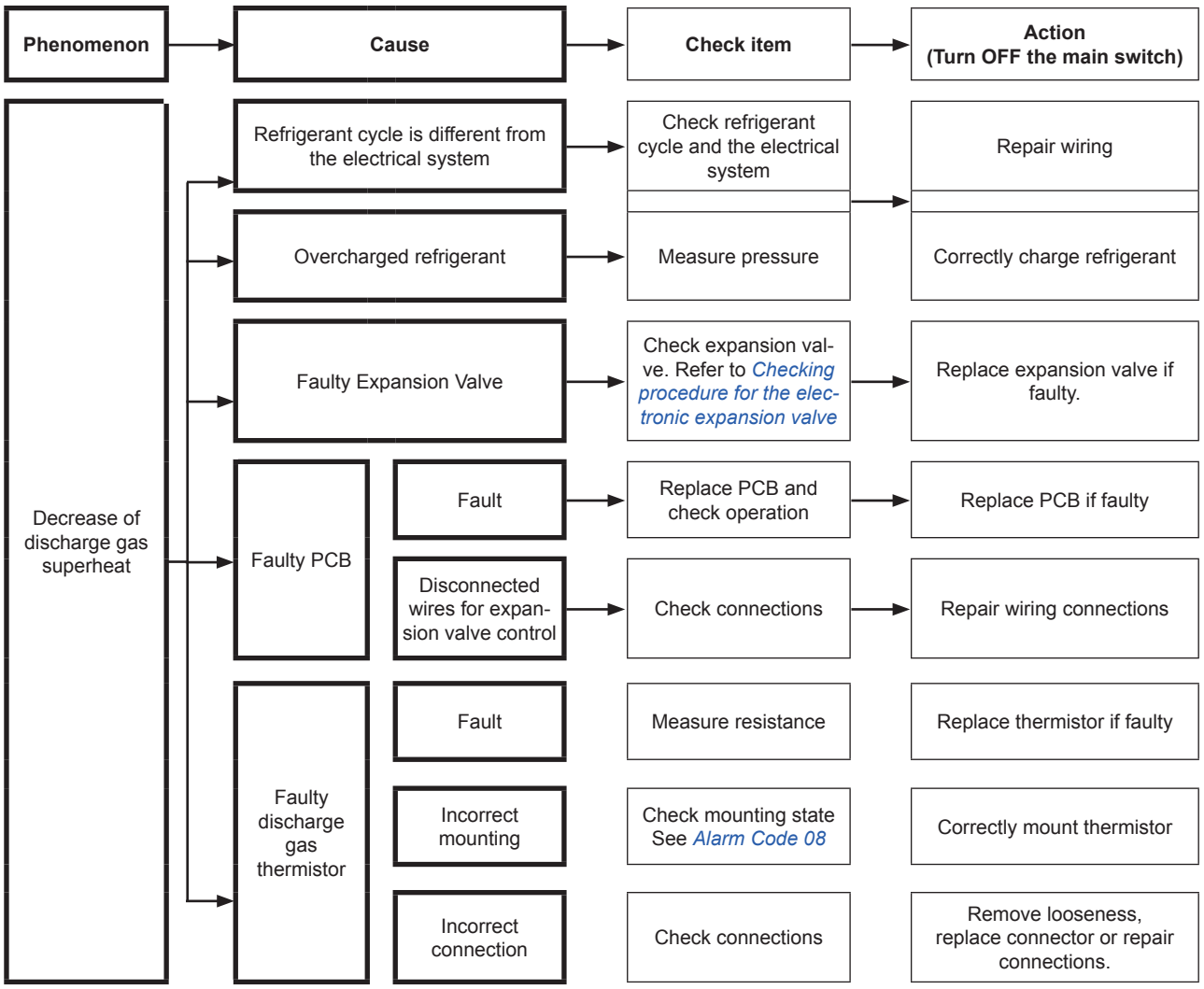
Alarm code		Decrease of Discharge Gas Superheat

- 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 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.


Is the thermistor on top of compressor normal?
No
Faulty thermistor
Yes
Is the thermistor installed correctly on the compressor?
No
Install it correctly
Yes
Is it at cooling or heating mode when the alarm has occurred?
Heating
Heating operation
Cooling
Yes
Cooling operation
Yes
Check the I.U. expansion valve opening and the temperature on the top of the compressor by the outdoor unit PCB.
Check the O.U. expansion valve opening and the temperature on the top of the compressor by the outdoor unit PCB.
No
I.U. expansion valve opening <300pls
No
O.U. expansion valve opening <70pls
Yes
No
Is the temperature on the top of compressor less than estimated condensation temp.?
No
Is the temperature on the top of compressor less than estimated condensation temp.?
Yes
Yes
Are the connectors for the indoor expansion valve connected properly?
- Connector on I.U. PCB for ex. valve
- Junction connector for ex. valve
No
Plug the connectors properly
Yes
Is the outdoor fan normal?
No
Replace fan motor
Yes
Is the refrigerant corectly charged?
No
Charge correct refrigerant volume
Yes
Is gas leaking?
No
Check the ex valve.
Or remove the cause of discharge air short-circuit at indoor and outdoor units.
Yes
Repair leaks of gas.
Correctly charge refrigerant.
I.U.: Indoor Unit
O.U.: Outdoor Unit

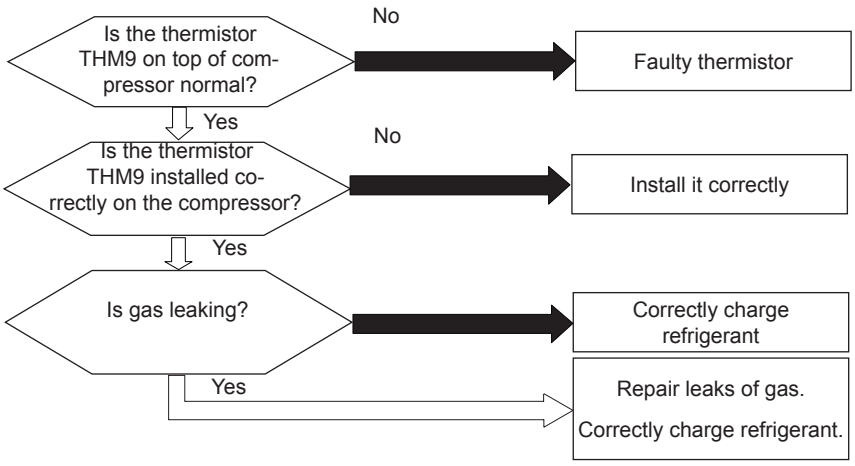

Phenomenon
Cause
Check item
Action (Turn OFF the main switch)
Decrease of discharge gas superheat
Refrigerant cycle is different from the electrical system
Check refrigerant cycle and the electrical system
Repair wiring
Overcharged refrigerant
Measure pressure
Correctly charge refrigerant
Faulty Expansion 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

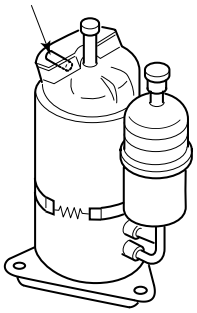
- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - The alarm appears during heating operation when the compressor-top thermistor remains at Tdh1 or above for 10 minutes, or at Tdh2 or above for 5 seconds.

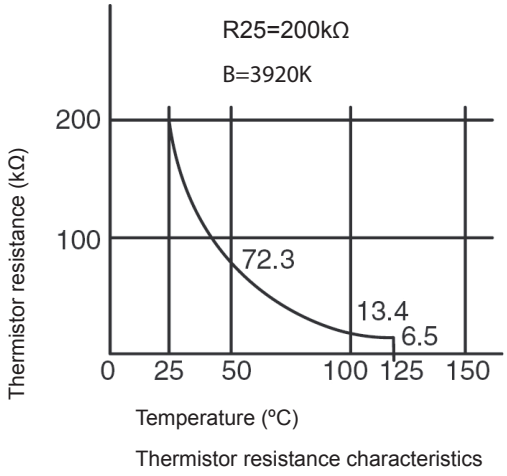
Tdh: Discharge gas temperature of the thermistor on the top of the compressor for heating operation.

Outdoor capacity	Tdh1	Tdh2
RAS-(4-6)HRNME-AF	127	140



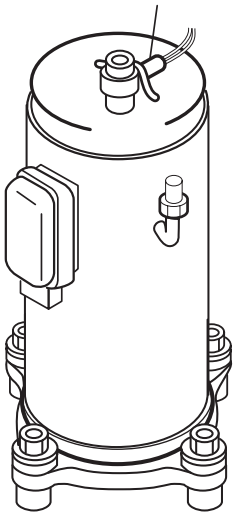
Compressor-top thermistor (THM9)





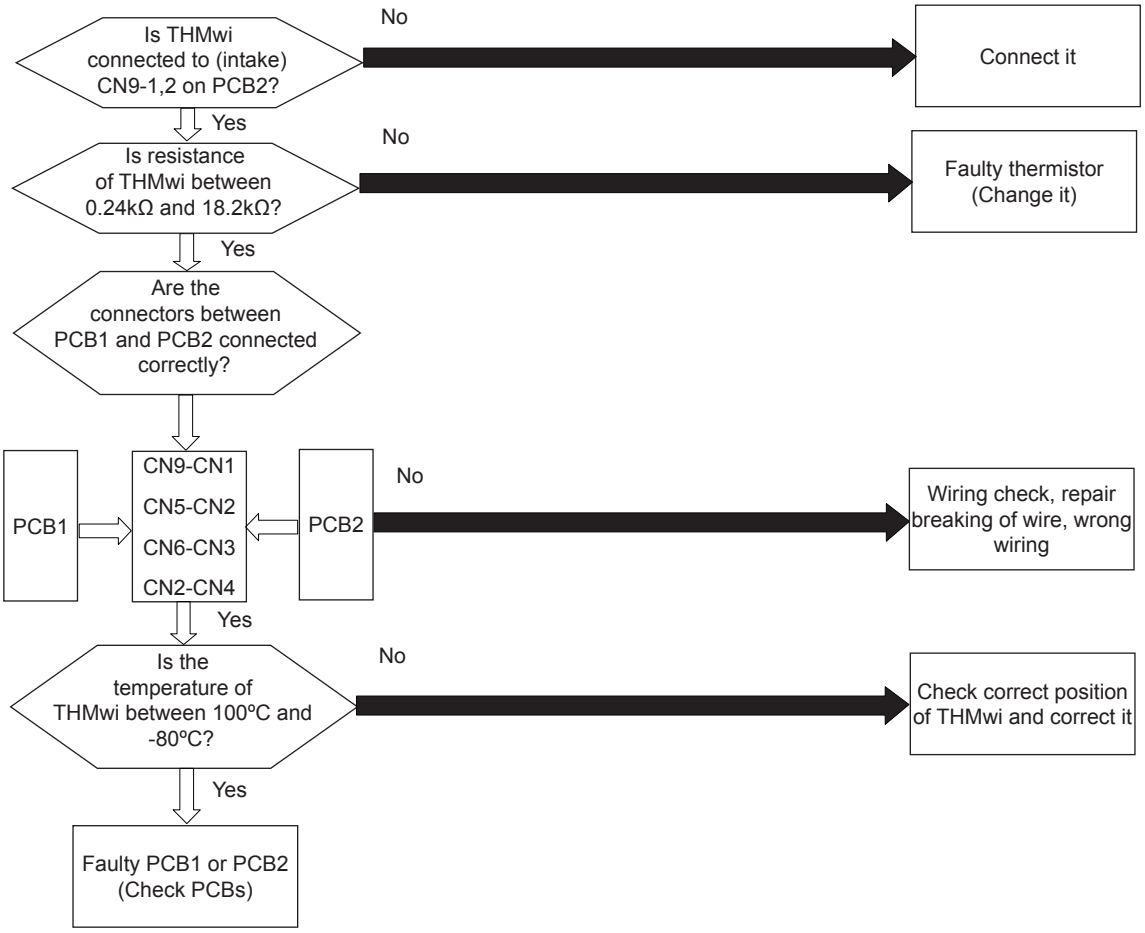
Thermistor resistance characteristics

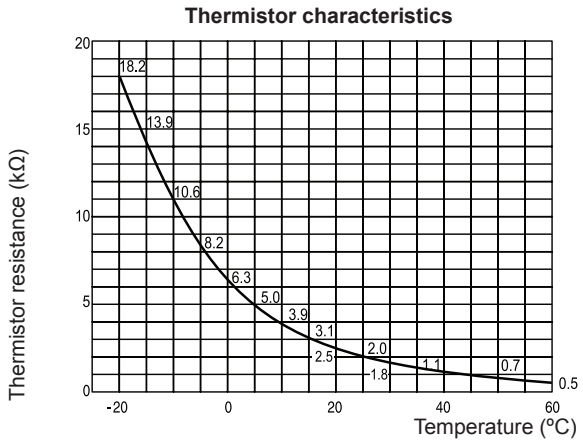
Thermistor for high discharge gas temperature at the top of compressor chamber (TH9)

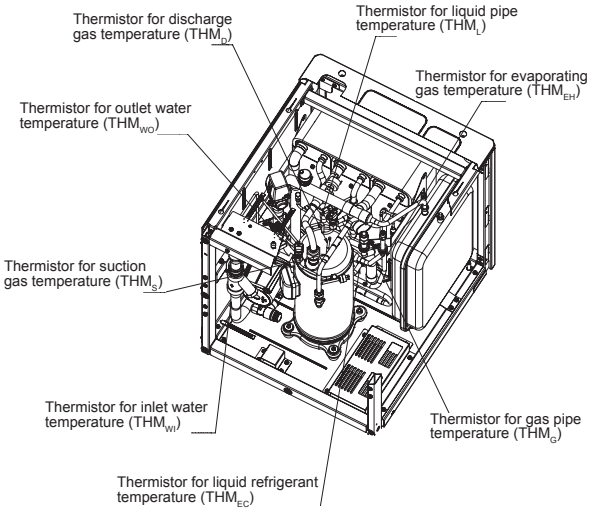


Alarm code	1 1	Water inlet Temperature (Twi) Thermistor Abnormality

- 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 operation process.

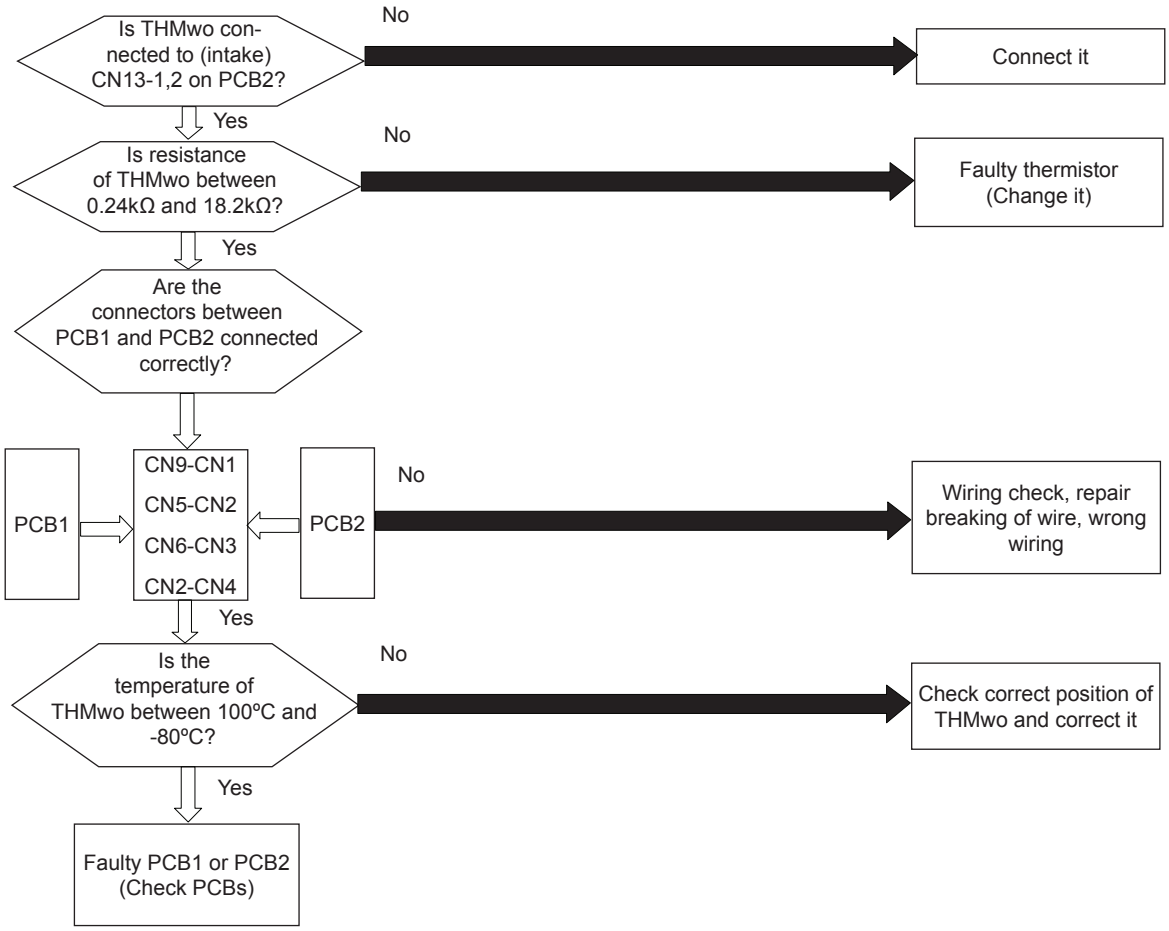


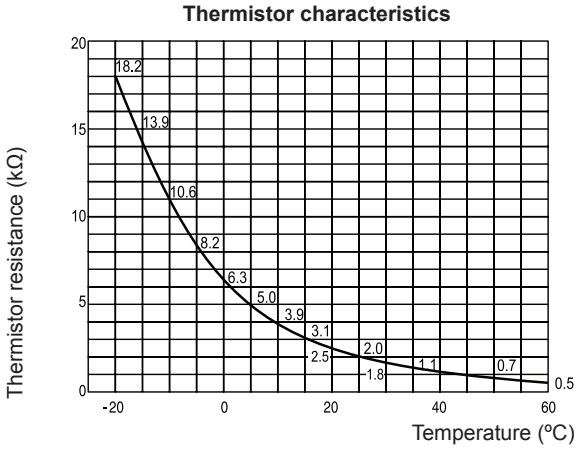


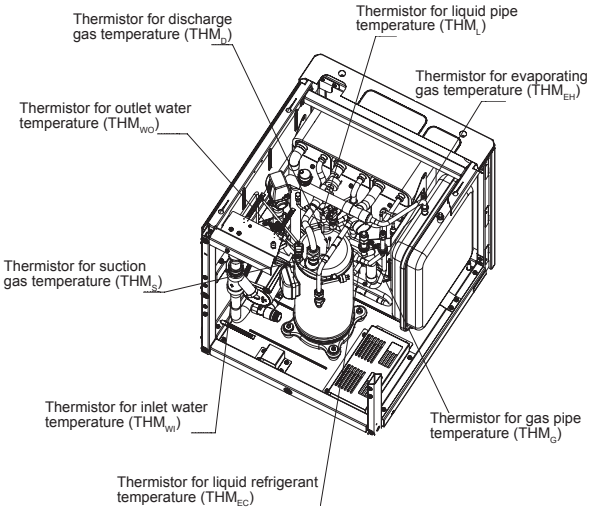


Alarm code	12	Water outlet Temperature (Two) Thermistor Abnormality

- 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 operation process.

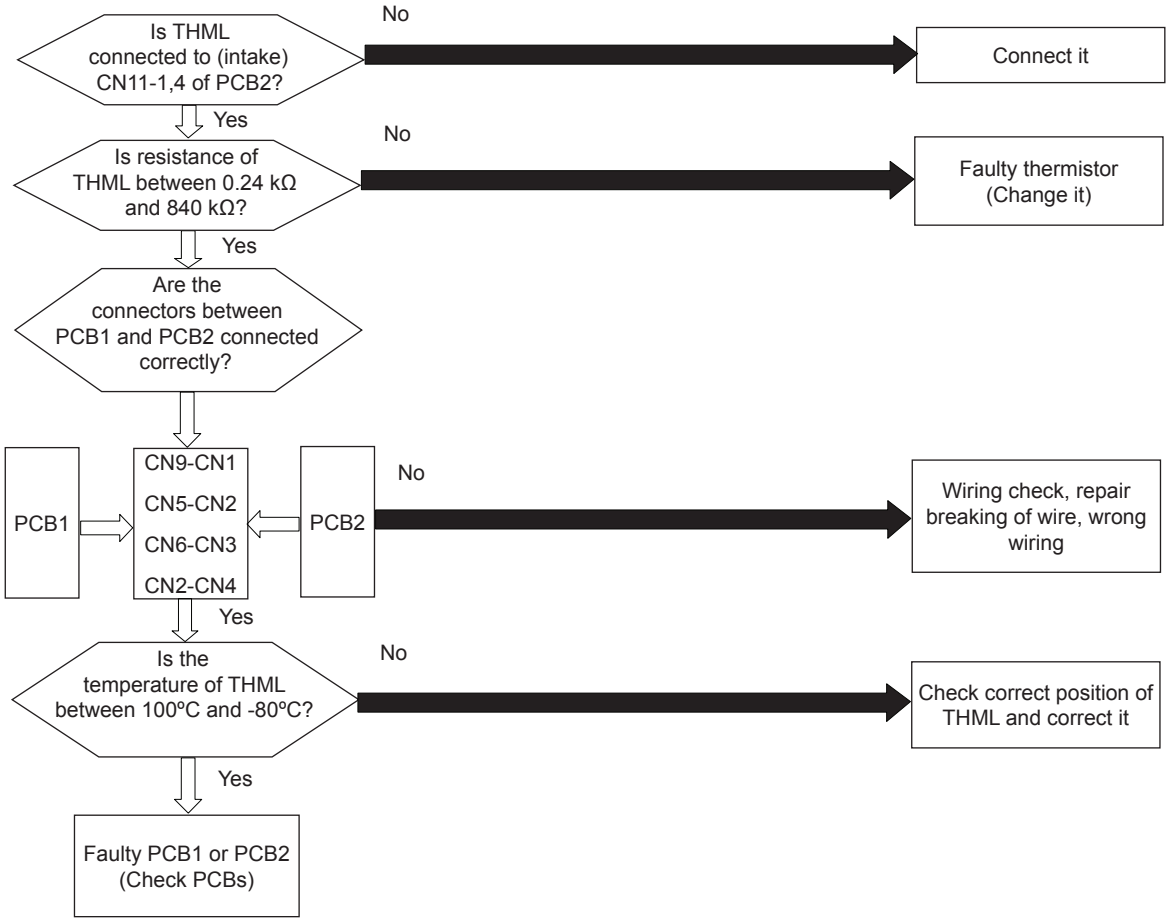




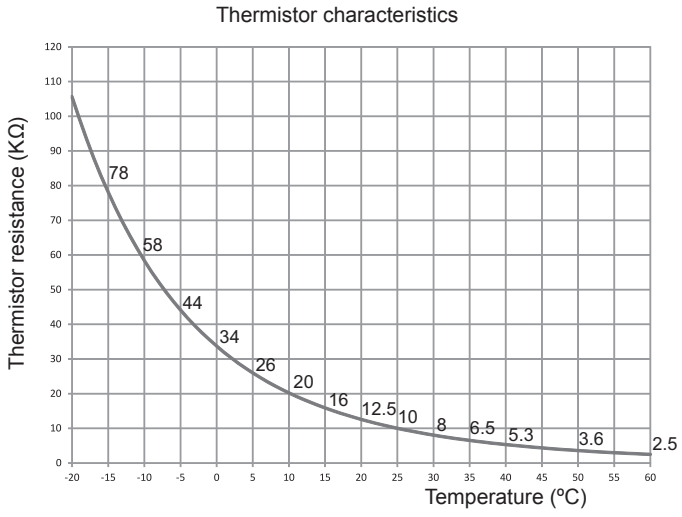


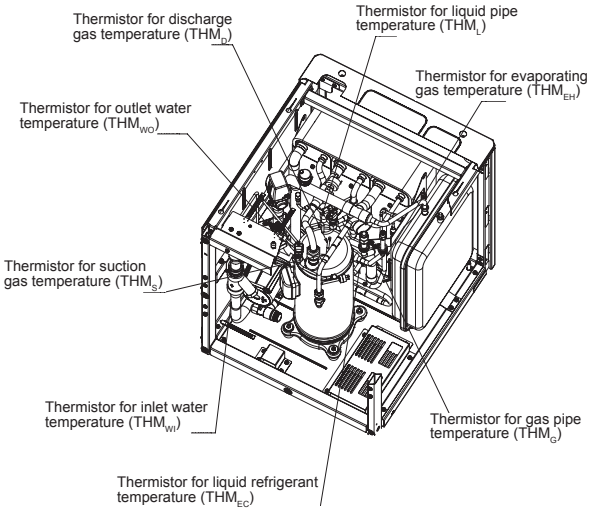
Alarm code	13	Indoor liquid pipe 410A Temperature (THMl) Thermistor Abnormality

- 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 operation process.



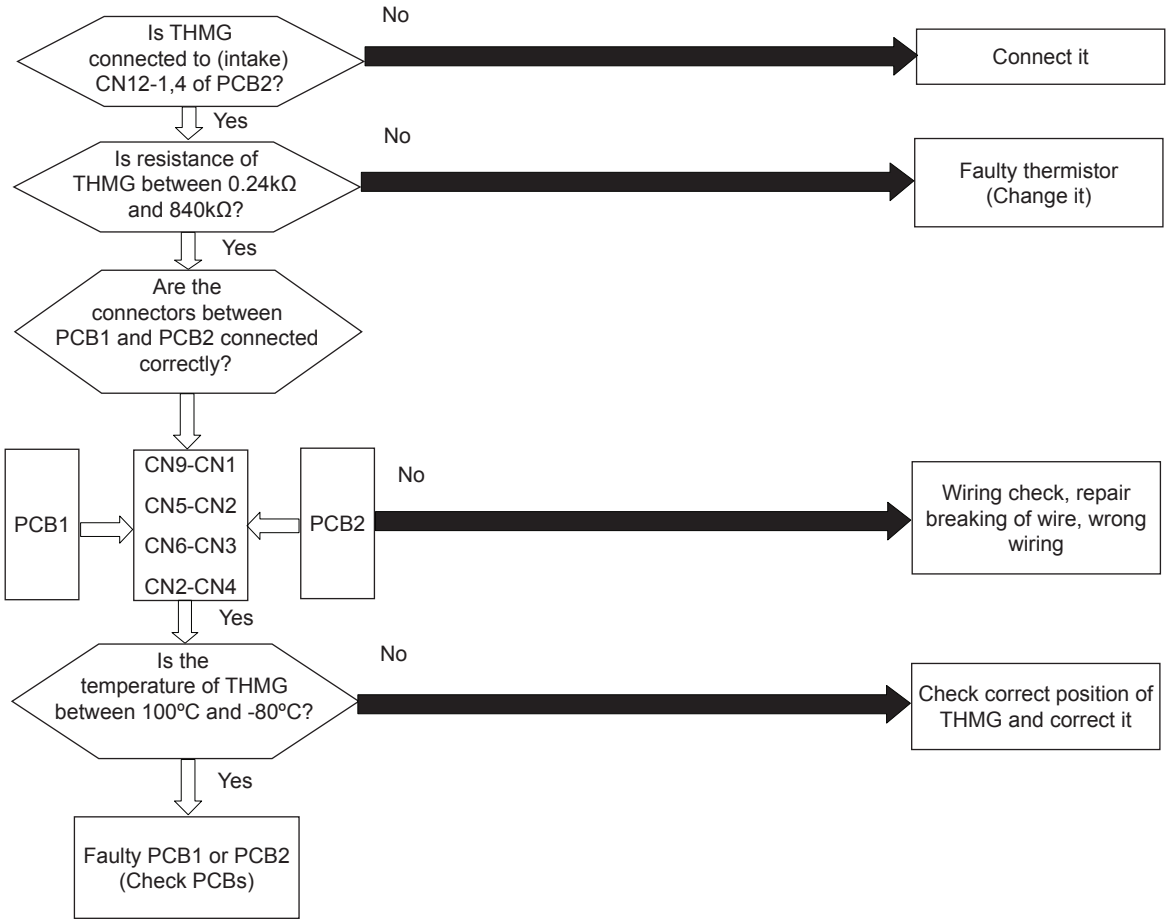
Measuring the thermistor resistance value:



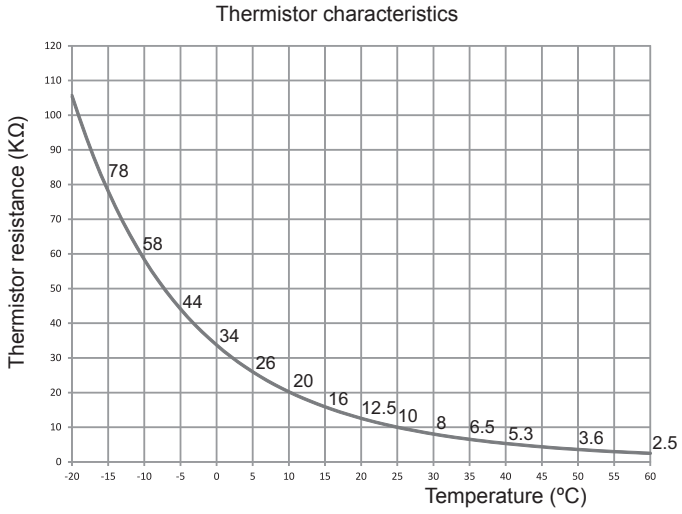


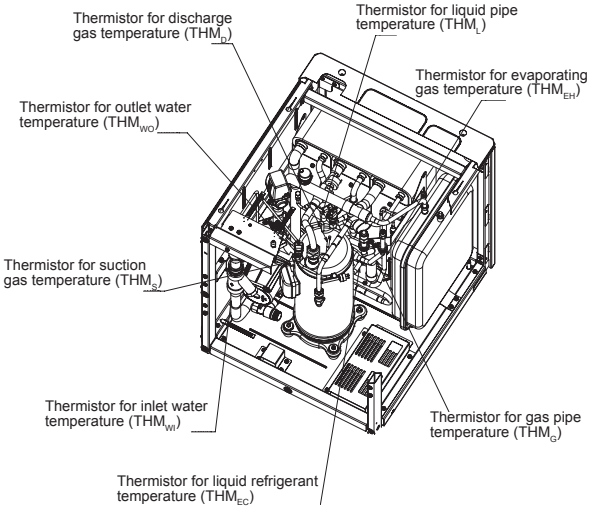
Alarm code	14	Indoor gas pipe 410A Temperature (THMg) Thermistor Abnormality

- 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 operation process.



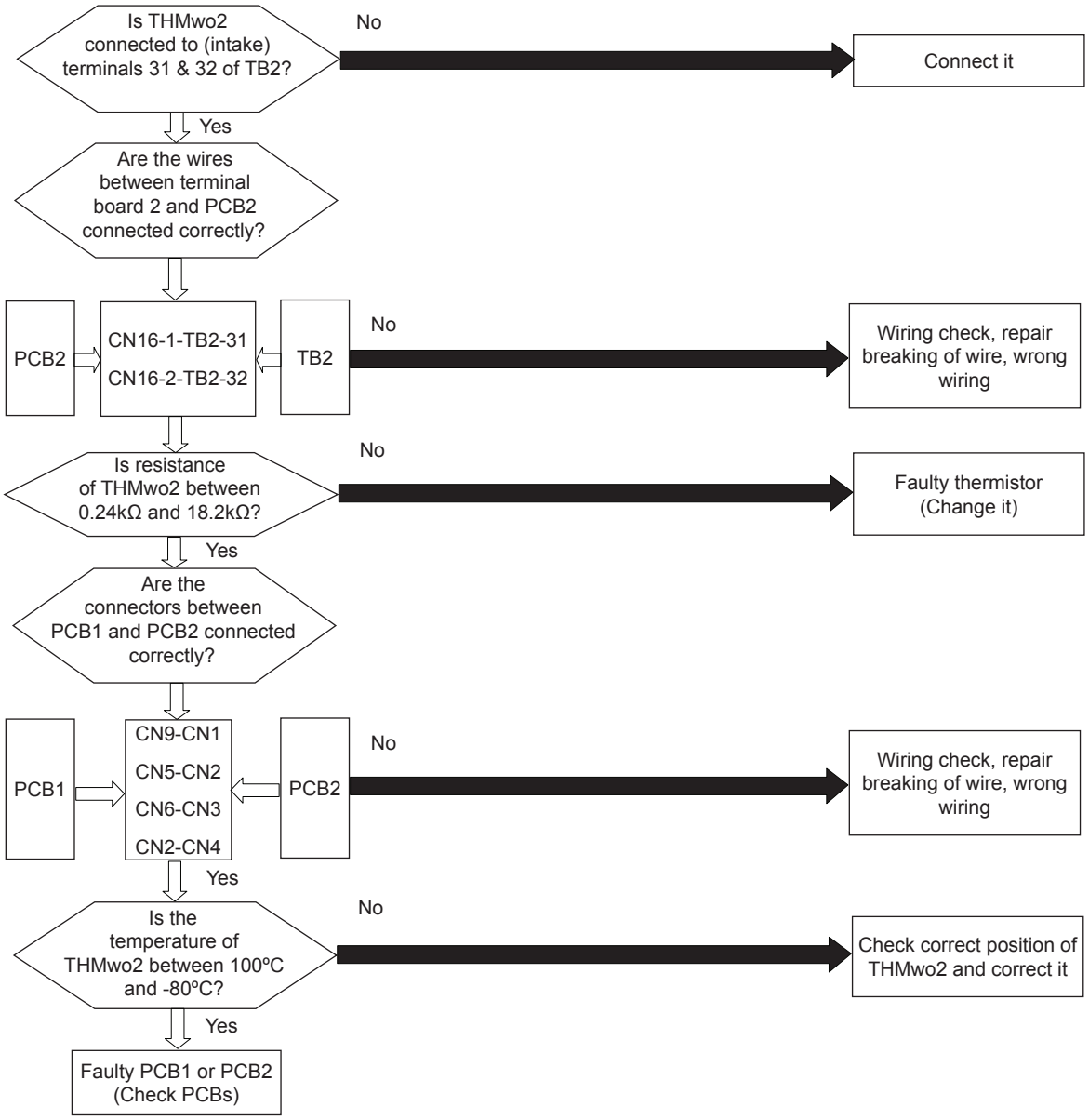
Measuring the thermistor resistance value:



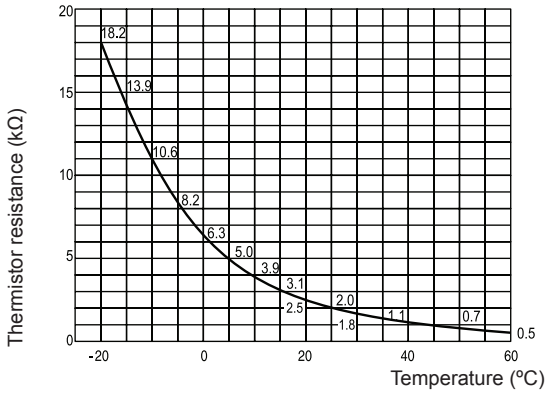


Alarm code	15	Water outlet circuit 2 (mix circ.) Temperature (Two2) Thermistor Abnormality

- 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 operation process and circuit 2 enabled.

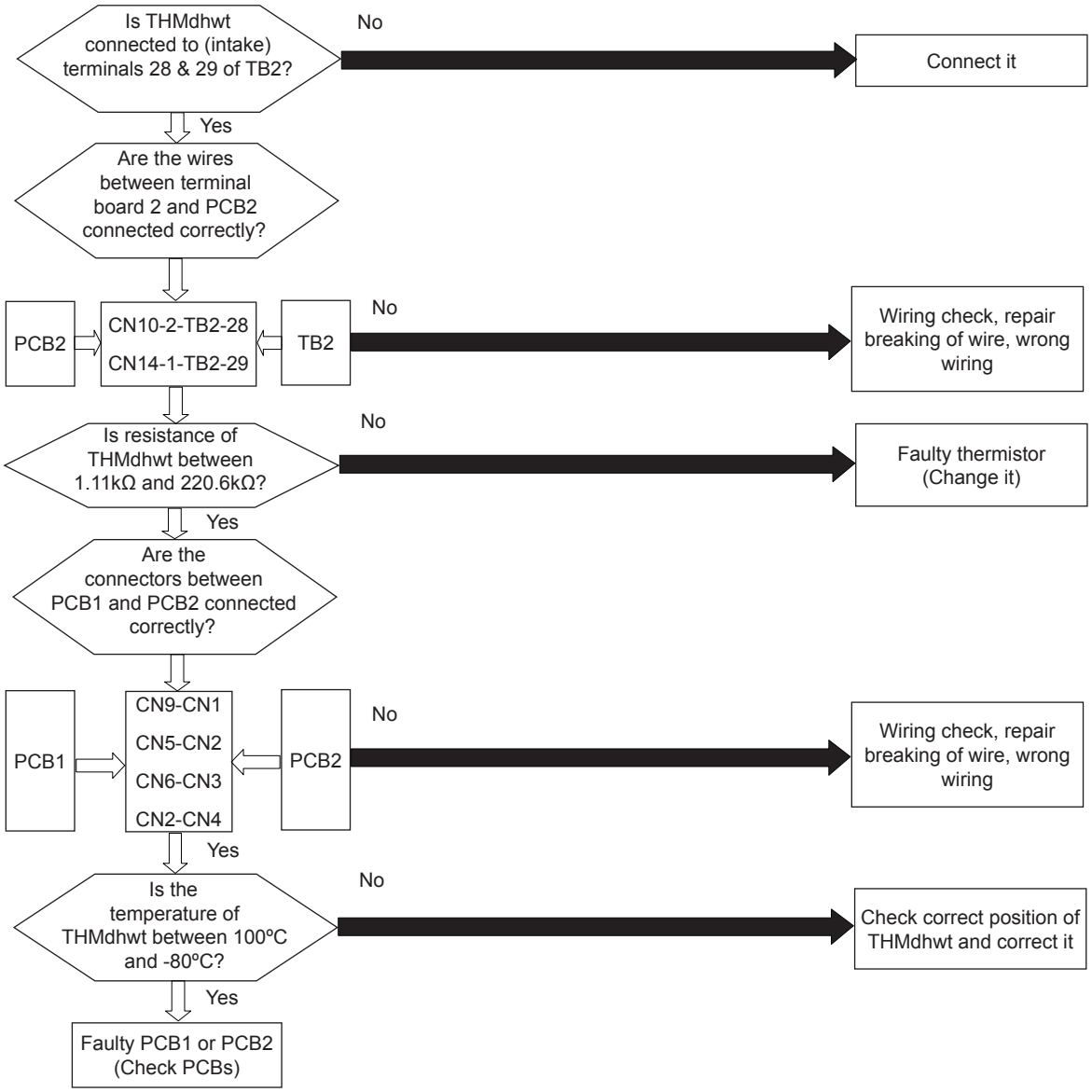


Thermistor characteristics



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.



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.

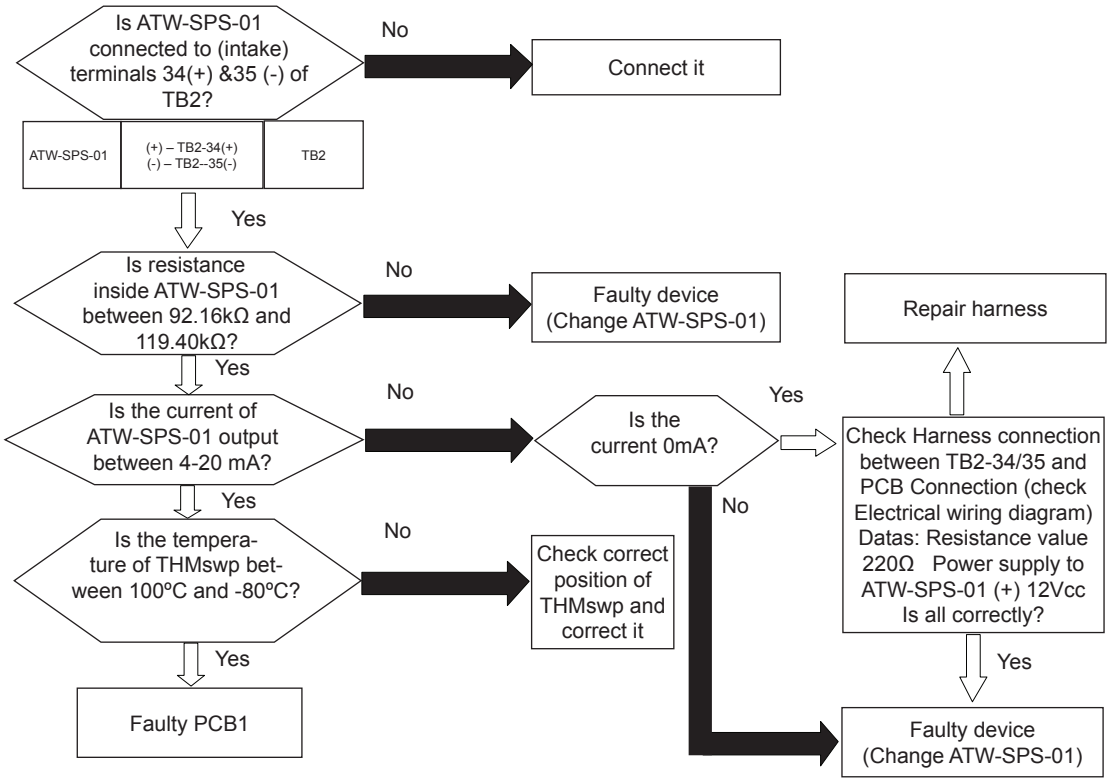


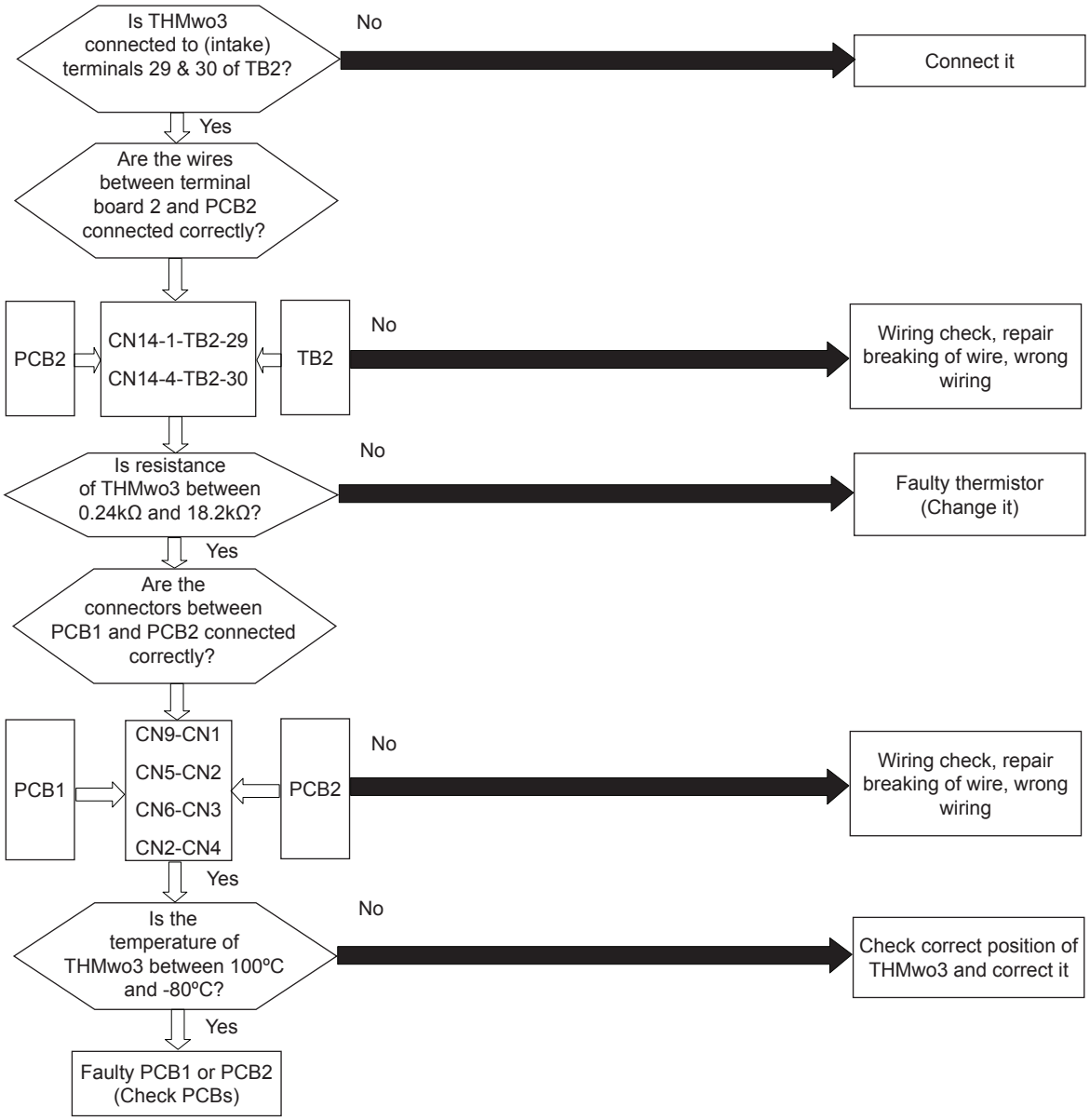
Table 1 - Temperature/resistance relationship, R_0 = 100.00 Ω

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	
-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

Alarm code	18	Water outlet 3 (boiler circ.) Temperature (Two3) Thermistor Abnormality

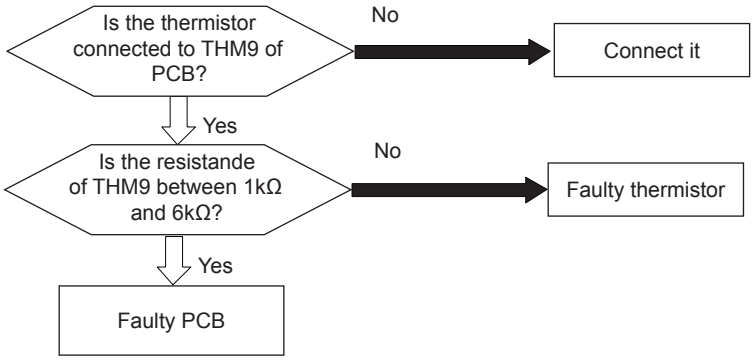
- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- This alarm code is displayed when the thermistor is short-circuited (less than 0.24 kΩ) or cut (greater than 18.2 kΩ) when boiler enabled.

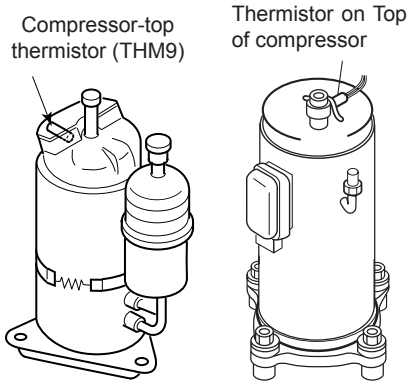


Temp (ºC)	Resist (Ω)	Temp (ºC)	Resist (Ω)	Temp (ºC)	Resist (Ω)	Temp (ºC)	Resist (Ω)	Temp (ºC)	Resist (Ω)	Temp (ºC)	Resist (Ω)
-20.0	220600	1.0	66515	22.0	23032	43.0	8983	64.0	3877	85.0	1824
-19.0	207607	2.0	63046	23.0	21967	44.0	8612	65.0	3734	86.0	1763
-18.0	195459	3.0	59777	24.0	20958	45.0	8258	66.0	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	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 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)
0	640.44
5	500.66
10	394.16
15	312.41
20	249.20
25	200.00
30	161.45
35	131.06
40	106.96
45	87.74
50	72.32
55	59.97
60	49.96
65	41.79

Temperature (ºC)	Resistance (kΩ)
70	35.11
75	29.61
80	25.07
85	21.31
90	18.17
95	15.55
100	13.35
105	11.50
110	9.93
115	8.60
120	7.47
125	6.51

The resistance value has 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.

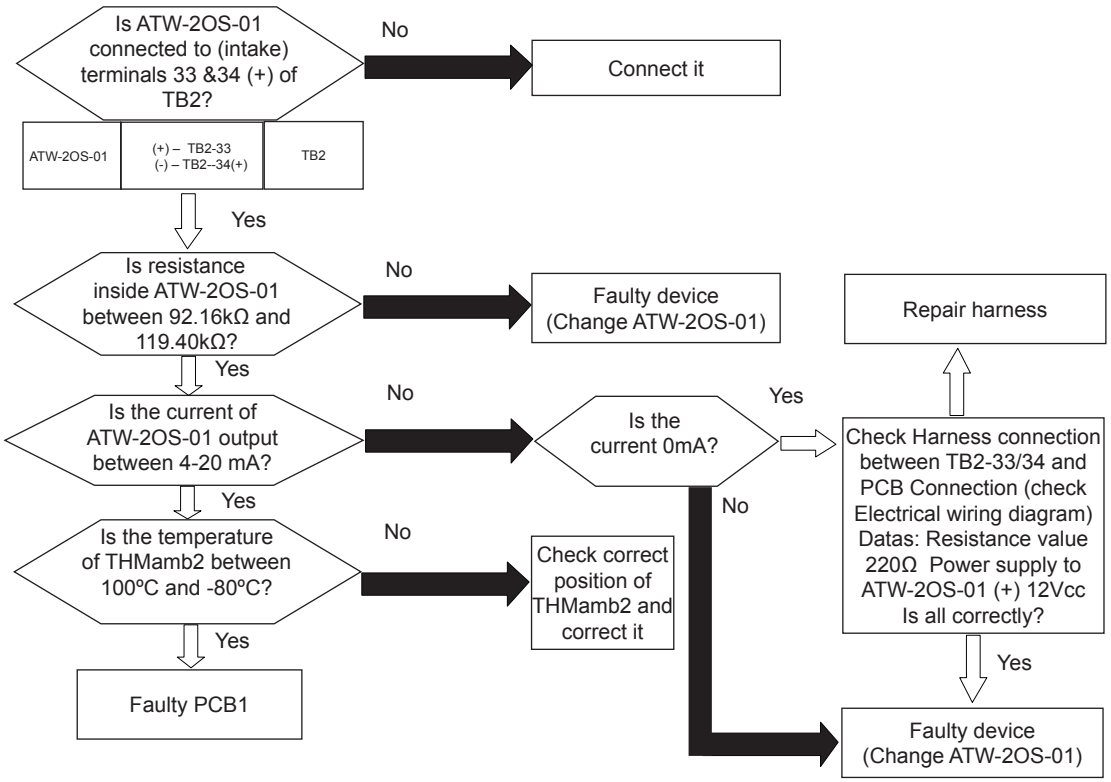


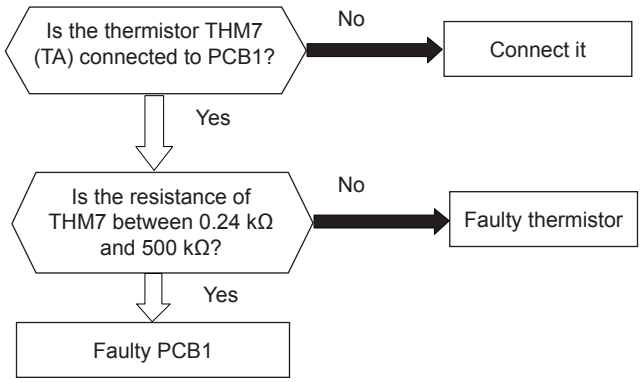
Table 1 - Temperature/resistance relationship, R_0 = 100.00 Ω

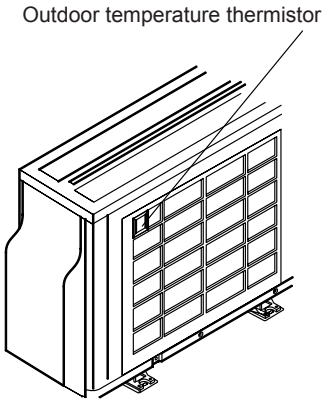
t_{90}1°C	Resistance at the temperature t_{90}1°C Ω										t_{90}1°C
	0	-1	-2	-3	-4	-5	-6	-7	-8	-9	
-30	88.22	87.83	87.43	87.04	86.64	86.25	85.85	85.46	85.06	84.67	-30
-20	92.16	91.77	91.37	90.98	90.59	90.19	89.80	89.40	89.01	88.62	-20
-10	96.09	95.69	95.30	94.91	94.52	94.12	93.73	93.34	92.95	92.55	-10
0	100.00	99.61	99.22	98.83	98.44	98.04	97.65	97.26	96.87	96.48	0

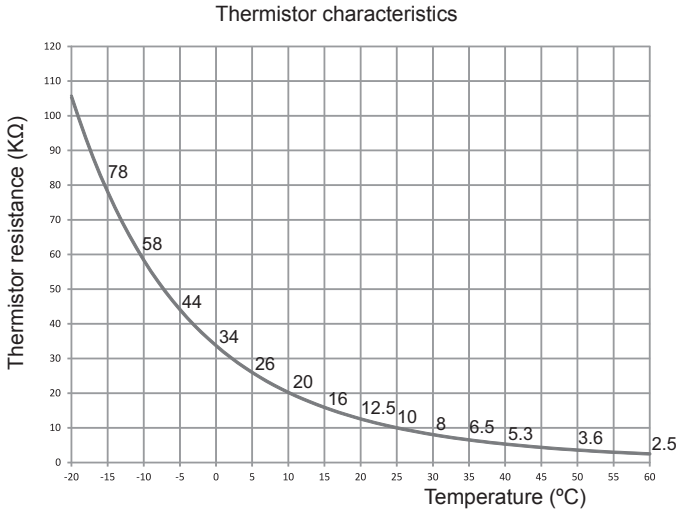
t_{90}1°C	0	1	2	3	4	5	6	7	8	9	t_{90}1°C
0	100.00	100.39	100.78	101.17	101.56	101.95	102.34	102.73	103.12	103.51	0
10	103.90	104.29	104.68	105.07	105.46	105.85	106.24	106.63	107.02	107.40	10
20	107.79	108.18	108.57	108.96	109.35	109.73	110.12	110.51	110.90	111.29	20
30	111.67	112.06	112.45	112.83	113.22	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

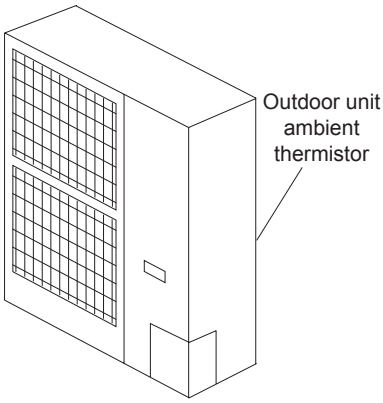
Alarm code	22	Abnormal operation of the thermistor for the outdoor temperature (outdoor unit ambient thermistor)

- 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 6 °C (heating).





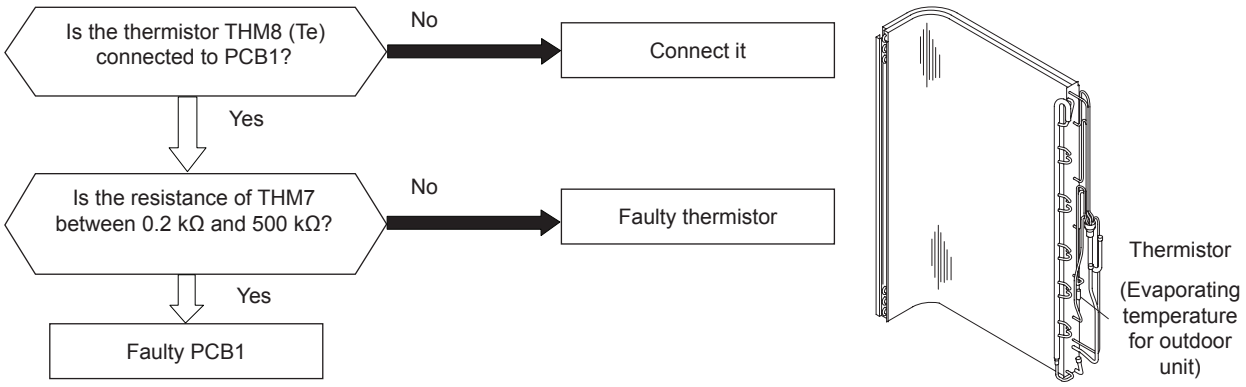


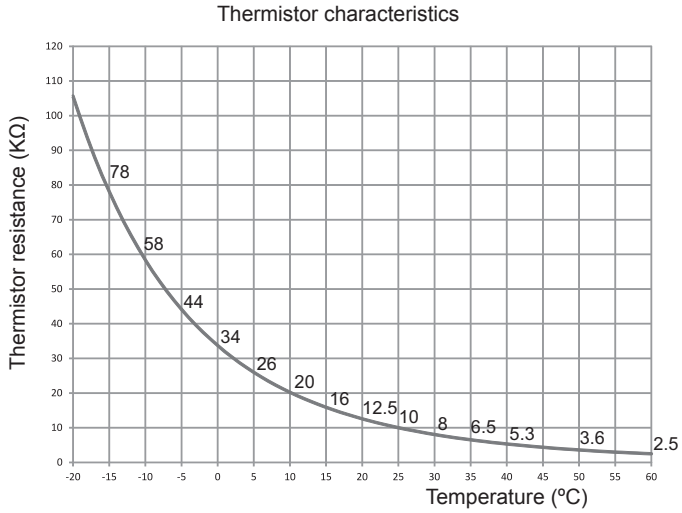


Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Faulty thermistor for the outdoor unit ambient	Fault	Check resistance	Replace thermistor if faulty
	Incorrect connection	Check wiring to PCB1	Repair wiring and connections
Faulty PCB1		Replace PCB1 and check operation	Replace PCB if faulty

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.

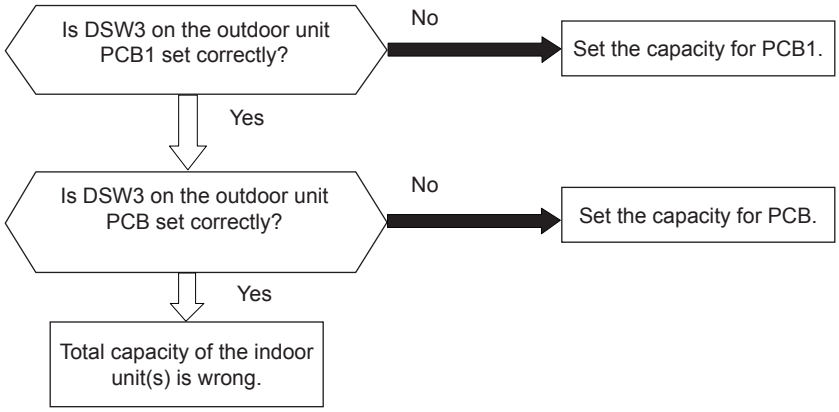




Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Faulty thermistor for the evaporating temperature during heating	Fault	Check resistance	Replace thermistor if faulty
	Incorrect connection	Check wiring to PCB1	Repair the wiring and the connections
Faulty PCB1		Replace PCB1 and check the operation	Replace PCB1 if faulty

Alarm code	3 1	Incorrect capacity setting or combined capacity between indoor unit 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	35	Incorrect indoor number setting

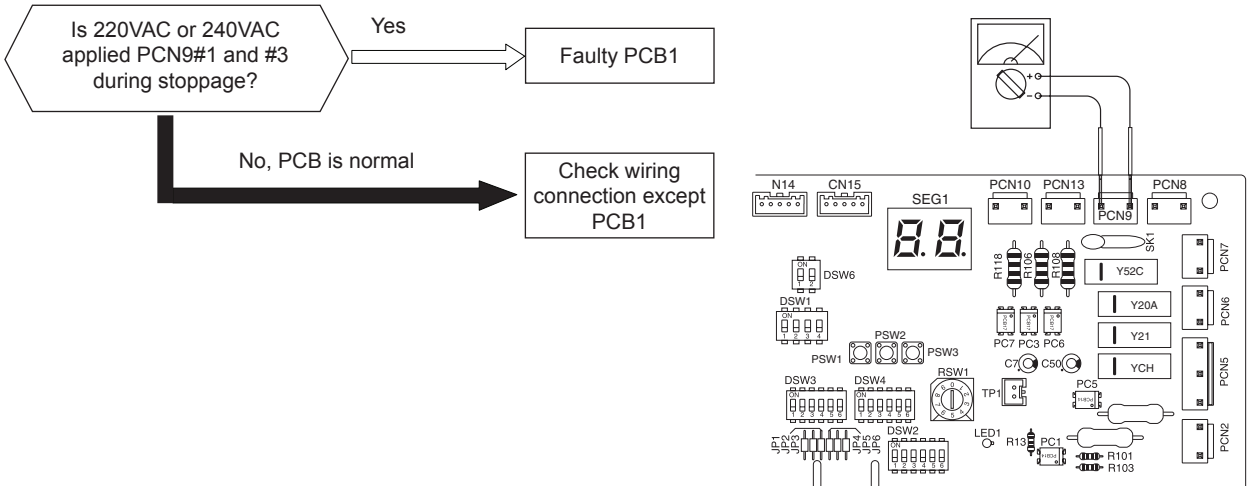
- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - This alarm code is indicated 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-(4-6)H(V)RNME-AF)

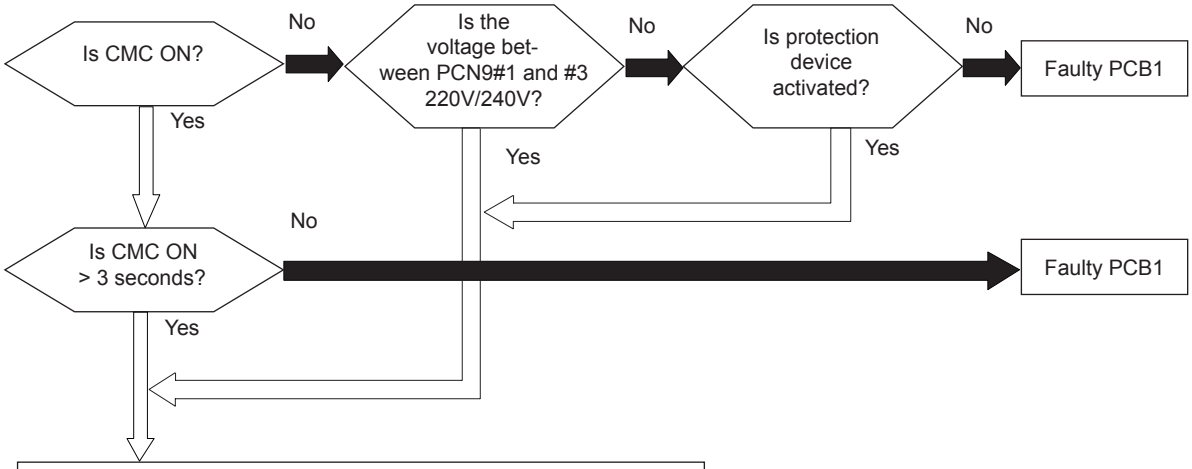
- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - ✶ This alarm code is 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	Pump down overload (high pressure switch will be activated)

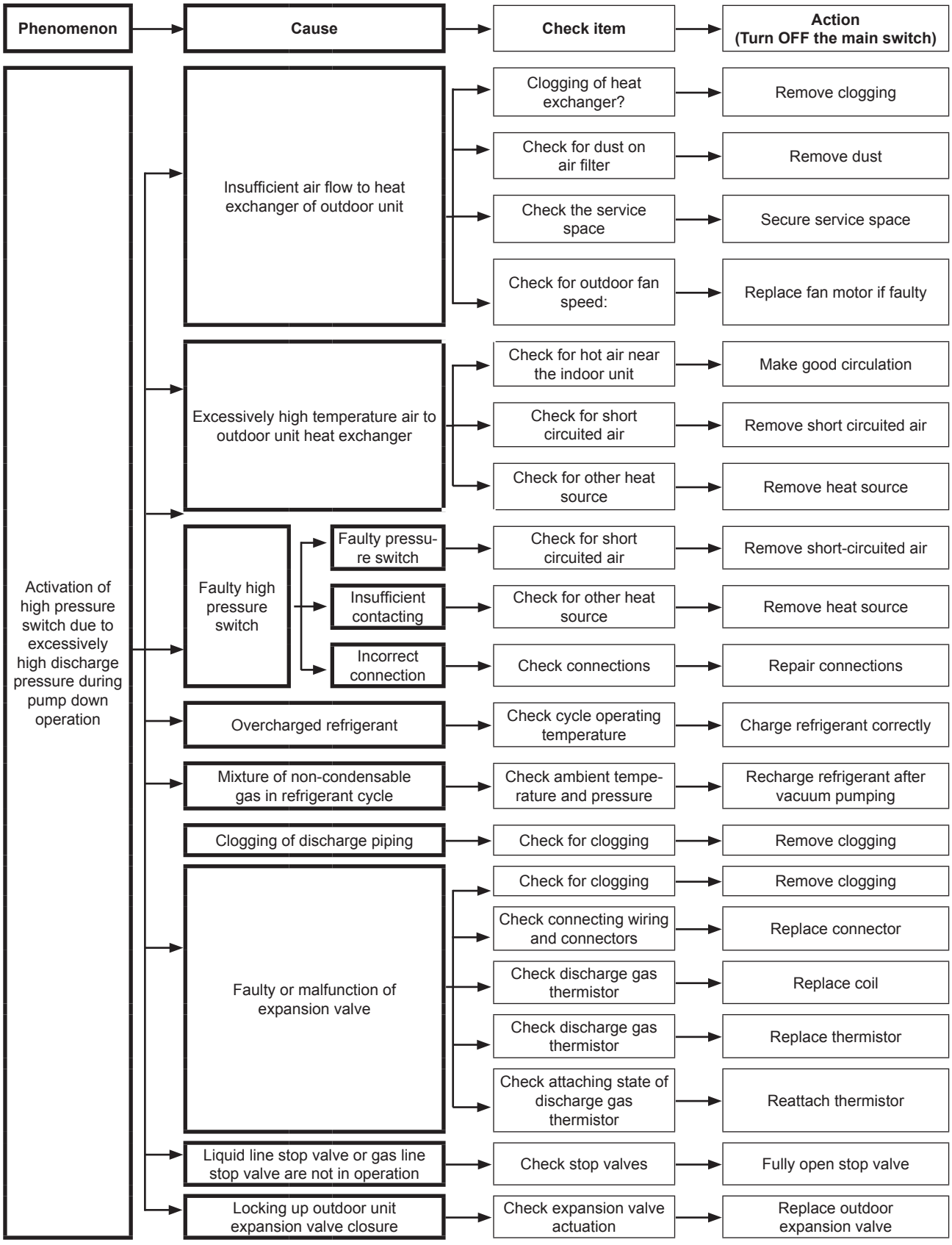
- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - This alarm code is indicated 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

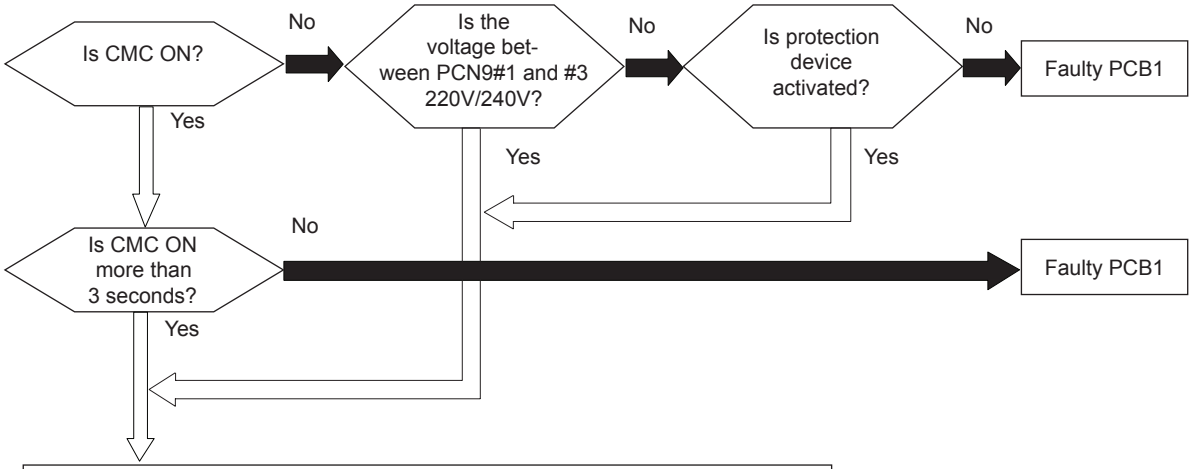


NOTE

This alarm code is indicated when the outdoor unit protective device is activated by high discharge pressure during pump down 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)

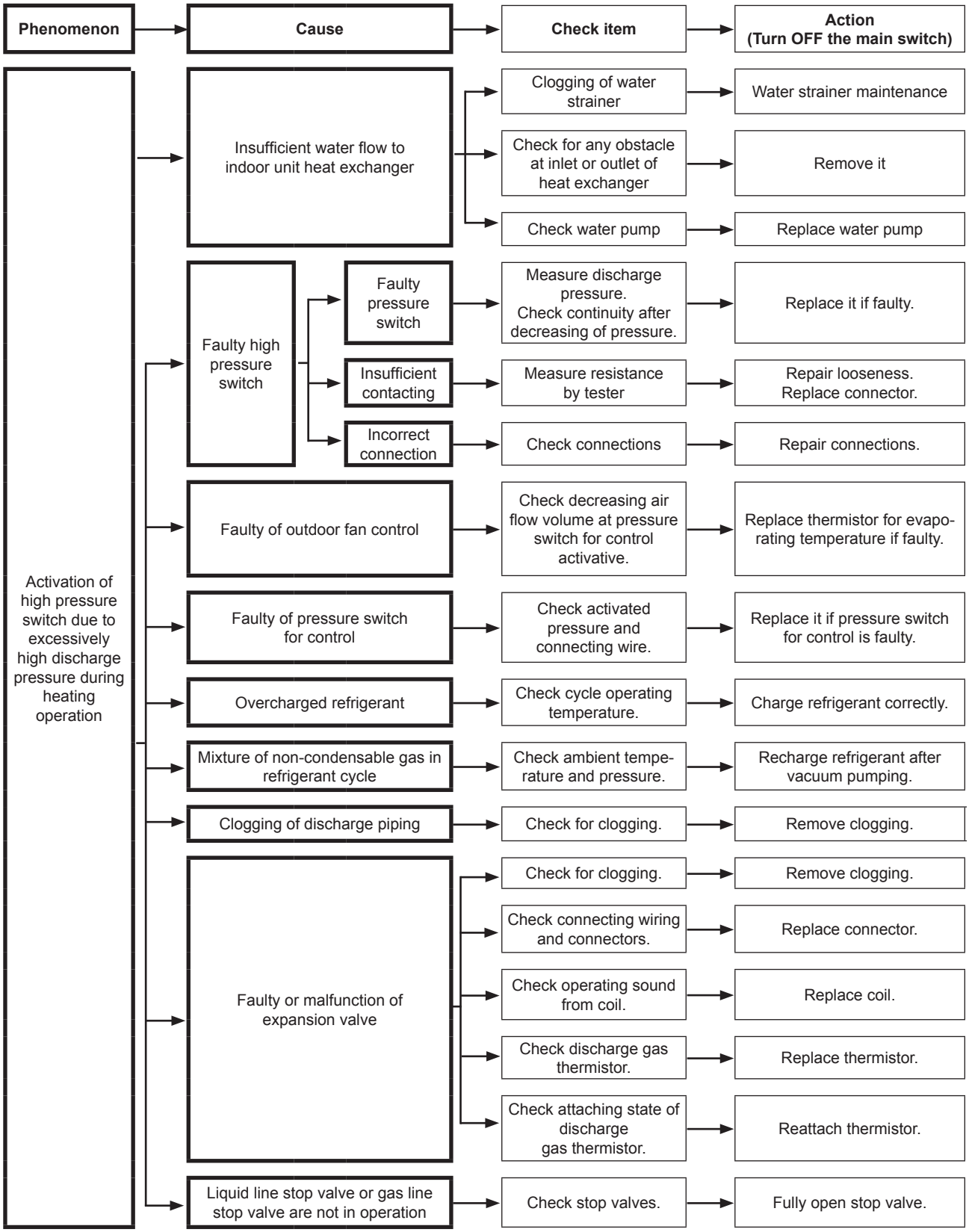
- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - This alarm code is indicated 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

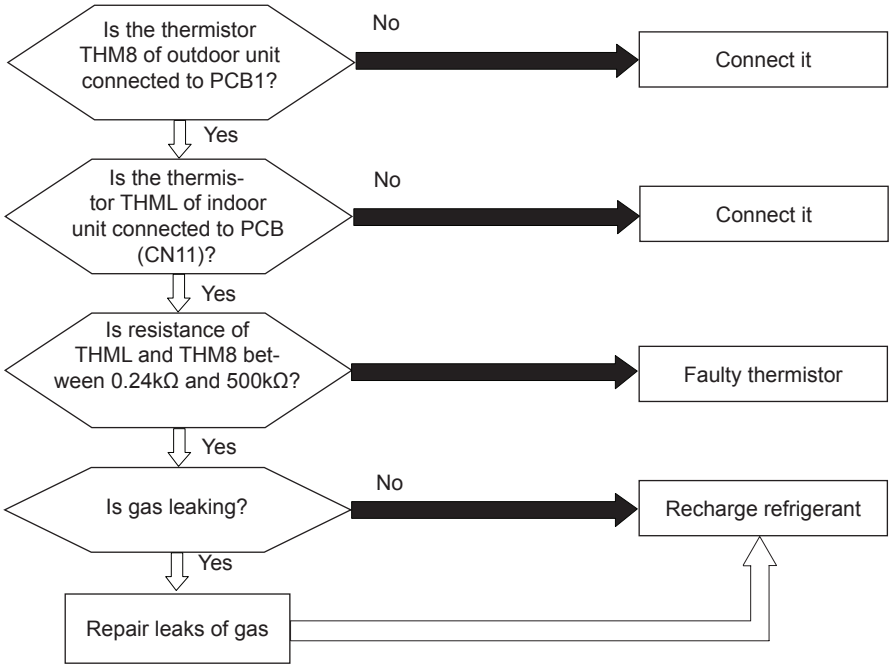


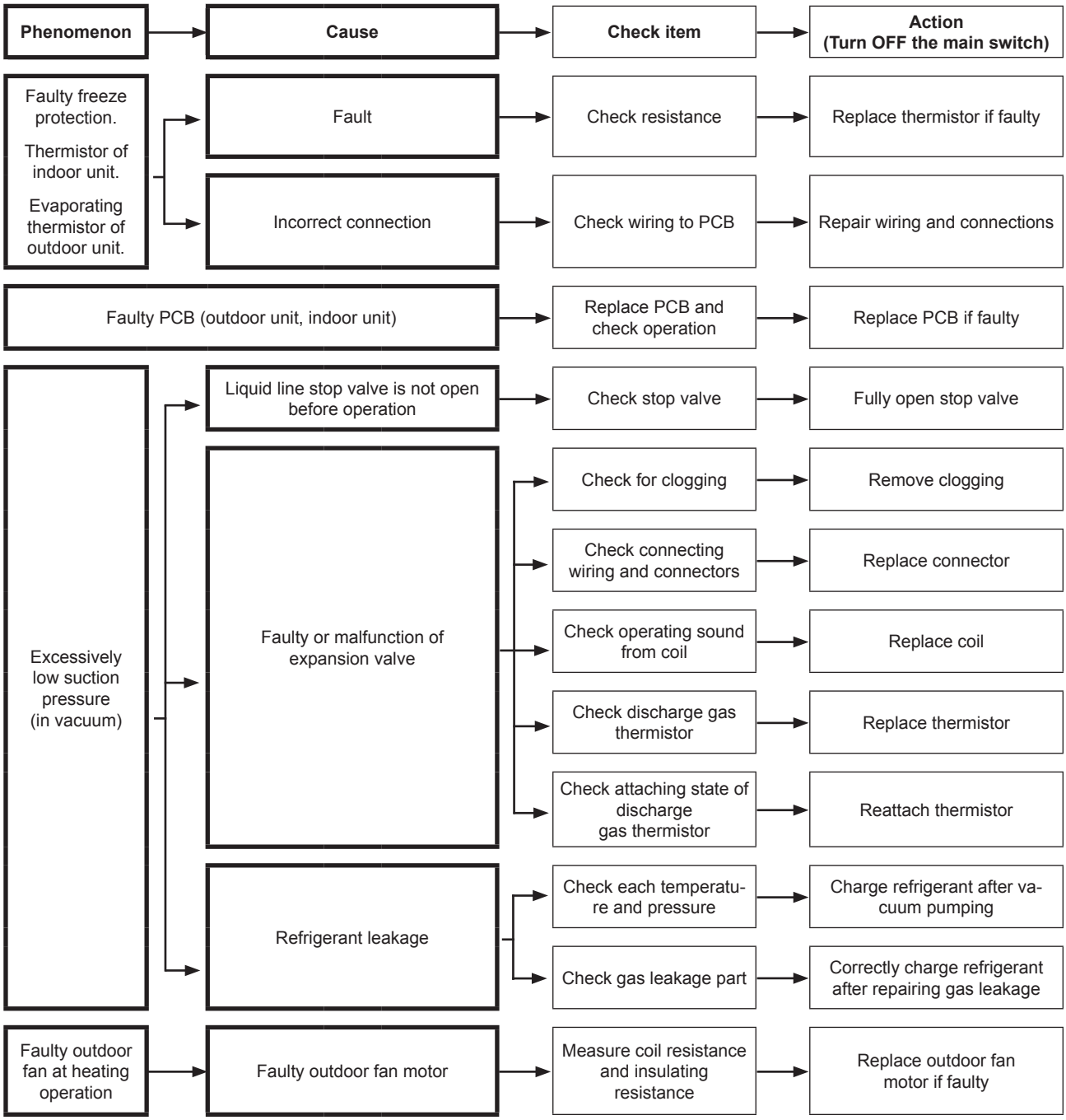
NOTE

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.

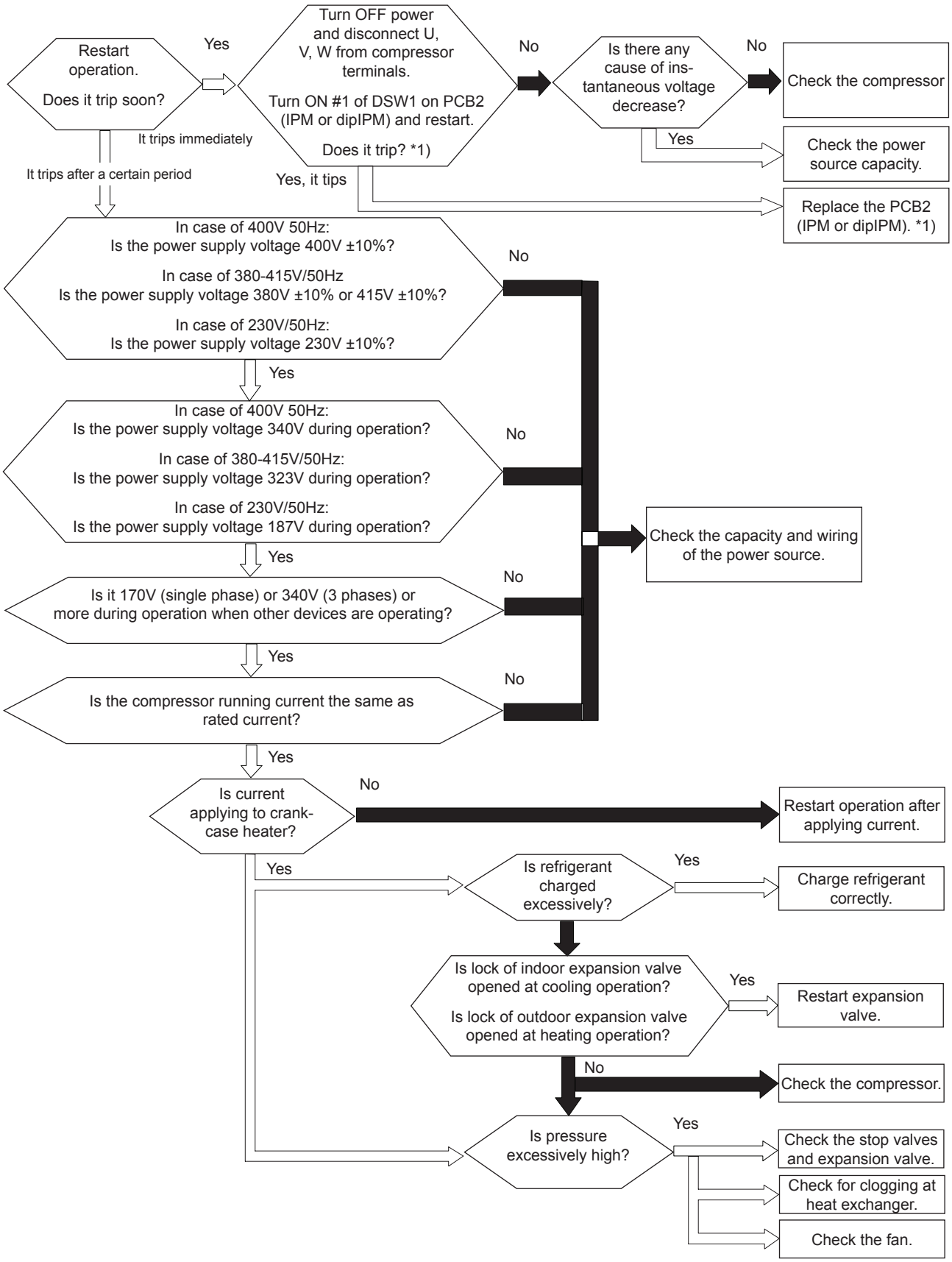
Alarm code	47	Activation to protect system from excessively low suction pressure (protection from vacuum operation)

- 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 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

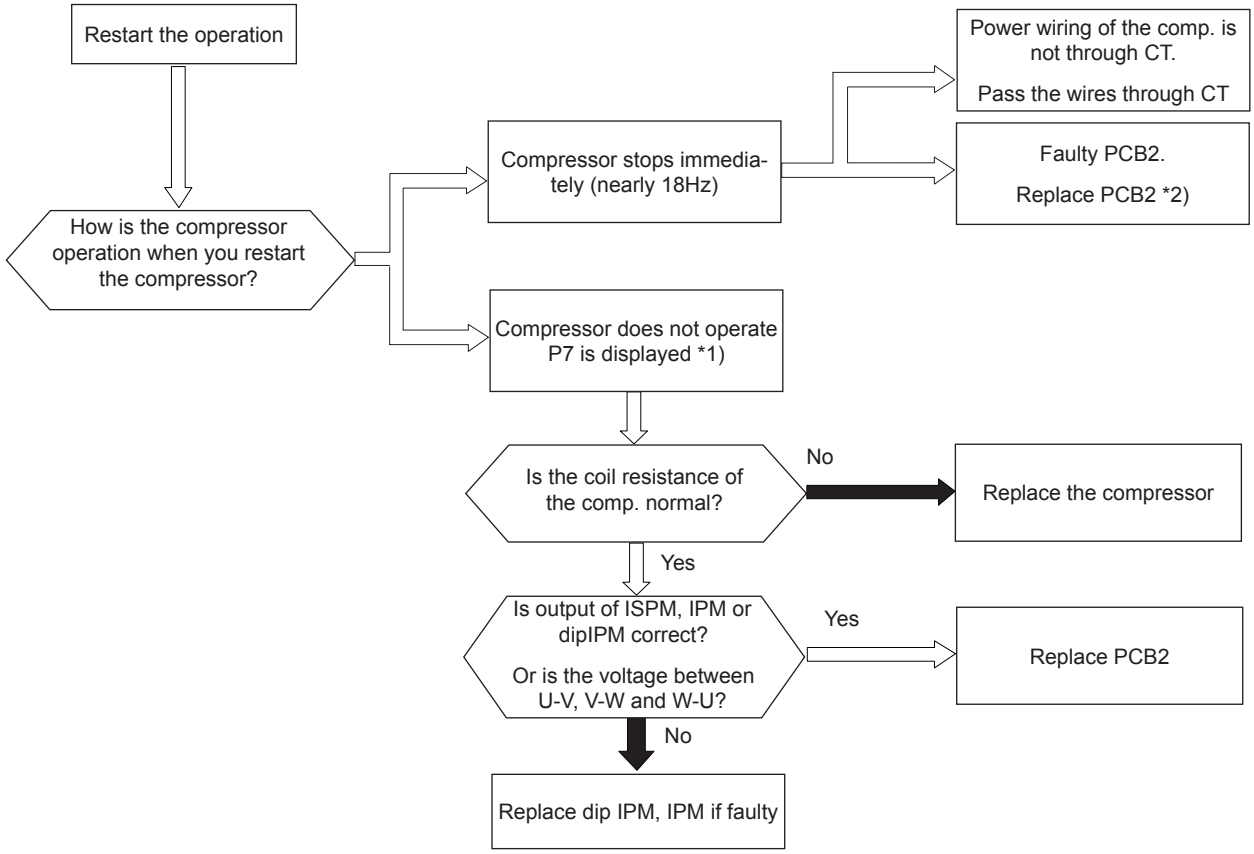
Alarm code 48 Overcurrent protection activation (RAS-(4-6)H(V)RNME-AF)



*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	Abnormal operation of the current transformer (0A detection) (RAS-(4-6)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 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.

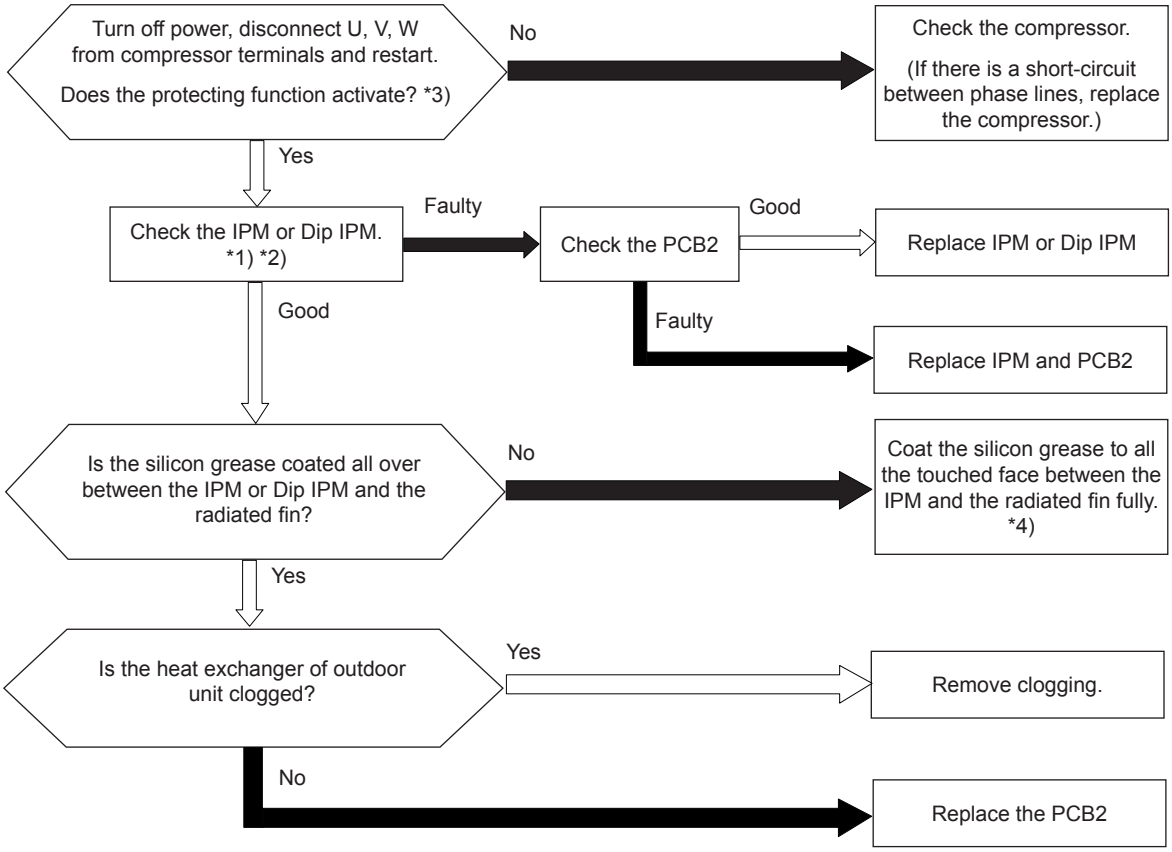
*2) Perform the high voltage discharge work by referring to the item *Procedure of checking other main parts* before checking and replacing the inverter parts.

Alarm code	53	Protection activation of IPM or DipIPM and PCB2 (RAS-(4-6)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.
  - 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

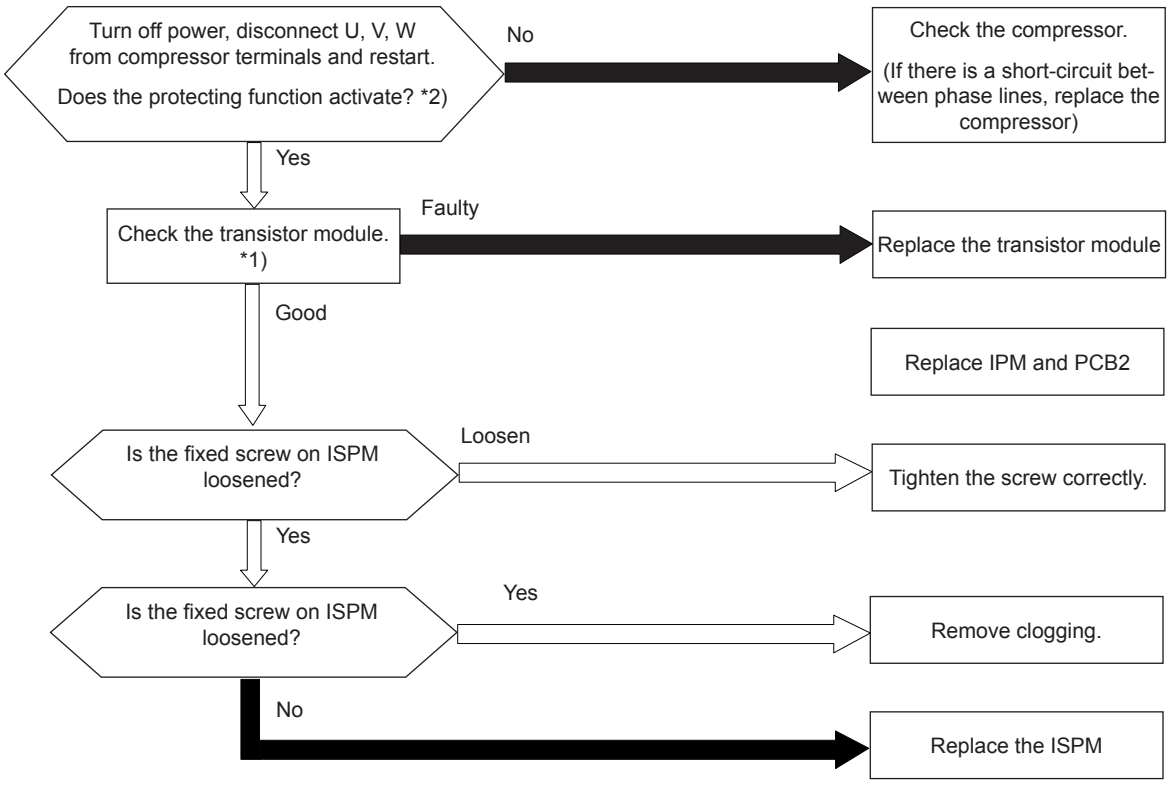
When alarm code “53” is indicated, the outdoor fan motor (DC motor) ensure that DC fan motor is checked according to the item Procedure of checking other main parts.

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*.

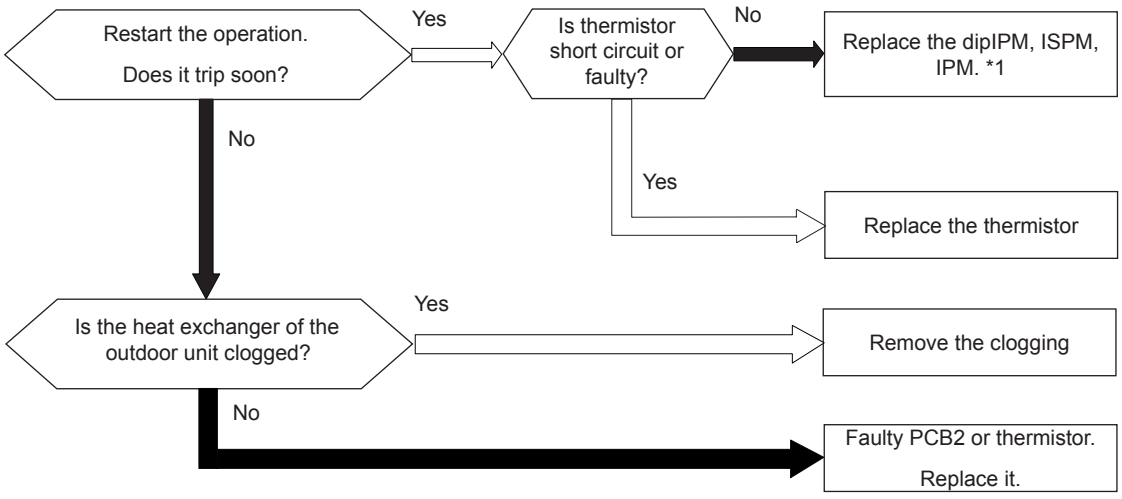
*2) Set the #1 pin of DIP switch DSW1 on ISPM to ON when you are restarting with the terminals of the compressor disconnected. After the troubleshooting, set the #1 pin of DIP switch DSW1 on ISPM to OFF.

Alarm code	54	Increase in the inverter fin temperature

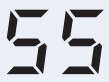
- The RUN LED flickers and “ALARM” is displayed on the remote control switch.
- The unit number, the alarm code and the unit code are alternately displayed on the set temperature section. The unit number and the alarm code are displayed on the display of the outdoor unit PCB.
  - If the alarm code “51” 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-(4-6)HVRNME-AF), 80 ºC (RAS-(4-6) 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:

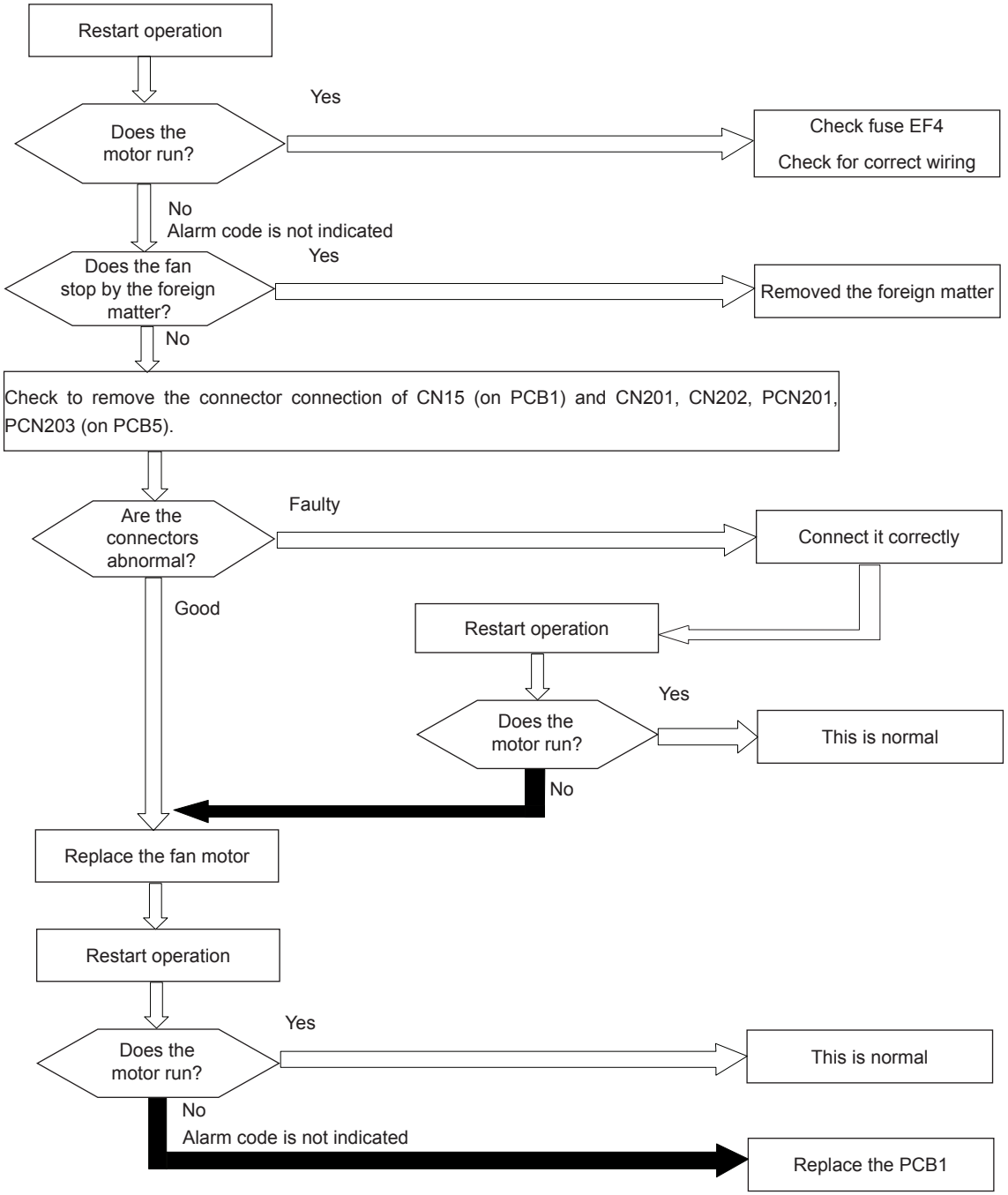
When the transmitting abnormality occurs between dipIPM (or IPM) and PCB2), this alarm is indicated and the operation is stopped.

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 10 rpm or lower during 10 seconds after the fan motor activation.
  - The alarm is indicated when the abnormality is repeated 10 times within 30 minutes after the first detection.



NOTE

In the case that the fan motor does not run even the PCB1 is replaced, replace PCB5

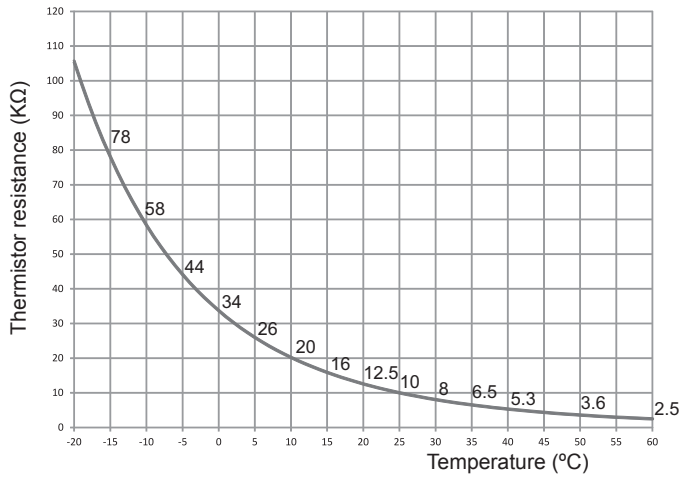
Check to ensure that DC Fan Motor is checked according to the item *Procedure of checking other main parts.*

Alarm code	59	Inverter fin temperature thermistor 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.
  - This alarm is indicaed when the thermistor detects inverter fin emperature greate than 100ºC or less than -10ºC during operation.

Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Faulty Inverer Fin Thermistor	Fault	Check resistance	Replace thermistor if faulty
	Incorrect Connection	Check wiring to inverter fin	Repair wiring and connections
Faulty IPM and PCB2		Replace IPM and PCB2 and check operation	Replace IPM and PCB2 if faulty

Thermistor characteristics



Alarm code		Abnormal transmission between Central and indoor communication

- 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 there’s no constant communication for more than three minutes between the central and the indoor unit.

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.

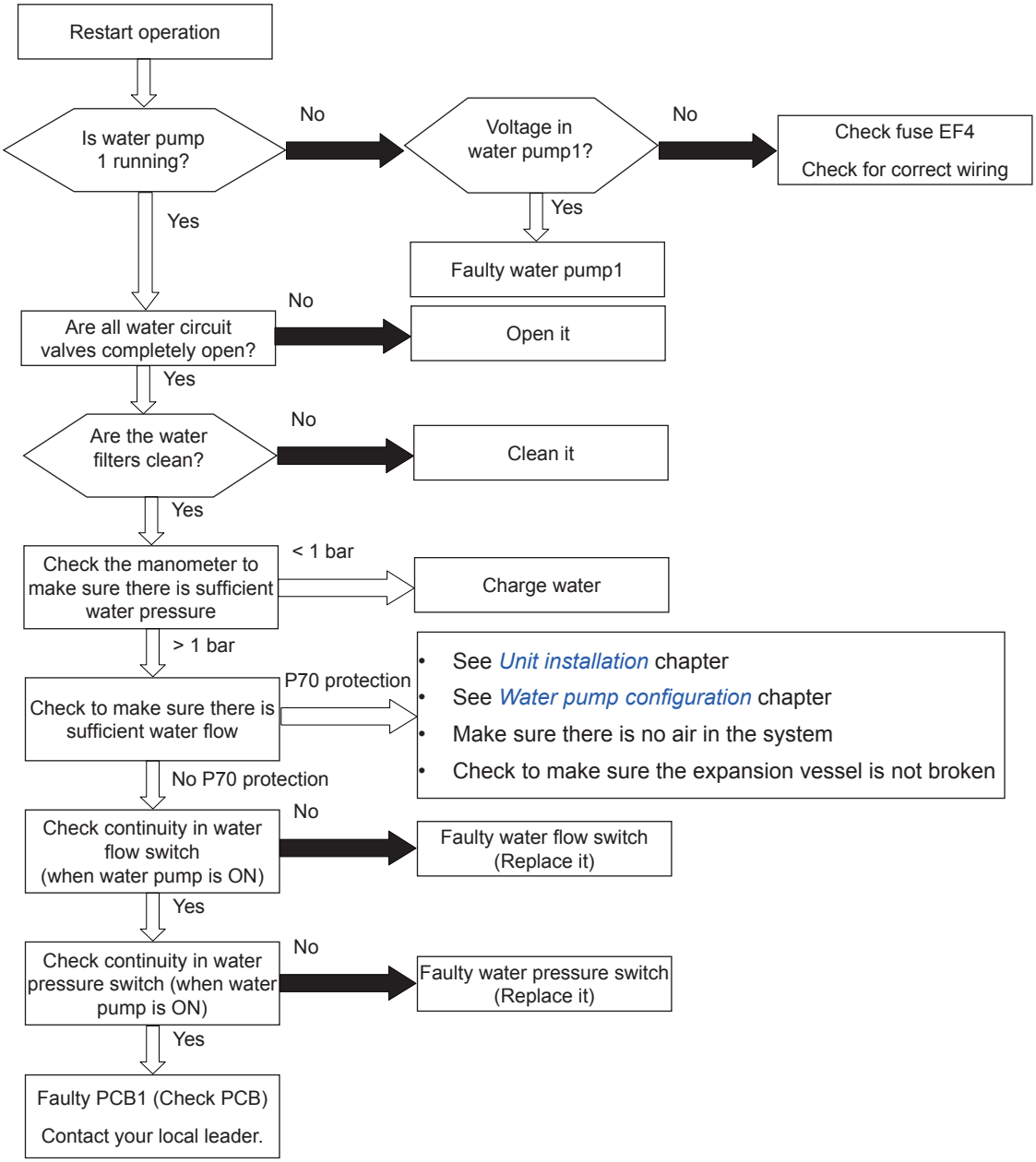
Alarm code	Content of abnormality
02	Tripping of protection device in outdoor unit
07	Decrease in discharge gas superheat
08	Increase in discharge gas temperature
41	Pump down overload
42	Heating overload
47	Low pressure decrease protection activating

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).

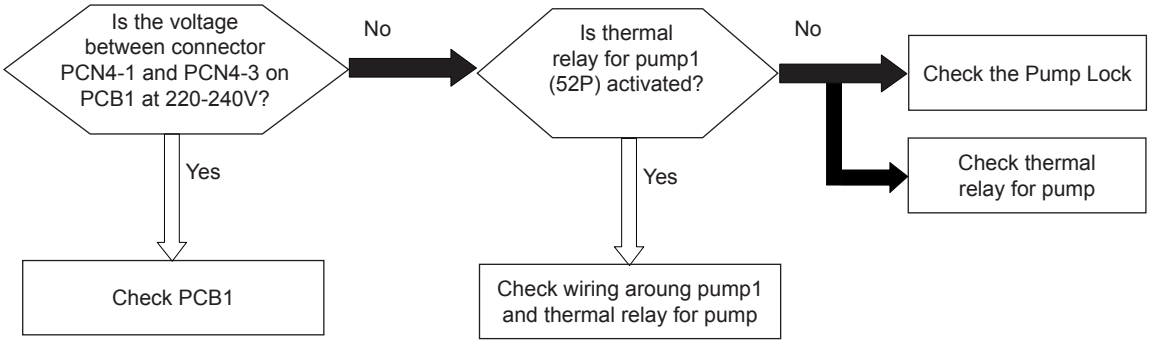


Alarm control procedure:

- Perform retry operation for 1 minutes the first time (Seven-segment shows P70) and keep Outdoor and Indoor Unit running (except Electrical Heater). After 1 minutes have passed (P70), Switch Stop status OFF for Outdoor and Indoor Units

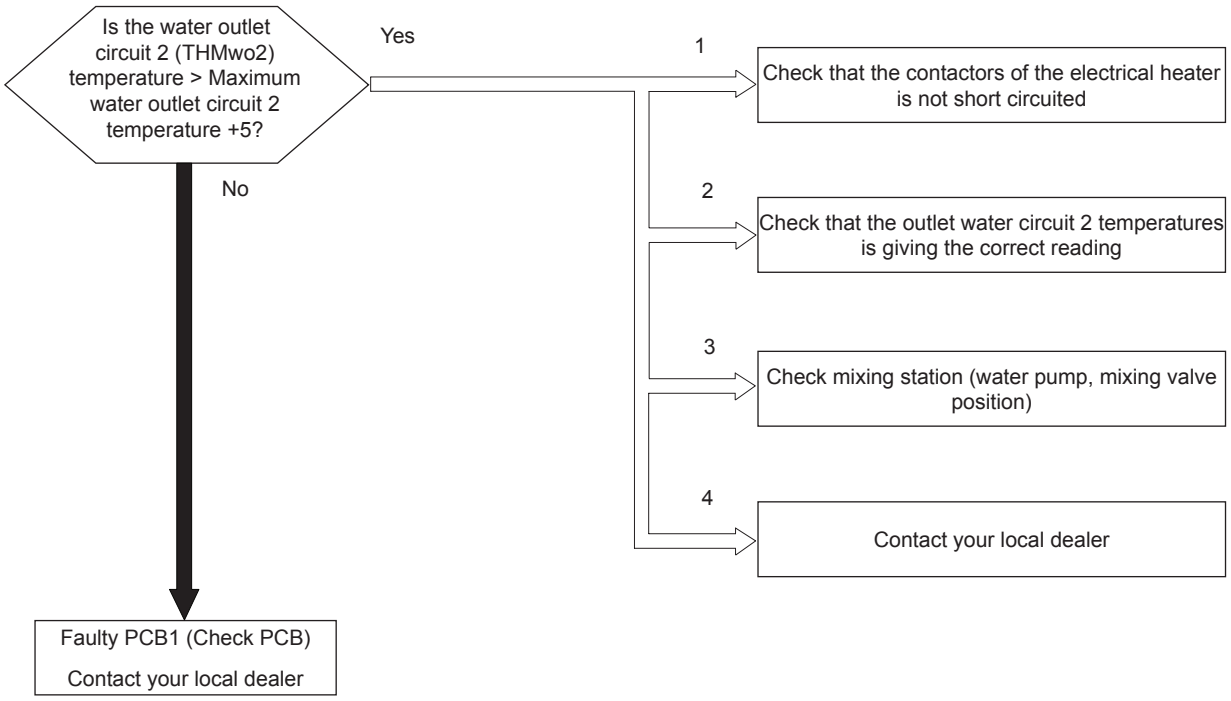
Alarm code	71	No feed back signal from water pump

- 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.



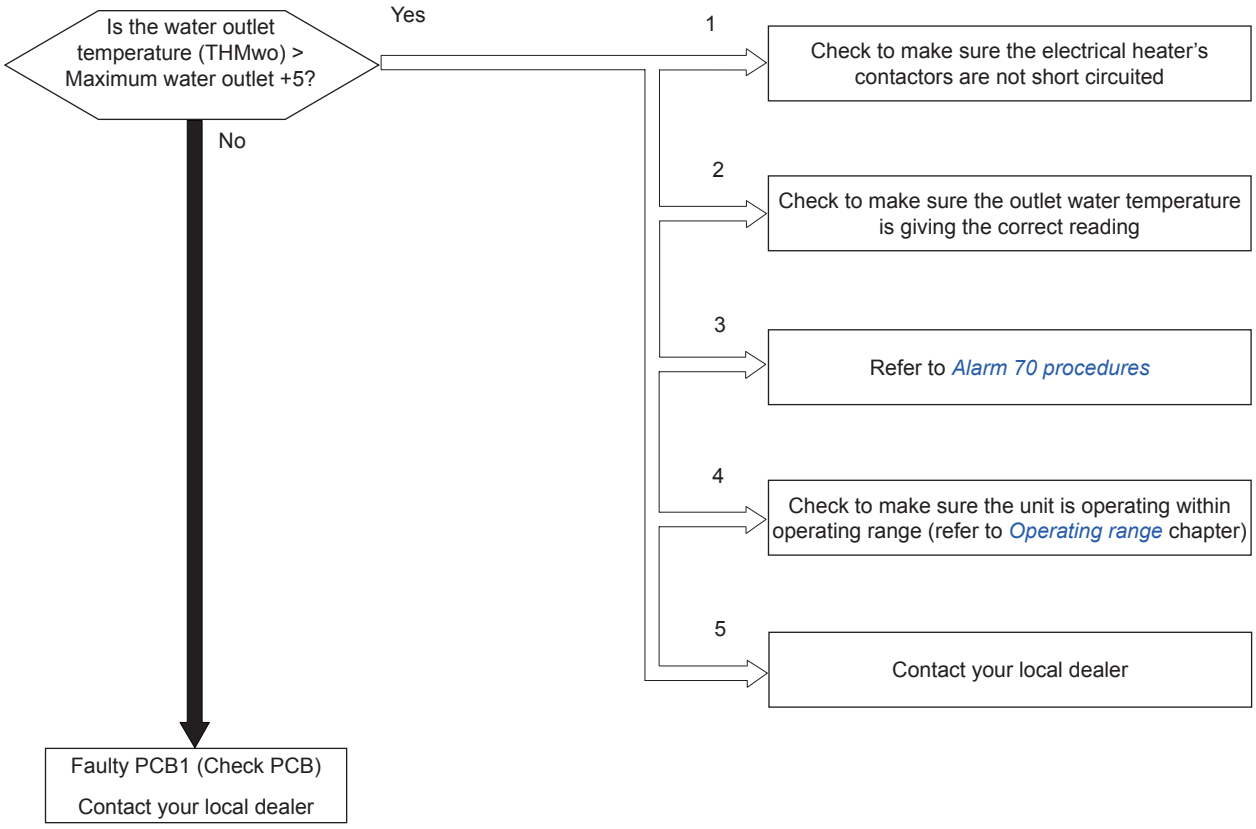
Alarm code	73	Mixing Overheating Limit Protection for mixed circuit (Only if Circuit 2 is enabled)

- 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 a dettermined offset more than maximum water outlet installer configuration for circuit 2 for 20 sec.



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 water supply temperature (Two) is 5ºC more than maximum water circuit temperature for 20 sec.



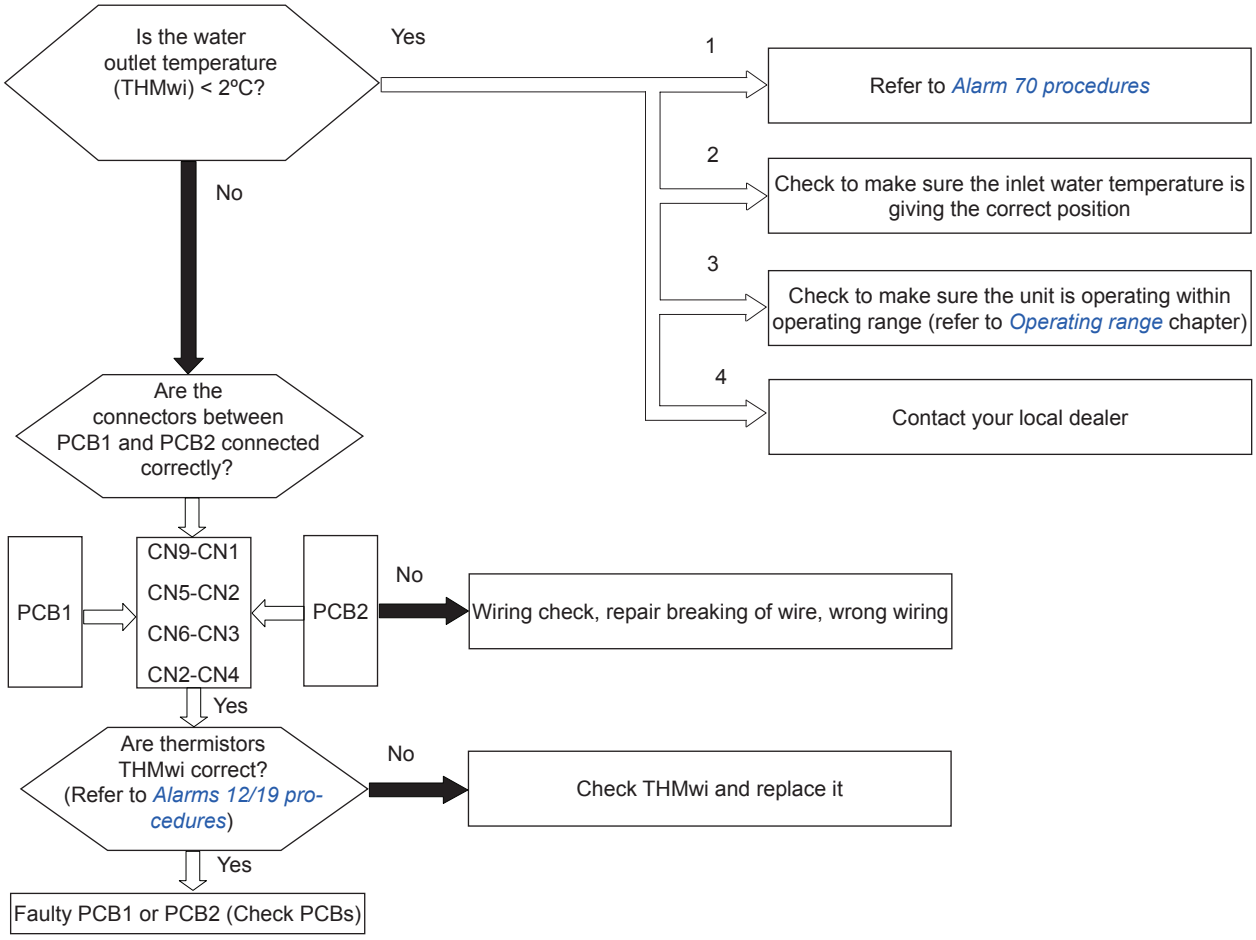
Alarm control procedure:

- 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.
  - Mixing valve closed.

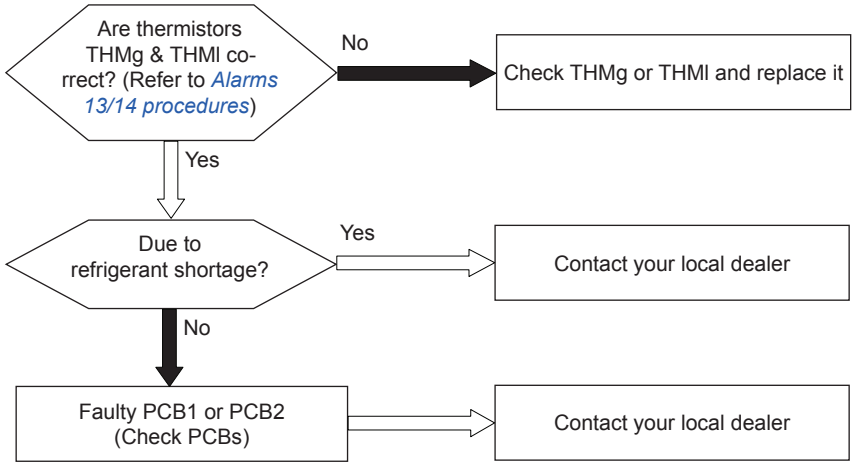
Alarm code	75	Freeze Protection by Cold water inlet temperature detection

- 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 for 30 sec.

Due to low water:



Due to low refrigerant:

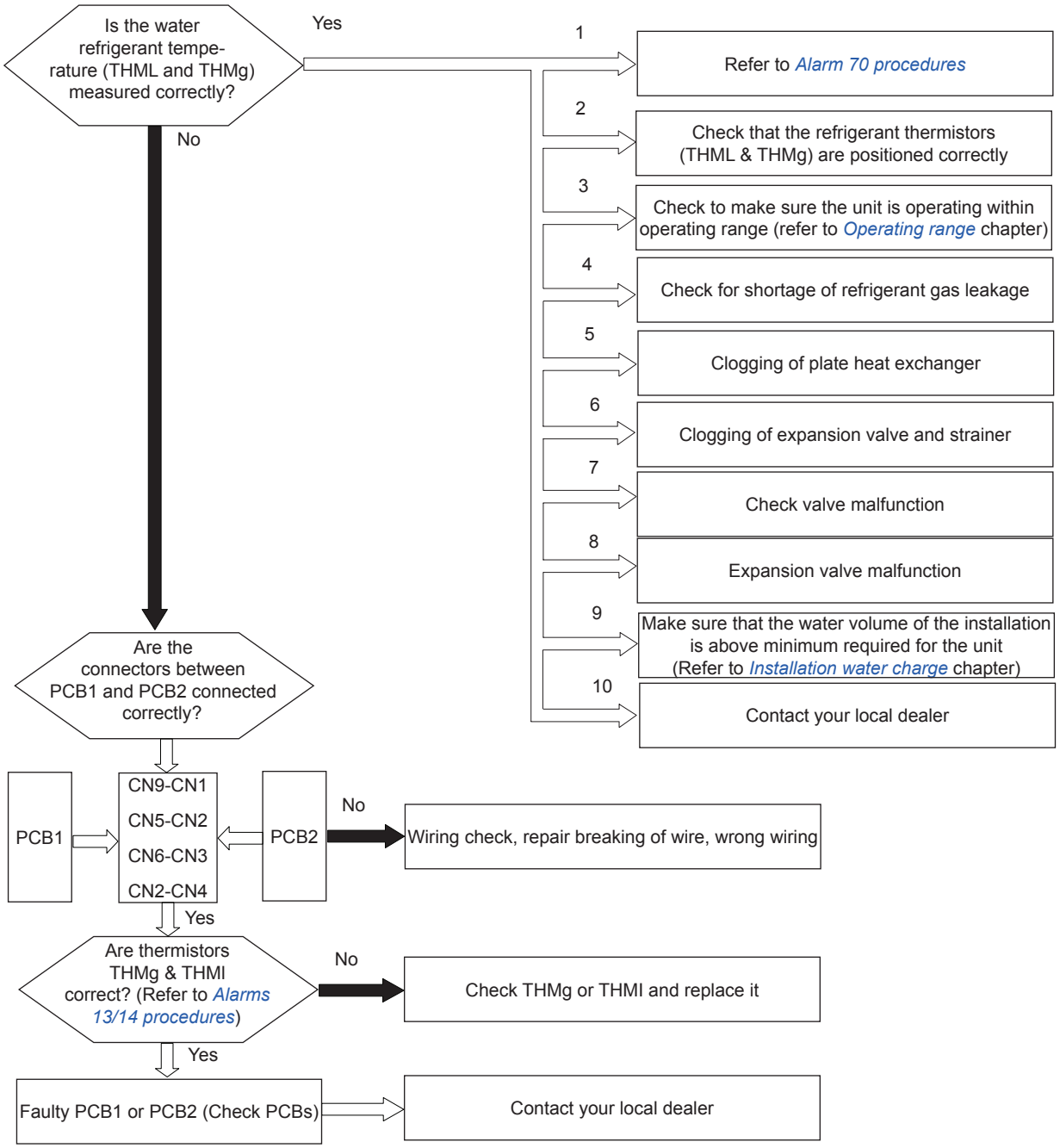


Alarm control procedure:

- Switch OFF Outdoor and Indoor Unit

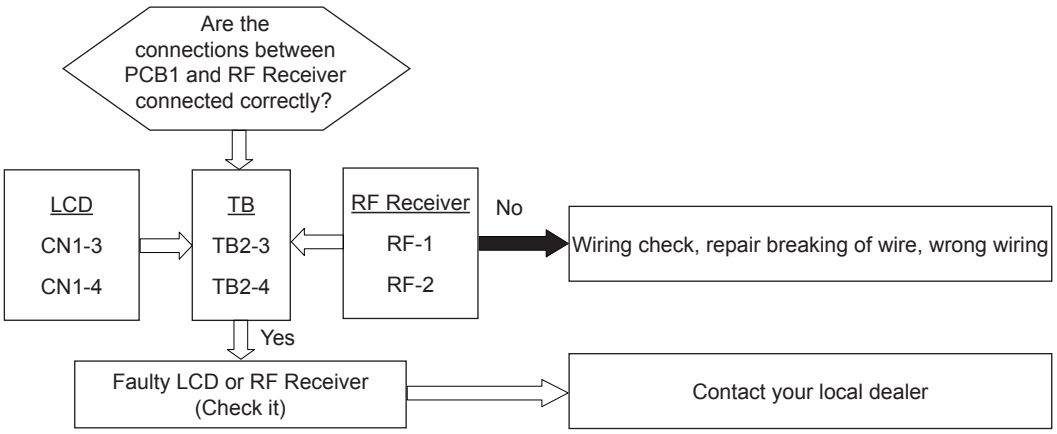
Alarm code	76	Freeze Protection Stop by indoor liquid temperature thermistor

- 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 10 minutes.



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.

Symptom (Fault Message)	Possible Cause	Remedy
The **RF Receiver** does not react to setpoint changes on the **Room Unit**	The **Room Unit** and **RF Receiver** are not bound or the installer parameter 8:Su has not been set correctly	Make sure that the 8:Su parameter value is set correctly. Reset the **RF Receiver** by pressing and holding the push button for 15 seconds. Then follow the binding / rebinding procedure as described in section **4. Binding/ Rebinding Procedure**
After the binding procedure the red LED continues to flash on the **RF Receiver**	Incorrect or incomplete binding procedure	Repeat the binding procedure
	Incorrect position of the **Room Unit** during binding	Repeat the binding procedure keeping approx 1m distance between the **RF Receiver** and the **Room Unit**
The red LED is on the **RF Receiver** (Communication loss)	The **RF Receiver** receives no RF messages from the **Room Unit**	-
	RF signal is blocked due to wrong location of the **Room Unit**	Re-locate the **Room Unit** following instructions in section *2. Installing the System MMI Pack*
	Room Unit batteries are exhausted	Replace batteries in the **Room Unit**

Alarm control procedure:

The control will continue in normal operation with the following fixed Opentherm values:

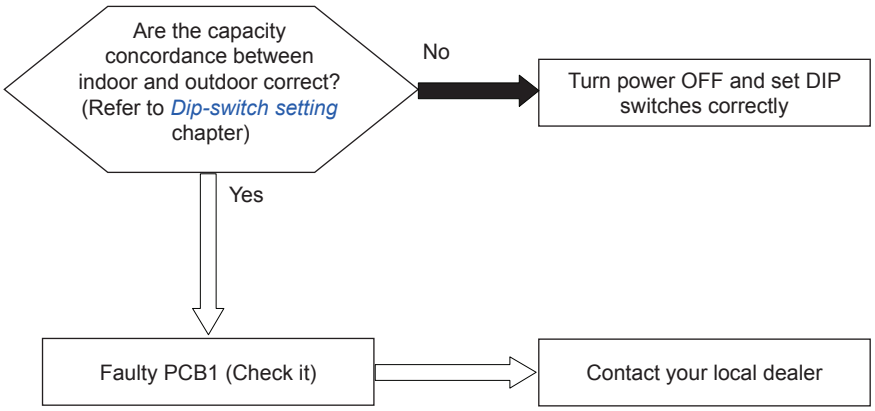
- Circuit 1: Uses the last received Room Set-point. The Room temperature is assumed to be equal to the Room Set-point
- Circuit 2: Uses the last received Room Set-point. The Room temperature is assumed to be equal to the Room Set-point
- Control will not obey the thermostat time programme and OFF function

NOTE

For more information refer to** Room unit installation and user's guide**.

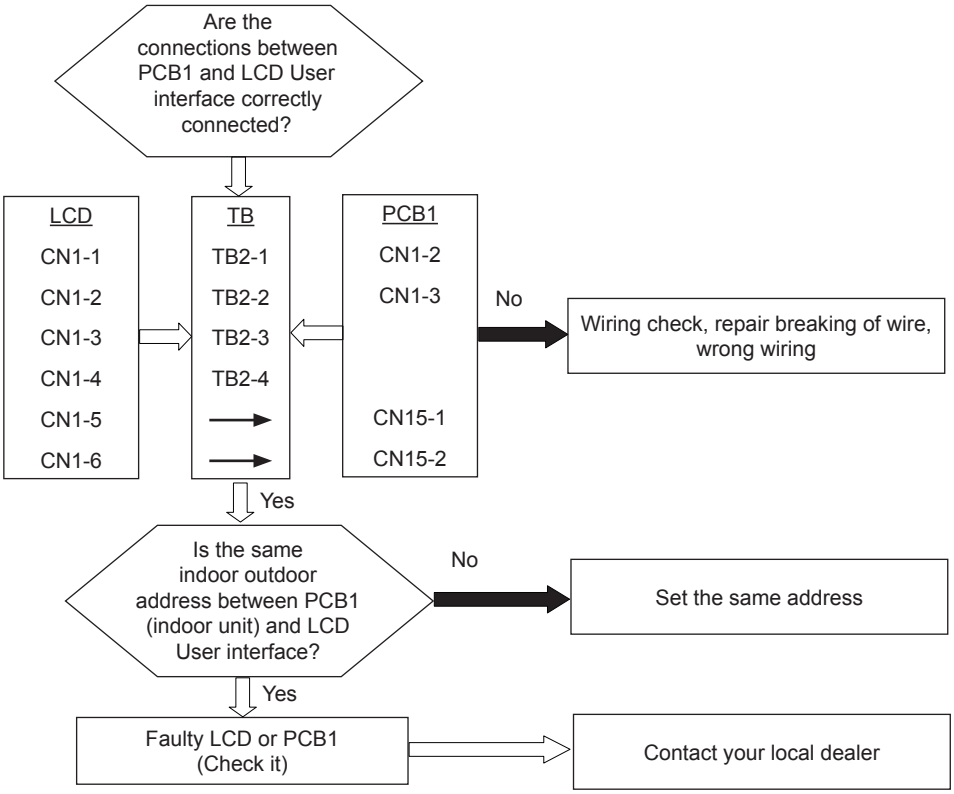
Alarm code	79	Incorrect capacity setting

- 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 and LCD User interface.



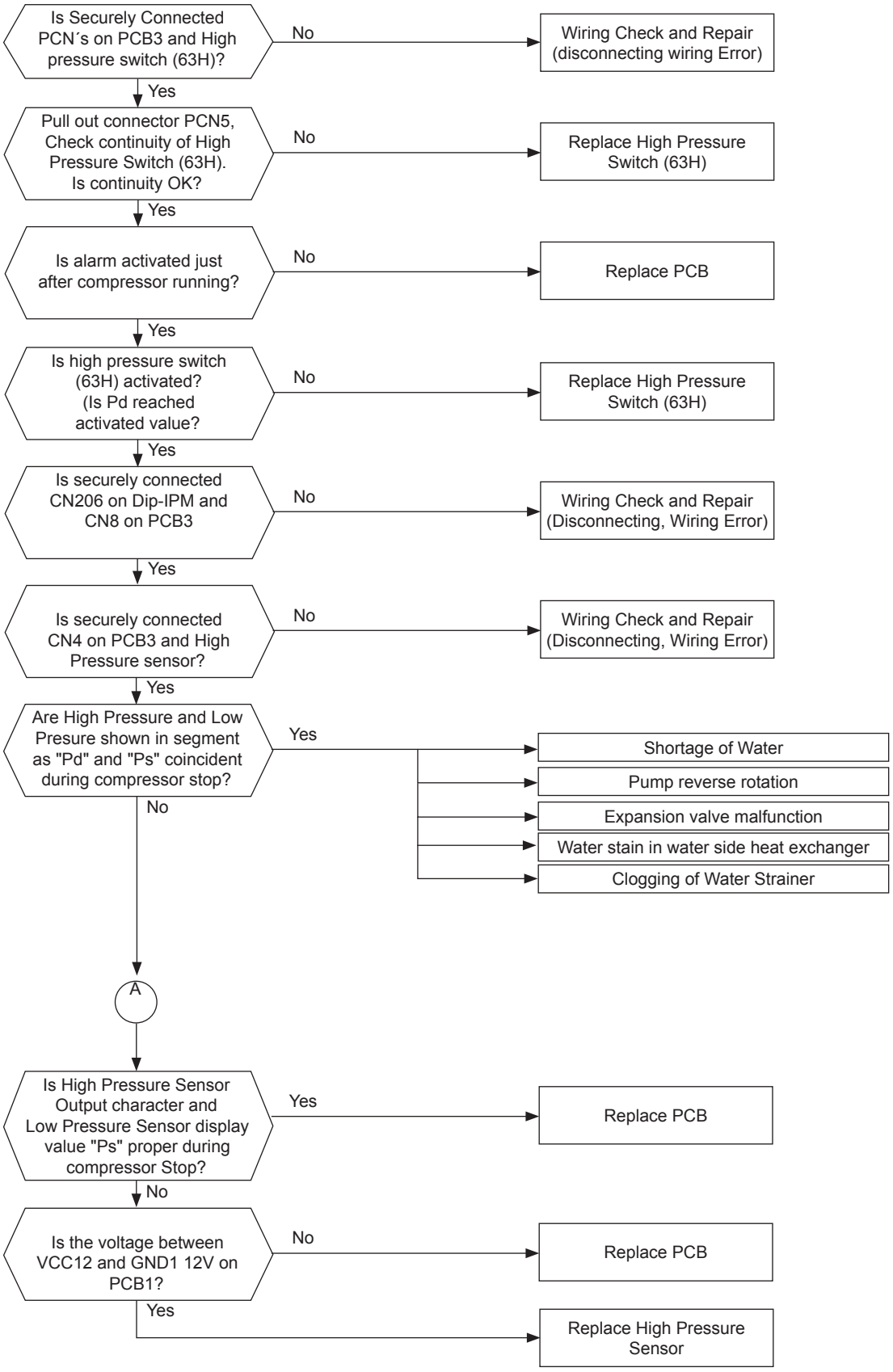
Alarm control procedure:

- Switch OFF Outdoor and Indoor Units.

Alarm code	101	Activation of high pressure switch

- 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 high pressure (Pd) is incresed to more than 3 MPa, and high pressure switch (63H) is activated.

PCB monitoring position: PCB3, PCN5 (See next page)



NOTE

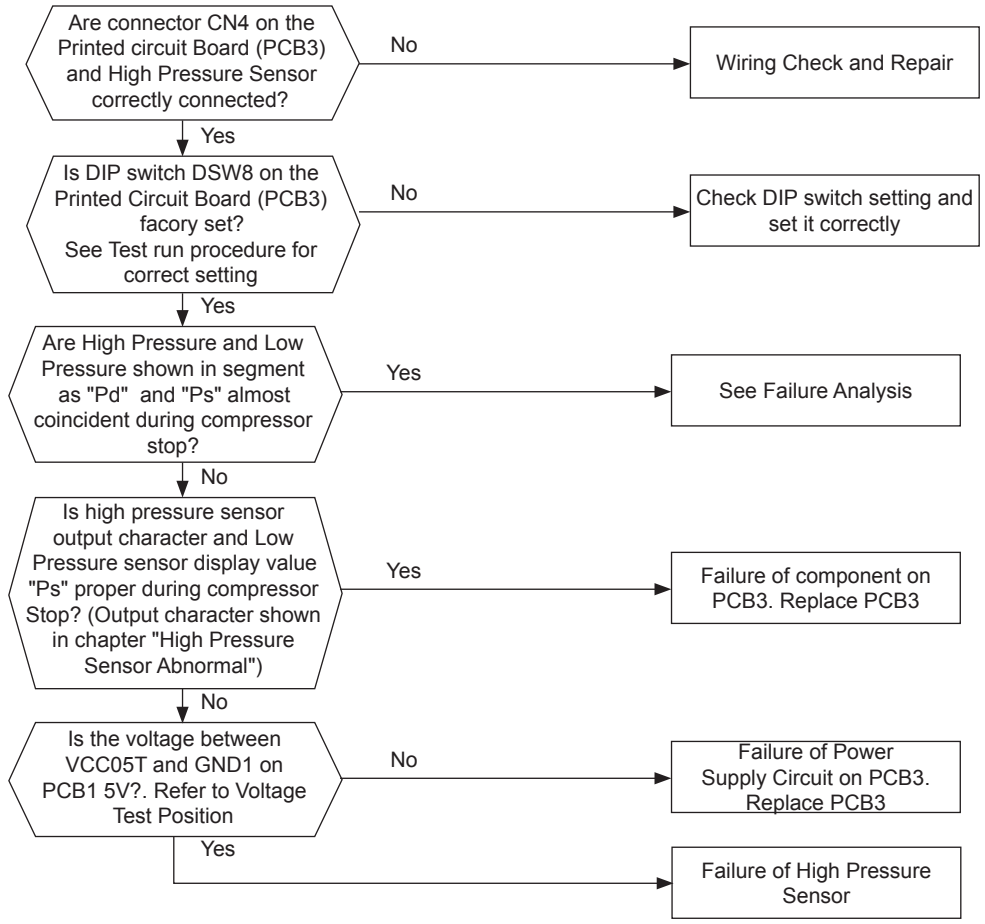
- ***In case that the low pressure is higher than 1.6 MPa, segment shows 1.6 MPa.***
- ***In this case, connect a pressure gauge to high pressure check joint, check the pressure shown in the gauge.***

Alarm code	102	Activation of protection control for excessively high pressure

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- During normal operation the Electronic Control stops and restarts automatically after 3 minutes.
- The Stop alarm appears after 3 retries during 30 minutes.
  - This alarm code is displayed when the high pressure (Pd) is incresed to more than 2.78MPa, during 10 seconds.

PCB monitoring position: PCB3, CN4

Retry code: P-12



NOTE

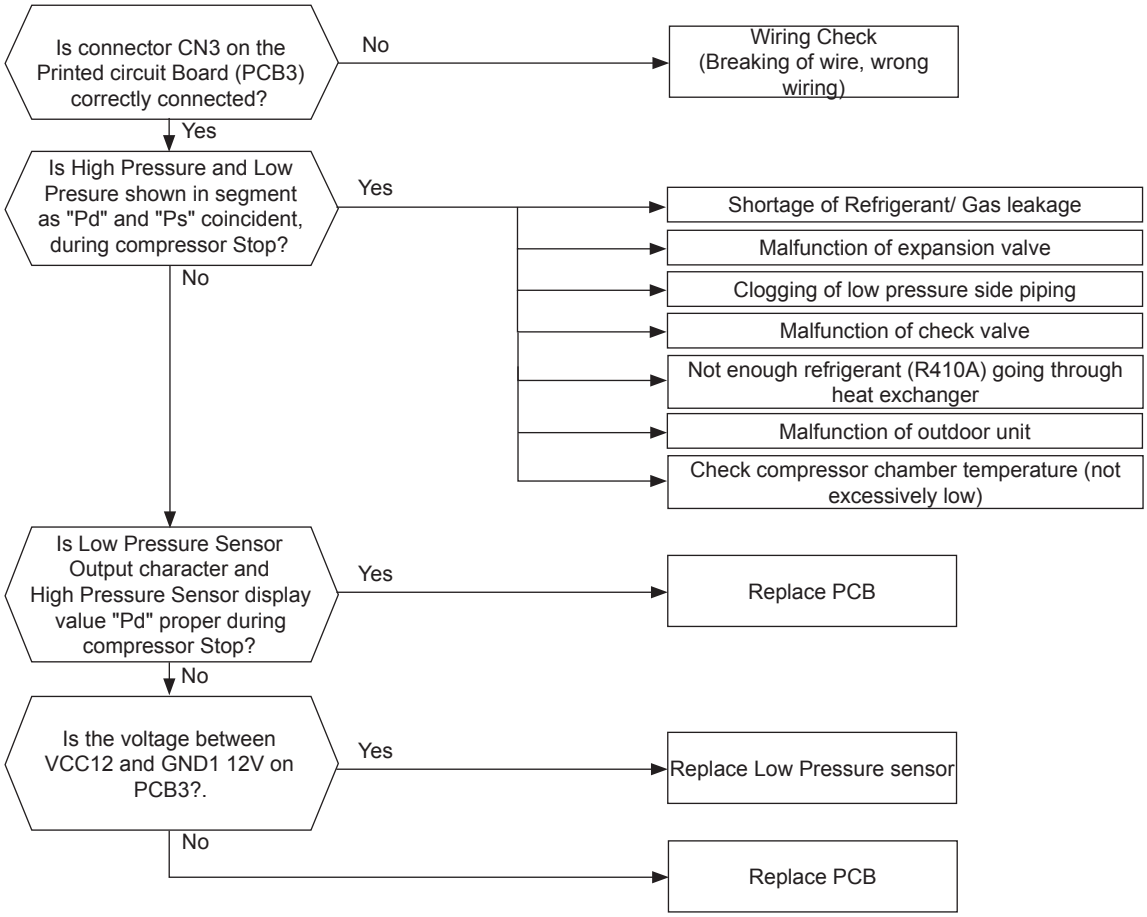
- ***In case that the low pressure is higher than 1.6 MPa, segment shows 1.6 MPa.***
- ***In this case, connect a pressure gauge to high pressure check joint, check the pressure shown in the gauge.***

Alarm code	103	Activation of protection control for excessively low pressure

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- During normal operation the Electronic Control stops and restarts automatically after 3 minutes.
- The Stop alarm appears after 3 retries during 30 minutes.
  - This alarm code is displayed when the low pressure (Ps) is decresed to less than 0.15 MPa, during 90 seconds or,
  - This alarm code is displayed when the low pressure (Ps) is decresed to less than 0.1 MPa after starting the compressor for 3 minutes.

PCB monitoring position: PCB3, CN3

Retry code: P-06



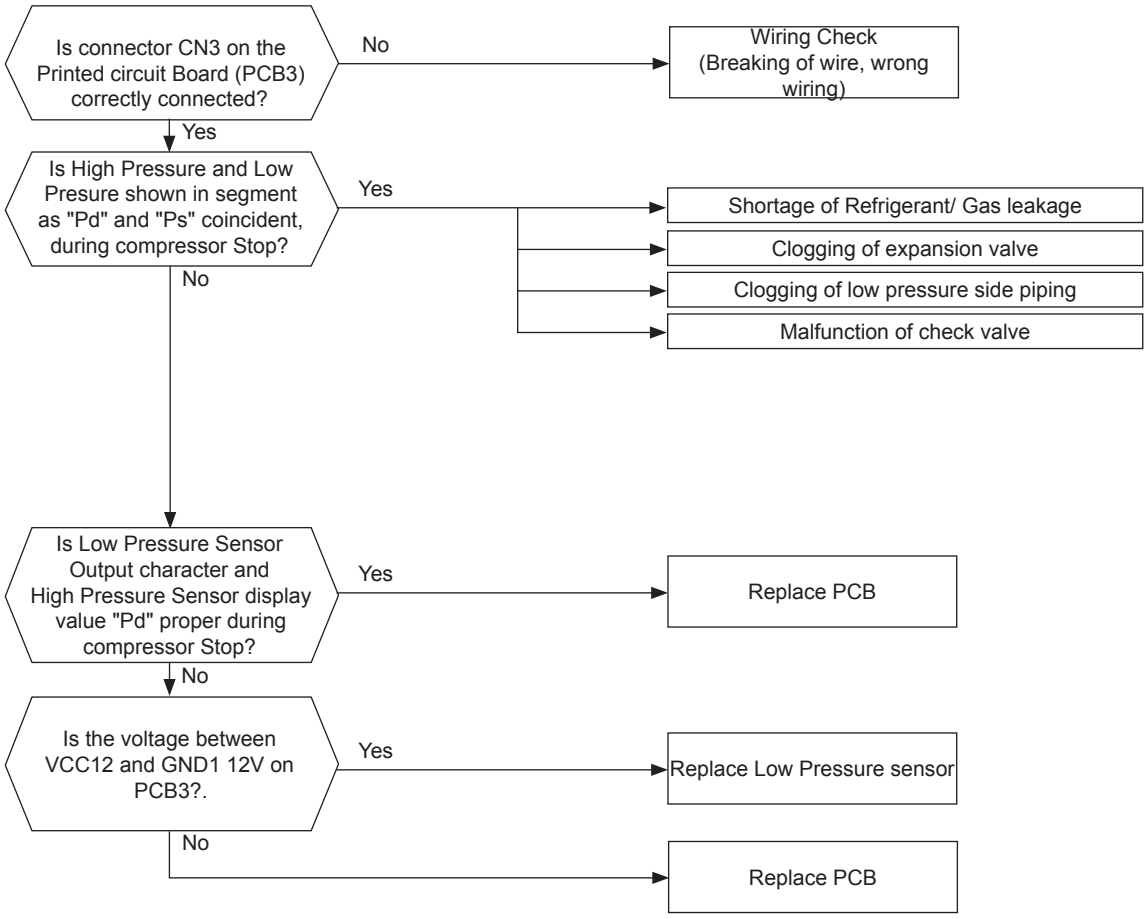
NOTE

- ***In case that the low pressure is higher than 2.0 MPa, segment shows 2.0 MPa.***
- ***In this case, check if the high pressure value "Pd" shown in segment is higher than 1.0 MPa.***

Alarm code	104	Activation of low pressure control

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- The electronic control displays the alarm during the operation in heathing mode.
  - This alarm code is displayed when the suction pressure (Ps) is less than 0.1 MPa during 3 seconds.

PCB monitoring position: PCB3, CN3



NOTE

- ***In case that the low pressure is higher than 2.0 MPa, segment shows 2.0 MPa.***
- ***In this case, check if the high pressure value "Pd" shown in segment is higher than 1.0 MPa.***

Alarm code	105	Excessively low pressure difference

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- The compressor stops and restarts automatically in 3 minutes.
- The Stop alarm appears after 3 retries during 30 minutes.
  - This alarm code is displayed when the Pressure Ratio calculated from High Pressure “Pd” and Low Pressure “Ps” is less than 1.8 MPa during 3 minutes.

PCB monitoring position: PCB3, CN3 and CN4

Retry code: P-11

Calculation Formula for Pressure Ratio:

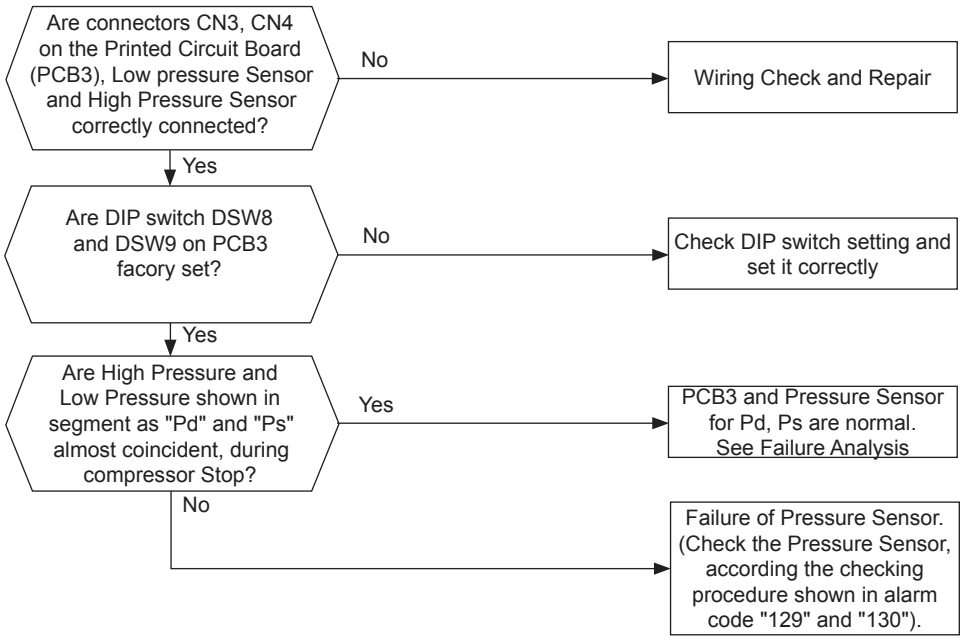
$$\text{Pressure Ratio} = \frac{\text{High Pressure "Pd"} + 0.1}{\text{Low Pressure "Ps"} + 0.1}$$

Example:

Pd= 1.6 MPa

$$\text{Pressure Ratio} = \frac{1.6 + 0.1}{0.7 + 0.1} = 2.13$$

Ps= 0.7 MPa



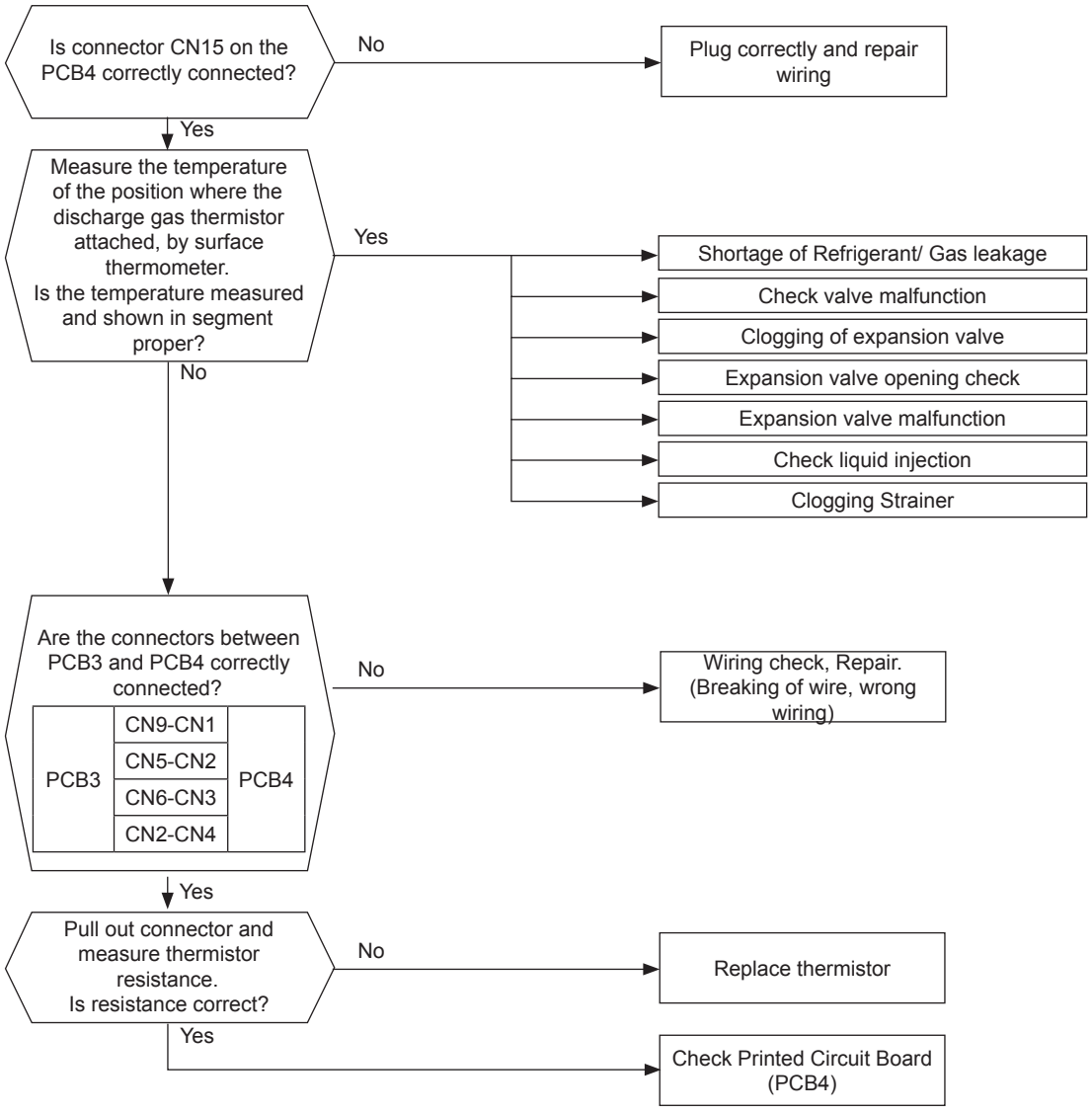
NOTE

- ***In case that the low pressure is higher than 1.6 MPa, segment shows 1.6 MPa.***
- ***In this case, connect a pressure gauge to high pressure check joint, check the pressure shown in the gauge.***

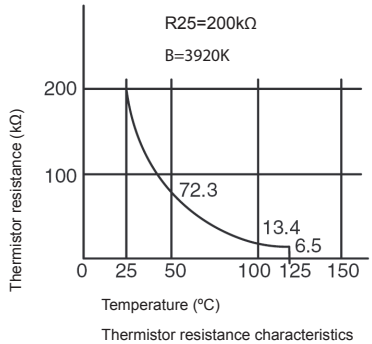
Alarm code	106	Excessively high discharge gas temperature

- 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 discharge gas temperature is increased to 120ºC and continues for 10 minutes.
- The discharge gas, temperature is increased over 140 ºC during more than 5 seconds.

PCB monitoring position: PCB4, CN15



Measuring the thermistor resistance value:

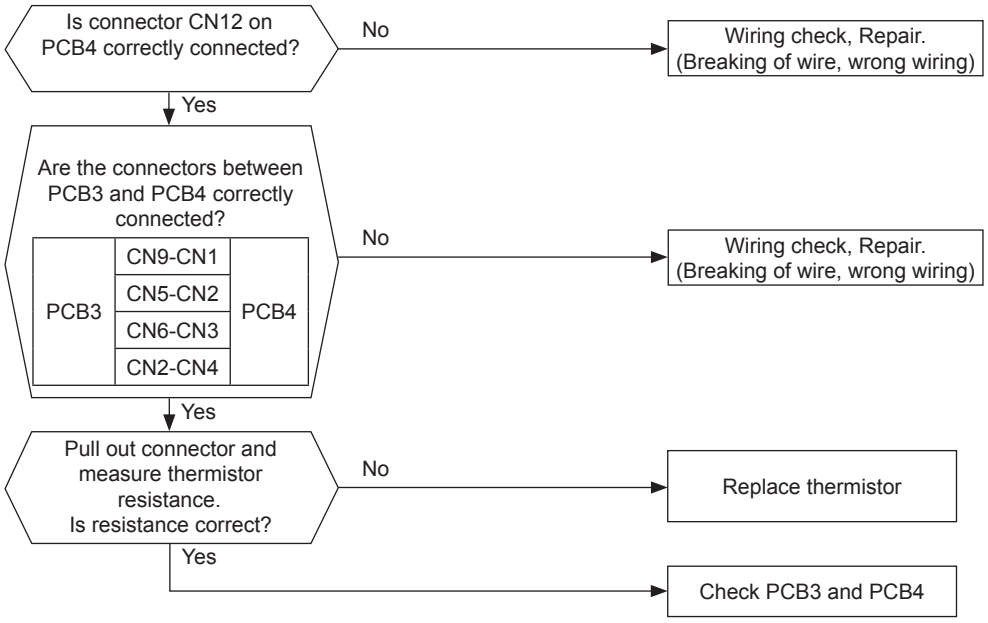


Thermistor resistance characteristics

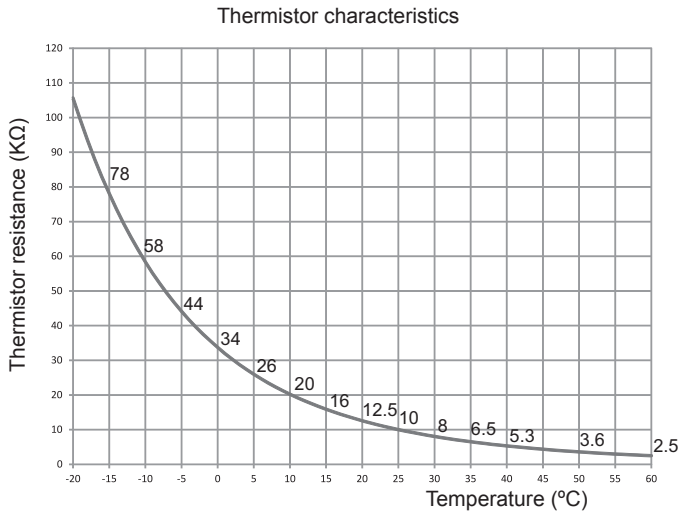
Alarm code	124	Failure of refrigerant liquid temperature thermistor (Open/Short)

- 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 or cut.

PCB monitoring position: PCB4, CN14



Measuring the thermistor resistance value:

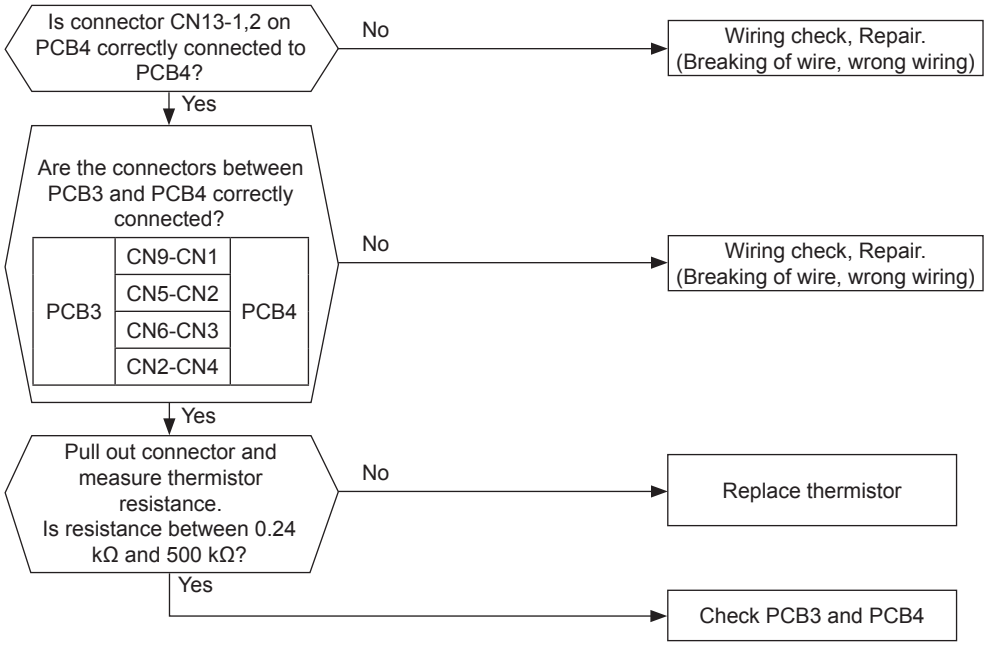


NOTE

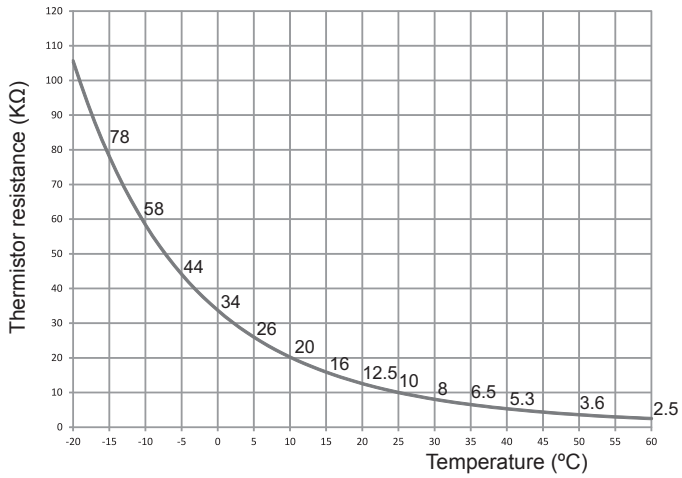
Measure the resistance at least in 2 different points which the temperature is different more than 10 ºC.

Alarm code	125	Failure of inverter ebox ambient 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 the thermistor is short circuited or cut.



Thermistor characteristics

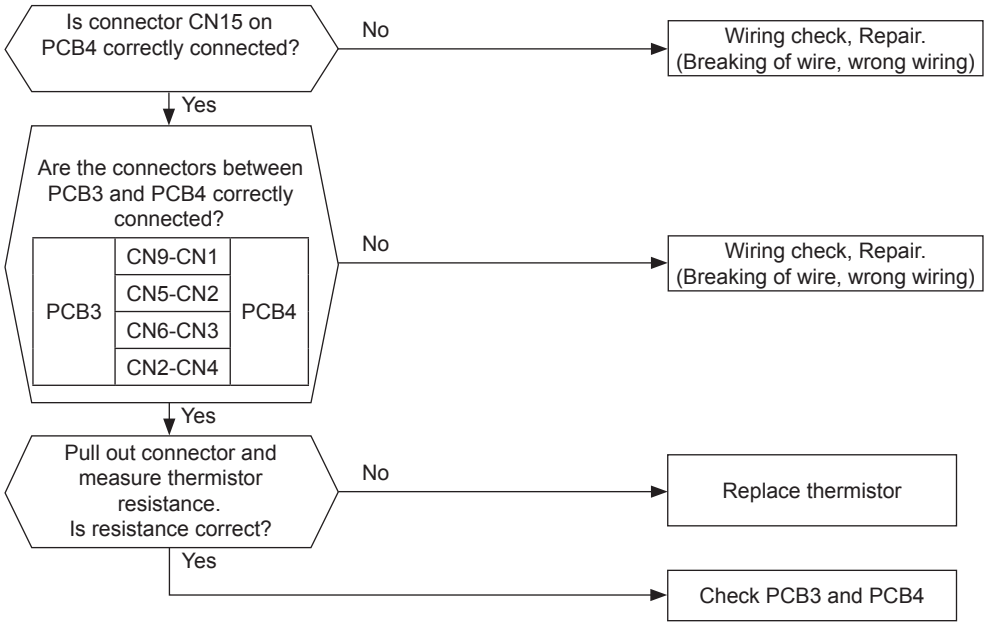


Phenomenon	Cause	Check item	Action (Turn OFF the main switch)
Faulty thermistor for the outdoor unit ambient	Fault	Check resistance	Replace thermistor if faulty
	Incorrect connection	Check wiring to PCB3	Repair wiring and connections
Faulty PCB3		Replace PCB3 and check operation	Replace PCB if faulty

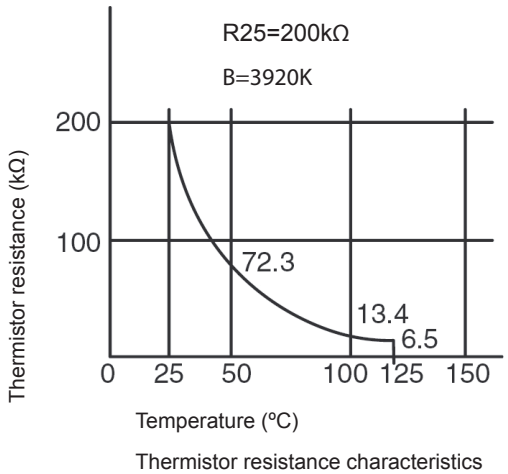
Alarm code	126	Failure of discharge gas temperature thermistor

- 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 the thermistor is short circuited or cut.

PCB monitoring position: PCB4, CN15



Measuring the thermistor resistance value:



Thermistor resistance characteristics

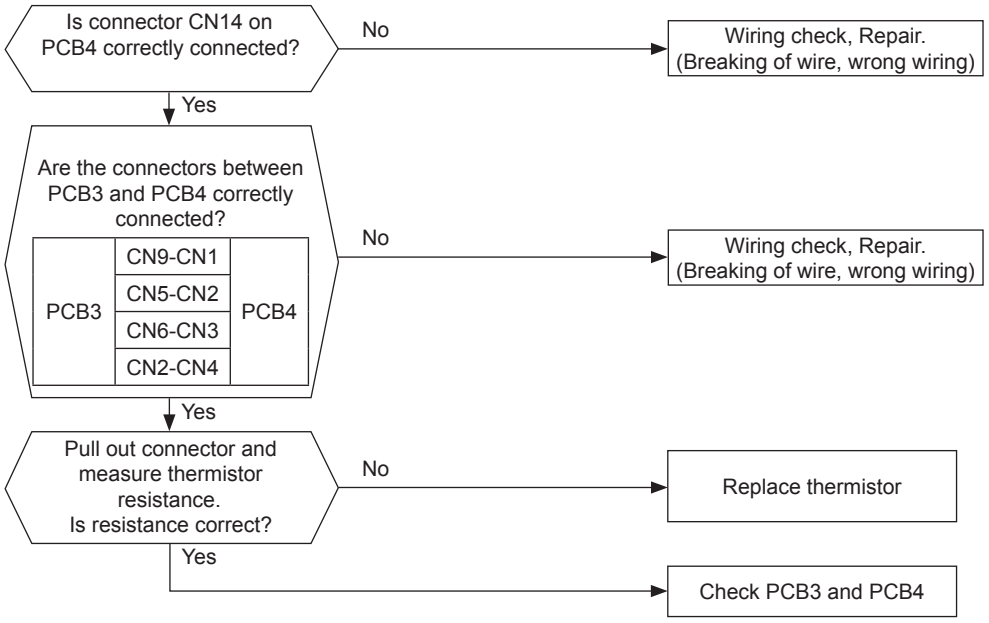
NOTE

Measure the resistance at least in 2 different points which the temperature is different more than 10 ºC.

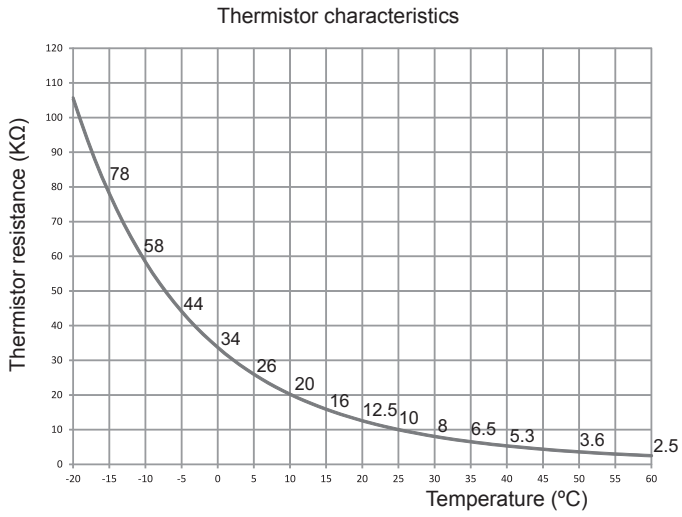
Alarm code	127	Failure of refrigerant evaporating temperature thermistor (Open/Short)

- 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 or cut.

PCB monitoring position: PCB4, CN12



Measuring the thermistor resistance value:



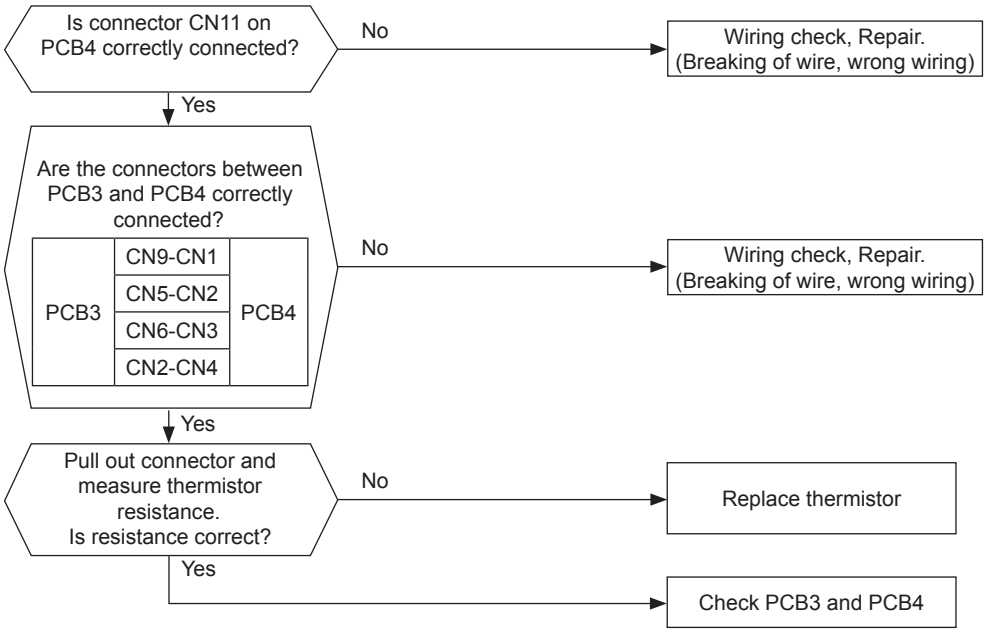
NOTE

Measure the resistance at least in 2 different points which the temperature is different more than 10 ºC.

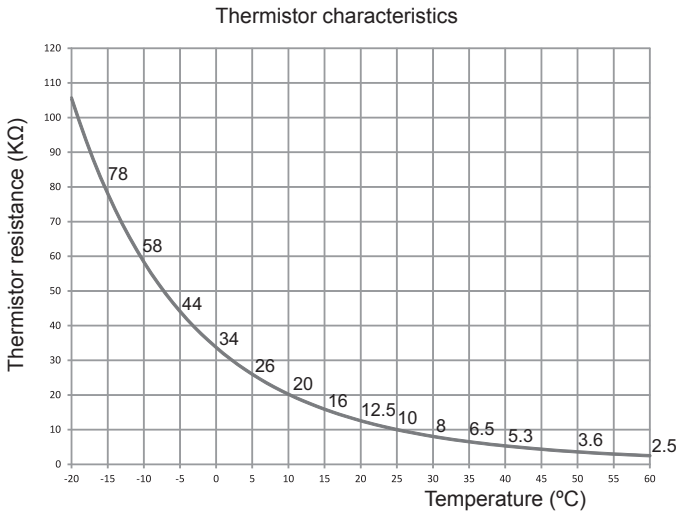
Alarm code	128	Failure of suction gas emperature thermistor (Open/Short)

- 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 or cut.

PCB monitoring position: PCB4, CN11



Measuring the thermistor resistance value:



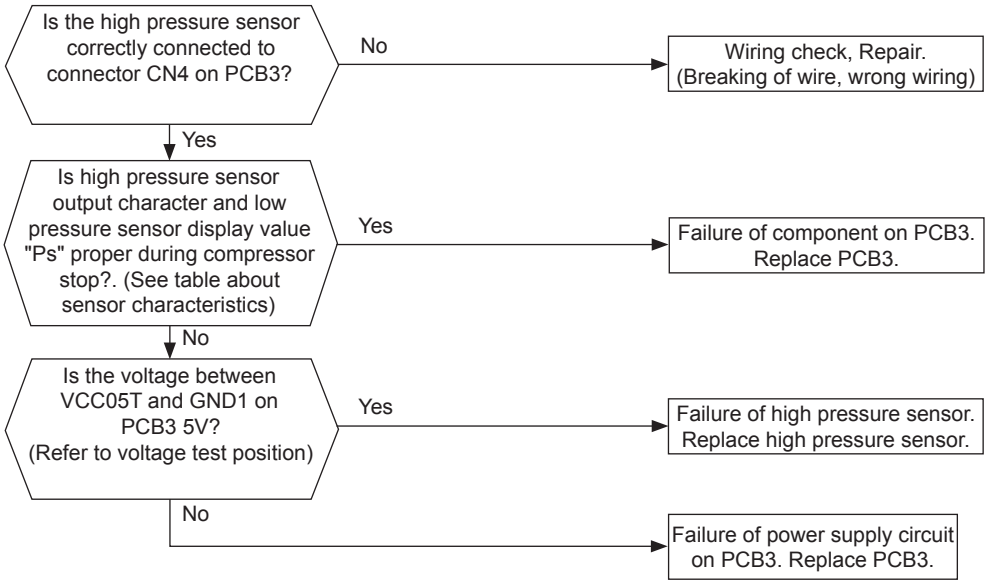
NOTE

Measure the resistance at least in 2 different points which the temperature is different more than 10 ºC.

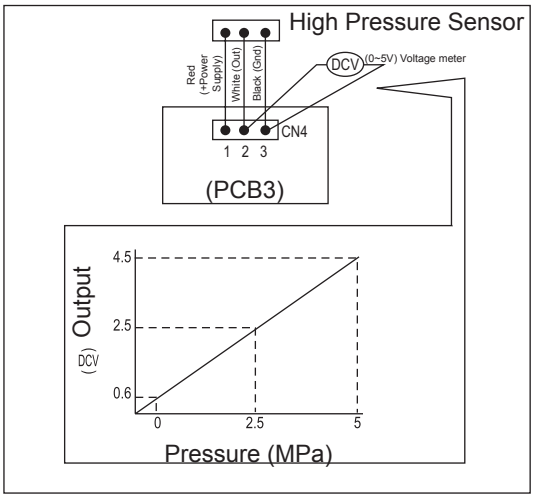
Alarm code	129	Failure of discharge gas pressure sensor (Open/Short)

- 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 or cut.

PCB monitoring position: PCB3, CN4



Characteristics of high pressure sensor



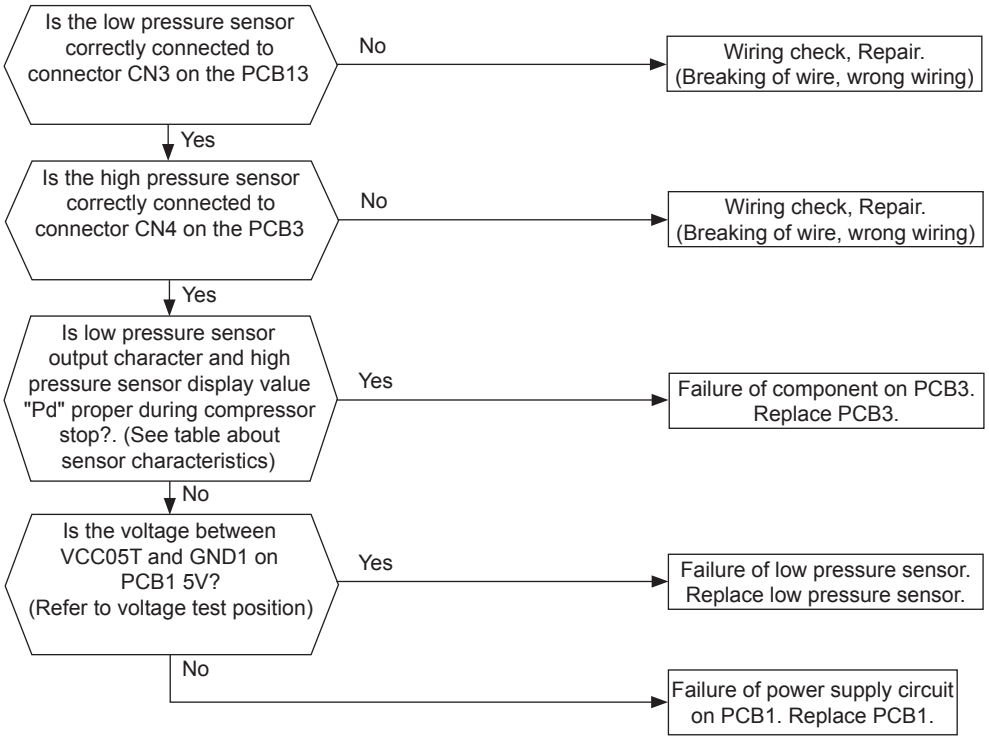
NOTE

- ***In case that the low pressure is higher than 1.6 MPa, segment shows 1.6 MPa.***
- ***In this case, connect a pressure gauge to high pressure check joint, check the pressure shown in the gauge.***

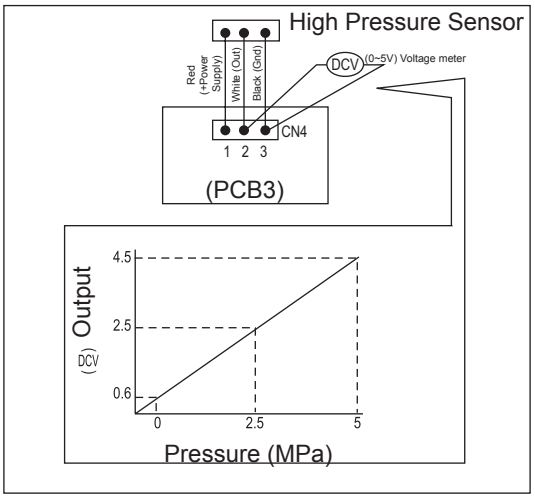
Alarm code	130	Failure of suction gas pressure sensor (Open/Short)

- 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 or cut.

PCB monitoring position: PCB3, CN3



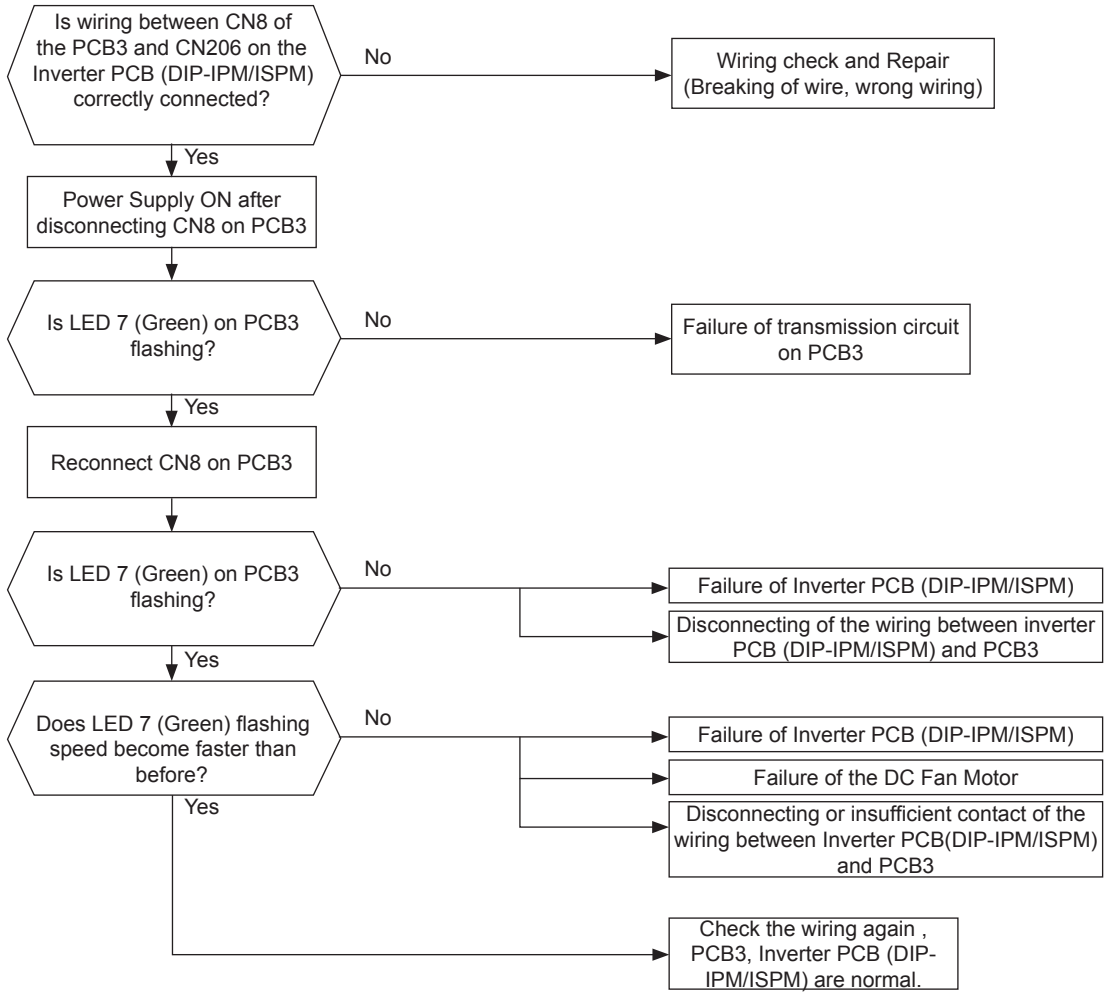
Characteristics of high pressure sensor



Alarm code	132	Abnormal transmission between Inverter PCB and Main PCB

- 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 communication between Main PCB (PCB1) and Inverter (DIP- IPM/ISPM) is not performed correctly during 30 seconds.

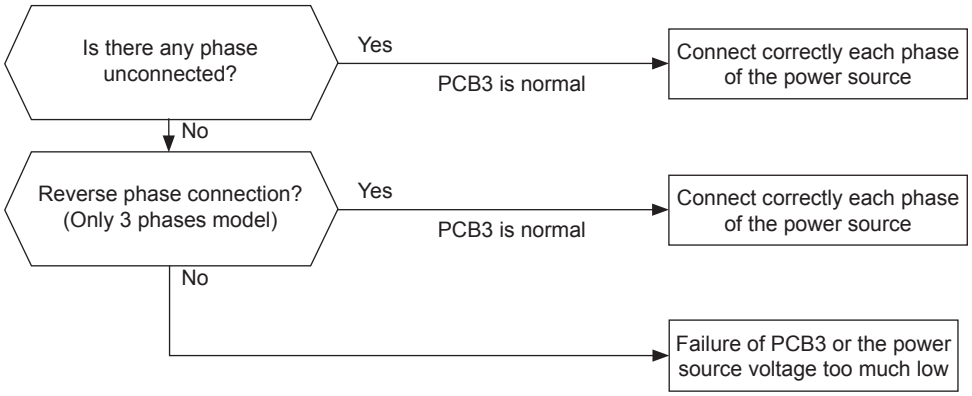
PCB monitoring position: PCB3, CN8



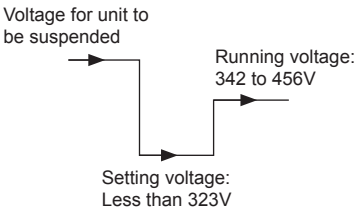
Alarm code	134	Abnormality of power supply phase

- 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 power source phases are reversely connected or one phase is not connected.

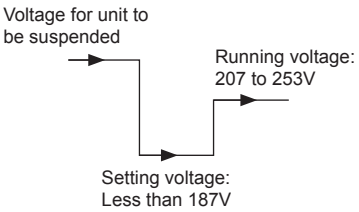
PCB monitoring position: PCB3, PCN1



- RWH-(4-6)FSNFE (Three phase)

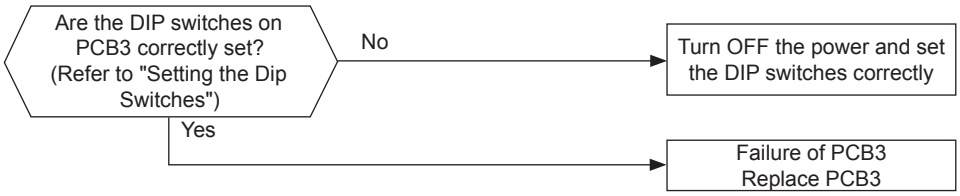


- RWH-(4-6)FSVNFE (Single phase)



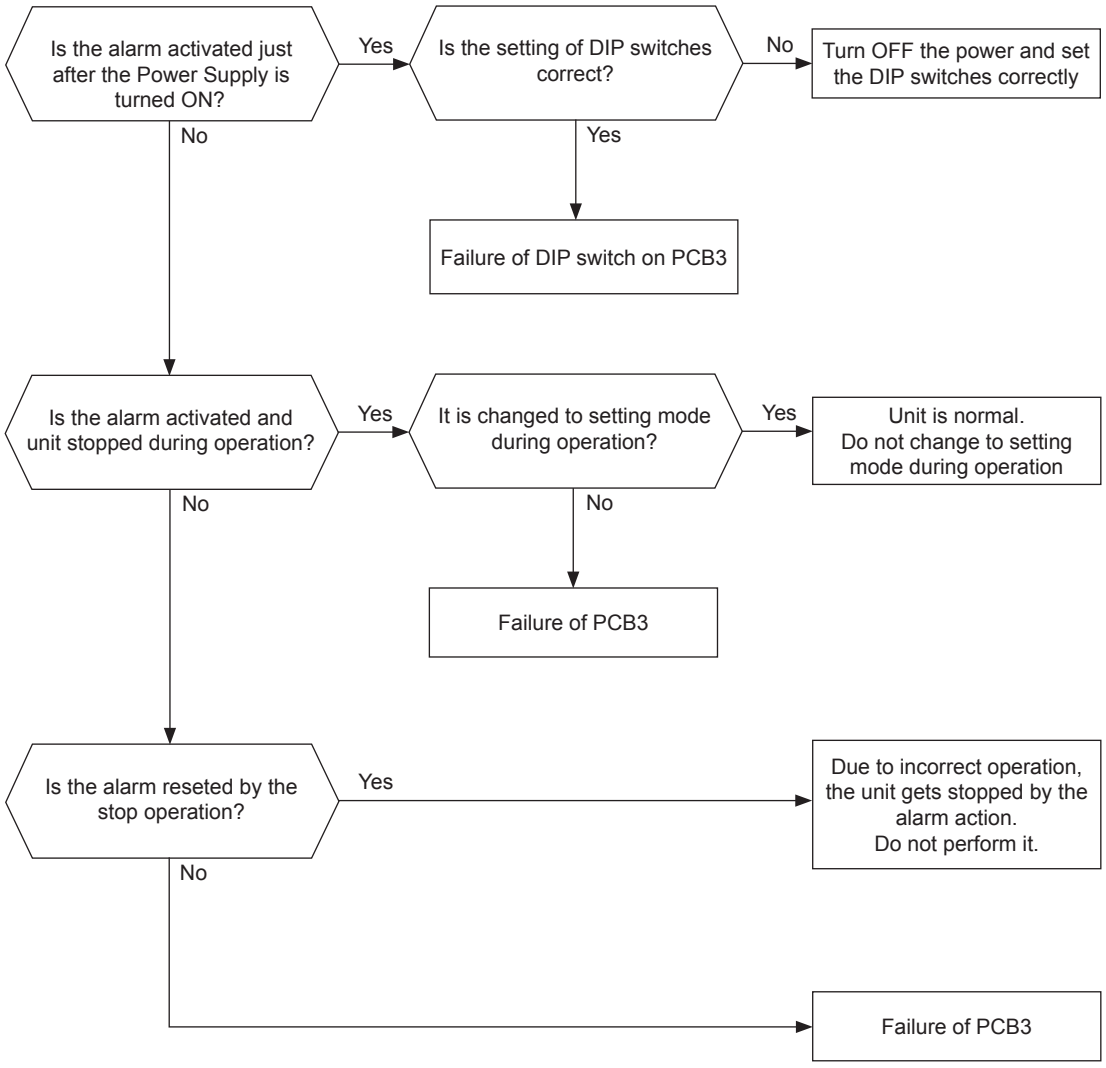
Alarm code	135	Incorrect PCB Setting

- 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 wrong settings are performed in DIP switches on PCB.



Alarm code	136	Incorrect PCB Operation

- 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 wrong settings is performed in DIP switch on PCB or prohibited operation is performed.



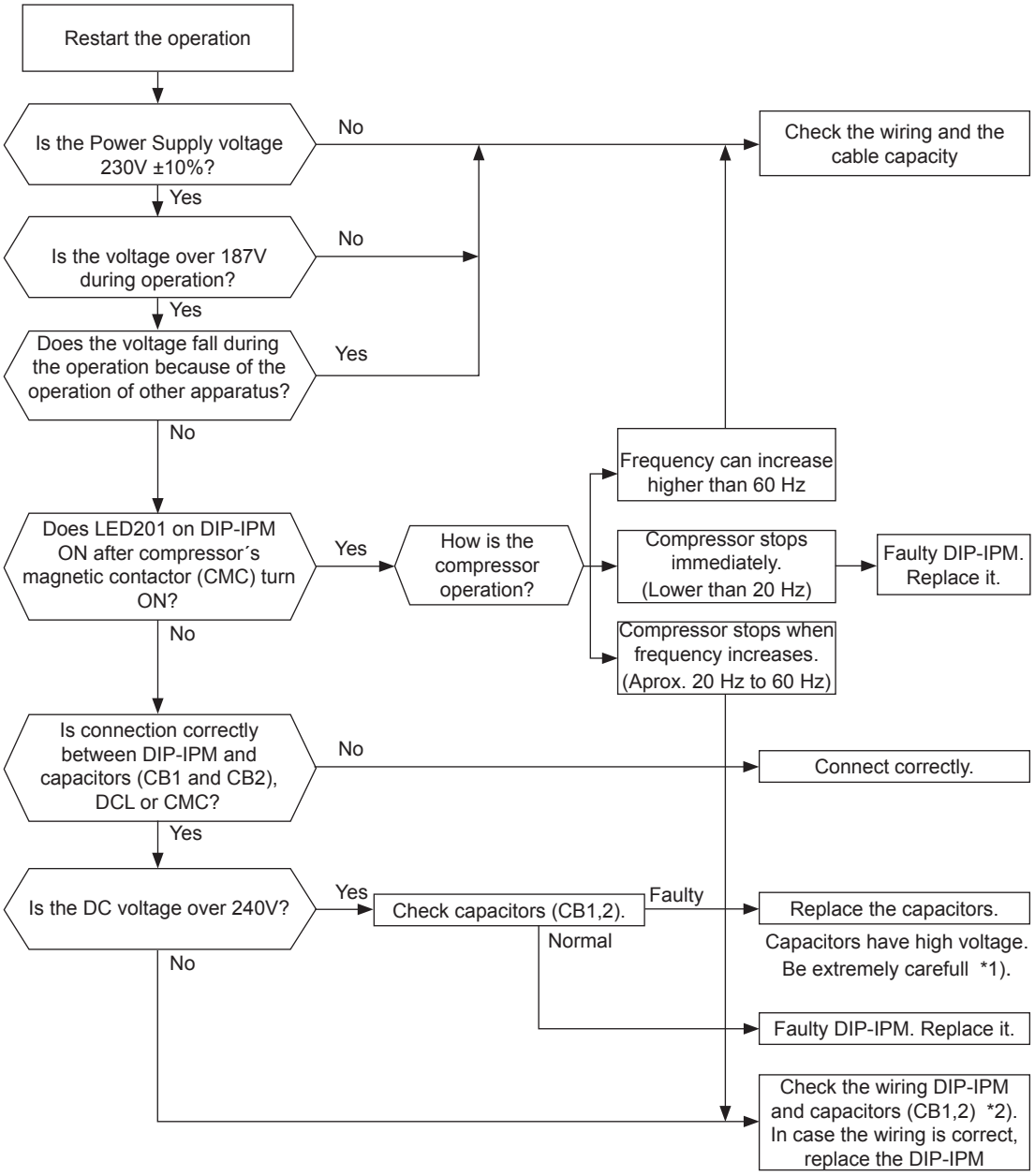
Alarm code	151	Excessively low voltage or excessively high voltage for the inverter of RWH-(4-6)FSVNFE

- 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 voltage between terminal “P” and “N” of DIP-IPM is insufficient.

Retry code: P-18

⚠ *CAUTION*

Electrical hazard. Risk of electrical shock. Be extremely carefull because of the high voltage.



*1) If the capacitor has a high voltage, perform the high-voltage discharge pocedure. Refer to section RWH-(4-6)FSVNFE: “Procedure for checking other main parts”.

*2) Checking procedures of the diode module are displayed in item RWH-(4-6)FSVNFE: “Procedure for checking other main parts”.

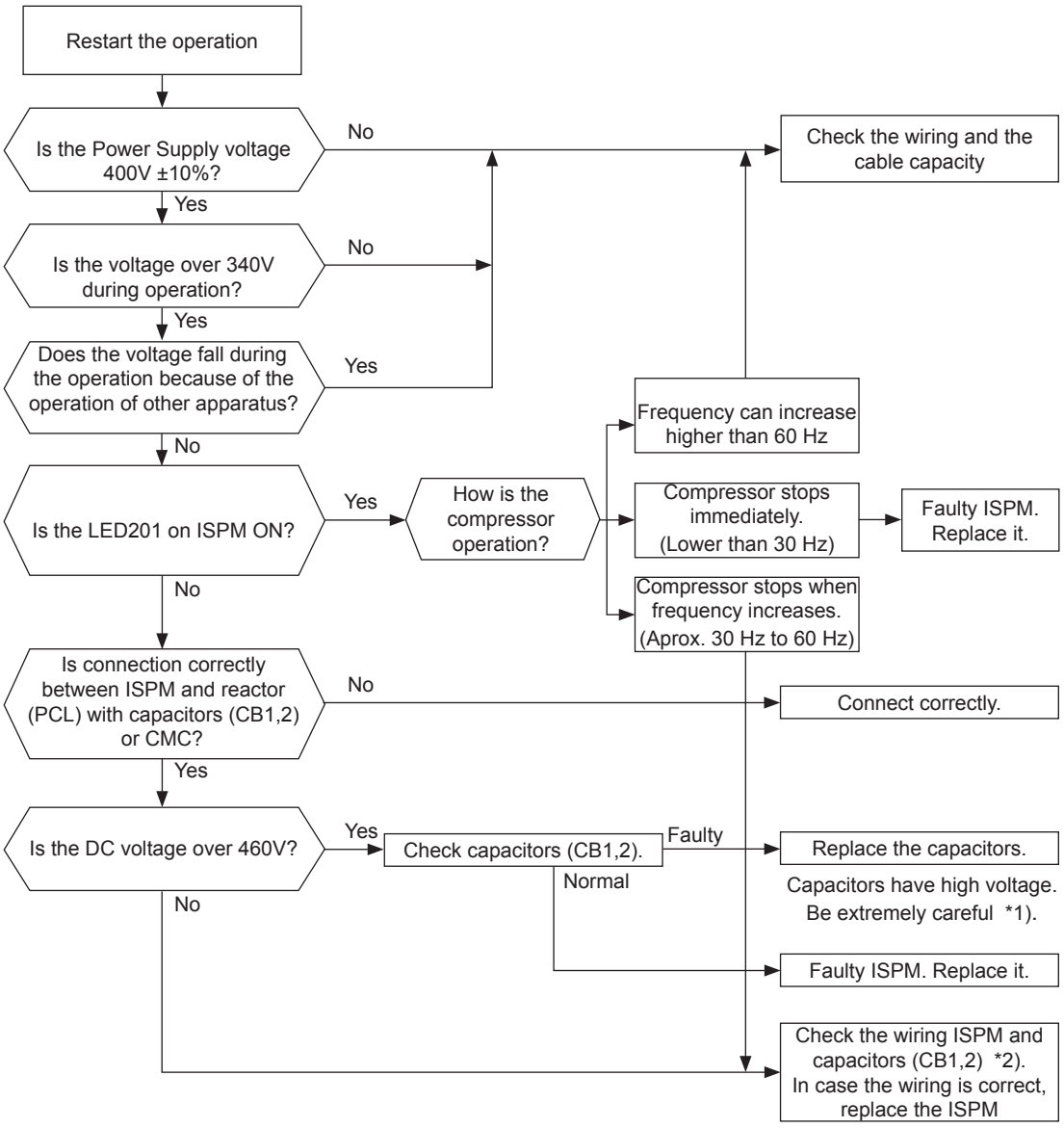
Alarm code	151	Excessively low voltage or excessively high voltage for the inverter of RWH-(4-6)FSNFE

- 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 voltage between terminal “R” and “S” of ISPM is insufficient.

Retry code: P-18

⚠ CAUTION

Electrical hazard. Risk of electrical shock. Be extremely carefull because of the high voltage.



*1) If the capacitor has a high voltage, perform the high-voltage discharge pocedure. Refer to section “RWH-(4-6)FSNFE: Procedure for checking other main parts”.

*2) Checking procedures of the diode module are displayed in item “RWH-(4-6)FSNFE: Procedure for checking other main parts”.

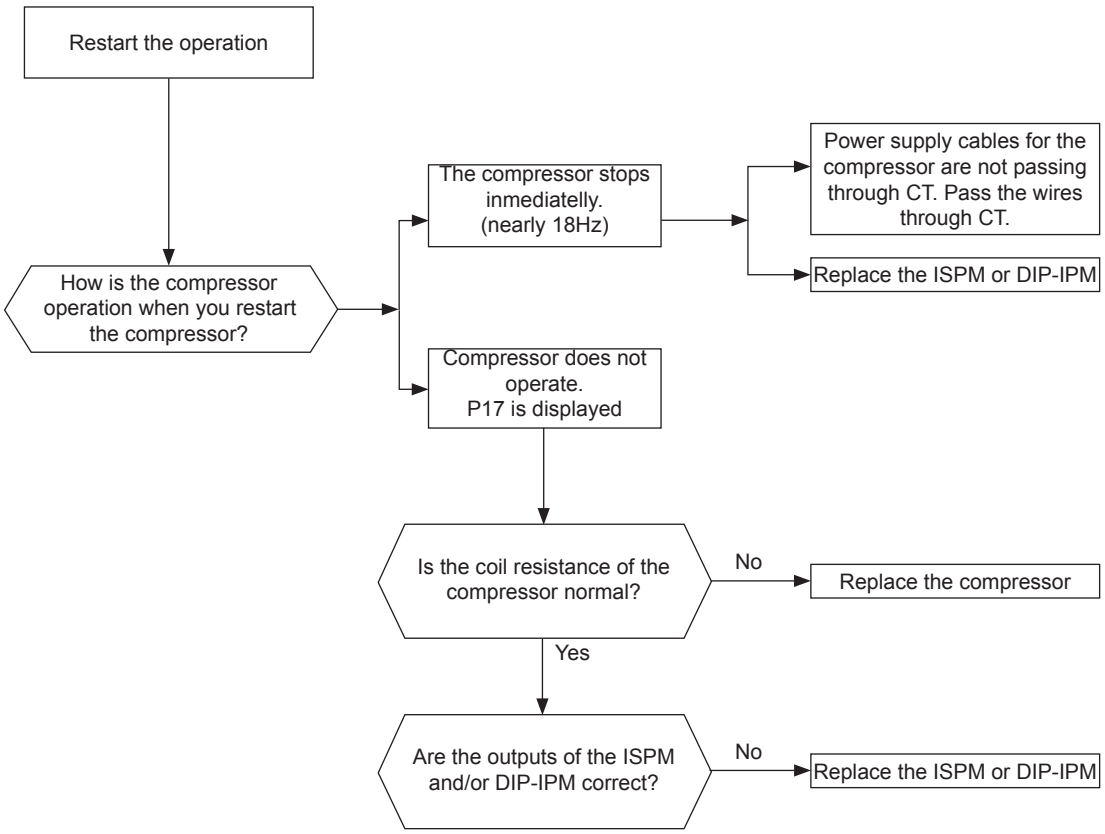
Alarm code	152	Failure of the current sensor for “Inverter” (0 A detection)

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- The compressor stops and restarts automatically in 3 minutes.
- The alarm appears after 3 retries during 30 minutes.
  - This alarm code is displayed when the frequency of the compressor is maintained at 15~18 Hz after the compressor is started, one of the absolute values of the running current at each phase U+, U-, V+ and V- is less than 1.5A (including 1.5A).

Retry code: P-17

⚠ *CAUTION*

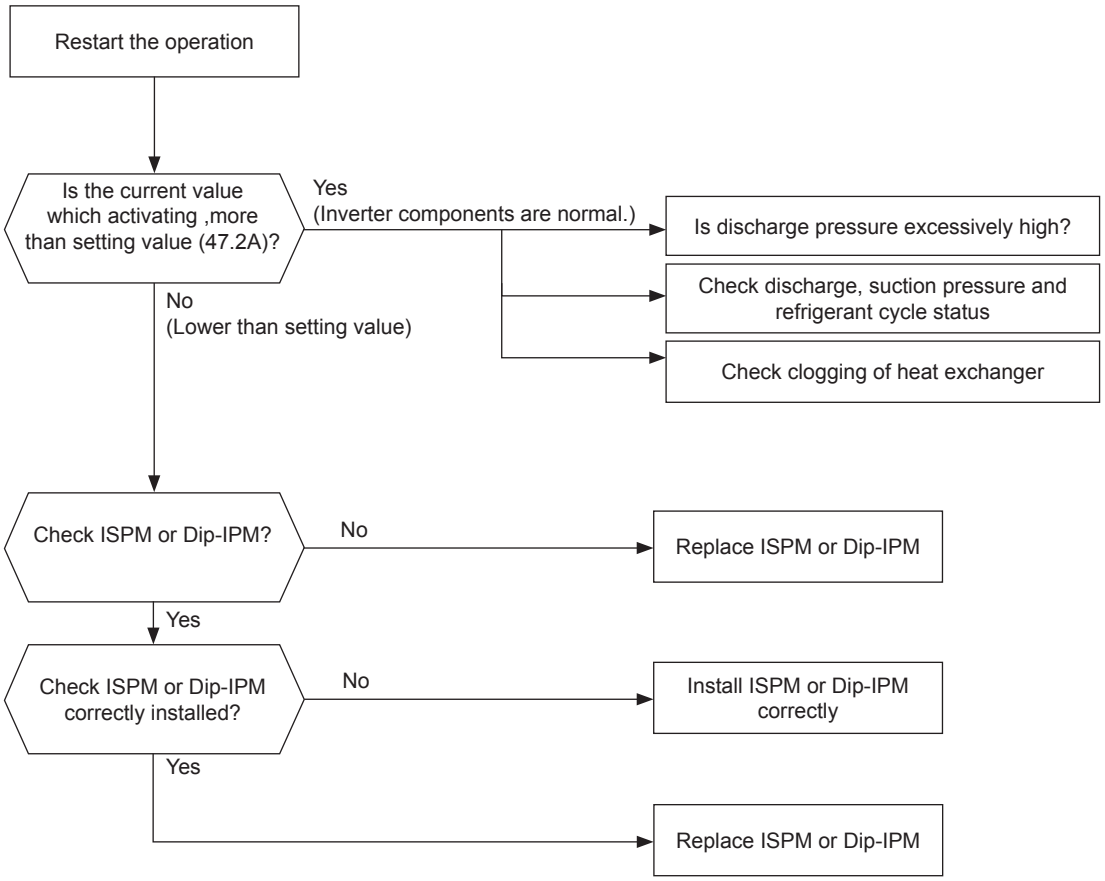
Electrical hazard. Risk of electrical shock. Before checking and replacing the inverter parts perform the high voltage discharge procedure by referring to section “Checking procedure of other main parts”.



Alarm code	153	Activation of protection for inverter instantaneous over current (1)

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- The compressor stops and restarts automatically in 3 minutes.
- The alarm appears after 6 retries during 30 minutes.
  - This alarm code is displayed when the compressor current is higher than the set value. Totally 3 minutes during 10 minutes.

Retry code: P-17



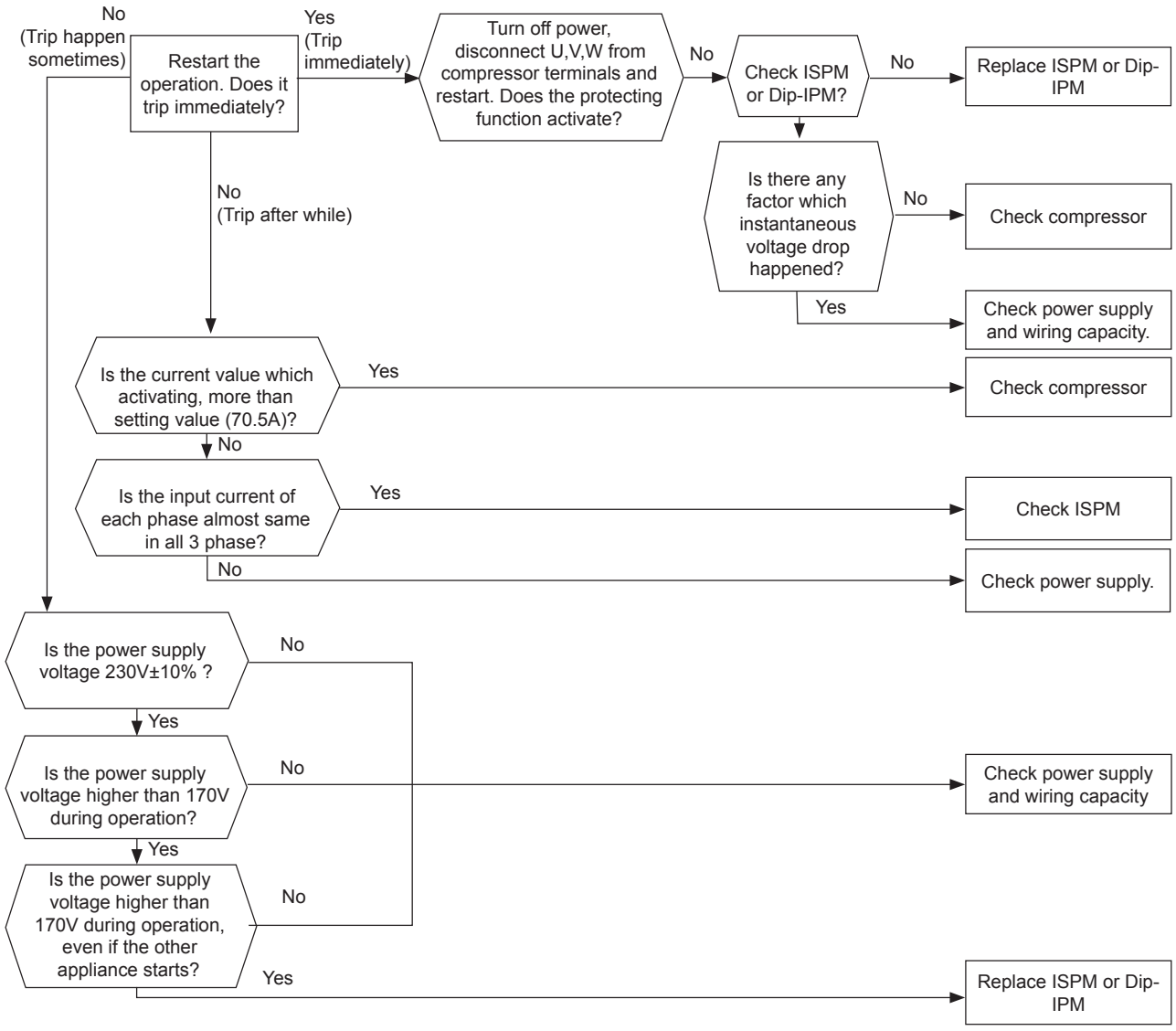
⚠ CAUTION

Electrical hazard. Risk of electrical shock. Before checking and replacing the inverter parts perform the high voltage discharge procedure by referring to section "Checking procedure for main parts".

Alarm code	153	Activation of protection for inverter instantaneous over current (2)

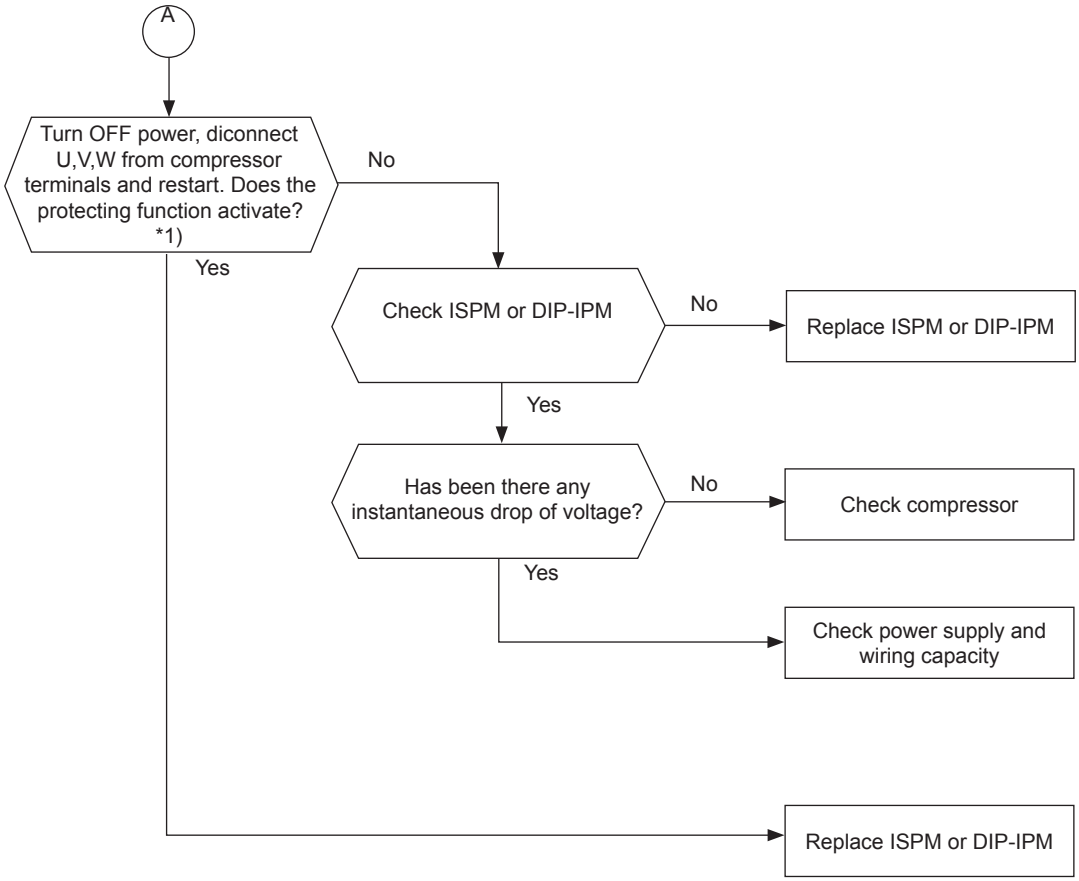
- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- The compressor stops and restarts automatically in 3 minutes.
- The alarm appears after 6 retries during 30 minutes.
  - This alarm code is displayed when the compressor current is higher than the set value.

Retry code: P-17



⚠ CAUTION

Electrical hazard. Risk of electrical shock. Before checking and replacing the inverter parts perform the high voltage discharge procedure by referring to section "Checking procedure for main parts".



*1): Turn ON the No.1 switch of the DIP switch on ISPM when restarting with disconnecting the terminals of the compressor. After troubleshooting, turn OFF the No.1 switch of the DIP switch on ISPM.

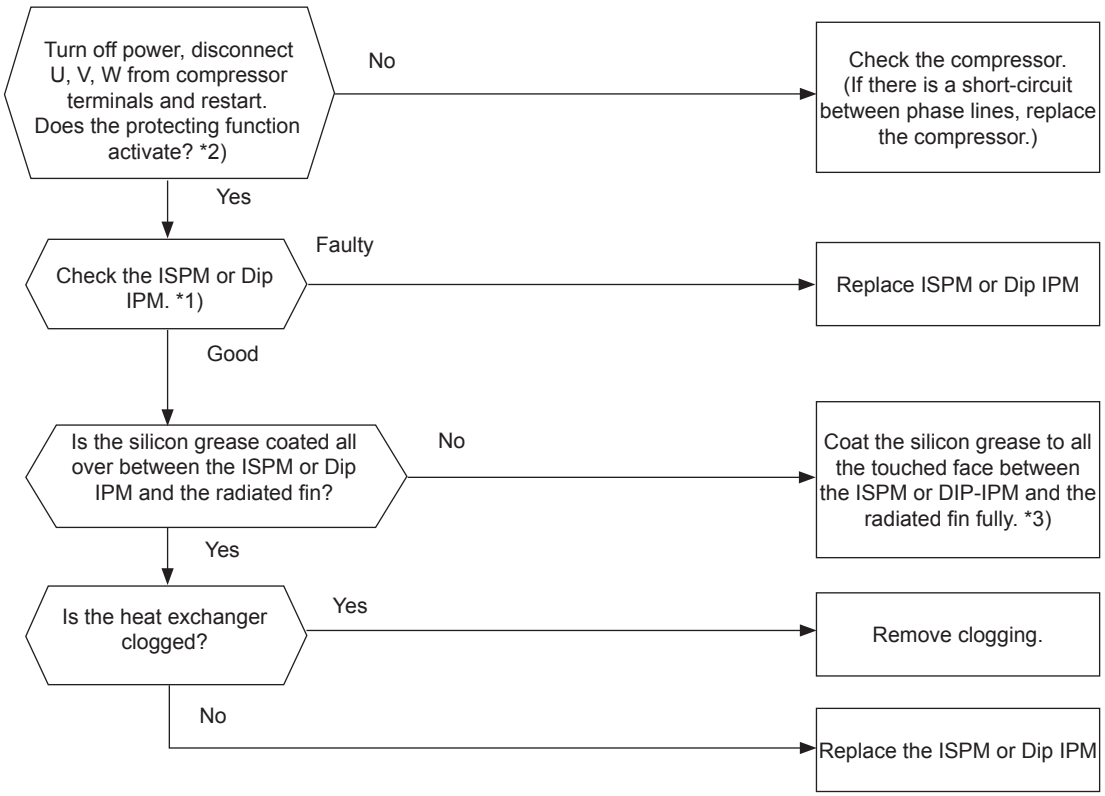
Alarm code	154	Transistor module protection activation

- 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 is indicated when the transistor module detect the abnormality 3 times in 30 minutes including 3. Retry operation is performed up to the occurrence of 2 times. (The compressor restarts automatically in 3 min.)

Conditions:

- Abnormal current to the transistor module such as
  - Short circuited or grounded or
  - Abnormal temperature of the IPM or Dip IPM and PCB4 or
  - Control voltage decrease

Retry code: P-17



*1) Perform the high voltage discharge work by referring to the section “Checking procedure for other main parts”. before checking and replacing the inverter components.

*2) Turn ON the No.1 switch of the dip switch DSW1 on Inverter PCB when restarting with disconnecting the terminals of the compressor. After troubleshooting, turn OFF the No.1 switch of the dip switch DSW1 on Inverter PCB.

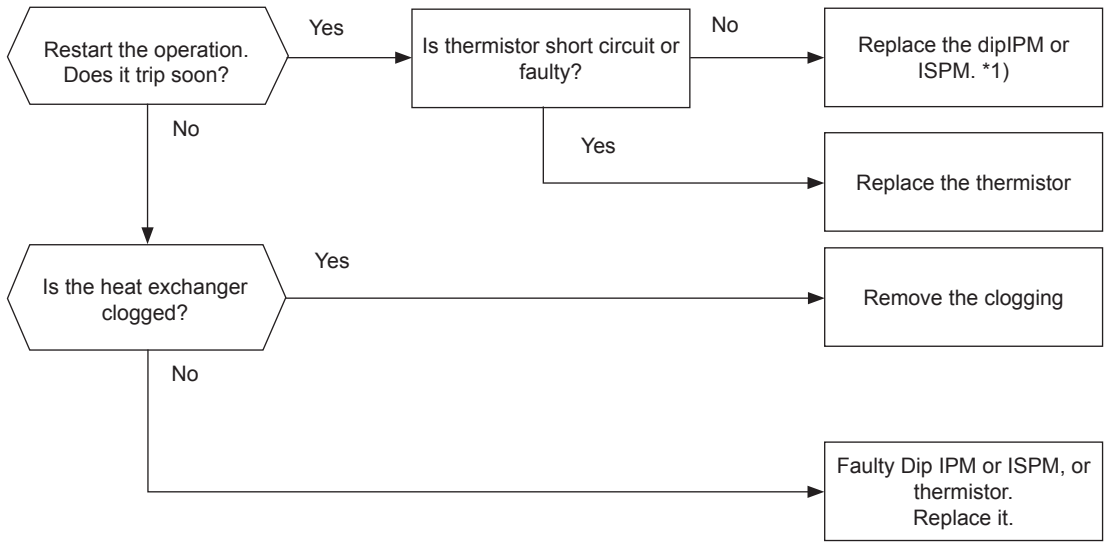
NOTE

When alarm code “53” is indicated, the fan motor (DC motor) ensure that DC fan motor is checked according to the section “Fault diagnosis of DC fan motor”.

Alarm code	155	Increase in inverter fin temperature

- The alarm code is displayed on the LCD User interface.
- The alarm code is displayed on the seven segments of the indoor unit PCB.
- The compressor stops when the temperature of the thermistor for inverter fin excess 100ºC, and restarts automatically in 3 minuntes.
- The alarm appears after 3 retries during 30 minutes.

Retry code: P-17



1*) Perform the high voltage discharge work by referring to the section “Checking procedure for other main parts” before checking and replacing the inverter components.

12.4 Troubleshooting in check mode

12.4.1 Check mode display

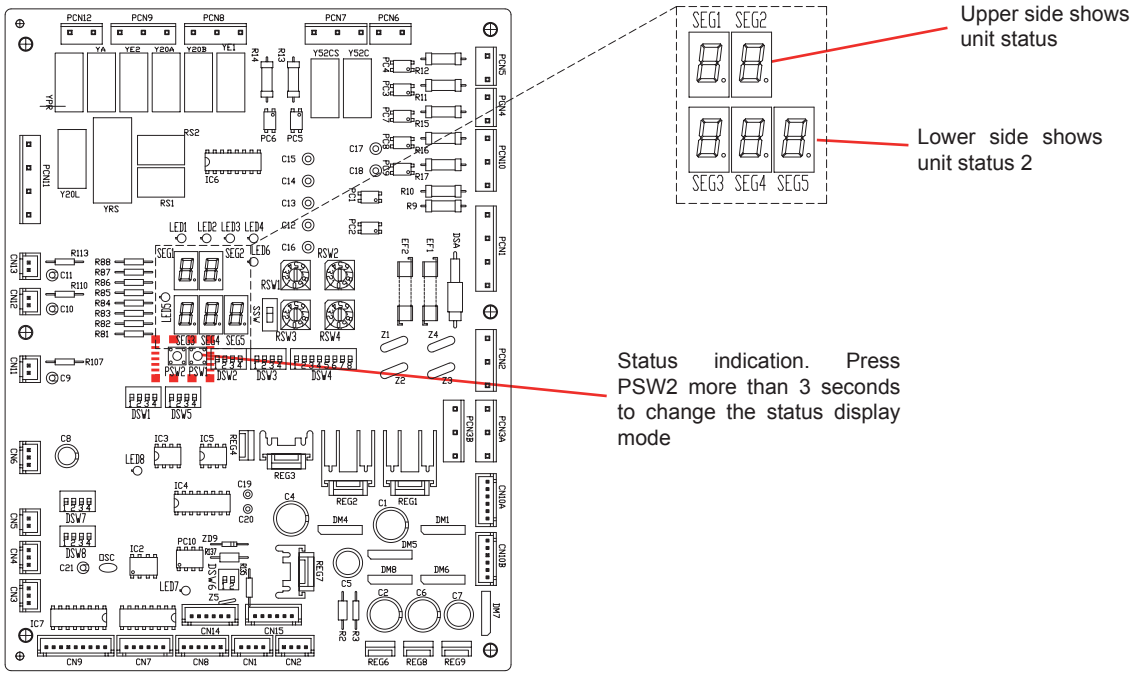
◆ Check mode by LCD controller

Refer to chapter *LCD user's interface.*

12.4.2 Troubleshooting using the 7 segment display (indoor unit)

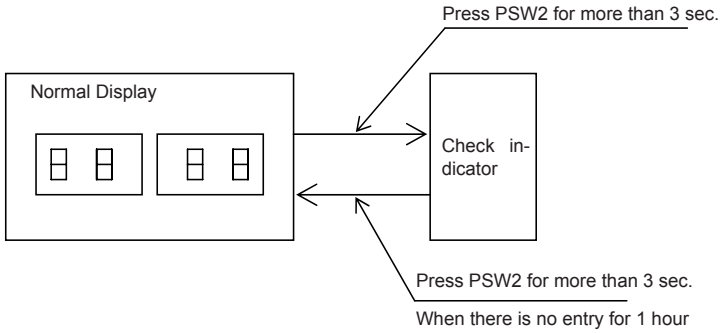
◆ Check indicator function (PCB1&3)

Below is the 7segment position in PCB1&3:



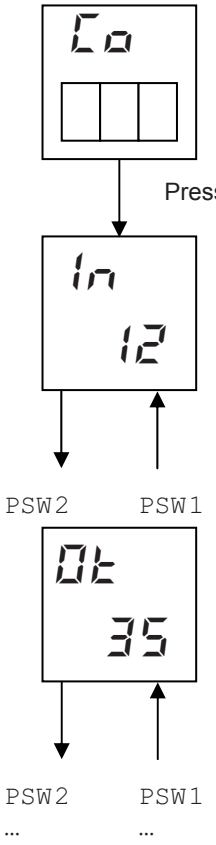
Operating conditions may be checked by 7-segment and push switches (PSW) on the PCB1&3 in the indoor unit. During checking data, do not touch the electric parts except for the indicated switches because 220-240V is applied to them. Pay attention not to contact the tools with electrical parts. If contacted, electrical parts will be damaged.

Change to check indicator mode to display different items.



This is he procedure to follow to check with the combination of checking switches (▲: PSW2 ▼: PSW1):

- 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 PSW1 switch.
- To cancel this checking, press the PSW2 switch for more than 3 seconds.



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.

Cold water inlet temperature

<Example of 12ºC

Cold water outlet temperature

<Example of 35ºC

◆ Check mode items PCB1

Code Display	Data display	Description
oF hE hS SP AL	St oF on bo 888	Normal operation explained in *5. Control System*
tH	888	Heat water Temperature Setting (ºC)
tC	888	Cold Water Temperature Setting (ºC) (Not available)
in	888	Water Inlet Temperature (THM_{WI}) (ºC)
ot	888	Water outlet Temperature (THM_{WO}) (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)
oS	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 (2 hours) (ºC)
t1.	888	Second Outdoor Unit Average Ambient Temperature (2 hours) (ºC)
tG	888	Gas Temperature (THM_G) (ºC)
tL	888	Liquid Temperature (THM_L) (ºC)
td	888	Compressor top Temperature (THM9) (ºC)
tS	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 Code (Hp x 8)

Indoor & Outdoor Unit Capacity Code

Capacity	Code
4HP	32
5HP	40
6HP	48

◆ Check mode items PCB3

Code Display	Data display	Description
tH	888	Heat water Temperature Setting (ºC)
in	888	Water Inlet Temperature (THM_{WI}) (ºC)
ot	888	Water outlet Temperature (THM_{WO}) (ºC)
tA	888	Inverter EBOX Ambient Temperature (THM_{INV}) (ºC)
td	888	R134a Discharge Gas Temperature (THM_{D}) (ºC)
tP	888	R134a Liquid RefrigerantTemperature (THM_{EC}) (ºC)
tH	888	R134a Evaporating Temperature (THM_{EH}) (ºC)
tS	888	R134a Suction Temperature (THM_{S}) (ºC)
tL	888	R410A Liquid Temperature (THM_{L}) (ºC)
Eo	888	R134a Expansion valve opening (%)
CF	888	R134a Compressor frequency (Hz)
no.	888	ROM Nº
Cd.	JEP	Model idenification: RWH-4.0FSVNFE
	JbP	Model idenification: RWH-4.0FSNFE
	bEP	Model idenification: RWH-5.0FSVNFE
	bbP	Model idenification: RWH-5.0FSNFE
	LEP	Model idenification: RWH-6.0FSVNFE
	LbP	Model idenification: RWH-6.0FSNFE
oP.	888	Option selection status

12.4.3 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
↓	

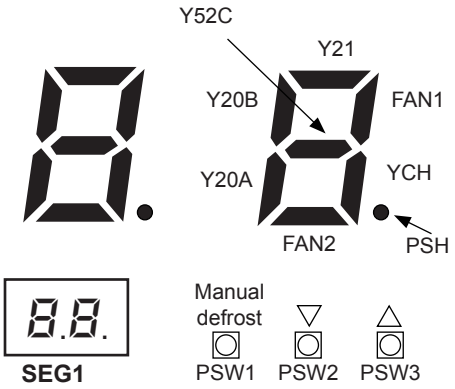
Outdoor unit, circuit board, PCB1

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
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)

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

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 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
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.

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 ~ b3	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

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
P	1	High-pressure ratio control at heating operation
P	2	High-pressure increase protection
P	3	Over current protection
P	4	IPM fin temperature increase protection
P	5	Discharge gas temperature increase protection
P	6	Frost formation protection
P	9	Unbalance power source detecting
P	A	Current demand control
P	b	Low-pressure decrease protection
P	C	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
P	7	Inverter retry
P	8	

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 pump down 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

12.5 Checking procedure for main parts

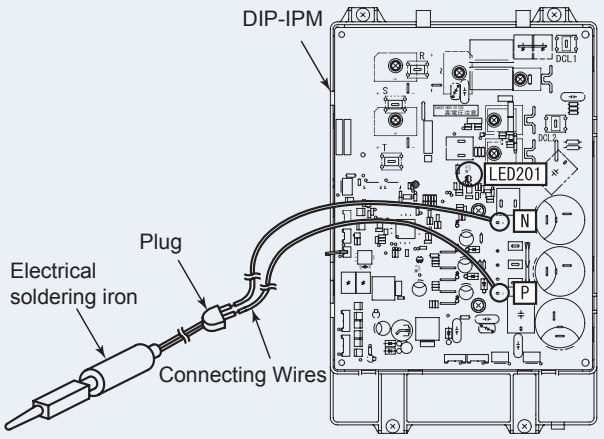
12.5.1 Procedure for checking the DIP-IPM inverter for indoor and outdoor units

High voltage discharge is an imperative work for replacing parts.

⚠ CAUTION

Electrical hazard. Risk of electrical shock. Perform this high voltage discharge work to avoid an electric shock.

1. Turn OFF the main switches and wait for three minutes. Make sure 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.
2. Connect connecting wires to an electrical soldering iron
3. Connect the wires to terminals, P and N on DIP-IPM. => Discharging is started, resulting in hot soldering iron. Pay attention not to short-circuit between terminal P(+) and N(-)
4. Wait for 2 or 3 minutes and measure the voltage once again. Check to ensure that no voltage is charged.

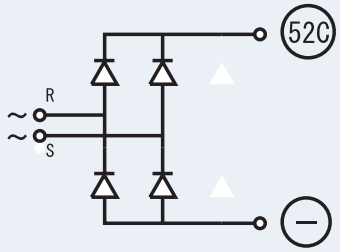


◆ Inverter module checking procedure

Internal circuit of rectified part of DIP-IPM

Non-faulty if [1] – [8] are checked and satisfied.

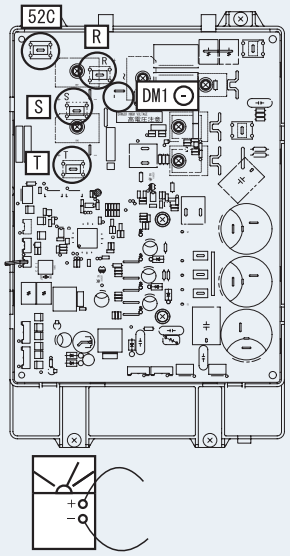
Measure with 1 kΩ range of a tester.



NOTE

DO NOT use a digital tester.

1. Touch [+] of the tester to DIP-IPM 52C terminal, and [-] to DIP-IPM R, S terminals to measure the resistance. Normal if all three terminals have 1 kΩ or greater.
2. Contrary to [1], touch [-] of the tester to DIP-IPM 52C terminal, and [+] to DIP-IPM R, S terminals to measure the resistance. Normal if all three terminals have 100 kΩ or greater.
3. Touch [-] of the tester to [-] of DIP-IPM DMI (soldered part), and [+] of the tester to DIP-IPM R, S terminals to measure the resistance. Normal if all three terminals have 1 kΩ or greater
4. Contrary to [3], touch [+] of the tester to [-] of DIP-IPM DMI, and [-] of the tester to DIP-IPM R, S terminals to measure the resistance. Normal if all three terminals have 100 kΩ or greater.

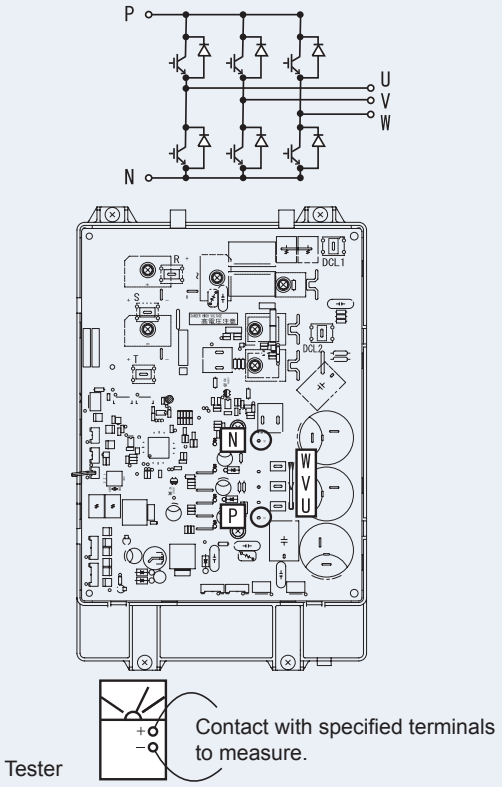


5 Touch [+] of the tester to [P] of DIP-IPM (soldered part), and [-] to DIP-IPM U, V, W terminals to measure the resistance. Normal if all three terminals have 1 kΩ or greater.

6 Contrary to [5], touch [-] of the tester to [P] of DIP-IPM (soldered part), and [+] to DIP-IPM U, V, W terminals to measure the resistance. Normal if all three terminals have 30 kΩ or greater. (Resistance gradually increases during measurement.)

7 Touch [-] of the tester to [N] of ISPM (soldered part), and [+] to ISPM U, V, W terminals to measure the resistance. Normal if all three terminals have 1 kΩ or greater.

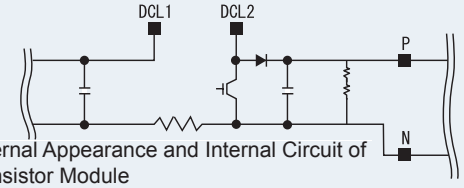
8 Contrary to [7], touch [+] of the tester to [N] ofDIP-IPM (soldered part), and [-] to DIP-IPM U, V, W terminals to measure the resistance. Normal if all three terminals have 30 kΩ or greater. (Resistance gradually increases during measurement.)



Internal circuit of ACT part of inverter module

Non-faulty if [9] – [13] are checked and satisfied.

(Measure with 1 kΩ range of a tester.)



External Appearance and Internal Circuit of Transistor Module

NOTE

DO NOT use a digital tester.

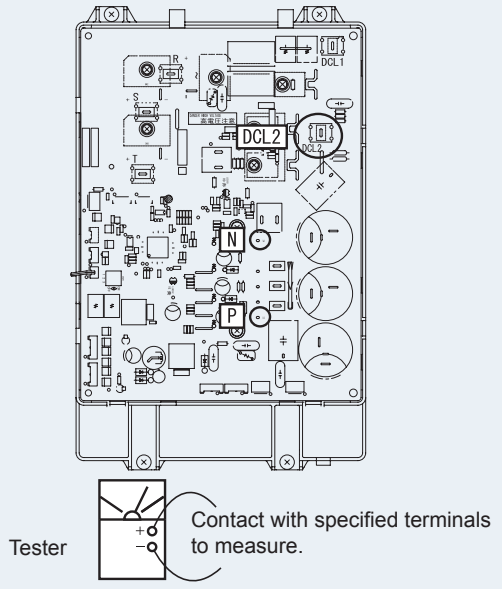
9 Check items [1] – [8].

10 Touch [+] of the tester to DIP-IPM DCL2 terminal, and [-] to [P] of ISPM/DIP-IPM (soldered part) to measure the resistance. Normal if all three terminals have 100 kΩ or greater

11 Contrary to [10], touch [-] of the tester to DIP-IPM DCL2 terminal, and [+] to [P] of DIP-IPM (soldered part) to measure the resistance. Normal if all three terminals have 1 kΩ or greater.

12 Touch [+] of the tester to DIP-IPM DCL2 terminal, and [-] to [N] of DIP-IPM (soldered part) to measure the resistance. Normal if all three terminals have 100 kΩ or greater.

13 Contrary to [12], touch [-] of the tester to DIP-IPM DCL2 terminal, and [+] to [N] of DIP-IPM (soldered part) to measure the resistance. Normal if all three terminals have 10 kΩ or greater. (Resistance gradually increases during measurement.)



12.5.2 Procedure for checking the ISPM inverter for indoor and outdoor units

High voltage discharge is an imperative work for replacing parts.

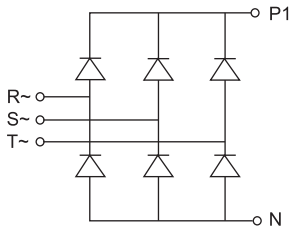
⚠ CAUTION

Electrical hazard. Risk of electrical shock. Perform this high voltage discharge work to avoid an electric shock.

Remove all the terminals of the ISPM before check.

If next items are performed and the results are satisfactory, ISPM is normal. Measure it under 1 kΩ range of a tester.

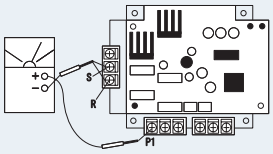
Rectification parts of internal circuit of ISPM (common)



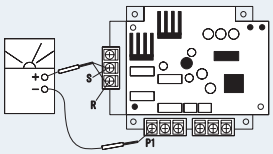
NOTE

DO NOT use a digital tester.

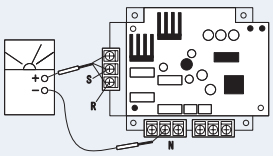
1 By touching the + side of the tester to the P1 terminal of ISPM and the - side of the tester to R and S of ISPM, measure the resistance. If all the resistances are more than 1 kΩ, it is normal.



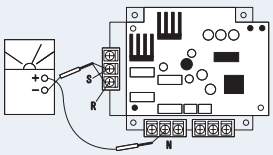
2 By touching the - side of the tester to the P1 terminal of ISPM and the + side of the tester to R and S of ISPM, measure the resistance. If all the resistances are more than 100 kΩ, it is normal.



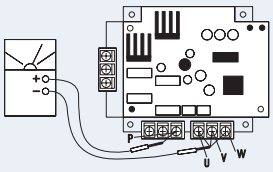
3 By touching the - side of the tester to the N terminal of ISPM and the + side of the tester to R and S of ISPM, measure the resistance. If all the resistances are more than 1 kΩ, it is normal.



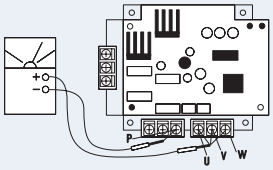
4 By touching the + side of the tester to the N terminal of ISPM and the - side of the tester to R and S of ISPM, measure the resistance. If all the resistances are more than 100 kΩ, it is normal.



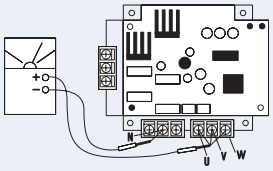
5 By touching the + side of the tester to the P terminal of ISPM and the - side of the tester to U, V and W of ISPM, measure the resistance. If all the resistances are more than 1 kΩ, it is normal.



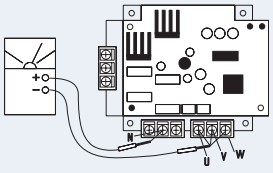
6 By touching the - side of the tester to the P terminal of ISPM and the + side of the tester to U, V and W of ISPM, measure the resistance. If all the resistances are more than 100 kΩ, it is normal.



7 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.



8 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.

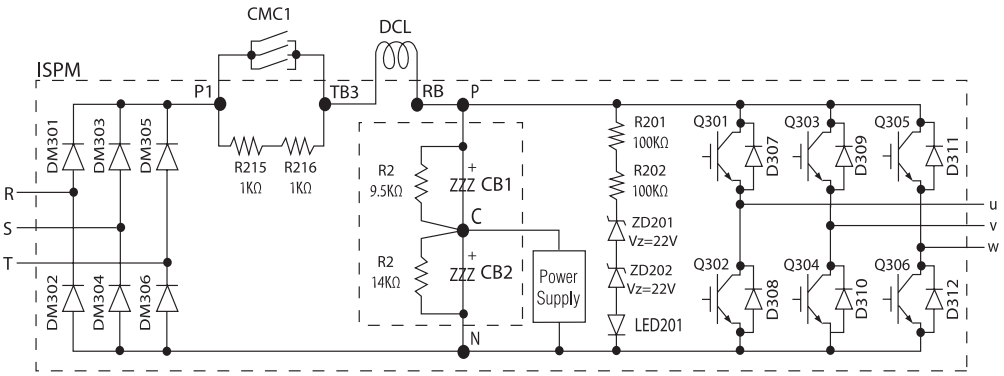


◆ Procedure using a digital tester

NOTE

The digital tester must be able to check semiconductors and continuity.

Based on the following scheme of ISPM with the contactor, the reactor, capacitors and the resistance, follow the next procedures.



Checking the diode module

1 By placing a jumper from +P1 to -RST or -N to +RST, no continuity and no variation on voltage drop should appear.
2 By placing a jumper from P1 to +RST or +N to RST: continuity and variation on voltage drop (nearly 0,365) should be displayed, and the same value in all cases. Not the same value means that the diode module is damaged.

Checking the transistor module

1 By bonding +P to -UVW or -N to +UVW, no continuity and no variation on voltage drop should appear.
2 By bonding -P to +UVW or +N to -UVW: continuity and variation on voltage drop (nearly 0,405) should be displayed, and the same value in all cases. Not the same value means that the diode module is damaged.

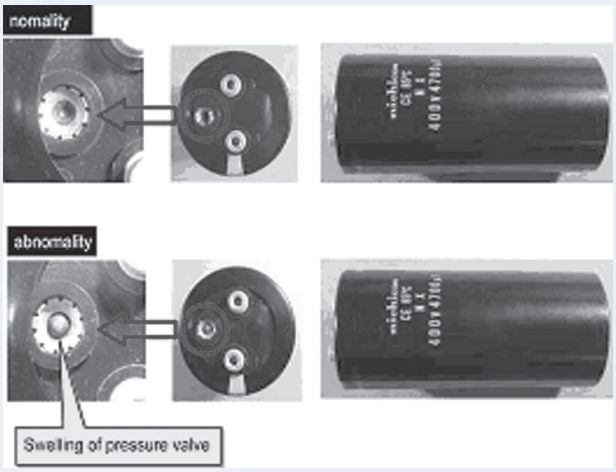
12.5.3 Checking capacitors CB1 & CB2.

DANGER:

- ***Electrical hazard. Risk of serious injuries or death.***
- ***Before installing the electrical wiring or before performing a periodical check, turn OFF the main switch of the unit. For safety reasons, be sure that the fan is stopped.***
- ***Prevent from touching the capacitors' terminals. High voltage should be present before discharging them.***
- ***Turn off the unit and wait for the LED 201 to be off before touching the components.***

If it's possible, check the capacitance of each capacitor : 4700µF ± 20% (between 3760µF to 5640µF).

A visual check of the pressure valve of capacitors must be done to ensure it's integrity



NOTE

It is not recommended to check tension.

PN = Power source x √2, PC=CN is nearly equal to PN/2.

R1 & R2:

1 If the value is different:
   - Capacitor could be damaged by overload.
   - 04 alarm could be displayed if low supply voltage (CN) for ISPM control part is present.

2 R1 = 9.5Ω & R2 = 14.0Ω. If these values are different, the capacitors will be not properly charged.

Resistance between P1 & TB3 = 2kΩ (white resistance in the ISPM).

In case that Mg. SW 52C (CMC1) is not ON, the compressor current will travel through these resistances, and they will be broken. Mg. SW 52C (CMC1) should be checked. Check the resistance between the primary and secondary terminal where the contact point is melted for Mg. SW 42C. If there is continuity, the contact is melted and 52C is broken (NG).

Reactor resistance can be messured between TB3 and RB = 0,2Ω. Checking this component is not necessary.

NOTE

- ***Noise filter does not affect ISPM directly, so is not necessary to check it when ISPM fails.***
- ***Both digital or analog testers are valid to check the values.***

12.5.4 Fault diagnosis of DC fan motor.

When ISPM/DIP-IPM is faulty and Alarm 53 appears, the fan motor may also be damaged. To prevent ISPM/DIP-IPM damage which may result from operation combined with a faulty fan motor, check also if the fan motor is not damaged when ISPM/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-(4-6)H(V)RNME-AF	2 Pieces

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:

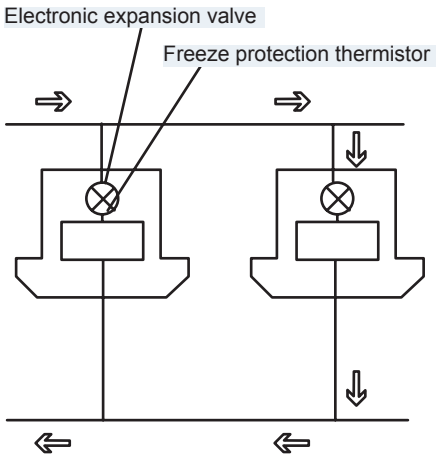
Measurement procedure	
1	Remove the fan motor connector from the control PCB, ISPM or DIP-IPM.
2	Connect the black test lead of the tester to the black wire pin of the fan motor connector.
3	Connect the red test lead to the wire connector pin to be checked.
Results	
Normal	Observed values will be close 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-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-(5/6)HVRNME-AF (upper)	SIC-68FV-D851-7	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 ∞.

12.5.5 Checking procedure for the electronic expansion valve for indoor and outdoor units

	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 pump down process.
Locked with slightly open **Locked with fully 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 pump down process.	It is abnormal if the liquid pipe pressure does not increase and the outlet temperature of the expansion valve decreases after the pump down process starts. 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.



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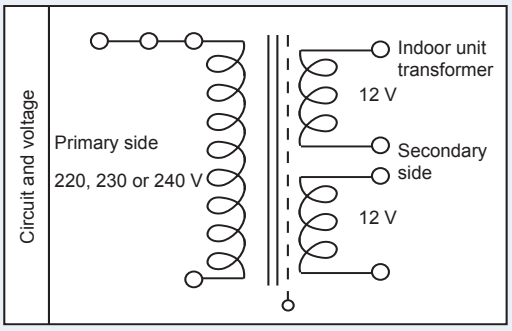
13. Maintenance notes

Index

13.1 General notes

13.1.1 Checking the power source and the wiring connection

Check the following items in the case of abnormal operation:

No.	Check item	Procedure
1	Is the breaker of the fuse cut out?	Check the secondary voltage of the breaker and the fuse by means of a tester.
2	Is the secondary power source on the transformer correct?	Disconnect the secondary side of the transformer and check the voltage by means of a tester. 
3	Is the wiring loosened or incorrectly connected?	Check the wiring connection on the PCB. • Thermistor connectors • Connector of the transformer • Connector of the LCD cable • Each connector in a high-voltage circuit Check the connectors according to the **electrical wiring** diagram.

13.1.2 Burnt-out compressor due to an insufficient refrigerant charge

Question and answer for the field work

Example 1 (Indoor unit R-410A compressor): Burnt-out compressor due to an insufficient refrigerant charge	
Phenomenon	After commissioning the alarm code “08” sometimes occurred and the compressors were burnt out after operating for two months.
Cause	The refrigerant piping work was performed during the summer season. The additional refrigerant was not sufficiently charged from the discharge gas side. This insufficient refrigerant charge resulted in the overheating of the discharge gas and the oil deterioration which was finally due to the separated operation despite the alarm code “08”.
Countermeasure	**1** The compressor was replaced with a new compressor. **2** The correct refrigerant amount was charged according to the refrigerant piping length.
Remarks	Additional refrigerant charge: Open the liquid stop valves slightly when you charge the additional refrigerant from the check joint of the liquid stop valves (the discharge gas side) during the cooling process. If the liquid stop valve is fully open it is difficult to charge the additional refrigerant. Do not charge the refrigerant from the gas stop valve.

Example 2 (Indoor unit R-134a compressor): Burnt-out compressor due to an insufficient refrigerant charge	
Phenomenon	After commissioning the alarm code “106” sometimes occurred and the compressors were burnt out after operating for two months.
Cause	The insufficient refrigerant charge resulted in the overheating of the discharge gas and the oil deterioration which was finally due to the separated operation despite the alarm code “106”.
Countermeasure	**1** The compressor was replaced with a new compressor. **2** The correct refrigerant amount was charged according to the refrigerant piping length.
Remarks	Additional refrigerant charge: Charge the additional refrigerant from the check joints very slowly. If the refrigerant cylinder valve is fully open it is difficult to charge the additional refrigerant. Use the correct check joints to charge refrigerant.

13.2 Maintenance work

CAUTION

- ***All inspections and checks of the outdoor unit, indoor unit and DHW tank have to be carried out by a licensed technician and never by the user itself.***
- ***Before any inspection and check the unit main power supply has to be switched OFF.***
- ***Wait minimum 10 minutes or more from all power supply have been turned OFF.***
- ***Take care with the crankcase heater. It could operate even when compressor is OFF.***
- ***Take care with the electrical box components. Some of them could remain hot after switch OFF the unit.***

NOTE

All these maintenance operations must be done with appropriate materials and following this manual.

13.2.1 Outdoor unit

1 Fan and fan motor
- Lubrication: All the fan motors are pre-lubricated and sealed at the factory. Therefore no lubrication maintenance is required.
- Sound and vibration: Check for abnormal sounds and vibrations.
- Rotation: Check the clockwise rotation and the rotating speed.
- Insulation: Check the electrical insulation resistance.

2 Heat exchanger
- Clog: Inspect the heat exchanger at regular intervals and remove any accumulated dirt and any accumulated dust from the heat exchanger. You should also remove other obstacles such as the growing grass and the pieces of paper which might restrict the airflow.

3 Refrigerant piping connection
- Leakage: Check for the refrigerant leakage at the piping connection between the outdoor and the indoor unit.
- Pressure: Check the R-410A refrigerant pressure using the check joints of the outdoor unit. Refer to the chapter *Piping work and refrigerant charge* for more information about the check joints.

4 Cabinet
- Stain: Check for any stain and remove it cleaning if it is the case.
- Fixing screw: Check for any loosened screw or any lost screw. Fix the loosened screws and the lost screws.
- Insulation material: Check for any peeled thermal insulator on the cabinet. Repair the thermal insulator.

5 Electrical equipment
- Activation: Check for an abnormal activation of the magnetic contactor, the auxiliary relay, the PCB and others.
- Line condition: Pay attention to the working voltage, the working amperage and the working phase balance. Check for any faulty contact that is caused by the loosened terminal connections, the oxidized contacts, the foreign matter and other items. Check the electrical insulation resistance.

6 Control device and protection device
- Setting: Do not readjust the setting in the field unless the setting is maintained at a point that is different from the point listed in the Installation and operation manual.

7 R410A compressor
- Sound and vibration: Check for abnormal sounds and vibrations.
- Activation: Check that the voltage drop of the power supply line is within 15% at the start and within 2% during the operation.

8 Reverse valve
- Activation: Check for any abnormal activation sound.

9 Strainer
- Clog: Check that there is no temperature difference between both ends.

10 Ground wire
- Ground line: Check for the continuity to earth.

11 Oil heater (Crankcase heater of the R-410A compressor)

- Activation: You should activate the oil heater at least twelve hours before the start-up by turning ON the main switch.

◆ Refrigerant charge and vacuum procedure or pump down of refrigerant

NOTE

Refer to the section Refrigerant circuit on the chapter Piping work and refrigerant charge for the detailed information.

13.2.2 Indoor unit

◆ General procedure

To ensure good operation and reliability of the indoor unit its main parts and field wiring have to be checked periodically.

The following checks have to be done by qualified technicians at least once a year:

1 Cabinet

- Stain: Check for any stain and remove it cleaning if it is the case.
- Fixing screw: Check for any loosened screw or any lost screw. Fix the loosened screws and the lost screws.
- Insulation material: Check for any peeled thermal insulator on the indoor part of the covers. Repair the thermal insulator.

2 Water piping connection

- Leakage: Check that there are no water leakages in the main water circuit and through the piping connection between the indoor unit, the space heating and the heating coil. Check all the joints, connections and circuit elements.

  NOTE

  - ***Pay special attention to the water pipe connections placed over the electrical box.***
  - ***If it is detected leakage and the water pipe needs to be replaced, remember to replace the gasket.***

3 Water pressure:

- Pressure checking: Check the water pressure using the indoor unit manometer or the LCD manometer (in case of existing tank) and the water pressure ports placed beside the indoor unit manometer.
- Water pressure switch: Check continuity in water pressure switch (when water pump is ON).

4 Water strainer:

- Cleaning: Unscrew the water strainer and replace or clean the mesh if needed.

  NOTE

  Pay special attention to the gasket. It is recommended to replace it by a new one once a while.

5 Air grille filter:

- Cleaning: Check if there is accumulated dirt in the air grille filter at the base of the indoor unit. If so, clean or replace it with a new one because otherwise the inverter fan could suck dirt and this will cause a malfunction. In this case, check also the inverter fans surface and clean the accumulated dirt if it is produced.

6 Safety valve:

- Operation: Check the correct operation of the indoor unit safety valve (pressure relief valve) on the space heating circuit. Open it manually and some water should be expelled by its connected drain pipe and will be driven to the base hole.

7 Air purger:

- Excessive air: Check the correct operation of the indoor unit air purger. There may be air in the water circuit, which needs to be expelled by this air purger.

8 Water flow switch:

- Water flow: Check that this element is indicating correctly if there is circulating a minimum water flow on the space heating circuit, checking the continuity in the water flow switch (when water pump is ON).

9 Water pump:

- Pump performance curves: Check in the 3 possible pump speeds (High, medium, low) that there is provided a correct water flow and pressure in accordance with the Pump performance curves.
- Electrical connection: Check the correct connection of the electrical wiring of the water pump. If it is detected moisture in the the pump surface, revise the water pipe connections of the 3-way valve. A water leakage could have been occurred.

10 Fixing points tightening:

- Check the fixing points of the indoor unit. Check the indoor unit mounting foots. The indoor unit has to be always in a vertical position.

11 Refrigerant piping connection

- Leakage: Check for the refrigerant leakage at the refrigerant piping connections. Check with detail the flare nut connection of the indoor unit refrigerant lines with the refrigerant piping supplied accessory.
- Pressure: Check the R-134a refrigerant pressure using the check joints of the indoor unit. Refer to the chapter *Piping work and refrigerant charge* for more information about the check joints.

12 Electrical equipment

- Activation: Check for an abnormal activation of the magnetic contactor, the relay, the PCBs and others.
- Line condition: Pay attention to the working voltage, the working amperage and the working phase balance. Check for any faulty contact that is caused by the loosened terminal connections, the oxidized contacts, the foreign matter and other items. Check the electrical insulation resistance.

13 Control device and protection device

- Setting: Do not readjust the setting in the field unless the setting is maintained at a point that is different from the point listed in the section

14 R134a compressor

- Sound and vibration: Check for abnormal sounds and vibrations.
- Activation: Check that the voltage drop of the power supply line is within 15% at the start and within 2% during the operation.

15 Ground wire

- Ground line: Check for the continuity to earth.

16 Oil heater (Crankcase heater of the R-134a compressor)

- Activation: You should activate the oil heater at least twelve hours before the start-up by turning ON the main switch.

◆ Descaling

Water quality and set temperature can affect the scale production and it can deposit on the heat exchangers surface of the indoor unit restricting the heat exchange and the good operation of the unit.

NOTE

Descaling should be necessary periodically at certain intervals depending on the supplied water quality.

Check the scale level when proceeding maintenance to ensure reliability of the unit.

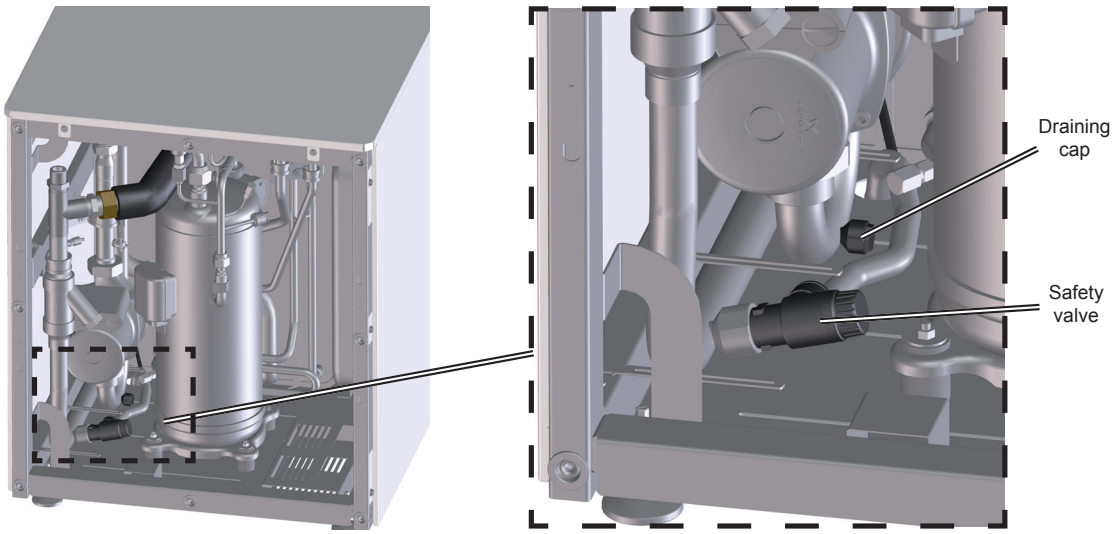
If necessary, proceed with descaling:

1 Switch OFF the main power supply of the indoor unit.
2 Empty the indoor unit water circuit by fully opening the drain valve.
3 Proceed with descaling of the heat exchangers.
4 Ensure that the water quality remains compliant with the EU council directive 98/83 EC.

◆ Draining

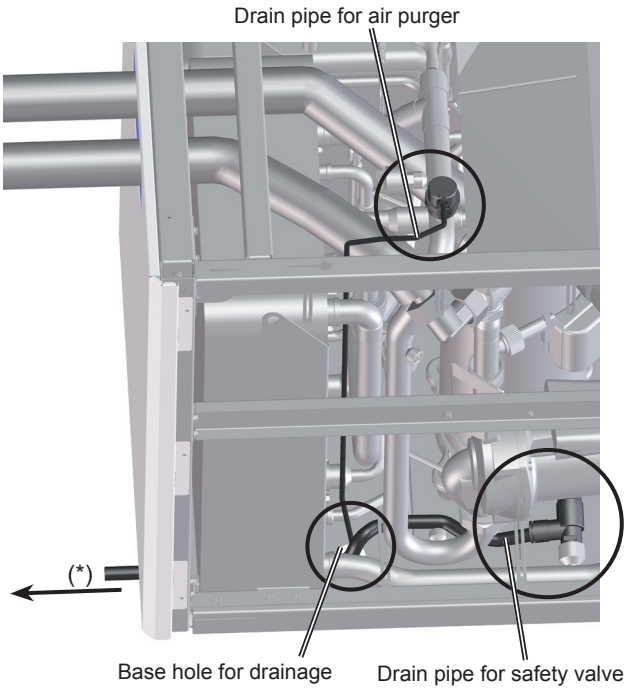
To drain the indoor unit follow the next procedure:

1. Switch OFF the main power supply of the indoor unit.
2. Close the 2 shut-off valves (field supplied) installed at the space heating pipes (Water inlet and outlet connections).
3. Open the safety valve of the indoor unit manually. The water will be expelled by its connected drain pipe and will be driven to the base hole.
4. There will be a part of the water contained into the indoor unit which may not be expelled through the safety valve. Open the cap placed in the lower part of the water pump piping in order to expel it.
5. Once all the water has been drained, close both safety valve and cap.



⚠ CAUTION

(*): Check that drain pipe for safety valve is correctly connected and placed as far as possible from the indoor unit.



13.2.3 DHW Tank

◆ General procedure

To ensure good operation and reliability of the DHW tank its main parts and field wiring have to be checked periodically.

The following checks have to be done by qualified technicians at least once a year:

1 Cabinet
- Stain: Check for any stain and remove it cleaning if it is the case.
- Fixing screw: Check for any loosened screw or any lost screw. Fix the loosened screws and the lost screws.
- Insulation material: Check for any peeled thermal insulator on the indoor part of the covers. Repair the thermal insulator.

2 Water piping connection
- Leakage: Check that there are no water leakages in the following water piping connections. Check all the joints, connections and circuit elements:
  - Heating coil pipes
  - DHW pipes
  - Flexible water pipes kit (ATW-FWP-01) (Only in case of tank beside the indoor unit)

  NOTE
  - ***Pay special attention to the water pipe connections placed over the electrical box (in case of tank integrated over the indoor unit).***
  - ***If it is detected leakage and the water pipe needs to be replaced, remember to replace the gasket.***

3 DHW flow and pressure:
- DHW flow: Check that the water circulation is correct along all the DHW circuit.
- DHW pressure: Check there is no loss of pressure and ensure that DHW pressure is not higher than 6 bars.

4 Security water valve (DHWT-SWG-01 accessory):
- Operation: Check the correct operation of the security water valve (pressure and temperature relief valve) at the DHW inlet connection of the tank. Remember that this element must ensure that the following functions are provided (Pressure protection, non-return function, shut-off valve, filling and draining).

5 Fixing points tightening:
- Tank integrated over the indoor unit:
  - Check that the 4 bolts (factory supplied) between the indoor unit and the tank (2 screws at the left side and the other 2 at the right side) are correctly screwed. If it are loosened, fix it.
  - Check that the wall fixing accessory (factory supplied) is correctly fixed between tank and the wall.
  - Check that the tank is totally vertical. Check the set mounting foot if it is needed.
- Tank beside the indoor unit:
  - Check that the wall fixing accessory (factory supplied) is correctly fixed between tank and the wall.
  - Check that the tank is totally vertical. Check the tank mounting foot if it is needed.

6 Electrical equipment
- Activation: Check for an abnormal activation of the electric heater.
- Line condition: Pay attention to the working voltage, the working amperage and the working phase balance. Check for any faulty contact that is caused by the loosened terminal connections, the oxidized contacts, the foreign matter and other items. Check the electrical insulation resistance.

7 Ground wire
- Ground line: Check for the continuity to earth for the electrical wiring of the electric heater of the tank.

◆ Descaling

Water quality and set temperature can affect the scale production and it can deposit on the heating coil surface of the DHW tank restricting the heat exchange and the good operation of the unit.

NOTE

Descaling should be necessary periodically at certain intervals depending on the supplied water quality.

Check the scale level when proceeding maintenance to ensure reliability of the unit.

If necessary, proceed with descaling:

1 Switch OFF the main power supply of the DHW tank. Switch OFF the main power supply of the indoor unit.
2 Empty the DHW tank of water closing the inlet main water supply valve and fully opening the outlet valves.
3 Proceed with descaling of the heating coil.
4 Ensure that the water quality remains compliant with the EU council directive 98/83 EC.

◆ Draining

Heating coil circuit

- **Tank over the indoor unit**

Follow the same procedure explained in the Draining point of the previous section *Indoor unit*.

- **Tank beside the indoor unit**

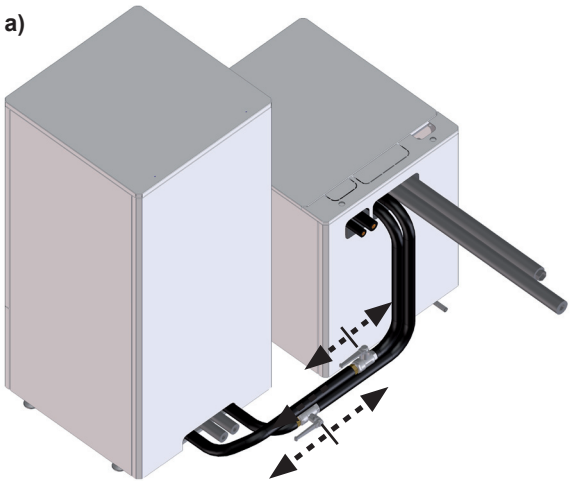
  - To drain the tank's heating coil water

  1 Switch OFF the main power supply of the indoor unit.
  2 Close the recommended 2 shut-off valves (field supplied) installed between the heating coil pipes (connected to the tank) and the flexible water pipes of the kit ATW-FWP-01 (connected to the indoor unit safety valve and T-branch).
  3 Disconnect the 2 heating coil pipes (connected to the tank) from the shut-off valves (field supplied) to expel the water contained into the heating coil of the tank.

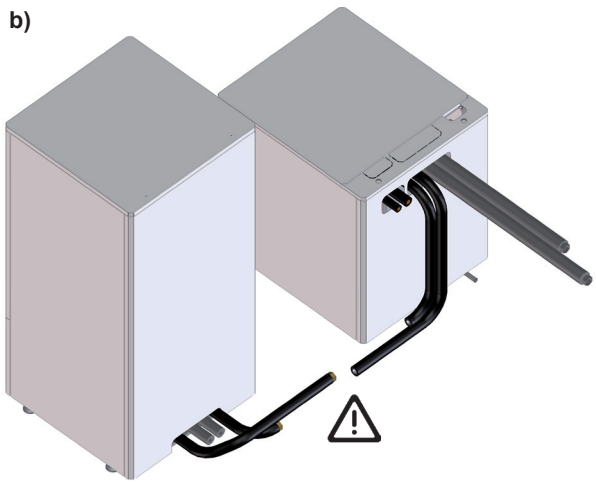
  - To drain the indoor unit water

    Follow the same procedure explained in the Draining point of the previous section *Indoor unit*, and finally, disconnect the 2 flexible water pipes of the kit ATW-FWP-01 (connected to the indoor unit safety valve and T-branch) from the shut-off valves (field supplied) to expel the remaining water in these pipes.

a)



b)



CAUTION

- ***Take care when draining the water of the tank's heating coil and the remaining water of the kit ATW-FWP-01 (connected to the indoor unit safety valve and T-branch). Perform the draining work as far as possible to the indoor unit.***
- ***The expelled water could be hot and could keep in pressure. Take care with this draining.***

DHW circuit

1 Switch OFF the main power supply of the indoor unit.
2 Close the main DHW inlet valve (shut-off valve of the security water valve accessory DHWT-SWG-01) in order to avoid the tank filling.
3 Close the shut-off valve of the DHW outlet.
4 Open manually the drain valve of the security water valve accessory DHWT-SWG-01. The water of the tank will expelled by this drain valve.
5 When the water begins to drain more slowly, disconnect the DHW outlet pipe from the shut-off valve. By this way, the air enters to the tank and helps to the draining process.
6 Continue with the draining process until the tank has been fully emptied of water.

⚠ CAUTION

- ***Check that water flows free through the discharge pipe of the security water valve accessory (pressure relief valve) (DHWT-SWG-01).***
- ***When disconnecting the DHW outlet pipe from the shut-off valve, the expelled water could be hot and could keep in pressure. Take care with this draining and perform this work as far as possible to the tank.***

13.3 Service and maintenance record

13.3.1 Outdoor unit

No.	Check item	Action	Judgement	
1	Is the service area sufficient?	—	Yes	No
2	Is there a short circuit of the discharged air?	—	Yes	No
3	Any heat influence?	—	Yes	No
4	Is the ground wire connected?	—	Yes	No
5	Refrigerant piping.	—	Good	Not Good
6	Fixing the unit.	—	Good	Not Good
7	Is there any damage on the outer surface or the internal surface?	—	Yes	No
8	Checking the screw and the bolts.	Tighten if loosened.	Tightened	Not Tightened
9	Tightening the terminal screws.	Tighten all the terminal screws with a Phillips screwdriver.	Tightened	Not Tightened
10	Are the compressor terminals tightly fixed?	Push all the terminals.	Pushed	Not Pushed
11	Insulation resistance.	Measure the insulation resistance with an insulation resistance meter. Comp. and fan. motor: greater than 3MΩ. Others: greater than 3MΩ.	Good	Not Good
12	Does the drain water flow smoothly?	Check the smooth flow by pouring some water.	Good	Not Good
13	Check for a leakage in the compressor.	Check for any leakage.	Good	Not Good
14	Check for a leakage in the heat exchanger.	ditto	Good	Not Good
16	Check for a leakage in the 4-way valve.	ditto	Good	Not Good
17	Check for a leakage in the check valve.	ditto	Good	No Good
18	Check for a leakage in the accumulator.	ditto	Good	Not Good
19	Check for a leakage in the strainer.	ditto	Good	Not Good
20	Check for a leakage in the electronic expansion valve	ditto	Good	Not Good
21	Check for a leakage in the piping.	ditto	Good	Not Good
22	Check the direction of the fans.	By viewing the airflow volume.	Good	Not Good
23	Voltage among each phase.	Higher than AC220V.	Good	Not Good
24	Vibration and sound.	Check the fan the compressor the piping and others.	Good	Not Good
25	Activation of each operation mode.	Check the activation of the HEAT switch, the STOP switch and the TEMP switch.	Good	Not Good
26	High-pressure cut-out switch.	Check the actual activation value.	Good	Not Good
27	Check the activation of the drain-up mechanism.	Check the activation during the cooling process.	Good	Not Good
28	Air inlet temperature of the outdoor unit DB/WB.	—	(°C)DB	(°C)WB
29	Air outlet temperature of the outdoor unit DB/WB.	—	(°C)DB	(°C)WB
30	High-pressure switch.	—	kg/cm^2G	
31	Low-pressure switch.	—	kg/cm^2G	
32	Operating voltage.	—	V	
33	Operating current.	—	A	
34	Instructions to the client for cleaning the air filter.	—	Done	Not yet
35	Instructions to the client about the cleaning method.	—	Done	Not yet
36	Instructions to the client about the operation.	—	Done	Not yet

13.3.2 Indoor unit

No.	Check item	Action	Judgement	
1	Is the service area sufficient?	—	Yes	No
2	Any heat influence?	—	Yes	No
3	Is the ground wire connected?	—	Yes	No
4	Refrigerant piping.	—	Good	Not Good
5	Water piping.	—	Good	Not Good
6	Fixing the unit.	—	Good	Not Good
7	Is there any damage on the outer surface or the internal surface?	—	Yes	No
8	Checking the screw and the bolts.	Tighten if loosened.	Tightened	Not Tightened
9	Tightening the terminal screws.	Tighten all the terminal screws with a Phillips screwdriver.	Tightened	Not Tightened
10	Are the compressor terminals tightly fixed?	Push all the terminals.	Pushed	Not Pushed
11	Insulation resistance.	Measure the insulation resistance with an insulation resistance meter. Comp. and fan. motor: greater than 3MΩ. Others: greater than 3MΩ.	Good	Not Good
12	Does the drain water flow smoothly?	Check the smooth flow by pouring some water.	Good	Not Good
13	Check for a leakage in the compressor.	Check for any leakage.	Good	Not Good
14	Check for a leakage in the heat exchangers.	ditto	Good	Not Good
15	Check for a leakage in the solenoid valves.	ditto	Good	Not Good
16	Check for a leakage in the check valve.	ditto	Good	No Good
17	Check for a leakage in the strainers.	ditto	Good	Not Good
18	Check for a leakage in the electronic expansion valve	ditto	Good	Not Good
19	Check for a leakage in the piping.	ditto	Good	Not Good
20	Check for a leakage in the water 3-way valve.	ditto	Good	Not Good
21	Check for a leakage in the water safety valve.	ditto	Good	Not Good
22	Check for a leakage in the water pump.	ditto	Good	Not Good
23	Voltage among each phase.	Higher than AC220V.	Good	Not Good
24	Vibration and sound.	Check the fan the compressor the piping and others.	Good	Not Good
25	Activation of each operation mode.	Check the activation of the HEAT switch, the STOP switch and the TEMP switch.	Good	Not Good
26	Refrigerant High-pressure cut-out switch.	Check the actual activation value.	Good	Not Good
27	Water High-pressure cut-out switch.	Check the actual activation value.	Good	Not Good
28	Water flow switch.	Check the actual activation value.	Good	Not Good
29	Water manometer.	Check the correct value indication.	Good	Not Good
30	Check the activation of the air purger.	Check by increasing the pressure.	Good	Not Good
31	Check the 3-way valve mechanism.	Check the correct work.	Good	Not Good
32	Check the activation of the drain-up mechanism through the safety valve.	Check the activation during work.	Good	Not Good
33	Water inlet temperature of the indoor unit.	—	(°C)DB	(°C)WB
34	Water outlet temperature of the indoor unit.	—	(°C)DB	(°C)WB
35	Refrigerant High-pressure switch.	—	kg/cm^2G	
36	Water pressure switch.	—	kg/cm^2G	
37	Operating voltage.	—	V	
38	Operating current.	—	A	
39	Instructions to the client about the cleaning method.	—	Done	Not yet
40	Instructions to the client about the operation.	—	Done	Not yet

13.3.3 DHW Tank

No.	Check item	Action	Judgement	
1	Is the service area sufficient?	—	Yes	No
2	Any heat influence?	—	Yes	No
3	Is the ground wire connected?	—	Yes	No
4	Water piping.	—	Good	Not Good
5	Fixing the unit.	—	Good	Not Good
6	Is there any damage on the outer surface or the internal surface?	—	Yes	No
7	Checking the screw and the bolts.	Tighten if loosened.	Tightened	Not Tightened
11	Does the drain water from the security valve flow smoothly?	Check the smooth flow by pouring some water.	Good	Not Good
13	Check for a leakage in the heating coil.	Check for any leakage.	Good	Not Good
15	Check for a leakage in the check valve of the optional recirculation.	ditto	Good	No Good
18	Check for a leakage in the hoses.	ditto	Good	Not Good
19	Check for a leakage in the water pump	ditto	Good	Not Good
22	Vibration and sound.	Check the fan the compressor the piping and others.	Good	Not Good
27	Water manometer.	Check the correct value indication.	Good	Not Good
30	Check the activation of the drain-up mechanism through the security valve.	Check the activation during work.	Good	Not Good
31	Water inlet temperature of the heating coil.	—	(°C)DB	(°C)WB
32	Water outlet temperature of the heating coil.	—	(°C)DB	(°C)WB
35	Operating voltage.	—	V	
36	Operating current.	—	A	
37	Instructions to the client about the cleaning method.	—	Done	Not yet
38	Instructions to the client about the operation.	—	Done	Not yet

13.4 Service and maintenance record using the 7-segment display

13.4.1 Outdoor unit

Customer's name:_____				Date:_____	
Outdoor unit model (serial No.)		**RAS-**			
1. Operation mode					
2. Test run start time					
3. Data collect start time					
4. Read out data from 7-segment in outdoor unit					
4.1 Protection control code					
4.2 Total capacity of connected I.U. *	CP				
4.3 Input/output state of outdoor micro-computer	SC	52C	FAN1	FAN2	20A
	AC				
	H1	20F	21	CH	PSH
	H2				
4.4 Alarm code for abnormal stoppage of compressor	Fo				
4.5 Inverter order frequency to compressor	Eo				
4.6 Indoor order frequency to compressor	Fd				
4.7 Air flow ratio	FE				
4.8 O.U. expansion valve opening	Fo				
4.9 Temp. at the top of compressor	oF				
4.10 Evaporating temp. at heating	FF				
4.11 Ambient air temp.	A1				
4.12 Cause of stoppage at inverter	A2				
4.13 Control information	nA				
4.14 Control information	EA				
4.15 Inverter secondary current	LA				
4.16 O.U. address	nA				
4.17 I.U. expansion valve opening	EA				
4.18 Liquid pipe temp. of I.U. (Freeze protection)	LA				
4.19 Cause of I.U. stoppage	dA				

NOTE

- ***O.U.: Outdoor Unit.***
- ***I.U.: Indoor unit.***
- ***FAN1 FAN2: Constant speed fan.***
- ***52C: CMC.***
- ***PSH: High pressure switch.***
- ***20A: Solenoid valve (SVA).***
- ***20F: Solenoid valve (SFV).***
- ***21: Reversing valve (RVR).***
- ***CH: Oil heater.***
- ****: Multiply 1/8 by the code on the 7-segment.***

13.4.2 Indoor unit

Customer's name:_____			Date:_____
Indoor unit model (serial No.)			RWH-
1	**Operation mode**		
2	**Test run start time**		
3	**Data collect start time**		
4	**Read out data from 7-segment in PCB1**		
4.1	Protection control code		
4.2	Heat water Temperature Setting (ºC)	tH	
4.3	Cold Water Temperature Setting (ºC) (Not available)	tC	
4.4	Water Inlet Temperature (THM_{WI}) (ºC)	in	
4.5	Water outlet Temperature (THM_{WO}) (ºC)	ot	
4.6	Water outlet Temperature Circuit 2 (THM_{WO2}) (ºC)	o2	
4.7	Water outlet Temperature Boiler (THM_{WO3})	ob	
4.8	Water outlet Temperature DHW (THM_{DHW}) (ºC)	oh	
4.9	Swimming pool Temperature (THM_{SWP}) (ºC)	oS	
4.10	Outdoor Unit Ambient Temperature (THM7) (ºC)	tA	
4.11	Second ambient Temperature (THM_{AMB2}) (ºC)	tA.	
4.12	Outdoor Unit Average Ambient Temperature (2 hours) (ºC)	t1	
4.13	Second Outdoor Unit Average Ambient Temperature (2 hours) (ºC)	t1.	
4.14	Gas Temperature (THM_G) (ºC)	tG	
4.15	Liquid Temperature (THM_L) (ºC)	tL	
4.16	Compressor top Temperature (THM9) (ºC)	td	
4.17	Evaporation gas Temperature (THM8) (ºC)	tS	
4.18	Defrosting	dF	
4.19	Cause of stoppage	d1	
4.20	Inverter Operation frequency (Hz)	h1	
4.21	Indoor Expansion valve opening (%)	E1	
4.22	Outdoor Expansion valve opening	Eo	
4.23	Compressor running current (A)	P1	
4.24	Digital inputs	d1	
4.25	Digital outputs	do	
4.26	Refrigerant Cycle Address	ou	
4.27	Indoor Unit Address	iu	
4.28	ROM Nº	no	
4.29	Capacity Code *	Cd	
4.30	Outdoor capacity Code *	Co	
5	**Read out data from 7-segment in PCB3**		
5.1	Protection control code		
5.2	Heat water Temperature Setting (ºC)	tH	
5.3	Water Inlet Temperature (THM_{WI}) (ºC)	In	
5.4	Water outlet Temperature (THM_{WO}) (ºC)	ot	
5.5	Inverter EBOX Ambient Temperature (THM_{INV}) (ºC)	tA	
5.6	R134a Discharge Gas Temperature (THM_D) (ºC)	td	

Customer's name:_____			Date:_____
Indoor unit model (serial No.)			RWH-
5.7	R134a Liquid RefrigerantTemperature (THM_{EC}) (ºC)	tP	
5.8	R134a Evaporating Temperature (THM_{EH}) (ºC)	tH	
5.9	R134a Suction Temperature (THM_{S}) (ºC)	tS	
5.10	R410A Liquid Temperature (THM_{L}) (ºC)	tL	
5.11	R134a Expansion valve opening (%)	Eo	
5.12	R134a Compressor frequency (Hz)	CF	
5.13	ROM Nº	no.	
5.14	Model idenification *	Cd.	
5.15	Option selection status	oP.	

NOTE

- ***O.U.: Outdoor Unit.***
- ***I.U.: Indoor unit.***
- ****: Multiply 1/8 by the code on the 7-segment.***

13.5 Service and maintenance record by LCD

Data sheet for checking by LCD

Customer's name:_____			**Date:**_____
I.U. serial No.			
I.U. No. / alarm code			
I.U. serial No.			
I.U. No. / alarm code			
REF	**Normal user**	**Description**	**State**
		Unit Status	
EVI	🔧	Indoor expansion valve opening (%)	
E2	🔧	Indoor expansion valve 2 opening (%)	
EO	🔧	Outdoor expansion valve opening (%)	
H4	🔧	Inverter operation frequency (Hz)	
H2	🔧	Inverter frequency Cy2 (Hz)	
DEF	🔧	Defrosting	
DI		Cause of stoppage C1	
D2		Cause of stoppage C2	
P1	🔧	Compressor 1 current (A)	
P2	🔧	Compressor 2 current (A)	
ROM1		PCB1 Firmware	
ROM2		PCB2 Firmware	
CD		Product spec code	
MVP		Mixing valve C2 position (%)	
Pd	🔧	Discharge pressure R134a (MPa)	
Ps	🔧	Suction pressure R134a (MPa)	
		Actual Temperature	
In		Water inlet temperature	
Out		Water outlet temperature	
Ob		Water outlet temperature Boiler/EH (3)	
OC2		Water outlet temperature C2 (5)	
OH		DH water temperature (6)	
OS		Swimming pool temperature (7)	
Ta		Outdoor ambient temperature	
Ta.		Second ambient temperature	
Ta2		Outdoor ambient average temperature	
Ta3		Second ambient average temperature	
TaSum		Summer Sw-Off average	
RT1		Room temperature C1 (8)	
RT2		Room temperature C2 (9)	
Td1	🔧	Discharge gas temperature (R410A)	
Td2	🔧	Discharge gas temperature (R134a)	
Tg1	🔧	Gas temperature (R410A)	
Tg2	🔧	Suction temperature (R134a)	
Tl1	🔧	Liquid temperature (R410A)	
Tl2	🔧	Liquid temperature (R134a)	
Ts	🔧	Evaporating gas temperature (R410A)	
Ts2	🔧	Evaporating gas temperature (R134a)	
		Set Point	
OTCS1		OTC Supply set point C1	
OTCS2		OTC Supply set point C2	
TC		Water temperature setting	
RTS1		Room temperature set point C1	
RTS2		Room temperature set point C2	
T_{DHWS}		DHW temperature set point	
T_{SWP}		SWP temperature set point	
		Alarm History	

🔧: Available only for installer.

13.6 Checking procedure for the outdoor and indoor compressors

13.6.1 Checking procedure for the outdoor compressor (410A refrigerant)

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 inverter 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 (MV) correctly connected?	Check to ensure that MV to CN5A is correctly connected		
8	Is exp. valve coil (MV) 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 heating operation		
12	Are the contacts for compressor magnetic switch CMC 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.		

13.6.2 Checking procedure for the indoor compressor (134a refrigerant)

Check list on compressor		
Client:_____	Model: _____	Date: _____
Serial No.: _____	Production date: _____	Checker: _____

No.	Check item	Check method	Result	Remarks
1	Is THMd correctly connected? THMd: 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 THMd		
2	Is thermistor THMd 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 inverter 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 (MV) correctly connected?	Check to ensure that MV to CN7A is correctly connected		
8	Is exp. valve coil (MV) 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 2nd cycle by operating one refrigerating cycle only from the indoor 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 heating operation		
12	Are the contacts for compressor magnetic switch CMC 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.		

13.6.3 Additional Information for “CHECK LIST ON COMPRESSOR” (R410A and R134a)

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 inverter. 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 heating operation, Td is controlled by MV. 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.
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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